

THE EFFECT OF POSITIVE INFORMATION AND MEAL-FIT ON THE ACCEPTABILITY OF DUCKWEED AS HUMAN FOOD, IN THE NETHERLANDS

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Abstract:

Objective: The aim of this thesis was to explore the acceptability of duckweed consumption in humans via explorative interviews and a survey to a larger sample, both conducted in the Netherlands. We were particularly interested in the roles of appropriateness (fitting) and positive information provision in the process of duckweed acceptability, through respectively automatic and deliberate evaluation. **Method:** We manipulated images of duckweed meals such that duckweed was either fitting or non-fitting in these meals. In addition, participants were either provided or not provided with information about the nutritional and environmental benefits of duckweed as human food. Participants were randomly allocated to one of the four possible survey conditions. **Results:** (1) In the deliberate evaluation of duckweed meals, fitting meals were evaluated more positively than non-fitting meals, but not in automatic evaluation. (2) The extent to which duckweed fits in a meal moderated the effect of information provision on deliberate evaluation of duckweed meals. (3) The more positive the automatic evaluation of duckweed, the more positive was the deliberate evaluation. (4) The more positive the deliberate evaluation of duckweed, the more acceptable duckweed was as human food. **Conclusion:** Providing information about the nutritional and environmental benefits of duckweed has a positive effect on duckweed acceptability as human food in the Netherlands, on condition that duckweed is used in a fitting meal (vs. a non-fitting meal).

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1. Introduction

The world population has reached 7.3 billion as of mid-2015 and is expected to increase further to 9.7 billion in 2050 (United Nations, 2015). Considering the increasing standards of living in developing countries, it is estimated that this population growth goes along with a high demand for animal-derived protein (Boland et al., 2013; Gilland, 2002). So far, protein production has been able to keep up with the population growth by intensifying animal production (Aiking, 2011), to the point that animal-derived protein accounts for almost 40% of total protein consumption worldwide (Bruinsma et al., 2006). The intensification of animal production seems to be driven by several factors including economic benefits, consumer preference, food security, benefits in child nutrition, and protein quality (Bruinsma et al., 2006; Gilland, 2002)

The amino acids present in animal-derived protein are required for growth, health, reproduction and the optimal performance of humans (Boland et al., 2013). The most recent FAO/WHO estimates of dietary amino acid requirements for adults are set to 0.18 g/kg per day of essential amino acids and 0.48 g/kg per day of non-essential amino acids, based on an estimated average protein requirement of 0.66 g/kg per day (FAO/WHO, 2007; Levesque & Ball, 2017). Overall, most sources of animal proteins, legumes, root crops and cereals contain the proposed requirement values of essential amino acids (FAO/WHO, 2007). However, the current production of animal-derived protein, even after intensification, would not suffice to keep up with the population growth and the associated requirements for amino acids (Gilland, 2002) In addition, the intensification of animal production has led to issues related to human and animal health and a decrease in animal welfare (Aiking, 2011; Raney et al., 2009; Steinfeld et al., 2006). Moreover, while the worldwide demand of meat, dairy and fish is increasing, so are the environmental impacts of their production (Aiking, 2011; Bruinsma et al., 2006; Van der Peet & Kamp, 2011).

It seems therefore inevitable to explore alternative sources of protein. A transition towards diets containing less animal-derived protein and more plant-derived protein in Western countries would benefit the conservation of biodiversity, land, water, energy, climate, human health and animal welfare (Aiking, 2011). Besides conventional protein sources (i.e. meat, fish, dairy and legumes), new plant proteins sources have been explored in the scientific world. As such, (micro)algae, seaweeds, rapeseed, insects, and duckweed are expected to enter the European feed and food market as an alternative for animal-derived proteins (Van der Peet & Kamp, 2011; van der Spiegel, Noordam, & van der Fels-Klerx, 2013).

Duckweeds, belonging to the botanical family *Lemnaceae*, are tiny free-floating vascular plants with a world-wide distribution. There are five common genera of duckweeds (*Spirodela*, *Lemna*, *Landoltia*, *Wolffia*, and *Wolffiella*) and about 40 species. They reproduce by vegetative reproduction and are characterized by rapid clonal growth. Furthermore, they cluster in colonies and form green blankets or a type of mat on the surface of the water (Armstrong, 2011; Hillman, 1961). Duckweeds have attracted considerable attention for several reasons: (1) they are the fastest growing flowering plants known till date (Ziegler, Adelman, Zimmer, Schmidt, & Appenroth, 2015); (2) they can be cultivated in a basin on non-arable land, thereby not making use of farming land; (3) they do not require external application of fertilizers for their growth as they can take up nutrients from wastewater using their function of bioremediation (Verma & Suthar, 2014; Zhao et al., 2015), thereby eliminating additional threat to the environment; (4) their carbon footprint is minimal: preliminary calculations reveal a score of 0.4 kg of carbon dioxide equivalent produced per 1 kg of duckweed compared to e.g. 0.9 kg for lentils and 27.0 kg

for beef (see Appendix I); (5) they contain high amounts of high quality protein when grown under optimal conditions, including temperature, light and nutrient availability (Appenroth et al., 2017; Leng, Stambolie, & Bell, 1995). With a water content of 92 to 94% in fresh duckweed, the protein concentration in dry matter of a wild colony of duckweed growing on nutrient-poor water typically ranges from 15 to 25%, while growing under ideal conditions and harvested regularly, it ranges from 35 to 43% (Leng et al., 1995).

Despite the great potential of duckweed to function as a full source of plant protein in human nutrition, it is not part of daily diet in Western countries. At this point, human duckweed consumption is common in some parts of Southeast Asia, including Laos, Thailand and Burma (now Myanmar) as a vegetable named 'Khai-Nam' (Bhanthumnavin & McGarry, 1971). There, *Wolffia arrhiza* and *Wolffia globosa* are the dominating species used for human consumption (Appenroth et al., 2017; ISCDRA, 2016). Possible explanations for why duckweed has not spread to the rest of the world could be (1) its high content of crystallised oxalic acid, resulting in a negative effect on the taste; (2) the difficulty of separating (pathogenic) organisms such as worms, snails, protozoa, and bacteria from the plant (Iqbal, 1999). Nonetheless, duckweed is seen as promising for human consumption in Western countries (Appenroth et al., 2017). Although more thorough investigation is suggested, there are no reports of harmful effects of eating duckweed (ISCDRA, 2016). Moreover, GreenOnyx, who developed a kitchen countertop system to grow and process Khai-nam, has already received approval from the US Food and Drug Administration, thus enabling duckweed introduction to the USA market as edible vegetable (ISCDRA, 2016). One remaining point of attention is, however, that it is not yet known whether duckweed is found acceptable as human food in Western countries. In addition, it may be unclear to consumers how duckweed can be incorporated in food, since duckweed is not yet part of the European food market. Therefore, acceptability of duckweed as human food is the focus of this thesis.

Other unconventional sources of protein, such as insects, are surrounded by negative perceptions which can be hard to change. The disgust factor is an often-mentioned obstacle that needs to be overcome in order to develop the Western insect industry and supply (Haidt, Rozin, McCauley, & Imada, 1997; Kellert, 1993; Tan et al., 2015). However, existing research on Western consumer acceptability of insects as food tends to focus on changing individual cognitions in food choice through education and experience (Tan et al., 2015), rather than on changing social or contextual factors (FAO, 2013; House, 2016), e.g. the degree of appropriateness (fitting) as explored by Tan, Fischer, van Trijp, & Stieger (2016). Accordingly, the importance of contextual fitting versus a cognitive approach is an interesting perspective to focus on in the process of duckweed acceptability.

Therefore, the aim of this thesis is to explore the acceptability of duckweed consumption in humans from Western countries, and to identify perceptions, barriers and facilitating factors in human use and consumption of duckweed. We are particularly interested in the roles of appropriateness (fitting) and positive information provision in the process of duckweed acceptability, through respectively automatic and deliberate evaluation. If duckweed (protein) is acceptable to human consumers, it can help to encourage or maintain sufficient protein intake, which is essential for human health. In this way, duckweed consumption has the potential to reduce the burdens related to high meat consumption (i.e. issues regarding human health, animal welfare, and the environment), as well as to improve the quality of life in large populations and specific risk groups.

1. Theoretical Framework

The process by which people find food acceptable is complex: how do people construct subjective interpretations of information from the environment? People’s responses to food are related to sensory characteristics of the product, available information (or lack of it) about the product, and attitudinal or personality variables (Tuorila, Meiselman, Bell, Cardello, & Johnson, 1994). This implies the involvement of different cognitive processes prior to potential consumption of a food product. However, numerous scientific concepts have evolved to describe the different aspects of the human response to food; their terminology differing from one discipline to another. Therefore, it is relevant to decompose the mind’s functionality into the separate cognitive processes involved in the food acceptability process prior to human behaviour, especially because duckweed is not yet available for tasting. A demarcation of these cognitive processes is presented in Figure 1. Sensory aspects other than appearance are left out of this model, because participants will not be exposed to real duckweed during the experimental part of this thesis, but rather to illustrations of duckweed. This decision stands until the safety of duckweed for human consumption is fully confirmed by scientists of Wageningen Food & Biobased Research and assessed by, for instance, the Medicines Evaluation Board (MEB).

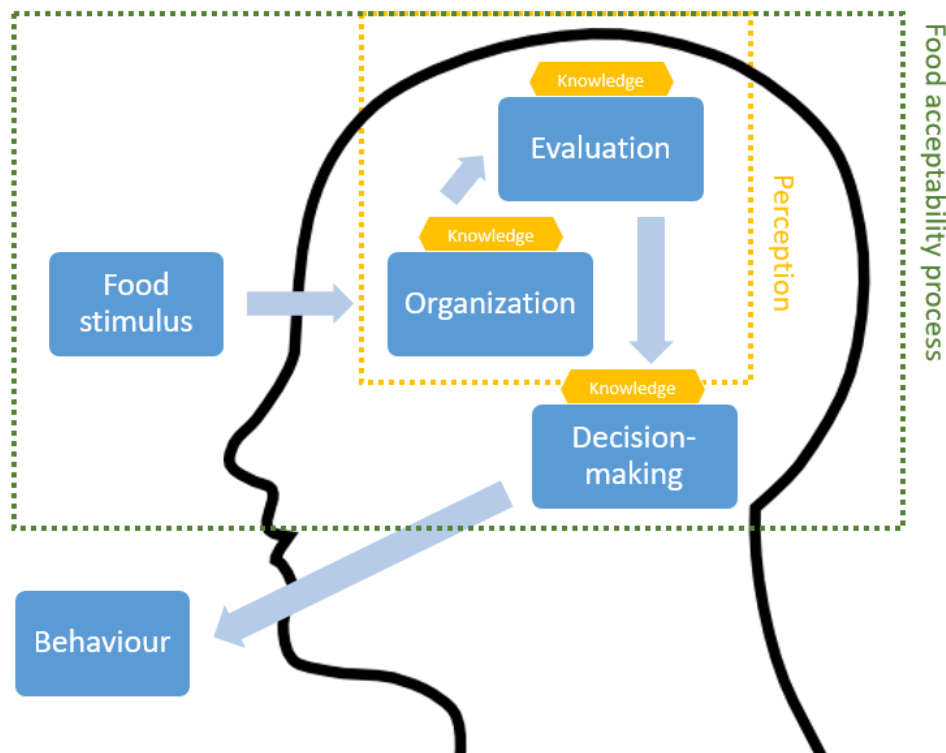


Figure 1: Demarcation of the main cognitive processes involved in the food acceptability process prior to human behaviour.

1.1. Perception of a food stimulus

Food stimuli, as advanced in this thesis, represent food-related detectable changes in people’s external environment, which implies the notion of attention (Solomon, Bamossy, Askegaard, & Hogg, 2010). The human brain is highly sensitive to the presence of visual food stimuli. A study assessing the effect of visual presentation of food on the response of the human brain (although subjects were under fasting conditions) revealed a marked activation of whole brain metabolism (24%) (Wang et al., 2004).

The concept of perception can be interpreted in different ways. As such, perception may include the ability to see, hear, or become aware of something through the physical senses, or in a broader sense, the way in which something is regarded, understood, or interpreted (English Oxford Living Dictionaries, 2016b). While the former definition describes a physiological mechanism, the latter definition seems to encompass a lot of mental abilities, referring to the domain of psychology. On a physiological level, all perception involves signals in the nervous system, which in turn result from physical or chemical stimulation of the sense organs (Goldstein, 2009). In this thesis, we are interested in visual perception over e.g. taste or olfaction, because the safety, nutritional value, and the human digestion of duckweed protein has yet to be analysed by scientists of Wageningen Food & Biobased Research. Before actual consumption, the first sensory contact with food mostly happens through the eyes. Visual perception is the process by which sensations aroused by light in the nervous mechanism of vision enable us to form conceptions as to the existence, form and position of external objects (von Helmholtz, 1910). Visual sensations may consist of different aspects including processing modules (e.g., form, motion) (Livingstone & Hubel, 1988; Ungerleider, L.G. and Mishkin, 1982) and sub-modules (e.g. visual feature-tracking) (Lu & Sperling, 1995). Overall, there is disagreement between scientists on how (visual) perceptual systems work, but the theoretical approach to perception that is considered in this thesis, is discussed below.

In the social sciences, the empiricist approach is one of the more predominant approaches. In this approach, perception is not solely a passive receipt of signals, since it requires inferences from knowledge of the world to make sense of the sensory signals (Bernstein, 2010; Gregory & Zangwill, 1987). Thus, the empiricist position considers a distinction between *sensation* (the stimulus message coming from the senses) and *perception* (the process of giving meaning to that message) (Bernstein, 2010). Sometimes, not two but three stages are identified in the process of perception. For instance, sensation, attention, and interpretation of stimuli (Solomon et al., 2010); or selection (i.e. sensation and attention combined), organizing and interpretation of stimuli (Schwartz, 2012). Regardless of the number of steps in the process of perception, the contribution of memory and cognitive processes is key. In fact, the mere sight of food can facilitate the subjective desire to eat it (Hill, Magson, & Blundell, 1984; Marcelino, Adam, Couronne, Köster, & Sieffermann, 2001) and can activate brain areas and neural pathways associated with reward (Beaver et al., 2006). It is important to note, though, that these studies involved ‘appetizing foods’ (e.g. pizza), while it is not known whether duckweed falls in this category.

1.2. Organization of a food stimulus

In the process of (visual) perception, we can identify the fast and automatic process of organization in which perceived information is sorted and categorized, based on innate and learned cognitive patterns.

Categorization refers to the process by which individuals respond to the variety and newness of information in their environment (Rosch, 1978). While some kinds of perceptual experience may be considered more analogue (Neisser, 1967), most forms of perception are categorical: sensory stimuli are ‘sorted’ into mutually exclusive categories (J. S. Bruner, 1957; Reed, 1972), based on proximity, similarity, and difference (Coren & Girgus, 1980). Besides automatic categorization (i.e. driven by unconscious cognitive processes), motivated categorization (i.e. driven by individual needs and desires) can also occur in the mind (Elsbach & Breitsohl, 2016; Smith & DeCoster, 2000). The latter mode of categorization is more conscious and effortful. In addition, categorization can either be based on perceptual grounds, by which a food stimulus is assigned to a class with which it shares some other physical characteristics (Craig, 1986),

or on conceptual grounds. That is, if a person were to be given conceptual information besides the mere physical appearance of the food stimulus (e.g. name of the food), other categories could be formed.

A perceived food stimulus can also be organized by analogy, which is often associated with categorization. Gentner and Markman (1997), for example, argue that determining that two items are analogous is an important criterion in deciding that the two items are members of a common category. In this sense, categorization is the end result of analogical reasoning. The fundamental purpose of analogy is to generate plausible and useful inferences about an unfamiliar target domain (Krawczyk, Holyoak, & Hummel, 2005). In contrast with categorization, the generation of analogies requires only partial resemblance of objects to make a mental connection (Gentner & Forbus, 2011). Analogies can be built upon either physical properties or abstract qualities, such as function (Holyoak & Koh, 1987). Finally, three types of analogy sources can be distinguished: surface similarity (i.e. analogy is built on physical properties), relational similarity (i.e. analogy is built on abstract properties), and literal similarity (i.e. analogy is built on both physical and abstract properties) (Gentner & Forbus, 2011; Gentner, Rattermann, & Forbus, 1993)

Categorization and analogy theory is important in studying consumer responses to new products like duckweed as food. When in contact with a new stimulus, people either accommodate it into an existing product category, or they construct a new independent category by using information contained in familiar product categories (Mandler, 1982). It is also shown that the first plausible category label to intervene in the mind significantly influences people's categorizations, expectations, and preferences (Moreau, Markman, & Lehmann, 2001). Therefore, it is likely that the success of a new food product depends on the extent to which the product attributes can be associated with existing attributes in the mind. Sometimes, categorization may lead to prejudice forming (Brewer & Crano, 1994), which may influence one's expectations regarding a food stimulus. Consumer expectations play a significant role in the determination of food acceptability (Cardello, 1994). In fact, before food is consumed, its appearance (both in raw and in cooked state) provides expectations about the taste quality, flavour, and palatability of food (Hurling & Shepherd, 2003). As such, consumer expectations may be an important determinant in food acceptability. Besides expectations, it is important to note that situational variables such as meal situation, social interaction, and physical environment also affect product acceptability (King, Meiselman, Hottenstein, Work, & Cronk, 2007; Rozin, 1996). On this note, the degree of appropriateness (fitting) of a food for a given situation also relates to the context in which food is eaten (Schutz, 1988, 1995). The more appropriate a product is for a situation, the more the product will be liked in general (Schutz, 1988, 1995).

1.3. Evaluation

In the evaluation stage of food acceptability, attitudes are key, which can be defined as evaluations in terms of good, positive, approachable, or, in contrast, in terms of bad, negative, to be avoided (de Vries, Modde, & Stoeller, 2009). There appears to be discussion among scientists about whether evaluations should be viewed as stable entities (Fazio, 2007; Petty, Briñol, & Demarree, 2007) or as constructions (Conrey & Smith, 2007; Gawronski & Bodenhausen, 2006; Schwarz, 2007) to qualify as an attitude. From a *stable-entity* perspective, attitudes are long-lasting and stored in the long-term memory to be retrieved when necessary. This perspective includes the *file-drawer model*, considering attitudes to be mental files which individuals consult for the evaluation of the object in question (Wilson, Kraft, & Lisle, 1990). In contrast, the *constructionist* view of attitudes suggests that people do not retrieve

any previously stored attitude from memory, but rather create an evaluative judgment at the time it is needed, based on the information that comes to mind in the situation (Wilson et al., 1990).

In addition, two types of evaluation can be distinguished: automatic and deliberate evaluation. In a first instance, evaluative responding can be immediate, unintentional, implicit, stimulus based, and directly linked to approach and avoidance motives (Duckworth, Bargh, Garcia, & Chaiken, 2002). In this sense, people use attitudes to be able to quickly evaluate both novel and known stimuli as either good or bad, without the demand of much cognitive effort (de Vries et al., 2009; Duckworth et al., 2002). This type of automatic evaluation is also acknowledged by Haidt (2001), who considered (moral) judgment to be caused by quick (moral) intuitions (i.e. 'gut feelings'), and followed – when needed – by slow, intentional (moral) reasoning (Haidt, 2001). Along these lines, a further step in the acceptability of food concerns the more deliberate and conscious step of evaluating the stimulus information. At this stage, other thoughts may override the initial automatic response by a process of more in-depth assessment. It is interesting to note that the first-observed attitudes (i.e. primacy effect) and stronger attitudes (i.e. more stable in time and/or less susceptible to processes of persuasion and social influence) may have more influence on the final evaluation of the food stimulus (de Vries et al., 2009).

