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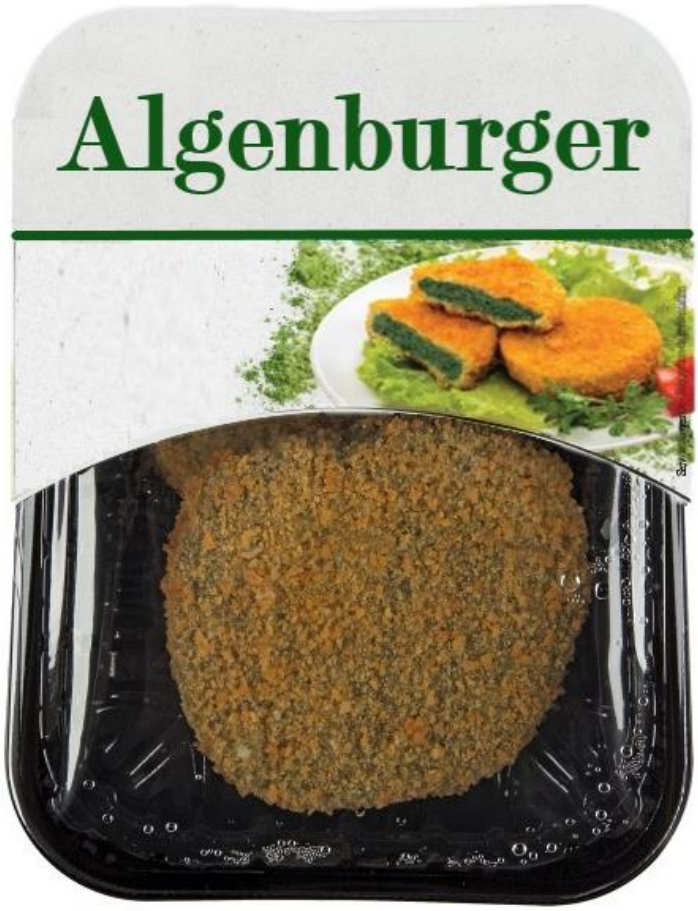
CONSUMER ACCEPTANCE OF ALGAE IN MEAT SUBSTITUTES

HOW FAMILIARITY AND FRAMING OF INFORMATION INFLUENCE CONSUMER EMOTIONS AND HOW THIS CAN LEAD TO CONSUMER ACCEPTANCE



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Abstract

The aim of this study is to investigate the influence of communicating health benefits, environmental benefits, and familiarity of algae on the emotions of consumers towards algae in meat substitutes and how these emotions influence the acceptance of algae in meat substitutes. An online experimental survey was set up in a 3 (information health benefit vs information environmental benefit vs no information benefit) x 2 (familiarity info vs no familiarity info) design. After the manipulation, emotions, intention to buy, goal relevance and consumer type were measured. From the results can be concluded that a higher levels of disgust leads to a lower acceptance of algae in meat substitutes and a higher levels of curiosity, excitement and hope leads to a higher acceptance of algae in meat substitutes. To what extent these emotions were raised by informing consumers about the benefits of consuming algae and their familiarity with algae did not become clear in this research. This study does however provide evidence that it is important to look at emotions specifically instead of just positive versus negative emotions. Moreover, future studies should make a split in neophobia and neophilia because they relate to different emotions and can therefore play an important part in the acceptance of algae in meat substitutes.

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1. Introduction

With the global population rapidly increasing, the demand for protein sources has grown substantially (Aiking, 2011). Meat is known as a valuable source of protein and has exerted an important role in the composition of meals in developed countries (Pereira & Vicente, 2013). However, producing enough meat to suffice the increasing demand of protein sources puts a lot of pressure on the environment (Stoll-Kleemann & Schmidt, 2017). Livestock farming accounts for 14.5% of the total amount of greenhouse gas emissions and therefore plays an important role in climate change. Furthermore, the large amounts of land and water resources that are needed to grow animal feed pave the way for deforestation which leads to a significant loss in biodiversity (Gerber et al., 2013). To reduce the burden of the meat production on the environment while coping with the growing demand of protein sources, consumers should become less reliant on animal-based protein and move towards a more sustainable protein source (Aiking, 2011).

Micro-algae is a promising protein source that can be used as a meat substitute. Several micro-algae species contain nutritional protein values that are similar to meat. Next to the protein values, they contain nutritious pigments and polyphenols compounds that are beneficial to consumers' health. Moreover, the production rate per square meter algae is high and the production does not require freshwater or arable land to grow. Therefore, the production process of micro-algae is more sustainable and environmental friendly than meat production (Bleakley & Hayes, 2017).

However, the willingness to reduce or substitute meat consumption is low (Graça et al., 2015). This seems to be the case for algae in meat substitutes as well. Research from the Consumentenbond (2016) among Dutch consumers and new protein sources show that almost 60% of the participants are not willing to try an algae burger. The most notable reasons being that consumers think an algae burger looks disgusting and the thought of eating it is (also) disgusting. (Consumentenbond, 2016). Disgust is a basic emotion that in food-related content often leads to the rejection food (Rozin & Fallon, 1987). Emotions play an important role in the acceptance of food (Juodeikiene, 2018). In order for micro-algae to be generally accepted by consumers as an ingredient in meat substitutes, it is important to investigate the role of emotions. Until now, no study has investigated the role of emotions in relation to the acceptance of algae in meat substitutes.

Research that focusses on consumer acceptance of micro-algae in meat substitutes is mainly focused on consumers attitude towards micro-algae as a protein source. Weinrich & Elshiewy (2019) found that the acceptance of micro-algae in meat substitutes is driven by negative attitudes of consumers towards the healthfulness and ethicality of meat (Weinrich & Elshiewy, 2019). Looking at this result, it seems that consumers only accept micro-algae in meat substitutes when consumers have negative attitude towards meat. However, research on how to positively influence the acceptance of micro-algae in meat

substitutes is lacking. Moreover, Weinrich & Elshiewy (2019) focussed on attitudes and not on emotions.

Emotions differ from attitudes because emotions provide unique information beyond attitudes. Attitudes are evaluative judgements while emotions are shorter in duration, higher in intensity, associated with an object and directly lead to behaviour tendencies (Bagozzi et al., 1999). Emotions arise instantly and before a person develops an attitude. When a negative emotion like disgust is related to an algae burger, the attitude is probably also negative, because the intensity of emotions is high and can directly lead to rejection (Bagozzi et al., 1999). Therefore, this study focusses on how to positively influence emotions instead of focussing on attitudes.

When new products create benefits for consumers and are able to communicate these benefits, the acceptance of the product increases (Cardello et al., 1985). Algae in meat substitutes have environmental and health benefits compared to animal based meat (Bleakley & Hayes, 2017). However, these benefits are credence attributes and thus indirectly visible towards consumers. It is unclear if communicating these benefits positively influences consumers emotions and in turn the acceptance of algae in meat substitutes.

Furthermore, familiarity with a product influences consumers buying behaviour (Hoek et al., 2017). Consumers are still unfamiliar with algae as meat substitutes (Consumentenbond, 2016). However, consumers may know algae in food products from the niche markets of health food (Becker, 2007) or from the Asian cuisine as an ingredient of sushi which has gained popularity in the Netherlands (House, 2019). It has not yet been investigated if informing consumers about possible familiarity with algae could influence emotions positively and therefore increase the acceptance of algae in meat substitutes.

The aim of this study is to investigate the influence of communicating health benefits, environmental benefits, and familiarity of algae on the emotions of consumers towards algae in meat substitutes and how these emotions influence the acceptance of algae in meat substitutes.

Understanding how communication of benefits and familiarity influences consumers emotions contributes to a better understanding of potential customers and a better chance for algae in meat substitutes to succeed on the market. Therefore this research will answer the following research question;

To what extent are which emotions raised by informing consumers about the benefits of consuming algae and their familiarity with algae and how do these emotions influence the consumer acceptance of algae in meat substitutes.

2. Theoretical framework

The objective of this research is to investigate factors that could influence the acceptance of algae as a substitute for meat. Emotional response is a factor that is proposed to have a direct effect on the acceptance of algae in meat substitutes. Moreover, the indirect effect of health or environmental benefits and familiarity on the acceptance on algae in meat substitutes are studied. These relations are shown in the following designed conceptual framework (Figure 1).

