Negative allergen labelling: possibilities and limitations for alcoholic beverages

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Abstract

Food allergies increase in prevalence throughout the world. This causes a rise in precautionary allergen labelling as well. It is used to ensure the safety of the allergenic consumer, but often causes more frustration and confusion than clarity. This study wanted to test potential new methods for allergen labelling given the current dissatisfaction with consumers. Researched was the effect of a negative allergen indication on the label of amaretto liqueurs, which provided the consumer with the assurance that almonds were *not* present in the product, while the product is often associated with them.

While the respondents failed to take the same information from the ingredient list and other information on the label, they did successfully take in the information from the statements researched. The inclusion of the negative allergen indication did not influence their perceived value of the product or their willingness to buy it. With this, a desire was brought forward for a more simple and straightforward method of allergen labelling than is used now.

Keywords Consumer behaviour | Allergen labelling | Precautionary labelling | Food information

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1. Introduction

1.1 General introduction

Food allergies gain an increased prevalence globally, which raises concern regarding the labelling of our food products in order to provide the consumer with sufficient food safety and relevant information (Sicherer, 2011). Next to the mandatory allergen labelling that is already present in the EU food information law, the rise of voluntary labelling is undeniable. Precautionary statements, an example of this voluntary labelling, are ubiquitously used, primarily to protect the allergenic consumer on a higher level. They are used to indicate the possible presence of an allergen in the product. These statements are formulated for example with the words "may contain [*name allergen*]" or "produced in an environment where [*name allergen*] is processed". They are often frowned upon. Even though this is the case, they are used more and more. An European study (Van Hengel, 2007) investigated how often they are used in supermarket products. They researched products in which peanuts and/or tree nuts might be included and found that with biscuits, 57% of products contained precautionary labelling (next to regular mandatory allergen labelling). With chocolate, this percentage was as high as 86% of products. Interesting about this is the fact that 90% of products with precautionary labelling concerning peanuts are not likely to actually contain traces of peanut protein. Those that do, contain traces low enough to not cause any clinical reaction (Hefle et al, 2007).

It has been proven that parents of allergenic children principally tend to ignore these phrases when encountered on labels. This was observed for children with a history of mild to moderate IgE-mediated reactions, but even for those with a history with anaphylactic shock(s). 30-35% of the related parents stated that they would give a product with precautionary labelling – concerning the allergen their child is allergic to – to their son or daughter. (Zurzolo et al, 2013). A UK study by Noimark, Gardner and Warner (2009) confirms this parental behaviour.

A precautionary statement can be and is stated to be a counterproductive piece on product labels. They are supposed to further protect consumers from harm, but cause confusion due to the abundance in which they are used (DunnGalvin et al, 2015). In a world where labels without these precautionary claims are scarce, it might be beneficial to flaunt and show off a product that undoubtedly does *not* contain a certain allergen. Consumers with an allergy for peanuts and tree nuts have even expressed a desire for more "nut free" labelling in a study by Barnett et al (2011).

This study investigated the possibility to include a way to translate this fact and deliver a message of safety to the allergic consumer. The inclusion of a particular stating the absence of a certain allergen in a product generally associated with the same allergen is relatively unexplored terrain. No prior studies regarding this matter have been found. This matter will further be referred to as negative allergen indications – not to be confused with precautionary statements, which are the exact opposite.

A subject of interest when considering the regulation of labelling are alcoholic beverages. The Food Information Regulation of 2011 has made beverages exceeding a certain percentage of alcohol by volume into an exception for certain mandatory particulars on the product label, including the ingredient list. Behavioural research supports the idea that the labelling of these products should be labelled stronger. The guidelines that do exist surrounding voluntary labelling are non-binding (Schebesta & Purnhagen, 2019). However, it is a given that sufficient information on the product is desired by the consumer. In the study by Zurzolo et al (2013) only 3% of participants stated they do not refer to the ingredient list of food products in general when checking for allergens. It is therefore necessary to re-evaluate the effect of labelling concerning allergens in this type of product.

1.2 Objective

The objective of this research was to assess the effects of a (voluntary) negative allergen indication on a product label generally associated with that relevant allergen. In this case this allergen was almonds (*Prunus dulcis*), a species of tree nuts. As mentioned before, it has been expressed that an increase in "nut free" labelling is desired (Barnett et al, 2011). Alcoholic beverages with a suggested presence of tree nuts exist mainly in the form of amaretto liqueurs: a beverage originally brewed with almonds. Nowadays, one can only seldom find one of these beverages that actually has almonds as an ingredient. For more information on the selection of the products in this study, it is referred to section 4 (Materials and method).

Included in the research were the perceived allergenicity and willingness to buy by the consumer. It was investigated whether the inclusion of a negative allergen indication (i.e. directly stating that the product does not contain almonds) had any added value as compared to other particulars such as an ingredient list (from which almonds were excluded).

1.3 Research questions

To complete the objective of the study, the following research question was leading: *do alcoholic beverages with voluntary negative allergen labelling influence the consumer's perception of the product?* In order to answer this, the following sub questions were answered:

a. What are the implications of food allergens in alcoholic beverages?
b. What are the current requirements for labelling allergens on the packaging of alcoholic beverages?
c. Is the absence of an allergen in the ingredient list sufficient to inform allergic consumers of the product's safety?
d. What influence does a negative allergen indication on the product label have on the willingness to buy the product?
e. Could an additional negative allergen increase purchases by allergic consumers?

2. Technical background

2.1 Mechanisms behind allergies and intolerances

Approximately 12-25% of the world population has a self-proclaimed food allergy (Miles et al, 2005 | Wood, 2002). This is, however, a severe overestimation caused by a worldwide increase in awareness towards food allergy (Woods et al, 2002). In reality, the prevalence lies much lower. It is estimated to be 5-8% for children (Van de Ven, Van den Eijnden & Engels, 2006 | Sicherer, Noone, & Muñoz-Furlong, 2001) and 1-2% for adults (Buttriss, 2002). The terminology surrounding this topic is something that often gets mixed up. Food allergies comprise adverse reactions that are mediated by the immune system (Guandalini & Newland, 2011) and are more often than not regulated by immunoglobulin E (IgE) (Opper & Burakoff, 1993). An example of this is the oral allergy syndrome, i.e. a discomfort in the mouth and throat upon contact with an allergen. These immune-mediated reactions tend to get mixed up with (other) food intolerances and are for that reason occasionally referred to as "true food allergies" as well.

