‘Whole grain’ label on food packages

How consumers understand the label ‘whole grain’ on food packages

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Bachelor thesis

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Preface

Dear reader,

I wrote this thesis as a part of my bachelor Business- and Consumer studies at the Wageningen University. I became interested in health claims on food products, when a lot of criticism on certain food products and their health claims were in the news. As a result, I chose the topic of my thesis: to find out the consumer understanding of the 'whole grain' label on food products. The process of doing research has not always been easy for me. Nevertheless, I feel like I learned a lot and got more confident about doing research. I would like to thank my supervisor Ellen van Kleef, she has been patient with me and was helping me with my questions and challenges. I want to thank my friends and family for the interesting discussions and for their advises.

I believe my topic is very interesting and this kept me motivated and I enjoyed doing this. I wish you a pleasant reading of this study.

Mandy van Kemenade – Nijmegen, May 2018

Abstract

There is a lot of attention among consumers concerning health and nutrition. Health claims on food products can guide consumers to make a healthy decision. The question arises if consumers understand health claims. This research gives answers on consumer understanding of the label 'whole grain' on food products. A between subject experimental design was set up in the form of two online questionnaires. The products bread, crackers, egg cake and biscuits with the label 'whole grain' were showed on images to one group and the products bread, crackers, egg cake and biscuits without the label 'whole grain' were showed on images to a control group. Consumer understanding was measured according to the CUT methodology from Rogeaux (2010). In total, a 138 respondents rated the percentage whole grain content and gave their inferences concerning health benefits of these products. Results indicated that consumer understanding does not depend on the label 'whole grain' on food products. For this study accurate inference making concerned answers classified as *safe* and less accurate inference making concerned answers classified as *risky*, *vague* or *better than*. Of the total respondents (not distinguishing between the two groups) concerning all four products, 15.22% were accurate in their inference making and 84.78% were less accurate in their inference making. Consumer understanding of whole grain products (with or without the label 'whole grain') is low. The findings of this study gave more insight in the consumer understanding of the label 'whole grain' and whole grain food products which may contribute towards increasing the awareness of lack of consumer knowledge of whole grain food products and to a change in legislation concerning 'whole grain' labelling on food products.

Key words: whole grain label, claims, inference making, consumer understanding

Table of Contents

List of tables and figures

1. Introduction

There is a lot of attention among consumers concerning health and nutrition (Nielsen, 2015). Potential health benefits are communicated by claims and labels. Health claims on food products are protected by the EU regulation (No.1924/2006) with regard to consumer protection: 'Claims are not false, ambiguous or misleading to the consumer' and 'claims shall be permitted only if the average consumer can be expected to understand the beneficial effects as expressed in the claim'. In this research we will specifically look at products with the label 'whole grain'. Currently there is no legislation regarding labelling of whole grains at the EU level. In the Netherlands there is a legislation concerning labelling bread 'whole grain' which states that 100% of the flour must be whole grain for bread if the label says 'whole grain' (EFSA, 2010). Other products with the label 'whole grain' than bread are not protected, which results in that a producer in the Netherlands is free to decide when to label a product, other than bread, 'whole grain'.

Whole grains have multiple health benefits. The consumption of whole grains increases the intakes of fiber which reduces the risks of chronic diseases, such as cardiovascular diseases, type II diabetes, obesity and colon cancer (Shao & Bao, 2015; Lilioja, Neal, Tapsell & Jacobs, 2013; Xu, Ding Zhao, Tang, Tang & Xiao, 2016; Kunzmann, Coleman, Huang, Kitahara, Cantwell & Berndt, 2015; Gemen, de Vries & Slavin, 2011). Recommendations have been made by the American Dietetic Association, the Surgeon General and the USDA in its Food Guide Pyramid, to consume at least 20 to 30 grams of fiber a day. Nevertheless, most consumers do not meet these nutrition guidelines. This is a concern among health professionals (Adams & Engstrom, 2000).

Consumers may have too high expectations of the amount of whole grain in a product and the health benefits of products with the label 'whole grain'. This is not unlikely, as research on how consumer interpret health claims has shown that consumers for some products tend to make inferences that are not in line with the scientific dossier concerning health benefits (Grunert, Scholderer & Rogeaux, 2011). The words 'whole grain' on the label are often misunderstood by American consumers shown by research which found that 85% of the consumers chose products with the label 'whole grain', assuming that these product were a 'good' or 'excellent' source of fiber which was not always the case. Determined by the US Food and Drug Administration a 'good' source of fiber is 2,5g/serving and an 'excellent' source of fiber 5g/serving (FDA, 2008). Consumers may rely too much on these food products to get a sufficient fiber intake (Hornick, Dolven & Liska, 2012).). Kellogg, as referred to in Hornick et al. (2012) found that 53% of the respondents agreed with the statement 'helps me lose weight' when they showed cereals with the label 'whole grain'. Several research show a positive relation between eating whole grain and weight loss (Wendel-Vos, Nooyens & Schuit, 2004). Nevertheless, the amount of consumers agreeing with this statement can indicate unjustified or incomplete inference as research also shows that eating whole grain does not immediately imply weight loss (Zondervan, 2012). The question arises if consumers understand and/or are making unjustified or incomplete health inferences concerning products with the label 'whole grain'. No research has been done on the effect of 'whole grain' on product labels like bread, egg cake, crackers and biscuits on consumer understanding and inference making in the Netherlands.

The research question of this study is:
What is the effect of ‘whole grain’ on the label of bread, egg cake, crackers and biscuits on consumer understanding and inference making concerning health benefits?

1. In comparison with bread, egg cake, crackers and biscuits without ‘whole grain’ on the label, do consumers assess that bread, egg cake, crackers and biscuits with ‘whole grain’ on the label contain a higher percentage whole grain flour?
2. In comparison with bread, egg cake, crackers and biscuits without ‘whole grain’ on the label, do consumers perceive bread, egg cake, crackers and biscuits with ‘whole grain’ on the label as healthier?
3. In comparison with bread, egg cake, crackers and biscuits without ‘whole grain’ on the label, do consumers make inferences that go beyond scientific evidence when ‘whole grain’ are on the label?’

A between subject-experimental design was applied in which consumer participants were shown the four products bread, egg cake, crackers and biscuits. About half of the participants saw these products without the words ‘whole grain’ on the label. The other half of the participants saw these products with the words ‘whole grain’ on the label. Key dependent variables are wholegrain content assessments and the accuracy of health inferences of consumers concerning a product with the label ‘whole grain’.

By getting to know how consumers understand the words ‘whole grain’ on labels of bread, egg cake, crackers and biscuits, we will be better able to make consumers aware and educate consumers on what ‘whole grain’ on these products mean. Also, this research may lead to a more adequate legislation in the Netherlands concerning ‘whole grain’ labelling on food products.

2. Theoretical background

To understand what the effect is of the words 'whole grain' on the label of bread, egg cake, crackers and biscuits on consumer understanding and inference making concerning health benefits, a theoretical framework is formed. In order to do so, this chapter describes the following: modes of thinking, consumer understanding of health claims and perceptual inference making.

2.1 Modes of thinking

Interpreting textual claims generally requires consumers to think consciously (system 2). Nevertheless, producers like to make use of pretty packages, with nice colours and other visual elements to attract consumers. Consumers are sensitive for this because they will (unconsciously) make use of a more heuristic and fast system (system 1) (Purnhagen, van Herpen & van Kleef, 2015).

In many human decision making models, there are two ways of thinking, they are called system 1 and system 2. System 1 is very quick, intuitive, automatic and unconscious. System 2 is slower, with conscious attention and logical (Norman, Sherbino, Dore, Wood, Yong & Gaissmaier, 2014). System 2, the conscious, rational self has opinions, makes choices and thinks about what to do and what to think. Although system 2 is important, system 1 is more often used. System 1 easily forms impressions and feelings. It is de main source of the choices from system 2. The automatic world of system 1 generates a complex pattern of ideas, but only system 2 is able to order these thoughts in clear steps. You can see these two systems as instruments with their own skills, limitations and functions. Examples of system 1 are when you see that an object is at a bigger distance than another object or when you have to locate the source of a sound. Examples of system 2 are when you are in a noisy space and you have to try keeping your focus to a certain person or when you have to compare the price-quality ratio of two washing machines. In the example situations of system 2 you have to be attentive. You will not be able to complete them when you are less or not focussed at all.

So most things you think and do in system 2, finds its origin in system 1. Nevertheless system 2 takes over when it gets complicated. Most of the time system 1 functions appropriate: known situations are formed accurately, short-term predictions are also accurate most of the times and the first reaction to challenging issues are quick and relevant. Although we should not forget that system 1 can have biases. Biases are systematic mistakes that are made in specific situations. Another disadvantage of system 1 is that it cannot be switched off (Kahneman, 2011).