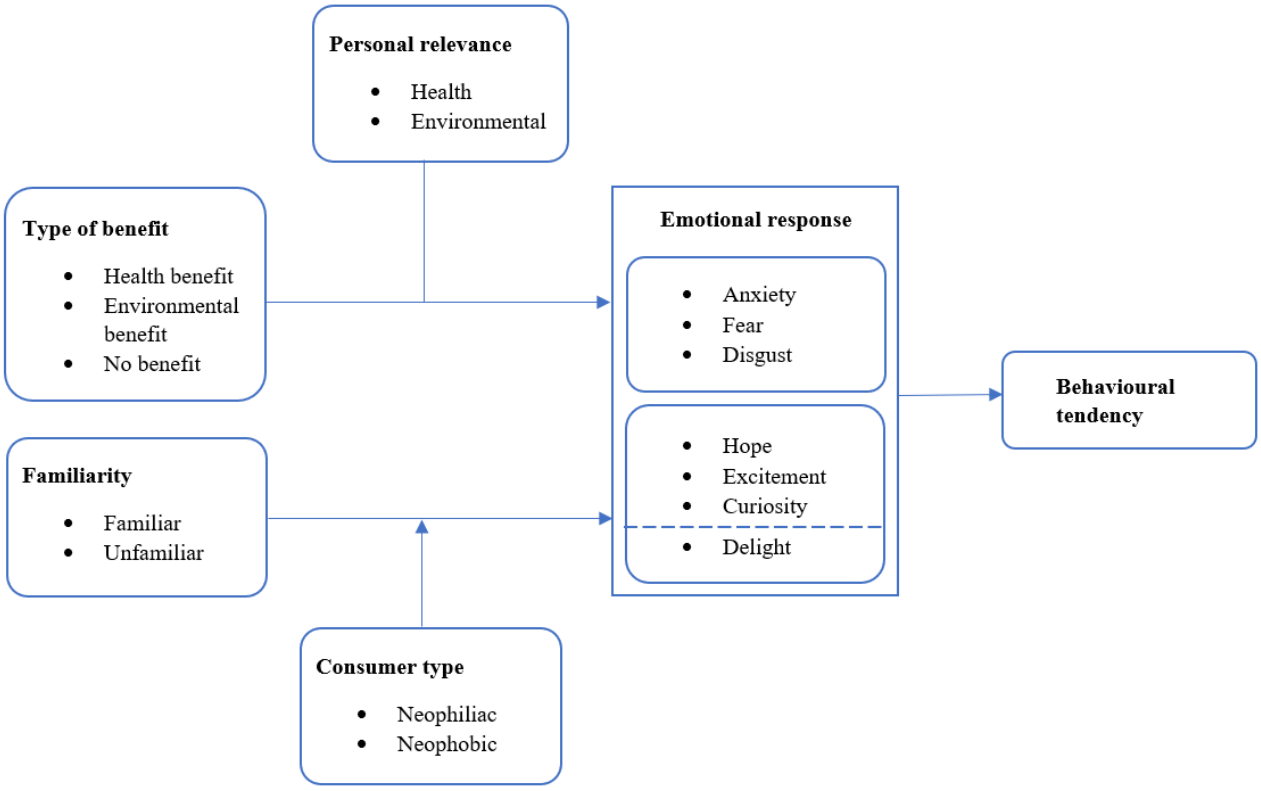

Figure 1. Conceptual framework consumer acceptance of algae in meat substitutes

2.1 Health and environmental benefits combined with personal relevance to emotions

At this moment, consumers are reluctant to try the algae burger because it induces the feeling of disgust (Consumentenbond, 2016). Disgust is an emotion that evokes a feeling of aversion (Ekman, 1992). In a food-related context, disgust is defined as an oral defence; people dislike the idea of eating particular foods because it is potentially contaminated or poisoned and consequently, an individual rejects the food (Rozin & Fallon, 1987). This rejection is not based on taste, but rather on the knowledge or lack of knowledge that people have about the origin of the food product (Rozin & Fallon, 1987). Disgust is an emotion that is related to fear (Rozin & Fallon, 1987). According to Rachman (1998, p. 2-3) fear is "an emotional reaction to a specific, perceived danger". People can for example have a fear for

contamination of food which causes a feeling of disgust towards a particular food. Both the emotions, disgust and fear, can lead towards rejection (Ekman, 1992; Lerner & Keltner, 2000). It is therefore important to take emotions into account when investigating the acceptance of new food products such as algae in meat substitutes.

One approach to emotions is the appraisal theory. According to this theory, emotion is a mental state that results from processing personally relevant information (Frijda, 1993; Lazarus & Smith, 1988). Thus, appraising is the processing of information that leads to an emotional response. The most basic interpretation of information involves the appraisal of goal congruence (Frijda, 1993; Lazarus 1991). The appraisal of goal congruence processes whether the given information in a situation is personally relevant for an individual and determines the valence of the emotional response (Frijda, 1993; Lazarus, 1991). When this information is evaluated as being relevant for achieving a personally relevant goal a positive emotional response is formed (Frijda, 1993; Lazarus, 1991). When the information is evaluated as hindering a personally relevant goal the emotional response will be negative. By default, when the information happens to be irrelevant for a person, the emotion process stops (Frijda, 1993). This means that the initial emotional reaction to a situation is evoked when there is no information from situational cues available or the when the available information is not relevant for a achieving a personal relevant goal.

Information that could be interesting about the algae consumption is its sustainability and healthy characteristics (Bleakley & Hayes, 2017). Algae contain high levels of protein, nutritious pigments, and polyphenols compounds that are beneficial to consumers' health. Moreover, the production rate per square meter algae is high and the production requires no freshwater or arable land to grow.

Health as well as environmental friendly characteristics are important criteria for consumers in the purchasing decision (Schifferstein & Oude Ophuis, 1998; Wandel & Brugge, 1997). Consumers are increasingly demanding foods that are assured to be healthier and more environmentally friendly (Brown, 2003; McCarty, 2006). Information about the environmental friendliness and healthiness of consuming algae could therefore be relevant for consumers. When information is processed as being relevant, the emotional response is positive (Frijda, 1993).

Even though the consumption of algae is beneficial for health and environment, the emotional reaction toward an algae burger appears disgusting for most people (Consumentenbond, 2016). Especially the sensory characteristics (i.e. green colour) hinder people from wanting to try algae in meat substitutes (Consumentenbond, 2016). This implies that for consumers, the negative emotional response outweighs the positive emotions that are evoked by the benefits of the consumption of algae.

This could be because health and environmental benefits are credence attributes. Credence attributes are qualities that cannot be observed by the consumer which makes it hard for consumers to see their utility (Nelson, 1970). This means that consumers are unable to recognize the healthy and sustainable benefits

of consuming algae by just looking at the product itself and could therefore not process this information as relevant for achieving personal goals. Subsequently, the positive emotions that arise through relevant information will be unrevoked. In contrast to the health and environmental benefits of algae, the green colour of algae burgers can be observed by just looking at the product itself. Therefore the negative emotion of disgust that arises from observing the green colour of algae prevails.

With the use of food labels, credence attributes can be transformed into search attributes. To make the beneficial attributes observable for consumers, labels on product packages are often used to inform consumers about credence attributes, providing quality information demanded by consumers (Caswell & Mojduszka, 1996). When the information about the attributes is consistent with a person's goal orientation, these attributes tend to outweigh their product choice (Chernev, 2004). By communicating the healthiness and environmental friendliness of algae in meat substitutes the credence attributes are transformed into search attributes. When this information is evaluated as being relevant for achieving a personally relevant goal, a positive emotional response is formed. This positive emotional response could outweigh the negative emotions that occurs from the green colour of the product. In conclusion, the following hypothesis is formed:

Hypothesis 1a: Information about the health benefits of algae in meat substitutes will cause the emotional reaction of consumers to become positive when consumers have personal health goals.

Hypothesis 1b: Information about the environmental benefits of algae in meat substitutes will cause the emotional reaction of consumers to become positive when consumers have personal environmental goals.

2.2 Familiarity to emotions

Algae in meat substitutes is a new concept in the market and consequently consumers are not yet familiar with consuming algae burgers (Consumentenbond, 2016). Unfamiliarity with novel food could negatively influence the acceptance of a product (Pliner et al., 1993). This could be due to the uncertainty about the consequences of eating algae in meat substitutes. Unfamiliar food could potentially be harmful for example. Certainty is next to goal congruency an important appraisal to determine emotional reactions of consumers (Frijda et al., 1989). It is a process of determining to what extent the outcome of a situation is known or predictable. Thus whether the outcome of a situation is certain or uncertain. This assessment helps people to cope with the situation elicited by the emotion. For algae burgers, this emotions is mostly disgust (Consumentenbond, 2016). Disgust stems from the perception of possible danger and is therefore linked to fear and anxiety (Haidt et al., 1994). Uncertain situations with a possible negative outcome lead to risk aversive behaviour (Bagozzi et al., 2000). Hence, feelings of fear, anxiety and disgust towards the yet unfamiliar of algae in meat substitutes could withhold consumers of trying this new food concept.