The term food intolerance is used as a collective noun to describe adverse reactions that are not caused by aversion (i.e. a disliking for a specific food) or by food poisoning (i.e. an abnormality in the food that causes adverse reactions). An example of food intolerance is lactose intolerance, where gastrointestinal discomfort is caused by a deficiency of the enzyme lactase. This enzyme is, under normal circumstances, responsible for the breakdown of lactose (Deng et al, 2015). Typical for food intolerance is the fact that patients might tolerate small amounts of the component in question, while patients with a food allergy already show severe reactions to trace amounts. More about the symptoms of food intolerances is described in section 2.2 below.

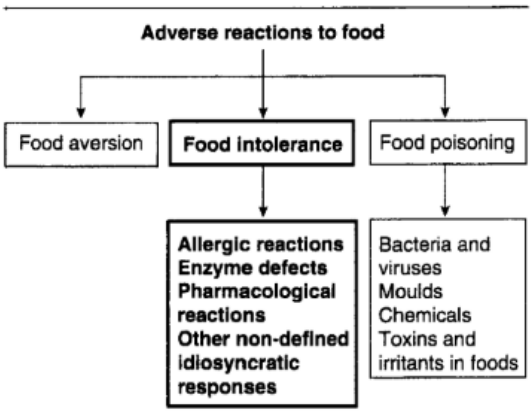

Figure 1 Types of adverse reactions induced by food (Buttriss, 2008)

2.2 Medical implications of food allergies

According to a study by Le et al (2015), approximately 2.4% of the Dutch population has a self-reported food allergy. This amounts to a total of 412,000 individuals. Based on several provocation tests, meta-analysis studies report up to 4.1% of a certain population with a self-proclaimed tree nut allergy (Zuidmeer et al, 2008; Rona et al, 2007). This would concern approximately 240,000 people in the Netherlands.

Even though the actual prevalence of tree nut and other allergies lies significantly lower, the verification of a food-related allergy is a tedious and time-consuming process and comprises many false negatives and -positives. This is also caused by a lack of studies applying reliable diagnostic methodologies.

Exposing an allergic individual to the relevant allergen may result in symptoms varying in severity, with the most severe often referred to as anaphylaxis or anaphylactic shock. Anaphylaxis is reported for true food allergies, but not for other food intolerances. Symptoms relate to skin, gastrointestinal tract, respiratory tract and cardiovascular system. Fatalities might occur, and are primarily reported from allergic reactions to peanuts and tree nuts (Sicherer & Sampson, 2010; Sampson, 2003). Hence the importance to protect the consumer against these food hazards.

2.3 Avoidance of risks

As for allergens in alcoholic beverages, ambiguity exists on the impact on allergenic consumers (American Academy of Allergy, Asthma & Immunology, 2019). As producers often do not include a list of ingredients on the label (see chapter 3 on Legislation), uncertainty about the presence of an allergen exists. With their current diet, they remain in a state of security. Choosing to purchase a product possibly containing an allergen they are sensitive to, however, exposes them to a potential risk, which they tend to avoid.

Next to this, the risk of a patient reacting to the allergen is small in a well-distilled drink. The only way to verify this, however, would be an oral challenge. Convincing the consumer to try this, however, is unreasonable.

Providing the consumer with an addition to the product label which would take away their uncertainty about the risk of inducing anaphylaxis, might thus benefit both consumer and company. For consumers, the range of products they can consume without risk becomes larger – instead of smaller, which is happening at the moment due to the increase in precautionary labelling. For companies, this might increase sales and revenues. Next to this, it might be well for their reputation, as frustration among consumers regarding precautionary labelling is present (Fleming et al., 2010). The use of phrases suggesting the possibility of presence of allergens, but not making any promises, causes confusion. Especially the varying phrasing of these precautionary statements causes the frustration and confusion (Ward et al., 2010). Examples of these can be seen below.

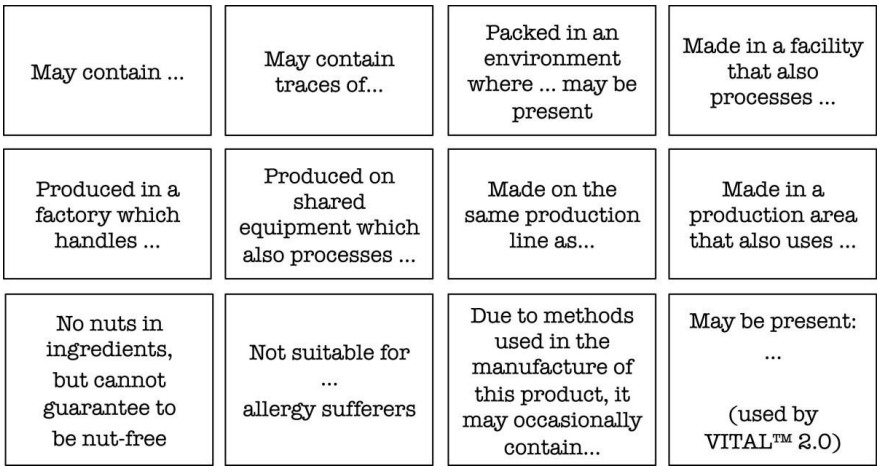

Figure 2 Examples of advisory warnings and voluntary precautionary statements on food labels (Allen et al, 2014)

3. Legislation

3.1 Allergen labelling

Regulation (EU) No 1169/2011, otherwise known as the Food Information Regulation (FIR) 2011, lays down the general requirements for labelling food products intended for the final consumer and mass caterers in the European Union. Article 9 states the mandatory particulars that should be included on the product label. Examples are the name of the food, a list of ingredients, date of minimum durability and a nutrition declaration. Article 10 and Annex III elaborate on the additional mandatory particulars that are supplementary for specific types or categories of foods. The product in this research does not have such additional mandatory particulars.

Specific ingredients able to cause allergy- or other intolerance-related adverse effects should be indicated on the product label as stated in article 9 as well. A list of these ingredients is included in Annex II of the regulation. Only these allergens are legally considered allergens in EU law and allergen labelling would apply only to those on the list. It contains 14 of the most common allergens, i.e.:

- Cereals (gluten);
- Crustaceans;
- Eggs;
- Fish;
- Peanuts
- Soybeans;
- Milk (lactose);
- Nuts;
- Celery;
- Mustard;
- Sesame seeds;
- Sulphur dioxide;
- Lupin;
- Molluscs.

As tree nuts are included in the list, almonds (*Prunus dulcis*) are as well. Also, according to article 22 of the same regulation, a quantitative indication of an ingredient should be included when it is emphasized on the labelling in words or pictures. It can thus cause confusion with consumers when a product or brand name is associated with a certain ingredient and the same ingredient is pictured on the packaging as well, but this is not included in the ingredient list or in the list of potential allergens. In the specific case of amaretto, this is often the case. The product in this study itself is generally associated with almonds. Next to this, the ingredient is often depicted on the labelling (see chapter 4.2) so article 22 should be applied. However, as the product does not contain almonds, the quantitative indication (i.e. “contains 0% almonds”) is not included. It might be discussed whether this is misleading for consumers.

