Determinants of Insect Consumption and an Investigation of its Place among other Alternative Protein Sources in the Netherlands.

Amy Brekelmans

920925122130

December 2016

Determinants of Insect Consumption and an Investigation of its Place among other Alternative Protein Sources in the Netherlands

Wageningen University - Department of Social Sciences

MSc Thesis Chair Group: Strategic Communication

CPT-81333

MSc Thesis written by:

Amy Brekelmans

920925122130

MSc programme Applied Communication Science

Supervisors:

dr. B. C. Mulder

Strategic Communication Group (COM)

dr. ir. C.M.M. Lakemond

Agrotechnology & Food Sciences Group (FQD)

Examiner:

dr. P. M. Poortvliet

Strategic Communication Group (COM)

December, 2016

Abstract

As the human population grows, the production of sufficient protein from livestock, fish and poultry is becoming a big challenge to ensure food security. In spite of that, there still exists a dominant consumption pattern in the Netherlands in which meat is part of the daily diet with negative environmental, health and animal welfare consequences, as a result. This resulted in an exploration of the consumption of insects i.e. entomophagy, which has sustainable outcomes in the domains of health, environment, economy and animal welfare. Many previous studies focused on the potential of insects as a global solution for food and feed security but there has been no significant research done about the exact reasons, i.e. determinants, that makes individuals to consume insects in Europe. While the consumption of insects in many Asian countries is considered normal, many people in Europe refuse to eat them as the reminder of livingness or strange texture may trigger aversion. This makes consumer acceptance the biggest challenge. In this study a questionnaire (n = 151) was designed in which the determinants, as proposed by the Theory of Planned Behaviour by Ajzen (1985), and current behaviour of the respondents were measured. Regression analyses were carried out to test the predictor variables' effect on the dependent variables. Perceived behavioural control and subjective norms proved to be significant contributors to the intention to consume an insect burger. These variables explained 34% of the variance in the behaviour. The participants categorized the insect burger as their last choice in a comparison with a nut burger and a soy burger. According to the participants the insect burger lacked on affective characteristics such as taste and appearance, but was appraised for its cognitive characteristics such as the amount of protein and sustainability. It was concluded that interventions should target the identified significant determinants of the intention to consume an insect burger and that adjustments to increase its affective characteristics should be made. Examples of implementation, limitations of this study and suggestions for further research are provided.

Key words: Entomophagy, insect consumption, determinants, Theory of Planned Behaviour

Preface

Dear reader,

You're looking at my MSc thesis, written as part of my study programme Applied Communication Sciences at Wageningen University. After nine months of hard work, learning, making mistakes and improving myself, I hereby present the result. The establishment of this thesis could not have happened without the support of some special people.

First, I would like to thank Bob Mulder, my supervisor, for outstanding advice and feedback during these months. Your involvement, enthusiasm and quick responses on 'panic' emails were highly appreciated.

Second, I would like to thank Catriona Lakemond, my second supervisor, for great feedback from a different scientific perspective and your enthusiasm on the practical opportunities that this topic has to offer.

Third, I would like to thank Wout, my significant other, who kept believing in me and who had to listen to endless thoughts, insights and frustrations during these months. I could not have done this without your patience with me during my SPSS exploration and your fresh look and advice on this topic.

Last, but certainly not least, I would like to thank my friends and family who all offered to help me in any way that they could to help me succeed. Thank you all very much.

Please enjoy reading this thesis!

Amy Brekelmans

Veldhoven, 28 Novermber 2016

Table of contents

1. Introduction

1.1 Background

As the human population grows, solutions to the inevitable, global food shortage have gained much attention. The production of sufficient protein from livestock, fish and poultry will become a big challenge for the future as more and more countries adopt a Westernized dietary pattern as a standard (Van Huis, 2013). One could say that the consumption of meat or even killing animals is part of cultures and traditions (Calvert, 2014). In the Netherlands for instance, it is pretty common to consume meat on a daily basis. Dutch people enjoy their traditional piece of meat together with some vegetables and potatoes. The consequences of this dominant consumption pattern have been widely researched. These consequences can be categorized as environmental impacts, health impacts and animal welfare impacts.

According to Walsh (2013), livestock production constitutes 40% of global agricultural gross domestic product. It provides income for more than 1.3 billion people but on the other hand it uses one-third of the world's fresh water. "There may be no other single human activity that has a bigger impact on the planet than the raising of livestock." (Walsh, 2013, p.1). Livestock's contribution to global warming is about 18%, which is even a larger percentage than the transportation sector worldwide. Furthermore, livestock contributes in the amount of greenhouse gases up to 9% of total carbon dioxide emissions, 37% of methane and 65% of nitrous oxide. Rumen fermentation and livestock waste cause the release of greenhouse gases. The conversion of forested areas into grazing land, or the expansion of pasture at the expense of forests releases large amounts of carbon dioxide into the atmosphere. The total amount of carbon dioxide released also includes the releases as a result from fossil fuel consumption such as the use of tractors, fertilizers and the rest of the processing and transportation of livestock (feed). The nitrous oxide emissions come from the chemical fertilizers that are applied to feed crops. Furthermore, water used by the livestock sector is over 8% of the global human water use. The major part of this water is used for irrigation and a small part for product processing and livestock drinking. Increasing livestock also affects biodiversity as more and more forests with wildlife have to make place for grazing land with a decreasing biodiversity as a result (FAO, 2006).

Moreover, although red meat is a major source of iron, zinc, and vitamin B12 (Gallagher, 2015), the negative health effects of meat consumption are more prominent. Excess meat consumption is thought to have a positive association with the risk for obesity and resulting coronary heart diseases because meat is high in energy, cholesterol and saturated fats (Wang & Beydoun, 2009). Furthermore, The International Agency for Research on Cancer (IARC) recently published a report about the relation between the consumption of red and processed meat and the development of colorectal cancer in the human body (IARC, 2015). Processed meat refers here to meat that has been preserved by adding preservatives, or by salting, curing or smoking in order to extend its shelf life or to change its

taste (Gallagher, 2013). Processed meat includes bacon, sausages, hot dogs, salami and ham, as well as canned meat and meat-based sauces while red meat consists of pork, beef and lamb. Processed meat was classified as carcinogenic to humans and red meat as possibly carcinogenic to humans. The advice of the IARC was therefore that reducing the consumption of red meat and processed meat can reduce the risk of these cancers (IARC, 2015). Furthermore, the chemicals involved in the processing and cooking on high temperatures such as on a barbeque can create carcinogenic chemicals as well (Gallagher, 2015). Other major concerns related to meat consumption are animal welfare and food safety risks.

In order to make a profit and to comply with the growing demand of affordable meat, industrial agriculture denies animals to have a minimally decent life before they are killed. The mad cow disease in Europe shocked many people and it shattered beef's image as a safe and healthy food. Society learned that the mad cow disease was caused by the breeders that fed their cattle brains and nerve tissue of sheep and other slaughterhouse waste instead of grass (Singer, 2006).

Moreover, throughout the meat industry, animal welfare is highly problematic. Chickens are produced to gain weight as fast as possible in order to be slaughtered at only 45 days old while they have never even been outdoors. The same goes for pigs. Pregnant sows are kept in crates without any form of bedding and the crates are so narrow that they cannot even turn around. The piglets are taken away immediately after birth so that the sow can be made pregnant again and the sows never leave the shed until they are taken to slaughter (Singer, 2006). A lack of transparency in the industrial agriculture caused that the consumer is now very suspicious when it comes to matters of food safety and animal welfare (Malik, n.d.). Consumers are concerned that economic interests of the industrial agriculture have a much higher priority than human health and animal wellbeing (Van Kleef et al., 2006).

The rapidly growing world population, negative health and environmentally consequences and the prospects of a depletion of our resources requires a reconsideration of food patterns and in particular meat consumption (Van Huis, 2013). This has resulted in many forms of alternative protein sources to replace meat on the plate. These alternative protein sources are mostly vegetable based food products that contain proteins made from pulses, cereal protein or fungi (Hoek et al., 2011), but now also insects. The adoption of edible insects with the intention of a decreased conventional meat consumption in Europe would have beneficial and sustainable outcomes in the domains of health, environment, economy and animal welfare. Insects are therefore a promising solution for global food security.

The change of the dominant practice of eating meat to a society that consumes insects on a regularly basis is a transition that needs time in order for society to fully adopt the consumption. However, knowledge on what prevents or facilitates the widespread acceptance and consumption of alternative protein sources is scarce. In particular, little research was performed on the exact reasons for an individual to consume insects. To date, research has mainly focused on the potential of insects

as a global solution for food and feed security (Van Huis et al., 2013; Rumpold & Schlüter, 2012; Halloran et al., 2014). As a result, there has been no significant research done about the exact reasons, which are the foundation of intentional behaviour, that makes individuals to consume insects in Europe. Furthermore, insects are often not present in researches that try to identify the reasons of an individual to consume alternative protein sources (Leahy, Lyons & Tol, 2011; Hoek et al.[a], 2011; Hoek et al., 2011). This is a sign that even by many researchers insects are not fully understood or accepted as an alternative protein source yet. It is therefore necessary to fill this knowledge gap and to identify the reasons for the consumption of insects.

1.2 Aim and research questions

The aim of this study was to provide insight in the determinants of insect consumption and to contribute to making this field of research theoretically as well as practically more comprehensive. The results can be used in future campaigns to increase the number of people to adopt a consumption pattern in which protein may be provided by insect products. To support this aim, the following research questions were formulated:

1. What is known in the literature about alternative protein sources and insect consumption and their role in today's consumption behaviour?
2. What are determinants to consume insect products?
3. How are insect products reviewed in comparison with other alternative protein sources?

2. Literature study on alternative protein sources and insect consumption

2.1 Current consumption

The rapidly growing world population, negative health and environmentally consequences and the prospects of a depletion of our resources requires a reconsideration of food patterns and in particular meat consumption (Van Huis, 2013). This has resulted in many forms of alternative protein sources to replace meat on the plate. These alternative protein sources are mostly vegetable based food products that contain proteins made from pulses, cereal protein or fungi (Hoek et al., 2011). Because they are plant-based, they are much more sustainable than meat, animal-friendly and better for human health. Nowadays many alternative protein sources are available on the market varying from non-processed tofu to meat-looking and processed forms that contain vegetables (e.g. bean burgers, vegetable balls). There was a sharp increase in the sales of alternative protein sources around 2001 after a number of food safety crises in the meat sector in the Netherlands (De Steur, 2001; PVE, 2003; Sadler, 2004). However, after this period the market stabilized and eventually the sales of alternative protein sources decreased (Biologica, 2006). The quantity and frequency of consumption of alternative

protein sources in the Netherlands stayed on low levels. Nowadays, the market shares of alternative protein sources are no more than 1-2% of the total Dutch meat market. Besides that, a very dominant meat consumption exists in the Netherlands where conventional meat is consumed at least 3 times a week or more by 80% of the Dutch consumers (Anonymous, 2004)..

2.2 Benefits of alternative protein sources

According to a study of the Federation of American Societies for Experimental Biology (FASEB, 2016), it is found that the production of alternative protein sources generates approximately 10 times less GHG-emissions than producing comparable beef-based products.

Furthermore, since many meat products contain high levels of cholesterol and saturated fat, alternative protein sources are found to be much better for human health. Many products are, for instance, excellent sources of protein and fibres which are desirable in the human diet, and low in cholesterol and saturated fat (Kumar et al., 2015).

