



Analysis of the online choice experiment on fruit and vegetables determining the importance of nutritional and environmental benefits and the level of information

Deliverable No. 2.3

SUSFANS DELIVERABLES

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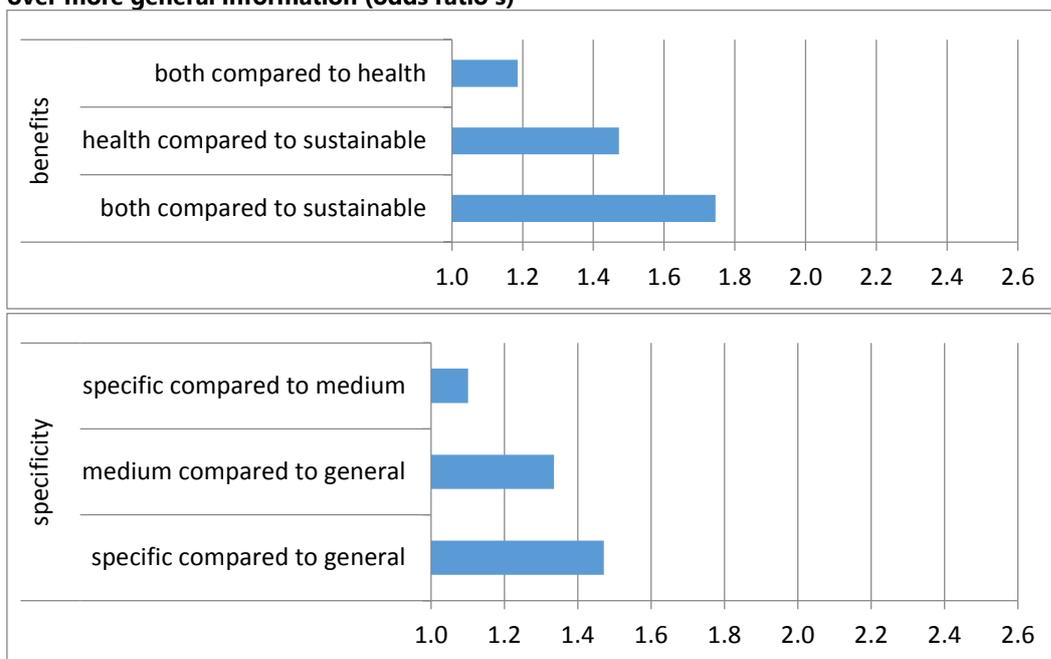
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Deliverable short summary for use in media

Title: Provide both health and sustainability information to consumers and do this is a specific rather than a general way

Consumer prefer combined information on health and sustainability benefits over only health or sustainability information. In addition, more specific information on health and sustainability is preferred over general information. This is the main outcome of Deliverable D2.3 in which results of an online choice experiment are described that was conducted in The Netherlands, France and Czech Republic. Consumers' sensitivity to product information on fruit and vegetable products was studied. More specifically, the effect of four different product attributes was studied, 1) communicating benefits in terms of health, sustainability or both, 2) the level of specificity of the information (specific, medium, general), 3) use and type of numeric information (percentage, grade, no number) and 4) price (low, medium, high). We found that price was an important driver of choice in the experiment and those differences exist across the included fruit and vegetables products, across countries and across demographic groups. But overall, results show that for all products, in all countries and for all consumers the preference for combined and more specific information was reported.

Figure. Consumer preference for information on health and sustainable benefits and for specific over more general information (odds ratio's)





Teaser for social media / Twitter

Consumers prefer *combined* health and sustainability information on fruit and vegetables products.

Evidence against general logo's? Consumers prefer more specific health and sustainability information in SUSFANS choice experiment.

ABSTRACT

Background. In this deliverable we investigate consumers’ sensitivity to product information on fruit and vegetable products. Fruit and vegetable consumption is associated with better health and prevention of diseases (Guillaumie et al., 2012) and more knowledge is needed on how product information on fruit and vegetable products influences consumer choices. This study contributes to the existing literature by studying the combination of health and sustainability information. In light of dual process theories (ELM; Petty & Cacioppo, 1986; HSM; Chaiken 1980) we took both message content and message characteristics into account.

Method. An online choice experiment was conducted in the Netherlands, France and the Czech Republic. Four product attributes systematically varied:

- 1) Information content (health benefits, sustainability benefits or both),
- 2) The level of specificity of the information (specific, medium, general),
- 3) Use and type of numeric information (percentage, grade, no number),
- 4) Price (low, medium, high).

Table. Experimental conditions

Content & framing

1. General

- | | |
|-----------------------|-------------------|
| - Sustainable product | - Healthy product |
|-----------------------|-------------------|

2. Medium

- | | |
|------------------------|----------------------|
| - People (social) | - Contains nutrients |
| - Profit (economic) | - Contains minerals |
| - Planet (environment) | - Contains vitamins |

3. Specific

- | | |
|------------------------------|----------------------|
| - Reduced CO2 emissions | - Contains vitamin C |
| - Ethical working conditions | - Contains potassium |
| - Fair trade | - Contains fibre |

Number

- 1. Percentage:* Meets 80% of the requirements for sustainable / healthy food
 - 2. Grade:* Scores 8 out of 10 on the requirements for sustainable / healthy food
 - 3. No number:* Meets most of the requirements for sustainable / healthy food
-

In total, 1483 respondents were recruited. The respondents were divided into four groups. Each group completed the choice experiment for a different product: fresh fruit, fresh vegetables, frozen fruit or frozen vegetables.

Results. Price had the largest effect on product choice in the choice experiment. A product with a lower price was chosen more often than a product with a higher price. Furthermore, a product with both sustainability and health information was chosen more often than a product with only sustainability or only health information. And health information had a larger effect on product choice than sustainability information. Results show that more specifically framed information had a larger effect on product choice than more general information. Finally, only the addition of a grade (thus not the addition of a percentage) influenced product choice slightly more than no information. Also the effect of adding a percentage or adding a grade on product choice did not differ.

Results differed across countries, type of product and demographic characteristics of respondents, but overall a similar pattern was observed. One exception is that in France, as opposed to the other countries, communicating sustainability benefits had a larger effect on product choice than communicating health benefits.

Conclusion. The results give insights into how consumers react to certain aspects of product information on fruit and vegetable products. We found that type of information can influence product choice and that although the degree to which this is influenced can differ between countries, type of products, and demographic characteristics of respondents similar results were found for all products, in all countries and for all consumers:

- combined information on health and sustainability benefits is preferred over only health or only sustainability information;
- specific information is preferred over general information;
- products with the highest prices are least preferred;
- the addition of numerical information has little or no effect.

These insights are valuable in the development of policy interventions and can also be used by industry to stimulate more healthy and sustainable food consumption.

1 INTRODUCTION

The overall aim of SUSFANS is to strengthen food and nutrition security in Europe, by advising food policy makers regarding healthy and sustainable food production and consumption. The SUSFANS project identifies three types of food system actors: primary producers, food chain actors and consumers (see SUSFANS deliverable 1.1, Figure 7). Work package 2 focuses on consumers and contributes to the SUSFANS aim by providing a better understanding of consumers' direct drivers of dietary change and their responses to dietary information regarding sustainable and healthy food consumption. The main direct drivers for consumers that are included in the conceptual framework are knowledge, food choice motives, food involvement, food interest, attitudes, subjective norms, demographics, information and food neophobia. In Deliverable 2.1 (Bouwman, Verain & Snoek, 2016) we investigated consumers' willingness to change their diets and looked into this broad range of drivers of food choices. Also, we investigated what consumers perceive as health and sustainable. In this deliverable (2.3) we focus on the interaction between consumers and products, by investigating consumers' sensitivity to product information related to fruit and vegetables. The main focus in this deliverable will therefore be on information and price. Results of this deliverable may be useful in task 5.3, in which innovation pathways in fruit-vegetable supply chains will be developed from the consumers' perspective. Also, it may be useful in the stakeholder meeting in WP6 where policy interventions will be discussed with stakeholders. Finally, results could be incorporated in task 10.3 where agro-food policies will be tested, including Health and nutrition policies aimed at directly influencing dietary choices such as fat taxes (on unhealthy foods) and thin subsidies (on healthy foods); food labelling, information and marketing campaigns.

More specifically, in task 2.3 we study how to communicate information to consumers on sustainability and healthiness of fruit and vegetable products. The aim of this task is to determine the effect of information manipulations on fruit and vegetables with an online choice experiment. By repeatedly asking participants to choose between two products and systematically varying 1) benefits in terms of health, sustainability or both, 2) the level of specificity (specific, medium, general), 3) use and type of numeric information (percentage, grade, no number) and 4) price (low, medium, high) it is possible to map the effects of different aspects of information. With this experimental design we

gain insight in the effect of product information about health benefits, sustainability benefits or both on consumer choices for fruit and vegetable products, the effect of the specificity of the information, the use of a number and different levels of price. Relative importance of these product attributes on consumers' choices are investigated.

Fruit and vegetables

We chose to focus on fruit and vegetable products in this study, because there is room for improvement when it comes to fruit and vegetable consumption. Also fruit and vegetable consumption is associated with better health and prevention of diseases (Guillaumie et al., 2012), which makes it important that fruit and vegetable consumption is stimulated. We chose to focus on fresh and frozen fruit and vegetable products to be able to generalise our findings further. For sustainability, the consumption of animal-based versus plant-based proteins is of major importance. This has been addressed in Deliverable 2.5: Analysis of consumers' choices related to meat/fish consumption and their possible replacement by plant-based products.

Informed choice

From a public policy perspective, a range of possible actions is available that may be used to influence consumer food choices. Three broad types of policy interventions can be distinguished: education (information), marketing and law (Rothschild, 1999). Brambila-Macias (2011) conducted a literature study on policy interventions to promote healthy eating and distinguished two types of interventions that are often used: policies supporting more informed choice and policies aimed at changing the market environment (Brambila-Macias, 2011). Informed choice can be supported by informational instruments such as labels or logos. Changes in the market environment can be supported by economic or legal instruments that for example can affect prices (Garnett, Mathewson, Angelides, & Borthwick, 2015; Rothschild, 1999). Also food industry uses these types of interventions to inform consumers and influence their food choices (Grunert & Wills, 2007).