Article 13 lays down the way in which mandatory particulars should be presented to the consumer to ensure legibility and uniformity. Paragraph 1 states that the information shall be marked “in a conspicuous place in such a way as to be easily visible, clearly legible and, where appropriate, indelible. It shall not in any way be hidden, obscured, detracted from or interrupted by any other written or pictorial matter or any other intervening material.” There is a minimum height of the font and some of the particulars should be included in the same line of vision of each other.

Next to the mandatory aspects of food labelling, there is room for voluntary food information, which is regulated in chapter V of the FIR 2011. Article 26.2 states that food information provided on a voluntary basis shall meet the following requirements: it shall not mislead the consumer (…), it shall not be ambiguous or confusing for the consumer and shall, where appropriate, be based on relevant scientific data. The precautionary allergen statements discussed before, for example, could be argued to contradict these requirements. It is, after all, proven that they can be confusing for consumers. They are, however, still legally allowed as voluntary food information. The more direct opposite of these statements – the negative allergen indication – could thus be desirable.

3.2 The exception of alcohol

Article 9 of the FIR 2011 states the mandatory particulars for labelling food products, as stated in section 3.1. In the case of a product containing a minimum of 1.2% alcohol by volume, a list of ingredients and nutrition declaration is not mandatory anymore. This is included in article 16 of the FIR 2011. For products with an even higher percentage, more aspects can be left out of the information provided on the label. It should be noted, however, that allergen labelling is still obligatory. The latter part has only a few specific exceptions, the most relevant in Annex II.8: nuts used for making alcoholic distillates including ethyl alcohol of agricultural origin. The reason for this exception is that an allergen itself does not end up in the end product when making alcoholic distillates, but stays in the residual matter. An example is gluten not ending up in clear distilled products such as gin and whiskey (GDH, NA). This means that, in this case, it is not mandatory to include almonds in the allergen labelling. It would be the case whether or not actual almonds were used in the production process.

The paradox here is that, on one hand, alcoholic beverages are legal regulatory outliers in the area of labelling, while on the other hand, they are strongly regulated. This is done with, for example, compositional and process requirements and banning from using most nutrition claims. A consumer insights study showed that 86% and 74% of EU participants is welcoming towards the inclusion of nutrition information and ingredient lists respectively on the labels of alcoholic beverages (GfK Belgium, 2016). Then why are these aspects still exempt from legislation? According to Schebesta and Purnhagen (2019), currently available studies from behavioural, health and safety science do not justify this exemption.

Businesses might rely on private regulation, using voluntary claims. This is a low-cost mode of governance with a high effect on consumer purchase, but is still regulated poorly and without much detail (Purnhagen & Schebesta, 2019). Guidelines exist, but they are non-binding. On the regulation and implication of negative allergen labelling concerning alcoholic beverages, no studies yet exist. It might thus be of importance to find out the effect of voluntary labelling on consumers, especially when applied next to other relevant labelling aspects (in this example: ingredient lists).

4. Materials and method

4.1 Experimental design and participants

An empirical test was performed to test the effect of different information cues on product labels on potential consumers. Respondents were 158 students at Wageningen University, the Netherlands. Three of these respondents suffered from an almond or tree nut allergy. The respondents were scouted via posters, flyers and social media.

The method was based on the research by Purnhagen & Herpen (2017). In this study, the effects of differences in labelling of packages were examined, which is done in this study as well. The main similarity is that the goal of the research was to find out whether participants were able to extract the correct information from the packaging. For the study by Purnhagen & Herpen, this concerned interpretation of different denotations of an increase of the contents (a "bonus volume") by letting them estimate the increase in product volume. The participants each received a package with either a yellow coloured area, a textual message with the amount of extra volume, or both. In this study, it concerned the interpretation of different denotations of the absence of a food allergen. Participants here received a product with a combination (or lack) of the following information cues: an image of the allergen, an ingredient list without the allergen, or a textual message stating the absence of the allergen. More on this is described in section 4.2 on information stimuli.

Two products were considered: product 1 was Disaronno Originale, a liqueur often described as amaretto-like and having a characteristic almond taste, but not promoted as such. Product 2 was Siebrand Amaretto Cocktail, advertised as amaretto but with a lower alcohol percentage (14.5% instead of the standard ~28% for amaretto). The products used in the study were selected by contacting varying companies and asking for statements on the inclusion of allergens in their drinks. Both of the products selected do not contain actual (traces of) almonds (see Appendix A for the email exchange with the companies) and are thus safe to drink for people suffering from an almond or tree nut allergy. Other products would have been suitable for this study as well, such as clear distilled liqueurs based on wheat (gin, whiskey). There are, however, exceptions in this field. A statement by the company on the absence of allergens should be inquired to be certain. In this case, no reply was received by other companies.

4.2 Stimuli

The labels of the two products were separated into a front label and back label. An image editing programme was used to alter the back label and adding a negative allergen indication to create a 'new' label. The created labels can be seen in the figures below.

Figure 3 Different labels of product 1 (Disaronno Originale) to be shown to participants. 1a: front label with logo, 1b: original back label, 1c: back label with additional negative allergen indication for almonds and other tree nuts.

Figure 4 Different labels of product 2 (Siebrand Amaretto cocktail) to be shown to participants. 2a: front label, 2b: back label with added translation, 2c: back label with added translation and additional negative allergen indication for almonds and other tree nuts.

The table below shows the combination of labels that were shown to individual participants. Each combination resulted in a set of information cues that could imply to the participant a presence or absence of almonds in the product. The coding mentioned here will be mentioned from now on.

Table 1 Information cues provided with the different products shown.

Product	**Image**	**Code**	**Cue implying *presence* of almonds**	**Cue implying *absence* of almonds**
Disaronno Originale	Front	1A	Name "Disaronno" associated with amaretto, associated with almonds.	N/A
	Front + back	1B	Name "Disaronno" associated with amaretto, associated with almonds.	Absence of allergen warning. Absence of almonds on ingredient list.
	Front + back + NAI	1C	Name "Disaronno" associated with amaretto, associated with almonds .	Phrase "Product does NOT contain almonds or other tree nuts". Absence of almonds on ingredient list.
Siebrand Amaretto Cocktail	Front	2A	Word "amaretto" associated with almonds. Picture of almonds.	N/A
	Front + back	2B	Word "amaretto" associated with almonds. Words "almond flavour".	Absence of allergen warning.
	Front + back + NAI	2C	Word "amaretto" associated with almonds. Words "almond flavour"	Phrase "Product does NOT contain almonds or other tree nuts".