An individual's familiarity is a key determinants of acceptance novel food (Fenko et al., 2015, House 2019; Raudenbush & Frank, 1999, Tuorila et al., 2001). Even though consumers are not yet familiar with algae in meat substitutes (Consumentenbond, 2016), consumers may know algae in food products from the niche markets of health food (Becker, 2007) or from the Asian cuisine as an ingredient of sushi which has gained popularity in the Netherlands (House, 2019). Informing consumers about the familiarity with algae from other practices could possibly diminish the uncertainty from consumers and could therefore lower the levels of fear and anxiety. Furthermore, when consumers feel more familiar with eating algae the certainty increases. A positive emotion that stems from certainty is delight (Johnson & Stewart, 2005). Therefore, the following hypothesis is formed.

Hypothesis 2: Framing the information about consuming algae as familiar diminishes the level of fear and anxiety and disgust, and increases the level of delight about consuming algae in meat substitutes.

2.3 Moderating role of consumer type on familiarity on emotional response

The rejection that some people show towards new or unfamiliar foods, is often called neophobia; the fear of trying new food (Martins & Pliner, 2005). When an individual tends to be neophobic, the high levels of fear and anxiety cause a person to reject new food (Pliner et al., 1993). Informing neophobic consumers about the familiarity with a product from other practices could possibly diminish the uncertainty and could therefore lower the levels of fear, anxiety and disgust.

Unfamiliarity with a new product is not only linked to fear and anxiety. New foods and technologies can bring value and benefits to customers which can lead to excitement to tasting new foods (Lupton, 1996). When an individual wants to try new food it can give them a feeling of being adventurous and sophisticated (Falk, 1994). The uncertainty of not being familiar with algae meat substitutes could therefore also trigger curiosity to try the new product. Positive emotions that could arise from uncertainty are hope and excitement (Johnsen & Stewart, 2005). This is the case when consumers are neophiliac.

Neophilia is the love that some people have for new foods. Neophiliac people are constantly looking for new experiences and have a low level of fear or anxiety towards these new experiences (van Trijp & van Kleef, 2008). Algae in meat substitutes is such an experience. Neophiliacs could already feel curious and excited about trying algae in meat substitutes. The familiarity with the algae from other practices could therefore lead to less curiosity and excitement among neophiliac consumers. Because the levels of fear and anxiety among neophiliac consumers are already low, the overall emotional response towards algae in meat substitutes remains positive. The following hypothesis is formed:

Hypothesis 3a: Informing neophobic consumers about familiarity with consuming algae will lead to lower levels of fear and anxiety and higher levels of delight

Hypothesis 3b: Informing neophiliac consumers about familiarity with consuming algae will lead to lower levels of hope, excitement and curiosity and will not influence the already low level of fear and anxiety.

2.4 Emotions to behaviour tendency

When an emotion is experienced, it may be perceived as additional information about the situation. For example, when the information provided on the healthiness of consuming algae is personally relevant for you, but you did not expect algae to be that healthy you, might feel positively surprised. The positive emotion that is evoked could motivate you to buy the algae meat substitute. This is called behavioural intention (also called action tendencies, Frijda et al., 1989). The emotions that an individual experiences provides information whether the situation fits with your desired state of the goal (Frijda et al., 1989; Johnson & Stewart, 2005). Thus whether the algae burger with the information that is presented with it, is relevant for you or not. Consequently, this behavioural intention can lead to actual behaviour (Johnson & Stewart, 2005). This means that when you have positive emotions towards the product, you are more likely to purchase the product. The following hypothesis is proposed:

Hypothesis 4: Increasing levels of hope, excitement, curiosity and delight lead to higher behavioural tendencies, increasing levels of fear, anxiety and disgust lead to lower behavioural tendencies.

3. Method

3.1 Participants and study design

An online survey was constructed in Qualtrics and distributed via Facebook and through other social networking (see appendix 7.1). To be included in the study, participants had to be 18 years and older. Since the questionnaire is in Dutch, a good understanding of the Dutch language was also required. In total 346 participants were recruited via convenience sampling of which 74% were women (Table 1). 53% of the participants were between the age of 20 and 29, and had a higher educational background 63% (Table 1). This study was pre-registered, before data was collected (August 2020, https://osf.io/mvzc6/). Data was collected late August.

The hypotheses were tested in a 3 (information health benefit vs information environmental benefit vs no information benefit) x 2 (familiarity info vs no familiarity info) between subjects design. The participants were randomly assigned to one of the six conditions. Every condition consisted of a general introduction with no, a health or an environmental benefit and no, or a familiarity cue. The structure of the conditions, the manipulation levels and the and texts of the manipulations can be found in table 3. Next to the text, the general introduction also included a picture of an algae burger (see figure 2). The 2 conditions in which a participant was shown 2 manipulations (e.g. health benefit and familiarity info or environmental benefit and familiarity info) were counterbalanced to make sure that the order in which the conditions were shown had no influence on the outcome of the study.

A pre-test among 7 participants was conducted to check if the health, environmental and familiarity condition were manipulated successfully. To test the health and environmental condition, participants had to evaluate to what extent the text regarded health, environmental or taste issues on a 7-point scale (see 7.2 appendix). To test the familiarity condition, they had to indicate on a scale from 1 to 7 to what extent they felt familiar to algae after reading the text (see 7.2 appendix). Based on the results of the pre-test no adjustments were made (Table 2). Next to the pre-test, a manipulation check with the same questions to check the health, environmental and familiarity condition was done after participants filled in the questionnaire.

Demographics participants					
Age		Education		Gender	
below 20	3,0%	Primary education	0,0%	Men	24,9%
20-29	53,0%	Secundairy education	18,4%	Women	74,3%
30-39	6,8%	Secondary vocational education	18,4%	Other / Not willing to tell	0,8%
40-49	13,5%	Higher education	63,2%		
50-59	15,1%				
60-69	6,2%				
70 or above	2,4%				

Table 1: Demographic profile participants

Conditions		
Structure conditions	Level manipulation	Text
Part 1: Introduction	No manipulation	<u>100% vegetable algae burger</u> Above you can see an algae burger. This is a new product that can serve as a meat substitute. It is a burger that contains algae. Algae, such as spirulina or chlorella, are unicellular algae and are also called phytoplankton.
Part 2: Information about benefits	Level 1: no information about benefits/ no manipulation	
	Level 2: information about health benefits	Eating algae perfectly fits in a healthy lifestyle. The green superfood is an exceptionally rich source of protein and nutrients such as antioxidants, vitamins and iron. In addition, it also contains little saturated fats, so you can enjoy this meat substitute responsibly.
	Level 3: information about environmental benefits	Algae production is extremely sustainable. The ecological footprint of algae is very small because algae only need sunlight and salt water to grow. This makes algae an almost inexhaustible source of nutrition. Moreover, there is no need to use insecticides and fertilizers to grow algae, making this meat substitutes with algae an environmentally friendly food source you can enjoy responsibly.
Part 3: Information about familiarity	Level 1: no information about familiarity	
	Level 2: information about familiarity	You already know algae as an important ingredient in sushi. Consider for example Nori, which is used to prepare sushi. Nowadays algae are also well known as a food supplement in powder or pill form. You can also recognize algae as a thickener in soups, pasta or, for example, cheese spreads under the names Alginates, Agar or Carrageenan.

Table 2: The structure of the conditions, the manipulation levels and the text of the manipulations used in the survey.

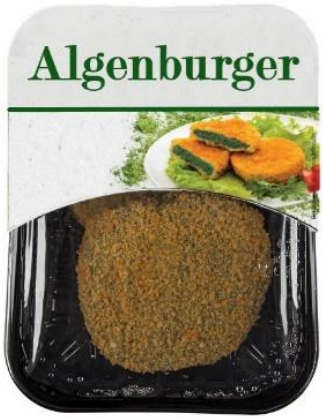

Figure 2: Picture of algae burger that was used in the survey

	Pre-test Mean(SD)			
	Health	Environmen	Taste	Familiarity
Introduction tekst	2.3(1.1)	2.3(1.8)	1.3(0.5)	x
Health condition	6.7(0.5)	1.3(0.5)	2.0(0.8)	x
Environment condition	2.3(1.4)	6.7(0.5)	1.0(0.0)	x
Familiarity condition	x	x	x	5.6(1.7)

Table 3: Mean and standard deviations pre-test.

3.3 Measures

Emotions

The specific food related emotions were measured on single item 7 point scale how strongly they felt the emotions ranging from (1) totally not to (7) very strong. The food related emotions hope, excitement, curiosity and delight were used to measure positive emotions and the food related emotions anxiety, fear and disgust were used to measure negative emotions. Anger and pleasure were also included in the survey and served as distractors for the specific emotions where they had no hypothesised effects.