2.2 Perceptual inference making

To find out how consumers understand claims, an important factor is what inferences consumers make concerning health claims (Stancu, Grunert, Lähteenmäki., 2017). When a consumer is confronted with a claim, they will make inferences related to the claim and they are often biased (Purnhagen, et al., 2015). Perceptual inference is using sensory stimuli to make a conclusion. Helmholtz (1910) described perception as a process of unconscious inference, which results the idea of that people infer the most likely. He also invented the term inductive inference, which means that perceptions are conclusions based not only on present sensations but also with reference to past sensations of the objects perceived (Nikolaos, 2015). In 1890 William James already expressed this idea and is referred to William James' law of perception: 'whilst part of what we perceive comes

from the object before us, another part (and it may be the larger part) always comes out of our own head'. Processes that might be responsible for the lack of understanding of health claims on food labels is inference making. Misunderstanding happens because consumers relate the new information to information already stored in the memory, and as part of this process they may make inferences about the product carrying the health claim that go beyond what is manifestly stated in the health claim (Grunert, et al., 2011).

2.2.1. Schema's

Inference making in situations of incomplete information or limited knowledge is explained by the theory of 'schemas'. Every person has their own schema, which is a knowledge structure about a particular domain he or she developed through his/her life (Alba & Hasher, 1983). Schema's are 'an active organization of past reaction or of past experiences' (Bartlett, 1932). The function of the schema is to give information, which immediately allows the consumer to make inference. According to this theory, consumers will go beyond the provided information. Consumers use schema's because they have to deal with an overwhelming amount of new information every day, schema's make it easier for consumers to process this information (Graber, 1988). For example in 1996 the FDA approved the use of Olestra as an ingredient in foods but Olestra could cause gastrointestinal problems for some consumers. According to the schema theory, there should have been a warning on the label that it can cause gastrointestinal problems because in the absence of this warning consumers apply their 'food safety' schema on this food product with Olestra without knowing that it is a schema default (Hastak & Mazis, 2011). Another example is when a consumer sees the claim on a product 'low in fat' the consumer may have developed a schema about fat according to personal experiences that 'low fat is less tasty' and 'low fat equals less calories'. When a consumer tries to make sense of a product, it will fill in the gaps with these associations (Chandon, 2013).

2.2.2. Health halo's

The 'halo-effect' is an exaggerated emotional bias. The 'halo-effect' is one way for system 1 to make the generated picture easier and more coherent than it actually is. The 'halo-effect' happens when there someone or something has a certain quality, you immediately assume that, that someone or something also has other qualities (Kahneman, 2011). The halo effect may also happen with the health claim 'whole grain' on a food product. Consumers have their expectations about nutritional and health benefits (Hornick, et al., 2012). This is called a 'health halo', in which a claim about single healthy quality rises one or more positive impression of other, non-claimed qualities (Chandon, 2013). The labels can lead consumers to form favourable overall evaluations and then use these overall evaluations to guide inferences about specific missing or unknown attributes (Sundar & Kardes, 2015). This halo effect may discourage them from seeking further nutrition information (Williams, 2005). For example when the label says 'whole grain' the consumer may make an inference that it is also low in fat. Andrews, Netemeyer and Burton (1998) did a study that focussed to what extend consumers generalize claims, the hypothesis was as following: 'consumer viewing favourable nutrient content claims will have more favourable evaluations of non-featured nutrient content and disease risk than will those exposed to control ad claims'. The sample for this study consisted of 365 consumers which did the primary groceries for their households and were at least 18 years old. These participants were interviewed in different malls across the US. Results showed that consumers who saw a favourable nutrient claim also had other benefits. They believed when a food was low in cholesterol it is also low in fat. The hypothesis is partly accepted as results were non-significant for the claim types heart diseases and cancer. These health halo's also apply on restaurant

menus. It was found that when a restaurant puts a 'heart-healthy' on the menu next to the meal, it was perceived as less risky of heart diseases, even when it was placed to an unhealthy meal on the menu like lasagna (Kozup, Creyer & Burton, 2003). A health halo also happens with food products with the label 'whole grain'. Hornick, et al. conducted an online study among approximately 1000 adults of 18 years or older. More than half of the respondents reported that they are making an effort to consume enough whole grains. 47% of the respondents gave the reason 'cholesterol reduction' for eating whole grain products. This means that one of the health halo's of products with the label 'whole grain' is that it also lowers the cholesterol.

2.2.3. Magic bullet effect

Another type of biased inference making is when consumers overinterpret and assign health benefits to these products that are not scientifically proven. The magic bullet effect differs from a health halo as the magic bullet effect happens when a consumer perceives a product as generally healthy when seeing a specific character of a product. A health halo happens when seeing this specific character leads consumers to assume that it also has other beneficial specific characteristics. As mentioned in section 2.2.2. Andrews, et al. (1998) did a research on nutrient content claims and favourable evaluations. In this research it was found that specific, general and control ad claims led to a higher overall health perception. This is an example of a magic bullet effect.

2.3 Research on understanding and overgeneralization of health and nutrition claims

To come to a conclusion, it is found that consumers infer that certain product with health claims have some health benefits they do not have (Roe, Levy & Derby, 1999) or to exaggerate certain health benefits when a product has health claim (e.g. Andrews et al., 1998; Roe et al., 1999). Consumers also make vague interpretations of health claims (Grunert et al., 2011). The contrary was found that consumers do not exaggerate health inferences of food products with health claims (Lähteenmäki et al., 2010) or consumers do not over-interpret health claims (Bilman, van Kleef, Mela, Hulshof & van Trijp, 2012). There is no research on overinterpretation by consumers of food products with the label 'whole grain' in the Netherlands.

In the legislation concerning health claims, they mention that consumers should understand the claim. This legislation does not provide further explanation on what is meant by 'understand'. Previous research state that understanding is 'adequate' when the average consumer 'makes inferences that are justified by the objective content of the claim without significant embellishment or exaggeration' (Leathwood, Richardson, Strater, Todd & van Trijp, 2007).

Van Trijp & van der Lans (2007) explored consumers perceptions in terms of the difficulty to understand a nutritional and health claims in four different country (Germany, Italy, UK and US). They asked there respondents: 'How difficult or easy it is for you to understand this claim?' [Very difficult to understand (1) to very easy to understand (5)]. They found that the consumers understanding depends on the benefit claimed. Cardio vascular diseases were perceived as difficult to understand and weight and concentration claims are perceived as easily understood. They found that a content claim is most difficult to understand. A content claim is a claim were it mentions an ingredient in the claim. Concerning this research the label 'whole grain' can be seen as a content

claim. Although respondents said and think they understood the claim, it does not prove that they actually did understand it (Leathwood, et al., 2007).

Also they measured health impact of a product by asking if they agree or disagree with the statements: 'is healthy', 'would help me achieve/manage <particular body function>', 'would help me reduce the risk of <particular disease>' and 'would help me <particular consumer benefit>'. They found that the weight product claim (i.e. keeps you feeling full) generated a low overall health perception (van Trijp, et al., 2007), which might indicate that they have not understood the health claim.

An approach on how consumers understand claims on food packages was done by Grunert, Scholderer and Rogeaux (2011). They measured consumer understanding by showing the respondents an image of the package of Actimel and the TV commercial that belonged to it with the health claim: 'Actimel helps strengthening the body's natural defences'. After seeing this claim they were asked: 'If you had to tell a friend what XXX does, what would you say? And if you had to tell a friend how it works?'. Answers were analysed and were ordered in three categories. The first category was *safe*; the consumer doesn't make any inferences that are not in line with the scientific dossier, the second category was *risky*; the consumer does make inferences that are not in line with the scientific dossier and the last category was *vague*; the answer was vague and not specific (e.g. a healthy product) or when the answer referred to other notions than about the healthiness of the product (e.g. the product was easy to eat). The results showed that 67% of the respondents are classified as safe, 21% as risky and 12% as vague. This shows that consumers make their own inferences and is possibly caused by the theory of 'schemas' (Grunert, et al., 2011).

Another approach on how consumers understand health claims was done by Bilman, et al. (2012). The aim of the research was to explore whether and how consumers may (over-) interpret satiety claims. A total of 1504 respondents filled in a questionnaire. In this questionnaire they were confronted with the following benefits: 'contains active fibers', 'increases fullness', 'helps to control hunger' and 'keeps you going between meals'. The results show that the majority correctly interpret the satiety related claims. The overall conclusion of this research is that the respondents correctly interpret the satiety related claims as the respondents understood that it requires personal effort to make use of the product claimed benefits. This means that consumer understanding differs per claim as for a different claim the opposite was found by Grunert et al. (2011).