2.3 The challenge of consumer acceptance concerning alternative protein sources

The difficulty of consumer acceptance of alternative protein sources seems to be related to two aspects. First, a lot of alternative protein sources are relatively new. Soy products such as tofu and tempeh have been around since the 1960s but others such as Tivall and Quorn were introduced less than 25 years ago (Davies & Lightowler, 1998). The current non-users could be relatively food neophobic and could therefore reject such new products (Hoek et al., 2011).

Second, since meat is especially appreciated for its sensory characteristics (e.g. taste and texture), a large difference is perceived between the product quality of meat and alternative protein sources. Convenience, freshness and sensory characteristics are important for consumer's buying behaviour of meat and the consumer will look for these aspects when trying to substitute the meat for something else (Grunert, Bredahl, & Brunsø, 2004). A few studies found that alternative protein sources lacked in overall evaluation with in particular the sensory appreciation but also on price and luxury (Aiking et al., 2006; McIlveen et al., 1999). Alternative protein sources did, however, score higher than conventional meat on animal and environmental friendliness (Van der Lans, 2001).

2.4 Entomophagy

Insects are an excellent source of protein which makes them a great substitute for conventional meat as well. Entomophagy, the consumption of insects, is a promising and popular pattern of alternative protein source consumption in many Asian and African countries but it is still very rare in Western societies (Van Huis, 2013). According to Parry (2013), around 2 billion people on earth are familiar with the consumption of insects. Approximately 1900 insect species have been identified so

far to be fit for human consumption and are mainly eaten in developing countries (Van Huis, 2013). The most common insects consumed worldwide, as displayed in Figure 1, are beetles (31%), caterpillars (18%), bees/wasps/ants (14%), grasshoppers/locusts/crickets (13%), cicadas/leafhoppers/plant hoppers/scale insects/true bugs (10%), termites (3%), dragonflies (3%), flies (3%) and other species (5%) (Van Huis et al., 2013).

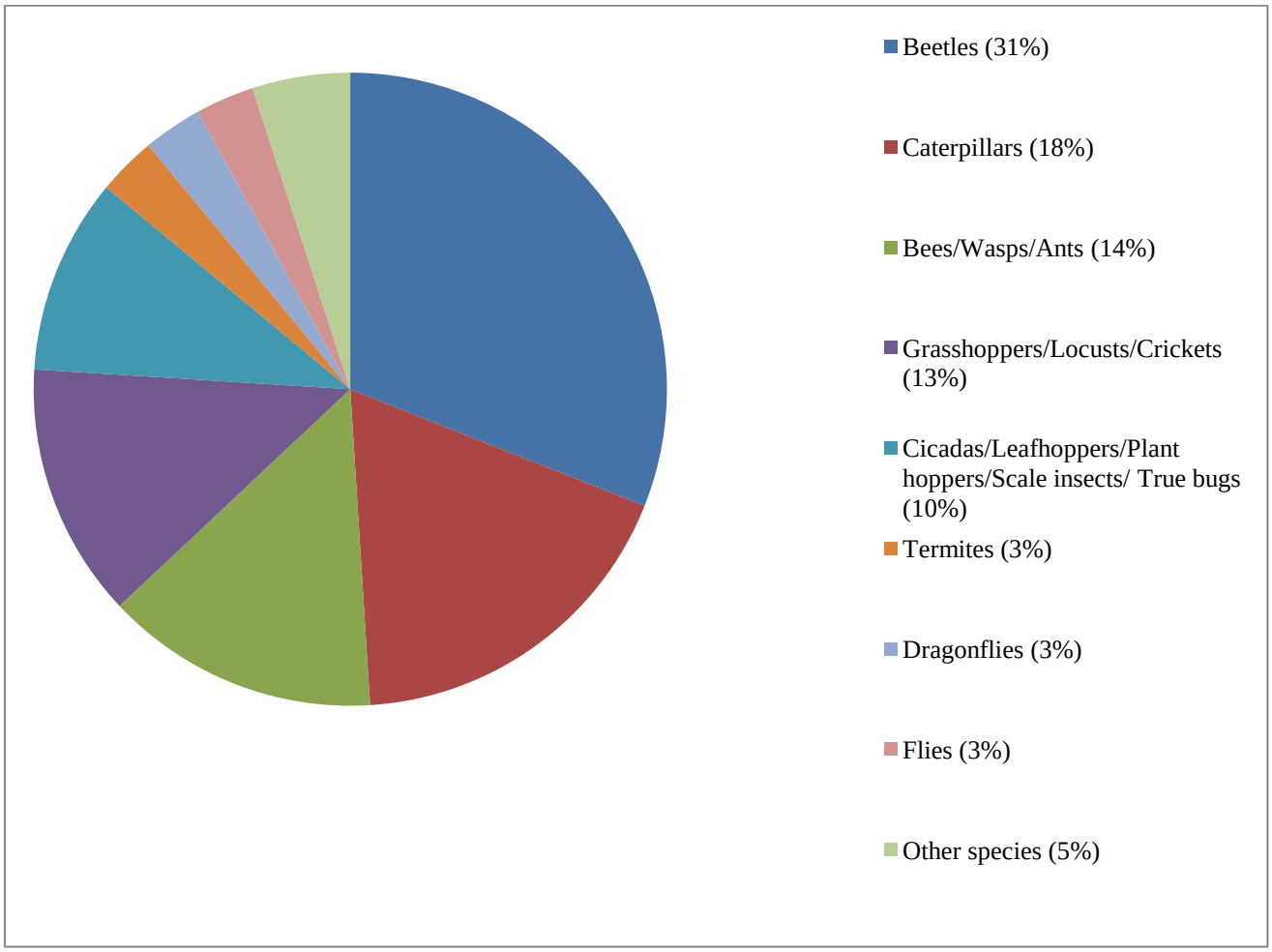


Figure 1. Most common consumed insects worldwide (Van Huis et al., 2013).

The insects that are available for consumption in the Netherlands are marketed as a delicacy and some stores have included mainly locusts and mealworms in their assortment. Furthermore, some chef cooks in the Netherlands like to prepare them in their dishes so they are available in a few restaurants and they are also available on some Internet shops that are specialized in exotic products (Schösler, de Boer & Boersema, 2011).

2.5 Benefits of entomophagy

The advantages of insect consumption have been widely researched and consists of four reasons why insects are called "The greenest meat on the planet" (Hollander, 2010).

First, insects are rich sources of protein, fats, calcium, vitamins, minerals and energy (Hollander, 2010). For example, 100 g of caterpillars provides 76% of the daily required amount of proteins and with nearly 100% of the daily recommended amount of vitamins (Agbidye, Ofuya, & Akindele, 2009). Furthermore, the energy content of insects is comparable with the energy content of meat, except for pork as it has a particularly high fat content (Rumpold & Schlüter, 2012).

Second, insects have a high feed-conversion efficiency, which is the animal's capacity to convert feed mass into increased body mass. Insects require far less feed than conventional livestock. For example, the production of 1 kg of crickets requires 1,7 kg of feed. When comparing this amount with the amount that cattle need, which is 10 kg for the production of 1 kg of beef, the difference is promising for enhancing global food security. When the numbers are adjusted for edible weight, the advantage of eating insects becomes even greater as up to 80% of a cricket is edible in comparison with the 40% for cattle. This means that crickets are 12 times more efficient in converting feed to meat than cattle. A side note to this information is that the feed-conversion efficiency for pork and chicken is higher than cattle, but still not as high as insects. An explanation for this high feed-conversion efficiency can be found in the nature of the insects because they are cold-blooded and do not require feed to maintain body temperature (Van Huis et al., 2013).

Third, when comparing the livestock sector with the production of insects as food, insects could serve as a more environmentally friendly alternative for the production of animal protein with respect to GHG and NH3. In the study of Oonincx et al. (2010), a comparison of selected edible insects with conventional livestock is based on a cost-benefit principle in which the environmental costs (GHG production) is linked to food production which is expressed per kg of mass gain (benefit). Furthermore, the NH3 emissions levels were lower for all insect species in comparison to conventional livestock.

Fourth, when looking at animal welfare, many insect species that can be used for human consumption are classified as 'social insects'. This means that these species are used to crowded conditions because they are used to live in colonies or to share a common nest. The lack of space that the current livestock experiences will therefore be less of a problem when keeping insects. They also reproduce on a much higher rate than livestock does which is again a guarantee for global food security. However, when looking at the practical side of edible insects in Europe, there is much space for improvement in the production of insects and the acceptance of edible insects as an alternative protein source (Meyer, 2005).

2.6 Entomophagy in practice

Up to now, the gathering of insects has been mainly done by manual labour in developing countries. The mass production of edible insects in Europe is therefore expensive with a price comparable to conventional meat (Rumpold & Schlüter, 2012). In order for insects to be more competitive with regard to conventional meat, it is necessary to develop rearing, harvest and post-harvest processing technologies for the automation of insect production to decrease its production costs. This also includes safety and quality monitoring to ensure food and feed safety (Rumpold & Schlüter, 2012). Moreover, although insects have few animal welfare issues, the extent to which insects experience pain or discomfort is unknown. Until conclusive proof that insects do or do not feel pain, insects should be given the benefit of the doubt with insect-killing methods that would reduce suffering such as freezing (Van Huis et al., 2013).

2.7 Challenge of consumer acceptance concerning entomophagy

The adoption of edible insects with the intention of a decreased conventional meat consumption in Europe would have beneficial and sustainable outcomes in the domains of health, environment, economy and animal welfare. Still, insects are an unlikely food source in the West, and there is much resistance concerning the consumption of insects (Scott-Thomas, 2014). While many people in Asian and African countries consider the consumption of entire insects as a delicacy, many people in Europe refuse to eat them as the reminder of livingness or strange texture may trigger aversion. This makes consumer acceptance the biggest challenge. Sushi however, was in the past refused by many as we were not used to the consumption of raw fish. Luckily, history has shown that dietary patterns change quickly, especially in this globalized world (Martins & Pliner, 2006).

3. Conceptual framework

3.1 The relevance of theory

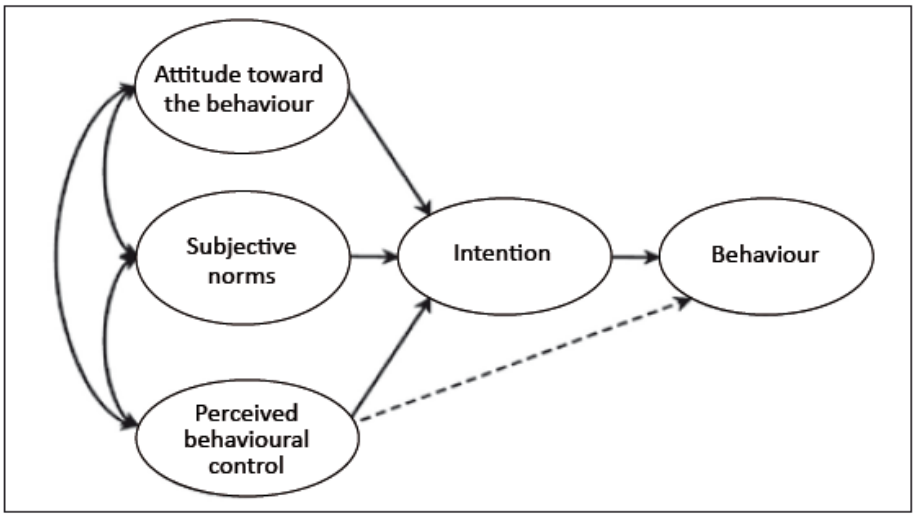
The determinants used in this study have proven their worth in numerous other studies based on the Theory of Planned Behaviour (Armitage & Conner, 2001; Guillaumie, Godin, & Vézina-Im, 2010; McDermott et al., 2015). Conducting this study in this field of work therefore contributes to the accumulation of knowledge in the social sciences. Looking at the Theory of Planned Behaviour, it can be concluded that theory was rarely used to design an intervention but more as background information to get an understanding of the behaviour and to develop measures of the behaviour. Ajzen tends to leave open the question as to how to change the behaviour but instead focuses on the identification of predictors of the behaviour in order to change these predictors (Hardeman, Johnston, Johnston, Bonetti, Wareham, & Kinmonth, 2002).