The interplay between these two evaluation processes can be based on one of the suggested patterns (i.e. pattern 6) of explicit and implicit attitude change implied by the associative–propositional evaluation (APE) model by Gawronski & Bodenhausen (2006). This pattern suggests that a given factor may directly influence both the activation of automatic evaluation and deliberate evaluation. In addition, the propositional implication of automatic evaluations indirectly influences deliberate evaluation processes. Conversely, deliberate evaluation processes do not influence the activation of automatic evaluation, implying that only deliberate evaluations directly influence the next step in the food acceptability process: decision-making (see Figure 1).

1.4. Decision-making

Both automatic and deliberate evaluation of the food stimulus seem closely related to the generation of decisions or intentions within the process of food acceptability. Voluntary behaviour, such as food consumption, implicitly requires choice. With the exception of a few theories on decision-making (Janis & Mann, 1977), most theories of choice use a cognitive perspective, as is stressed in Figure 1. These theories assume that decisions derive from an assessment of several alternatives of future outcomes through some type of cost-benefit analyses (Bechara, Damasio, & Damasio, 2000). The formation of planned behaviour (or intentions) can be included in the step of decision-making. According to the theory of planned behaviour, intentions are good predictors of actual behaviour (Ajzen, 2011). However, this does not necessarily guarantee that all intentions lead to the intended behaviour. This discrepancy is typically referred to as the *intention-behaviour gap*, which has, for instance, been demonstrated in the context of healthy snack choice (Pascalle L.G. Weijzen, de Graaf, & Dijksterhuis, 2008). A related study showed that female gender, a high education level, a strong habitual healthy snack use, and a strong self-control were all factors that increased the intention-behaviour consistency of healthy snack choices (P.L.G. Weijzen, de Graaf, & Dijksterhuis, 2009).

1.5. Behaviour

Behaviour is advanced as the last step of the schematic overview proposed in Figure 1. This concept can be considered as the way in which an animal or person behaves in response to a particular situation or

stimulus (English Oxford Living Dictionaries, 2016a). Since actual human consumption of duckweed will not be included in the experimental part of this thesis, behaviour does not fall under the food acceptability process as is implied in Figure 1. However, behaviour is ultimately the reason why food acceptability is important to investigate. With respect to duckweed, it is desirable that it is not only acceptable to consumers in Western countries, but that this acceptability will lead to actual intake.

Accordingly, the fear of eating new or unfamiliar foods may hinder the consumption of duckweed. This phenomenon, termed ‘*neophobia*’, is particularly common in young children and generally decreases with age (Birch, McPhee, Shoba, Pirok, & Steinberg, 1987; Cooke, Carnell, & Wardle, 2006; Cooke, Wardle, & Gibson, 2003). Although the treatment of neophobia has been less extensively studied in adults, it remains possible to persuade adults to try food they initially reject (Marcontell, Laster, & Johnson, 2002). Relevant for this thesis is how visual exposure to unfamiliar foods leads to enhanced visual preference judgments and to a greater willingness to try those foods than those not visually exposed (Birch et al., 1987; Houston-Price, Butler, & Shiba, 2009). In children, not only mere visual exposure, but also enhancing visual appeal, can encourage consumption of a new food product (Jansen, Mulkens, & Jansen, 2010). Finally, exposure to a visually similar and familiar food prior to a new food may reduce the uncertainty about the taste of a new food and therefore generate a greater willingness to try it, particularly in children (Dovey et al., 2012).

In the theory, we distinguished two pathways that are both active in the evaluation phase of food acceptability: automatic evaluation and deliberate evaluation. In addition, we concluded that food appropriateness (fitting) plays an important role in the preceding organization phase of food acceptability. Contextual fitting relies strongly on the analogies, categorizations, expectations, and preferences that people generate. While contextual fitting of a food product mostly influences the automatic evaluation pathway, the role of knowledge (information provision) is more important in deliberate evaluation processes. Both factors were used in the experimental design of this thesis, confined to the acceptability of duckweed as human food. We advanced a mediation model (Figure 2) in which ‘exposure to an image of duckweed’ and ‘positive information about duckweed’ represented two categorical independent variables. Duckweed can either be visually exposed in a ‘fitting context’ or a ‘non-fitting context’ (to be determined after explorative interviews), and information about the benefits of duckweed as human food can either be ‘provided’ or ‘not provided’. These two variables influence the acceptability of duckweed in humans from Western countries (i.e. the positive intention to eat duckweed) through two parallel mediators: automatic evaluation processes and deliberate evaluation processes.

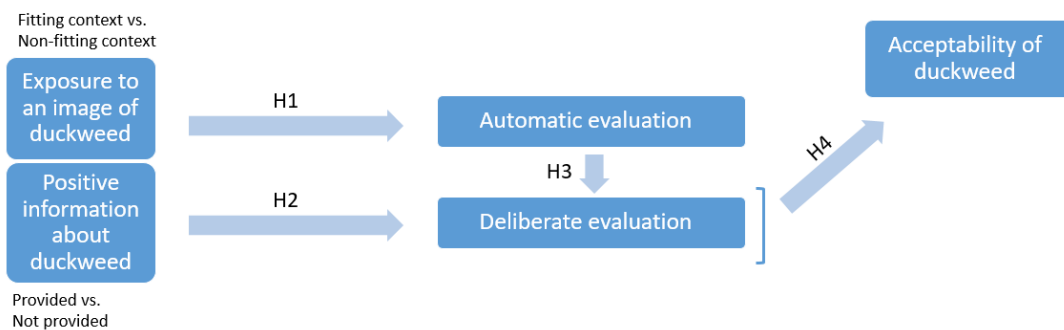


Figure 2: Mediation hypotheses relating independent variables ‘exposure to an image of duckweed’ and ‘positive information about duckweed’ to the acceptability of duckweed in humans from Western countries.

The model incorporates the following four hypotheses:

(H1) People who are exposed to an image of duckweed in a fitting context are more likely to have a positive automatic evaluation of duckweed as human food than people who are exposed to an image of duckweed in a non-fitting context.

(H2) People who are provided with information about the benefits of duckweed as human food are more likely to have a positive deliberate evaluation of duckweed as human food than people who are not provided with any positive information.

(H3) The more positive the automatic evaluation of duckweed as human food, the more positive the deliberate evaluation will be, regardless of the experimental condition.

(H4) The more positive the deliberate evaluation of duckweed as human food, the more acceptable duckweed will be as human food.

The experimental part of this thesis includes two steps. First, we carried out explorative interviews in a small sample, to get a general impression of people's opinions on duckweed as human food. Secondly, we developed an online survey and submitted this to a larger sample with the Qualtrics survey tool to test the four hypotheses. The results from the explorative interviews were used to determine which meals were used in the 'fitting' and 'non-fitting' conditions of the survey.

2. Study 1: explorative interviews

2.1. Objective

Semi-structured interviews were carried out to gain insight into people's opinions on duckweed as human food. The interviews were explorative, because it is not yet known how people from Western countries will perceive this new product. By determining a variation of analogies people think of when seeing duckweed, as well as categories in which duckweed could be placed, we can establish a 'fitting context' for duckweed as human food. In other words, a fitting context represents the serving in which duckweed may be processed or presented before people consider this food as acceptable.

2.2. Method

3.2.1. Semi-structured interviews

Dutch male (n = 6) and female (n = 4) consumers between 18 and 39 years of age were recruited by convenience sampling via a message on Facebook to participate in semi-structured interviews. The Facebook message was aimed at 'people willing to give their opinion on a possible new food product'. People with food allergies or intolerances were excluded, because this could limit the collection of varied categories and analogies. Demographic information on gender, age and study- or work domain of all ten participants was collected. Not that the obtained data was not intended to be generalized to a larger and broader population, but to provide an impression of people's ideas and opinions about duckweed as human food.

We chose to carry out semi-structured interviews because this technique allows participants the freedom to express their views in their own terms (Cohen & Crabtree, 2006), which fits the explorative character of study 1. We developed an interview protocol (see Appendix II) based on the interview techniques provided by Harrell & Bradley (2009). This protocol presented concrete topics and questions

in order to retrieve reliable and comparable qualitative data (Cohen & Crabtree, 2006). All questions were designed in an open and neutral way to elicit the participant's ideas and opinions.

3.2.2. Procedure

From 9 January 2017 until 18 January 2017, the ten interviews were executed in the Consumer Research Room of the Leeuwenborch building (Wageningen UR). The size of the room was adapted to a one-on-one interview setting by placing room separators. In order to reach the interview objectives, diverse topics were addressed. We were interested in the participants':

- (1) gender, age, and study- or work domain;
- (2) prior knowledge about duckweed, its cultivation possibilities, and its benefits;
- (3) attitude towards duckweed as human food;
- (4) thoughts or expectations about the attitudes of the general population towards duckweed as human food;
- (5) analogies and categories regarding duckweed as human food;
- (6) attitude towards new food products in general and thoughts about what characterizes the success of a food product in the Netherlands;
- (7) opinion about the name 'duckweed' for human food;
- (8) ideas about possible applications of duckweed in meals.

Probes were used to get more clarity and/or in-depth information (Harrell & Bradley, 2009). The interviews were conducted in Dutch, because this was the mother tongue of all participants. At the end of each interview, there was room for remarks and questions, and a duckweed recipe book made by students from VHL University of Applied Sciences (Gauw & Derksen, 2015) was shown when there was enough time ($n = 7$). Each interview session took approximately 20 minutes and all participants received a small present after completion. All interviews were conducted and recorded by the same interviewer.

3.2.3. Data analysis

The recorded interviews were transcribed by the interviewer and a student assistant. The interviewer checked the transcripts with the recordings, in order to add non-verbal information. A coding framework was developed based on the interview objectives and the interview guide. We used the qualitative analysis software NVivo 11 from QRS International to code and organise data systematically. Analogies and categories regarding duckweed were coded with a label (so-called 'nodes'). Corresponding analogies and categories were labelled with the same code. We compared these nodes by the amount of coding at all transcripts to identify prominent analogies and categories, by creating 'Hierarchy charts'. As such, the most prominent analogies and categories served as primary input for quantitative research (i.e. surveys) on duckweed acceptability.

3.3. Results

3.3.1. Prior knowledge about duckweed, its cultivation possibilities, and its benefits

Six out of ten participants were familiar with the term 'duckweed' and could explain what duckweed was. The other four participants initially indicated that they had no idea what duckweed was, but recognized it when they were shown the photographs. One of the four participants initially thought it was part of a duck. Only two out of ten participants indicated that they had heard of duckweed being cultivated.

However, all participants were able to imagine ways of how duckweed could be cultivated. Seven participants mentioned (human) food as a possible reason for duckweed cultivation, although two of them were only suspecting this because they knew the study domain of the interviewer, and one of them suggested that duckweed also had medical purposes.

Regarding knowledge about the nutritional benefits of duckweed, three participants mentioned protein and one mentioned fibre as possible components of duckweed. One participant was under the impression that duckweed was toxic; another participant said that duckweed could absorb heavy metals from water, possibly affecting health.

Regarding environmental benefits of duckweed, one participant mentioned the efficiency of duckweed growth and the possibility of using waste waters for this; four participants mentioned the term 'easy' to characterize its cultivation; and one participant mentioned the term 'low maintenance'. Four participants mentioned 'the environment', one in the context of water recycling and three in the context of 'less meat consumption'. One participant mentioned the term 'sustainability'.

Overall, duckweed and its cultivation possibilities were not completely unfamiliar to the participants. Approximately a third of the participants mentioned protein as a possible nutritional benefit, and approximately half of the participants considered duckweed to be beneficial because of its easy growth. Although approximately half of the participants expressed interest in duckweed because of its sustainable qualities, deeper details concerning the environmental benefits of duckweed remained generally unclear until they were given this information at the end of the interviews.

3.3.1. Attitude towards duckweed as human food

None of the participants showed objection towards trying duckweed. Five participants showed a special interest in trying duckweed, because they either saw it as a 'nice add-on' to food from nature, as 'interesting', as a 'possibility for variation', or as 'beneficial for the environment'. Two participants mentioned safety as an important condition for trying duckweed. Four participants made the remark that, at first glance, duckweed did not seem tasty because of its association with ponds. Ponds were described as 'dirty', 'filthy', or 'turbid'. However, when packed in a supermarket, only seeing the edible parts, duckweed would look more attractive as a food product. One participant mentioned it looked healthy due to its green colour. One participant mentioned that he would only actually buy duckweed if it was mainstream, because he chooses his meals from recipes. Another participant mentioned healthiness as a precondition for buying duckweed. Taste and price were also both mentioned as important determinants for the decision to buy.

Thus, people's attitude towards duckweed as human food was predominantly positive; no objection towards trying it was noticed. Safety, environmental friendliness, and the possibility for variation were mentioned as most important pre-requisites for trying duckweed, whereas appearance, healthiness, taste, and price were mentioned as most important pre-requisites for buying duckweed.

3.3.2. Thoughts or expectations about the attitudes of the general population towards duckweed as human food

All participants expected that the general population would not necessarily be open towards human consumption of duckweed. The main reason for this involved the association of duckweed with its natural environment (ponds), which could be considered 'dirty', 'turbid', 'filthy', and not 'healthy', 'safe', 'fresh', 'edible', 'inviting', 'appetizing' or 'attractive to swim in'. However, two participants mentioned that if duckweed was seen in a supermarket, people would be more likely to accept duckweed as human food, because it would change the physical context. Three participants suggested building a 'nice', 'hip' or 'juicy'

story around duckweed to increase acceptability, which could especially work with ‘superfoodies’ or people who are familiar with ‘health foods’ and ‘organic products’. Four participants considered duckweed as more approachable than other foods (i.e. ‘insects’, ‘weeds’ or ‘algae’), because it is associated with ‘attractive’, ‘plants’, ‘vegetables’, ‘salad’, ‘green’, and ‘does not move like insects’. Three consumers mentioned (cultural) ‘education’ as a determinant for acceptability towards duckweed.

Four participants used the Dutch proverb ‘wat de boer niet kent, dat vreet hij niet’, referring to people who do not trust anything they do not know. One of these participants associated this proverb with consumers from lower class and them being less prone to trust new foods. Another of these participants associated this proverb with the typical ‘fixed’ Dutchman, but thought that people in Wageningen might be more open to food ‘alternatives’ than the typical Dutchman. Two other participants also suggested that people would not want to eat duckweed because it ‘deviates from normal eating patterns’ or because ‘they do not know it’. One participant mentioned that consumers are ‘capricious’, that they ‘use emotions’ when buying food and that they ‘lack confidence in the food industry’; another participant used the term ‘picky’ with consumers. The latter highlighted the importance of colour in the acceptability process: green duckweed might be better accepted than yellow duckweed, because green renders ‘freshness’. Another participant considered consumers to be ‘too superficial’ to associate duckweed in the environment with human food.

We can conclude that, while their own attitude towards duckweed as human food was predominantly positive, participants did not expect the same attitude for the general Dutch population. At this point, duckweed is predominantly associated with its natural environment – ponds, which are considered dirty – and not so much with food; it is deemed too new or deviating. Because of duckweed’s unfamiliarity as food, participants expected the general population to mistrust it. However, since duckweed is a plant, it is expected to be more easily accepted than other new foods. The green and fresh aspects of plants are generally recognized as attractive characteristics for food. Moreover, a hip and attractive presentation of duckweed in stores is expected to increase the chance that people accept an unfamiliar food like duckweed.

3.3.3. Analogies and categories regarding duckweed as human food

The interviews resulted in a variety of general analogies regarding duckweed. ‘Salad’ was mentioned by nine participants; the types ‘rocket salad’ and ‘lamb's lettuce’ were specifically named by respectively four and three participants. ‘Ponds’, ‘insects’ and ‘green’ were frequently used terms in eight transcripts; ‘food’ in seven transcripts; and ‘plants’ in six participants. ‘Watercress’ and ‘algae’ were mentioned by five participants. The terms ‘herbs’ (‘spices’), ‘ducks’ and ‘dirty’ were all mentioned by four different participants. When focusing on duckweed analogies with food products alone, duckweed was again frequently associated with ‘salad’, ‘insects’, ‘watercress’ and ‘algae’, but also ‘superfoods’, ‘garnish’, ‘vegetables’ and ‘cress’ were each mentioned by three participants.

Regarding food categories for duckweed, ‘vegetables’ was by far the most prominent food category for duckweed; it was mentioned by seven participants. ‘Salad’ was mentioned by three participants; ‘herbs’ (‘spices’) was mentioned by two participants; ‘leafy vegetables’, ‘plants’, and ‘superfoods’ were each mentioned by one participant. It was interesting to note that one of the participants would rather associate duckweed with a ‘normal vegetable’ than with ‘superfoods’.

In a supermarket-context, five participants would imagine duckweed to be near the ‘vegetables’. Five participants considered it particularly as a ‘salad’ product; three as ‘cress’; and two as fresh or dried ‘herbs’. Four participants mentioned that it had to be cooled; one participant mentioned a ‘humid’

environment; and another mentioned a 'frozen' environment. One participant mentioned that it could also be situated near the vegetarian burgers; and another considered the organic section of supermarkets.

We can conclude that the most dominant analogies were either based on the physical properties of duckweed (surface similarity: 'pond', 'green', resembles 'salad'), on abstract properties (relational similarity to another new food product: 'insects'), or a combination of both (literal similarity: 'watercress', 'algae'). The broader dominant analogies ('plants' and 'food') were probably made because the interviewer mentioned that duckweed was a plant with the potential to become a new food product. Duckweed was mostly categorized as a vegetable that would fit well in the vegetable section – the salad section in particular – or in the herbs section of any supermarket.

3.3.4. Attitude towards new food products in general and thoughts about what characterizes the success of a food product in the Netherlands

All participants indicated to be open towards new food products in general. Terms like 'nice', 'special', 'interesting', 'chance' and 'positive' were used. Some participants mentioned, however, that their open mind did not include 'too weird' or 'extreme' products, such as insects for four participants, and 'living octopus' and 'algae', due to 'sliminess', for others. From this, we can deduce that the participants in this sample had a predominantly positive attitude towards new food products in general, but only to a certain extent of oddness.

To investigate the potential of duckweed as a food product in the Netherlands, we asked participants about the determinants for a successful food product in general. For two participants, a food product is a success in the Netherlands when it is adopted by one of the larger supermarkets, and thus widely available, ideally over a longer period of time. Another participant mentioned that a successful product should be produced on a sustainable basis in the Netherlands and consumed by a large portion of the population. 'Profit' was also mentioned as a determinant of success by two participants, next to 'limited availability' to increase the 'wanting factor' of a food product. One participant made the remark that a product needs time to become a successful product, just like how the availability of meat substitutes evolved during the last twenty years.