A study on 'whole grain' products was done by Hornick, et al. (2012). The aim of this research was to measure perceptions and understanding of the relationship between whole grains, fiber and potential health benefits. They chose labels with the following statements: 'Made with whole grains', 'made with X g whole grains', 'made with [product specific] whole grains' (e.g. oats), 'whole-grain guarantee', 'At least X g whole grains per serving', 'good (or excellent) source of whole grains' (not FDA approved), 'whole grain food', 'X% whole grain' and 'one serving of whole grains'. The respondents were asked to fill in a survey. 69% of the respondents indicated they are choosing whole-grain products so there fiber intake would increase. Other respondents indicated that they choose whole-grain products because they think it has health benefits, associated with fiber. According to them it increases your digestive health (63%), satiety and weight loss (53%) and cholesterol reduction (47%). 85% of the respondents indicated they choose food with the claim

'whole grain' on the label assuming the product to be a good or an excellent source of fiber (Hornick, et al., 2012).

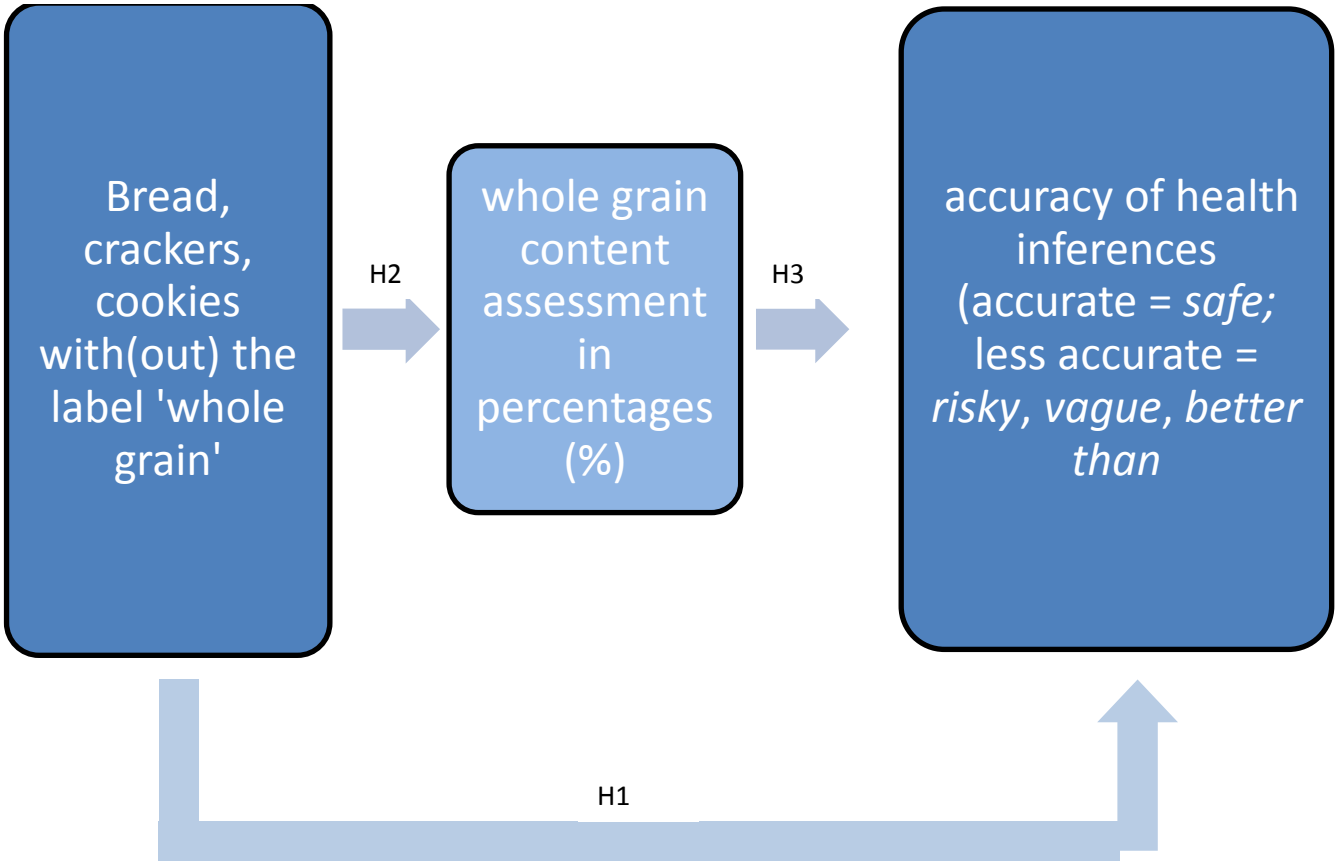
Kellog as referred to in Hornick, et al. did a research on consumer perceptions related to whole grain in cereals. The respondents were given statements and they could agree or disagree when on a cereal package was stated 'whole grain' or 'made with whole grain'. The percentages reflect the amount of respondents agreeing with the statement: 'whole- grain foods are healthier' (76%) 'A 'good' or 'excellent' source of fiber' (75%), 'cereal made from whole grains is an easy way to add fiber to my diet' (73%), 'one of the best sources of fiber' (70%), 'improves my digestive health (63%) and prevents constipation' (50%), 'helps me lose weight' (53%), 'I rely on foods made with whole grains for my daily fiber needs' (47%), 'If a label says X grams of whole grains, I expect X grams or more of fiber' (47%). This could mean that different claims are understood differently, it depends on the type of claim. There is no research on just the label 'whole grain' on food products concerning consumer understanding.

2.4 Conceptual model and hypothesis

Based on the research questions and the literature, hypotheses are established and will be tested by a between subject-experiment. As described in previous literature the understanding and inference making of a health claim seems to depend on the claim and the prior knowledge associated with the claim (Grunert et al., 2011, Bilman, et al., 2012, Chandon, 2013). The label 'whole grain' carries a health halo according to Hornick et al. (2012) what leads to a less accurate inference making of the health benefits as respondents assumed that products with the label 'whole grain' also ensures cholesterol reduction. The respondents went beyond what is scientifically proven. To test if respondents of this research will go beyond what is scientifically proven with the products of this research and for the Dutch population, the following hypothesis if formed: *(H1) Compared to bread, cracker and cookies without 'whole grain' label, the label 'whole grain' on these products will lead to less accurate inference making of health benefits.*

Personal prior knowledge associated with a health claim influences the understanding of claims (Chandon, 2013). To see if whole grain content assessment of a food product has an influence on respondents inference making of the product, the following hypothesis is formed: *H2) Compared to bread, crackers and cookies without 'whole grain' label, the label 'whole grain' on these products will lead to a higher 'whole grain' flour content.* To check the relationship between the whole grain content assessment and the according related inferences of health benefits, the following hypothesis is formed: *(H3) A higher rated 'whole grain' content in bread, egg cake, crackers and biscuits will lead to less accurate inference making of health benefits.* Figure 1 shows the conceptual model for hypothesis 1, 2 and 3

Figure 1 Conceptual model



3. Methodology

This research was designed to find out what the consumers' estimated whole grain flour content assessment is of products with(out) the label 'whole grain' and to see what they understand of this label by looking at the accuracy of health inferences made by consumers of products containing the label 'whole grain'. In order to evaluate consumer whole grain content assessments and consumer understanding, an online administrated experiment was performed. The study is conducted between March and April 2018 in the Netherlands. The images of the following products with their labels were used as stimuli: bread, egg cake, crackers and biscuits. The manipulation of the images consisted of removing the 'whole grain' label from the products that are used as a control condition.

3.1 Participants

In the European law it states that an 'average consumer' should understand a health claim. According to this law an average consumer is someone 'who is reasonably well-informed, taking into account social, cultural and linguistic factors'. This is still a vague and non operational definition. In this research this is interpreted as it is not a prerequisite that consumers should be current users of the concerned products so also non-consumers of the products are allowed. Respondents were randomly and through the snowball-effect recruited through distributing the link of the questionnaires via social media (Facebook) and through researcher's own social network, where they voluntarily selected to be a part of the sample. Participants were screened by age (18 years and older) and pre-knowledge: respondents who have finished or are still studying the following educations were excluded from the questionnaire as they are assumed to have more than average knowledge about whole grain products: 'weight consultant', 'nutrition and dietetics', 'dietetics', 'nutrition and health' and 'food'. A total of 138 respondents have completed the questionnaires. 65 for questionnaire 'whole grain 'and 73 for questionnaire 'control group'. The questionnaires were made in Qualtrics, this is an online survey platform. The total final sample consisted of 36.2% men (N= 50) and 63.8% women(N= 88), with a total average age of 32.17 years (SD= 13.39). Table 1 gives an overview of the demographic information of the sample used.