Informational interventions are the most frequently used type of intervention to achieve healthy food consumption (Capacci, 2012). Providing information to consumers about food products can help them to make informed choices. The main goal of informed choice is to increase transparency and trust, which is

hoped to empower people to consume more sustainably and more healthy (Altintzoglou, 2010; Brambila-Macias et al., 2011; Grunert, Hieke & Wills, 2014). Consumers indicate an interest in nutrition and report that they use nutrition information on packages when they buy food products (Brambila-Macias et al., 2011; Grunert & Wills, 2007; Miller & Cassady, 2015). Product information obtained via label claims seems to influence consumers' product perceptions and there is some empirical evidence that providing label information about nutritional qualities leads to higher repurchasing intentions (Samant & Seo, 2016).

So far, interventions are often targeted at stimulating healthy or sustainable food consumption, but demand is increasing for more synergy between health and sustainability in nutritional guidelines and (policy) interventions (Alarcon & Gerritsen, 2014; Aschemann-Witzel, 2015, Gezondheidsraad, 2011, Verain et al., 2016). Therefore, in this study we will look at effects of combining health and sustainability information.

Dual process theory: how information is processed

Dual process theories give a first insight into how consumers process information on products. Two main dual-process theories are the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986) and the heuristic systematic model (HSM; Chaiken 1980). Both models are similar in the way they explain individuals' information processing strategies, namely through two distinct processing routes. The central route in ELM and systematic processing in HSM entail high cognitive effort to process information. Individuals that process information through this central route put more effort in attaching meaning to the message and thus rely more on content and less on message characteristics as compared to the other route. The inferences that are then made are more stable and more easily remembered later. By contrast, the peripheral route in ELM and heuristic processing in HSM leads to decisions based on cues in the environment and simple decision rules without using the actual information presented. Individuals that process information through this peripheral route rely more on message characteristics than on message content and the inferences that are made can be easily changed later (Chaiken, 1980; Petty & Cacioppo, 1986). Both types of processing are relevant for use of information and decision making, so it is important to focus on both message content and message characteristics.

Message content: health, sustainability or a combination

In this study we will look into the effect of message content (information on health, sustainability or both) on consumer choices. Health is an important motivation for consumers to buy certain foods (Grunert & Wills, 2007). Health as a food motive is often found in third place, after price and taste (Verain et al., 2015). Health, next to ethical values, has also been found to be an important food motive for intention to purchase sustainable foods (Dowd & Burke, 2013). Sustainability and animal welfare are becoming more important for consumers (Altintzoglou, 2010), although level of use of sustainability information is still quite low (Grunert, Hieke & Wills, 2014). In general, consumers who are more concerned about sustainability issues also report higher levels of use of sustainability labels (Grunert, Hieke & Wills, 2014).

We know that perceptions of healthiness and sustainability of food is related (Verain et al., 2016), but to our knowledge there is little research on the effects of combining health and sustainability information on product choice. The few available studies (Hoek et al., 2017; Kareklas, Carlson and Meuhling, 2014; Verain, Sijtsema, Dagevos and Antonides, 2017) seem to show added value of combining health and sustainability information, although effects on behaviour remain uncertain. One paper on organic labels by Lee, Shimizu, Kniffin and Wansink (2013) showed that consumers estimated those foods with organic labels to be lower in calories, elicited a higher willingness-to-pay and yielded better nutritional evaluations than foods without the organic label (Lee, Shimizu, Kniffin & Wansink, 2013). So sustainable information seems to influence health perceptions.

Message characteristics: specificity and number-use

Next to message content, in this study we will look into the effect of message characteristics (specificity and type of number) on consumer choices. Information that is very specific with a lot of detail influences readers differently than when it is very general. According to construal level theory (Liberman & Trope, 1998; Trope & Liberman, 2003), the effect of information on behavior depends on the perceived distance between the information and the self. This distance can be applied to different domains, for example in time (soon or later), space (near or far), probability (likely or unlikely) or social (from your own

perspective or from an observers' perspective). For information that is perceived as being close to the self, people tend to use more concrete mental models (lower level construal). Consequently they start to think about "how" they can use the information and if this is feasible. For information that is perceived as being far from the self, individuals think about "why" they would use the information and what the value or desirability of the outcome is (Liberman & Trope, 2008). Very specific information is very concrete and can be seen as closer to the self than general information, which is more abstract.

A European review showed that numbers give consumers an impression of transparency and that consumers like a combination of percentages and grams (Grunert & Wills, 2007). It is interesting to see if numbers also influence consumer choices and whether there is a differences between type of numbers, that is percentages or grades.

Price

As mentioned earlier, price is often a main motive in food choices. Also, an interest in price leads to less label use (Grunert & Wills, 2007). In this study we will look into the influence of price and more specifically, the trade-offs between price and the other product characteristics: message content and message characteristics.

Psychosocial determinants

A range of factors influence the effect of information on behavior (Grunert & Wills, 2007). Task 2.1 showed that important factors include food choice motives, descriptive social norm concerning healthy and sustainable diets, subjective knowledge about healthy and sustainable food and an interest in healthy and sustainable food.

Content of this deliverable

This report presents an overview of the choice experiment in which the importance of message content, the specificity of information, the use of a number and different levels of price are researched relatively to one another. The report includes the method, the results and the discussion.

In the method-section we will elaborate on how the choice experiment was conducted, who participated and which measures were included.

In the result-section we report the outcomes of the choice experiment: our findings about the relative importance of the different aspects of content and characteristics of the information on product choice. Also, we will report the background characteristics of our sample in terms of psychosocial determinants that were identified in deliverable 2.1. Finally in the result section we will report the control questions of the experiment that give more insights in how the experiment performed. In the discussion, finally, we will write down our conclusions and take a critical look at our work.

2 METHOD

Design and procedure

An online choice experiment was conducted in the Netherlands, France and Czech Republic, in which four factors systematically varied (**see table 1**):

- 5) Content of information on benefits (focussed on health, sustainability or both),
- 6) the level of specificity (specific, medium, general),
- 7) use and type of number (percentage, grade, no number),
- 8) price (low, medium, high).

The orthogonal design, conducted in SPSS, resulted in 9 choice sets, which implies that 9 sets of 2 choices were presented to the respondents.

Table 1. Experimental conditions

Content & framing

1. General

- Sustainable product
- Healthy product

2. Medium

- People (social)
- Contains nutrients
- Profit (economic)
- Contains minerals
- Planet (environment)
- Contains vitamins

3. Specific

- Reduced CO₂ emissions
- Contains vitamin C
- Ethical working conditions
- Contains potassium
- Fair trade
- Contains fibre

Number

- 1. *Percentage*: Meets 80% of the requirements for sustainable / healthy food
 - 2. *Grade*: Scores 8 out of 10 on the requirements for sustainable / healthy food
 - 3. *No number*: Meets most of the requirements for sustainable / healthy food
-

The respondents were divided into four groups. Each group completed the choice-experiment for a different product: fresh fruit (NL: N=122; FR: N=119; CZ: N=127), fresh vegetables (NL: N=126; FR: N=124; CZ: N=128), frozen fruit (NL: N=124; FR: N=126; CZ: N=118) and frozen vegetables (NL: N=122; FR: N=127; CZ: N=120) (**see Table 2**).

The online study consisted of five parts. First, subjects were randomly assigned to one of the four product groups and then included or excluded based on their answer on the screening variable: their purchase behaviour of fresh/frozen fruit/vegetables. Participants were excluded when they indicated that they never purchase fresh/frozen fruits/vegetables (depending on the condition). Second, the choice-experiment took place. Third, survey questions on specific psychosocial determinants related to healthy and sustainable food choices were asked. Fourth, control questions about consumers' perceptions of the included products (fresh/frozen fruits/vegetables) were formulated. Finally some socio-demographics were asked. Completion of the questionnaire took on average 11 minutes in The Netherlands and in France and 14 minutes in The Czech Republic.

The choice-experiment has been developed in English and has been translated with forward and backward translation by professional translators. In addition, these translations were checked by native speaking researchers from the SUSFANS consortium on understanding of the wording and jargon used in the questionnaire.

Respondents

Data collection took place in three European countries: The Netherlands, Czech Republic and France. These countries were selected to obtain a spread across North, South and Eastern Europe. In the project, we had aimed to include two countries based on the outcomes of deliverable 2.1. We were able to include a third countries which was The Netherland for reasons of convenience. Czech Republic was chosen since it was the only Eastern country and from the Southern countries France was chosen over Italy since Italy had some extreme scores on their sustainability attitudes and preferences (see deliverable 2.1). Respondents were recruited by MSI-ACI, a market research company that can blend different consumer panels and sample sources for each study through one controlled platform, coordinated from The Netherlands. Quota were set to get a good spread on gender, age, education and degree of urbanisation. Participants had to be over 18 years to be able to participate. Data collection took place in winter 2017, within a short time period (8 days) in all countries simultaneously. Prior to the survey, a quantitative pilot study was conducted in the same countries. All respondents from the survey and pilot were paid for their participation.

For the pilot study, a total of 317 respondents were recruited in the Netherlands (N=103), Czech Republic (N=108) and France (N=106). This sample was 51.4% male with a mean age of 43.5 (SD=13.3), and representative for education, income and rural living area.

For the final study, a total of 1483 respondents was recruited: 494 in the Netherlands, 496 in France and 493 in Czech Republic. 336 respondents were excluded from participation in the survey since they did not purchase the product of interest. In all countries respondents were excluded but mostly in the frozen fruit (77,1% of the excluded respondents were in this condition) and the frozen vegetables (16,6%) condition. Additionally, data from 48 respondents have been excluded from the analyses based on answer patterns. In cleaning the dataset, we checked the responses for boredom (filling in the same answer throughout the whole survey) and checked attention with mirrored items. We deleted 21 respondents due to boredom (15 respondents had 0 variance in their answers to all 7-point scales and another 6 respondents had 0 variance in their answers to all psychosocial determinants 7-point scales). Also 27 respondents were deleted due to no variance in mirrored items and a score above or below 4 (answering only 4 is possible with mirrored items, since it indicates a neutral answer, so we did not delete them).