In contrast, there are three reasons to advocate for the use of theory in the design of interventions for behavioural change. First, a theory can only be tested and improved by evaluations of

interventions if those interventions are theoretically informed. Second, interventions are more likely to be successful by targeting causal determinants of the behaviour which requires an understanding of these determinants, i.e. theoretical mechanisms of change. Third, theory-based interventions create an understanding of what works and what does not work. It forms therefore a basis for the development of improved theory across different contexts (Michie, Johnston, Francis, Hardeman & Eccles, 2008)..

3.2 The Theory of Planned Behaviour

The Theory Of Planned Behaviour (TPB) (Ajzen, 1985) is a widely known model that is used to explain and predict behaviour, including nutritional behaviours. According to the TPB, human behaviour is the outcome of a reasoning process that creates a conscious intention to perform the particular behaviour. This makes intention the most important determinant of human behaviour (Ajzen, 1991). The TPB helps to understand how behaviour is established and how we can change the behaviour of an individual when behaviour is deliberative and planned. The TPB proposes that there are three determinants that guide people's intentions and resulting behaviours: attitudes, perceived behavioural control and subjective norms (Ajzen, 1991). All these determinants are thought to have their foundation in underlying beliefs held by the individual. An overview of these determinants can be found in Figure 2.



Source: Ajzen, I. (1991). Theory of planned behaviour. *Organizational Behaviour and Human Decision Processes, 50*, 182. http://dx.doi.org/10.1016/0749-5978(91)90020-T

Figure 2. Schematic overview of the determinants of the Theory of Planned Behaviour

The determinant 'attitude' is a result of beliefs about the outcomes of the behaviour and the resulting evaluation of those outcomes (Fishbein & Ajzen, 2010). In other words, it reflects the extent to which a behaviour is seen as favourable because of possible positive outcomes or possible negative outcomes. A favourable attitude towards insect consumption could arise from the belief that consuming insects is better for the environment in comparison with conventional meat.

The determinant 'subjective norms' represents the individuals' perception of social pressure to perform the particular behaviour. Subjective norms reflect an individual's beliefs about the peer-group of the individual and whether the others want the individual to perform the behaviour (injunctive norms). It also reflects the belief of the individual whether the others perform the behaviour themselves and the individual's motivation to comply to that behaviour (descriptive norms) (Fishbein & Ajzen, 2010). Favourable subjective norms towards insect consumption could be a norm concerning the consumption of environmental friendly products or a norm concerning the consumption of innovative and cool, new products.

The determinant 'perceived behavioural control' shows the level of ease or difficulty of performing the particular behaviour. Perceived behavioural control is a result of the beliefs of the individual about the power of internal and external factors to facilitate or interfere with the particular behaviour (Fishbein & Ajzen, 2010). It is assumed that past experiences and beliefs about factors such as skills, opportunities, relations or resources and the strength of these beliefs determine the perceived behavioural control to interfere or facilitate the behaviour (Dunn et al. 2011). A favourable perceived behavioural control towards insect consumption could arise, for example, when the individual knows where to get insect products, when the individual has the resources to buy them and when the individual knows how to prepare these products in a meal.

The TPB posits a causal link between attitudes, subjective norms, perceived behavioural control and behaviour that is mediated by intentions (Dunn et al. 2011). As a rule, the more favourable and stronger the attitudes and perceived norms with respect to a behaviour, and the greater the perceived behavioural control, the stronger should be one's intention to perform a particular behaviour (Ajzen, 1991). All these variables can be positively influenced in order to increase the intention. This intention along with the perception of capability of the behaviour, determines the likelihood of the individual to perform the behaviour. According to Ajzen (1985) all other variables such as environmental, biological, and social are hypothesized to be mediated by the determinants.

The TPB has been applied to predict the adoption of sustainable and healthy dietary patterns with predictive success. The meta-analysis of 161 studies of Armitage and Conner (2001) provides support for the efficacy of the TPB as a predictor of intentions and behaviour. The analysis also showed that perceived behavioural control independently predicted intentions and behaviour in many domains (Armitage & Conner, 2001). In a review of 23 studies, the determinants of fruit and vegetable intake were examined. Guillaumie, Godin, and Vézina-Im (2010) found that TPB is a preferred model to predict intentions and behaviour when it comes to fruit and vegetable intake. The most consistent variables explaining intention were beliefs about perceived behavioural control (capabilities), beliefs about attitudes (consequences) and beliefs about subjective norms (social influences). Furthermore, the consistent variables explaining behaviour were beliefs about capabilities, motivation and goals, habits, knowledge and taste (Guillaumie et al., 2010). Another meta-analysis of 22 studies of McDermott et al. (2015) to predict healthy dietary patterns provides further support for the TPB. The

variables of TPB had medium to large associations with both intention and behaviour, whereas attitudes had the strongest association with intention (McDermott et al., 2015). As shown in this review, the TPB has been applied to many domains concerning consumption and food consumption. However, to my knowledge it has not been applied to the domain of insect consumption. In view of the global food shortage and the strive to a sustainable food system, it is necessary to investigate the determinants of intentions and behaviours concerning insect consumption in Europe.

3.3 Product comparison by consumers

Evidence for the set up of research question three can be found in the research of Scheibehenne, Von Helversen & Rieskamp (2015) on strategies for evaluating consumer products. In this research, similarity-based strategies have been found that guide consumer behaviour. Similarity-based strategies are used by consumers to compare a new product with a similar product that the consumer is already familiar with. The new product is evaluated and according to its characteristics, placed in a category in the consumers' mind, with products similar to the new product. This is done in order to create an evaluation or attitude of the product whereas attitude is an important determinant of (purchasing) behaviour.

4. Methodology

4.1 Design and procedure

The research questions were *"what is known in the literature about alternative protein sources and insect consumption and their role in today's consumption behaviour?"*, *"what are determinants to consume insect products?"* and *"how are insect products reviewed in comparison with other alternative protein sources?"*.These questions were answered through a combination of research methods. The first question was studied by means of a literature study conducted with help of Google Scholar. The terms that were used were entomophagy, insect consumption, alternative protein sources, meat substitutes and consumption behaviour. The second and third question were answered by a questionnaire in which it was studied to what extent the determinants influenced the respondents' intention to consume an insect burger and how the insect burger was reviewed in comparison with other alternative protein sources. The choice for an insect burger was made based on two aspects. First, as a burger the product could be compared with two other alternative protein sources in the same form. This makes the comparison more reliable. Second, a burger is familiar. The burger almost looks like a regular hamburger and it only shows on the package that it partly consists of buffalo worms. This again makes the comparison between the burgers more reliable. The questionnaire was designed in response to a small interview with four individuals in which it was explored which aspects matter when buying conventional meat or meat substitutes. The online survey questionnaire was designed by the programme Qualtrics and pre-tested by four acquaintances of the researcher so that unclear

questions or other flaws could be revised. The questionnaire was spread via the internet on www.facebook.com and via e-mail and WhatsApp and analyzed by the statistics programme SPSS version 24.

4.2 Measures

The questionnaire assessed variables associated with alternative protein source consumption with a focus on insect consumption. The questionnaire contained of six separate sections. These sections were named: behaviour, attitude, subjective norms, perceived behavioural control, intention and demographics. Each of these sections consisted of multiple questions. For the items attitude, subjective norms, perceived behavioural control and intention the target behaviour was 'to consume an insect burger instead of conventional meat in the next month'. Since all determinants are investigated for insect consumption, the conclusions regarding the consumption (frequency) of meat substitutes and conventional meat are merely based on an assumption. This assumption implies that a favourable attitude, high subjective norms and high perceived behavioural control concerning insect products correlate with a high consumption frequency of meat substitutes and a low consumption frequency of conventional meat and vice versa. As an addition, it was also assessed how the insect burger was ranked by the participants in comparison with two vegetarian burgers: a soy burger and a nut burger.

4.2.1 Behaviour

The first part measured current behaviour of the respondents and consisted of seven items. The first question on an 8-point Likert scale (*range: 0-7*) was formulated as: " How many days a week on average, do you consume conventional meat?". Next, a multiple choice question with six response categories was used to ask the respondents as what kind of consumer they would categorize themselves (*meat lover, vegetarian, flexitarian etc*.). Other multiple choice questions were included to indicate whether they consider themselves as someone who likes to try new food products (*yes-no*) and if they ever consume meat substitutes with five answer possibilities (*never-always*). The respondents were also asked whether they ever tried an insect burger before (*yes-no*) and for the respondents that consume meat substitutes every once in a while there were two additional questions. One question was used to indicate how many days the respondent consumes meat substitutes (*one day a week - once every two weeks*) and another checkbox question was used to indicate which meat substitutes they regularly consume.

4.2.2 Attitude

The second part measured the attitudes towards the consumption of an insect burger and consisted of six items (Cronbach's Alpha = .75; M = 3.45, SD = 0.92). Attitudes towards the behaviour

were assessed by asking respondents to evaluate the consumption of an insect burger instead of conventional meat by six 7-point semantic differentials (*e.g. bad-good, disgusting-tasty*). Furthermore, attitudes towards the insect burger itself were measured by showing a picture of the burger and asking the respondents to evaluate the burger on seven characteristics on 5-point Likert scales with the endpoints labelled *totally disagree-totally agree*. Furthermore, the respondents were asked to indicate the extent to which the characteristics that they evaluated the insect burger on are important when buying substitutes for conventional meat on 7-point Likert scales. The respondents were also asked to rank the burgers (from 1 to 3, with 1 being the highest and 3 the lowest in rank order) on preference and they were asked to select their preferable burger in a matrix table based on eight criteria. Moreover, the respondents had to rank the burgers in the order (from 1 to 3, with 1 being the highest and 3 the lowest in rank order) in which they feel is the best replacement for conventional meat looking at nutritional values.

4.2.3 Subjective norms

The third part measured the subjective norms concerning the consumption of an insect burger and consisted of four items (Cronbach's Alpha = .83; M = 1.35, SD = .70). Three 5-point Likert scales were used to measure subjective norms concerning the consumption of an insect burger. On the first scale, respondents indicated whether people that are important to them consume insect burgers instead of conventional meat (*totally untrue-totally true*). On the second scale, respondents indicated whether they feel that it is expected of them to consume insect burgers instead of conventional meat (*totally untrue-totally true*). Furthermore, on the third scale respondents indicated whether people that are important to them prefer that the respondent consumes insect burgers instead of other vegetarian burgers (*totally untrue-totally true).* Moreover, the respondents were asked to rank the burgers in order (from 1 to 3, with 1 being the highest and 3 the lowest in rank order) in preference of people who are important to them.