3.2. Experimental design

In this study a between subjects design is used with two groups ('whole grain' group vs. control group).The control group relates to the group that filled in the questionnaire with the images of products without the 'whole grain' label. The 'whole grain' group relates to the group that filled in the questionnaire with the images of products with the 'whole grain' label. The two questionnaires were randomly and evenly presented. This research is interested in how the label 'whole grain' affects consumer inference making and consumer understanding. One factor is manipulated: the presence of the 'whole grain' label on the food products. The results of the two groups are compared to each other. The questions in both questionnaires are asked in Dutch.

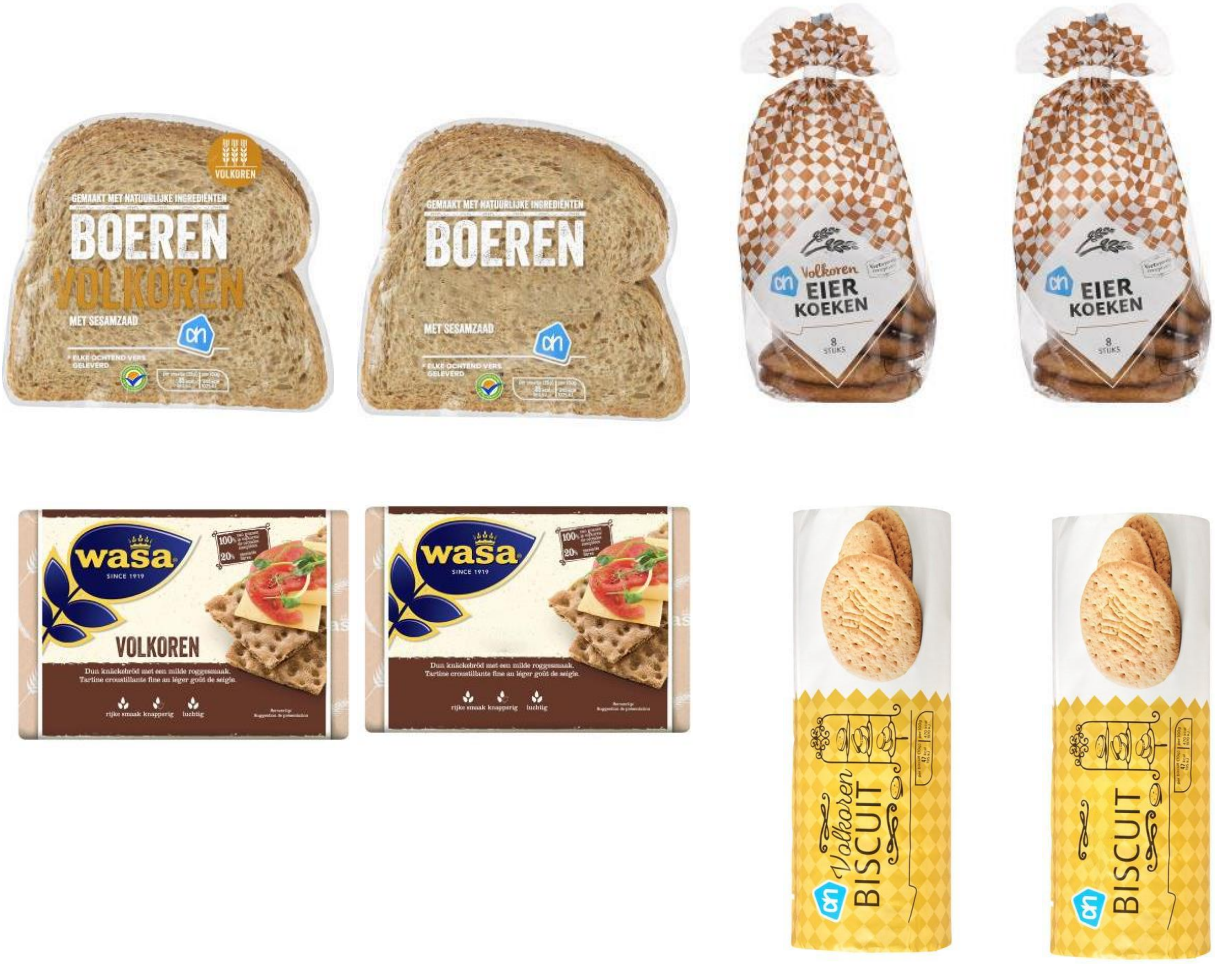
3.2.3. Stimuli

The main stimulus of this study are images of food products with(out) the label 'whole grain' (see figure 2). These food products are: bread, egg cake, crackers and biscuits. These products are chosen because they are known among Dutch consumers and are often consumed. The fiber in whole grain is a functional ingredient and has certain health benefits. Furthermore, the products used on the images already exist on the market in order to enhance task realism. For the products without the claim 'whole grain' the exact same product image is used but without the label 'whole grain'. These

products are used as a control group so it can be compared to the answers of the products with the label ‘whole grain’.

A total of 8 (2x4) products are shown in two different questionnaires. The questionnaires have the exact same questions but the only difference is the stimuli: one questionnaire has the product images with the ‘whole grain’ labels and the other questionnaire will contain the same product images without the label ‘whole grain’. To create the same images of products only without the label ‘whole grain’, Adobe Photoshop is used for graphical editing.

Figure 2 Product images with ‘whole grain’ label (left) and without ‘whole grain’ label (right)



3.3. procedure

This questionnaire started with an informed consent: screening requisite, information about privacy and personal data, how long the research will approximately take and contact information. After this information, the respondents could start with the experiment when they agreed on participating in the research. After they had clicked on ‘Yes, I agree with the participation of this research’ (translated from: ‘Ja, ik ga akkoord met deelname aan dit onderzoek’), the questionnaire started. After this, a screening question is asked, if the respondents agreed with finishing or still studying one of the following educations: ‘weight consultant’, ‘nutrition and dietetics’, ‘dietetics’, ‘nutrition and

health' and 'food', the questionnaire immediately sent these respondents to the end of the questionnaire and they were finished. For the respondents answered 'no' on the question are proceeding with a short explanation of the upcoming questions, including mentioning that no answer given can be wrong. After this short explanation, the respondents were exposed randomly to one of the four food product images. Subsequently, the respondent's whole grain content assessment and consumer understanding of the label 'whole grain' is measured. It was measured by showing the image and a slide bar to give their estimation of whole grain flour in percentages. Always after this question the next question asked to the participants: 'After seeing this product, if you had to tell a friend about the health effects of this *name of the product*, what would you tell?'. These two types of question were asked for the four products. The order of the images with the food products were randomised. After this, the respondents were asked about their demographic information, gender and education level). Finally, respondents had the option to give any comments about the research. All the questions had a 'force response' and the participants were able to go back to the previous pages.

3.4. Measures

3.4.1. Whole grain content assessment

To measure whole grain content assessment of the products bread, egg cake, crackers and biscuits with(out) the label 'whole grain', images of these products where shown and respondents were asked: 'How much percent of the used flour of this product is whole grain flour?' (translated from: 'Hoeveel procent van het gebruikte meel voor dit product is volkorenmeel?'). Respondents could do this by sliding a bar from 0% whole grain flour to 100% whole grain flour used. The images of products without the label 'whole grain' are used as a control group and to see the ratio between the questionnaire with and without the label 'whole grain'.

3.4.2. Consumer understanding

Consumer understanding was measured using a derivative of the method CUT (Consumer Understanding Test) in online questionnaires, originally developed by Danone (Rogeaux, 2010). Respondents were exposed to stimuli (in this research: images of food products and was followed by two open questions). In this research only one open question is used. By asking an open question it allows respondents to give their own inferences without being directed. The only direction they get is that it should be about health effects. This direction is chosen to assure the answers will not be too broad. The CUT also provides guidelines for data coding and analysis (Grunert et al., 2011). The method is changed a little bit for this study, the CUT questions from Grunert et al (2011):

- 'If you had to tell a friend what *product name* does, what would you say?'
- 'And if you had to tell your friend how it works?'

The first question for this study is changed into:

- 'After seeing this product, if you had to tell a friend about the health benefits of this *product name*, what would you say?' (translated to Dutch in questionnaire: 'Na het zien van dit product, als u aan een vriend moest vertellen over de gezondheidsvoordelen van deze crackers, wat zou u vertellen?')

The second question was not included in this study.

3.5 Data analysis

In order to evaluate the hypotheses and sub research questions, the analysis was carried out with the statistical software program IBM SPSS Statistics 25. The sample properties are bundled together to create a clear overview of this data, see table 1.