Because for the first hypotheses this study the groups the food related emotions together in positive and negative emotions and from the second hypothesis on, the focus is on specific emotions, the sequence in which the emotions were asked of the participants was randomised. This was done because participants could subconsciously group the emotions into positive and negative emotions when these emotions are asked in this order, which could influence the results if participants want positive and negative emotions to align.

Behavioural tendency

Following Rossiter and Berkvist (2007), intention was measured with a single item selected from Ajzens suggested set to assess behaviour; I intend to do (a specific behaviour), I will try to do (a specific

behaviour) and I plan to do (a specific behaviour) (Ajzen, 2002). Participants had to indicate if they intended to buy an algae burger on a 7-point scale ranging from 1 (totally disagree) to 7 (totally agree).

Goal relevance

To measure health consciousness, the six items to measure the subscale health in the food choice scale of Steptoe et al. (1995) were used (table 4). All items were measured on a 7 point scale ranged from totally disagree to totally agree. Personal health goal formed a reliable scale with $\alpha = .78$

For measuring environmental consciousness, three items from the new food choice questionnaire of Lindeman & Väänänen (2000) were used (Table 5). Lindeman & Väänänen (2000) developed complementary scales to the food choice questionnaire from Steptoe et al. (1995). The three items that were used to measure environmental consciousness were part of the complementary factor ecological welfare. This factor consisted of the subscales animal welfare and environmental protection. Because the focus of environmental consciousness lies on the environment it was chosen to only make use of the three items that measured environmental protection and therefore the items that measured animal welfare have been omitted. All items were measured on a 7 point scale ranged from totally disagree to totally agree. Together the items formed a reliable scale ($\alpha = .91$).

Personal health goal	
1	It is important to me that the food I buy contains a lot of vitamins and minerals
2	It is important to me that the food I buy keeps me healthy
3	It is important to me that the food I buy is nutritious
4	It is important to me that the food I buy Is high in protein
5	It is important to me that the food I buy is good for my skin/teeth/hair/nails etc
6	It is important to me that the food I buy is high in fibre and roughage

Table 4: items to measure personal health goal, adapted from Steptoe et al. (1995)

Personal environmental goal	
1	It is important to me that the food I buy has been prepared in an environmentally friendly way
2	It is important to me that the food I buy has been produced in a way which has not shaken the balance of nature
3	It is important to me that the food I buy has been packaged in an environmentally friendly way

Table 5: items to measure personal environmental goal, adapted from Lindeman & Väänänen (2000).

Consumer type

Food neophobia and neophilia was measured with a Dutch translation by Beukelaar et al. (2019) of the 10-item food neophobia scale developed by Pliner and Hobden (1992). This 10-item questionnaire has

a 7-point rating scale to measure neophobia. Five of these items of this scale are reversed and in this study we use these five items to measure neophilia and the other five to measure neophobia (Table 6). We have strong reasons to believe that the scale can be divided in these two factors since access to the data of the study from Beukelaar et al. (2019) showed after a factor analysis a correlation of -.4 on the factor neophilia.

Participants indicated on a seven-point rating scale ranging from 1 (totally disagree) to 7 (totally agree) the extent to which they could identify themselves with the statements. The sequence in which the ten questions about neophobia and neophilia were asked was randomised. This was done because participants could subconsciously group the questions into questions about neophobia and neophilia, which could influence the results if participants want questions about neophobia or questions about neophilia to align.

A factor analysis with oblique rotation on the data ensured that neophilia and neophobia were different factors and had a correlation of -.45. Both components had eigenvalues larger than Kaiser's criterion 1. The first component, neophilia explained 45% of the variance and formed a reliable scale ($\alpha = .815$). The second factor, neophobia, explained 12% of the variance and formed a reasonable reliable scale ($\alpha = .777$).

Neophobia		**Neophilia**	
1	I do not trust new foods.	6	I am constantly sampling new and different foods. (R)
2	If I do not know what is in a food, I will not try it.	7	I like foods from different countries. (R)
3	Ethnic food looks too weird to eat.	8	At dinner parties, I will try a new food. (R)
4	I am afraid to eat things I have never had before.	9	I will eat almost anything. (R)
5	I am very particular about the foods I will eat.	10	I like to try new ethnic restaurants. (R)

Table 6: 10-item scale from Pliner and Hobden (1992) to measure neophobia and neophilia.

3.4 Procedures

The survey was conducted online using Qualtrics and started with an introductory text. The text thanked participants for participating and communicated that the results to the questionnaire were anonymous and treated confidentially. Furthermore, the participants were informed that the survey would take 5 to 7 minutes and if there were any questions concerning this survey they could send it to the e-mail address that was provided. Before the survey started, participants had to confirm that they read the introduction text.

Hereafter the participants had to fill in their age, gender and education background. Then, they were randomly assigned to one of the six conditions. After reading the text that belonged to the condition they were in, participants had to confirm that they had read the text and looked at the picture from the algae burger. This was important because the emotions that they had to indicate right after reading the text

where manipulated through the text and the picture. The emotions were asked first in the questionnaire because people form emotions fast and emotions are short in duration. After indicating their emotions, participants had to answer a question to measure behavioural tendency. It was hypothesised that emotions influence behavioural tendency and because emotions are short in duration I chose to ask the question about behavioural tendency right after participants indicated their emotions so participants still had the emotions evoked by the text about the algae burger. Next the questions about goal relevance were asked followed by the questions about consumer type. These questions were asked after the question about behavioural tendency because these are not dependent on the conditions participants were in since these are consumer traits. Lastly, the manipulation check was done. When participants were at the end of the questionnaire they were thanked again for participating in the study.

3.5 Data analysis

Because all hypothesis were tested in a 3 (health benefit vs environmental benefit vs no benefit) x2 (familiar vs unfamiliar) design, half of the participants were in the familiarity condition while only one third of the participants were in the health or environmental benefit condition. This imbalance causes multicollinearity between the predictors when performing a MANOVA. Therefore this study used multiple regression instead. To include the categorical predictors familiarity, health benefit and environmental benefit into a multiple regression, effect coding was used which made it possible to assign different weights to the various levels of the categorical variable and thus balance the data. Afterwards grand mean centring was done for the moderating variables to make the main predictors interpretable.

To examine hypothesis 1a and 1b, a multiple regression analysis on positive emotions and a multiple regression analysis on negative emotions was done. For both multiple regression analyses, the independent variables health benefit and environmental benefit, and the moderating variables health goal relevance and environmental were included. Next to these variables, the independent variable familiarity and the moderating variables neophobia and neophilia were included when analysing the effect on positive and negative emotions, to be as complete as possible.

To examine hypothesis 2, 3a and 3b seven multiple regression analysis were performed with the specific emotions fear, disgust, anxiety, hope, excitement, curiosity and delight as dependent variables. Two extra multiple regression analyses were done on the emotions anger and pleasure, which served to derive the attention from the other emotions, to see if they showed significant relations who were not hypothesised. For all nine multiple regression analysis on specific emotions the independent variables health benefit, environmental benefit and familiarity, and the moderating variables health benefit, environmental benefit, neophobia and neophilia where used in the model.

Lastly a multiple regression analysis was done with the nine different emotions as independent variables and intention to buy as dependent variable, to examine hypothesis 4.

4. Results

In the following chapter the results will be discussed in four parts. Because this study provides many results, first an overview of the data will be given. Secondly the results of the multiple regression analyses on positive and negative emotions will be reported, then the multiple regression analyses on the specific emotions, and lastly the results of the emotions on the intention to buy. Furthermore, an $\alpha = .05$ will be used.

4.1 Overview of the data

Because this study provides many results, an overview was provided with the means and standard deviations of every variable in the conditions (Table 7). Moreover, to see how the specific emotions correlate with one another the correlations are shown in table 8. The results of the manipulation check are displayed in table 9. The manipulations of health and environmental information were successful: the health condition scored higher on health than on environment and taste, and the environmental condition scored significantly higher on environment than on environment and taste. The manipulation check on familiarity indicated that participants felt somewhat familiar towards algae after reading the manipulation (m=4.1 sd= 1.6).