4.2.4 Perceived behavioural control

The fourth part measured the perceived behavioural control concerning the consumption of an insect burger and consisted of nine items (Cronbach's Alpha = .69; M = 2.44, SD = 1.23). Three 5-point Likert scales were used to measure perceived behavioural control concerning the consumption of an insect burger. The first scale measured whether the respondent knows where to buy an insect burger (*totally not agree-totally agree*). The second scale measured whether the respondent knows how to prepare an insect burger (*totally not agree-totally agree*). The third scale measured whether the respondent knows how to combine the insect burger in a dish (*totally not agree-totally agree*). Furthermore, the respondents were asked to indicate whether it would be difficult for them to replace conventional meat with an insect burger in the forthcoming month, on a 5-point Likert scale (*very*

difficult-very easy). Another three 5-point Likert scales in the form of statements were used to measure perceived behavioural control with the endpoints *totally not agree-totally agree*. The first scale measured whether, if the respondent would wanted, if he/she would be able to replace conventional meat with an insect burger. The second scale measured whether or not the respondent feels that he/she has enough control over his/her own consumption to replace conventional meat with an insect burger. The third scale measured whether, if the respondent would wanted, he/she would be sure to replace conventional meat with an insect burger. Moreover, the respondents were asked to rank the burgers (from 1 to 3, with 1 being the highest and 3 the lowest in rank order) in an order of where they knew best to buy them and to rank the burgers in an order of ease to prepare them in a dish.

4.2.5 Intention

The fifth part measured the respondents' intention to consume an insect burger and consisted of three items (Cronbach's Alpha = .91; M = 1.67, SD = .93). Two 5-point Likert scales were used. On the first scale, respondents indicated whether they were going to try to replace conventional meat with an insect burger in the forthcoming month (*extremely unlikely - extremely likely).* On the second scale, respondents indicated whether they were sure that they were going to replace conventional meat with an insect burger in the forthcoming month (*extremely unlikely-extremely likely*). Furthermore, intention was measured in an additional question in which the respondents were asked to rank the burgers in order (from 1 to 3, with 1 being the highest and 3 the lowest in rank order) of which they were planning to buy.

4.2.6 Demographics

The sixth part consisted of demographic items such as gender, age and education.

4.3 Statistical analysis

In order to answer the research questions, five multiple regression analyses have been executed with the statistics programme SPSS version 24. For the analyses, average scores for attitude, subjective norms, perceived behavioural control and intention was calculated per respondent in order to draw conclusions. This was done by categorizing the questions for 'behaviour', 'attitude', 'subjective norms', 'perceived behavioural control' and 'intention' and calculating the average score per respondent in these categories. For the last two analyses, a subsample was used in which only the respondents that consume meat substitutes have been included. One would expect that this group in our society would most likely be the first to try and consume insect products since they are already familiar with alternative protein sources and/or simply because they are interested in sustainable consumption. In

these analyses, the respondents that answered *'never'* on the question 'Do you ever consume meat substitutes?' have been excluded. This leaves a subsample of 85 respondents.

For all five analyses, a sequential regression (i.e. block-wise) entry method was used. An overview of the five analyses can be found in Table 1. First, a multiple regression was used in which gender, age and education as well as attitude, subjective norms and perceived behavioural control and their effects on the intention to consume an insect burger (DV) were analyzed. Second, the effects of gender, age, education, attitude, subjective norms, perceived behavioural control and intention on the consumption of meat substitutes (DV) were studied through multiple regression. Third, another multiple regression analysis was done in order to study the effects of gender, age, education, attitude, subjective norms, perceived behavioural control and intention on the frequency of consumed conventional meat (DV). The fourth multiple regression analysis of the subsample was done in order to test the effects of gender, age, education, attitude, subjective norms and perceived behavioural control on the intention to consume an insect burger (DV). The fifth multiple regression analysis of the subsample tested the effects of gender, age, education, attitude, subjective norms, perceived behavioural control and intention on the behaviour of the frequency of consumed meat substitutes (DV). In order to draw conclusions from these analyses, the data should be statistical significant. Statistical significance is a number that expresses the probability that the results of a study could have occurred purely by chance (statistical significance, n.d.). In order for the data to be statistical significant, the number for *p* should be .05 or less to draw the conclusion that there exists a relationship between de dependent variable and the independent variable(s) (Cowles & Davis, 1982).

Table 1. Overview of the executed regression analyses.

Regression analysis	**Dependent variable (DV)**	**Independent variable(s)**	**Sample**
1	Intention to consume an insect burger	Gender, age, education, attitude, subjective norms and perceived behavioural control	Complete sample (151)
2	Consumption of meat substitutes	Gender, age, education, attitude, subjective norms, perceived behavioural control and intention	Complete sample (151)

3	Frequency of consumed conventional meat	Gender, age, education, attitude, subjective norms, perceived behavioural control and intention	Complete sample (151)
4	Intention to consume an insect burger	Gender, age, education, attitude, subjective norms and perceived behavioural control	Subsample (85)
5	Frequency of consumed meat substitutes	Gender, age, education, attitude, subjective norms, perceived behavioural control and intention	Subsample (85)

5. Results

5.1 Sample

Of the 203 respondents, 151 respondents filled in the questionnaire completely. Non-completion could be due to the length of the questionnaire or other external factors. An overview of the demographics of the sample can be found in Table 2.

Table 2. Overview of the demographics of the sample

Gender	**Mean age**	**Highest level of education**
Female (62,3%) Male (37,7%)	36,7 years	Higher Vocational Education (47%) University of Science (28%) High School (17%) Other (8%)

5.2 Descriptive data

When looking at the behavioural part of the questionnaire, the respondents consume conventional meat on an average of five days per week whereas most of them categorized themselves as a "meat lover" (51%) or a "flexitarian" (29,8%). This indicates that conventional meat is still very popular in the Dutch kitchen but also shows that there is a large group of people looking at alternative sources and products. This could perhaps be explained by the 74,2% that would categorize themselves

as an individual that likes to try new food products. On average, most respondents never consume meat substitutes with a percentage of 43,7% whereas 31,1% consume meat substitutes very occasionally. The meat substitutes that are consumed by this group include cheese products (25,7%), vegetable products (36,9%), soy products (16,5%), nut products (10,6%), bean products (11,9%) and mushroom products (13,9%). Furthermore, none of the respondents ever consumes insect products as a replacement for conventional meat and only two respondents (1,3%) had ever tried an insect burger before.

When asked about the characteristics that are important to them when buying a replacement for conventional meat, taste received the highest score with 6 out of 7. Product quality, appearance, ingredients, price and the product being easy to combine in a dish also scored high with an average of 5 out of 7. The amount of protein and sustainability received the lowest scores with an average of 4 out of 7. This indicates that the choice for a replacement of conventional meat is somewhat more of an affective decision than a cognitive decision.

In the last part of the questionnaire the respondents had to rank three different burgers, with 1 having the highest and 3 having the lowest score. The items were: preference, nutritional values as a replacement for conventional meat, preference for people who are important to them, which one they knew best to find, which one they knew best to prepare in a dish and which one they intend to buy. The results can be found in Figure 3.

Concerning preference, 11,3% of the respondents chose the insect burger. The nut burger received a preference of 63,6% and the soy burger got 25,1%. When asked about the nutritional values of the burgers, 56,3% of the respondents would identify the insect burger as the best protein-replacement for conventional meat. Furthermore, over half of the respondents (56,9%) indicated that the nut burger would be the preferable product for people important to them whereas 6,2% indicated this would be the insect burger. Moreover, most respondents (77,5%) knew best where to buy a soy burger whereas a minority (6,6%) knew best where to buy an insect burger. When asked upon the ease of preparation in a dish, 50,3% answered that this would be the soy burger whereas 18,5% answered the insect burger. Furthermore, the respondents were asked to rank the burgers in an order of which they would intend to buy. More than half of the respondents (58,9%) chose the nut burger whereas 10,6% chose the insect burger.

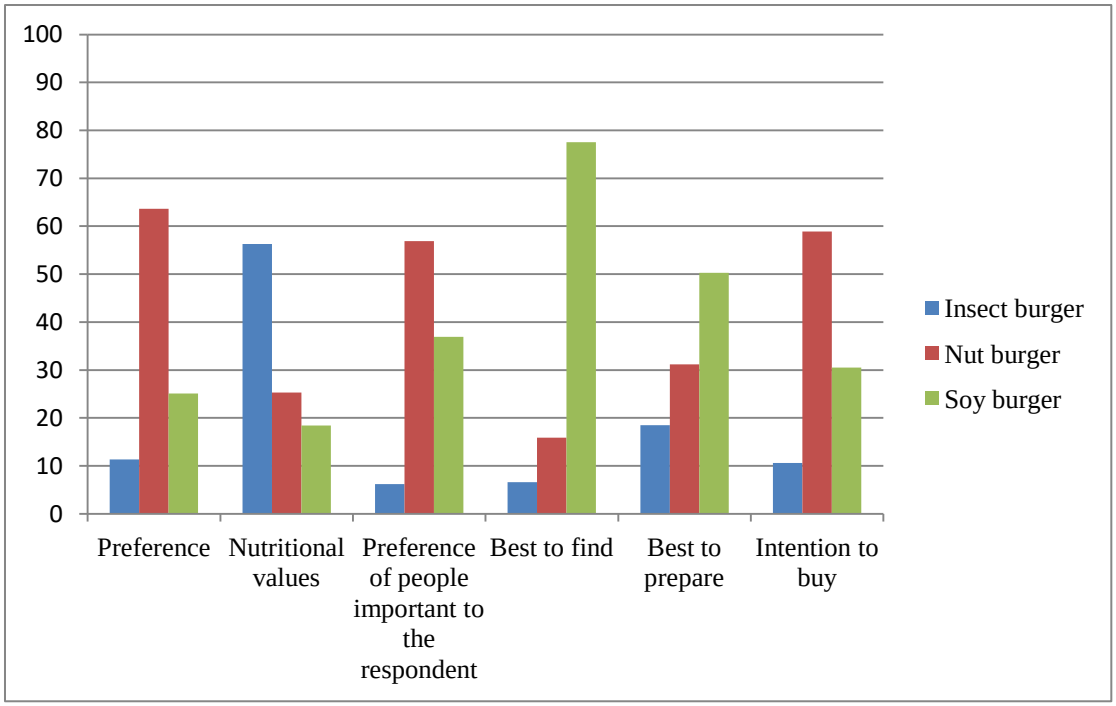


Figure 3. Overview of the ranking scores of the burgers.

Adding to this, the insect burger received a first ranking by 23,2% of the respondents on appearance, 11,3% on taste, 45,7% on the amount of protein, 10,6% on ingredients, 11,3% on product quality, 13,9% on easy to combine in a dish, 9,3% on food safety, 34,4% on sustainability and 4% on availability. An overview of the percentages can be found in Figure 4. It can therefore be concluded that the respondents do recognize that the insect burger is high in protein and a more sustainable product, yet it does not get recognition on affective characteristics such as taste, appearance and quality. It is also worrisome that the insect burger received a really low score on food safety which may cause that the consumer is afraid to buy the product.