4.3 Procedure

Respondents were seated in front of a computer where they could fill in the questionnaire, which was designed in Qualtrics. Respondents were seated at least one seat from each other, in order to prevent them noticing the difference in other respondents' product labels.

After reading an introduction and answering some questions about their consumption of alcoholic beverages, they were asked to raise their hand. They received one version of each product (e.g. 1B and 2B) and were asked to examine the products and labels as long as they thought decent.

After this, the products were taken away and the respondents answered a set of filler questions related to a reward snack they were allowed to pick. This was done for two reasons: to ensure the products were out of view and to take their mind of the products they viewed shortly before. Only after answering these filler questions, they answered questions regarding the relevant products. In order to confuse the participants on what the study was about – and thus purposefully eliminating participants who try to answer questions in a way that they think is "desired" of them – the same questions regarding the beverages were asked about the snack they had picked as well.

The important variables here were perceived presence of certain ingredients – amongst which were almonds, allergenicity, perceived value and authenticity and willingness to buy for both products and the snack they had chosen. The questionnaire finished with a set of personal questions such as age and gender, also including whether or not the respondent suffered from a food allergy and if so, which. The complete questionnaire is included in Appendix B. The blocks containing questions regarding product 1 and 2 respectively were switched halfway through the study for randomisation purposes.

5. Results

Table 2 and table 3 present the results to the main relevant questions in the survey. The questions can be found in Appendix B with the numbers included in the tables. Included are the means per question and indications on the significance of differences between the answers. The results are on product 1/Disaronno Originale and product 2/Siebrand Amaretto respectively. A visualisation of these means is shown in figures 3, 4 and 5.

Table 2 Answer results regarding product 1 (Disaronno Originale).

Dependent variable	Front label only (A) (n = 55)	Front + back label (B) (n = 55)	Front + back label + NAI (C) (n = 48)
[Q14(6)] Perceived presence of almonds (1-10)	6.87 a (0.36)	6.64 a (0.44)	4.21 b (0.44)
[Q22] Perceived safety for allergic consumers (1-7)	3.13 a (0.23)	3.09 a (0.25)	4.44 b (0.32)
[Q13] Willingness to buy (1-10)	7.13 a (0.23)	7.15 a (0.25)	7.44 a (0.26)

The numbers in front of the variables relate to the relevant survey question. Horizontally paired means with different letters significantly differ in comparative T-test. Pairwise or not relied on standard F-tests. Standard errors (SEM) are between brackets. α =0.05.

Table 3 Answer results regarding product 2 (Siebrand Amaretto)

Dependent variable	Front label only (A) (n = 55)	Front + back label (B) (n = 55)	Front + back label + NAI (C) (n = 48)
[Q18(6)] Perceived presence of almonds(1-10)	6.58 a (0.38)	6.71 a (0.43)	4.86 b (0.50)
[Q23] Perceived safety for allergic consumers (1-7)	3.06 a (0.23)	2.49 a (0.23)	3.92 b (0.33)
[Q17] Willingness to buy (1-10)	5.27 a (0.28)	5.51 a (0.26)	5.52 a (0.23)

The numbers in front of the variables relate to the relevant survey question. Horizontally paired means with different letters significantly differ in comparative T-test. Pairwise or not relied on standard F-tests. Standard errors (SEM) are between brackets. α =0.05.

Results showed that the inclusion of a negative allergen indication ("Product does NOT contain almonds or other tree nuts) indeed affected the perceived presence of almonds in the product. This includes significant differences ($\alpha = 0.05$) for the perceived presence of almonds and perceived safety for allergic consumers, for both products tested. This suggests that the indication is read by the consumer. Including a back label did not influence the answers related to the presence of almonds, which is noteworthy. This

was even the case when an ingredient list was included in the original label, which lacked almonds as an ingredient (the case with product 1B).

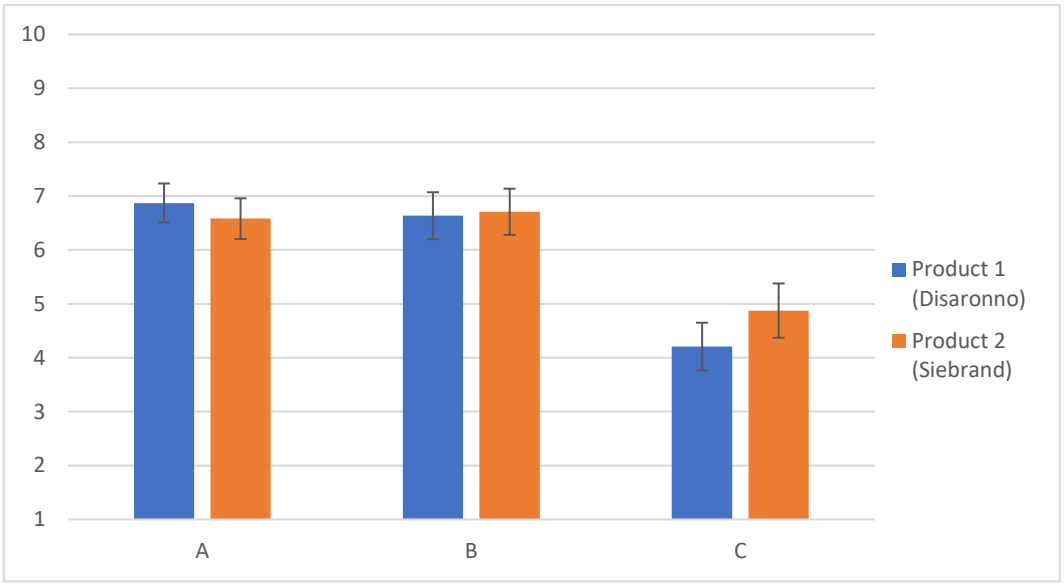

Figure 5 [Q14(6) & Q18(6)] Perceived presence of almonds (n(A)=55, n(B)=55, n(C)=48) (1=strongly disagree, 10=strongly agree).