Mean(SD) of variables in conditions						
	Familiar			Unfamiliar		
Variable	Health Benefit	Environmental benefit	No benefit	Health Benefit	Environmental benefit	No benefit
Environmental relevance	5.54(1.04)	5.41(1.15)	5.25(1.40)	5.52(1.14)	5.33(1.14)	5.35(1.34)
Health relevance	5.39(0.71)	5.44(0.71)	5.30(0.78)	5.43(1.05)	5.41(0.77)	5.45(0.76)
Neophobic	3.51(0.83)	3.40(0.83)	3.52(0.87)	3.69(0.88)	3.40(0.74)	3.64(0.77)
Neophiliac	4.66(0.80)	4.81(0.85)	4.85(0.74)	4.88(0.60)	4.85(0.70)	4.38(0.88)
Positive emotion	3.98(1.32)	3.64(1.41)	3.44(1.47)	3.29(1.64)	3.72(1.45)	3.10(1.52)
Negative emotion	2.01(1.20)	1.97(0.94)	1.99(1.31)	2.06(1.28)	1.95(0.90)	2.35(1.12)
Anxiety	1.83(1.36)	1.74(1.16)	1.80(1.36)	1.88(1.62)	1.76(1.23)	2.10(1.49)
Fear	1.65(1.25)	1.58(0.99)	1.50(1.15)	1.67(1.19)	1.51(1.05)	1.85(1.32)
Disgust	2.56(1.61)	2.56(1.58)	2.74(1.94)	2.63(1.79)	2.56(1.37)	3.10(1.74)
Anger	1.13(0.40)	1.43(1.04)	1.35(1.03)	1.21(0.65)	1.24(0.72)	1.56(0.96)
Hope	3.69(1.72)	3.52(1.90)	3.24(1.97)	3.21(1.89)	3.91(1.86)	3.08(1.92)
Excitement	4.17(1.51)	3.76(1.73)	3.46(1.62)	3.23(1.97)	3.67(1.74)	3.27(1.82)
Curiosity	4.83(1.53)	4.68(1.63)	4.50(1.74)	4.19(1.94)	4.45(1.84)	3.71(1.95)
Delight	3.27(1.41)	2.68(1.43)	2.66(1.49)	2.54(1.62)	2.84(1.45)	2.35(1.36)
Pleasure	3.74(1.69)	3.55(1.76)	3.43(1.83)	3.35(1.73)	3.78(1.51)	3.17(1.54)
Intention to buy	4.68(1.64)	4.22(1.88)	4.18(2.00)	3.94(2.15)	3.85(1.93)	3.27(1.92)

Table 7: Mean and standard deviations of variables in specific conditions. Scores could range from 1 to 7.

Correlation between emotions									
	Fear	Disgust	Anxiety	Anger	Hope	Excitement	Curiosity	Delight	Pleasure
Fear	1								
Disgust	.34**	1							
Anxiety	.63**	.46**	1						
Anger	.48**	.26**	.46**	1					
Hope	-.02	-.25**	-.06	-.03	1				
Excitement	-.09	-.37**	-.138*	-.08	.67**	1			
Curiosity	-.21**	-.40**	-.22**	-.18**	.59**	.74**	1		
Delight	-.09	-.35**	-.08	-.05	.60**	.73**	.61**	1	
Pleasure	-.05	-.28**	-.07	-.01	.69**	.73**	.62**	.62**	1

*Table 8: Correlation between emotions. Correlations significant at the .01 level (2-tailed) are indicated with **. Correlations significant at the 0.5 level (2-tailed) are indicated with *.*

	Manipulation check Mean(SD)			
	Health	Environment	Taste	Familiarity
Health condition	5.9(1.3)	3.0(1.9)	2.4(1.5)	x
Environment condition	3.4(1.7)	6.2(1.0)	2.1(1.3)	x
Familiarity condition	x	x	x	4.1(1.6)

Table 9: mean and standard deviations manipulation check.

4.2 Multiple Regression Analyses on positive and negative emotions

Table 10 show that the multiple regression models were significant predictors of positive and negative emotions. The effect of the predictors on emotions were however small.

Hypotheses 1a concerned the moderating effect of health goal relevance on the relation between getting information on the health benefits of algae and the positive and negative emotions of consumers. Hypotheses 1b concerned the moderating effect of environmental goal relevance on the relation between getting information on the environmental benefits of algae and the positive and negative emotions of consumers.

Eight significant effects were found (Table 10). For every unit that a person scores higher on personal health goals, their positive emotions increase by .43 and their negative emotions decrease by .28. Having personal environmental goals also has a significant effect on emotions. For every unit that a person scores higher on personal health goals, their positive emotions increase by .17 and their negative emotions decrease by .14. For every unit that a person scores higher on neophilia, their positive emotions increase by .28 and negative emotions decrease by .17. For every unit that a person scores higher on neophobia , their positive emotions decrease by .28 and their negative emotions increase by .19.

Furthermore no evidence was found to support hypothesis 1a and 1b; no significant effect was found between providing versus not providing information about health benefits and the degree of personal health goals on positive or negative emotions. Also, no significant effect was found between providing versus not providing information about environmental benefits and the degree of personal environmental goals on positive or negative emotions.

	Positive emotion				**Negative emotion**			
Variable	B	SE	t	p	B	SE	t	p
(Constant)	3.52	0.08	44.83	< .01	2.07	0.06	33.69	< .01
Health benefit effect	0.10	0.07	1.50	.14	-0.03	0.05	-0.50	.62
Health goal GMC	**0.43**	**0.11**	**3.91**	**< .01**	**-0.28**	**0.09**	**-3.31**	**< .01**
Health effect x Health goal GMC	0.07	0.07	0.99	.32	0.02	0.05	0.40	.69
Environmental benefit effect	0.10	0.06	1.51	.13	-0.04	0.05	-0.86	.39
Environmental goal GMC	**0.17**	**0.07**	**2.30**	**.02**	**-0.14**	**0.06**	**-2.46**	**.01**
Environmental effect x Environmental goal GMC	0.05	0.05	1.09	.28	0.04	0.04	1.18	.24
Familiarity effect	0.15	0.08	1.85	.06	-0.05	0.06	-0.88	.38
Neophilia GMC	**0.28**	**0.11**	**2.65**	**< .01**	**-0.17**	**0.08**	**-2.03**	**.04**
Neophobia GMC	**-0.28**	**0.10**	**-2.82**	**< .01**	**0.19**	**0.08**	**2.44**	**.02**
Familiarity effect x Neophilia	0.06	0.11	0.59	.55	-0.02	0.08	-0.24	.81
Familiarity effect x Neophobia	0.05	0.10	0.49	.62	-0.02	0.08	-0.28	.78
Overall model	$F(11, 291) = 6.15$, $p < .01$, $R^2 = .19$				$F(11, 291) = 4.44$, $p < .01$, $R^2 = .14$			

*Table 10: Multiple regression analyses for predicting positive and negative emotion. Significant relationships are indicated in **bold.***

4.3 Multiple Regression Analysis on specific emotions

Table 11, 12, 13 and 14 show that the multiple regression models were significant predictors of the specific emotions. The effect of the predictors on emotions were however small.

Hypotheses 2 concerned a direct effect of familiarity on the emotions fear, anxiety, disgust and delight. The results provided no evidence to support hypothesis 2; no significant relations were found between familiarity and the emotions fear, anxiety, disgust or delight (Table 11; Table 12). A significant effect from familiarity to the emotion curiosity was found. The emotion curiosity increased with .25 when respondents were in the familiarity condition (Table 13).

Hypotheses 3a concerned the moderating effect of neophobia on the relation between getting information on familiarity of algae and the emotions fear, anxiety and delight. Hypotheses 3b concerned the moderating effect of neophobia on the relation between getting information on familiarity of algae and the emotions hope, excitement and curiosity. No evidence was found to support hypothesis 3a and 3b; no significant interaction effect was found between familiarity, neophobia and the emotions fear,

anxiety and delight (Table 11; Table 12). Also, no significant interaction effect was found between familiarity, neophilia and the emotions hope, excitement and curiosity (Table 13).

For completeness, the results of the multiple regression analyses on anger and pleasure are shown in table 14. It shows that environmental goal has a significant effect on anger. Furthermore, health goal and neophilia had a significant effect on pleasure.