Materials

The fresh fruit and vegetable box were self-made, so unknown to all respondents. The frozen products were chosen from an online UK supermarket (tesco.co.uk), so also expected to be unknown to all respondents in the three selected countries. The materials for the choice-experiment were tested in the quantitative pilot: an online questionnaire in which we tested consumers' willingness to pay for, familiarity with, availability, likability and luxuriousness of two product-images per product that we aimed to use in the choice-experiment (eight products in total). One of the two options was chosen for the choice-experiment based on minimal differences between the countries, most frequently consumed, highest likability and a lower score on luxuriousness. The self-developed claims were also tested in the pilot, by investigating trust, understanding, likability, usefulness, realism and specificity of the claim. The pilot results showed that the self-developed claims were equally evaluated in the three countries, giving us a green light to use them in the choice-experiment.



Table 2. Images of different products used in the choice-experiment (in this case Dutch)



Measures

Product preference in choice experiment

Participants were asked to make forced choices from nine choice sets (see Figure 1 for an example). Each set consisted of two options that differed on the four included attributes: content of the benefits, specificity, type of number, and price. The first set was derived from the orthogonal design, the second choice set consisted of the subsequent level for each of the attributes. For example, if the attribute benefit had level 2 (health), the second set would have the benefit level 3 (both). And if price had level 3 (high) the second set would have level 1 (low). The choice sets were presented to the respondents in a random order and also the position of the options within the sets (left or right) was presented randomly. Respondents were asked to indicate which one they preferred “Imagine you are shopping for **[a fresh fruit box / a fresh vegetable box /**

frozen fruit / frozen vegetables], which of these two options **[for frozen products: (both 450 grams)]** would you be more likely to purchase?".

Figure 1. Example of a choice set in the experiment (in this case the fresh fruit condition in Dutch)

Stelt u zich voor dat u in de winkel op zoek bent naar een doosje vers fruit, welke van deze twee opties zou u kopen?

Product 1



Product 2



terug
verder

Psychosocial variables

General food motives were assessed with a one-item food choice questionnaire (Onwezen et al., in preparation), based on the 9 categories from the food choice questionnaire of Steptoe, Pollard and Wardle (1995) and 2 sustainable categories of Lindeman and Vaananen (2000). ‘Animal Friendliness’ was omitted, because this is not applicable to fruit and vegetables. Respondents were asked to indicate for in total 11 aspects to what extent the aspects were important to

them for the food they eat on a typical day (1=not at all important, 7=very important).

Descriptive social norms concerning consumption of sustainable and healthy diets was assessed with five items, adapted from Povey et al. (2000). Respondents were asked to answer these items on a 7-point scale (1=not at all, 7=to a great extent). Questions were repeated for sustainable diets and healthy diets. Items were 'people who are important to me', 'my colleagues/classmates', 'my friends', 'my family', 'the average Dutch person [adjusted to the country of the respondent]'. For both sustainable and healthy diets, the five items belonged to one underlying factor, explaining 72.4% of the item variance for sustainable diets with a Cronbach's alpha of .904. For the descriptive norm towards a healthy diet, the explained variance was 63.3% with a Cronbach's alpha of .854.

Subjective knowledge concerning sustainable food and healthy food was measured with the scale developed by Flynn and Goldsmith (1999). Respondents were asked 'In your opinion, how informed are you about sustainable/healthy food?' Respondents answered five items on a seven-point scale from 'totally disagree' to 'totally agree'. Example items are 'I know pretty much about sustainable food' and 'Compared to most other people, I know less about healthy food' (reversed). A factor analysis showed that the items scored on two factors. Since the second factor was due to reversed items we forced the items on one factor. The explained variance was 55.8% for subjective knowledge towards sustainable food with a Cronbach's alpha of .804. For subjective knowledge towards healthy food, the explained variance was 55.6% with a Cronbach's alpha of .794.

General health interest was assessed with eight items, developed by Roininen et al. (1999). Respondents were asked to rate on a 7-point scale (1=totally disagree, 7=totally agree) to what extent they agreed with the eight items. Example items are 'The healthiness of food has little impact on my food choices' (reversed) and 'I always follow a healthy and balanced diet'. Factor analysis resulted in two underlying factors, due to reversed items. Therefore we forced the items onto a single factor, explaining 42.5% of the variance, with a Cronbach's alpha of .798. General sustainability interest was assessed in a similar way. Items were based on Roininen et al. (1999) and were adapted for sustainability. Example items are 'The sustainability of food has little impact on my food choices' (reversed) and 'I always follow a sustainable diet'. Again, factor

analysis resulted in two underlying factors due to reversed items. Therefore we forced the items onto a single factor explaining 46.1% of the variance with a Cronbach's alpha of .744.

Control questions

Control questions investigating familiarity with, availability, likability and perceptions of luxuriousness, health and sustainability of the four products used in the choice-experiment were asked. Furthermore, the respondents' opinion on the product-prices used in the choice-experiment was asked. Respondents were randomly presented one of the three price options and were asked to indicate on a 7-pointscale how cheap (1) or expensive (7) they thought the price was for that specific product. We chose not to show all three prices to every respondent, to avoid respondents answering relative to the other prices. Finally, we also included a question on claim use in general for food products and for fresh/frozen fruits/vegetables specifically.

Socio-demographic variables

Finally, a range of socio-demographic characteristics were asked: gender, age, education, income, and degree of urbanisation and household members.

Statistical analyses

For the psychosocial determinants, the scales have been checked by conducting exploratory factor analyses with oblique rotation. Reliability of the scales have been checked with Cronbach's alpha.

First, the effects of the four attributes (price, content, specificity and numeric information) on consumers' choices were investigated by means of a binary logistic regression analysis. Consumer choice for one of the sets was used as the dependent variable. The independent variables were created by coding the attribute for each set into dummy variables. For both options in each set the attributes were recoded to dummies with two dummies per attribute. Next, the difference score between the dummies of both sets was calculated and used in the regression as independent variables. This procedure was repeated with different dummies based on a different reference category. In the logistic regression, odds ratios are calculated from the regression coefficient (Beta) by e^B . Interpretation of odds ratios is the change of a group compared to the reference group.

Interactions between the dummies of the attributes (price, benefits, specificity, and type of number) and demographics were created. This was done by multiplying difference scores of the two options in each set with dummies of demographics. These interactions were tested in the logistic regression for their relation with the choice for a specific set. Testing main effects of demographics is not relevant since this would imply that for example age is related to the choice regardless of the characteristics of that set. Demographics were tested in separate regressions in combination with the main effects of the attributes. In addition, differences across the four included products and across the three included countries were investigated. Finally, psychosocial characteristics and perceptions of the sample were analysed to gain insights in possible explanations of the effects that have been found.

3 RESULTS

Preparatory analyses and sample demographics

In total 1483 participants were analysed in this web-survey. 719 participants were male (48.5%) and the mean age was 46.0 (SD=15.45) with a range from 18 to 83. Participants were from three different countries (NL: 494; FR: 496; CZ: 493). The demographic profile of the respondents in terms of education, income, degree of urbanisation of living area and family status are described in Appendix I.

In this study we analysed data of 1483 respondents in total from 3 countries (The Netherlands, France and Czech Republic). Respondents were roughly equally distributed over countries and sexes.

Choice experiment

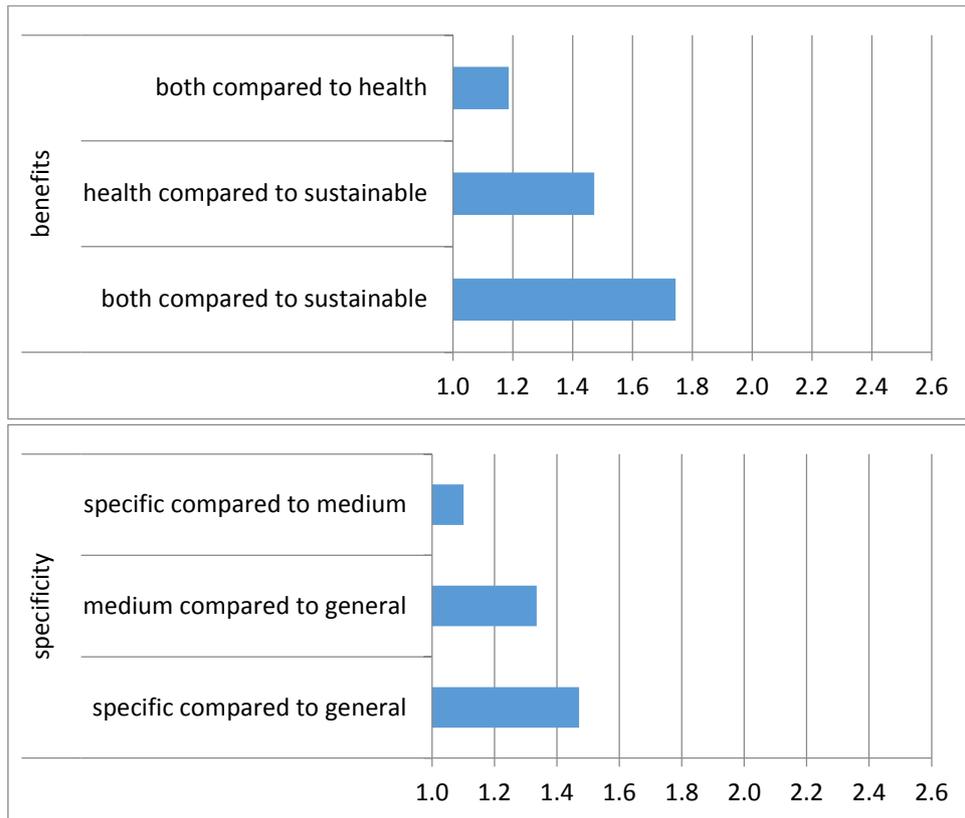
Before estimating the model with main and interaction effects, an initial model was estimated that included only the main effects. Price had the largest effect size on product choice in the choice experiment. A product with a low price was chosen 2.46 times more often compared to one with a high price and 1.69 times more often compared to those with a medium price, additionally, medium priced products were chosen 1.46 times more often compared to high price products (see Figure 2 and Appendix II for statistical details).