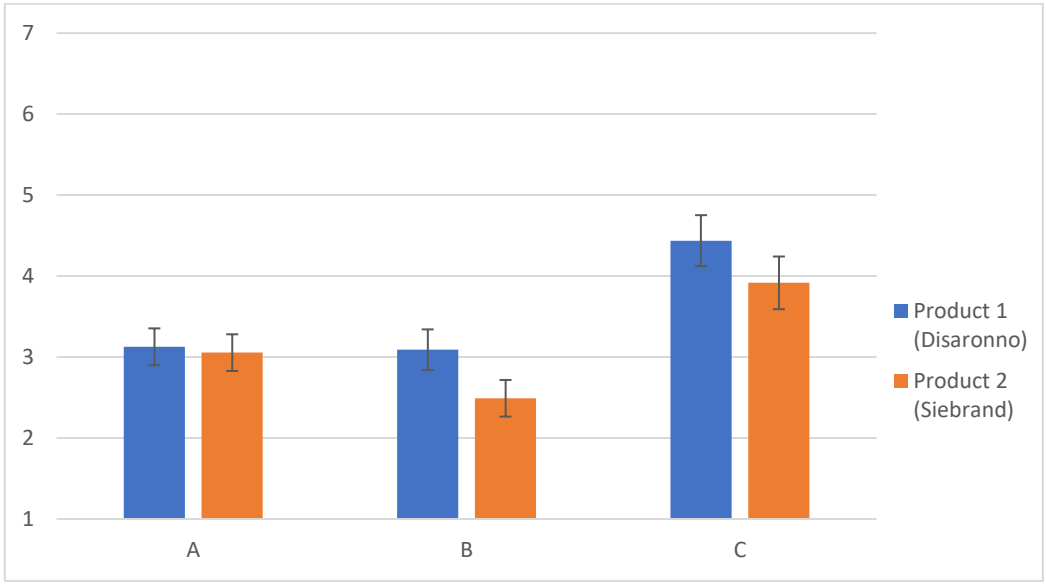

Figure 6 [Q22 & Q23] Perceived safety for consumers allergic to nuts (n(A)=55, n(B)=55, n(C)=48) (1=strongly disagree. 7=strongly agree).

An interesting finding was that respondents suffering from a relevant food allergy (tree nuts and/or almonds), also behaved in the same way as the other respondents. Even though the samples size of these respondents is too low to draw any sort of conclusion (n = 3), it is notable that these consumers were suggested to be not more educated on the topic than the other respondents.

One of the cases investigated as well was whether a decrease in perceived presence of almonds would be paired with a decrease in the willingness to buy. No significant differences between the parameters shown were found in the perceived traditionality, value and authenticity. There were significant differences between product 1 and 2 for the perceived traditionality, value and authenticity, with product 1 scoring higher on all parameters. There were no differences found, however, between the different labels shown. Next to these parameters, this was also the case for the willingness to buy of the two products (see figure 5).

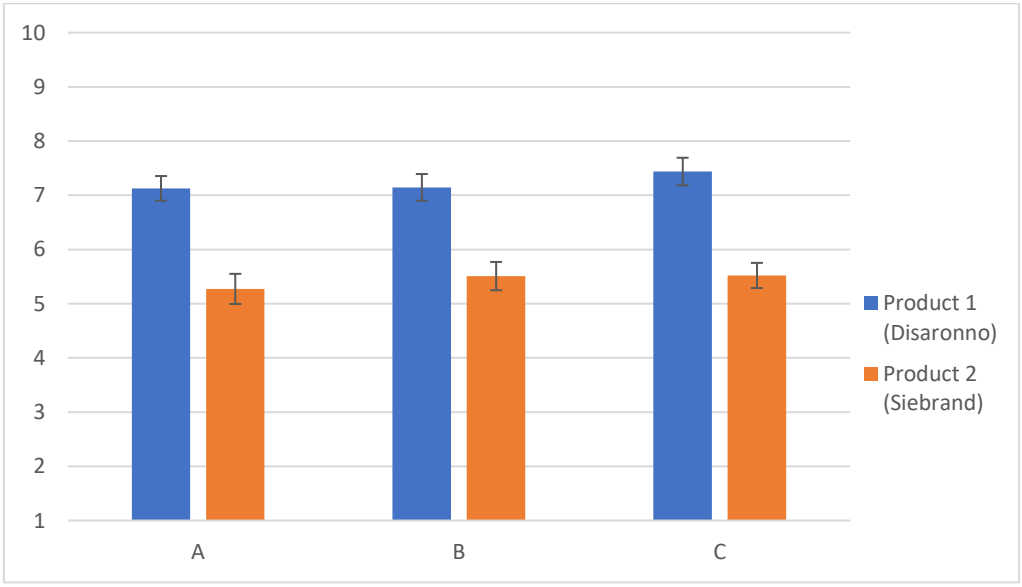

Figure 7 [Q13 & Q17] Willingness to buy (n(A)=55, n(B)=55, n(C)=48) (1=strongly disagree, 10=strongly agree).

6. Discussion

6.1 Result interpretation

Voluntary claims within private regulation are a low-cost and effective mode of governance. The results of this study show that the claims have an effect on the consumer. It can be concluded that the inclusion of a negative allergen indication decreases the perceived presence of the respective allergen. An additional back label that does not include a (precautionary) warning about the presence of almonds has no effect on this as compared to only having shown the front label. Leaving the associated allergen out of the ingredient list (if this is included on the label) does not have an effect on the perceived presence as well. This could also suggest that the anchoring effect of the negative allergen indication is simply larger than the lack of an ingredient from the ingredient list. A notable or out-of-place remark on the label might draw the eye of a consumer as an oddity, creating the thought that this is something that should be remembered for further purposes during the experiment. This hypothesis could be challenged in the future, as it might yield results regarding the information consumers draw from ingredient lists. All differences in the labelling do not have a significant effect on the willingness to buy the products.

The inclusion of a picture of the allergen on the label of product 2 (Siebrand, all labels) yielded no increase in the perceived presence of almonds. This might imply that a product with the name already is associated with the ingredient and that including a picture does not increase this. Another explanation of this observation is that the effect of the picture is counterbalanced by the assumption that a cheaper brand would be less likely to use "real" almonds in their product, even though it has been shown that in the Netherlands store brands typically provide significantly better information about the presence or absence of specific allergens than A-type brands do (Boulogne et al, 2017). This cannot be extrapolated from the results, however, but is conjecture based on comments left by several respondents. It is true that the assessment of direct "intrinsic" cues (e.g. real ingredient quality) by an average consumer is often extremely difficult, if not impossible. This causes them to use surrogate measures to assess product quality (Dick, Jain & Richardson, 1996). In this case, that would be to take the brand name to infer ingredient quality (De Wulf et al, 2005). This relation of brand name with quality can also be seen in the results for the willingness to buy question, with product 1 (Disaronno) scoring significantly higher than product 2.