	Fear				**Disgust**			
Variable	B	SE	t	p	B	SE	t	p
(Constant)	1.64	0.07	24.95	< .01	2.71	0.09	29.71	< .01
Health benefit effect	0.01	0.06	0.10	.92	-0.07	0.08	-0.92	.36
Health goal GMC	**-0.21**	**0.09**	**-2.26**	**.02**	**-0.32**	**0.13**	**-2.51**	**.01**
Health effect x Health goal GMC	0.02	0.06	0.27	.79	0.10	0.08	1.27	.20
Env. benefit effect	-0.02	0.05	-0.42	.68	-0.07	0.07	-0.96	.34
Env. goal GMC	-0.04	0.06	-0.62	.54	**-0.29**	**0.09**	**-3.41**	**< .01**
Env. effect x Env. goal GMC	0.02	0.04	0.43	.67	0.07	0.06	1.21	.23
Familiarity effect	-0.04	0.07	-0.65	.51	-0.06	0.09	-0.66	.51
Neophilia GMC	**-0.25**	**0.09**	**-2.82**	**< .01**	-0.16	0.12	-1.29	.20
Neophobia GMC	0.05	0.08	0.62	.53	**0.32**	**0.12**	**2.77**	**< .01**
Familiarity effect x Neophilia	-0.07	0.09	-0.77	.44	0.00	0.12	-0.02	.99
Familiarity effect x Neophobia	-0.05	0.08	-0.60	.55	0.03	0.12	0.23	.82
Overall model	$F(11, 291) = 2.08$, $p = .02$, $R^2 = .27$				$F(11, 291) = 4.37$, $p < .01$, $R^2 = .14$			

*Table 11: Multiple regression analyses for predicting fear and disgust. Significant relationships are indicated in **bold.***

	Anxiety				**Delight**			
Variable	B	SE	t	p	B	SE	t	p
(Constant)	1.86	0.08	24.26	< .01	2.71	0.08	33.71	< .01
Health benefit effect	-0.01	0.06	-0.18	.85	0.13	0.07	1.92	.06
Health goal GMC	**-0.33**	**0.11**	**-3.02**	**< .01**	**0.59**	**0.11**	**5.19**	**< .01**
Health effect x Health goal GMC	-0.05	0.07	-0.77	.44	0.00	0.07	0.07	.95
Env. benefit effect	-0.04	0.06	-0.57	.57	0.06	0.07	0.96	.34
Env. goal GMC	-0.09	0.07	-1.32	.19	0.02	0.08	0.25	.81
Env. effect x Env. goal GMC	0.05	0.05	1.02	.31	0.05	0.05	1.07	.29
Familiarity effect	-0.06	0.08	-0.77	.44	0.14	0.08	1.72	.09
Neophilia GMC	-0.10	0.10	-0.94	.35	0.11	0.11	0.98	.33
Neophobia GMC	**0.20**	**0.10**	**2.02**	**.04**	**-0.22**	**0.10**	**-2.14**	**.03**
Familiarity effect x Neophilia	0.01	0.10	0.11	.91	0.04	0.11	0.38	.70
Familiarity effect x Neophobia	-0.04	0.10	-0.42	.68	0.01	0.10	0.10	.92
Overall model	$F(11, 291) = 2.58$, $p < .01$, $R^2 = .09$				$F(11, 291) = 4.36$, $p < .01$, $R^2 = .14$			

*Table 12: Multiple regression analysis for predicting anxiety and delight. Significant relationships are indicated in **bold.***

	Hope				Excitement				Curiosity			
Variable	B	SE	t	p	B	SE	t	p	B	SE	t	p
(Constant)	3.43	0.10	32.93	< .01	3.57	0.09	37.72	< .01	4.37	0.09	46.12	< .01
Health benefit effect	0.07	0.09	0.77	.44	0.09	0.08	1.06	.29	0.11	0.08	1.43	.15
Health goal GMC	0.23	0.15	1.59	.11	**0.49**	**0.13**	**3.66**	**< .01**	**0.42**	**0.13**	**3.14**	**< .01**
Health effect x Health goal GMC	0.14	0.09	1.51	.13	0.03	0.08	0.40	.69	0.10	0.08	1.16	.25
Env. benefit effect	0.16	0.09	1.82	.07	0.08	0.08	0.97	.33	0.10	0.08	1.23	.22
Env. goal GMC	**0.31**	**0.10**	**3.15**	**< .01**	**0.19**	**0.09**	**2.15**	**.03**	0.16	0.09	1.81	.07
Env. effect x Env. goal GMC	0.06	0.06	0.98	.32	0.07	0.06	1.28	.20	0.02	0.06	0.33	.74
Familiarity effect	0.02	0.10	0.19	.85	0.18	0.09	1.88	.06	**0.25**	**0.09**	**2.59**	**.01**
Neophilia GMC	**0.30**	**0.14**	**2.09**	**.04**	**0.29**	**0.13**	**2.25**	**.03**	**0.44**	**0.13**	**3.40**	**< .01**
Neophobia GMC	-0.16	0.13	-1.22	.22	**-0.29**	**0.12**	**-2.39**	**.02**	**-0.46**	**0.12**	**-3.79**	**< .01**
Familiarity effect x Neophilia	0.06	0.14	0.39	.69	0.03	0.13	0.24	.81	0.12	0.13	0.97	.34
Familiarity effect x Neophobia	0.07	0.13	0.54	.59	-0.03	0.12	-0.25	.80	0.14	0.12	1.21	.23
Overall model	$F(11, 291) = 3.55$, $p < .01$, $R^2 = .12$				$F(11, 291) = 4.84$, $p < .01$, $R^2 = .16$				$F(11, 291) = 6.87$, $p < .01$, $R^2 = .21$			

*Table 13: Multiple regression analyses for predicting hope, excitement and curiosity. Significant relationships are indicated in **bold.***

	Anger				Pleasure			
Variable	B	SE	t	p	B	SE	t	p
(Constant)	1.32	0.05	28.00	< .01	3.49	0.09	38.58	< .01
Health benefit effect	-0.07	0.04	-1.79	.07	0.06	0.08	0.75	.45
Health goal GMC	-0.04	0.07	-0.54	.59	**0.53**	**0.13**	**4.17**	**< .01**
Health effect x Health goal GMC	0.01	0.04	0.29	.77	0.04	0.08	0.45	.66
Env. benefit effect	-0.02	0.04	-0.51	.61	0.09	0.07	1.18	.24
Env. goal GMC	**-0.13**	**0.04**	**-2.86**	**< .01**	0.11	0.08	1.35	.18
Env. effect x Env. goal GMC	0.03	0.03	0.92	.36	0.04	0.06	0.76	.45
Familiarity effect	-0.01	0.05	-0.24	.81	0.06	0.09	0.67	.50
Neophilia GMC	-0.11	0.06	-1.65	.10	**0.37**	**0.12**	**3.04**	**< .01**
Neophobia GMC	0.05	0.06	0.80	.42	-0.09	0.12	-0.74	.46
Familiarity effect x Neophilia	0.05	0.06	0.74	.46	0.03	0.12	0.21	.83
Familiarity effect x Neophobia	0.03	0.06	0.56	.58	0.06	0.11	0.49	.63
Overall model	$F(11, 291) = 2.32$, $p < .01$, $R^2 = .08$				$F(11, 291) = 4.56$, $p < .01$, $R^2 = .15$			

*Table 14: Multiple regression analyses for predicting anger and pleasure. Significant relationships are indicated in **bold.***

4.4 Multiple Regression Analysis on behavioural tendency

Hypothesis 4 concerned the direct effect of fear, anxiety, disgust, hope, excitement and curiosity on intention to buy. Table 15 shows the result of the multiple regression analysis on intention to buy. It shows that the model was a significant predictor of intention to buy and that the effect of emotions on the intention to buy was large and explained 69.6% of the variances. Fear, anxiety, delight and pleasure had no significant effect on intention. The emotions disgust, anger, hope, excitement, curiosity did show a significant effect on the intention to buy. For every unit scores that a person scores higher on disgust, their buying intention decreases with .29. For every unit scores that a person scores higher on hope, their buying intention increases with .10. For every unit scores that a person scores higher on excitement, their buying intention increases with .35. For every unit scores that a person scores higher on curiosity, their buying intention increases with .37. For every unit that a person scores higher on anger, their buying intention decreases with .25.

Intention to buy				
Variable	B	SE	t	p
(Constant)	1.74	0.27	6.42	< .01
Fear	0.06	0.07	0.85	.40
Disgust	**-0.29**	**0.05**	**-6.05**	**< .01**
Anxiety	-0.01	0.06	-0.16	.88
Anger	**-0.25**	**0.09**	**-2.84**	**< .01**
Hope	**0.10**	**0.05**	**2.06**	**.04**
Excitement	**0.35**	**0.07**	**5.19**	**< .01**
Curiosity	**0.37**	**0.05**	**6.73**	**< .01**
Delight	-0.02	0.06	-0.30	.77
Pleasure	0.02	0.06	0.36	.72
Overall model	$F(7, 302) = 94.41$, $p < .01$, $R^2 = .70$			

*Table 15: Multiple regression analyses for predicting intention to buy. Significant relationships are indicated in **bold.***

5. Conclusion and Discussion

To reduce the burden of the meat production on the environment while coping with the growing demand of protein sources, consumers should become less reliant on animal-based protein and move towards a more sustainable protein source (Aiking, 2011). Micro-algae is a promising protein source in this regard, due to its health and environmental benefits. Despite the promising benefits of algae, the emotional reaction toward an algae burger appears to be disgust for most people (Consumentenbond, 2016). Because a negative emotional reaction can lead towards rejection (Rozin & Fallon, 1987), this study has investigated the influence of emotions on the acceptance of algae in meat substitutes.