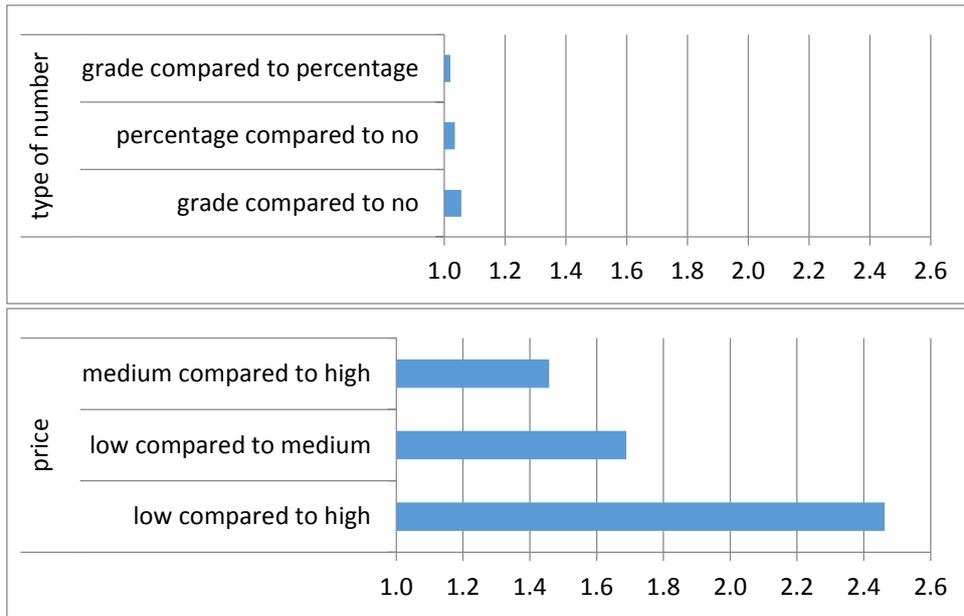
The next most important factor for product choice was content of the information label. When product information contained both sustainability and health information this product was chosen 1.75 respectively 1.19 more often compared to when only sustainability or health was included. Additionally, a product with health information was chosen 1.47 times more often compared to one with sustainability information.

The framing of the information was also related to product choice, but less than price and content. Specifically framed information had a larger effect on product choice than more generally framed (1.47) and medium framed (1.10) information and medium framed had a larger effect on product choice than more generally framed (1.34).

Numerical information had little effect on product choices. The addition of a grade (scores 8 out of 10 on sustainability/health/both) slightly influenced product choice more than no information (1.06) whereas it did not differ from adding a percentage (80%). Finally, adding a percentage also did not differ from adding no information.

Figure 2. Odd ratios of the variables in the choice experiment: benefits, specificity, type of number and price.





Price had a large effect on product choice in the choice experiment. A product with a lower price was chosen more often. When product information contained both sustainability and health information this product was chosen more often compared to when only sustainability or health was included and health information influence product choice more than sustainability information. More specifically framed information had a larger effect on product choice than more general information. Finally, the addition of a grade slightly influenced product choice more than no information whereas it did not differ from adding a percentage and adding a percentage also did not differ from adding no information.

Interactions between choice variables and demographic characteristics

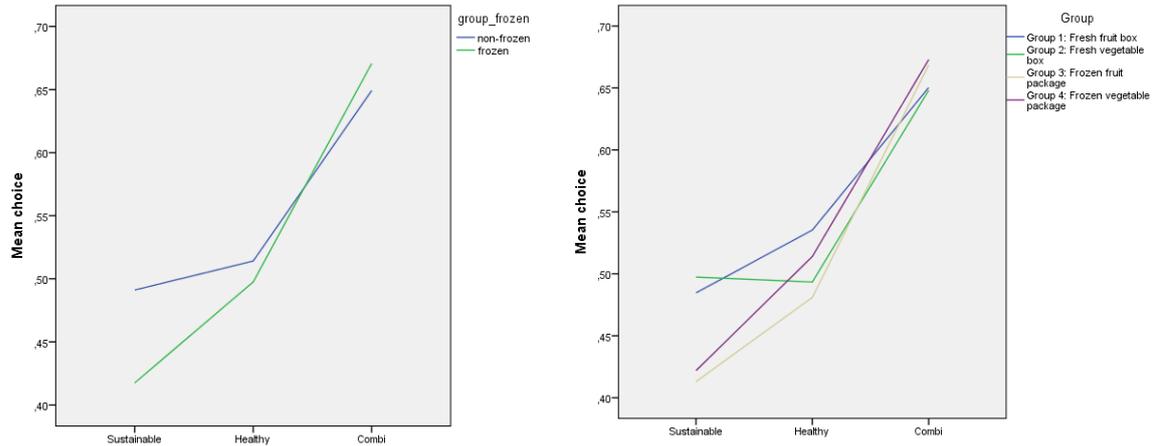
All interactions between demographic variables and the four choice variables on content and framing were analysed. Below we will discuss the significant interactions.

Product type

The result that health content or a combination of health and sustainability content were more important drivers of product choice compared to only sustainability content, was stronger for frozen products compared to non-frozen

products (Beta's of the interactions 0.21 and 0.16 respectively, $p < 0.001$ and $p = 0.003$). In other words, sustainability content contributes more to the choice for a fresh product than to the choice of a frozen product. This was mostly due to the non-frozen (fresh) vegetables (Figure 3).

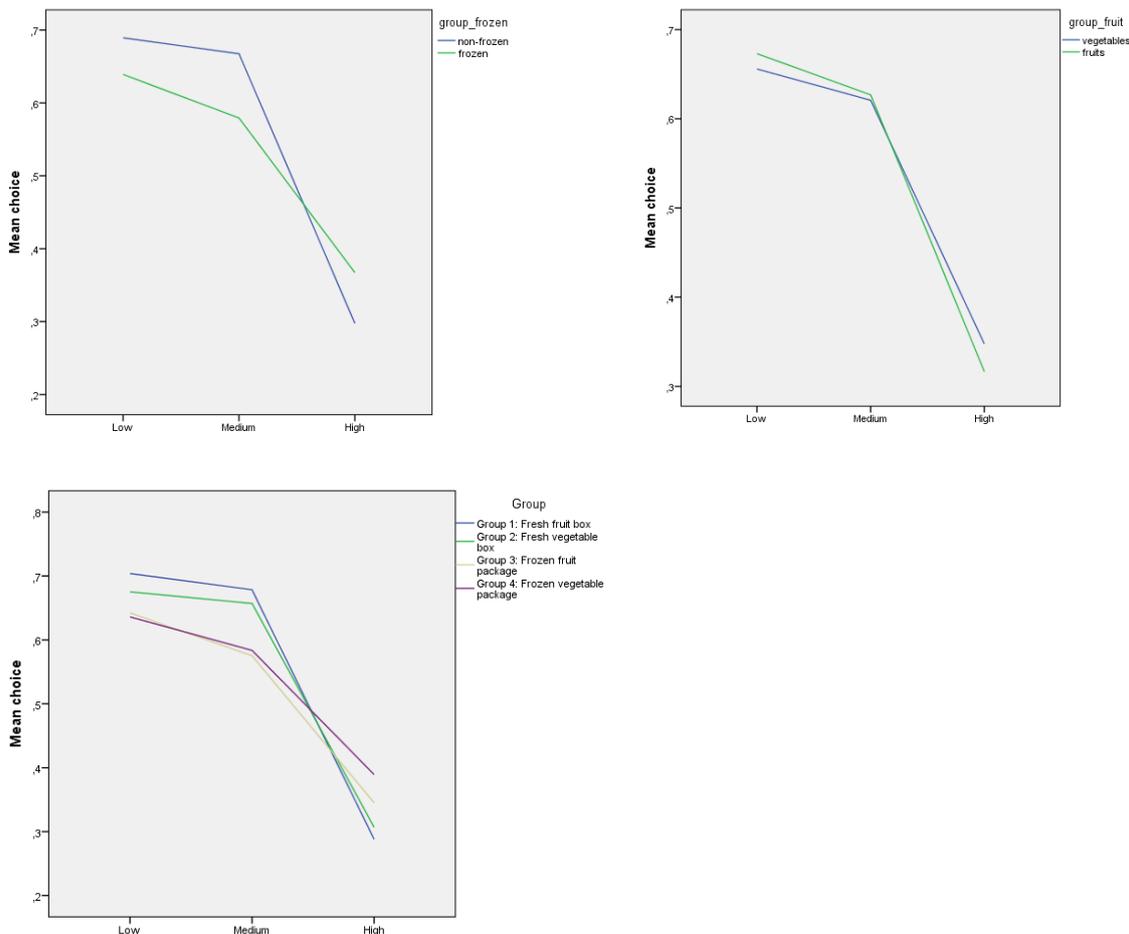
Figure 3. Mean choice by benefits for the frozen products and non-frozen products and for all products



For frozen food products, the result that low price products were chosen more often compared to high and medium priced products, was less pronounced compared to fresh products (Beta's of the interactions 0.41 and 0.12 respectively, $p < 0.001$ and $p = 0.033$). Also the result that medium priced products influenced product choice more than high priced products, was less strong for frozen products (Beta of the interaction -0.29, $p < 0.001$) (Figure 4). In other words, price plays a bigger role in consumer choices for fresh products (preferring a low price), than in consumer choices for frozen products.

When we take a closer look at the difference between fruit and vegetables, results show that the influence of a low price on product choice over a high price was stronger for fruit compared to vegetables (Beta of the interaction 0.14, $p = 0.012$) (Figure 4). In other words, a low price influences consumer choices for fruit products more than consumer choices for vegetables.

Figure 4. Mean choice by price for the frozen products compared to non-frozen products and for fruits compared to vegetables, and for all products.



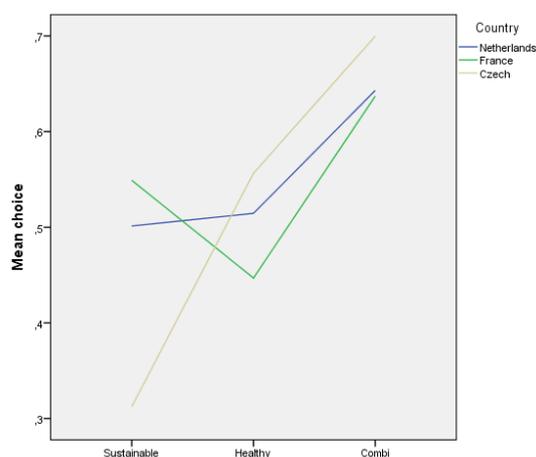
Sustainability content contributes more to the choice for a fresh product than to the choice of a frozen product. Price plays a bigger role in consumer choices for fresh products (preferring a low price), than in consumer choices for frozen products and for fruit products more than for vegetables.