The effectiveness as regarding to an increase in sales in this specific case is to be disputed. This is because it might be questioned how many consumers could profit from the information distributed via the labels in this study, as the amount of nut-allergenic consumers comprises a relatively small amount throughout the European Union. This raises the question, while this minority might benefit from the extra information on the package, whether it poses no disadvantage for the majority. It might be argued that non-allergic consumers would experience little to no disadvantage from an additional disclaimer. It is, however, proven that less information on a label is preferred by consumers in general (Verbeke, 2005). Confronting them with too much information results in adverse effects caused from consumer indifference and takes away rationality.

A second issue that the additional claim might bring forward, is more confusion among consumers. As was stated in the introduction, the use of many different phrases concerning allergen labelling – especially precautionary allergen labelling – causes confusion and frustration (DunnGalvin et al, 2015 | Fleming et al., 2010 | Ward et al, 2010). The introduction of a new phrase concerning allergens might thus not be extremely well-received, and could best be tested further.

The results also raise a question regarding the 2016 consumer survey results by GfK Belgium mentioned in section 3.2. This stated that, supposedly, 74% of European consumers are welcoming towards the mandatory inclusion of certain particulars on a label. This makes it surprising that this majority did not take out the necessary information from the included ingredient list, an aspect they were specifically positive towards. A majority of consumers read product labels, but fail to take out the messages important to them. In general, they tend to be more satisfied with nutritional than safety-related labelling (Wandel, 1997). This implies that it might be time to look into a shift in regulation concerning allergen labelling, not only in alcoholic beverages, but in all food products. It is essential that the way certain information is presented to customers is re-evaluated and adjusted. It should be noted that this study fails to show whether the same effect is seen in allergic individuals. The few allergic individuals' response was in line with the non-allergic individuals, which is odd considering the finding by Zurzolo et al (2013) that 97% of allergic respondents takes notice of the ingredient list. The observations in this study are however too few (n = 3) to draw any conclusions.

6.2 Generalizability of results

The respondents of this study were predominantly Dutch students. This brings forth two issues regarding the study (Lynch, 1982):

1. The general level of education was higher than average. Normally, this would be beneficial to extrapolate to lower levels of education. In this case, however, this does not hold. Consumers with higher educational levels tend to look at nutritional labels more than other consumer classes. This implies that we could extrapolate the fact that not even this group of consumers did not take out the necessary information from the ingredient list. This also implies that this does not hold for noticing the negative allergen indication. While this group of consumers might have taken note of it and responded to it, consumers with lower education might not have noticed it. A study with respondents with more divergent educational backgrounds is thus called for.
2. With the addition of the previous point, as well as the fact that the respondents were mainly of Dutch origin, the study should be carried out in other European countries as well before suggesting to alternate any regulation. This is caused by the notice in Regulation (EU) 1169/2011 in article 4.2 that "When considering the need for mandatory food information and to enable consumers to make informed choices, account shall be taken of a widespread need on the part of the majority of consumers for certain information to which they attach significant value or of any generally accepted benefits to the consumer".

6.3 Implication of the study

Previously mentioned, it might be questioned how many consumers may actually profit from the inclusion of a negative allergen indication, since only a small percentage of consumers suffer from a specific food allergy. More research might be necessary in order to prove this use.

If a need is shown, it might also be discussed whether this way of indication is the most useful. As mentioned before, it was shown that participants failed to take out necessary allergen information from the ingredient list[1]. It could prove to be most fruitful to perform research on the most efficient way to present allergen labelling to the consumer. This could take into account both present and undoubtedly absent allergens, combined into a quick, clear and comprised manner that can effectively be shown to

[1] N.B. This could also be a side effect due to the anchoring effect of the negative allergen indication as mentioned in section 6.1. Caution drawing conclusions here should be taken.

the average EU consumer. This could be performed in the same way as the voluntary front-of-pack rating system concerning nutrition labelling, now under development. This system would make use of interpretational aides, such as colours and symbols. According to the WHO, these are more likely to be used and understood by consumers (Kelly & Jewell, 2019 | WHO, 2018). As an “allergen-free symbol” is generally more eye-catching between the other information in text, it might provide consumers with the ability to quickly check for allergens. It has however be shown that these types of labels tend to confuse consumers, which contradicts the statement made by the WHO (Hartmann et al, 2018). Further research on this is therefore suggested.

7. Conclusion

It has been shown that consumers did take notice of negative allergen indications and responded with a lowered perceived presence of almonds and allergenicity of both products. Willingness to buy, as well as traditionality, value and authenticity, remained constant. This was even the case when they were shown different label types with cues on the presence of the allergen. Product 1 (Disaronno) scored higher for these parameters than product 2 (Siebrand), as this A-type brand might be associated with a higher quality than the store brand. This might also have caused the assumption that a store brand such as product 2 would not contain any "real" almonds.

No difference in perceived presence of almonds was shown between when presented with an ingredient list or not, which implies that consumers fail to take away necessary allergen information from these types of food labelling, despite claiming to read and take notice of it. This is in line with the dissatisfaction of consumers towards safety-related labelling as compared to nutritional information, especially their annoyance with precautionary allergen statements. This suggests the need for a new method of allergen labelling that is clear and quick to understand for the average consumer. The textual message that the negative allergen indication used here comprises might suffice. Other, perhaps simpler, alternatives such as allergen-free symbols should be considered as well. The effect of the different options should in that case be studied in further detail. The WHO front-of-pack labelling, currently in development, could be utilized for this.

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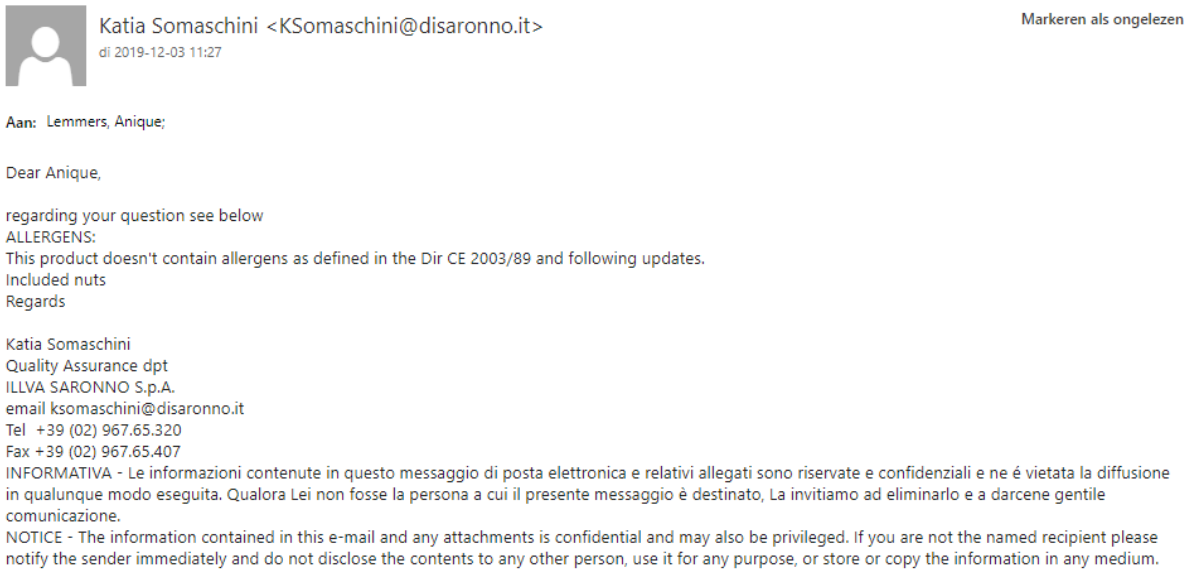
Appendix A – Statements by amaretto producers on the presence of allergens