No support was found for the hypothesis that information about the health benefits of algae in meat substitutes for consumers who have personal health goals causes more positive emotional reactions. Also no support was found for the hypothesis that information about the environmental benefits of algae in meat substitutes for consumers who have personal environmental goals causes more positive emotional reactions. Both hypotheses were based on the assumption that consumers had a high level of negative emotions towards algae in meat substitutes. The results in the control group however shows that the mean of the positive emotions is higher than the mean on negative emotions which may explain why no evidence was found. A possible explanation to these low levels of negative emotions could be that emotions are more intense when actually seeing a algae burger in real life, than just seeing a picture of an algae burger on a computer screen. Food shown in a real life environment versus an unrealistic environment influences the acceptance of food (King et al., 2004). A picture on a computer screen could feel less real than seeing an algae burger in a physical environment. Therefore it is suggested that future research is done in a physical environment where people can see the food.

The study did find a significant relation between the level of health goal on positive and negative emotions and the level of environmental goal on positive and negative emotions. Participants had the propensity to evaluate the algae burger more positive when having higher levels of health goals. This relationship existed in a lesser extent for environmental goal. This is an important finding because this could indicate that especially health conscious consumers are open to try algae burgers. A possible explanation for the higher positive emotions for people with a high health goal could be that the algae burger in itself provides a relevant cue that fits their health goal. According to Lazarus (1991) and Frijda (1993) information relevant for achieving a personal relevant goal could lead to a positive emotional response. It could for example be that the name algae burger, evokes more healthy associations for people than for example the word beef burger, implying that the name in itself is already a relevant cue for people with a health goal. More research is therefore needed to find out what kind of associations people have with algae in meat substitutes.

The study provides no evidence to support hypothesis 2, no significant relation was found between framing the information about consuming algae as familiar and diminished levels of fear, anxiety,

disgust, and increased levels of delight. There was also no evidence found to support hypotheses 3a and 3b; Informing neophobic consumers about familiarity with consuming algae will lead to lower levels of fear and anxiety and higher levels of delight and to support that informing neophiliac consumers about familiarity with consuming algae will lead to lower levels of hope, excitement and curiosity. This could be due to the manipulation of familiarity. Even though a pre-test was done to check if the manipulation of familiarity was successful, the manipulation check indicated that there were a lot of individual differences between participants in their evaluation of how familiar they felt towards algae after reading the manipulation. Therefore it is suggested that in future research more research should be done about how to frame familiarity in regard to algae.

The study did provide evidence that a persons' neophobia and/or neophilia influences the emotions experienced and therefore consumer type can play an important part in the acceptance of algae in meat substitutes. In this study neophobia leads to a higher level of disgust and anxiety and a lower level of curiosity, excitement and delight. Neophilia leads to higher levels of hope, curiosity, excitement and pleasure and lower levels of fear. Interesting here is that neophobia and neophilia relate to different emotions, lending further support that the distinct factors observed in the factor analysis of neophobia scale indeed relate to distinct constructs. This is in line with the omnivore paradox described by Rozin (1976), in which he describes the natural need for humans to have a neophiliac trait to seek for new food needed for survival, but at the same time the need to be neophobic towards new food because it can be potentially harmful.

The results on the last hypothesis on the relation between the specific emotions and intention to buy, showed that increasing levels of hope, excitement and curiosity leaded to higher behavioural tendencies, while delight and pleasure did not. The emotions hope, curiosity and excitement have in common that they occur in uncertain situations, while delight and pleasure arise in situations that are known and certain (Bagozzi et al., 2000; Johnson and Steward, 2005; Silvia, 2008). Positive uncertain emotions lead people to pursuing a desired outcome (Bagozzi et al., 2000; Frijda et al., 1989) This means that people who experience these emotions believe in a positive outcome and are willing to approach a situation. Thus in the case of algae in meat substitutes, hope, curiosity and excitement could lead to wanting to try an algae burger. Neophilia is therefore an important consumer trait to take into account in further research about consumer acceptance of algae in meat substitutes, because it increases the levels of hope, excitement and curiosity and these emotions subsequently lead to higher intentions to buy algae in meat substitutes.

The results on the last hypothesis also showed that disgust and anger lead to lower behavioural tendencies. No significant effect was found for fear and anxiety on the willingness to buy algae burgers. The means of anger, fear and anxiety were very low, indicating that the algae burgers barely evoked these emotions. This can be explained by the assumption that disgust is "the" negative emotion related

to food (Hartmann et al., 2018; Rozin & Fallon, 1987). Another possible explanation is that due to some multicollinearity between disgust fear and anxiety, disgust takes away the entire effect of fear and anxiety.

The demographic characteristics of the participants could also explain the non-significant effect of fear on intention to buy. This study used convenience sampling due to limited time and the target population was not specified. The respondents in this research were therefore not very diverse in their demographic characteristics. Most were between the age of 20-29 and high educated. The sample is therefore probably not representative for other age groups or lower educated people. The higher the age of people, the lower chance that people adopt new technologies (Gilly & Ziethaml, 1985). This could mean that older generations could have a lower acceptance towards trying new foods. As people age they also become more cautious (Botwinick, 1973). This could indicate that on a higher age people experience a higher level of fear and or anxiety towards algae in meat substitutes, while younger people may not have the feeling that the new technology of using algae in meat substitutes is threatening. Education could also effect the level of fear and anxiety. High educated people often have lower levels of neophobia and show more variety seeking consumption behaviour than lower educated people and (Flight et al., 2003; Mustonen et al., 2012). This could therefore lead to lower levels of fear and anxiety among high educated people. It is therefore suggested to do this research on a larger scale with more participants in different age groups and with participants who differ more in their level of education.

It was chosen to execute the survey in Dutch because most of the potential participants lived in the Netherlands and were native Dutch speakers. When providing them the survey in English it could be that people would have not fully understood the questions or manipulations that were provided which could have influenced the results. This also meant that the emotions were translated into Dutch. There is a chance that items that were used do not have the exact same meaning in English as they have in Dutch. This could have influenced the reliability of emotions that were used.

Altogether, the results of the study could partly answer the research question; To what extent are which emotions raised by informing consumers about the benefits of consuming algae and their familiarity with algae and how do these emotions influence the consumer acceptance of algae in meat substitutes. It can be concluded that a higher levels of disgust leads to a lower acceptance of algae in meat substitutes and a higher levels of curiosity, excitement and hope leads to a higher acceptance of algae in meat substitutes. To what extent these emotions were raised by informing consumers about the benefits of consuming algae and their familiarity with algae did not become clear in this research. This study does however provide evidence that it is important to look at emotions specifically instead of just positive versus negative emotions. Moreover, future studies should make a split in neophobia and neophilia because they relate to different emotions and can therefore play an important part in the acceptance of algae in meat substitutes.

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7. Appendix

7.1 Questionnaire algae burger

PART 1: INTRODUCTION

Welkom

Bedankt dat u deel wilt nemen aan dit onderzoek! De vragenlijst die u krijgt te zien is onderdeel van mijn masterthesis en gaat over algenburgers. Het is voor het onderzoek van belang dat u alle vragen naar waarheid invult. Er zijn geen slechte of foute antwoorden, het is uw mening die belangrijk is. U kunt deelnemen aan dit onderzoek wanneer u 18 jaar of ouder bent. De antwoorden die u geeft worden volledig vertrouwelijk en anoniem behandeld. Dit betekent dat uw naam nergens zal verschijnen en dat uw antwoorden niet aan uw naam worden gekoppeld. Het invullen van de vragenlijst duurt ongeveer 5-7 minuten en u kunt ten alle tijden stoppen. Mocht u nog vragen hebben kunt u mailen naar anne.vanhassel@wur.nl.

Door te bevestigen dat u de bovenstaande tekst heeft gelezen kunt u beginnen met de vragenlijst.