Country differences

Overall sustainability information influenced consumer choices less compared to health information or both health and sustainability information. The interaction analyses show that this was mainly true for The Czech Republic (Figure 5). In The Netherlands, the difference between the effect of health information or sustainable information on consumer choice was smaller, compared to The Czech Republic indicating that in The Netherlands sustainable information had a larger influence on choice. In France sustainable information was even a bigger

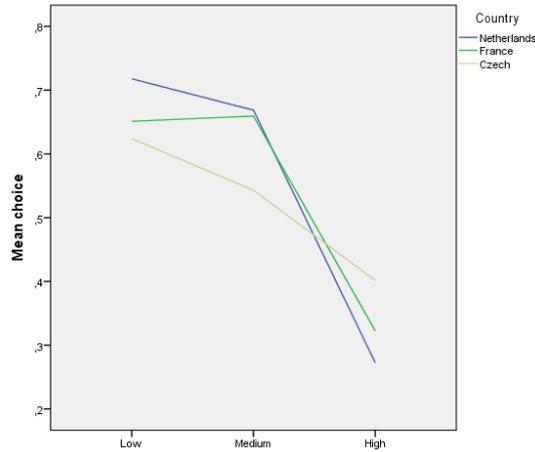
driver of consumer choice than health information (Beta's of the interaction 0.35 and 0.34 respectively, p 's < 0.001). This difference between The Netherlands and France was also significant (Beta of the interaction 0.24, p < 0.001). The result that both sustainable and health information affected product choice more than sustainable information only was not so strong in The Netherlands and France compared to The Czech Republic (Beta's of the interaction -0.69 and -0.93 respectively, p 's < 0.001). The result that both sustainable and health information had a larger impact on product choice than health information only on the other hand was stronger in The Netherlands and France compared to The Czech Republic (Beta of the interaction -0.34 and -0.59, p 's < 0.001) and less in The Netherlands compared to France (Beta of the interaction 0.25, p < 0.001).

Figure 5. Mean choice by benefits information (sustainable, health or both) and by country



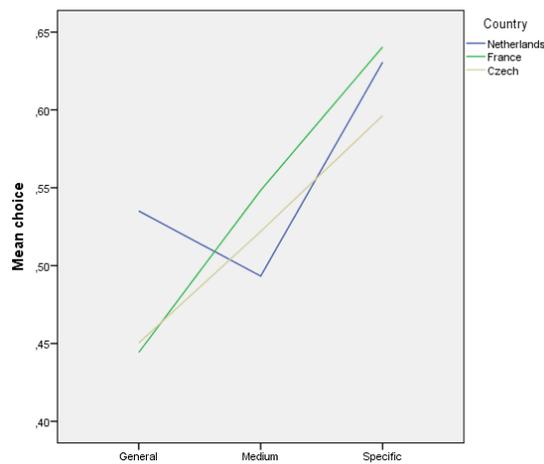
The influence of a low price on product choice compared to a medium price was stronger in the Netherlands. Significant differences were found between the Netherlands and both France and Czech Republic (Beta's of the interaction 0.28 and 0.27 respectively, p 's < 0.001) (Figure 6). Although, no differences were found between France and Czech Republic. The influence of a medium price on product choice compared to a high price however was stronger in The Netherlands and France compared to the Czech Republic (Beta's of the interaction 0.44 and 0.43 respectively, p < 0.001). Finally, the influence of a low price on product choice compared to a high price was stronger in The Netherlands and France compared to the Czech Republic (Beta's of the interaction 0.71 and 0.42 respectively, p < 0.001), also the difference between The Netherlands and France was significant (Beta = 0.28, p < 0.001).

Figure 6. Mean choice by price and by country



For level of specificity, The Netherlands showed a different pattern for medium specific information compared to the other two countries (Figure 7). General information was a bigger driver of product choice compared to medium specific information in The Netherlands, whereas in France and Czech Republic it was the other way around (Beta's of the interaction 0.36 and 0.26 respectively, $p < 0.001$). Furthermore, in all countries, specific information had a larger influence on product choice than medium specific information but in the Netherland the difference was stronger (Beta's of the interaction 0.31 and 0.37 respectively, $p < 0.001$).

Figure 7. Mean choice by framing and by country



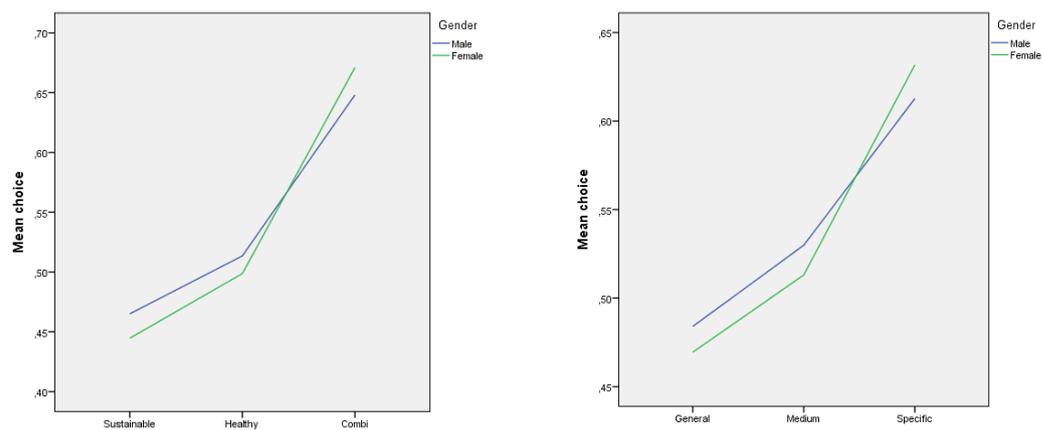
In France sustainable information was a bigger driver of consumer choice than health information, whereas in The Czech Republic health information was valued much more. Price was a stronger driver for food choice in The Netherlands and less strong in The Czech Republic.

In France and in The Czech Republic the more specific the information was framed the better whereas in The Netherland medium specific framed information was not valued over general information.

Gender

For women compared to men, the larger influence of both sustainable and health information on product choice compared to only sustainability information, was more pronounced (Beta of the interaction 0.15, $p=0.008$) (Figure 8). Additionally, the larger influence of specifically framed information compared to generally framed information, was stronger for women compared to men (Beta of the interaction 0.13, $p =0.019$). In other words, content and specificity play a bigger role in consumer choices of women (preferring both sustainable and health information and more specific information), than in consumer choices of men.

Figure 8. Mean choice by benefits (left) / framing (right) and by gender



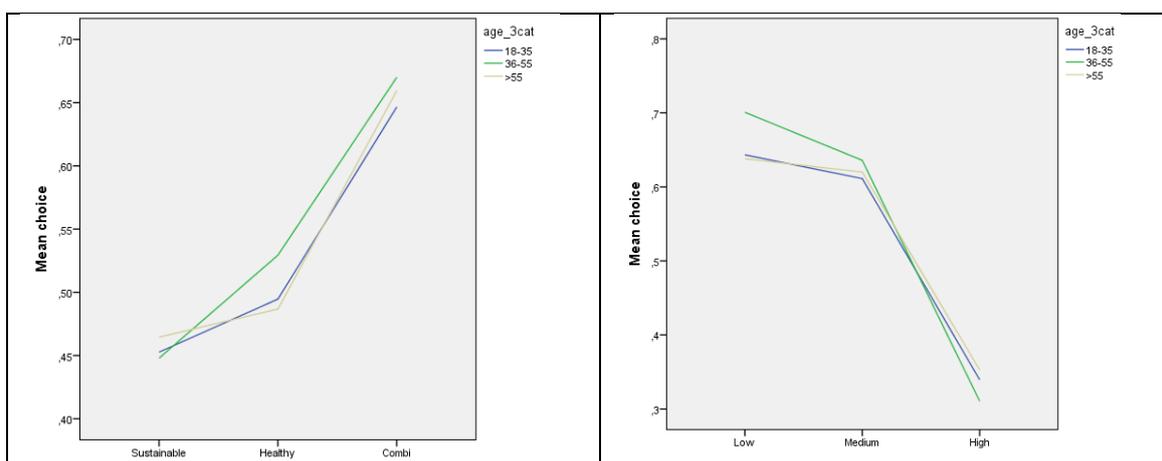
The preference for combined information over only sustainability or health information and for more specific information influenced the choice of women more than that of men.

Age groups

Three age groups were created: younger (18-35 years) which was 29.2% of the sample, middle aged (36-55 years) which was 39.4% of the sample and older (>55 years) which was 31.4% of the sample. For the middle aged group, health information relatively had a larger influence on product choice (Figure 9). The influence of health information on product choice compared to the influence of sustainable information was therefore higher in this group and the influence for both sustainable and health information on product choice compared to health information only was somewhat lower compared to the older group (Beta's of the interaction 0.14 and 0.14 respectively, $p = 0.022$ and 0.035).

Significant interactions were also found for price and age groups, again the middle aged groups differed from the other in the way that low prices influenced their product choices even more than the others (Figure 9). Stronger influences of low prices compared to medium prices on product choices were found for middle aged compared to both younger and older respondents (Beta's of the interaction 0.19 and 0.22 respectively, $p = 0.001$ and 0.004). Similarly, stronger influences of low prices compared to high prices on product choices were found for middle aged compared to both younger and older respondents (Beta's of the interaction 0.22 and 0.25 respectively, $p = 0.001$ and <0.001).