3.5.1. Consumer understanding

To measure consumer understanding, there is looked at the accuracy of health inferences made by the respondents. The method used to measure consumer understanding is from Grunert, et al. (2011). The content of the answers of the open question are analysed and divided into three categories: *risky*, *safe* and *vague* and *better than*. *Risky*: the answer is not in line of what is scientifically proven, safe: the answer is in line of what is scientifically proven, *vague*: the answer is not specific enough (e.g. it is healthy) or the answer is irrelevant with regard to the research (e.g. the product is tasteful) and *better than*: the answer contains 'it is better than' (e.g. 'this bread is better than white bread'). The category *safe* is perceived as an accurate inference making, the categories *risky*, *vague* and *better than* are perceived as less accurate and indicate a lack of consumer understanding. The codification is done manually and the content of the answers were analysed using a coding scheme. The coding scheme is showed in table 1 based on a schema of Stancu, Grunert & Lähteenmäki (2017). For this study 'Better than' is added to the three groups.

Table 1 Content categories developed for the CUT method answers (Stancu, et al., 2017)

Content category and selected sub-categories	**Description**
Safe inferences	Statement that were in line with the scientific evidence behind the health claim
Content inferences	Statements that refer to the content of the claimed component in the product
Risky inferences	Statements that were not in line with the scientific evidence behind the health claim. The content coded at this category referred mainly to exaggerations of the claimed benefit
Unrelated health benefits	Statements that referred to health benefits which were unrelated to the one claimed
Unrelated ingredient inferences	Statements that refer to the content of a nutrient/component in the product other than the claimed component or just contain a mention of an ingredient which is unrelated to the claimed one
Vague inferences	Statements that expressed a vague notion related to the claimed benefit Statements that expressed a vague notion (e.g. healthy product) or statements that were irrelevant in relation to the health claim (e.g. product is tasty). This code also includes the ''do not know" types of answer
'Better than' inferences	Statements that say 'better than ... *another product*'

To see if respondents are right about the percentage whole grain flour in the products showed, the percentage whole grain flour per product was calculated. As according to the Dutch law, bread with the label whole grain is made from 100% whole grain flour. The percentage for the other products was calculated according to this, e.g. bread is made of 100% whole grain flour and contains 6.5 gram of fiber/100 gram bread, whole grain biscuits contain 6 grams of fiber per 100 gram so you can calculate that whole grain biscuits contain 92.31% of whole grain flour ((6*100)/6.5).

To check if respondents' answers are in line with the health benefits that are scientifically proven, a closer look is necessary. It is scientifically proven that products containing fiber reduces the risk of coronary heart diseases, lower risks of type 2 diabetes and hypertension (Lillioja, Neal, Tapsell & Jacobs, 2013). For reducing the risk of colon cancer it is proven that a diet rich of fiber improves the immune function, reduces inflammatory response and promotes early recovery of intestinal movement (Xu, Ding, Zhao, Tang, Tang & Xiao, 2016) and it thus has a reduced risks of colon cancer (Kunzmann, Coleman, Huang, Kitahara, Cantwell & Berndt, 2015). A fiber rich diet also contributes to the gut health and it is proven that high intakes of fiber is associated with a lower body weight (Gemen, de Vries & Slavin, 2011). It is important to notice that fiber itself does not reduce body weight but fiber does increase your satiety feeling what can lead to less eating (Zondervan, 2012). To check if the products used for this research contribute to these health benefits, an overview was made (see table 2). The health effects for these products were based on their grams fiber per portion and the amount an average Dutch consumer consumes of this product. As bread and crackers are important food products in an average Dutch consumer diet (VCP, 2007/2010) and have relatively high fiber contribution per portion, they are seen as contributors for the health effects mentioned. Biscuits and egg cake do not contribute to the mentioned health effects as they are very low in their fiber per portion. For this study, the respondents' answers from the control group are analysed such that the products without the label 'whole grain' do not contribute to any of the mentioned health effects related to fiber.

Table 2 Product information

Product type	Portion size	Grams fiber/portion	% whole grain flour	Health effects
Whole grain bread 	35 grams	2.275 grams	100%	Yes, potential health effects from fiber
Whole grain biscuits 	10 grams	0.6 grams	92.31%	No potential health effects from fiber
Whole grain egg cake 	25 grams	0.75 grams	46.15%	No potential health effects from fiber
Whole grain crackers 	13 grams	2.6 grams	307.69%*	Yes, potential health effects from fiber

* the reason why this is more than 100% is because of the way it was calculated. Whole grain bread is made of whole *wheat* flour and the crackers are made of whole *rye* flour. Whole rye flour contains more fiber than whole wheat flour. For the data analysis: if the respondent answered that whole grain crackers contain 100% whole grain flour, it was analysed as the truth.

3.5.2. Interaction effect between the 'whole grain' label and accuracy of health inferences

To see if there is a correlation between the products which contain the 'whole grain' label and the accuracy of respondents' health inferences, a squared chi test is conducted. To accept the hypothesis: '*Compared to bread, cracker and cookies without 'whole grain' label, the label 'whole grain' on these products will lead to less accurate inference making of health benefits'* , a p-value of 0.05 or smaller is needed.

3.5.3. Significant difference between content assessment and accuracy of health inferences

To see if there is a significant difference between the estimated content assessment of the respondents and the accuracy of respondents' health inferences, an ANOVA is conducted. To accept

the hypothesis: '*Compared to bread, crackers and cookies without 'whole grain' label, the label 'whole grain' on these products will lead to a higher 'whole grain' flour content',* a p-value of 0.05 or smaller is needed.

3.5.4. Predictive value of the 'whole grain' label on health inference making

To see that the label 'whole grain' causes health inference making of respondents to be less accurate, a binary logistic regression is conducted. To accept the hypothesis: *A higher rated 'whole grain' content in bread, egg cake, crackers and biscuits will lead to less accurate inference making of health benefits',* a p-value of 0.005 or smaller is needed. If the p-value is 0.05 or smaller then the odds ratio can tell the likeliness of respondents being accurate when the percentage of the whole grain content assessment increases.

4. Results

4.1. Descriptive information and randomisation check

A total of 217 respondents agreed to participate of whom 74 completed the questionnaire partially and 143 people completed the questionnaire fully. 5 of these respondents agreed with Q2 and were excluded from the questionnaire as there was assumed they have too much knowledge about the subject to be an average consumer. So a total of 138 (50 males, 88 females) respondents were analyzed (see table 3). 65 respondents participated in the 'whole grain' questionnaire and 73 respondents participated in the control questionnaire. The average age of the group with 'whole grain' label was 31.63 (SD 12.65) years (range 18 – 65 years). Gender was equally balanced across conditions ($p<0.422$) and participants across conditions did not differ in education level ($p<0.742$) and age ($p<0.737$). However, in total more women than men filled in the questionnaires.

Table 3 Demographic factors

	Group with 'whole grain' label (N=65)	Group without 'whole grain' label (N=73)	P- value (main effect)
Gender - %			0.422[1]
Male	32.3	38.9	
Female	67.7	61.1	
Age - Mean (SD)	31.63 (12.65)	32.40 (14.02)	0.737[2]
Education level - %			0.742[1]
High	80.0	82.2	
Low/middle	20.0	17.8	

[1] Squared chi test

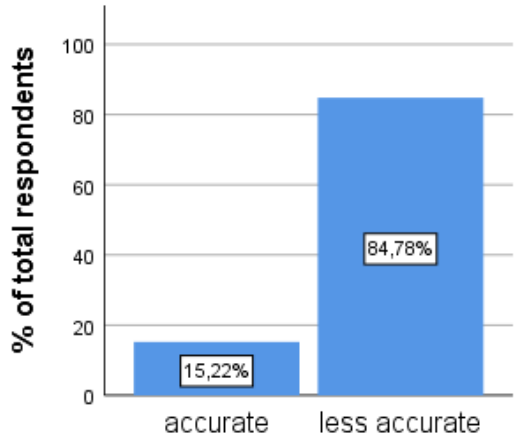
[2] Anova

4.2 Consumer understanding of whole grain products

Consumer understanding was measured according to the CUT methodology originating from Rogeaux (2010). For this study answers that were classified as *safe* were considered accurate and answers that were classified as *risky*, *vague* or *better than* were considered as less accurate. Figure 3

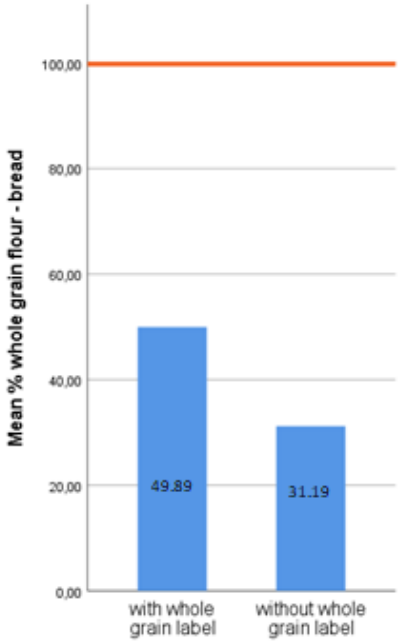
shows the accuracy of inference making of the total respondents without making a distinguish between the whole grain group and the control group. It is notable that there is a big difference between the accurate inference making and less accurate inference making.