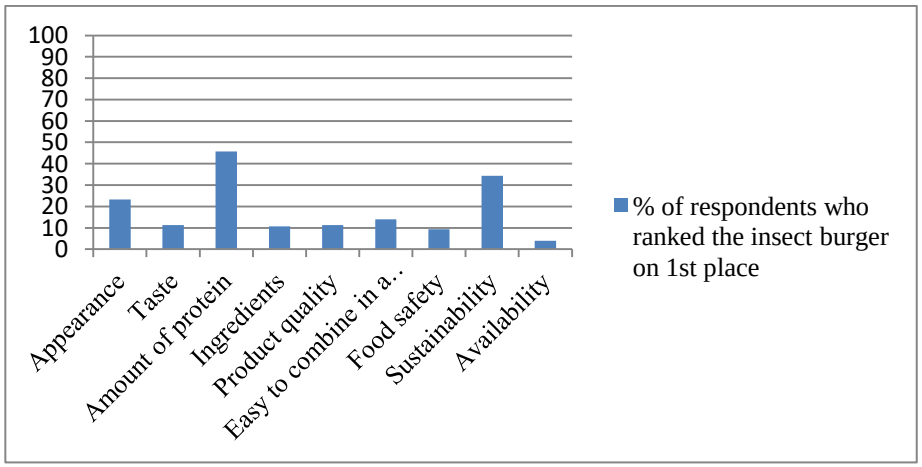


Figure 4. Overview of the percentages of respondents that ranked the insect burger on 1st place on different characteristics.

5.3 Regression analyses

Table 3. Multiple regression analysis to test the effects of age, gender, education, attitude, subjective norms and perceived behavioural control on the intention to consume an insect burger (= dependent variable)

N = 151	β[1]	*t*[2]	*p*[3]	R^2 [4]
DV: Intention (to consume insect burger)				
Model 1:				.02
Gender	-.03	-.32	.75	
Age	-.12	-1.47	.14	
Education	-.08	-.92	.36	
Model 2:				.34
Gender	.06	.82	.42	
Age	-.04	-.63	.53	
Education	-.05	-.65	.51	
Attitude	.14	1.93	.05	
Subjective norms	.30	4.27	.00	
Perceived behavioural control	.40	5.58	.00	

The demographic variables in model 1 account for 2% variance in the behaviour, which is the intention to consume an insect burger. Model 2, which includes all variables, accounts for 34% variance in the behaviour. Furthermore, only subjective norms (β = .30, p = .000) and perceived behavioural control (β = .40, p = .000) make a statistically significant contribution to the behaviour with attitude being almost significant. None of the demographic predictors make a statistically significant contribution. It can therefore be concluded that the intention to consume an insect burger is mostly influenced by perceived behavioural control and the effects of subjective norms.

[1] β =For every standard deviation increase of the independent variable, the dependent variable will increase by the unstandardized beta coefficient value (β).

[2] *t* = Measures the size of the difference relative to the variation in the sample data.

[3] *p* = Significance test.

[4] R^2 = Found variance in the behaviour.

Table 4.Multiple regression analysis to test the effects of gender, age, education, attitude, subjective norms, perceived behavioural control and intention on the behaviour of consuming meat substitutes (= dependent variable).

N = 151	β	*t*	*p*	R^2
DV: Behaviour (consumes meat substitutes)				
Model 1:				.05
Gender	.22	2.74	.01	
Age	-.01	-.12	.91	
Education	.05	.67	.50	
Model 2:				.08
Gender	.23	2.69	.01	
Age	.03	.38	.70	
Education	.04	.51	.61	
Attitude	.10	1.20	.23	
Subjective norms	-.02	-.31	.76	
Perceived behavioural control	.14	1.63	.10	
Model 3:				.10
Gender	.22	2.58	.01	
Age	.04	.47	.64	
Education	.05	.61	.54	
Attitude	.08	.93	.35	
Subjective norms	-.07	-.86	.39	
Perceived behavioural control	.07	.78	.44	
Intention	.17	1.69	.09	

According to these results, model 1 accounts for 5.0% of the variance in the outcome, model 2 for 8% and model 3 for 10%. This shows that the demographic variables make a very large contribution to the variance. These results also show that gender ($\beta = .22$, $p = .01$) makes a significant contribution to the model and accounts for the most effect on the measured behaviour of the consumption of meat substitutes. None of the other variables make a significant contribution.

Table 5. Multiple regression analysis to test the effects of gender, age, education, attitude, subjective norms, perceived behavioural control and intention on the behaviour of the frequency of consumed conventional meat (= dependent variable).

N = 151	β	*t*	*p*	R^2
DV: Behaviour (frequency of consumed conventional meat)				
Model 1:				.07
Gender	-.26	-3.31	.00	
Age	.03	.38	.71	
Education	-.03	-.38	.70	
Model 2:				.13
Gender	-.33	-4.08	.00	
Age	.02	.25	.80	
Education	-.06	-.70	.49	
Attitude	.17	2.01	.05	
Subjective norms	-.02	-.31	.75	
Perceived behavioural control	-.22	-2.61	.01	
Model 3:				.15
Gender	-.32	-3.98	.00	
Age	.01	.16	.88	
Education	-.06	-.80	.42	
Attitude	.19	2.30	.02	
Subjective norms	.03	.32	.74	
Perceived behavioural control	-.14	-1.60	.11	
Intention	-.18	-1.86	.06	

The results of table 5 show that model 1, which consists of the demographic variables, accounts on its own for 7% of variance in the behaviour. In model 2 attitude, subjective norms and perceived behavioural control have been added and account for 13%. In model 3, intention has been added to the model and accounts for 15% of variance in the behaviour. This shows that the demographic variables in model 1 make a very large contribution to the variance in the frequency of consumed conventional meat in comparison to the other variables. Furthermore, gender ($\beta = -.32$, $p = .000$) and attitude ($\beta = .19$, $p = .02$) show to have a significant effect on the outcome throughout the

models. Gender however, shows a negative contribution to the frequency of consumed conventional meat. This means in this study that being a female has a negative relationship with the frequency of consumed conventional meat, i.e. females, in this study, consume less frequently conventional meat. Attitude however shows a positive contribution to the behaviour. Perceived behavioural control shows to be significant in model 2 (β = -.22, p = .01) but with interferences of measured intention in model 3, it is no longer significant. Furthermore, none of the other variables have a significant effect on the behaviour.

Table 6. Multiple regression analysis of the subsample to test the effects of gender, age, education, attitude, subjective norms and perceived behavioural control on the intention to consume an insect burger (= dependent variable).

N = 85	β	*t*	*p*	R^2
DV: Intention				
Model 1:				.02
Gender	-.01	-.12	.90	
Age	-.14	-1.26	.21	
Education	-.05	-.41	.68	
Model 2:				.36
Gender	.10	1.12	.26	
Age	-.04	-.44	.66	
Education	.03	.33	.74	
Attitude	.15	1.63	.11	
Subjective norms	.29	3.05	.00	
Perceived behavioural control	.48	5.10	.00	

According to these results, model 1 which consists of the demographic variables, explains 2% of the variance in the outcome. When attitude, subjective norms and perceived behavioural control are added in model 2, the model explains 36% of variance in the outcome. Perceived behavioural control (β = .48, p = .000) and subjective norms (β = .29, p = .000) therefore show to contribute significantly to the model in order to predict the intention to consume an insect burger. Furthermore, attitude was not significant enough (p = .11) and none of the demographic variables seem to make a significant contribution in this model.

Table 7. Multiple regression analysis of the subsample to test the effects of gender, age, education, attitude, subjective norms, perceived behavioural control and intention on the behaviour of the frequency of consumed meat substitutes (= dependent variable).

N = 85	β	*t*	*p*	R^2
DV: Behaviour (frequency of consumed meat substitutes)				
Model 1:				.08
Gender	-.08	-.63	.53	
Age	.05	.44	.66	
Education	.26	2.10	.04	
Model 2:				.19
Gender	-.13	-1.07	.29	
Age	.05	.40	.69	
Education	.24	1.90	.06	
Attitude	.30	2.46	.02	
Subjective norms	-.00	-.03	.98	
Perceived behavioural control	-.20	-1.59	.12	
Model 3:				.20
Gender	-.12	-.98	.33	
Age	.05	.37	.71	
Education	.24	1.91	.06	
Attitude	.31	2.50	.01	
Subjective norms	.02	.15	.88	
Perceived behavioural control	-.16	-1.10	.28	
Intention	-.08	-.55	.59	

The results of the last analysis indicate that model 1, which consists of the demographic variables, accounts for 8% of variance in the outcome. In model 2 where attitude, subjective norms and perceived behavioural control have been added, the model accounts for 19% variance. In model 3, intention has been added to the model and accounts for 20% of variance in the outcome. This shows that model 2 with the added variables attitude, subjective norms and perceived behavioural control explain most of the variance in the frequency of consumed meat substitutes. Another interesting

conclusion is that education in model 1, without interferences of variables from other models, shows to have a positive and significant contribution (β = .26, p = .04) to the frequency of consumed meat substitutes. Education is no longer significant in model 3 when all other variables are added to the model. Attitude however, shows to be significant throughout the model with a positive contribution (β = .31, p = .01) to the behaviour. This makes attitude the most predictive and influential variable for the frequency of consumed meat substitutes in the subsample.

5.4 Variables left out of the analyses

The measured behaviour that resulted from the question 'Have you ever tried an insect burger?' was left out of the analyses. This variable proved to be not significant since only two out of 151 respondents ever tried an insect burger in their entire life.

In addition, the characteristic trait 'likes to try new food products' that came forth out of the question 'Do you consider yourself as a person that likes to try new food products?' was left out of the analyses. One would expect a characteristic trait as 'likes to try new food products' to be a predictor of behaviour. In this research, this was not the case since this trait was not significant in any of the analyses and was therefore left out of the statistical analyses. An explanation for this finding could be that the respondents do see themselves as people that like to try new food products but insects are not considered as actual food.

6. Discussion

6.1 Conclusions

The aim of this study was to provide insight in the determinants of insect consumption and to contribute to making this field of research theoretically as well as practically more comprehensive. The results can be used in future campaigns to increase the number of people to adopt a consumption pattern in which protein may be provided by insect products.

From the literature study, set up to answer the question *"What is known in the literature about alternative protein sources and insect consumption and their role in today's consumption behaviour?"* , it can be concluded that the market shares of alternative protein sources represents no more than 1-2% of the total Dutch meat market (Anonymous, 2004). This is mainly caused by a difficulty in consumer acceptance of alternative protein sources in which unfamiliarity and a negative quality perception play a role. Insects are also considered as an alternative protein source but the acceptance of insect products in Western societies is an entirely different story. While many people in Asian and African countries consider the consumption of entire insects as a delicacy, many people in Europe refuse to eat them as the reminder of livingness or strange texture may trigger aversion (Martins & Pliner, 2006).

From the results of the questionnaire, set up to answer the questions *"What are determinants to consume insect products?"* and *"How are insect products reviewed in comparison with other alternative protein sources?"*, it can be concluded that half of the respondents categorized themselves as a "meat lover" while one third of the respondents chose to be a "flexitarian". This is a large group of people looking at alternative protein sources instead of conventional meat every once in a while. Furthermore, most of the respondents considered themselves as an individual that likes to try new food products but this characteristic trait proved to not be statistical significant and was therefore left out of the analyses. Moreover, nearly half of the respondents answered that they never consume meat substitutes while one third consumes meat substitutes very occasionally. The most important characteristics when buying a replacement for conventional meat are, in order of importance, taste, product quality, appearance, ingredients, price and the product being easy to combine in a dish. The amount of protein and sustainability received the lowest importance scores while the insect burger was reviewed best on these two aspects. These scores also indicated that the choice for an alternative protein source is somewhat more of an affective decision instead of a cognitive decision. In other words, in order for the insect burger to become a more popular product, there should be more of a focus on affective characteristics such as appearance, taste and quality.