Two participants considered 'healthy' and 'hip' to be determinants for the success of a food product in the Netherlands. Another participant also mentioned 'environmental benefits' and 'nutritional value' as determinants. New foods should enclose 'a message'. Food bloggers on social media (e.g. Facebook, Instagram) were mentioned by three participants as being important in promoting food as a 'new', 'innovative', 'hip' and 'healthy' product, especially for the youth. Promoting new foods with a recipe magazine, such as *Allerhande* (with e.g. a special section about duckweed), was suggested by two participants. By two participants, 'price' was labelled as important for the successfulness of a food product, in the sense that people would not bother buying a new food product if it was too expensive for them.

Food products that were considered as a success included products produced by food companies like Lays and Mona, which regularly explore new flavours and introduce limited edition foods. Food products that were not considered as a success included green ketchup, 'bitterballen' containing meal worms, tofu, and, often mentioned, insects in general. Overall, participants had more hope for duckweed to become a successful product than for insects, which were considered as 'dirty' in contrast to the 'appealing' character of 'green' duckweed.

So, new food products were predominantly approached with a positive attitude in this sample, but only to a certain extent of oddness. This becomes clear when comparing duckweed to insects,

whereby participants were more inclined towards the success of duckweed as food. Nonetheless, in order for duckweed to become a successful food product in the Netherlands, time is needed to embed this new food into the larger supermarkets. Once sustainable production and wide availability of duckweed is established in the Netherlands, a large portion of the Dutch population can consume it, which is deemed necessary for success. In contrast, a few participants articulated the advantages of limited availability, as scarcity could increase the attractiveness ('wanting factor') of a new food product. Noteworthy to mention is the paradox of price: although people would not buy a new food product that is too expensive, profit for suppliers is considered a determinant for the success of a new food product. Finally, the importance of promoting duckweed as a new, hip, and healthy food product was often mentioned by participants. Promotion is suggested through food bloggers on social media and recipe magazines.

3.3.5. Opinion about the name 'duckweed' for human food

Participants were challenged to consider another name for 'eendenkroos' ('duckweed'), in order to maximize positive associations with the product. Overall, participants noticed a negative association of 'duckweed' with 'dirty ponds'. Two participants would change the 'duck'-part in the name to eliminate the association with 'animals', because duckweed is not an animal product. Another participant attributed the association with dirty ponds to the 'kroos'-part in the name, instead of the 'duck'-part. He suggested, for instance, the name 'duck salad'. Another participant suggested the name 'driepuntsblad' ('three pointed leaf'), because of the appearance of duckweed. Three participants mentioned the name '(water) cress', or a deviation from it, although it is probably patented according to one participant. Using the Latin name of duckweed 'Lemna Minor' or 'Minilemna' was also suggested to put duckweed out of its 'pond'-context. However, one participant associated Latin names with 'weird', because they might be difficult to remember. One participant also made the remark that it had to be a simple name. Two participants suggested to use the English name for duckweed, but reconsidered their suggestion after they were told the name. They did not consider 'weed' as a term that could elicit positive associations in the food domain.

Someone compared the case to 'Shiso purple'; a purple basil plant that is put in a more 'exotic' context through another name. Using the Latin name of 'duck', for instance, could make duckweed less recognisable. However, another participant was in favour of maintaining recognisability and would only slightly change the name. He considered it particularly important to differentiate duckweed growing in ponds from duckweed growing in a controlled environment. Two participants asked themselves whether people would identify duckweed as the plant that grows in ponds if placed in a supermarket-context; perhaps they do not even notice it. Even if people did notice it, they might be stimulated to try and eat duckweed because of the funny environment in which it grows naturally.

Two participants would not necessarily change the name, because 'it is what it is' and it made the food product 'interesting', 'funny' or 'transparent', especially if it becomes a hype. The idea of adding terms like 'fresh' and 'healthy' on the package was considered to elicit positive associations.

Overall, there were different opinions about whether to change the name 'duckweed' or not, because of several possible negative associations: (1) the association of 'ducks' or 'kroos' with 'dirty ponds', referring to an environment that is considered unappealing in combination with food (2) the association of 'duck' with 'animals', which appears misleading because duckweed is not an animal product; (3) the association of 'weed' with undesirable plants or drugs, both irreflective of duckweed as actual food. On the one hand, more positive associations can be elicited by using surface similarities or Latin for a new name, thereby eliminating the context of 'ponds' or 'animals'. On the other hand, more

positive associations can be elicited by attracting people’s attention through the current name, which evokes curiosity and transparency.

3.3.6. Possible applications of duckweed in meals

Participants were asked to suggest meals they would prepare if they had a bag with duckweed to their disposition in the kitchen. Table 1 shows the results of this brainstorm, with possible meal applications sorted by the number of participants by which it was mentioned. Five participants indicated explicitly that it would be easier to make suggestions if they knew the taste. Eight participants thought of making a ‘salad’; one participant suggested to hitch on the popularity of ‘mesclun’ – a salad mix. Four participants thought duckweed would fit well on a ‘sandwich’; and four participants rather associated duckweed with ‘garnish’ than with a larger meal component. The stronger the flavour of duckweed, the higher the chance it can be used as an isolated vegetable. ‘Soup’, ‘pasta’ and ‘herbs’ (‘spices’) were each mentioned by three participants. Two participants thought that duckweed would go well with ‘fish’, and two participants mentioned a ‘sandwich with cheese’.

TABLE 1: Fitting meal applications by number of different sources (interview transcripts)

Meal applications	Number of different sources
Salad	8
Sandwich; garnish	4
Soup; pasta; herbs (spices)	3
Fish; sandwich with cheese	2
Burrito; party nibbles; wok dish; quiche; chicken breast; couscous; chicken; cream sauce; duck; mashed potato dish; pesto; veggie burger; cookies	1

People also mentioned meals that they would rather not prepare with duckweed. Two participants showed negative reactions towards the cake with duckweed when browsing through the VHL recipe book at the end of the interview. This was also the case for the duckweed curry, which was deemed ‘too crazy’ by one participant. This participant also negatively evaluated the duckweed juice, because he considered this as a ‘health food’. Although ‘it is good for you’, it is also ‘undrinkable’ (taste-related) according to this participant. Apart from the VHL recipe book, ‘steak’ was mentioned by one participant. No concrete reasons were given for the negative evaluations of these food products in combination with duckweed, but from this we concluded that these products were not going to be classified as ‘fitting’ products in the survey to a larger sample.

All participants reacted positively towards serving duckweed meals to guests. Three participants would serve duckweed as a ‘fancy’, ‘exclusive’, ‘high-end’, ‘novel’, or ‘special’ food. ‘Higher events’, such as congresses that touch upon world problems or a ‘Horecava’, were mentioned as possible serving situations. Three participants mentioned that they would serve duckweed in the presence of guests (e.g. Christmas dinner, dinner with family or friends, gourmet) and, for instance, use it as a conversation topic. Another participant indicated that she had no objection towards eating duckweed in a more standard situation (e.g. at home on the couch). Two participants found lunch to be a fitting serving situation, while one participant would rather serve duckweed for dinner. Three participants were interested in how duckweed would react to heat. Another participant suggested a tasting session in a restaurant. Overall, we can conclude that duckweed was predominantly viewed as food that should be served at special

occasions, but that taste and physical structure of duckweed were important in deciding on specific meal applications. Salad, sandwich and garnish were the most mentioned meal applications for duckweed.

3.4. Conclusion and discussion

This qualitative study showed that the ten participants were generally open-minded towards duckweed as human food, although some people attributed their open-mindedness to their education. The participants had a relatively high education level and six out of ten the participants indeed had affinity with food via their study- or work domain. Therefore, the open-mindedness of the Dutch population could be overestimated in this study, especially because the sample seemed low in food neophobia (open for new food). In addition, it should be noted that open-mindedness could differ depending on whether it was about trying or about buying duckweed. The latter seems to be related to a higher threshold, involving factors like product price, availability, promotion, and status in the consumer industry. Nonetheless, participants perceived duckweed as a food product which has potential to be successful in the Netherlands, especially comparing it to products which they considered less appealing, such as insects. As such, participants seemed to consider duckweed as odd, but not too odd to be consumed by humans.

We identified clear patterns in all the analogies and categories extracted from the interviews. Based on these patterns, we validated some meals as 'fitting' and 'non-fitting' to incorporate in the quantitative survey. We chose salads and sandwiches as fitting duckweed meals, because they were both mentioned by a large majority of the participants. Although significantly less mentioned, quiches and mashed potato dishes were also chosen as fitting duckweed meals, in order to connect with people who possibly associate duckweed with warm dinner meals rather than with cold lunch meals. We chose cake and vegetable juice as non-fitting duckweed meals based on the results from this study seen in '3.3.8. Possible applications of duckweed in meals'. In addition, pastries were chosen as non-fitting because of its sweetness. In this study, duckweed was almost always associated with savoury food products, and only once with a sweet food product (i.e. cookies). Cheese was chosen based on its high-intensity flavours. Although cheese was mentioned twice as being a possible combination with duckweed on a sandwich, we chose cheese as a product in which duckweed is processed rather than served alongside.

4. Study 2: survey to a larger sample

4.1. Objective

The main objective of this study was to explore the conflict between the roles of contextual fitting and positive information provision in the process of duckweed acceptability via a survey to a large sample. The results from the explorative interviews about people's opinions on duckweed as human food were taken along.

4.2. Sample

































The survey was distributed from 27 February 2017 until 12 March 2017 among over 1000 contacts of a consumer panel list and market study list generated at Wageningen Food & Biobased Research. These contacts are volunteers who are frequently asked to participate in taste analysis and market studies. They were recruited with an e-mail (see Appendix III), which contained practical information and the weblink to the survey. Inclusion criteria for participants were: a minimum age of 18 years old and a good knowledge of the Dutch language.

4.3. Design

In a 2x2 between-subjects design, participants were randomly allocated to one of the four possible survey conditions (see Table 2). The conditions differed according to two factors: 'factor fit' (2-level: fitting or non-fitting) and 'factor info' (2-level: positive information provided or not provided).

Specifically, the survey manipulation consisted of exposing the participants to four images in total, each showing a meal with the text 'This meal contains duckweed'. For the purpose of this survey, we used photographs of meals that are imagined to contain duckweed, because we did not have the opportunity to produce meals that actually contained duckweed. Based on the results from the explorative interviews, duckweed was either *fitting* (sandwich, salad, quiche, mashed potato dish) or *non-fitting* (cake, pastry, vegetable juice, cheese) when illustrated in a meal (i.e. factor fit). In addition, participants were either *provided* or *not provided* with information about the benefits of duckweed for human consumption (i.e. factor info). These benefits included: (1) nutritional value: high amounts of high quality protein when grown under optimal conditions; and (2) environmental benefits: cultivation in basins on non-arable land, fast growth, function of bioremediation, and minimal carbon footprint. The exact wording of the information text, as was used in the survey, is shown in Appendix IV.

TABLE 2: Four possible survey conditions referred to as ‘factor fit’ and ‘factor info’

Factor fit: Exposure to an image of duckweed		Fitting context		Non-fitting context	
Factor info: Positive information about duckweed	Provided				
					
					
					
	Not provided				
					
					
					

4.4. Procedure

The online survey consisted of five parts, which altogether took 15 minutes to complete. The different parts are discussed below in more detail and a summary flowchart of the survey is presented in Appendix IV. The exact question wording of the complete survey is shown in Appendix V.

4.4.1. Part 1: Automatic evaluation

In the first part, named ‘automatic evaluation’, we made use of the affect misattribution procedure (AMP), originally introduced by Payne & Lundberg (2014), which measures automatically activated responses based on the misattributions that people make about the sources of their affect or cognitions. This method was chosen because it assesses attitudes implicitly rather than explicitly, thereby excluding conscious (deliberate) evaluations of the duckweed images in the survey. In addition, Payne & Lundberg (2014) reported Cronbach’s alpha coefficients from 45 studies, which ranged from 0.47 to 0.95, with an

average alpha of 0.81 (95% confidence interval = 0.77, 0.85). Thus, the AMP task developed by Payne & Lundberg (2014) had an elevated level of reliability.

Each participant was exposed to a total of four AMP trials, containing images from one of the four conditions. Every AMP trial began with briefly showing (300 ms) a photograph of a meal containing duckweed (visual prime). After the prime, a Chinese character (target item which is intended to be abstract and neutral, see Figure 3) was shown for 300 ms. Participants had to rate the Chinese character in their own time via a 7-point Likert scale, anchored from 'not very pleasant' to 'very pleasant'. The Chinese characters were randomly assigned to the meal images using a Latin square design, thus each participant rated all four characters. Before starting this experiment, participants were explicitly instructed to ignore the primes prior to the Chinese characters. Despite this instruction, we expected that participants are more inclined to perceive the Chinese characters as pleasant if they have formed a favourable automatic evaluation towards the primes.

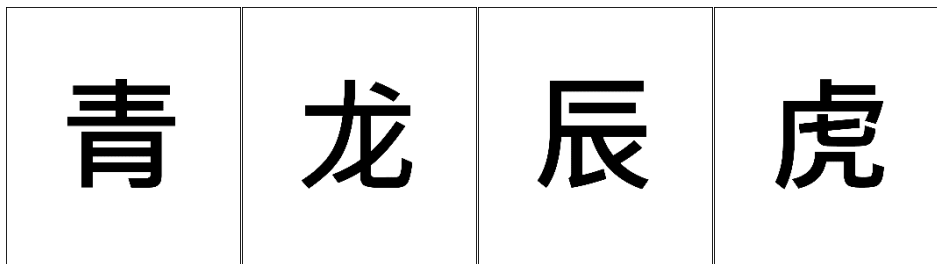


Figure 3: Four Chinese characters used in 'automatic evaluation', referred to as 1: 'blue', 2: 'dragon', 3: 'morning', 4: 'tiger'

To be able to control for participants' general attitudes towards the Chinese characters, we asked them to evaluate the four characters on a 7-point Likert scale ranging from 'very unpleasant' to 'very pleasant'. This part figured later in the survey and was the same for every condition.

4.4.2. Part 2: Deliberate evaluation and acceptability of duckweed

In the second part, participants were once more exposed to the four photographs of meals containing duckweed.

To measure 'deliberate evaluation', they were either provided or not provided with positive information about duckweed and are then asked questions regarding their attitude towards the meals. We made use of three deliberate attitude measures which were identified from the Marketing Scales Handbook (G. C. Bruner, 2012, 2015), that participants had to rate on a 7-point semantic differential scale: 'very negative-very positive' (neutral scale), 'very meaningless-very meaningful' (cognitive scale), and 'not very tasty-very tasty' (emotional scale).

To measure 'acceptability of duckweed', we used two acceptability measures, willingness to buy and willingness to try, as seen in a study by Tan, van den Berg, & Stieger (2016), which was rated on a 7-point Likert scale. Finally, we asked participants to rate duckweed appropriateness in the presented meals on a 7-point Likert scale.

To be able to control for participants' general attitudes towards the different meal types included in this survey (sandwiches, salads, savoury pies, mashed potato dishes, cake products, pastries and sweet pies, vegetable juices, and Dutch cheese products), we asked them to evaluate the eight meal types on a 7-point Likert scale ranging from 'not very positive' to 'very positive'. This part figured later in the survey and was the same for every condition.

4.4.3. Part 3: General opinion on duckweed

In the third part, named 'opinion on duckweed in general', participants were asked to give their opinion on duckweed as human food in general. For this, we used 9 deliberate attitude measures which were identified from the Marketing Scales Handbook (G. C. Bruner, 2012, 2015), including the three measures used in part 2. Participants had to rate the following 9 items on a 7-point semantic differential scale: very negative-very positive; very meaningless-very meaningful; not very tasty-very tasty; very unfamiliar-very familiar; very unnatural-very natural; very unsafe-very safe; very accessible-very exclusive; very unhealthy-very healthy; very environmentally unfriendly-very environmentally friendly.

We added a 7-point semantic differential scale to measure taste expectations of duckweed; participants were asked about the expected distinctiveness of the taste of duckweed, going from 'not very distinct' to 'very distinct'.

At the end of the survey, the participants who were provided with positive information about duckweed were asked to indicate, if remembered, what information they found most relevant when evaluating duckweed as food.

4.4.4. Part 4: Participant characteristics

In the fourth part, participants were asked to answer questions about the following individual traits: (1) food neophobia, (2) environmental concern, and (3) motives for food choice.

(1) To measure the trait of food neophobia in participants, we used the food neophobia scale (FNS) constructed by Pliner & Hobden (1992). Participants were asked to rate 10 items in a randomized order on a 7-point Likert scale. A back and forward Dutch translation of the English statements of the FNS by Pliner & Hobden (1992) was provided by Hoek et al. (2011).

(2) To quantify participants' orientation towards environmentalism, we used the Environmental Motives Scale (EMS), which was established by Schultz (2001) and based on the Value-Belief-Norm model (VBN) developed by Stern & Dietz (1994; Stern, 2000). Participants were asked to rate the following 12 items in a randomized order on a 7-point Likert scale: marine life, birds, animals, plants, my health, my future, my lifestyle, me, children, people in my country, all people, and my children. In short, the 12 items assess each of the three sets value orientations related to environmental concern: egoistic, social-altruistic, and biospheric value orientations.

(3) Finally, we were interested in participants' motives for food choice. Steptoe, Pollard, & Wardle (1995) developed a brief questionnaire to assess perceived influences on food selection at the individual level. Their 'Food Choice Questionnaire' included nine factors: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern. Onwezen, van 't Riet, & Bartels (2011) also used these nine factors in their study, but complemented this scale with three additional factors that are relevant for the evaluation of new food products: 'animal friendliness', 'environmental concern' and 'safety'. In addition, we used one question per factor, as was done by Onwezen et al. (2011), instead of several questions per factor, as was done by Steptoe et al. (1995). Finally, we excluded 'animal friendliness' from the 12-factor scale by Onwezen et al. (2011), because animals are not involved in the cultivation of duckweed. Participants were asked to rate all 11 factors in a randomized order according to their importance on a 7-point Likert scale.

4.4.5. Part 5: Participant demographics

In the fifth and last part, participants were asked to provide demographic information about their gender, age, highest level of education completed, food allergies or intolerances, and special dietary requirements.

4.5. Data analysis

Data obtained from this survey was analysed using IBM SPSS Statistics version 24. Cronbach's alpha tests were used to determine whether the scales in the survey were reliable. When the alpha was higher than 0.7, we assumed that the statements together gave an indication of the topic measured. The scales used for measuring deliberate evaluation were very reliable, with Cronbach's α 's ranging from 0.80 (evaluation of cake) to 0.92 (evaluation of quiche). The scales used for measuring duckweed acceptability were relatively reliable, with Cronbach's α 's ranging from 0.56 (acceptability of cake) to 0.84 (acceptability of quiche). The food neophobia scale (Cronbach's $\alpha = 0.85$), environmental motives scale (Cronbach's $\alpha = 0.91$), and the food motives scale (Cronbach's $\alpha = 0.75$) were reliable as well. Several analyses of variance and linear regressions were used to test the four survey hypotheses.

4.6. Results

4.6.1. Survey

A total of 751 people took the survey. People who did not complete part 1 (automatic evaluation) and part 2 (deliberate evaluation and acceptability of duckweed) of the survey were excluded from the analysis, as these parts contained relevant questions to test the four hypotheses. Thus, 669 people were eventually included in the analysis.