Figure 3 accuracy inference making of total respondents (accurate = *safe*, less accurate = *risky*, *vague*, *better than*)

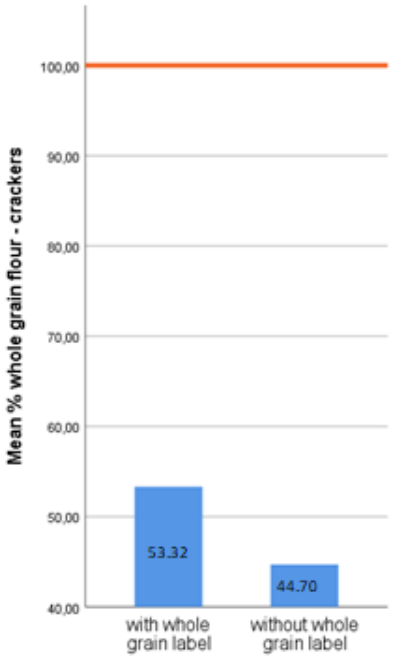


Another way to measure the consumer understanding was by asking the respondents the percentage of whole grain flour that each product contained. Figure 4 shows the results of the whole grain flour content assessment for both groups. The orange line represents the real whole grain flour content of each product (see § 3.5.1.). Both groups are far below the real whole grain flour content of the products.

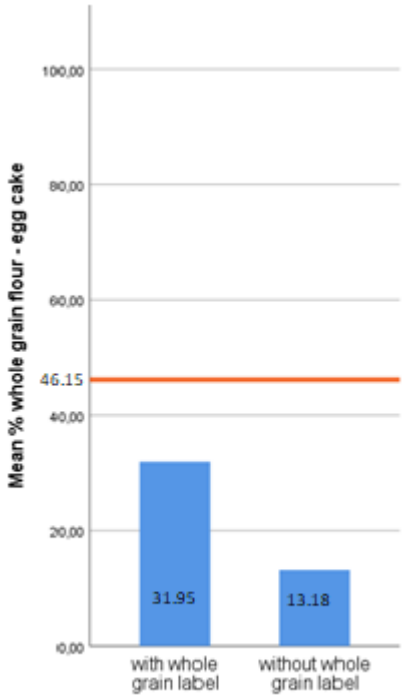
Figure 4 Mean % whole grain flour content assessment per food product on the two different groups



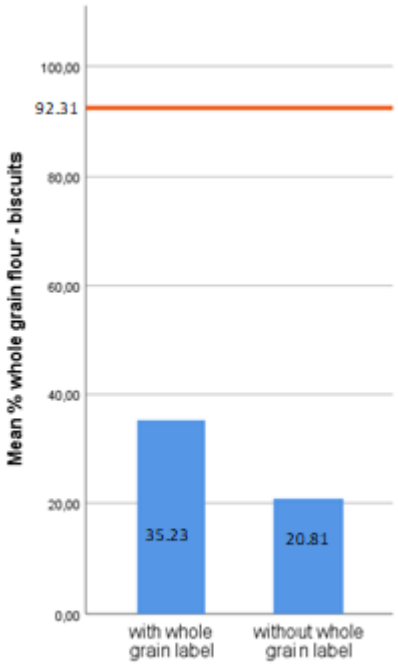
Bread



Crackers



Egg cake



Biscuits

4.3. Understanding of the claim

Answers to the open questions on understanding the 'whole grain' claim were coded according to the coding scheme from Rogeaux (2010) and according to the scientific dossier on whole grain health benefits, classified as *risky*, *safe*, *vague* or *better than*.

4.3.1. Inference making difference across condition

This paragraph will outline the results of the analysis that are derived from hypothesis 1, which states that the label 'whole grain' on the concerned products will lead to a less accurate inference making of health benefits compared to the control group.

The squared chi test with the CUT categories as dependent variable and the 'whole grain' label as the independent variables, shows that there is no significant interaction between the accuracy of inference making of consumers and the 'whole grain' label for bread ($p<0.310$), egg cake ($p<0.432$), crackers ($p<0.839$) and biscuits ($p<0.241$) (see table 4).This means that hypothesis 1 is rejected.

There is a significant interaction between the answer 'better than' and the whole grain label for the products bread ($p<0.010$), egg cake ($p<0.001$) and crackers ($p<0.001$). This means that the label 'whole grain' on products of bread, egg cake and crackers are more likely to have a 'better than' inference making than these products without the 'whole grain' label.

Besides the significant values table 4 also shows that ,regardless of the group respondents are in, a lot of respondents are *vague* concerning all four products. For the products biscuits and egg cake a high percentage of the respondents are *risky*. 32.3% of the whole grain group and 37.0% of the control group is *risky* concerning biscuits. For egg cake, 32.3% of the 'whole grain' group and 28.8% of the control group is *risky*.

Table 4 % of group respondents per product category classified for every CUT category on the two different groups and results of the **squared chi** test for *risky*, *safe*, *vague*, *better than* and *accuracy.*

	Group with 'whole grain' label (N=65)	Group without 'whole grain' label (N=73)	P- value (main effect)
Bread - %			
Accuracy	16.9	11.0	0.310
Risky	15.4	20.5	0.432
Safe	16.9	11.0	0.310
Vague	41.5	57.5	0.061
Better	26.2	9.6	**0.010***
Egg cake -%			
Accuracy	15.4	20.5	0.432
Risky	32.3	28.8	0.652
Safe	15.4	20.5	0.432
Vague	33.8	49.3	0.066
Better	18.5	1.4	**0.001***
Crackers - %			
Accuracy	13.8	15.1	0.839
Risky	12.3	21.9	0.137
Safe	13.8	15.1	0.839
Vague	53.8	61.6	0.354
Better	20.0	1.4	**<0.001***
Biscuits - %			
Accuracy	10.8	17.8	0.241
Risky	32.3	37.0	0.565
Safe	10.8	17.8	0.241
Vague	40.0	37.0	0.716
Better	16.9	8.2	0.120

*$p \leq 0.05$

4.3.2. 'Whole grain' label and content assessment

The second hypothesis states that the 'whole grain' label on the products showed to the respondents, will lead to a higher rated whole grain flour content for the products. This paragraph will outline the results from the analysis following from hypothesis 2.

The one-way ANOVA was performed to see if there is a significant difference between the two groups on rating the whole grain flour content (see Table 5). ANOVA with 'whole grain' label as independent variable and the content assessment in percentages of the products bread, egg cake, crackers and biscuits as dependent variables revealed a significant effect of the 'whole grain' label on bread (<0.001), egg cake (p<0.001), crackers (p<0.032) and biscuits (p<0.001), which means that the

whole grain flour content assessment is dependent on the 'whole grain' label. Hypothesis 2 is accepted.

Table 5 average % whole grain content assessment per product on the two different groups and results of the ANOVA test for each product content assessment.

	Group with 'whole grain' label (N=65)	Group without 'whole grain' label (N=73)	P-value (main effect)
Content assessment – % mean (SD)			
Bread	50.0 (23.0)	31.2 (22.0)	**<0.001***
Egg cake	32.0 (22.5)	13.2 (22.6)	**<0.001***
Crackers	53.2 (24.6)	44.7 (22.2)	**0.032***
Biscuits	35.2 (23.6)	20.8 (16.5)	**<0.001***

* $p \leq 0.05$

4.3.3. Prediction value of whole grain flour content

This paragraph will outline the results of the analysis that are derived from hypothesis 3, which states that when a higher rated whole grain content flour in the products will lead to inaccurate inference making of health benefits.

A binary logistic regression was performed to check if the percentage whole grain flour rated by the respondents can predict the accuracy of inference making of health benefits for the products bread, egg cake, crackers and biscuits. The binary logistic regression with the 'percentage whole grain flour rated' as independent variable and the accuracy of inference making as dependent variable, revealed that the percentage of whole grain content flour has no prediction value for any of the products. There was no significant association between the accuracy of inference making of health benefits for the products bread ($p<0.286$), egg cake ($p<0.155$), crackers ($p<0.480$) and biscuits ($p<0.855$), thus there is no prediction value of the percentage whole grain flour content assessment towards accuracy of inference making. Hypothesis 3 is rejected.