For the statistical part of the study it can be concluded that for the complete sample, perceived behavioural control and subjective norms were the strongest predictors of the intention to consume an insect burger. None of the demographic predictors, nor the respondents' attitude showed to make a significant contribution. The same conclusion can be drawn for the subsample of this study, i.e. the respondents that never consume meat substitutes. For the subsample, perceived behavioural control and subjective norms were the strongest predictors of the intention to consume an insect burger. It can therefore be concluded that these two groups' intention is influenced by the same predictors. A limitation to these findings is that no conclusions regarding the behaviour, i.e. the consumption of an insect burger, could have been made since this variable was not significant. However, since intention is the most proximate predictor of behaviour, conclusions regarding the intention to consume an insect burger have been chosen to be made. For perceived behavioural control this means that the individual believes that he or she is able to consume an insect product. This can be by means of having the money to buy the product, knowing where it is sold but also to actually being able to persuade yourself to eat the product. For subjective norms this means that the consumption of an insect burger is susceptible to influences from the direct social environment of the individual. When the individual's social environment is familiar with the consumption of insect products, the individual would most likely have an increased intention to consume insect products him or herself. This also works as a social pressure for the individual to conform to the subjective norms of his or her direct social environment. In addition, attitude showed to be a predictor of the frequency of consumed conventional meat as well as the frequency of consumed meat substitutes. Attitude therefore seems more related to a deliberative choice of consumption pattern but it cannot be excluded that this could be due to dietary

habits as discussed in the study of Morabia & Wynder (1990). Furthermore, as earlier stated it should be noted that the conclusions regarding the consumption (frequency) of meat substitutes and conventional meat are based on the assumption that a favourable attitude, high subjective norms and high perceived behavioural control concerning insect products correlate with a high consumption (frequency) of meat substitutes and a low consumption frequency of conventional meat and vice versa. Conclusions regarding the consumption (frequency) of conventional meat and meat substitutes should therefore be handled with caution.

The respondents of the questionnaire were also asked to compare the insect burger with two other protein burgers, a nut burger and a soy burger. In comparison with the two other burgers, the insect burger was the least favourite among the respondents and it also received the lowest intention to buy the product. The insect burger did receive high scores in the rating of the expected amount of protein and on sustainability but lacked on appearance, taste, product quality, ease to combine in a dish, food safety and availability. Most of the respondents would identify the insect burger as the best protein replacement for conventional meat but it was also identified as the least preferable burger for people important to the complete sample. The insect burger was chosen last as well on the aspects of ease of preparation in a dish and availability. It can therefore be concluded that the insect burger, in comparison with the 2 other burgers, is not very popular yet. The respondents appreciated the insect burger on its cognitive characteristics (amount of protein, sustainability) but preferred the other 2 burgers on a whole lot of affective characteristics (appearance, taste, product quality) in which the insect burger seemed to lack.

The study also showed that the effects of gender, in fact being a female, is the largest predictor of the consumption of meat substitutes. Being a female also showed to be a negative predictor on the frequency of consumed conventional meat. Another remarkable finding is that in the analyses to measure the intention to consume an insect burger, attitude was in both the complete sample as well as in the subsample borderline significant. Moreover, education as a single predictor, showed to be a predictor of the frequency of consumed meat substitutes in the subsample.

From many different studies in different food groups, it can be concluded that the determinants, as hypothesized by the Theory of Planned Behaviour, influence the investigated behaviour. The study of Verbeke & Vackier (2005) on determinants of fish consumption, Soyez, Francis & Smirnova (2012) on determinants of organic food and Dunn, Mohr, Wilson & Wittert (2011) on determinants of fast food consumption, all conclude that a favourable attitude, high subjective norms and high perceived behavioural control have a positive impact on said behaviour. All studies were cross-sectional but differed in their execution. All studies used questionnaires and were supported by interviews or the respondents were asked to keep a diary in order to keep track of their consumption and/or behaviour. Since the TPB is proven by a lot of studies, it is therefore interesting to see why in this study only subjective norms and perceived behavioural control influence the intention to consume insect products whereas attitudes about the behaviour do not influence this intention. An

explanation for this could be due to a lack of visibility and availability of insect products in the respondents' environment. Insect products are scarce and only found in a limited amount of supermarkets in the Netherlands (Telegraaf, 2014). It could be that the attitudinal beliefs of the respondent about the behaviour do not correlate with the intention to actually perform the behaviour because of this perceived unreal scenario. In addition, another possible explanation could be that the set up of this study unintentionally limited the predictive capacity of the determinant 'attitude' for the consumption of insect products. As seen in other studies, the questionnaire was supported by interviews or diaries. It is therefore necessary to continue this research in a larger set up with additional interviews as will be discussed in the suggestions for further research.

6.2 Limitations of this study

There are several limitations to this study that should be taken into consideration.

First, the sample size was sufficient but could have been larger and this therefore limits the representativeness of the sample for the whole Dutch population.

Second, the conclusions regarding the consumption (frequency) of meat substitutes and conventional meat should be handled with caution because they are based on the assumption that a favourable attitude, high subjective norms and high perceived behavioural control concerning insect products correlate with a high consumption frequency of meat substitutes and a low consumption frequency of conventional meat and vice versa. The questionnaire was designed to investigate the attitudes, subjective norms and perceived behavioural control concerning insect products and not meat substitutes or conventional meat.

Third, due to the fact that only a very small part of the sample (1,3%) had actually tried an insect burger before, it was impossible to use this behaviour as a dependent variable in order to receive significant results. Therefore, conclusions regarding the intention to consume an insect burger could only be made.

Fourth, the study was cross-sectional which means that relations between predictor variables and outcome variables were examined but no conclusions regarding causality can be made. Therefore, the implications for practice should be handled with caution and can merely be used as an inspiration for the development of future campaigns aiming to pursue consumers to consume insect products instead of conventional meat. It should also be noted that this study should not be used as evidence of why a future campaign might work.

Fifth, the data in this study was self-reported by the respondents by means of a questionnaire. This may have caused memory bias or social desirability bias. For this study this means that the respondents may not have remembered clearly what their previous behaviour was and that therefore their answers may not correspond completely with their actual behaviour. Also, the respondents may

have answered the survey in a way that they would expect to be beneficial or desirable for the researcher.

7. Practical recommendations

7.1 Implications for practice

In response to these conclusions, the researcher would advise to make some adjustments to insect products in order to increase its affective aspects such as appearance and taste instead of focusing on cognitive aspects, in order to achieve a similar quality perception as for conventional meat. Another advise would be to focus on the perceived behavioural control and subjective norms of women as, according to the results, they would most likely be the first innovators of the Dutch society to consume insect products because of the positive relationship that was found between women and the consumption of meat substitutes. Another reason for this advise is the negative relationship that was found between women and the frequency of consumed conventional meat. This shows that women in the Netherlands are cutting on conventional meat, and instead are looking for alternative protein sources. It would therefore make sense to focus on women, instead of men. Creating campaigns or interventions that increases the perceived behavioural control and the effects of subjective norms may lead to an increased intention which is the most important predictor of behaviour. For example, it would be wise to give suggestions or recipes on the packaging of the insect product so that the ease of combination and preparation will be increased, thus the perceived behavioural control of the consumer. In addition, Bandura (1998) explained that people's perceived behavioural control can be developed by 4 sources of influence: mastery experience, vicarious experiences provided by social models, social persuasion and the somatic and emotional state of the consumer in judging their capabilities. For this study, the vicarious experiences provided by social models is the most interesting source and will therefore be explained.

Vicarious experiences provided by social models means that a consumers' perceived behavioural control regarding a behaviour is suspect to increase when they see another person, similar to them, performing the behaviour with success. This raises the consumers' beliefs that they too possess the capabilities to perform the behaviour as well. In a future intervention in order to increase the consumers' perceived behavioural control, one could use the power of food bloggers. Food bloggers can be recognized as normal people, similar to the consumer, and their reach is very large with not only generated traffic on their food blog, but on social media as well. Instagram has become a very popular medium for food bloggers to share food diaries, recipes or other food related information. It could be a smart strategy to start working together with some popular food bloggers and to ask them to cook with insect products and to share their experiences and information about the products with their followers. According to the source, followers of the food blog would have an increased perceived

behavioural control to consume insect products because they see someone, similar to them, performing this behaviour with success.

In order to increase the effects of subjective norms, both descriptive and injunctive norms should be used. A strategy could be used to make the consumption of insect products a responsible, delicious and healthy choice, a choice that others would approve of. When one's social environment is already familiar with the consumption of insect products, one is more likely to consume insect products him or herself in order to conform to the social environment's subjective norms.

According to Cialdini (2004), there are three central motivations that drive the targets' cognitions and behaviours in the areas of compliance and conformity to subjective norms: to be accurate, to affiliate and to maintain a positive self-concept. For this study, conformity and to affiliate are the most interesting motivations and will therefore be explained.

Conformity refers to the act of changing one's behaviour to match the responses of others (Cialdini, 2004). This may happen in social situations in order to behave correctly and obtain social approval from others. The goal of affiliation has to do with the fact that humans are fundamentally motivated to have meaningful social relationships with others. It's in our nature. It is therefore that we engage in behaviours of which others approve, so that they will approve us too. A technique that is used to influence a targets' cognitions and behaviour in this domain is called 'behavioural mimicry'. Behavioural mimicry operates completely outside of conscious awareness. It describes behaviour matching of postures, manners, facial expressions and vocal characteristics between two or more individuals (Chartrand & Bargh 1999). Behavioural mimicry may be a useful technique to increase the conformity to a social norm regarding the consumption of insect products. It can be used in supermarkets where a cook can demonstrate how healthy and tasty a meal with insects can be. In this situation there is an interaction between the cook and a numerous of individuals where behavioural mimicry can take place.

7.2 Suggestions for further research

It is necessary that more research on this topic needs to be done. First, a study could be done with a sample that already consumes insect products so that exact predictors for the behaviour can be measured. This sample can be compared with a sample that never consumes insect products in order to draw conclusions. Furthermore, the study could be expanded by adding multiple insect products so that measured evaluations of these products can be compared.

Second, the conclusions regarding the consumption (frequency) of meat substitutes and conventional meat should be handled with caution because they are based on the assumption that a favourable attitude, high subjective norms and high perceived behavioural control concerning insect products correlate with a high consumption frequency of meat substitutes and a low consumption frequency of conventional meat and vice versa. The questionnaire was designed to investigate the

attitudes, subjective norms and perceived behavioural control concerning insect products and not meat substitutes or conventional meat. The research on this topic could therefore be improved by adding questions in the questionnaire that measure the determinants of conventional meat and other meat substitutes besides insect products. This could be done to test the assumption as presented in this research and to draw conclusions concerning the relation between the consumption of insect products and the consumption (frequency) of meat substitutes and conventional meat.

Third, interviews could be added to support the research in order to get more detailed information from the respondents on the topics of insect products, meat substitutes and conventional meat in order to supposedly increase the determinant 'attitudes' predictive capacity.

Fourth, longitudinal observational and/or experimental studies could be done in order to make statements about causality regarding the determinants to consume insect products.

Fifth, in order to solve the memory and social desirability bias the future research could gather data that is not self-reported but rather achieved by observation in an experimental study.

Sixth, a supportive study could be done in order to investigate how insect products should be improved, according to the consumer, in order to match the quality perception of conventional meat.