Statement by Disaronno (Illva Saronno S.p.A.)



Katia Somaschini <KSomaschini@disaronno.it>
di 2019-12-03 11:27

Markeren als ongelezen

Aan: Lemmers, Anique;

Dear Anique,

regarding your question see below
ALLERGENS:
This product doesn't contain allergens as defined in the Dir CE 2003/89 and following updates.
Included nuts
Regards

Katia Somaschini
Quality Assurance dpt
ILLVA SARONNO S.p.A.
email ksomaschini@disaronno.it
Tel +39 (02) 967.65.320
Fax +39 (02) 967.65.407
INFORMATIVA - Le informazioni contenute in questo messaggio di posta elettronica e relativi allegati sono riservate e confidenziali e ne é vietata la diffusione in qualunque modo eseguita. Qualora Lei non fosse la persona a cui il presente messaggio è destinato, La invitiamo ad eliminarlo e a darcene gentile comunicazione.
NOTICE - The information contained in this e-mail and any attachments is confidential and may also be privileged. If you are not the named recipient please notify the sender immediately and do not disclose the contents to any other person, use it for any purpose, or store or copy the information in any medium.

Figure 9 Email sent by Illva Saronno S.p.A. on the presence of allergens in their product Disaronno originale.

Statement by Siebrand B.V.

Aline Mateboer <a.mateboer@siebrand.nl>
ma 2019-11-04 12:36

Markeren als ongelezen

Aan: Lemmers, Anique;

Geachte mevrouw Lemmers,

Onze amaretto wordt inderdaad niet van amandelen gemaakt, maar van een kunstmatig aroma, dat geen amandelen bevat. Wij zijn dan ook niet verplicht een allergenen waarschuwing op het etiket te vermelden en u kunt dit product gewoon nuttigen.

Met vriendelijke groeten,
Siebrand B.V.

Aline A. Mateboer
Office Manager

Siebrand

Figure 8 Email sent by Siebrand Groep B.V. on the presence of allergens in their product Siebrand Amaretto Cocktail.

Translation

Dear Mrs. Lemmers,

Our amaretto is indeed not made from almonds, but from an artificial aroma, which does not contain almonds. We are therefore not obligated to include an allergen warning on the label and you can safely consume this product.

With kind regards,

Siebrand B.V.

Appendix B – Questionnaire

D: description
Q: question

Start of Block: Default Question Block

D1 Dear respondent,

This questionnaire is part of an MSc thesis related to consumer behaviour when picking certain products in a supermarket or other store. The questionnaire will take about 10 minutes to complete. It is important to take notice that the 'back' button is not included in this survey. Please think about each answer carefully and respond truthfully.

End of Block: Default Question Block

Start of Block: Block 1

Q1 Do you drink alcohol?

- Yes (1)
- No (2)

D2 In the question below the abbreviation Unit of Alcohol (UoA) is mentioned. With this, a standard glass (i.e. 250 mL for beer, 100 mL for wine and 35 mL for spirits) is meant.

Q2 On what basis do you consume products containing alcohol? Please answer 'never' if you do not drink alcohol.

- Never (1)
- ≤5 UoA/week (2)
- 6-15 UoA/week (3)
- 16-24 UoA/week (4)
- ≥25 UoA/week (5)

End of Block: Block 1

Start of Block: Block 3

Q3 Do you consume chocolate-based candy bars?

- Yes (1)
- No (2)

Q4 On what basis do you consume these candy bars?

- ○ Never (1)
- ○ Once a month or less (2)
- ○ Once a week (3)
- ○ 2-4 times a week (4)
- ○ 5-7 times a week or more (5)

End of Block: Block 3

Start of Block: Block 2

D3 You will now be shown two products which are very similar, one from product group 1 and one from product group 2. **Please raise your hand** in order to receive the products. You can spend any amount of time to **look at the product and to read the information on the label**. Please do not open the bottles. Afterwards, you can click the 'next' button.

Q5 I have received the two products.

- ○ Yes (1)

End of Block: Block 2

Start of Block: Block 4

Q6 Which product of group 1 did you receive? You can find this on the lid and front label.

- ○ A (1)
- ○ B (2)
- ○ C (3)

Q7 Which product of group 2 did you receive? You can find this on the lid and front label.

- ○ A (1)
- ○ B (2)
- ○ C (3)

Q8 Please now fill in the piece of paper on the desk and check the box if you are finished.

○ I have filled in the paper. (1)

End of Block: Block 4

Start of Block: Block 5

D4 When you have spent enough time to carefully look at the product and the label, the products will be taken away again. **Please raise your hand again** for the products to be picked up, then click the 'next' button.

Q9 The products have been taken away.

○ Yes (1)

End of Block: Block 5

Start of Block: Block 6

Q10 Instead of afterwards, you will get to choose your reward snack now. You will be able to pick it up after completing the questionnaire. Which reward snack would you choose?

_____

Q11 Why did you choose this product? (Multiple answers possible)

☐ This is my personal favourite. (1)

☐ This one is the healthiest out of them all. (2)

☐ I wanted to try something new. (3)

☐ I have not had this product in a long time. (4)

☐ I had a craving for something sweet. (5)

☐ I had a craving for something savoury. (6)

End of Block: Block 6

Start of Block: Product 1A

Q12 Please rate the following statements regarding <u>product 1</u> (Disaronno).

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)	N/A (11)
I think the colour of the product's	○	○	○	○	○	○	○	○	○	○	○

content looked good. (1)											
I think the product is traditional. (3)	○	○	○	○	○	○	○	○	○	○	○
I think the product has a high value. (4)	○	○	○	○	○	○	○	○	○	○	○
I think the product is authentic. (5)	○	○	○	○	○	○	○	○	○	○	○
I think the packaging looked good. (6)	○	○	○	○	○	○	○	○	○	○	○

Q13 I would be willing to buy this product.