Table 3 shows the means and standard deviations for the participants' general attitudes towards the eight product types included in this survey. Overall, participants were somewhat more positive about sandwiches (M = 5.23, SD = 1.29), salads (M = 5.90, SD = 1.10), savoury pies (M = 5.52, SD = 1.21), mashed potato dishes (M = 5.62, SD = 1.20) and Dutch cheese products (M = 5.76, SD = 1.14) than about cake products (M = 4.67, SD = 1.56), pastries and sweet pies (M = 4.66, SD = 1.68), and vegetable juices (M = 4.48, SD = 1.57), which still tended toward positive perceptions.

TABLE 3: Mean + SD for participants' general attitudes towards eight product types* (measured on a 7-point scale) (N = 661)

Classification	Product types	Mean	Std. Deviation
Fitting	Sandwiches	5.23	1.29
	Salads	5.90	1.10
	Savoury pies	5.52	1.21
	Mashed potato dishes	5.62	1.20
Non-fitting	Cake products	4.67	1.56
	Pastries and sweet pies	4.66	1.68
	Vegetable juices	4.48	1.57
	Dutch cheese products	5.76	1.14

* Product types are here classified as fitting or non-fitting, but this was not the case for this question in the survey. Each participant was asked about all 8 product types.

Table 4 shows the means and standard deviations for the participants' attitude towards each of the Chinese characters. The means and standard deviations of 'blue' (M = 4.31, SD = 1.20), 'dragon' (M = 4.27,

SD = 1.23), 'morning' (M = 4.22, SD = 1.15), and 'tiger' (M = 4.30, SD = 1.20) were similar and reflect a neutral degree of pleasantness.

A factorial repeated measures ANOVA was conducted to determine whether there was a statistical significance between the participants' attitudes towards each of the Chinese characters used in the 'automatic evaluation' section of the survey. There was no statistically significant difference between the participants' attitudes towards the four Chinese characters, $F(3, 587) = 1.81, p = 0.145$.

This confirms that all the Chinese characters were successfully ambiguous/abstract with regard to the judgment made about them.

TABLE 4: Mean + SD for the participants' attitude towards the Chinese characters (measured on a 7-point scale) (N = 590)

Chinese characters	Mean	Std. Deviation
Blue	4.31	1.20
Dragon	4.27	1.23
Morning	4.22	1.15
Tiger	4.30	1.20

Means and standard deviations for the participants' characteristics regarding food neophobia, orientation towards environmentalism, and motives for food choice are shown in Table 5.

TABLE 5: Mean + SD for neophobia, orientation towards environmentalism, and motives for food choice (measured on a 7-point scale) (N = 669)

	n*	Mean	Std. Deviation
Neophobia	665	2.72	0.94
Environmental concern	661	5.62	0.83
Biospheric		5.91	0.97
Social-altruistic		5.80	0.94
Egoistic		5.15	1.09
Motives for food choice	661	5.44	0.59
Safety		6.26	0.78
Health		5.98	0.82
Sensory appeal		5.93	0.78
Price		5.71	0.97
Mood		5.69	0.95
Environmental concern		5.53	1.05
Natural content		5.42	1.17
Ethical concern		5.34	1.19
Weight control		5.13	1.33
Convenience		5.09	1.24
Familiarity		3.72	1.55

* Not all participants completed the 'participant characteristics' section of the survey.

The results show that food neophobia in the participants was relatively low (M = 2.72, SD = 0.94). Furthermore, participants' orientation towards environmentalism was relatively positive (M = 5.62, SD = 0.83), with somewhat greater orientations towards biospheric (M = 5.91, SD = 0.97) and social-altruistic values (M = 5.80, SD = 0.94), compared to egoistic values (M = 5.15, SD = 1.09).

Participants considered safety, health, sensory appeal, price, mood, environmental concern, natural content, ethical concern, weight control, and convenience as important motives for food choice in general (mean values > 5). Particularly safety (M = 6.26, SD = 0.78), health (M = 5.98, SD = 0.82), and sensory appeal (M = 5.93, SD = 0.78) were perceived as very important motives for food choice. Only familiarity (M = 3.72, SD = 1.55) was not perceived as an important motive for food choice.

When considering food neophobia, orientation towards environmentalism, and food choice motives as covariates while testing the study hypotheses, no significant differences were observed compared to the reported results. Therefore, these characteristics were not further included in the analyses.

4.6.2. Participant demographics

In Table 6, an overview of the participants' demographics can be found.

TABLE 6: Participant demographics (N = 669)

Category	n	Percentage	Pearson's χ^2
Gender (n = 657*)			$\chi(3)=2.88, p=0.41$
Male	218	33%	
Female	439	67%	
Age category (n = 657*)			
18-20	25	4%	
21-30	105	16%	
21-40	40	6%	
41-50	72	11%	
51-60	118	18%	
61-70	193	29%	
71-80	97	15%	
>80	7	1%	
Highest level of education completed (n = 657*)			$\chi(12)=11.35, p=0.50$
Elementary education / Primary school	2	<1%	
Lower level vocational education	42	6%	
Intermediate vocational education	116	18%	
Secondary education	100	15%	
Tertiary education	397	60%	
Food allergies or intolerances (n = 642**)			$\chi(3)=4.73, p=0.19$
No	503	78%	
Yes	139	22%	
Special dietary requirements (n = 652**)			$\chi(6)=8.45, p=0.21$
No	579	89%	
Vegetarian	38	6%	
Other	35	5%	
Survey condition (n = 669)			
Fitting + information	170	25%	
Fitting + no information	162	24%	
Non-fitting + information	172	26%	
Non-fitting + no information	165	25%	

* 2% of the 669 participants dropped out before completing the last 'participant demographics' section of the survey.

** Participants were not required to answer the questions about 'food allergies or intolerances' and 'special dietary requirements' to continue the survey.

Pearson's chi squares show that the participants were almost equally assigned across the four survey conditions, with respect to gender, education level, food allergies or intolerances, and special dietary requirements. Out of 657 participants, the majority (67%) was female. The mean age was 53 (SD = 18) and most participants belonged to the age category 61-70. The majority was highly educated, with 60% of the participants reporting to have completed tertiary education.

Of 22% participants reporting food allergies or intolerances, those who shared specifications reported i.a. lactose intolerance or allergies regarding tree nuts, peanuts, shellfish and/or mollusc, stone fruits, and some fruits and vegetables (especially apple). 89% of the participants reported that they had no additional special dietary requirements. Examples of reported diets included vegetarian (6%), flexitarian, no pork, low-salt, low-sugar, and low-carbohydrate diets.

Considering the demographic factors as covariates while testing the study hypotheses did not yield a significant effect on the results. Therefore, the demographic factors were not further included in the analyses.

4.6.3. Disaggregated overview of the results

An overview of the means and standard deviations for factor fit and factor info predicting automatic evaluation, deliberate evaluation, and duckweed acceptability of each of the eight duckweed meals was composed (Table 7).

TABLE 7: Disaggregated overview of mean + SD for factor fit and factor info predicting automatic evaluation, deliberate evaluation, and duckweed acceptability of duckweed meals (measured on a 7-point scale) (N = 669)

		Automatic evaluation (n = 590)*		Deliberate evaluation (n = 669)		Duckweed acceptability (n = 669)		
		Mean	SD	Mean	SD	Mean	SD	
Fitting	Info	Sandwich	4.35	1.08	5.65	1.00	5.94	1.06
		Salad	4.24	1.18	5.56	1.15	5.70	1.21
		Quiche	4.12	1.22	5.44	1.28	5.51	1.38
		Mashed potato dish	4.21	1.14	5.40	1.11	5.60	1.22
	No info	Sandwich	4.36	1.17	5.12	0.96	5.70	1.05
		Salad	4.29	1.16	4.96	1.18	5.36	1.32
		Quiche	4.21	1.20	4.91	1.24	5.26	1.39
		Mashed potato dish	4.21	1.17	4.90	1.11	5.35	1.22
Non-fitting	Info	Cake	4.27	1.18	4.36	1.10	5.25	1.16
		Pastry	4.44	1.10	4.86	1.11	5.48	1.14
		Vegetable juice	4.23	1.19	3.96	1.25	4.55	1.38
		Cheese	4.01	1.15	3.67	1.52	4.55	1.53
	No info	Cake	4.47	1.24	5.00	1.11	5.68	1.05
		Pastry	4.51	1.25	5.33	1.07	5.78	1.05
		Vegetable juice	4.33	1.25	4.55	1.27	4.90	1.39
		Cheese	4.13	1.29	4.27	1.51	4.73	1.60

* Not all participants managed to see all the images of duckweed meals during the AMP, possibly due to the device on which the survey was taken in combination with the short prime duration (300 ms)

4.6.4. Hypothesis 1: effect of factor fit on the automatic evaluation of duckweed meals

Table 8 shows the means and standard deviations for the influence of factor fit on the automatic evaluation of duckweed meals. The average of the AMP scores obtained for the four fitting meals (sandwich, salad, quiche, mashed potato dish), as well as the average of AMP scored obtained for the non-fitting meals (cake, pastry, vegetable juice, cheese) was used to measure automatic evaluation. The mean for fitting meals (4.25) was similar to the mean for non-fitting meals (4.30) and both had similar standard deviations (0.97 and 0.99 respectively). The means show that the participants' ratings were neutral (around 4 = 'not very unpleasant, not very pleasant') for both the fitting meals and non-fitting meals.

A one-way ANOVA was used to determine if factor fit influenced the automatic evaluation of duckweed meals. The results of the ANOVA show that the mean automatic evaluation was not significantly

different for the factor fit; $F(1, 588) = 0.424, p = 0.515$. This means that the participants did not perceive the Chinese characters as more pleasant or unpleasant when they had different fitting conditions.

TABLE 8: Mean + SD for the influence of factor fit on automatic evaluation of duckweed meals (measured on a 7-point scale) (N = 669)

	n*	Mean	Std. Deviation
Fitting meals**	290	4.25	0.97
Non-fitting meals**	300	4.30	0.99

* Not all participants managed to see all the images of duckweed meals during the AMP, possibly due to the device on which the survey was taken in combination with the short prime duration (300 ms)

** Average of four fitting meals and average of four non-fitting meals

So, the results do not provide support for H1, because people who were exposed to an image of duckweed in a fitting context were not more likely to have a positive automatic evaluation of duckweed as human food than people who were exposed to an image of duckweed in a non-fitting context.

4.6.5. Hypothesis 2: effect of factor fit and factor info on the deliberate evaluation of duckweed meals

Figures 4 and 5 provide an overview of the differences in deliberate evaluation of the duckweed meals for factor fit and factor info apart, respectively. The average of the three deliberate attitude factors was used to measure deliberate evaluation. The mean obtained from the deliberate evaluations of the fitting meals (5.26) reflected a positive evaluation and was higher than the mean of the non-fitting meals (4.50), which also reflected a positive evaluation. Both had similar standard deviations (1.01 and 1.04 respectively). The mean obtained from the deliberate evaluations of meals with positive information provision (4.87) reflected a positive evaluation and was similar to the mean of the meals without positive information provision (4.88). Standard deviations differed slightly (1.20 and 0.98 respectively).

A two-way ANOVA was conducted with factor info and factor fit predicting deliberate evaluation of all eight meals containing duckweed. The main effect for factor fit yielded an F ratio of $F(1, 665) = 96.514, P = <0.001$, indicating that the main effect for factor fit on deliberate evaluation was significant. The main effect for factor info yielded an F ratio of $F(1, 665) = 0.107, P = 0.743$, indicating that the main effect for factor info on deliberate evaluation was not significant.

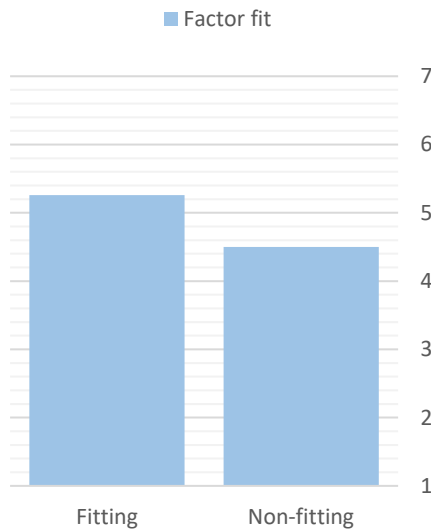


Figure 4: Means for factor fit predicting the deliberate evaluation of the duckweed meals.

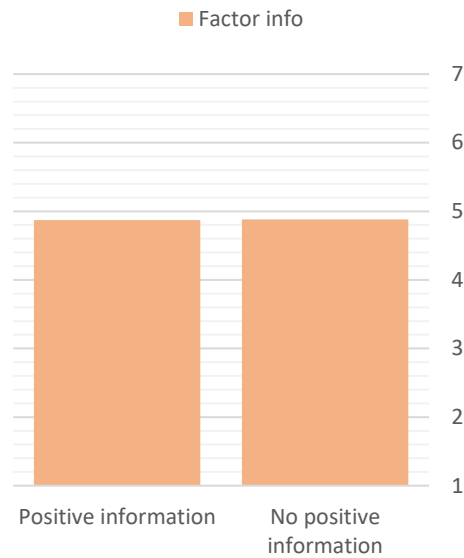


Figure 5: Means for factor info predicting the deliberate evaluation of the duckweed meals.

Figure 6 provides an overview of the differences in deliberate evaluation of the duckweed meals for the interaction between factor fit and factor info. We compared these results to Figure 7, showing the means for the interaction of factor fit with factor info predicting the deliberate evaluation of duckweed in general.

Regarding duckweed meals (Figure 6), the mean obtained from the deliberate evaluations of the fitting meals with positive information provision (5.51) reflected a positive evaluation and was higher than the mean of the fitting meals without positive information provision (4.99), which also reflected a positive evaluation. Both had similar standard deviations (1.01 and 0.94 respectively). The mean obtained from the deliberate evaluations of the non-fitting meals with positive information provision (4.21) reflected a neutral evaluation and was slightly lower than the mean of the non-fitting meals without positive information provision (4.79). Both had similar standard deviations (1.01 and 1.00 respectively). The interaction effect of factor fit and factor info was significant, $F(1, 665) = 51.33, P = <0.001$.

Regarding the participants' opinion of duckweed in general (Figure 7), the mean obtained from the deliberate evaluation in the condition 'fitting + positive information provision' (5.17) reflected a positive evaluation and was higher than the mean in the condition 'fitting + no positive information provision' (4.62), which also reflected a relatively positive evaluation. Both had similar standard deviations (0.87 and 0.90 respectively). The mean obtained from the deliberate evaluations of the non-fitting meals with positive information provision (4.32) reflected a neutral evaluation and was slightly lower than the mean of the non-fitting meals without positive information provision (4.77). Both had similar standard deviations (0.88 and 0.83 respectively). The interaction effect of factor fit and factor info was significant, $F(1, 665) = 55.37, P = <0.001$. Thus, the participants' deliberate evaluation of duckweed in general appeared to be similar to their deliberate evaluation of the meals containing duckweed.

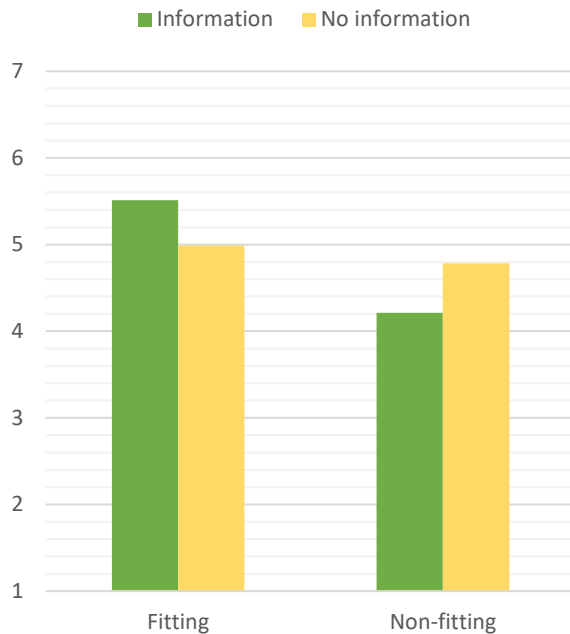


Figure 6: Means for the interaction factor fit*factor info predicting deliberate evaluation of the duckweed meals.

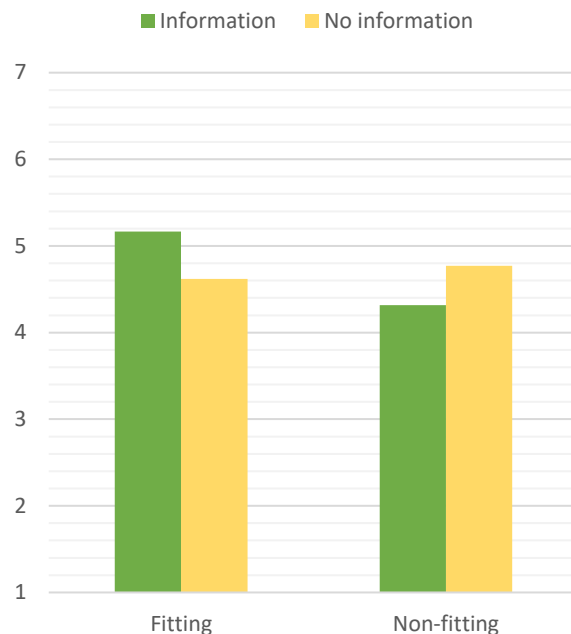


Figure 7: Means for the interaction factor fit*factor info predicting the deliberate evaluation of duckweed in general.

The results partly provide support for H2. People who were provided with information about the benefits of duckweed as human food were more likely to have a positive deliberate evaluation of duckweed as human food than people who were not provided with any positive information, but this was only the case in the condition where people were exposed to fitting meals. People who were exposed to non-fitting meals with positive information provision showed a less positive deliberate evaluation than people who were exposed to non-fitting meals without positive information provision, which was the opposite from what was hypothesized in H2.

4.6.6. Hypothesis 3: correlation between automatic evaluation and deliberate evaluation of duckweed meals

A simple linear regression was conducted to predict deliberate evaluation of the eight meals containing duckweed based on automatic evaluation. The average of the three deliberate attitude factors was used to measure deliberate evaluation.

The regression model statistically significantly predicts the deliberate evaluation of the meals containing duckweed, $F(1, 588) = 11.89$, $p = 0.001$, $R = 0.15$, $\beta = 0.16$ ($SE = 0.046$). $R^2 = 0.02$, so only 2% of the total variation in the deliberate evaluation was explained by people's automatic evaluation of the meals containing duckweed. The regression equation was: deliberate evaluation = $4.23 + 0.16 * (\text{automatic evaluation})$.

Despite a low degree of correlation, the results provide support for H3. A positive automatic evaluation of duckweed as human food predicts a more positive the deliberate evaluation, regardless of the experimental condition.

4.6.7. Hypothesis 4: correlation between deliberate evaluation and the acceptability of duckweed meals

A simple linear regression was conducted to predict duckweed acceptability of the eight different meals based on deliberate evaluation. The average of the two acceptability factors ‘willingness to try’ and ‘willingness to buy’ was used to measure duckweed acceptability.

The regression model statistically significantly predicts the acceptability of the eight meals containing duckweed, $F(1, 667) = 1237.93$, $p < 0.001$, $R = 0.81$, $\beta = 0.81$ ($SE = 0.023$). $R^2 = 0.65$, so 65% of the total variation in acceptability was explained by people’s deliberate evaluation of the meals containing duckweed. The regression equation was: $\text{acceptability} = 1.40 + 0.81 * (\text{deliberate evaluation})$.