Figure 9. Mean choice by benefits (left) / price (right) and by age group

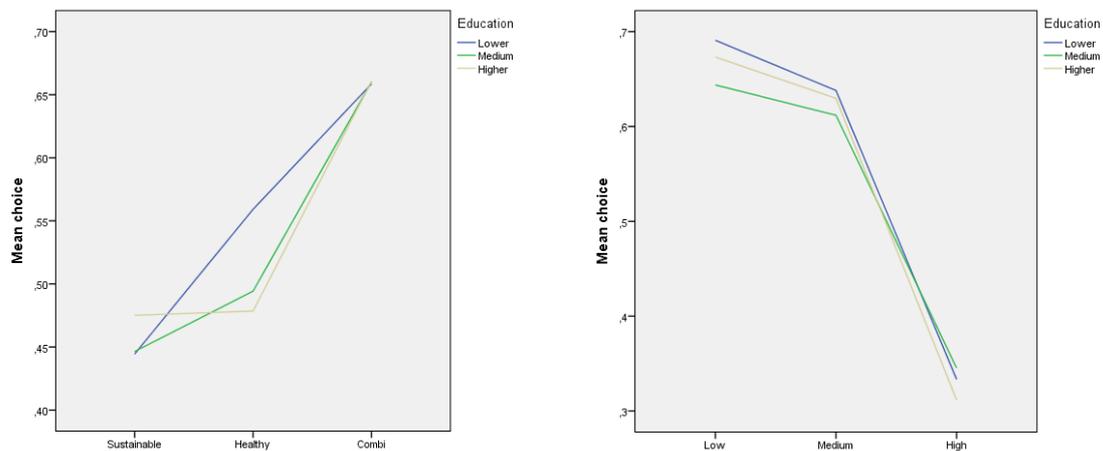


For the middle aged group, health information relatively had a larger influence on product choice and price was a stronger driver of choice compared to younger and older respondents.

Education level

Three groups were created based on education level: Lower level education, which was 25.1% of the sample, medium level education which was 45.1% of the sample, and higher level education which was 29.8% of the sample. For the respondents with a higher education level, health and sustainability information more or less equally influenced product choices, which differed from the respondents with a lower education level for whom health information influenced product choice more (Beta of the interaction 0.21, $p = 0.004$) (Figure 10). Information on both health and sustainability influenced product choice more compared to health information only in all three groups but the difference was larger in the lower education groups compared to medium and higher education groups (Beta's of the interaction 0.21 and 0.31 respectively, $p = 0.002$ and < 0.001). For price, the respondents with a medium level of education differed from the others. For this group, the influence of a lower price compared to a high price on product choice was less strong compared the high education group and the lower education group (Beta's of the interaction 0.19 and 0.14 respectively, $p = 0.003$ and 0.033). Also the influence of a medium compared to a high price on product choice was less strong in this group compared to the lower education group (Beta of the interaction .13, $p=0.049$).

Figure 10. Mean choice by benefits (left) and price (right) and by education level



Health information was a stronger driver for respondents with a lower education and a less stronger driver for those with higher education levels. For respondents with a medium level of education, price was a less stronger driver compared to lower or higher educated respondents.

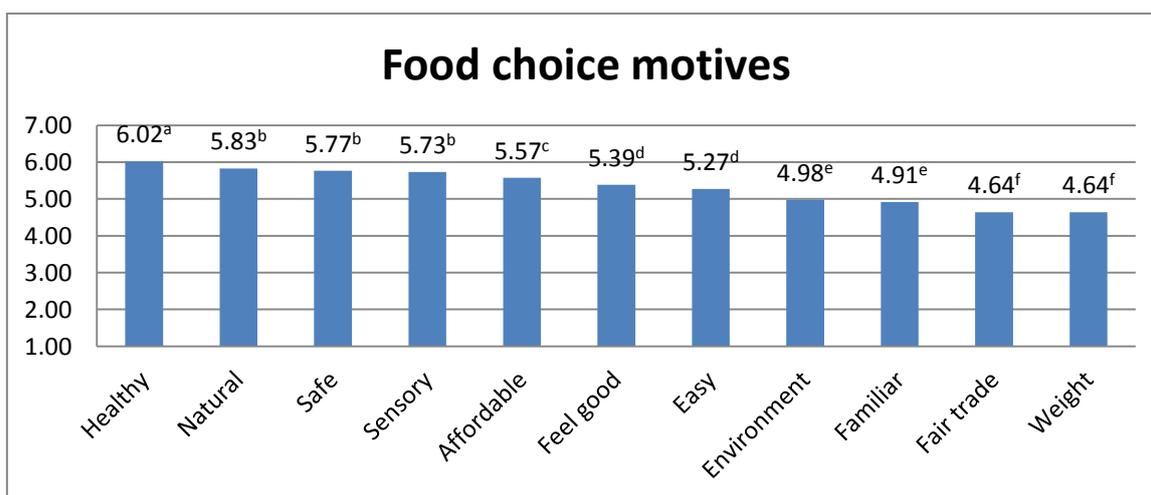
Personal characteristics

The variables described in this section were the most important determinants of consumers' sustainable food behaviours and choices for the different strategies according to SUSFANS deliverable 2.1 (Bouwman, Verain & Snoek, 2016). These are variables framed specifically for sustainable and healthy food behaviour. The purpose of this section of the results is to give some background on the differences between the countries that may explain the results of the choice experiment.

General food motives

All countries taken together (Figure 11), consumers report to base their food choices mostly on health motives ($p < .01$). Next, consumers find natural, safe and sensory appealing food more important than the other motives ($p < .01$). Environment is found less important than most motives ($p < .01$), but more important than the fairness of a product and if the product helps to control their weight ($p < .01$). Consumers base their food choices the least on the fairness of a product (fair trade) and whether the product helps them to control their weight ($p < .01$).

Figure 11. General food choice motive scores on a 7-point scale
Note: all scores differ significantly from each other (probably due to the large sample)



Countries differ in the importance of food choice motives (see Table 3), we will discuss health, affordability and environmental friendly since this were variables in the choice experiment. All three countries find **health** motives equally important (no significant differences). There are differences in what countries

find the most important motive. France finds **health** motives most important in their food choices, the Netherlands find **affordability** most important and Czech Republic finds **sensory appeal** most important. When it comes to **affordability**, The Netherlands takes this into account the most when making food choices compared to the other countries ($p < .01$) and Czech Republic takes **affordability** more into account than France ($p < .01$). Finally France finds **environmentally friendly** motives most important when choosing their food compared to the other two countries ($p < .01$) and the Netherlands take **environmentally friendly** motives more into account than Czech Republic ($p < .05$).

Table 3. Food choice motives

	NL	FR	CZ
Healthy	5.97 ^a	6.04 ^a	6.05 ^a
Natural	5.52 ^a	6.01 ^b	5.96 ^b
Safe	5.59 ^a	5.85 ^b	5.86 ^b
Sensory	5.55 ^a	5.59 ^a	6.06 ^b
Affordable	6.01 ^a	5.03 ^b	5.67 ^c
Feel good	5.11 ^a	5.31 ^a	5.74 ^b
Easy	5.12 ^a	5.26 ^{a,b}	5.45 ^b
Environment	4.90 ^a	5.37 ^b	4.66 ^c
Familiar	4.73 ^a	4.91 ^{a,b}	5.09 ^b
Fair trade	4.74 ^a	4.90 ^a	4.28 ^b
Weight	4.97 ^a	4.54 ^b	4.41 ^b

Note: Different subscripts per row indicate significant different values

Descriptive social norm, subjective knowledge, food interest

Descriptive social norm. All countries taken together, consumers score 4.08 out of 7 on the **descriptive norm towards sustainable eating** scale ($SD=1.1$) and a 4.48 out of 7 on the **descriptive norm towards healthy eating** scale ($SD=1.0$) (see Table 3). Both scores are rather neutral, indicating that consumers don't extremely feel like people around them eat healthy and sustainable food, but also don't extremely feel that people around them don't eat healthy and sustainable food either. Consumers do feel like people around them eat healthy more than that people around them eat sustainable ($p < .01$). Comparing the countries, the Netherlands score significantly lower on the **descriptive norm**

towards sustainable eating scale compared to France ($p < .01$). Czech Republic scores in the middle and doesn't differ significant from the other countries. There are no differences in scores on the **descriptive norm towards healthy eating** scale between the countries.

Subjective knowledge. Overall, all countries score higher on **subjective knowledge about healthy food** ($M=4.47$; $SD=1.14$) than on **subjective knowledge about sustainable food** ($M=3.79$; $SD=1.18$) ($p < .01$). Consumers don't feel very knowledgeable about the sustainability of food, scoring below average. Although consumers score higher on subjective knowledge towards health, they still don't score very high. Indicating that there is room for improvement for subjective knowledge towards health and sustainability of food. Comparing the countries, respondents from the Czech Republic significantly score lower on **subjective knowledge about sustainable and healthy food** than the Netherland and France ($p < .01$). The Netherlands and France don't differ in their subjective knowledge about sustainable and healthy food.

Food interest. Overall, consumers' score rather neutral on **interest in sustainable and healthy food**. Consumers are generally more interested in the healthiness of food than in the sustainability of food ($p < .01$) (see

Table 4). Comparing the countries, France has most interest in sustainable food compared to the Netherlands and Czech Republic ($p < .01$). The Netherlands and Czech Republic don't differ significantly in their interest towards sustainable food. When it comes to interest in healthy food, no differences are found between the countries.

Table 4. Descriptive social norm, subjective knowledge, food interest

	Total	NL	FR	CZ
Descriptive norm towards sustainable eating	4.08	3.95 ^a	4.21 ^b	4.07 ^{a,b}
Descriptive norm towards healthy eating	4.48	4.48 ^a	4.53 ^a	4.43 ^a
Subjective knowledge sustainable food	3.79	3.85 ^a	4.00 ^a	3.51 ^b
Subjective knowledge healthy food	4.47	4.56 ^a	4.55 ^a	4.30 ^b
Sustainability interest	3.97	3.84 ^a	4.18 ^b	3.89 ^a
Health interest	4.41	4.44 ^a	4.44 ^a	4.36 ^a

Note: Different subscripts per row indicate significant different values

Affordability was considered most important for food choice in the Netherlands and more important compared to the other countries. Environment was not in the upper half of most important motives in all countries, however in France it was considered more important compared to the other countries.

Dutch respondents feel less like people around them eat sustainable food compared to the other countries. Norms for healthy eating did not differ across countries.

Respondents from the Czech Republic feel less knowledgeable about sustainable and healthy food than respondents in The Netherlands and France.