5. Discussion

The main goal of this study is to investigate consumer understanding of the 'whole grain' label on food products. This study also showed results concerning consumer understanding of the products bread, crackers, egg cake and biscuits, not distinguishing between the whole grain group and the control group. Of the total respondents concerning all four products, 15.22% were accurate (= *safe*) and 84.78% were less accurate (= *risky*, *vague* or *better than*) with their inference making. This indicates that in general the respondents may have a lack of knowledge of the health benefits of whole grain products. Often in the consumers' minds whole grain is equal to fiber and this is not the case (Hornick, et al., 2012). Grunert, et al.(2011) found the contrary as they found that 67% of the respondents were classified as *safe*.

For all four products a high percentage of the respondents were *vague* (see table 2). This indicates that respondents did not know the related health benefits or respondents found it difficult to be concrete regarding health benefits which again indicates a lack of knowledge. Also here Grunert, et al. (2011) found the contrary as they found that only 12% was *vague*. Grunert et al. (2011) used Actimel yoghurt drinks as stimuli with a very specific health claim and in this research whole grain products were used without a specific claim, according to Van Trijp & van der Lans (2007) consumer understanding depends on the benefit claimed. It could be that the benefit claimed in Grunert et al. (2011) is easier to understand than the 'whole grain' label. Another explanation is that the CUT methodology might not have been the best methodology as it mainly has been used for health claims that actually mention a health benefit, e.g. in the study of Stancu, et al. (2017) the claim was: 'A meal with beta-glucans from oats limits blood sugar fluctuations afterwards', the label 'whole grain' does not mention such a health benefit.

Also high percentages of riskiness was found for all four products but especially for egg cake and biscuits. Respondents might be too optimistic, thinking that there are more health benefits related to egg cake and biscuits than they actually have. A reason why bread and crackers had a lower riskiness level could be because bread and crackers do contribute to some health benefits related to fiber and egg cake and biscuits never have health benefits related to fiber. Respondents might have thought that every whole grain product has the same health benefits. Hornick et al. (2012) confirms that consumers rely too much on whole grain labels to add fiber to their diet and their health benefits. It may also be explained that consumer have a limited knowledge of the products egg cake and biscuits and are applying their 'schemas' which allows consumer to make their own inferences (see §2.2.1.) (Grunert, et al., 2011).

Secondly, all the respondents were asked to rate the whole grain flour for each product. Both groups are far below the real whole grain flour content for every product. Respondents were rather pessimistic about the whole grain flour content. This could indicate that respondents are suspicious to all four products. This could be because over the last year there was a lot of attention concerning bread and other food products that was being perceived as misleading according to Foodwatch (A Dutch social organisation that critically looks at food products). There was no criticism on whole grain bread but mainly on other products such as crackers in general, according to Foodwatch, they do not contain enough whole grain flour. Also corn bread from a Dutch retailer was revealed to be misleading as there was 0% corn in their corn bread. These criticisms were widely adopted by the media. The consumers mind may have just remembered that bread and/or whole grain products are misleading. Another explanation of the low rated whole grain flour for all products could be again a lack of knowledge.

With regard to the inference making across the condition 'whole grain' label , the results of the analysis showed that there is no significant effect of the 'whole grain' label on inference making of health benefits. This result was not expected because it was thought that the label 'whole grain' would provoke consumers to be less accurate because it was expected that consumers associated the label with the product being more healthy due to health halo's than the same product but without the label (Hornick, et al., 2012; Chandon, 2012; Sunder & Kardes, 2015; Andrews, et al., 1998). As there is no effect of the label it may be assumed that consumers are not being less accurate concerning the products bread, egg cake, crackers and biscuits compared to these products without the label. Although there was a significant difference of the 'whole grain' label on answers

that are classified as 'better than' for the products bread, egg cake and crackers. This means that respondents answered with 'better than' significantly more often with products containing the label than with products without the label. This could be because when the respondents did not know the exact health benefits at least they assumed that it is a better version than products without the label 'whole grain', e.g. bread containing the label, a lot of respondents answered: 'this is better than white bread'. It is true but this implies that respondents think that products with the label 'whole grain' are a healthier/better choice but they do not know how much healthier/better the product is and what the exact health benefits are of the concerning products. Although consumers might have a lack of knowledge the 'whole grain' label, it does not lead to overgeneralization of health benefits or does not seem to have a health halo.

Also, results indicated that the products with the label 'whole grain' led to a significantly higher level of whole grain content. Thus, respondents are affected by the 'whole grain' label concerning rating the percentage whole grain flour of a product. This is explicable as respondents might have assumed that there is more whole grain flour in products that have the 'whole grain' label. As this was affirmed, this study also expected that when consumers rated a high percentage whole grain flour in a product this would lead to less accurate inference making. Less accurate inference making are answers that were classified as *risky*, *vague* or *better than*. This was expected as it was thought that in the consumers' mind a higher rated percentage of whole grain would have a health halo and would lead to an exaggeration of healthiness perception (*risky*), an exaggeration of the amount of health benefits (*risky*) or a vague answer due to a lack of knowledge of the health benefits concerning whole grain products (*vague*) (Chandon, 2012; Sundar & Kardes, 2015; Andrews, et al., 1998; Hornick, et al., 2012). Nevertheless, the results from the binary logistic regression showed no significant evidence. This means that the level of whole grain flour content cannot predict the accuracy of inference making. Thus, this means that in the consumers' mind a higher rated whole grain content does not lead to less accurate inference making. Although they rate the percentage whole grain flour products with a 'whole grain' label higher than products without a 'whole grain' label, respondents do not exaggerate health effects or stay more vague.

5.2 Limitations and recommendations for further research

5.2.1. Limitations with regard to study design

This study also encountered some limitations that have to be acknowledged. Firstly, with regard to the sample of the study, the sample is not completely representative. Due to the recruitment of the respondents, which was through the network of the researcher, a large part of the sample consists of higher educated people (81.2%) and in their twenties (students). Moreover, the majority of the respondents consisted of women (63.8%). Regarding the two sample sizes of 65 for the 'whole grain' group and 73 for the control group are rather small and might therefore not be very representative for the Dutch consumers.

Secondly, with regard to the order of two questions in the questionnaire, the first question gives the respondents an anchor ('How much percent of the used flour of this product is whole grain flour?') for the second question('After seeing this product, if you had to tell a friend about the health benefits of this *product name*, what would you say?'). The respondents probably assumed for the second question that the research was aiming at health benefits related to whole grain flour. This anchor makes the research less strong.

Third, the percentages of the products showed in the images were calculated on the basis of bread assuming bread is made of 100% whole grain. Because of this, crackers are stated to have more than 100% whole grain flour. The reason it is done like this is because it is not generally known how much the percentage 'whole grain' in products are exactly. Nevertheless, it is important to realize that whole grain flour is not directly equal to fiber. There are more types of whole grain flour (e.g. whole grain wheat flour and whole grain rye flour), not every type of whole grain flour contains the same amount of fibers.

Thereby, the coding procedure is done manually and not through an automatic coding via computer software. It is done manually since coding mechanical could misinterpret answers and would lead to non-meaningful answers, you reduce misinterpretation by doing it manually. The study acknowledges that manual coding raises questions about reliability. Nevertheless, the coding scheme adjusted for this study from Rogeaux (2010) is used consequently. The coding procedure was only done by one person. To increase the reliability two persons should code the answers independently and later discuss their differences and come to a final conclusion of the code given to a respondents' inference.

5.2.2. Recommendations and implications

The results of the analyses showed that there is no effect of the 'whole grain' label on consumers inference making. It did showed that a big majority of the total respondents where less accurate (*risky*, *vague* and *better than*). It should thus not be assumed that consumers knowledge concerning whole grain food products is sufficient, it is recommended to the consumers to broaden their knowledge about whole grain food products. Nevertheless, an increase of nutrition knowledge is necessary for change but not sufficient enough for changes in consumers behaviour (Worsley, 2002).

As a lot of the respondents gave feedback of the perceived difficulty of the questionnaires, it would be interesting to do a following-up study and apply a different methodology to measure consumer understanding of the 'whole grain' claim. Moreover, to ensure the findings of this study it would also be interesting to replicate this study with more whole grain product types and to check if the findings differ.

Overall, it can be concluded that consumer understanding of the products bread, egg cake, crackers and biscuits concerning health benefits does not depend on the label 'whole grain' among the Dutch consumers.

To conclude, this study contributes to the scientific literature, since little research has been carried out towards the 'whole grain' label on food products. Furthermore, this study can be assessed as valuable in making consumers aware of their lack of whole grain food product knowledge. The legislation should have the same rules concerning all whole grain products so it is more transparent to the consumers.