The high degree of correlation provides support for H4: the more positive the deliberate evaluation of duckweed as human food, the more acceptable duckweed was as human food.

4.6.8. Other relevant findings

4.6.8.1. Perceived appropriateness of duckweed in the eight meals

The perceived appropriateness of duckweed in the eight meals, as measured in the ‘deliberate evaluation and duckweed acceptability’ section of the survey, is shown in Table 9. For each meal, the average means of participants in the info condition and no info condition were used. All meals that were labelled ‘fitting’ were considered as appropriate meals to combine with duckweed: sandwich ($M = 5.06$, $SD = 1.38$), salad ($M = 5.36$, $SD = 1.34$), quiche ($M = 5.09$, $SD = 1.49$), and mashed potato dish ($M = 5.05$, $SD = 1.44$). However, juice, which was labelled as ‘non-fitting’, was also considered as an appropriate meal to combine with duckweed ($M = 5.06$, $SD = 1.48$). The other ‘non-fitting’ meals were either neutrally evaluated for appropriateness: pastry ($M = 4.03$, $SD = 1.48$); or evaluated slightly below neutral: cake ($M = 3.66$, $SD = 1.53$) and cheese ($M = 3.73$, $SD = 1.78$).

TABLE 9: Mean + SD for the perceived appropriateness of duckweed in the eight meals (measured on a 7-point scale) ($N = 669$)

Factor fit	Duckweed meals	Mean	Std. Deviation
Fitting ($n = 332$)	Sandwich	5.06	1.38
	Salad	5.36	1.34
	Quiche	5.09	1.49
	Mashed potato dish	5.05	1.44
Non-fitting ($n = 337$)	Cake	3.66	1.53
	Pastry	4.03	1.60
	Juice	5.06	1.48
	Cheese	3.73	1.78

4.6.8.2. Taste expectations of duckweed

The distinctiveness of the taste of duckweed in general was evaluated. Participants ($N = 669$) expected it to have a relatively neutral taste ($M = 4.02$, $SD = 1.164$). No further explanations about expected taste (e.g. specific flavours), other than ‘no extreme taste expected’, were given at the end of the questionnaire. However, many participants expressed interest in tasting duckweed and asked whether it was already available on the market.

4.6.8.3. Perceived relevance of provided information about duckweed

87% of the participants in the condition in which positive information was provided ($N = 338$) remembered what information they found most relevant when evaluating duckweed as food. Most of them indicated

healthiness and environmental friendliness, or more specific; high protein content and low CO₂ emission as most relevant components for the evaluation of duckweed as food. Some participants also mentioned the easy and natural (no need for fertilizers) cultivation as relevant information. The possibility of growing duckweed in wastewaters raised some questions about the cleanliness and healthiness of such cultivation.

5. General discussion

The present research demonstrated that the extent to which duckweed fits into a meal is important to the acceptability of duckweed as human food. More specifically, the meal types identified as fitting with duckweed in the exploratory study 1 were confirmed to be more acceptable than the meal types identified as non-fitting. This effect of factor fit was shown in the deliberate evaluation of duckweed meals, where fitting meals were evaluated more positively, but not in automatic evaluation. This suggests that interpretation of fit requires some deliberate reflection and may not be an automatic perception per se.

Providing information about the nutritional and environmental benefits of duckweed as human food did not have a main effect on the deliberate evaluation or acceptability of duckweed. However, the extent to which duckweed fits in a meal was proven to moderate the effect of information provision on deliberate evaluation. Participants who were exposed to an image of duckweed in a fitting meal with positive information provision were more likely to have a positive deliberate evaluation of duckweed as human food than participants who were exposed to duckweed in a fitting meal without any positive information provision – supporting our hypothesis. In contrast, participants who were exposed to duckweed in a non-fitting meal with positive information provision had a less positive deliberate evaluation than participants who were exposed to duckweed in a non-fitting meal without any positive information provision – not supporting our hypothesis. Thus, the results partly confirmed our research expectations, since providing information about the benefits of duckweed as food for humans did not always lead to a positive deliberate evaluation of meals containing duckweed.

Furthermore, the present research indicated that the more positive the automatic evaluation of duckweed as human food, the more positive the deliberate evaluation turned out, regardless of the experimental condition. In addition, the more positive the deliberate evaluation of duckweed as human food, the more acceptable duckweed was as human food. The observed correlation was high, indicating that, overall, participants were relatively willing to accept duckweed as human food when their deliberate evaluation was high.

5.1. Theoretical implications

5.1.1. The effect of information provision

Providing information about the benefits of duckweed as food for humans did not always lead to a positive deliberate evaluation in the study sample. From a theoretical standpoint, two possible reasons are pinpointed to discuss why highlighting the nutritional and environmental benefits of a food may backfire.

The first reason for a less positive deliberate evaluation of the non-fitting products in this study, while positive information about nutritional and environmental benefits of duckweed was provided, concerns psychological reactance. Psychological reactance is conceived as a motivational state directed towards the reestablishment of freedoms that have been eliminated or threatened with elimination (Brehm, 1966). Based on some participants' remarks made at the end of the questionnaire, we argue that they may have perceived the information as a threat to the freedom of enjoying some of the non-fitting meals. Applying duckweed in e.g. cake and pastries might form a threat to some participants, because these products were not perceived as 'sources of important nutrients'. Therefore, participants did not

seem to understand the point of adding 'nutritious' duckweed to such products. More specifically, some participants made the remark at the end of the questionnaire that using duckweed as a 'substitute for animal protein' (e.g. 'duckweed burger') would make more sense to them than using duckweed as a 'high-protein supplement' in the non-fitting meals. Reactance towards duckweed in the non-fitting meals was not noticeable in participants who were allocated to a non-fitting condition without positive information provision, which seems in line with the results of the survey.

Secondly, it cannot be excluded that the 'unhealthy = tasty'-intuition comes in play. According to Raghunathan, Naylor, & Hoyer (2006) when information pertaining to the assessment of the healthiness of food is provided, foods perceived as less healthy are inferred to taste better. Along these lines, the knowledge that e.g. cake (a relatively unhealthy food) with duckweed contains healthy ingredients might have allowed participants to evaluate it as less tasty. Although frequently observed in the US context (Raghunathan et al., 2006) this effect does seem to be less important outside the US context (Werle, Trendel, & Ardito, 2013), with the exception of a study by Wardle & Huang (2000) about promoting healthy foods to UK-children. Werle et al. (2013) suggest how cultural differences and food-related heritage explain the difference in food perceptions in a country like France. In addition, Huang & Wu (2016) explored the idea of food pleasure orientation – which has been shown to be high in French people (Rozin, Paris, & Imada, 1999) – in the sense that people with a high food pleasure orientation are more likely to perceive healthy food as tasty than people with a low food pleasure orientation. So, considering that Dutch people are from a different culture and might have a higher food pleasure orientation than US people, the 'unhealthy = tasty'-intuition appears to be unlikely in the Netherlands.

5.1.2. The effect of a fitting context

The context in which duckweed is presented has proven to be important in terms of deliberate evaluation. Within the non-fitting condition of the survey, the sweet meal applications (cake and pastry) were less positively evaluated than the savoury meal applications (vegetable juice and cheese). This difference might have emerged because participants perceived duckweed as a vegetable, which are predominantly savoury. Some participants indeed indicated at the end of the questionnaire finding it strange to put 'vegetables' in sweet products (e.g. 'sweet pastries'), and that they would rather use duckweed in 'something savoury' like 'salads', 'vegetable juices' or as a 'meat substitute'. Another explanation might concern the colour of the meal presented. In fact, one participant explicitly revealed at the end of the questionnaire that the meal evaluations were formed based on colour perceptions, rather than on the fact that the meals contained duckweed. Another participant mentioned that green cake (due to the addition of duckweed) would probably be evaluated as less tasty than most vegetable dishes, which are 'supposed' to be green. Colour is often taken for granted in food, but it has been shown that by interfering with judgments of flavour intensity and identification, it can dramatically influence the pleasantness and acceptability of foods (Clydesdale, 1993).

The present research showed that, among the non-fitting meals, vegetable juice scored the highest on perceived appropriateness (appropriate to combine with duckweed), and cheese the lowest. The perceived appropriateness of vegetable juice was relatively similar to the perceived appropriateness of the four fitting-meals. Vegetable juice might be more easily associated with duckweed, because duckweed was perceived as a vegetable in the explorative interviews. In addition, colour might again play a key role; participants might be familiar to vegetable juice being green (in contrast to cheese). Cheese might be perceived as less appropriate to combine with duckweed, because of its nutritional value. In fact, one participant mentioned that cheese was already a high-protein product, hence it seemed pointless to

add duckweed as an additional source of protein. However, vegetable juice is also generally nutritious, so this argument does not seem to apply there.

Participants were relatively positive towards all four fitting meals presented in the survey (sandwich, salad, quiche, mashed potato dish). Results from explorative interviews revealed other possibilities for fitting duckweed applications (e.g. soup, pasta dishes), which could be explored in future research in terms of deliberate evaluation and acceptability. On a broader level, the theory from our literature study suggests that there is more to context than just meal-fit. Other situational variables such as meal situation, social interaction, and physical environment also affect product acceptability (King, Meiselman, Hottenstein, Work, & Cronk, 2007; Rozin, 1996), and are therefore relevant to investigate.

5.1.3. Measuring automatic evaluation

In the present research, the AMP did not show a significant difference in automatic evaluation between fitting and non-fitting duckweed meals. This either means that: (1) this finding does not match the theory from our literature study that a given factor may directly influence both the activation of automatic evaluation and deliberate evaluation (Gawronski & Bodenhausen, 2006), because there is no relation between factor fit and the automatic evaluation of duckweed meals; or that (2) the method used to measure automatic evaluation in the current research did not pick up this relation.

There are several methods to measure automatic evaluation (indirect/implicit attitudes). We used the affect misattribution procedure (AMP), which is known for its widely used and particularly simple approach to the implicit measurement of attitudes (Payne & Lundberg, 2014). Concerning the presentation time of the duckweed meals and Chinese characters in the questionnaire (300 ms), some participants in the current research made the remark at the end of the questionnaire that they could 'barely perceive the Chinese characters' during the AMP 'because of the time restriction', resulting in 'evaluating the characters as neutral'. While Payne & Lundberg (2014) recommend using preferably less than 300 ms for both primes and target images in the AMP to ensure subliminal presentation, they also suggest using the fastest times that are practical in a given sample, because subjects who are older, less educated, or less familiar with computerized tasks may become frustrated by very fast presentation times. In the current research, the majority of the participants was highly educated, but most participants were older than 50. Because of the latter, the AMP might show clearer results by increasing the presentation time of the duckweed meals and Chinese characters (e.g. 1000 ms instead of 300 ms). Another possible improvement might involve the addition of more trials to the AMP. Payne & Lundberg (2014) recommend using at least 100 trials when it is feasible (e.g. 50 trials for each of two prime categories), since their study indicated that more trials was associated with greater reliability. As the present research included only four trials, the AMP's poor results might be improved by adding trials – maybe even beyond (> 100) the numbers used in most existing applications of the AMP (Bar-Anan & Nosek, 2014). However, adding more trials to the AMP in the present study does not seem realistic with respect to the length of the online questionnaire; it already took 15 minutes of the participants' time.

Despite the lack of effect of the manipulation, the outcomes of the AMP did influence deliberate attitude of duckweed products, suggesting that the AMP procedure did indeed pick up a relevant automatic evaluation of duckweed as human food. This relation was however rather low ($R = 0.15$). To be able to determine what this says about the use of AMP in this context, the current results are compared with a method that has been extensively assessed in the measurement of implicit attitudes: the Implicit Association Test (IAT), reviewed by Greenwald et al. (2009). The IAT is a latency-based measure of the relative associations between two concepts in computer-administered categorization tasks. Using the IAT,

Greenwald et al. (2009) indicated relatively low correlations between implicit and explicit attitudes regarding consumer preferences: $R = 0.32$, (95% CI ± 0.06). The correlations in the current study between automatic and deliberate evaluation were somewhat lower than those found by Greenwald et al. (2009) for IAT. This might be due to the use of a different method (AMP) or the fact that participants filled in the survey in their own time and place of choosing, but it may also be due to the fact that the present research was about a new and unfamiliar food product, possibly triggering unstable attitudes, which resulted in lower correlations between different assessments of those attitudes.

In any case, it is important to note that automatic evaluation remains difficult to measure, since it is such an immediate, unintentional and implicit process. Even if we had chosen to be in direct contact with the participants instead of distributing an online questionnaire, we could not have controlled for true automatic responses. It would be interesting to compare both implicit measurement tools (AMP and IAT) systematically for a more rigorous perspective in their ability at measuring the effect of factor fit on the automatic evaluation of duckweed meals.

5.2. Practical implications

The present research demonstrated that participants in the study were relatively willing to accept duckweed as human food, indicating that duckweed has a realistic potential to be accepted as human food in the Netherlands. Based on the results of the explorative interviews, we suspect that, in order for duckweed to become a successful food product in the Netherlands, time is probably needed to embed this new food into the larger supermarkets, especially with respect to the intention-behaviour gap. In fact, throughout the present research, behaviour did not fall under the concept of duckweed acceptability. However, in practice, it is desirable that duckweed is not only acceptable to consumers in the Netherlands, but that this acceptability will lead to purchasing behaviour and actual intake. In the exploratory interviews, healthiness was mentioned as an important pre-requisite for buying duckweed – among other factors like appearance, taste, and price. In the present research, duckweed was explicitly called healthy. However, subtlety in promoting healthiness can be interesting to investigate in future research. Although explicitly calling a food product healthy is a common form of health communication, Wagner, Howland, & Mann (2014) found it to be ineffective at persuading individuals to select that food product. They suggest that subtle messages may be more useful than explicit health messages in encouraging individuals to make a healthy food choice (Wagner et al., 2014). An example of a subtle health message used in the studies by Wagner et al. (2014) is an image of a red heart with a white check mark (a commonly used indication that a food is healthy) displayed on a sign.

Providing information about the nutritional and environmental benefits of duckweed was (deliberately) positively evaluated in the present research, but only when duckweed was fitting in the presented meals. Noteworthy is that in both the conditions where people were not provided with information, participants made remarks about the 'lack of information'. More information was requested about the production process (e.g. 'can you grow it yourself?'; 'is it safe to cultivate?'; 'it is not mentioned whether duckweed is harvested from ponds or specially cultivated somewhere, which would make a difference. '), about the health benefits (e.g. 'I would like to know more about the health effects of duckweed.', 'what nutrients), about the environmental benefits ('is it environmentally friendly?'; 'is it organic?'), and especially about the taste (e.g. 'I would like to taste duckweed'; 'where can we taste these products?'; 'it was difficult to answer questions about taste without knowing the taste.'). Thus, in the present research, participants felt the need to obtain a certain amount of information; a feeling that might be generalised to consumer society in general, in which consumers tend to crave for information about

the foods they buy. Therefore, it is not recommended to hide information about duckweed, but rather to give special attention to placing duckweed in appropriate contexts when it will be introduced in the market. Since taste and physical structure of duckweed remain important in deciding on specific meal applications, we suggest organizing consumer tasting sessions featuring duckweed in diverse meals as soon as safety aspects have been tested.

The importance of promoting duckweed as a new, hip, and healthy food product was often mentioned by participants in the explorative interviews, and promotion was suggested through food bloggers on social media and recipe magazines. If the healthiness of duckweed (high-protein content) becomes key in marketing strategies, we recommend communicating recipes of full-meals (e.g. lunch or main meals). In fact, participants who participated in the survey were more inclined towards accepting duckweed in full-meals (fitting condition), than duckweed in snack products (non-fitting condition). On a different note regarding duckweed promotion, the explorative interviews demonstrated that duckweed was predominantly viewed as an exclusive food that should be served at special occasions. However, this should be further explored in a larger sample before clear marketing recommendations can be made.

Finally, product developers might question the use of the current name of duckweed (in Dutch: 'eendenkroos') when introducing it in the market. Some participants in the present research mentioned at the end of the questionnaire that they found the name 'unattractive' or 'misleading' (e.g. 'it makes me think of raw meat'). The results of the explorative interviews suggested that more positive associations with duckweed can be elicited by using surface similarities or Latin for a new name, thereby eliminating the context of 'dirty ponds' or 'animals'. On the other hand, more positive associations can also be elicited by attracting people's attention through the current name. In doing so, transparency can be evoked, which might have a positive effect on building consumer trust.

5.3. Limitations and further research

An important limitation of the present research is that the non-fitting meals with duckweed presented in the survey (cake, pastry, vegetable juice, cheese) were more likely to be perceived as snack products – as opposed to full meals – than the fitting meals (sandwich, salad, quiche, mashed potato dish). Although the allocation of these food products to a fitting or non-fitting condition was based on the results from the explorative interviews, the interviews did not reveal that this allocation may be confounded with snack products versus more full meals as suggested by the unexpected effect of information provision in the survey. To control for this alternative explanation, we recommend future research in which a more equal distribution between full meals and snack products is pursued. In this way, a more reliable comparison could be made between the fitting and non-fitting condition.

Concerning automatic evaluation measurement, since the AMP seemed a well-validated tool with great experimental control, we decided to stay close to the method developed by Payne & Lundberg (2014). This included the use of Chinese characters as ambiguous target items following the prime stimulus. Our results show that there was no higher liking for any individual Chinese character and that the characters fulfilled their purpose in Dutch participants as they did in American participants, since they were successfully abstract/neutral with respect to the judgment made about them. Nonetheless, some participants expressed confusion about the use of Chinese characters in association with duckweed. Not only was the inability to read the characters a reason for frustration, they also gave some participants the impression that duckweed could be exported from China, which would be evaluated as unpleasant. This could be a reason for unclear results regarding the effect of factor fit on the automatic evaluation of duckweed meals. Therefore, in future research, it is worthwhile to investigate whether replacing Chinese

characters with equally neutral images as target items in the AMP (e.g. abstract shapes) leads to clearer results.

In addition, the present research could be extended by assessing whether taste perceptions moderate the observed effects. We purposely excluded information about taste from our study design, because we wanted participants to form their own opinion about it, based on imagined associations. As an inevitable result, participants indicated that some aspects of duckweed (meals) were difficult to evaluate in this study, because they had no knowledge of the taste. In future study designs, duckweed tasting could be useful to obtain empirical information regarding the taste of duckweed. Since taste would influence automatic and deliberate evaluations of duckweed (Iqbal, 1999), it would also influence the acceptability of duckweed as food for humans. However, until safety aspects have been tested, it is not possible to carry out taste sessions yet.

Finally, one of the strengths of the present study was that the survey included a large group of participants with relatively mixed backgrounds. We experienced little drop-outs, resulting in a large sample for analysis. In addition, the survey was preceded by ten explorative interviews. This strategy allowed us to get a quick idea of people's opinions on duckweed as human food, which allowed for well-considered fitting and non-fitting conditions in the survey. Moreover, the present study is the first study to address the acceptability of duckweed as human food.