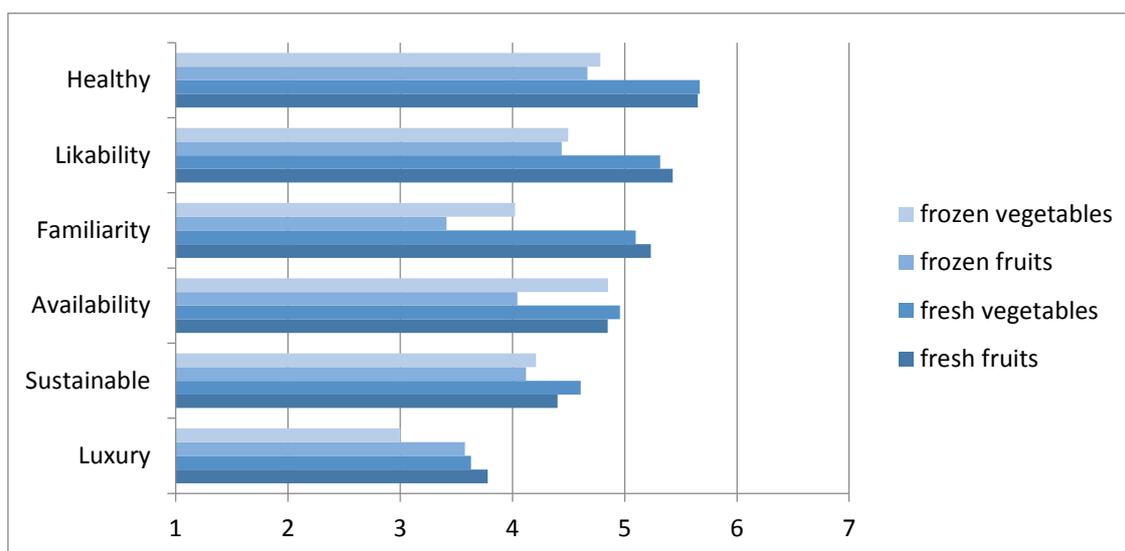
French respondents had most interest in sustainable food compared to the Netherlands and the Czech Republic. Food interest did not differ across countries for healthy food.

4 CONTROL QUESTIONS

Control questions were included to test how the experiment performed in terms of the choice of the products and the tested prices.

Healthy, likability, familiarity, availability, sustainability, and luxury was reported for all 4 test products. All four products had on average positive scores on likability but none of the products had very high or low scores on any of the control variables, so they were not considered for example very healthy or unhealthy. Clear differences were found in perceptions between the tested fresh products and the frozen products (see Figure 12; and appendix III for statistical details). The fresh products were considered on average healthy, likable, familiar and available, somewhat sustainable and not so luxurious. Frozen products were on average somewhat healthy, likable, available (vegetables) and sustainable, not so familiar (especially the fruits) and not luxury (especially vegetables). Differences between countries were found for availability ($F= 15.81, p<0.001$), luxurious ($F= 20.78, p<0.001$), and sustainable ($F= 3.25, p<0.05$). In France a lower availability was reported than in the other countries and in The Netherlands a lower perception of luxury and a higher perception of sustainability (compared to France only) was reported.

Figure 12. Control questions: perceptions of the tested products



Additionally, we tested the price perception of the tested products (see Table 4). Respondents rated all fresh fruit, vegetables, and frozen fruit in all three price

categories on average as neutral to somewhat expensive. Frozen vegetables scored on average as neutral to somewhat cheap. Significant differences were found between product categories. Fresh fruits were perceived as more expensive in all price categories, the fresh vegetables and frozen fruits as least expensive in the low and medium price categories, and the frozen vegetable product was perceived as less expensive in the high price category. In all price categories country differences were found ($F= 17.95, 22.62, \text{ and } 10.67$ for the low, middle, and high price respectively, all p 's < 0.001). In the Netherlands, products were valued as more expensive compared to the other countries for all three price levels.

Table 4. Average price perceptions (1=cheap to 7=expensive) and SD of the tested products, per product and per price category

Product	Low price	Medium price	High price	Differences between price groups
Fresh fruit	4.72 (1.45) ^c	4.78 (1.39) ^c	4.44 (1.60) ^b	-
Fresh vegetables	4.30 (1.44) ^a	4.24 (1.48) ^a	4.61 (1.29) ^b	medium compared to high, $t=-2.13, p=0.034$
Frozen fruit	4.33 (1.44) ^a	4.15 (1.35) ^a	4.44 (1.17) ^b	-
Frozen vegetables	3.66 (1.22) ^b	3.56 (1.47) ^b	3.64 (1.24) ^a	-

Note: Different subscripts per column indicate significant different values

The four test products were not considered very (un)healthy, likability, familiarity, availability, sustainability, or luxury. Frozen products scored considerable lower on likability, healthy, and familiarity. Respondents rated all fresh fruit, vegetables, and frozen fruit in all three price categories on average as neutral to somewhat expensive. Frozen vegetables scored on average as

Just over half of the of the respondents (54.4%) indicated to look at claims on food products whereas a quarter (24.8%) did not and the rest gave a neutral answer. The average score on a scale from 1 (not at all) to 7 (very much) was 4.48 ($SD=1.64$). For fresh and frozen fruits and vegetables the means were lower ($t=12.74, p<0.001$). Less than half of the respondents (45.9%) indicated to look at claims on fruit and vegetable products whereas a third (31.5%) did not and

the rest gave a neutral answer. The average score on a scale from 1 (not at all) to 7 (very much) was 4.18 ($SD=1.70$). The products however, did not differ from each other ($F=2.07, p>0.05$). Country differences were used for claim use in general ($F= 17.80, p <0.001$) and for fruit and vegetable claim use ($F= 27.10, p <0.001$). In The Netherlands a lower general and fruit and vegetable specific claim use was reported compared to the other two countries.

Just over half of the respondents indicated to look at food claims. For fresh and frozen fruits and vegetables specifically, just under half of the respondents indicated to look at claims.

Conclusion and general discussion

Summary of the main results implications

Main effects & interaction effects

In this study, the effect of product information on the choice of fresh and frozen fruits and vegetables was investigated with a choice experiment. We wanted to gain insights in the effect of price, the content of benefits communicated (health and/or sustainability benefits), the level of specificity of the information and the use of supporting numerical information on consumers' choices.

Price

Price was found to be an important factor in consumer choice. The higher the price, the less a product was chosen. This effect was stronger for fresh products as compared to frozen products and for fruits as compared to vegetables. These differences could be explained by differences in perceptions. Our results show that fresh products are perceived as more familiar and more healthy and are liked more than frozen products. In addition, frozen fruits are less familiar than frozen vegetables. Frozen fruits are perceived as least available and frozen vegetables are perceived as least luxurious. Finally, fresh vegetables are perceived as most sustainable and fresh fruits are perceived as more sustainable than frozen fruits.

The size of the effect also differed across countries, with the smallest effects in the Czech Republic, indicating that choices from respondents from the Czech Republic were less driven by a low price than choices from French respondents and especially Dutch respondents. The finding that price was an important attribute for food choice is not surprising and in accordance with the literature (e.g. Hoek et al., 2017), also in choice experiments (e.g. Kamphuis et al., 2015). Country differences were also found in a previous choice experiment by Contini et al. where Danish consumers were mostly driven by price and Italians more by quality attributes (2015).

Content

Content of the label was also an important factor in consumer choice. Products were more often chosen when both sustainability and health benefits were communicated, as compared to only sustainability or only health benefits.

Additionally, products with only health benefits on the label were more often chosen as compared to those with only sustainability benefits, except in France. French respondents chose products with sustainability benefits more often than products with health benefits. This is in line with our finding that compared to the other countries the French scored higher on self-report measures concerning sustainable food consumption. The result is in contrast however to the scores of French respondents on the self-report measures concerning health and sustainable food consumption. Those scores indicate that French respondents find health a more important motive than environmentally friendliness, perceive a higher descriptive norm towards healthy food consumption, have a higher interest in healthy food and have more subjective knowledge about health food compared to sustainable food. The discrepancies in the results of the questionnaire and the choice experiment shows that self-reported results do not always align with actual behaviour.

The finding that the combined information on sustainability and health is most preferred is in accordance with earlier studies (Hoek et al., 2017; Kareklas, Carlson & Muehling, 2014; Verain et al., 2017) and supports the plea for a better integration of health and sustainability in dietary information (e.g. Lang, Barling, & Caraher, 2009; Van Dooren et al., 2014).

Level of specificity

The level of specificity of the information on the label also had an impact on product choices. Overall, the more specific the information, the more impact it had on product choice. Except for the Dutch respondents who were equally effected by medium level information and specific information. Suggestions have been made to bundle several aspects of sustainability in one general sustainability logo with the aim to prevent consumers' confusion. We found that the more specific labels resulted in a higher choice of the sustainable alternatives. On the basis of this result we advise against a generic logo. It should be noted that we did not test the effect of multiple specific claims. In our study specific information on for example CO₂ and Vitamin C was in combined in one logo therefore we cannot conclude on preferences for several specific logo's.

The preference for more specific information can be explained by construal level theory, indicating that more specific information is closer to the self and thus leads to more concrete thoughts as to how to use the information (Lieberman & Trope, 1998; Trope & Liberman, 2003). However, we cannot test whether the

effect of more specific information actually was due to construal level. Alternative mechanisms might also play a role. In our study, for example, the choice option with the most specific information was also the longest one and provided the most detailed information. This in contrast with research by Wansink et al., (2004) who found that for front package claims and in combination with a longer back-package claim, shorter health claims led to more favourable beliefs about the product and to a more positive image of the product. They suggested that if a short health claim provides reasonable and relevant information, it may be better understood and believed by people. The reason we found different results, might also be because we measured choice behavior while Wansink et al. (2004) measured beliefs and attitudes. Another explanation for the positive effect of specific information is that more specific information might be perceived as more reliable.

Numerical information

Effects of numerical information were minimal. The addition of a grade increased choice slightly over no numerical information whereas the addition of a percentage did not. Based on the literature it was expected that the addition of numerical information could stimulate choice, but apparently this is not or only partly the case. In our study, we provide quite some information in each choice set: A picture of the product, the logo, the text with information price, sustainability and or health information and in some cases the numeric information. This number or grade was just one detail of the information provided and this could explain why compared to the other factors it did not influence choice whereas in an experiment focused only on numeric information it could have been of importance.