8. References

Agbidye, F.S. , Ofuya, T.I. & Akindele, S.O. (2009). Marketability and Nutritional Qualities of Some Edible Forest Insects in Benue State, Nigeria. *Pakistan Journal of Nutrition 8* (7): pp. 917-922

Agerström, J., Carlsson, R., Nicklasson, L. & Guntell, L. (2015). Descriptive social norms and charitable giving. The power of local norms. *Journal of Economic Psychology, Vol. 52*, pp. 147-153

Aiking, H., de Boer, J. & Vereijken, J. (2006). Sustainable protein production and consumption. Pigs or peas? Dordrecht, The Netherlands: Springer

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), Action-control: From cognition to behavior, pp. 11–39. Heidelberg: Springer.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, Vol. 50,* 179–211

Albarracín, D., Johnson, B. T., Fishbein, M., & Muellerleile, P. A. (2001). Theories of reasoned action and planned behavior as models of condom use: A meta-analysis. *Psychological Bulletin*, Vol. *127*(1), pp.142-161. doi:10.1037/0033-2909.127.1.142

Anonymous. (2004). Food magazine November 2004. Arnhem, The Netherlands: Audet Tijdschriften

Armitage, C.J. & Conner, M. (2001). Efficacy of the Theory of Planned Behaviour: A meta-analytic review. *British Journal of Social Psychology*, 2001, *Vol.40*(4), pp.471-499

Aurelia. (2002). Vleesvervangers in Nederland 2002. A marketing report on alternative protein sources in the Netherlands 2002]. Amersfoort, The Netherlands: Aurelia.

Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology & Health, Vol.13*(4), pp.623-649

Biologica. (2006). Bio-monitor Jaarrapport 2006. Utrecht, The Netherlands: Biologica.

Calvert, A. (2014). You Are What You (M)eat: Explorations of Meat-eating, Masculinity and Masquerade. *Journal of International Women's Studies, Vol. 16(*1), pp. 18-33.

Chartrand, T.L. & Bargh J.A. (1999). The chameleoneffect: the perception-behavior link and social interaction. *Journal of Personality and Social Psychology, Vol.76*(6), pp.893-910

Cowles, M. & Davis, C. (1982). On the origins of the .05 level of statistical significance. *American Psychologist, Vol. 37*(5), pp. 553-558

Davies, J.& Lightowler, H. (1998). Plant-based alternatives to meat. *Nutrition & Food Science, Vol. 2,* pp. 90–94

De Steur, M. (2001). De gevolgen van MKZ voor de slachterijen en vleesverwerking. The consequences of food and mouth disease for slaughterhouses and meat-packing industry]. Industriemonitor 09, The Hague, The Netherlands: Centraal Bureau voor de Statistiek.

Dunn, K.I., Mohr, P., Wilson, C.J. & Wittert, G.A. (2011). Determinants of fast-food consumption. An application of the Theory of Planned Behaviour. *Appetite, 2011, Vol.57*(2), pp.349-357

Dunn, K.I., Mohr, P., Wilson, C.J. & Wittert, G.A. (2011). Determinants of fast-food consumption. An application of the Theory of Planned Behaviour. *Appetite, Vol.57*(2), pp.349-357

FAO. (2006). *Livestock's long shadow* [PDF]. Retrieved from ftp://ftp.fao.org/docrep/fao/010/a0701e/a0701e07.pdf

Federation of American Societies for Experimental Biology (FASEB). (2016). Quantifying the environmental benefits of skipping the meat. Retrieved from www.sciencedaily.com/releases/2016/04/160404170427.htm

Fishbein, M., & Ajzen, I. (2010). Predicting and changing behavior. The reasoned action approach. New York: *Psychology Press (Taylor & Francis).*

Gallagher, J. (2013). Processed meat 'early death' link. Retrieved from: http://www.bbc.com/news/health-21682779

Gallagher, J. (2015). Processed meats do cause cancer - WHO. Retrieved from http://www.bbc.com/news/health-34615621

Grunert, K. G., Bredahl, L. & Brunsø, K. (2004). Consumer perception of meat quality and implications for product development in the meat sector. A review. *Meat Science, Vol. 66,* pp. 259–272

Guillaumie, L., Godin, G. & Vézina-Im, L. (2010). Psychosocial determinants of fruit and vegetable intake in adult population: a systematic review. *The International Journal of Behavioral Nutrition and Physical Activity, Vol.7,* pp.12-12

Halloran, A., Muenke, C., Vantomme, P. & Van Huis, A. (2014). Insects in the human food chain: global status and opportunities. *Food Chain, Vol. 4 No. 2.*

Hardeman, W., Johnston, M., Johnston, D.W., Bonetti, D., Wareham, N.J. & Kinmonth, A.L. (2002). Application of the Theory of Planned Behaviour in behaviour change interventions: A systematic review. *Psychology and Health, Vol. 17*, pp.123–158

Hoek, A.C., Luning, P.A., Weijzen, P., Engels, W., Kok, F.J. & de Graaf, C. (2011). Replacement of meat by alternative protein sources. A survey on person- and product-related factors in consumer acceptance. *Appetite, Vol.56*(3), pp.662-673

Hoek, A.C., van Boekel, M.A.J.S., Voordouw, J. & Luning, P.A. (2011). Identification of new food alternatives: How do consumers categorize meat and alternative protein sources? *Food Quality and Preference*. *Vol.22* (4), pp. 371 - 3293

Hollander, K. (2010). Eating insects: a solution to the meat problem? Retrieved from http://www.theecologist.org/investigations/food_and_farming/554292/eating_insects_a_solution_to_the_meat_problem.html

IARC. (2015). *IARC Monographs evaluate consumption of red meat and processed meat* [PDF]. Retrieved from https://www.iarc.fr/en/media-centre/pr/2015/pdfs/pr240_E.pdf

Kleef, E., Frewer, L.J., Chryssochoidis, Houghton, J.R., G.M., Korzen-Bohr, S.,Krystallis, T., Lassen, J, Pfenning, U. & Rowe, G. (2006). Perceptions of food risk management among key stakeholders: Results from a cross-European study. *Appetite,Vol.47*, pp.46-63

Kumar, P., Chatli, M.K., Mehta, N., Singh, P., Malav, O.P. & Verma, A.K. (2015). Meat analogues: Health Promising Sustainable Meat Substitutes. *Critical Reviews in Food Science and Nutrition*, DOI: 10.1080/10408398.2014.939739

Leahy, E., Lyons, S. & Tol, R.S.J. (2011). Determinants of Vegetarianism and Meat Consumption Frequency in Ireland. *The Economic and Social Review, Vol. 42* (4), pp. 407–436

Malik, R.K. (n.d.) Integrating consumers and industry in food control. Retrieved from http://www.fao.org/docrep/v2890t/v2890t02.htm#integrating consumers and industry in food control

Martins, Y. & Pliner, P. (2006). "Ugh! That's disgusting!". Identification of the characteristics of foods underlying rejections based on disgust. *Appetite, 46*, pp. 75–85

McDermott, M.S., Oliver, M., Simnadis, T., Beck, E.J., Coltman, T., Iverson, D., Caputi, P. & Sharma, R. (2015). The Theory of Planned Behaviour and dietary patterns: A systematic review and meta-analysis. *Preventive Medicine, Vol.81*, pp.150-156

McIlveen, H., Abraham, C. & Armstrong, G. (1999). Meat avoidance and the role of replacers. *Nutrition & Food Science, Vol. 1*, pp. 29–36.

Meyer, J.R. (2005). Social insects. Retrieved from https://www.cals.ncsu.edu/course/ent425/tutorial/Social/

Michie, S., Johnston, M., Francis, J. Hardeman, W. & Eccles, M. (2008). From Theory to Intervention: Mapping Theoretically Derived Behavioural Determinants to Behaviour Change Techniques. *Applied Psychology, Vol.57*(4), pp.660-680

Morabia, A. & Wynder, E.L. (1990). Dietary habits of smokers, people who never smoked, and exsmokers. *American journal of clinical nutrition,Vol.(5)*, pp.933-937

Oonincx, D.G.A.B., van Itterbeeck, J., Heetkamp, M.J.W., van den Brand, H., van Loon, J.J.A. & van Huis, A. (2010). An Exploration on Greenhouse Gas and Ammonia Production by Insect Species Suitable for Animal or Human Consumption. *PLoS One, Vol.5*(12), pp.e14445-e14445

Parry, W. (2013). Eating Insects Will Help Feed Hungry World, UN Says. Retrieved from http://www.livescience.com/37816-eating-insects-helps-feed-hungry-world.html

PVE. (2003). Marktverkenning 2002 'Vlees, cijfers en trends'. Market research 2002 'Meat, figures and trends']. Zoetermeer, The Netherlands: Product Boards for Livestock, Meat and Eggs.

Robinson, E. & Higgs, S. (2013). Eat as they eat, not as they think. Descriptive but not injunctive social norm messages can increase fruit and vegetable intake. *Appetite, Vol.71*, pp.484-484

Rumpold, B.A. & Schlüter, O.K. (2012). Nutritional composition and safety aspects of edible insects. *Mol. Nutr. Food Res. Vol. 57*, pp. 802–823

Rumpold, B.A., Schlüter, O.K. (2012). Potential and challenges of insects as an innovative source for food and feed production. *Innovative Food Science and Emerging Technologies, Vol. 17,* pp. 1–11

Sadler, M. J. (2004). Meat alternatives. Market developments and health benefits. Trends *in Food Science & Technology, Vol. 15*, pp. 250–260.

Scheibehenne, B., von Helversen, B. & Rieskamp, J. (2015). Different strategies for evaluating consumer products: Attribute- and exemplar-based approaches compared. *Journal of Economic Psychology, Vol.46*, pp.39-50

Schösler, H. , de Boer, J. & Boersema, J.J. (2011). Can we cut out the meat of the dish? Constructing consumer-oriented pathways towards meat substitution. *Appetite, Vol. 58*, pp. 39–47

Scott-Thomas, C. (2014). Target the curious: Bringing insect consumption to the mainstream. Retrieved from http://www.foodnavigator.com/Market-Trends/Target-the-curious-Bringing-insect-consumption-to-the-mainstream

Sheppard, B. H., Hartwick, J. & Warshaw, P. R. (1988). The Theory of Reasoned Action: A Meta-Analysis of Past Research with Recommendations for Modifications and Future Research. *Journal of Consumer Research, Vol. 15*(3), pp. 325–343

Singer, P. (2006). Meat production today is not just inhumane, it's inefficient. Retrieved from http://www.theguardian.com/commentisfree/2006/jul/12/comment.animalwelfare

Soyez, K., Francis, J. & Smirnova, M. (2012). How individual, product and situational determinants affect the intention to buy and organic food buying behavior: a cross-national comparison in five nations. *Der markt,Vol.51*(1), pp.27-35

statistical significance. (n.d.). *The American Heritage® New Dictionary of Cultural Literacy, Third Edition*. Retrieved from http://www.dictionary.com/browse/statistical-significance

Telegraaf. (2014, October 30). Jumbo legt eetbare insecten in schappen. Retrieved from http://www.telegraaf.nl/uitwinkelen/23265742/__Jumbo_legt_eetbare_insecten_in_schappen__.html

Van der Lans, I. A. (2001). Het imago van vers vlees en vleesvervangers in 2000 en 2001. The image of fresh meat and meat substitutes in 2000 and 2001]. Rijswijk, The Netherlands: Product Boards for Livestock, Meat and Eggs.