6. Conclusion

Providing information about the nutritional and environmental benefits of duckweed has a positive effect on duckweed acceptability as food for humans in the Netherlands, on condition that duckweed is used in a fitting meal (vs. a non-fitting meal). We therefore emphasize the importance of introducing duckweed in appropriate contexts to increase its chance of acceptability in an information craving, marketing driven, Western society. Only then duckweed (protein) consumption can reach its potential to reduce the burdens related to high meat consumption, as well as to improve the quality of life in large populations and specific risk groups.

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8. References

- AFP – Carbon footprint of what you eat. (2012). Retrieved from <http://www.adeddesign.com/?p=119>
- Aiking, H. (2011). Future protein supply. *Trends in Food Science and Technology*, 22, 112–120.
- Ajzen, I. (2011). Theory of Planned Behavior. In P. A. M. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of Theories of Social Psychology: Volume One*. SAGE.
- Appenroth, K. J., Sree, K. S., Böhm, V., Hammann, S., Vetter, W., Leiterer, M., & Jahreis, G. (2017). Nutritional value of duckweeds (Lemnaceae) as human food. *Food Chemistry*, 217, 266–273.

- Armstrong, W. P. (2011). The Lemnaceae (Duckweed Family). Retrieved November 9, 2016, from <http://waynesword.palomar.edu/1wayindx.htm>
- Bar-Anan, Y., & Nosek, B. A. (2014). A comparative investigation of seven indirect attitude measures. *Behavioural Research Methods*, *46*, 668–688.
- Beaver, J. D., Lawrence, A. D., van Ditzhuijzen, J., Davis, M. H., Woods, A., & Calder, A. J. (2006). Individual Differences in Reward Drive Predict Neural Responses to Images of Food. *Journal of Neuroscience*, *26*(19), 5160–5166.
- Bechara, A., Damasio, H., & Damasio, A. R. (2000). Emotion, Decision Making and the Orbitofrontal Cortex. *Cerebral Cortex*, *10*(3), 295–307.
- Bernstein, D. A. (2010). Sensation and Perception. In *Essentials of Psychology* (Fifth Edit, pp. 84–131). Cengage Learning.
- Bhanthumnavin, K., & McGarry, M. G. (1971). Wolffia arrhiza as a possible source of inexpensive protein. *Nature*, *232*, 495.
- Birch, L. L., McPhee, L., Shoba, B. C., Pirok, E., & Steinberg, L. (1987). What kind of exposure reduces children's food neophobia? Looking vs. tasting. *Appetite*, *9*(3), 171–8.
- Boland, M. J., Rae, A. N., Vereijken, J. M., Meuwissen, M. P. M., Fischer, A. R. H., van Boekel, M. A. J. S., ... Hendriks, W. H. (2013). The future supply of animal-derived protein for human consumption. *Trends in Food Science and Technology*, *29*(1), 62–73.
- Brehm, J. W. (1966). *A theory of psychological reactance*.
- Brewer, M. B., & Crano, W. D. (1994). *Social Psychology*. Minneapolis/St.Paul: West.
- Bruinsma, J., Bödeker, G., Schmidhuber, J., Broca, S., Shetty, P., & Grazia Ottaviani, M. (2006). *World agriculture: towards 2030/2050*. Rome, Italy: FAO.
- Bruner, G. C. (2012). *Marketing scales handbook: a compilation of multi-item measures - Vol. 6*. Fort Worth, TX, US: CBGII productions.
- Bruner, G. C. (2015). *Marketing scales handbook : a compilation of multi-item measures - Vol. 7*. Fort Worth, TX, US: CBGII Productions.
- Bruner, J. S. (1957). On perceptual readiness. *Psychological Review*, *64*(2), 123–152.
- Cardello, A. V. (1994). Consumer expectations and their role in food acceptance. In H. J. H. MacFie & D. M. H. Thomson (Eds.), *Measurement of Food Preferences* (pp. 253–297). Springer US.
- Clydesdale, F. M. (1993). Color as a factor in food choice. *Critical Reviews in Food Science and Nutrition*, *33*(1), 83–101.
- Cohen, D., & Crabtree, B. (2006). Qualitative Research Guidelines Project. Retrieved December 1, 2016, from <http://www.qualres.org/HomeSemi-3629.html>
- Conrey, F. R., & Smith, E. R. (2007). Attitude Representation: Attitudes as Patterns in a Distributed, Connectionist Representational System. *Social Cognition*, *25*(5), 718–735.
- Cooke, L., Carnell, S., & Wardle, J. (2006). Food neophobia and mealtime food consumption in 4-5 year old children. *International Journal of Behavioral Nutrition and Physical Activity*, *3*, 14–19.
- Cooke, L., Wardle, J., & Gibson, E. . (2003). Relationship between parental report of food neophobia and

- everyday food consumption in 2–6-year-old children. *Appetite*, 41(2), 205–206.
- Coren, S., & Girgus, J. S. (1980). Principles of perceptual organization and spatial distortion: the gestalt illusions. *Journal of Experimental Psychology. Human Perception and Performance*, 6(3), 404–412.
- Craig, C. G. (Ed.). (1986). *Noun Classes and Categorization: Proceedings of a Symposium on Categorization and Noun Classification, Eugene, Oregon, October 1983*. Amsterdam/Philadelphia: John Benjamins Publishing Company.
- de Vries, N., Modde, J., & Stoeller, T. (2009). Sociale Psychologie. In R. Vonk (Ed.), *Sociale Psychologie* (2nd ed., pp. 375–427). Groningen/Houten, The Netherlands: Noordhoff Uitgevers.
- Dovey, T. M., Aldridge, V. K., Dignan, W., Staples, P. A., Gibson, E. L., & Halford, J. C. G. (2012). Developmental differences in sensory decision making involved in deciding to try a novel fruit. *British Journal of Health Psychology*, 17(2), 258–272.
- Duckworth, K. L., Bargh, J. A., Garcia, M., & Chaiken, S. (2002). The automatic evaluation of novel stimuli. *Psychological Science*, 13(6), 513–519.
- Elsbach, K. D., & Breitsohl, H. (2016). A dual-mode framework of organizational categorization and momentary perception. *Human Relations*, 69(10), 2011–2039.
- English Oxford Living Dictionaries. (2016a). Home > British & World English > Behaviour. Retrieved November 14, 2016, from <https://en.oxforddictionaries.com/definition/behaviour>
- English Oxford Living Dictionaries. (2016b). Home > British & World English > Perception. Retrieved November 9, 2016, from <https://en.oxforddictionaries.com/definition/perception>
- FAO. (2013). *Edible insects. Future prospects for food and feed security*. (FAO Forestry Paper 171).
- FAO/WHO. (2007). *Protein and amino acid requirements in human nutrition. Report of a Joint WHO/FAO/UNU Expert Consultation*. Geneva, Switzerland: WHO.
- Fazio, R. H. (2007). Attitudes as object-evaluation associations of varying strength. *Social Cognition*, 25(5), 603–637.
- Gauw, C., & Derksen, Y. (2015). *Waterlinzen, heerlijk en gezond*. ABC Kroos BV en Hogeschool VHL.
- Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin*, 132(5), 692–731.
- Gentner, D., & Forbus, K. D. (2011). Computational models of analogy. *Wiley Interdisciplinary Reviews: Cognitive Science*, 2(3), 266–276.
- Gentner, D., Rattermann, M. J., & Forbus, K. D. (1993). The Roles of Similarity in Transfer: Separating Retrievability From Inferential Soundness. *Cognitive Psychology*, 25(4), 524–575.
- Gilland, B. (2002). World population and food supply: Can food production keep pace with population growth in the next halfcentury? *Food Policy*, 27, 47–63.
- Greenwald, A. G., Poehlman, T. A., Uhlmann, E. L., Chugh, D., Cohen, G., Cvencek, D., ... Walton, G. (2009). Understanding and Using the Implicit Association Test : III . Meta-Analysis of Predictive Validity. *Journal of Personality and Social Psychology*, 97(1), 17–41.
- Gregory, R. L., & Zangwill, O. L. (1987). *The Oxford companion to the mind*. Oxford: Oxford University Press.
- Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment.

- Psychological Review*, 108, 814–834.
- Haidt, J., Rozin, P., McCauley, C., & Imada, S. (1997). Body, Psyche and Culture: the Relationship between Disgust and Morality. *Psychology and Developing Societies*, 9(1), 107–131.
- Harrell, M. C., & Bradley, M. (2009). *Data Collection Methods: Semi-Structured Interviews and Focus Groups*. Santa Monica, CA: RAND.
- Hill, A. J., Magson, L. D., & Blundell, J. E. (1984). Hunger and Palatability: Tracking Ratings of Subjective Experience Before, During and After the Consumption of Preferred and Less Preferred Food. *Appetite*, 5, 361–371.
- Hillman, W. S. (1961). The Lemnaceae, or duckweeds - a review of the descriptive and experimental literature. *Bot Rev*, 27, 221–287.
- Hoek, A. C., Luning, P. A., Weijzen, P., Engels, W., Kok, F. J., & Graaf, C. De. (2011). Replacement of meat by meat substitutes. A survey on person- and product-related factors in consumer acceptance. *Appetite*, 56(3), 662–673.
- Holyoak, K. J., & Koh, K. (1987). Surface and structural similarity in analogical transfer. *Memory & Cognition*, 15(4), 332–340.
- House, J. (2016). Consumer acceptance of insect-based foods in the Netherlands: Academic and commercial implications. *Appetite*. <https://doi.org/10.1016/j.appet.2016.07.023>
- Houston-Price, C., Butler, L., & Shiba, P. (2009). Visual exposure impacts on toddlers' willingness to taste fruits and vegetables. *Appetite*, 53(3), 450–453.
- Huang, Y., & Wu, J. (2016). Food pleasure orientation diminishes the “healthy = less tasty” intuition. *Food Quality and Preference*, 54, 75–78.
- Hurling, R., & Shepherd, R. (2003). Eating with your eyes: effect of appearance on expectations of liking. *Appetite*, 41, 167–174.
- Iqbal, S. (1999). *Report No. 6/99. Duckweed Aquaculture. Potentials, possibilities and limitations for combined wastewater treatment and animal feed production in developing countries*. Duebendorf, Switzerland.
- ISCDRA. (2016). Duckweed Forum. *Newsletter of the Community of Duckweed Research and Applications*, 4(15), 304–326.
- Janis, I. L., & Mann, L. (1977). *Decision-making: a psychological analysis of conflict, choice, and commitment*. New York, USA: Free Press.
- Jansen, E., Mulkens, S., & Jansen, A. (2010). How to promote fruit consumption in children. Visual appeal versus restriction. *Appetite*, 54(3), 599–602.
- Kellert, S. R. (1993). Values and perceptions of invertebrates. *Conservation Biology*, 7(4), 845–855.
- King, S. C., Meiselman, H. L., Hottenstein, A. W., Work, T. M., & Cronk, V. (2007). The effects of contextual variables on food acceptability: A confirmatory study. *Food Quality and Preference*, 18(1), 58–65.
- Krawczyk, D. C., Holyoak, K. J., & Hummel, J. E. (2005). The One-to-One Constraint in Analogical Mapping and Inference. *Cognitive Science*, 29(5), 797–806.
- Leng, R. A., Stambolie, J. H., & Bell, R. (1995). eed - a potential high-protein feed resource for domestic

- animals and fish. *Livestock Research for Rural Development*, 7(1).
- Levesque, C. L., & Ball, R. O. (2017). Chapter 15. Protein and Amino Acid Requirements. Retrieved from <https://basicmedicalkey.com/protein-and-amino-acid-requirements/>
- Livingstone, M., & Hubel, D. (1988). Segregation of Form, Color, Movement, and Depth: Anatomy, Physiology, and Perception. *Science, New Series*, 240(4853), 740–749.
- Lu, Z.-L., & Sperling, G. (1995). The Functional Architecture of Human Visual Motion Perception. *Vision Research*, 35(19), 2697–2722.
- Mandler, G. (1982). The structure of value: accounting for taste. In M. S. Clark & S. T. Fiske (Eds.), *Affect and Cognition: 17th Annual Carnegie Mellon Symposium on Cognition* (pp. 3–36). Hillsdale, NJ: Lawrence Erlbaum.
- Marcelino, A. S., Adam, A. S., Couronne, T., Köster, E. P., & Sieffermann, J. M. (2001). Internal and external determinants of eating initiation in humans. *Appetite*, 36, 9–14. Retrieved from <http://www.idealibrary.com>
- Marcontell, D. K., Laster, A. E., & Johnson, J. (2002). Cognitive-behavioral treatment of food neophobia in adults. *Journal of Anxiety Disorders*, 16(3), 341–349.
- Moreau, C. P., Markman, A. B., & Lehmann, D. R. (2001). “What Is It?” Categorization Flexibility and Consumers’ Responses to Really New Products. *Journal of Consumer Research*, 27(4), 489–498.
- Neisser, U. (1967). *Cognitive psychology*. New York: Appleton-Century-Crofts.
- Onwezen, M. C., van ’t Riet, J. P., & Bartels, J. (2011). *Voedselbalans 2011 : Dl. 2 Consumenten*. Den Haag, LEI, 2011.
- Payne, K., & Lundberg, K. (2014). The Affect Misattribution Procedure: Ten Years of Evidence on Reliability, Validity, and Mechanisms. *Social and Personality Psychology Compass*, 8(12), 672–686.
- Petty, R. E., Briñol, P., & Demarree, K. G. (2007). The meta-cognitive model (MCM) of attitudes: implications for attitude measurement, change and strength. *Social Cognition*, 25(7), 657–686.
- Pliner, P., & Hobden, K. (1992). Development of a Scale to Measure Neophobia in Humans the Trait of Food. *Appetite*, 19, 105–120.
- Raghunathan, R., Naylor, R. W., & Hoyer, W. D. (2006). The Unhealthy = Tasty Intuition and its effects on Taste Inferences, Enjoyment, and Choice of Food. *Journal of Marketing*, 70, 170–184.
- Raney, T., Gerosa, S., Khwaja, Y., Skoet, J., Steinfeld, H., McLeod, A., & Al., E. (2009). *The state of food and agriculture 2009: Livestock in the balance*. Rome, Italy: FAO.
- Reed, S. K. (1972). Pattern Recognition and Categorization. *Cognitive Psychology*, 3, 382–407.
- Rosch, E. (1978). Principles of Categorization. In E. Rosch & B. B. Lloyd (Eds.), *Cognition and categorization* (pp. 27–48). Hilldale, NJ: Lawrence Erlbaum.
- Rozin, P. (1996). The socio-cultural context of eating and food choice. In H. L. Meiselman & H. J. H. Macfie (Eds.), *Food Choice, Acceptance and Consumption* (pp. 83–104). Glasgow: Blackie Academic and Professional.
- Rozin, P., Paris, C. N. R. S., & Imada, S. (1999). Attitudes to Food and the Role of Food in Life in the U. S. A., Japan, Flemish Belgium and France: Possible Implications for the Diet – Health Debate. *Appetite*,

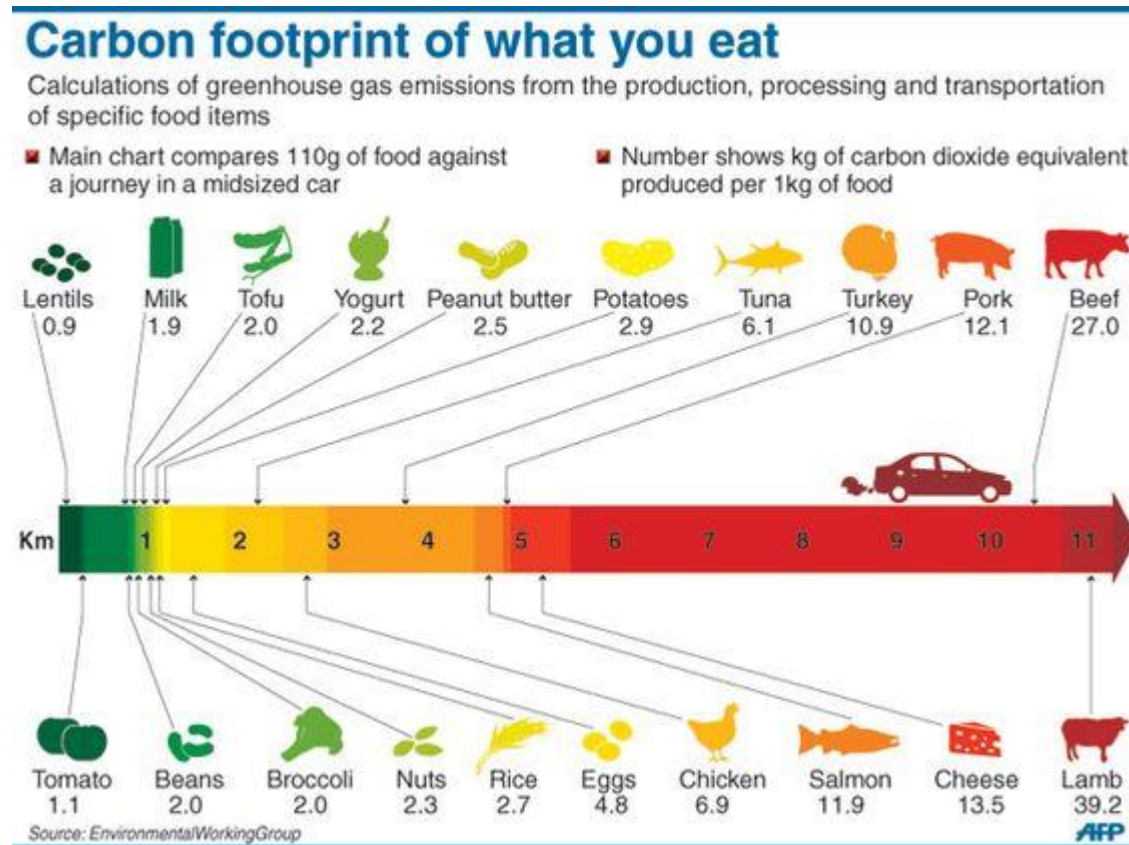
33, 163–180.