Differences between type of product, countries and demographics

Overall

Overall, these findings imply that combined and specific information on health and sustainability benefits is the most effective way of communication on both frozen and fresh fruit and vegetable products. This also indicates that both message content (central processing) and message characteristics (peripheral processing) should be taken into account when developing product information (ELM; Petty & Cacioppo, 1986; HSM, Chaiken, 1980). Effects differ across countries, people and products, but mostly in terms of the magnitude of the

effect whereas the direction of the effect is rather stable. This finding is underpinned by a study of Verain et al., 2017, who identified consumer segments based on food motives and for that for each segment, the combination of health and sustainability information is the best option for stimulating healthy and sustainable food consumption.

Limitations and future research

Limitations and strengths of the study design

Strengths of the study are the large sample from three different European countries and the inclusion of two general products (fruit and vegetables) of two different types (fresh and frozen). Also the pilot study and the control questions contributed to the quality of study. The main advantage is the use of a choice experiment instead of a survey. Social desirability bias is lower in choice experiments as compared to surveys (Auger & Devinney, 2007; Norwood & Lusk, 2011 from Hoek et al., 2017). Also, the experiment allows us to look at trade-offs between the different variables. In other words, socio-desirable answers with high importance ratings for all motives (such as health, sustainability, content and price) are not possible since respondents were forced to choose between two options.

The design of the study could have had some limitations. It should be kept in mind that the choices were hypothetical choices and the logos were self-developed. Such experiments deviate from actual shopping situations in such a way that during an online choice-experiment, consumers have more time, more attention for packaging, less automatic behaviour, no monetary risks etc. In addition, only about half of the consumers indicated to look at claims on food products in general. In a choice experiment much more focus is attained to the claims as compared to what would be expected in a real-life context, so effects may become smaller. The upward bias of hypothetical settings has been extensively studied (e.g. List and Wallet, 2001).

Participants were asked to choose from nine choice sets, which could have led to boredom. Also a between subjects design has been chosen not to confront them with even more choice sets. However, this could have resulted in lower effect sizes for the comparison of the products as compared to a within subjects design due to interpersonal variability.

Another limitation could be the price levels that we used. The price differences in terms of money were very small, and based on the control questions it seems that they were maybe too small as we found little differences in price

perceptions. Although the differences were small, we did find that price was an important factor in the choice experiment.

Generalisation of the results to other products or countries

This study included fresh and frozen fruit and vegetable products. We used combined products with several fruits/vegetables to be able to generalize our results to fruits and vegetables in general instead of specific products. However, our findings indicate that both the product category (fruit or vegetable) and the type of product (fresh or frozen) has an impact on the effect of product information. Therefore we should be careful in generalizing the results to other product categories. We have to keep in mind that fruits and vegetables are product categories that are relatively similar, and therefore more differences can be expected across other types of product categories. On the other hand, we found that it is mainly the size of the effect and not so much the direction of the effects that differs across the included products.

Similarly, we only included three countries in this study. Although the countries were strategically chosen to get a good coverage over Europe, we should be careful in generalizing the results to other countries, as we found differences across countries.

Suggestions for future research

Our findings imply that combined and specific information on health and sustainability benefits is the most effective. This indicates that both the content and the characteristics of the message are important. This is in accordance with dual process theories, indicating that consumers process information in two ways, namely deliberately or automatically. It is therefore important to focus both on message content (deliberate processes) and message characteristics (automatic processes). Dual process theory (Chaiken, 1980; Petty & Cacioppo, 1986) states that consumers that are motivated to make the right choice, consumers with have the ability and opportunity to think about their choice, use de central cognitive (content-based) way of processing information and those that are not use the peripheral route of information processing based on contextual characteristics. Future research could look into the effects of different

food product information for different consumer groups, based on motivation, ability and opportunity.

Also, it is important to look at other possible measures to stimulate healthy and sustainable product choices. The provision of information is proven to have limitations when it comes to changing behaviour in real life (Brambila-Macias et al., 2011; Capacci et al., 2012). In real contexts such as supermarkets, consumers have limited time for focusing on information or recall the information. Other measures such as legal instruments or nudges to change the choice context could be important additions to product information (Brambila-Macias, 2011; Rothschild, 1999). Similarly, price manipulations could be effective since price had the largest effect on product choice in this choice experiment and the effect of price is supported by modelling research. For example, a per-unit subsidy could be an efficient tool for leading to more consumption as was shown by Marette et al. (2008). The effects of food taxation in real life are less known but some positive results have been found. For example, saturated fat tax had a small positive influence on dietary quality in Denmark (Smed et al, 2016). Finkelstein et al. (2014) reviewed the relationship between food prices and obesity and concluded that modest food taxes and subsidies may play an important role in a multifaceted approach to reducing obesity incidence but by themselves, are unlikely to have a major effect on individual weight or obesity prevalence. We have to keep in mind that in our study the preference for the lower price was compared to a more expensive product in a forced choice situation and we therefore cannot draw hard conclusions from our results that lowering fruit and vegetable prices would increase consumption in real life.

5 CONCLUSION

In the SUSFANS project we investigate healthy and sustainable food production and consumption in relation to three types of food system actors: primary producers, food chain actors and consumers (see SUSFANS deliverable 1.1, Figure 7). For consumers, knowledge and information are drivers of behaviour and framing of information could be important in stimulating consumers towards more healthy and sustainable diets. Therefore, the aim of this task was to investigate how to best communicate product information to consumers on fresh and frozen fruit and vegetable products. Information was studied together with price which is also a main driver.

The results give us insight in how consumers react to certain aspects of communication. We found that differences exist across the included fruit and vegetables products, countries and demographic groups, but overall, results show that:

- Combined information on health and sustainability benefits is preferred over only health or only sustainability information;
- Specific information is preferred over general information;
- Products with the highest prices are least preferred;
- The addition of numerical information has little or no effect.

Within the SUSFANS project, the results of this deliverable underline the importance of studying health in combination with sustainability since the combination of both influences the choice for a fruit or vegetable product more than information about health and sustainability separately. Towards the end of the project these insights are valuable in the development of recommendations on informational policy interventions (under work package 10). They can also be used by industry to stimulate more healthy and sustainable food consumption, which makes the results useful for task 5.3.

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7 APPENDICES

Appendix I Demographic characteristics of the sample

Education levels in the three countries

	Low education	Medium education	High education
Total	25.1%	45.1%	29.8%
Netherlands	25.3%	40.7%	34%
France	23.2%	45.4%	31.5%
Czech Republic	26.8%	49.3%	23.9%

Income levels in the three countries

	Low income	Medium income	High income
Total	22.4%	39.2%	24.1%
Netherlands	20.4%	37.4%	21.3%
France	21.2%	34.9%	32.9%
Czech Republic	25.6%	45.4%	18.1%

Degree of urbanisation of living area in the three countries

	In a village not adjacent to a city	In a village adjacent to a city	In a city with less than 30.000	Between 30.000 and 100.000	In a city with more than 100.000
Total	15.8%	19.7%	21.2%	20.8%	22.5%
Netherlands	24.1%	15.2%	12.6%	23.7%	24.5%
France	13.1%	26.4%	21.4%	18.8%	20.4%
Czech Republic	10.1%	17.4%	29.6%	20.1%	22.7%

Household size in the three countries

	1-person	2-person	3-person	4-person	5-person	6-person and over
Total	20.4%	37.2%	18.7%	16.6%	5.5%	1.2%
Netherlands	24.5%	37.2%	15.2%	16.4%	5.3%	0.6%
France	20.8%	35.3%	19.8%	18.3%	4.6%	1.2%
Czech Republic	16%	38.9%	21.3%	15%	6.5%	1.6%

Note. Answers more than 3 standard deviations from the mean were deleted (in total 7 answers).

Children living at home in the three countries

	No children	1 child	2 children	3 children	4 children and over
Total	53.3%	18.7%	16.8%	4.7%	0.8%
Netherlands	55.9%	14.6%	17.6%	5.5%	0.6%
France	53.6%	20.6%	16.5%	4%	1.2%
Czech Republic	50.3%	20.9%	16.2%	4.5%	0.4%

Appendix II

Logistic regression with choice of a option (yes / no) as the outcome variable and values of the product attributes as predictors

	B	Sig.	Exp(B)
Benefits			
Health (compared to both)	-.171	.000	.843
Both (compared to sustainable) ¹	.557	.000	1.745
Health (compared to sustainable) ¹	.386	.000	1.472
Specificity			
Specific (compared to general) ¹	.386	.000	1.471
Medium (compared to general) ¹	.289	.000	1.335
Medium (compared to specific)	-.097	.000	.908
Type of number			
Percentage (compared to none)	.034	.201	1.035
Grade (compared to none)	.054	.039	1.056
Grade (compared to percentage) ¹	.020	.461	1.020
Price			
Low (compared to high)	.902	.000	2.465
Med (compared to high)	.377	.000	1.458
Medium (compared to low) ¹	-.525	.000	.592
Constant	.194	.000	1.214

¹These dummies were included in a second analyses with a different reference point since not all comparisons can be included in one set of dummies.

Appendix III details control questions

	fresh fruits		fresh vegetables		frozen fruits		frozen vegetables		<i>F value</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	
Familiarity	5.23 ^c	1.58	5.10 ^c	1.62	3.41 ^a	1.58	4.02 ^b	1.66	112.35 ^{***}
Likability	5.43 ^b	1.38	5.32 ^b	1.40	4.44 ^a	1.38	4.50 ^a	1.38	55.12 ^{***}
Availability	4.85 ^b	1.60	4.96 ^b	1.50	4.04 ^a	1.54	4.85 ^b	1.43	29.71 ^{***}
Luxury	3.78 ^b	1.70	3.63 ^b	1.71	3.58 ^b	1.62	3.00 ^a	1.47	16.81 ^{***}
Healthy	5.65 ^b	1.19	5.67 ^b	1.19	4.67 ^a	1.29	4.78 ^a	1.25	74.08 ^{***}
Sustainable	4.40 ^b	1.43	4.61 ^c	1.38	4.12 ^a	1.34	4.21 ^{ab}	1.38	9.38 ^{***}

****p* < 0.001

Note: different letters indicate a significant difference