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Appendix I

Questionnaire 'whole grain' group

Introduction

Beste deelnemer,

Fijn dat u mee wilt werken aan dit onderzoek! Deze vragenlijst zal gaan over voedingsmiddelen en uw mening hierover en zal ongeveer 5 minuten duren.

Er bestaan geen foute antwoorden bij dit onderzoek. De resultaten worden anoniem verwerkt en zullen enkel gebruikt worden om meer inzicht te krijgen in consumentengedrag. Deelname is eenmalig en geheel vrijwillig.

Voor eventuele vragen kunt u mailen naar
mandy.vankemenade@wur.nl

Alvast ontzettend bedankt voor uw deelname!

- ○ Ja, ik ga akkoord met deelname aan dit onderzoek

Q1 Heeft u een van deze opleidingen behaald? Of indien u nog studeert, volgt u op dit moment een van deze opleidingen?

- Gewichtsconsulent(e)
- Voeding en diëtetiek
- Voedingsleer
- Voeding en gezondheid
- Voeding

- ○ ja
- ○ nee

(condition: 'ja' is selected – skip to: end of survey)

Explanation

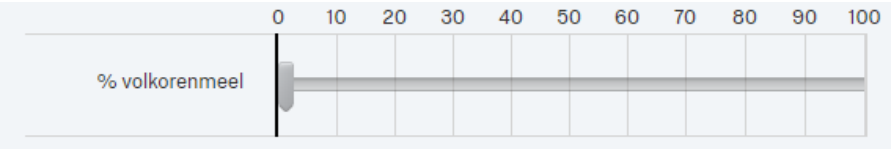
Bij de volgende vragen zult u van verschillende producten een afbeelding te zien krijgen. Eerst wordt er gevraagd of u een schatting kunt geven wat betreft de hoeveelheid gebruikt volkorenmeel in het betreffende product.

Dit doet u door met uw muis op op het balkje te klikken en te schuiven. De vraag die daar op volgt gaat over de gezondheidsvoordelen van het product op de afbeelding. Probeer altijd iets in te vullen zelfs als u het niet weet.

Succes!

Q2

Hoeveel procent van het gebruikte meel voor dit product is volkorenmeel?

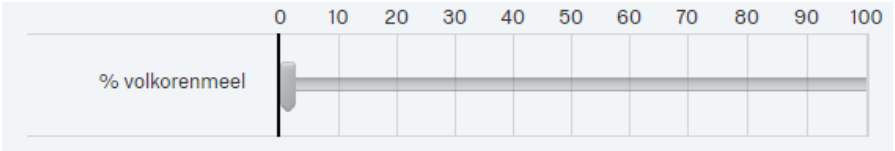


Q3

Na het zien van dit product, als u aan een vriend moest vertellen over de gezondheidsvoordelen van dit brood, wat zou u vertellen?

Q4

Hoeveel procent van het gebruikte meel voor dit product is volkorenmeel?

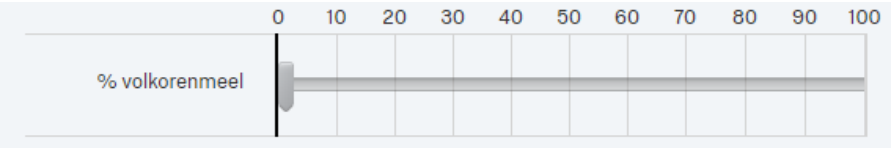


Q5

Na het zien van dit product, als u aan een vriend moest vertellen over de gezondheidsvoordelen van deze eierkoeken, wat zou u vertellen?

Q6

Hoeveel procent van het gebruikte meel voor dit product is volkorenmeel?

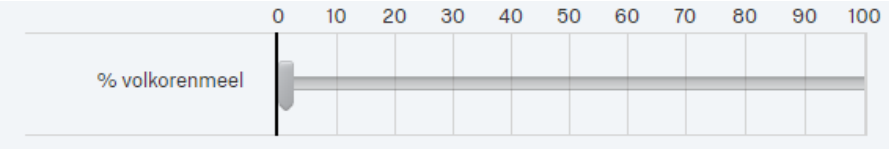


Q7

Na het zien van dit product, als u aan een vriend moest vertellen over de gezondheidsvoordelen van deze crackers, wat zou u vertellen?

Q8

Hoeveel procent van het gebruikte meel voor dit product is volkorenmeel?



Q9

Na het zien van dit product, als u aan een vriend moest vertellen over de gezondheidsvoordelen van deze biscuits, wat zou u vertellen?

Q10 Wat is uw leeftijd?

Q11 Wat is uw geslacht?

- ○ vrouw
- ○ man

Q12 Wat is uw hoogste behaalde opleiding? Of indien u nog studeert, welke opleiding volgt u op dit moment?

- ○ basisonderwijs
- ○ lager / voorbereidend beroepsonderwijs (vmbo beroeps, lbo, lts, ito, leao, lhno, lave, huishoudschool, etc.)
- ○ middelbaar algemeen voortgezet onderwijs (vmbo theoretisch, mavo, ulo, mulo, ivo, vglo, etc.)
- ○ middelbaar beroepsonderwijs (mbo, mts, meao, mhno, inas, mis, etc.)
- ○ hoger algemeen voortgezet onderwijs (havo)
- ○ voorbereidend wetenschappelijk onderwijs (vwo, gymnasium, atheneum)
- ○ hoger beroepsonderwijs (hbo, hts, heao, kandidaatsopleiding, bachelor)
- ○ wetenschappelijk onderwijs (wo, doctoraal, master)

Q13 Heeft u opmerkingen over deze enquête, schrijf dat dan hier neer:

Hartelijk bedankt voor uw bijdrage.

Appendix II

Questionnaire control group

Introduction

Beste deelnemer,

Fijn dat u mee wilt werken aan dit onderzoek! Deze vragenlijst zal gaan over voedingsmiddelen en uw mening hierover en zal ongeveer 5 minuten duren.

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- Gewichtsconsulent(e)
- Voeding en diëtetiek
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- Voeding

- ○ ja
- ○ nee

(condition: 'ja' is selected – skip to: end of survey)

Explanation

Bij de volgende vragen zult u van verschillende producten een afbeelding te zien krijgen. Eerst wordt er gevraagd of u een schatting kunt geven wat betreft de hoeveelheid gebruikt volkorenmeel in het betreffende product.

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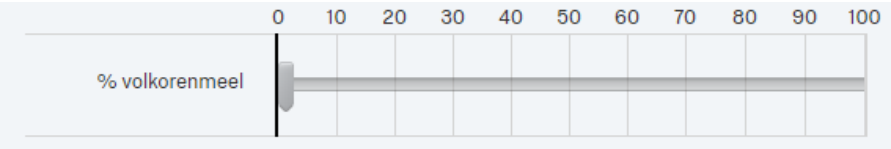
Succes!

Q2

Hoeveel procent van het gebruikte meel voor dit product is volkorenmeel?



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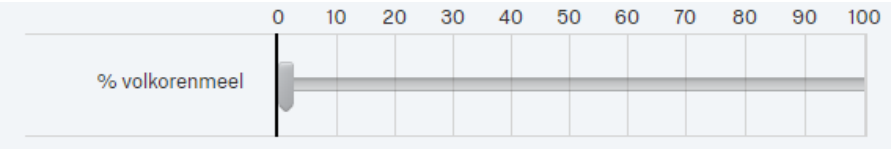
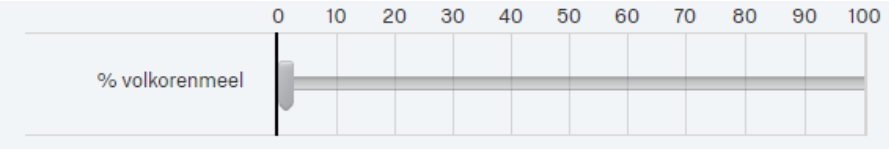


Q5

Na het zien van dit product, als u aan een vriend moest vertellen over de gezondheidsvoordelen van deze eierkoeken, wat zou u vertellen?

Q6

Hoeveel procent van het gebruikte meel voor dit product is volkorenmeel?



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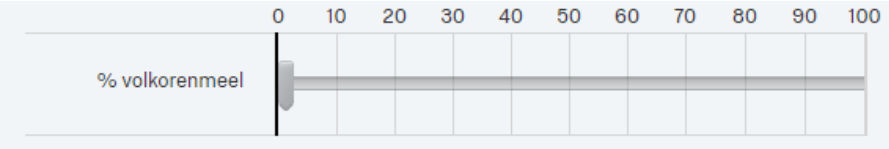

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