- Schultz, P. W. (2001). The structure of environmental concern: concern for self, other people, and the biosphere. *Journal of Environmental Psychology, 21*, 327–339.
- Schutz, H. G. (1988). Beyond preference: Appropriateness as a measure of contextual acceptance of food. In D. M. Thomson (Ed.), *Food Acceptability* (London: EI, pp. 115–134).
- Schutz, H. G. (1995). Eating Situations, Food Appropriateness, and Consumption. In B. M. Marriott (Ed.), *Not Eating Enough: Overcoming Underconsumption of Military Operational Rations*. Washington (DC): National Academies Press (US).
- Schwartz, H. D. (2012). Communication and Perception. In *A Primer on Communication Studies* (pp. 58–121). Retrieved from <http://2012books.lardbucket.org/books/a-primer-on-communication-studies/s02-communication-and-perception.html>
- Schwarz, N. (2007). Attitude construction: evaluation in context. *Social Cognition, 25*(5), 638–656.
- Smith, E. R., & DeCoster, J. (2000). Dual-Process Models in Social and Cognitive Psychology: Conceptual Integration and Links to Underlying Memory Systems. *Personality and Social Psychology Review, 4*(2), 108–131.
- Solomon, M. R., Bamossy, G., Askegaard, S., & Hogg, M. K. (2010). Perception. In *Consumer Behaviour : A European Perspective* (Fourth Ed, pp. 118–141). Prentice Hall/Financial Times.
- Steinfeld, H., Gerber, P., Wassenaar, T., Castel, V., Rosales, M., & De Haan, C. (2006). *Livestock's Long Shadow: Environmental Issues and Options*. Rome, Italy: FAO.
- Step toe, A., Pollard, T. M., & Wardle, J. (1995). Development of a Measure of the Motives Underlying the Selection of Food: the Food Choice Questionnaire. *Appetite, 25*, 267–284.
- Stern, P. C. (2000). Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues, 56*(3), 407–424.
- Stern, P. C., & Dietz, T. (1994). The Value Basis of Environmental Concern. *Journal of Social Issues, 50*(3), 65–84.
- Tan, H. S. G., Fischer, A. R. H., Tinchan, P., Stieger, M., Steenbekkers, L. P. A., & van Trijp, H. C. M. (2015). Insects as food: Exploring cultural exposure and individual experience as determinants of acceptance. *Food Quality and Preference*. <https://doi.org/10.1016/j.foodqual.2015.01.013>
- Tan, H. S. G., Fischer, A. R. H., van Trijp, H. C. M., & Stieger, M. (2016). Tasty but nasty? Exploring the role of sensory-liking and food appropriateness in the willingness to eat unusual novel foods like insects. *Food Quality and Preference*. <https://doi.org/10.1016/j.foodqual.2015.11.001>
- Tan, H. S. G., van den Berg, E., & Stieger, M. (2016). The influence of product preparation, familiarity and individual traits on the consumer acceptance of insects as food. *Food Quality and Preference*. <https://doi.org/10.1016/j.foodqual.2016.05.003>
- Tuorila, H., Meiselman, H. L., Bell, R., Cardello, A. V., & Johnson, W. (1994). Role of sensory and cognitive information in the enhancement of certainty and liking for novel and familiar foods. *Appetite, 23*, 231–246.
- Ungerleider, L.G. and Mishkin, M. (1982). Two Cortical Visual Systems. In D. J. Ingle, M. A. Goodale, & R. J. W. Mansfield (Eds.), *Analysis of visual behavior* (pp. 549–586). Cambridge, MA: MIT Press.

- United Nations. (2015). *World Population Prospects: The 2015 Revision, Keys Findings and Advance Tables. Working paper No. ESA/P/WP.241.*
- Van der Peet, G., & Kamp, J. (2011). *Rapport 472: Workshop nieuwe kansen voor eiwit.* Wageningen UR Livestock Research.
- van der Spiegel, M., Noordam, M. Y., & van der Fels-Klerx, H. J. (2013). Safety of novel protein sources (insects, microalgae, seaweed, duckweed, and rapeseed) and legislative aspects for their application in food and feed production. *Comprehensive Reviews in Food Science and Food Safety, 12*, 662–678.
- Verma, R., & Suthar, S. (2014). Synchronized urban wastewater treatment and biomass production using duckweed *Lemna gibba* L. *Ecological Engineering, 64*, 337–343.
- von Helmholtz, H. (1910). Volume III: Visual perception. Retrieved November 14, 2016, from <http://poseidon.sunyopt.edu/BackusLab/Helmholtz/>
- Wagner, H. S., Howland, M., & Mann, T. (2014). Effects of Subtle and Explicit Health Messages on Food Choice. *Health Psychology, (January 27)*.
- Wang, G.-J., Volkow, N. D., Telang, F., Jayne, M., Ma, J., Rao, M., ... Fowler, J. S. (2004). Exposure to appetitive food stimuli markedly activates the human brain. *NeuroImage, 21(4)*, 1790–1797.
- Wardle, J., & Huong, G. (2000). An experimental investigation of the influence of health information on children's taste preferences. *Health Education Research, 15(1)*, 39–44.
- Weijzen, P. L. G., de Graaf, C., & Dijksterhuis, G. B. (2008). Discrepancy between Snack Choice Intentions and Behavior. *Journal of Nutrition Education and Behavior, 40(5)*, 311–316.
- Weijzen, P. L. G., de Graaf, C., & Dijksterhuis, G. B. (2009). Predictors of the consistency between healthy snack choice intentions and actual behaviour. *Food Quality and Preference, 20(2)*, 110–119.
- Werle, C. O. C., Trendel, O., & Ardito, G. (2013). Unhealthy food is not tastier for everybody : The “healthy = tasty” French intuition. *Food Quality and Preference, 28*, 116–121.
- Wilson, T. D., Kraft, D., & Lisle, D. J. (1990). The Disruptive Effects of Self-Reflection: Implications For Survey Research. In M. E. Goldberg, G. Gorn, & R. W. Pollay (Eds.), *NA - Advances in Consumer Research* (Vol. 17, pp. 212–216). Provo, UT: Association for Consumer Research.
- Zhao, Y., Fang, Y., Jin, Y., Huang, J., Bao, S., Fu, T., ... Zhao, H. (2015). Pilot-scale comparison of four duckweed strains from different genera for potential application in nutrient recovery from wastewater and valuable biomass production. *Plant Biol, 17(Suppl 1)*, 82–90.
- Ziegler, P., Adelman, K., Zimmer, S., Schmidt, C., & Appenroth, K. J. (2015). Relative in vitro growth rates of duckweeds (Lemnaceae) - the most rapidly growing higher plants. *Plant Biology, 17(1)*, 33–41.

9. Appendices

Appendix I – Carbon footprint of what you eat



Source: "AFP – Carbon footprint of what you eat," (2012)

1. Doel van het interview

De interviews worden gehouden om impressies en meningen te verzamelen over eendenkroos als humane voeding. De interviews zijn exploratief omdat nog niet bekend is hoe mensen uit de Westerse wereld tegen dit nieuwe product aankijken. Daarnaast is het doel een variatie aan categorieën te identificeren waarin men dit nieuwe product zou plaatsen en te zien aan welke analogieën gedacht worden.

2. Aanpak interview

Mannelijke en vrouwelijke Nederlanders (n=10) tussen de 18 en 65 jaar worden geworven om deel te nemen aan semi-gestructureerde interviews. Mensen met voedselallergieën of -intoleranties zijn uitgesloten van deelname, omdat dit de variatie aan categorieën en analogieën kan beperken. Hoewel semi-gestructureerde interviews doorgaans concrete onderwerpen en vragen bevatten, moeten deze geen imposante meningen weerspiegelen. Alle vragen zijn open en neutraal geformuleerd, zodat de respondent gemakkelijk zijn of haar ideeën en meningen kan delen. Om de antwoorden van de respondenten te verduidelijken en/of te verdiepen wordt gebruik gemaakt van doorvraagmethodes. De interviews worden in het Nederlands gehouden, omdat ervan uitgegaan wordt dat dit de moedertaal van de respondenten is. Elk interview wordt opgenomen met behulp van een spraakrecorder, zodat hier achteraf een rapportage over gemaakt kan worden. Verkregen data van deze interviews zal zodoende bijdragen aan het opzetten van de survey over de acceptatie van eendenkroos.

3. Algemene instructies voor de interviewer

- Vragen die gesteld worden aan de respondenten staan in normaal lettertype. Overige instructies voor de interviewer staan schuingedrukt;
- Streef naar een ontspannen en aangenaam gesprek. De interviewer dient zelf aan te voelen (vraagt er desnoods naar) wanneer de respondenten met 'u' of met 'je' aangesproken worden;
- Voor dit interview is het van belang dat de respondenten gestimuleerd worden om hardop na te denken. Dit verhoogt de kans op het identificeren van een variatie aan associaties die men kan hebben met eendenkroos als voedsel;
- Het interview duurt maximaal een half uur.

Inventarisatie

- Spraakrecorder (batterij en geheugencapaciteit vooraf controleren);
- Afbeeldingen van eendenkroos (plant), geplastificeerd;
- Interview Protocol;
- Horloge om de tijd in de gaten te houden.

4. Het interview

Deel A: Kennismaking

Introduceer jezelf. Geef leeftijd en studiedomein aan binnen de WUR.

Dit onderzoek is onderdeel van een project over eendenkroos. Binnen dit project doe ik mijn masterscriptie over dit deelonderwerp. Hierbij wordt de mening en houding van consumenten ten opzichte van voeding verkend.

Als er verder gevraagd wordt naar het doel van het onderzoek, vertel dat je dit nog niet bekend kan maken.

Het is voor mij prettig om ons gesprek op te nemen met een spraakrecorder. Gaat u hier akkoord mee? De uitkomsten van het interview worden anoniem verwerkt; uit de rapportage zal uw identiteit niet af te leiden zijn. Uw deelname aan het interview is vrijwillig, wat betekent dat u altijd mag besluiten het gesprek af te breken.

Het interview zal ongeveer een half uur duren.

Laat de respondent zichzelf introduceren. Hiermee leeftijd en studie- of werkdomein achterhalen. Als dit niet spontaan komt:

- Om een goed beeld te hebben van de diversiteit van onze groep respondenten is het handig om [*..hier iets noemen uit hun introductie..*] te weten, maar ook uw leeftijd en uw studie- of werkdomein. Kunt u mij deze vertellen?

Deel B: Eendenkroos als voedsel

- Weet u wat eendenkroos is?

Toon de afbeelding van eendenkroos en leg uit dat het een waterplant is.

- Heeft u wel eens gehoord dat eendenkroos ook verbouwd/gekweekt wordt?
→ Zo ja, wat weet u hierover en hoe weet u dit?
→ Zo nee, hoe stelt u zich dat voor?
→ Weet u waarom eendenkroos verbouwd/gekweekt wordt?

Leg uit dat er momenteel aan gewerkt wordt om eendenkroos te verbouwen voor menselijke consumptie.

- Wat is uw eerste reactie daarop?
- Hoe staat u tegenover het eten van eendenkroos?
 - Wat weet u al over het eten van eendenkroos door mensen?
 - Waarom zou u eendenkroos wel of niet eten? Voordelen/nadelen? *Hier goed doorvragen.*
 - Waar zou u eendenkroos mee vergelijken op het gebied van voedselproducten?
 - Kunt u eendenkroos in een voedselcategorie plaatsen?
 - Stel, u loopt in een supermarkt, in welk schap zou u dit product tegenkomen?
- U denkt [.....] over eendenkroos als voedsel. Kunt u zich voorstellen dat anderen er anders over denken? Zo ja, op welke manier? Wat maakt hen verschillend van u?
- Hoe staat u tegenover het proberen van nieuwe voedselproducten in het algemeen?
 - Wanneer denkt u dat een voedselproduct een succes is in Nederland?
 - Heeft u wel eens gehoord van een voedselproduct dat in Nederland geen succes is? Zo ja, van wie, en wat was je reactie? Hoe vergelijkt u dit met eendenkroos?
- Het zou kunnen dat de naam 'eendenkroos' van het product de kans op succes in Nederland verlaagt.
 - Hoe zou u 'eendenkroos' anders noemen om positieve associaties op te wekken bij dit product?
- Stel u heeft een zak vol eendenkroos tot uw beschikking in de keuken. Wat zou u hiermee

klaarmaken?

- Waarom heeft u hiervoor gekozen?
- Hoe zou u dit gerecht noemen?
- Voor welke gelegenheid zou u dit gerecht maken?
- Zou u dit aan gasten voorzetten?

- Dit zijn de vragen die ik voorbereid had; wilt u nog iets vragen of opmerken rondom eendenkroos?

Na afloop van het interview wordt de respondent nogmaals bedankt voor de medewerking en uitleggen waarom eendenkroos interessant als humane voeding, o.a.:

- Eiwitrijke plant (95% water → 40% eiwit uit 5% droge stof)
- Snelle groei plant (snelste van bloeiende planten), zonder hulp van meststoffen (eigen biologisch filtratiesysteem)
- Kan in een waterreservoir gekweekt worden, geen gebruik van landbouwgronden
- Minimale 'carbon footprint' → 0.4 kg CO₂ equivalent geproduceerd per 1 kg eendenkroos. (ter vergelijking: 0.9 kg voor linzen en 39.2 kg voor lamsvlees)

Deel C: Doorvraagmethodes

Voor duidelijkheid:

- Wat bedoelt u hiermee?
- Kunt u een voorbeeld noemen?
- Wat is uw mening daarover?
- Ik weet niet zeker of ik begrijp wat u bedoelt.
- De reactie van de deelnemer herhalen ('wat bedoelde je toen je zei dat...')

Voor diepgang:

- Heeft u hier nog iets aan toe te voegen?
- Kunt u mij hier meer over vertellen?

Overige technieken:

- De vraag herhalen;
- De reactie van de deelnemer samenvatten en laten bevestigen ('als ik u goed begreep zei u net dat...');
- Gesprek terugsturen: 'Als ik het goed onthouden heb zei u net dat...' 'Daar zou ik graag nog wat verder op in willen gaan';
- Een paar secondes pauzeren en aandachtig luisteren (open lichaamshouding);
- Bevestigend hummen;
- Beloon gedetailleerde antwoorden door te reageren met bijvoorbeeld: 'bedankt, dit soort informatie komt van pas'; 'ik begrijp het, bedankt voor het delen'; of 'deze details ga ik even opschrijven'.

5. Na het interview

Na het interview controleren of de spraakrecorder alles heeft opgenomen en de belangrijkste impressies noteren van het interview.

6. Afbeeldingen eendenkroos

Beide afbeeldingen zijn verkregen van Wikipedia; rechtenvrije foto's.



https://upload.wikimedia.org/wikipedia/commons/1/19/Kotvice_Nov%C3%BD_Rybn%C3%ADk_%285%29.JPG



https://upload.wikimedia.org/wikipedia/commons/0/03/A_pond_at_Hatfield_Park_Essex_England.JPG

Deelnemers gezocht Eendenkroos vragenlijst

Graag nodigen we u uit om deel te nemen aan een vragenlijst over eendenkroos als voedsel voor mensen. Het gaat hierbij om uw mening. De vragenlijst is onderdeel van wetenschappelijk onderzoek uitgevoerd door Wageningen UR. De onderzoeksresultaten zullen niet gebruikt worden voor commerciële doeleinden.

Wat wordt er van u verwacht?

Wij vragen u om een digitale vragenlijst in te vullen; het invullen hiervan kost ongeveer 15 minuten.

U komt in aanmerking voor deelname wanneer:

- U 18 jaar of ouder bent.
- U een goede beheersing van de Nederlandse taal heeft.

Wat staat er voor u tegenover?

- U maakt kans op één van de vijf VVV bonnen ter waarde van €25, die verloot worden onder alle deelnemers.
- U levert een belangrijke bijdrage aan wetenschappelijk onderzoek.
- U wordt geïnformeerd over de onderzoeksresultaten.

Hoe kan ik deelnemen?

U kunt deelnemen door via deze link de vragenlijst in te vullen:

https://wur.az1.qualtrics.com/SE/?SID=SV_1RKXHBSyLxxHIMV

Inschrijven kan t/m zondag 12 maart.

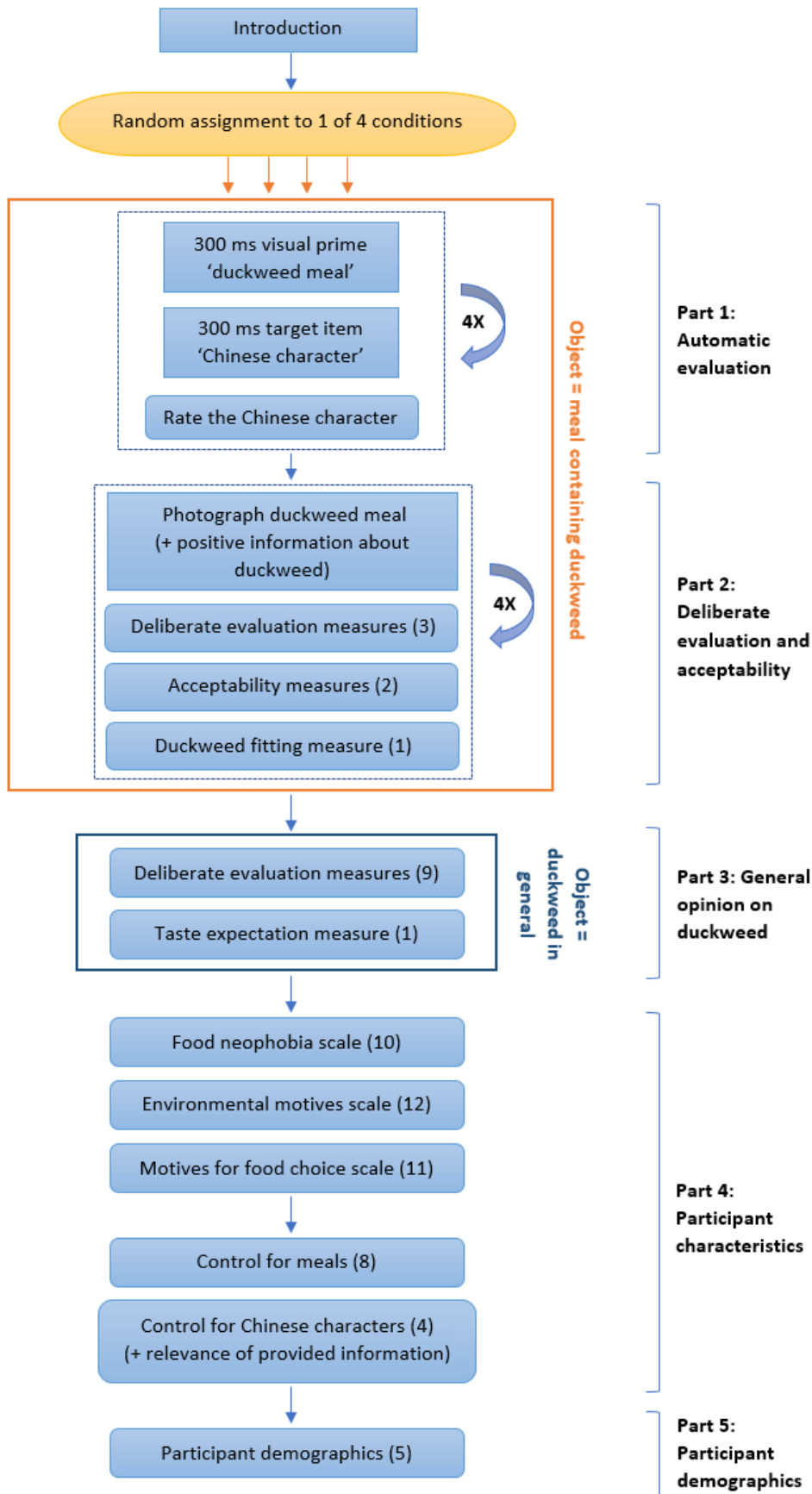
Contact

Heeft u vragen, neem dan contact op met het onderzoeksteam via smaakonderzoek@wur.nl.

Met vriendelijke groet,

Myrthe de Beukelaar en Milou Vrijhof

Appendix IV – Survey flowchart



Appendix V – Survey questions

Hartelijk dank voor uw deelname aan deze vragenlijst van Wageningen UR over de mening en houding van consumenten ten opzichte van eendenkroos. De vragenlijst bestaat uit vijf onderdelen. Voor alle vragen die worden gesteld, geldt dat wij geïnteresseerd zijn in uw mening. Er zijn dus geen goede of foute antwoorden.

De totale duur voor het invullen van de vragenlijst is ongeveer 15 minuten.