- ○ Strongly disagree 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 (7)
- ○ 8 (8)
- ○ 9 (9)
- ○ Strongly agree 10 (10)

End of Block: Product 1A

Start of Block: Product 1B

Q14 Please rate the following statements regarding product 1 (Disaronno).

I think the product contains...

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)
water (1)	○	○	○	○	○	○	○	○	○	○
sugar (2)	○	○	○	○	○	○	○	○	○	○
preservatives (3)	○	○	○	○	○	○	○	○	○	○
caramel (4)	○	○	○	○	○	○	○	○	○	○
artificial flavours/aromas (5)	○	○	○	○	○	○	○	○	○	○
almonds (6)	○	○	○	○	○	○	○	○	○	○
alcohol (7)	○	○	○	○	○	○	○	○	○	○
vanilla beans (8)	○	○	○	○	○	○	○	○	○	○

Q15 If you have to make a guess, what is the percentage alcohol by volume as was stated on the package?

	0	10	20	30	40	50	60	70	80	90	100
Alcohol by volume (%) ()											

End of Block: Product 1B

Start of Block: Product 2A

Q16 Please rate the following statements regarding product 2 (Siebrand).

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)	N/A (11)
I think the colour of the product's content looked good. (1)	○	○	○	○	○	○	○	○	○	○	○

I think the product is traditional. (3)	○	○	○	○	○	○	○	○	○	○	○
I think the product has a high value. (4)	○	○	○	○	○	○	○	○	○	○	○
I think the product is authentic. (5)	○	○	○	○	○	○	○	○	○	○	○
I think the packaging looked good. (6)	○	○	○	○	○	○	○	○	○	○	○

Q17 I would be willing to buy this product.

- ○ Strongly disagree 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 (7)
- ○ 8 (8)
- ○ 9 (9)
- ○ Strongly agree 10 (10)

End of Block: Product 2A

Start of Block: Product 2B

Q18 Please rate the following statements regarding <u>product 2</u> (Siebrand).

I think the product contains...

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)

water (1)										
sugar (2)										
preservatives (3)										
caramel (4)										
artificial flavours/aromas (5)										
almonds (6)										
alcohol (7)										
vanilla beans (8)										

Q19 If you have to make a guess, what is the percentage alcohol by volume as was stated on the package?

	0	10	20	30	40	50	60	70	80	90	100
Alcohol by volume (%) ()											

End of Block: Product 2B

Start of Block: Block 11

Q20 Please rate the following statements regarding <u>the snack you picked</u>.

I think the product contains...

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)
sugar (1)										
lactose (2)										

nuts (3)	○	○	○	○	○	○	○	○	○	○
flour (4)	○	○	○	○	○	○	○	○	○	○
salt (5)	○	○	○	○	○	○	○	○	○	○
preservatives (6)	○	○	○	○	○	○	○	○	○	○
artificial flavours/aromas (7)	○	○	○	○	○	○	○	○	○	○
soy (8)	○	○	○	○	○	○	○	○	○	○

Q21 I would be willing to buy the product.

- ○ Strongly disagree 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 (7)
- ○ 8 (8)
- ○ 9 (9)
- ○ Strongly agree 10 (10)

End of Block: Block 11

Start of Block: Block 12

D5 Please rate the following statements.

Q22 I think product 1 (Disaronno) is safe to consume for people with a nut allergy.

- Strongly disagree (1)
- Disagree (2)
- Somewhat disagree (3)
- Neither agree nor disagree (4)
- Somewhat agree (5)
- Agree (6)
- Strongly agree (7)

Q23 I think product 2 (Siebrand) is safe to consume for people with a nut allergy.

- Strongly disagree (1)
- Disagree (2)
- Somewhat disagree (3)
- Neither agree nor disagree (4)
- Somewhat agree (5)
- Agree (6)
- Strongly agree (7)

Q24 I think the snack I picked is safe to consume for people with a nut allergy.

- Strongly disagree (1)
- Disagree (2)
- Somewhat disagree (3)
- Neither agree nor disagree (4)

- ○ Somewhat agree (5)
- ○ Agree (6)
- ○ Strongly agree (7)

End of Block: Block 12

Start of Block: Block 13

Q25 When was the last time you have bought or drank (e.g. in a bar) an amaretto or similar product (Disaronno, Amaretto liquorette etc.)? This includes the drink mixed with other product in e.g. a cocktail.

- ○ Less than a month ago (1)
- ○ 1-2 months ago (2)
- ○ 2-6 months ago (3)
- ○ 6-12 months ago (4)
- ○ More than a year ago (5)
- ○ Never (6)

Q26 When was the last time you have looked at the (back) label of an amaretto or similar product?

- ○ Less than a month ago (1)
- ○ 1-2 months ago (2)
- ○ 2-6 months ago (3)
- ○ 6-12 months ago (4)
- ○ More than a year ago (5)
- ○ Never (6)

Q27 When was the last time you have bought a chocolate-based candy bar?

- ○ Less than a month ago (1)

- ○ 1-2 months ago (2)
- ○ 2-6 months ago (3)
- ○ 6-12 months ago (4)
- ○ More than a year ago (5)
- ○ Never (6)

Q28 When was the last time you have looked at the label of a chocolate-based candy bar?

- ○ Less than a month ago (1)
- ○ 1-2 months ago (2)
- ○ 2-6 months ago (3)
- ○ 6-12 months ago (4)
- ○ More than a year ago (5)
- ○ Never (6)

End of Block: Block 13

Start of Block: Block 14

Q29 What is your age?

_____

Q30 What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Other/not specified (3)

Q31 What is your nationality?

- ○ Dutch (1)

○ Other: (2) _____

Q32 What is your current occupation?

○ Working (full- or part-time) (1)

○ Job-seeking (2)

○ Student HBO (3)

○ Student Bachelor (4)

○ Student Master (5)

○ Other: (6) _____

Q33 Do you work at a professional level with alcoholic drinks?

○ Yes (1)

○ No (2)

Q34 Do you have any food-related allergies and/or intolerances?

○ Yes: (1) _____

○ No (2)

End of Block: Block 14

Start of Block: Block 15

Q35 Thank you for your contribution. You can now hand in the piece of paper with one of the assistants and pick up the reward you have chosen. Any additional comments on the research are welcome below.

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D6
For more information on the thesis research, you can send an email to anique.lemmmers@wur.nl.

Kind regards,

Anique Lemmers, MSc student Food Safety - Food Law and Regulation, Wageningen University, The Netherlands

End of Block: Block 15