Alvast bedankt!

o Ik heb de bovenstaande tekst gelezen (1)

PART 2: DEMOGRAPHICS

Q1 Wat is uw leeftijd

Q2Wat is uw geslacht

o Man

o Vrouw

o Anders/Wil ik niet zeggen

Q3 Wat is uw hoogst voltooide opleiding

o Geen

o Basis onderwijs

o Lager/ voorbereidend beroepsonderwijs (lbo/ vmbo)

o Middelbaar algemeen voortgezet onderwijs (mavo/ vmbo-t)

o Middelbaar beroepsonderwijs (mbo)

o Hoger algemeen voortgezet onderwijs (havo)

o Voorbereidend wetenschappelijk onderwijs (vwo)

o Hoger beroepsonderwijs (hbo)

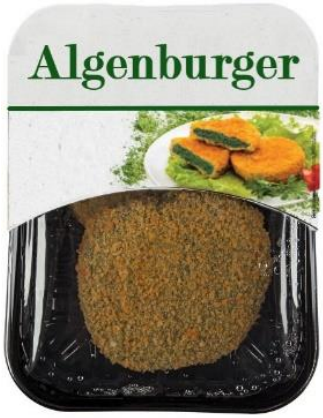
o Wetenschappelijk onderwijs (wo)

PART 3: CONDITIONS

(Below is an example of the condition health benefit information and information about familiarity. Participants were randomly allowcated to 1 of the 6 conditions.)

Lees de onderstaande tekst goed door en kijk goed naar de bijgevoegde foto!

<u>100% plantaardige algenburger</u>



Hierboven ziet u een algenburger. Dit is een nieuw product dat kan dienen als vleesvervanger. Het is een burger waarin algen zijn verwerkt. Algen, zoals spirulina of chlorella, zijn eencellige wieren en heten ook wel fytoplankton.

Het eten van algen is een perfecte aansluiting op een gezonde levensstijl. Het groene superfood is een buitengewoon rijke bron van proteïne en voedingstoffen als antioxidanten vitamines en ijzer. Daarnaast bevat het ook nog eens weinig verzadigde vetten waardoor je verantwoord kunt genieten van deze vleesvervanger.

U kent algen al als belangrijk ingrediënt van sushi. Denk bijvoorbeeld maar eens aan Nori die gebruikt wordt om sushi te bereiden. Daarnaast worden algen al eeuwenlang gebruikt in Afrika, Amerika en het Midden-Oosten. Zo werd het samen met tarwe gegeten of er werd soep van gemaakt. Tegenwoordig is het bekent als voedingssupplement in poeder- of pilvorm.

o Ik heb de bovenstaande tekst gelezen en heb goed naar de bijgevoegde foto gekeken (1)

PART 4: EMOTIONS

Q4 De foto van de algenburger en het lezen van de bijbehorende tekst kan bepaalde emoties bij u oproepen.

Geef hieronder aan in hoeverre u de volgende emoties heeft ervaren tijdens het kijken naar de foto van de algenburger en het lezen van het bijgevoegde bericht. De mogelijke antwoorden lopen uiteen van 1 (helemaal niet) tot 7 (zeer sterk). Bij het kijken naar de foto van de algenburger en het lezen van de bijbehorende tekst over algenburgers ervaarde ik de emotie...

Hoop	1	2	3	4	5	6	7
Enthousiasme	1	2	3	4	5	6	7
Nieuwsgierigheid	1	2	3	4	5	6	7
Genot	1	2	3	4	5	6	7
Ongerustheid	1	2	3	4	5	6	7
Angst	1	2	3	4	5	6	7
Walging	1	2	3	4	5	6	7
Tevredenheid	1	2	3	4	5	6	7
Boosheid	1	2	3	4	5	6	7

PART 5: GOAL RELEVANCE; HEALTH AND ENVIRONMENT

Q5 De volgende stellingen gaan over uw koopgedrag. Geef in de onderstaande stellingen aan in hoeverre u het met de stelling eens bent. De mogelijke antwoorden lopen uiteen van helemaal niet mee eens (1) tot helemaal mee eens (7).

Ik vind het belangrijk dat het eten dat ik koop...

Veel vitamines en mineralen bevat	1	2	3	4	5	6	7
Mij gezond houdt	1	2	3	4	5	6	7
Voedzaam is	1	2	3	4	5	6	7
Een hoog eiwitgehalte heeft	1	2	3	4	5	6	7
Goed is voor mijn huid/haar/nagels etc.	1	2	3	4	5	6	7
Veel vezels bevat	1	2	3	4	5	6	7

Q6 Ik vind het belangrijk dat het eten dat ik koop...

Op een milieuvriendelijke manier geproduceerd is	1	2	3	4	5	6	7
Geproduceerd is op een manier waarbij de balans in de natuur niet wordt verstoord	1	2	3	4	5	6	7
Milieuvriendelijk verpakt is	1	2	3	4	5	6	7

PART 6: CONSUMER TYPE; NEOPHOBIA AND NEOPHILIA

Q7 Nu krijgt u een aantal vragen over uw eetgedrag en beweegredenen in het algemeen. De mogelijke antwoorden lopen uiteen van helemaal niet mee eens (1) tot helemaal mee eens (7).

Ik probeer constant nieuw en verschillend voedsel	1	2	3	4	5	6	7

Ik vertrouw geen nieuw voedsel.	1 2 3 4 5 6 7
Ik probeer graag nieuwe buitenlandse restaurants.	1 2 3 4 5 6 7
Als ik niet weet uit welk voedsel de maaltijd bestaat, probeer ik het niet.	1 2 3 4 5 6 7
Ik houd van voedsel uit diverse landen.	1 2 3 4 5 6 7
Buitenlands voedsel ziet er te vreemd uit om te eten.	1 2 3 4 5 6 7
Tijdens feestjes probeer ik nieuw voedsel.	1 2 3 4 5 6 7
Ik ben bang om voedsel te eten, dat ik nooit eerder heb gehad.	1 2 3 4 5 6 7
Ik ben erg kieskeurig over het voedsel dat ik eet.	1 2 3 4 5 6 7
Ik eet bijna alles.	1 2 3 4 5 6 7

PART 7: BEHAVIOURAL TENDENCY

Q8 Ik heb de intentie om een algenburger te kopen wanneer deze te vinden is in de supermarkt. De mogelijke antwoorden lopen uiteen van helemaal niet mee eens (1) tot helemaal mee eens (7).

1 2 3 4 5 6 7

PART 8: END OF SURVEY

Bedankt voor uw deelname aan mijn onderzoek! Wanneer u verder nog vragen heeft kunt u mailen naar anne.vanhassel@wur.nl.

7.2 Pre-test

Tekst 1

100% plantaardige algenburger

De algenburger is een nieuw product dat kan dienen als vleesvervanger. Het is een burger waarin algen zijn verwerkt. Algen, zoals spirulina of chlorella, zijn eencellige wieren en worden ook wel fytoplankton genoemd.

In hoeverre vindt u dat deze tekst gaat over (omcirkel het juiste getal 1= gaat er totaal niet over 7= gaat er helemaal over)

Gezondheid	1 2 3 4 5 6 7
Milieu	1 2 3 4 5 6 7
Smaak	1 2 3 4 5 6 7

Tekst 2

Het eten van algen is een perfecte aansluiting op een gezonde levensstijl. Het groene superfood is een buitengewoon rijke bron van proteïne en voedingstoffen als antioxidanten vitamines en ijzer. Daarnaast bevat het ook nog eens weinig verzadigde vetten waardoor je verantwoord kunt genieten van deze vleesvervanger.

In hoeverre vindt u dat deze tekst gaat over (omcirkel het juiste getal 1= gaat er totaal niet over 7= gaat er helemaal over)

Gezondheid	1	2	3	4	5	6	7
Milieu	1	2	3	4	5	6	7
Smaak	1	2	3	4	5	6	7

Tekst 3

De productie van algen is ontzettend duurzaam. De ecologische voetafdruk van algen is bijzonder klein omdat algen enkel zonlicht en zoutwater nodig hebben om te kunnen laten groeien. Hierdoor zijn algen een bijna onuitputtelijke voedingsbron. Bovendien hoeft er geen gebruik gemaakt te worden van insecticiden en kunstmest om algen te kweken waardoor algen een milieuvriendelijke voedingsbron zijn en je verantwoord kunt genieten van deze vleesvervanger.

In hoeverre vindt u dat deze tekst gaat over (omcirkel het juiste getal 1= gaat er totaal niet over 7= gaat er helemaal over)

Gezondheid	1	2	3	4	5	6	7
Milieu	1	2	3	4	5	6	7
Smaak	1	2	3	4	5	6	7

Tekst 4

U kent algen al als belangrijk ingrediënt van sushi. Denk bijvoorbeeld maar eens aan Nori die gebruikt wordt om sushi te bereiden, maar tegenwoordig zijn algen ook erg bekend als voedingssupplement in poeder- of pilvorm. Waar u algen ook van kunt herkennen is als verdikkingsmiddel in soepen, pasta of bijvoorbeeld smeerkaas. U herkent algen dan onder de namen Alginaten, Agar of Carrageen.

In hoeverre heeft u na het lezen van deze tekst het gevoel dat u bekend bent met algen? (omcirkel het juiste getal 1= totaal niet 7= helemaal)

Bekend met algen	1	2	3	4	5	6	7