Deelname aan deze vragenlijst is vrijwillig. U mag dus op elk moment stoppen als u dat wilt. De gegevens die we verzamelen zijn niet voor commerciële doeleinden en worden anoniem (zonder naam) verwerkt.

Bij vermelding van uw e-mailadres in het laatste deel van de vragenlijst maakt u kans op één van de vijf VVV bonnen ter waarde van €25,- die verloot worden onder alle deelnemers. Tevens wordt u dan op de hoogte gesteld van de onderzoeksresultaten.

Let op: om de studie goed te laten verlopen is het belangrijk om eerst de afbeeldingen te laden. Daarom vragen wij u om geduld te hebben tot de '>>' knop onderaan zichtbaar is. Het kan helaas nog steeds voorkomen dat in het eerste deel van de vragenlijst niet alle afbeeldingen goed geladen worden. Ziet u geen afbeelding, dan kunt u dit aangeven en doorgaan met de vragenlijst.

Zodra de teller op 0 is, is de '>>' knop zichtbaar en kunt u beginnen met de vragenlijst. Veel plezier en succes.

Deel 1

In dit deel krijgt u meerdere malen **kort** twee afbeeldingen te zien. Daarna krijgt u de tijd om **de tweede afbeelding** te beoordelen op een 7-punts schaal. De eerste afbeelding mag u daarbij vergeten.

Het gaat hierbij om uw eigen mening, dus er zijn geen goede of foute antwoorden.

Klik op '>>' om te starten met deel 1.

Dit gerecht bevat eendenkroos.



Eendenkroos is eiwitrijk en milieuvriendelijk.

青

Beoordeel het Chinese teken.

Ik ervoer het Chinese teken als...

- Erg onaangenaam
 - Onaangenaam
 - Een beetje onaangenaam
 - Niet onaangenaam/niet aangenaam
 - Een beetje aangenaam
 - Aangenaam
 - Erg aangenaam
 - Afbeelding niet gezien
-



龙

Beoordeel het Chinese teken.

Ik ervoer het Chinese teken als...

- Erg onaangenaam
 - Onaangenaam
 - Een beetje onaangenaam
 - Niet onaangenaam/niet aangenaam
 - Een beetje aangenaam
 - Aangenaam
 - Erg aangenaam
 - Afbeelding niet gezien
-

Dit gerecht bevat eendenkroos.



Eendenkroos is eiwitrijk en milieuvriendelijk.

辰

Beoordeel het Chinese teken.

Ik ervoer het Chinese teken als...

- Erg onaangenaam
- Onaangenaam
- Een beetje onaangenaam
- Niet onaangenaam/niet aangenaam
- Een beetje aangenaam
- Aangenaam
- Erg aangenaam
- Afbeelding niet gezien



Beoordeel het Chinese teken.

Ik ervoer het Chinese teken als...

- Erg onaangenaam
- Onaangenaam
- Een beetje onaangenaam
- Niet onaangenaam/niet aangenaam
- Een beetje aangenaam
- Aangenaam
- Erg aangenaam
- Afbeelding niet gezien

Deel 2

U krijgt nu de afbeeldingen van gerechten met eendenkroos wat langer te zien. Eendenkroos is een waterplant met kleine blaadjes. In het dagelijks leven ziet u vaak dat eendenkroos een groen tapijt vormt op het water.

Wij vragen u om elk gerecht te beoordelen op verschillende aspecten. Ook hier gaat het om uw eigen mening, dus er zijn geen goede of foute antwoorden.

Klik op '>>' om te starten met deel 2.



U ziet hier een broodje met eendenkroos. Eendenkroos is een waterplant met kleine blaadjes. In het dagelijks leven ziet u vaak dat eendenkroos een groen tapijt vormt op het water.

Eendenkroos is **eiwitrijk**, wat het waardevol maakt als menselijk voedsel. Voldoende eiwit eten is belangrijk voor een goede gezondheid. Als eendenkroos onder optimale omstandigheden gekweekt wordt, kan het tot wel 40% aan eiwit bevatten. Dit eiwit kan relatief makkelijk opgenomen worden door het lichaam.

Daarnaast is het kweken van eendenkroos **milieuvriendelijk**, omdat het snel groeit en geen intensieve landbouw of veeteelt vereist. Eendenkroos kan bijdragen aan de zuivering van (afval)water en kan zonder hulp van meststoffen gekweekt worden in waterbakken. De ecologische voetafdruk van eendenkroos is minimaal: per 1kg eendenkroos wordt ongeveer 0.4kg CO2 equivalent geproduceerd. Ter vergelijking, per 1kg rundvlees wordt ongeveer 27kg CO2 equivalent geproduceerd.

Geef uw oordeel over dit broodje met eendenkroos.

Ik vind dit broodje met eendenkroos...

	1	2	3	4	5	6	7
Heel erg negatief:Heel erg positief	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg zinloos:Heel erg zinvol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg onsmakelijk:Heel erg smakelijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Stel u bent boodschappen aan het doen. De prijs van dit broodje met eendenkroos is gelijk aan hetzelfde broodje zonder eendenkroos. Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik ben bereid dit broodje met eendenkroos te kopen.

- Helemaal mee oneens
- Mee oneens
- Een beetje mee oneens
- Niet mee oneens/niet mee eens
- Een beetje mee eens
- Mee eens
- Helemaal mee eens

Stel u bent bij een gratis proefsessie. Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik ben bereid dit broodje met eendenkroos te proberen.

- Helemaal mee oneens
- Mee oneens
- Een beetje mee oneens
- Niet mee oneens/niet mee eens
- Een beetje mee eens
- Mee eens
- Helemaal mee eens

Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik vind eendenkroos goed passen bij belegde broodjes.

- Helemaal mee oneens
 - Mee oneens
 - Een beetje mee oneens
 - Niet mee oneens/niet mee eens
 - Een beetje mee eens
 - Mee eens
 - Helemaal mee eens
-



U ziet hier een stampot met eendenkroos. Eendenkroos is een waterplant met kleine blaadjes. In het dagelijks leven ziet u vaak dat eendenkroos een groen tapijt vormt op het water.

Eendenkroos is **eiwitrijk**, wat het waardevol maakt als menselijk voedsel. Voldoende eiwit eten is belangrijk voor een goede gezondheid. Als eendenkroos onder optimale omstandigheden gekweekt wordt, kan het tot wel 40% aan eiwit bevatten. Dit eiwit kan relatief makkelijk opgenomen worden door het lichaam.

Daarnaast is het kweken van eendenkroos **milieuvriendelijk**, omdat het snel groeit en geen intensieve landbouw of veeteelt vereist. Eendenkroos kan bijdragen aan de zuivering van (afval)water en kan zonder hulp van meststoffen gekweekt worden in waterbakken. De ecologische voetafdruk van eendenkroos is minimaal: per 1kg eendenkroos wordt ongeveer 0.4kg CO₂ equivalent geproduceerd. Ter vergelijking, per 1kg rundvlees wordt ongeveer 27kg CO₂ equivalent geproduceerd.

Geef uw oordeel over deze stampot met eendenkroos.

Ik vind deze stampot met eendenkroos...

	1	2	3	4	5	6	7
Heel erg negatief:Heel erg positief	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg zinloos:Heel erg zinvol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg onsmakelijk:Heel erg smakelijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Stel u bent boodschappen aan het doen. De prijs van deze stampot met eendenkroos is gelijk aan dezelfde stampot zonder eendenkroos. Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik ben bereid deze stampot met eendenkroos te kopen.

- Helemaal mee oneens
- Mee oneens
- Een beetje mee oneens
- Niet mee oneens/niet mee eens
- Een beetje mee eens
- Mee eens
- Helemaal mee eens

Stel u bent bij een gratis proefsessie. Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik ben bereid deze stampot met eendenkroos te proberen.

- Helemaal mee oneens
- Mee oneens
- Een beetje mee oneens
- Niet mee oneens/niet mee eens
- Een beetje mee eens
- Mee eens
- Helemaal mee eens

Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik vind eendenkroos goed passen bij stampotten.

- Helemaal mee oneens
 - Mee oneens
 - Een beetje mee oneens
 - Niet mee oneens/niet mee eens
 - Een beetje mee eens
 - Mee eens
 - Helemaal mee eens
-



U ziet hier een salade met eendenkroos. Eendenkroos is een waterplant met kleine blaadjes. In het dagelijks leven ziet u vaak dat eendenkroos een groen tapijt vormt op het water.

Eendenkroos is **eiwitrijk**, wat het waardevol maakt als menselijk voedsel. Voldoende eiwit eten is belangrijk voor een goede gezondheid. Als eendenkroos onder optimale omstandigheden gekweekt wordt, kan het tot wel 40% aan eiwit bevatten. Dit eiwit kan relatief makkelijk opgenomen worden door het lichaam.

Daarnaast is het kweken van eendenkroos **milieuvriendelijk**, omdat het snel groeit en geen intensieve landbouw of veeteelt vereist. Eendenkroos kan bijdragen aan de zuivering van (afval)water en kan zonder hulp van meststoffen gekweekt worden in waterbakken. De ecologische voetafdruk van eendenkroos is minimaal: per 1kg eendenkroos wordt ongeveer 0.4kg CO₂ equivalent geproduceerd. Ter vergelijking, per 1kg rundvlees wordt ongeveer 27kg CO₂ equivalent geproduceerd.

Geef uw oordeel over deze salade met eendenkroos.

Ik vind deze salade met eendenkroos...

	1	2	3	4	5	6	7
Heel erg negatief:Heel erg positief	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg zinloos:Heel erg zinvol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg onsmakelijk:Heel erg smakelijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Stel u bent boodschappen aan het doen. De prijs van deze salade met eendenkroos is gelijk aan dezelfde salade zonder eendenkroos. Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik ben bereid deze salade met eendenkroos te kopen.

- Helemaal mee oneens
- Mee oneens
- Een beetje mee oneens
- Niet mee oneens/niet mee eens
- Een beetje mee eens
- Mee eens
- Helemaal mee eens

Stel u bent bij een gratis proefsessie. Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik ben bereid deze salade met eendenkroos te proberen.

- Helemaal mee oneens
- Mee oneens
- Een beetje mee oneens
- Niet mee oneens/niet mee eens
- Een beetje mee eens
- Mee eens
- Helemaal mee eens

Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik vind eendenkroos goed passen bij salades.

- Helemaal mee oneens
- Mee oneens
- Een beetje mee oneens
- Niet mee oneens/niet mee eens
- Een beetje mee eens
- Mee eens
- Helemaal mee eens



U ziet hier een quiche met eendenkroos. Eendenkroos is een waterplant met kleine blaadjes. In het dagelijks leven ziet u vaak dat eendenkroos een groen tapijt vormt op het water.

Eendenkroos is **eiwitrijk**, wat het waardevol maakt als menselijk voedsel. Voldoende eiwit eten is belangrijk voor een goede gezondheid. Als eendenkroos onder optimale

omstandigheden gekweekt wordt, kan het tot wel 40% aan eiwit bevatten. Dit eiwit kan relatief makkelijk opgenomen worden door het lichaam.

Daarnaast is het kweken van eendenkroos **milieuvriendelijk**, omdat het snel groeit en geen intensieve landbouw of veeteelt vereist. Eendenkroos kan bijdragen aan de zuivering van (afval)water en kan zonder hulp van meststoffen gekweekt worden in waterbakken. De ecologische voetafdruk van eendenkroos is minimaal: per 1kg eendenkroos wordt ongeveer 0.4kg CO2 equivalent geproduceerd. Ter vergelijking, per 1kg rundvlees wordt ongeveer 27kg CO2 equivalent geproduceerd.

Geef uw oordeel over deze quiche met eendenkroos.

Ik vind deze quiche met eendenkroos...

	1	2	3	4	5	6	7
Heel erg negatief:Heel erg positief	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg zinloos:Heel erg zinvol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg onsmakelijk:Heel erg smakelijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Stel u bent boodschappen aan het doen. De prijs van deze quiche met eendenkroos is gelijk aan dezelfde quiche zonder eendenkroos. Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik ben bereid deze quiche met eendenkroos te kopen.

- Helemaal mee oneens
- Mee oneens
- Een beetje mee oneens
- Niet mee oneens/niet mee eens
- Een beetje mee eens
- Mee eens
- Helemaal mee eens

Stel u bent bij een gratis proefsessie. Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik ben bereid deze quiche met eendenkroos te proberen.

- Helemaal mee oneens
- Mee oneens
- Een beetje mee oneens
- Niet mee oneens/niet mee eens
- Een beetje mee eens
- Mee eens
- Helemaal mee eens

Geef aan in hoeverre u het eens bent met de volgende stelling:

Ik vind eendenkroos goed passen bij hartige taarten.

- Helemaal mee oneens
- Mee oneens
- Een beetje mee oneens
- Niet mee oneens/niet mee eens
- Een beetje mee eens
- Mee eens
- Helemaal mee eens

Deel 3

Nu krijgt u een aantal vragen over eendenkroos als voedsel voor mensen in het algemeen.

Ik vind eendenkroos als voedsel voor mensen...

	1	2	3	4	5	6	7
Heel erg negatief:Heel erg positief	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg zinloos:Heel erg zinvol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg onsmakelijk:Heel erg smakelijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg vreemd:Heel erg vertrouwd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg onnatuurlijk:Heel erg natuurlijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg onveilig:Heel erg veilig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg toegankelijk:Heel erg exclusief	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg ongezond:Heel erg gezond	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heel erg milieuonvriendelijk:Heel erg milieuvriendelijk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

De smaak van eendenkroos is volgens mij...

	1	2	3	4	5	6	7
Helemaal niet uitgesproken:Heel erg uitgesproken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Deel 4

Nu krijgt u een aantal vragen over uw eetgedrag en beweegredenen in het algemeen.

Geef voor de volgende stellingen aan in hoeverre u het hiermee eens bent.

	Helemaal mee oneens	Mee oneens	Een beetje mee oneens	Niet mee oneens/niet mee eens	Een beetje mee eens	Mee eens	Helemaal mee eens
Ik probeer constant nieuw en verschillend voedsel.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik vertrouw geen nieuw voedsel.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Als ik niet weet uit welk voedsel de maaltijd bestaat, probeer ik het niet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik houd van voedsel uit diverse landen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Buitenlands voedsel ziet er te vreemd uit om te eten.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tijdens feestjes probeer ik nieuw voedsel.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben bang om voedsel te eten, dat ik nooit eerder heb gehad.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben erg kieskeurig over het voedsel dat ik eet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik eet bijna alles.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik probeer graag nieuwe buitenlandse restaurants.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Over de hele wereld zijn mensen in het algemeen bezorgd over milieuproblemen vanwege de gevolgen van het aantasten van de natuur. Welke gevolgen men zich het meest zorgen over maakt, verschilt echter per persoon. Geef hieronder aan hoe belangrijk u de verschillende gevolgen vindt.

Ik ben bezorgd over milieuproblemen vanwege de gevolgen voor...

	Helemaal mee oneens	Mee oneens	Een beetje mee oneens	Niet mee oneens/niet mee eens	Een beetje mee eens	Mee eens	Helemaal mee eens
Planten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het leven in de zee	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vogels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dieren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijzelf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn levensstijl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn gezondheid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn toekomst	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mensen in mijn samenleving	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alle mensen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kinderen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Toekomstige generaties	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Geef aan in hoeverre u het eens bent met onderstaande stellingen.

Als ik voedingsmiddelen eet, vind ik het belangrijk dat het product...

	Helemaal mee oneens	Mee oneens	Een beetje mee oneens	Niet mee oneens/niet mee eens	Een beetje mee eens	Mee eens	Helemaal mee eens
...gezond is.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...veilig is.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...natuurlijk is.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...gemakkelijk te bereiden/te kopen is.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...betaalbaar is.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...eerlijk geproduceerd (fairtrade) is.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...sensorisch aantrekkelijk is (goede smaak, geur en uiterlijk).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...bekend voor me is.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...me een goed gevoel geeft.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...milieuvriendelijk is.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...goed voor mijn lijn (gewicht) is.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Geef per productsoort aan in hoeverre u het hiermee eens bent.

Ik ben positief over...

	Helemaal mee oneens	Mee oneens	Een beetje mee oneens	Niet mee oneens/niet mee eens	Een beetje mee eens	Mee eens	Helemaal mee eens
Belegde broodjes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stamppotten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hartige taarten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Salades	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cakeproducten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gebak en zoete taarten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Groentesappen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hollandse kaasproducten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

U heeft uw mening gegeven over diverse gerechten met eendenkroos en u heeft hierbij informatie gekregen over de voordelen van eendenkroos als voedsel voor mensen. Indien u zich dit kunt herinneren, welke informatie was het meest relevant voor u?

- Ik kan me niets (relevants) herinneren.
- Ik vond de volgende informatie relevant voor mijn beoordeling: _____

U heeft Chinese tekens beoordeeld aan het begin van de vragenlijst. Hoe komen de Chinese tekens nu op u over?



Ik ervaar dit Chinese teken als...

- Heel erg onaangenaam
- Onaangenaam
- Een beetje onaangenaam
- Niet onaangenaam/niet aangenaam
- Een beetje aangenaam
- Aangenaam
- Heel erg aangenaam

Eventuele toelichting: _____



Ik ervaar dit Chinese teken als...

- Heel erg onaangenaam
- Onaangenaam
- Een beetje onaangenaam
- Niet onaangenaam/niet aangenaam
- Een beetje aangenaam
- Aangenaam
- Heel erg aangenaam

Eventuele toelichting: _____

辰

Ik ervaar dit Chinese teken als...

- Heel erg onaangenaam
- Onaangenaam
- Een beetje onaangenaam
- Niet onaangenaam/niet aangenaam
- Een beetje aangenaam
- Aangenaam
- Heel erg aangenaam

Eventuele toelichting: _____

虎

Ik ervaar dit Chinese teken als...

- Heel erg onaangenaam
- Onaangenaam
- Een beetje onaangenaam
- Niet onaangenaam/niet aangenaam
- Een beetje aangenaam
- Aangenaam
- Heel erg aangenaam

Eventuele toelichting: _____

Deel 5

Tot slot volgen nog een aantal achtergrondvragen.

Wat is uw geslacht?

- Man
- Vrouw
- Anders / wil niet zeggen

Wat is uw leeftijd? _____

Wat is uw hoogst voltooide opleiding?

- Basisonderwijs / Lagere school
- VMBO / MAVO / LBO / LTS / Huishoudschool / Ambachtschool
- Middelbaar beroepsonderwijs (MBO) [MTS, MEAO]
- Hoger voortgezet onderwijs (HAVO of VWO) [MMS, HBS]
- Hoger beroepsonderwijs (HBO) [HTS, HEAO] of wetenschappelijk onderwijs (WO)

Heeft u voedselallergieën?

- Nee
- Ja, namelijk... _____

Heeft u andere dieetvoorschriften?

- Nee
- Vegetariër
- Veganist
- Anders, namelijk... _____

Wilt u kans maken op één van de vijf VVV bonnen ter waarde van €25,- die verloot worden onder alle deelnemers? *Uw e-mailadres wordt enkel gebruikt voor deze loting en voor het verzenden van de onderzoeksresultaten.

- Nee, bedankt.
- Ja, mijn e-mailadres is: _____

Hartelijk dank voor uw deelname. Heeft u naar aanleiding van deze vragenlijst nog iets toe te voegen over eendenkroos? Laat het ons weten.