Van Huis, A. (2013). Potential of Insects as Food and Feed in Assuring Food Security. *Annual Review of Entomology, Vol.58*, pp.563-583.

Van Huis, A., Van Itterbeeck, J., Klunder, H., Mertens, E., Halloran, A., Muir, G. & Van Tomme, P. (2013). Edible insects: Future prospects for food and feed security. Rome: Food and Agriculture Organization of the United Nations, 2013.

Verbeke, W. & Vackier, I. (2005). Individual determinants of fish consumption: application of the theory of planned behaviour. *Appetite,Vol.44*(1), pp.67-82

Walsh, B. (2013). The Triple Whopper Environmental Impact of Global Meat Production. Retrieved from http://science.time.com/2013/12/16/the-triple-whopper-environmental-impact-of-global-meat-production/

Wang, Y. & Beydoun, M.A. (2009). Meat consumption is associated with obesity and central obesity among US adults. *International Journal of Obesity, Vol. 33***,** pp. 621–628; doi:10.1038/ijo.2009.45

Appendix: questionnaire

Bedankt voor uw deelname aan dit onderzoek! Uw bijdrage is van uiterst belang voor mijn Master thesis in Communication Science voor de Universiteit van Wageningen. Met dit onderzoek zou ik er graag achter willen komen hoe u over vleesvervangers denkt. Met vlees wordt in dit onderzoek gevogelte, varkensvlees, rundvlees, lamsvlees en alle verwerkte vormen van deze soorten bedoelt. Het invullen van de vragenlijst duurt ongeveer 10 minuten. Vul deze vragenlijst op een rustige plek in zonder met anderen te overleggen. Het is erg belangrijk dat u de vragenlijst eerlijk beantwoordt en in één keer invult. Wanneer u niet direct het antwoord op de vraag weet, vul dan in wat u zou verwachten. De resultaten van deze enquête zijn anoniem en zullen niet worden verstrekt aan derden. Nogmaals, heel erg bedankt voor uw deelname!

Q1 Hoeveel dagen per week eet u doorgaans vlees?

- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7

Q2 Als wat voor soort consument zou u zichzelf categoriseren?

- ❍ Ik ben een vegetariër
- ❍ Ik ben een veganist
- ❍ Ik ben een flexitariër (één of meerdere keren per week eet ik geen vlees)
- ❍ Ik ben een vleesliefhebber
- ❍ Ik eet geregeld vlees maar wil graag minderen
- ❍ Anders, namelijk: _____

Q3 Beschouwt u zichzelf als iemand die graag nieuwe voedselproducten uitprobeert?

- ❍ Ja
- ❍ Nee

Q4 Eet u wel eens vleesvervangers bij de avondmaaltijd?

- ❍ Nooit
- ❍ Heel af en toe
- ❍ Soms
- ❍ Regelmatig
- ❍ Altijd

Q5 Hoeveel dagen eet u doorgaans vleesvervangers per week?

- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7
- ❍ Eens in de 2 weken
- ❍ Anders, namelijk: _____

Q6 Welke vleesvervanger eet u dan zoal?

- ❑ Kaasproduct
- ❑ Groenteproduct
- ❑ Sojaproduct
- ❑ Tofuproduct
- ❑ Notenproduct
- ❑ Bonenproduct
- ❑ Paddestoelproduct
- ❑ Insectenproduct
- ❑ Anders, namelijk: _____

Q7 Heeft u ooit een insecten burger geprobeerd?

- ❍ Ja
- ❍ Nee

Q8 Hoe zou u een insecten burger beoordelen op de onderdelen die onder de foto staan beschreven? (Wanneer u nog nooit een insectenburger heeft geprobeerd, wat zou u dan verwachten?)
Ingrediënten: water, gemalen buffalowormen (14%), tarwegluten (14%), plantaardige olie (zonnebloemolie), paprika, wortel, maïs, zout, witte peper, kippenei-eiwitpoeder, inuline, tarwezetmeel, aardappelvezels.

	Helemaal mee oneens	Mee oneens	Niet oneens/ Niet eens	Mee eens	Helemaal mee eens
Het product is duurzaam	❍	❍	❍	❍	❍
Het product is lekker	❍	❍	❍	❍	❍
Het product ziet er aantrekkelijk uit	❍	❍	❍	❍	❍
Het product bevat voldoende eiwitten als vervanger voor vlees	❍	❍	❍	❍	❍
Het product is van goede kwaliteit	❍	❍	❍	❍	❍
Het product is makkelijk te combineren in een gerecht	❍	❍	❍	❍	❍
Het product is veilig te consumeren	❍	❍	❍	❍	❍

Q9 Één keer per week in de aankomende maand een insectenburger eten in plaats van vlees is:

	1	2	3	4	5	6	7
Slecht:Goed	❍	❍	❍	❍	❍	❍	❍
Vies:Smakelijk	❍	❍	❍	❍	❍	❍	❍
Gezond:Ongezond	❍	❍	❍	❍	❍	❍	❍
Veilig:Schadelijk	❍	❍	❍	❍	❍	❍	❍
Niet duurzaam:Duurzaam	❍	❍	❍	❍	❍	❍	❍
Prettig:Onprettig	❍	❍	❍	❍	❍	❍	❍

Q10 Geef aan in hoeverre onderstaande eigenschappen belangrijk voor u zijn bij het kopen van een vervangend product voor vlees (1 ster = onbelangrijk, 7 sterren = heel belangrijk)

_____ Duurzaamheid
_____ Smaak
_____ Hoeveelheid eiwitten
_____ Uiterlijk
_____ Prijs
_____ Productkwaliteit
_____ Ingrediënten
_____ Makkelijk te combineren in een gerecht

Q11 Geef aan in hoeverre u het met de volgende stellingen eens bent

	Helemaal onwaar	Onwaar	Niet onwaar/ Niet waar	Waar	Helemaal waar
De meeste mensen die belangrijk voor mij zijn consumeren minstens één keer per week een insectenburger in plaats van vlees.	❍	❍	❍	❍	❍
Het wordt van mij verwacht dat ik eens per week vlees vervang door een insectenburger.	❍	❍	❍	❍	❍
De meeste mensen die belangrijk voor mij zijn hebben liever dat ik een insectenburger koop dan een andere vegetarische burger.	❍	❍	❍	❍	❍

Q12 Geef aan in hoeverre u het met de volgende stellingen eens bent

	Helemaal mee oneens	Mee oneens	Niet oneens/ Niet eens	Mee eens	Helemaal mee eens
Ik weet waar ik een insectenburger kan kopen.	❍	❍	❍	❍	❍
Ik weet hoe ik een insectenburger moet bereiden.	❍	❍	❍	❍	❍
Ik weet hoe ik een insectenburger in een gerecht kan combineren.	❍	❍	❍	❍	❍

Q13 Eens per week in de aankomende maand vlees vervangen door een insectenburger is voor mij:

- ❍ Heel moeilijk
- ❍ Best moeilijk
- ❍ Niet makkelijk maar ook niet moeilijk
- ❍ Best makkelijk
- ❍ Heel makkelijk

Q14 Geef aan in hoeverre u het eens bent met de volgende stelling.

	Helemaal mee oneens	Mee oneens	Niet oneens/ Niet eens	Mee eens	Helemaal mee eens
Ik zou, als ik zou willen, ééns per week in de aankomende maand vlees kunnen vervangen met een insectenburger.	❍	❍	❍	❍	❍
Ik heb het gevoel dat ik niet genoeg controle heb over mijn consumptie om ééns per week in de komende maand vlees te vervangen door een insectenburger.	❍	❍	❍	❍	❍
Ik ben er zeker van dat ik ééns per week in de aankomende maand vlees zou kunnen vervangen door een insectenburger als ik dat zou willen.	❍	❍	❍	❍	❍

Q15 Geef aan in hoeverre u het eens bent met de volgende stellingen.

	Heel onwaarschijnlijk	Onwaarschijnlijk	Niet onwaarschijnlijk/ Niet waarschijnlijk	Waarschijnlijk	Heel waarschijnlijk
Ik ga proberen om ééns per week in de aankomende maand vlees te vervangen door een insectenburger.	❍	❍	❍	❍	❍
Ik ga zeker ééns per week in de aankomende maand vlees vervangen door een insectenburger.	❍	❍	❍	❍	❍

Q16 Stel: U staat in de supermarkt en u bent op zoek naar een vervanger voor het gebruikelijke vlees bij de avondmaaltijd. Nummer de producten in volgorde van voorkeur (nummer 1 is uw eerste voorkeur).

_____ Insectenburger Ingrediënten: water, gemalen buffalowormen (14%), tarwegluten (14%), plantaardige olie (zonnebloemolie), paprika, wortel, maïs, zout, witte peper, kippenei-eiwitpoeder, inuline, tarwezetmeel, aardappelvezels.

_____ Notenburger Ingrediënten: Water, notenmix 31% (cashewnoten, paranoten, amandelen,macadamianoten, pistachenoten, pecannoten), plantaardige eiwitten 9% (soja, tarwegluten), kippenei-eiwit, zetmeel (aardappel, tarwe, maïs), dextrose, aroma, zonnebloemolie, knoflook, zout, kruiden en specerijen, mineraal (ijzer), vitamine B12.

_____ Sojaburger Ingrediënten: 44% Tofu, 13% Zonnebloemolie, 10% Rijst, 5% Paneermeel, 5% Natuurlijk aroma, 4% Mais-korrel, 3% Wortel, 3% Ui, 3% Tomaat, 2% Kruiden, 2% Boekweitmeel, 2% Bouillon - groente, 2% Havervlokken, 2% Zout.

Q17 Vul in welk product uw voorkeur heeft, afgaande op het criterium dat links in de tabel staat.

	Insectenburger	Sojaburger	Notenburger
Uiterlijk	❍	❍	❍
(Verwachtte) smaak	❍	❍	❍
(Verwachtte) hoeveelheid eiwitten	❍	❍	❍
Ingrediënten	❍	❍	❍
Productkwaliteit	❍	❍	❍
Makkelijk te combineren in een gerecht	❍	❍	❍
Veilig te consumeren	❍	❍	❍
Duurzaamheid	❍	❍	❍
Beschikbaarheid	❍	❍	❍

Q18 Nummer de producten in de volgorde waarvan u denkt dat het, qua voedingsstoffen, de beste vervanger is voor vlees (nummer 1 is de beste vervanger voor vlees qua voedingsstoffen).

_____ Insectenburger
_____ Sojaburger
_____ Notenburger

Q19 Nummer de producten in volgorde van voorkeur voor de mensen die belangrijk voor u zijn (nummer 1 heeft de eerste voorkeur).

_____ Notenburger
_____ Sojaburger
_____ Insectenburger

Q20 Nummer de producten in de volgorde waarvan u het beste weet waar deze te koop is (van nummer 1 weet u het beste waar u dit product kunt kopen).

_____ Notenburger
_____ Insectenburger
_____ Sojaburger

Q21 Nummer de producten in de volgorde waarvan u denkt dat deze het makkelijkste te bereiden is en in een gerecht past (nummer 1 is het makkelijkste te bereiden en past het beste in een gerecht).

_____ Insectenburger
_____ Sojaburger
_____ Notenburger

Q22 Welk product bent u van plan om te kopen? Nummer de producten in volgorde van voorkeur (nummer 1 is uw eerste voorkeur).

_____ Sojaburger
_____ Insectenburger
_____ Notenburger

Q23 Wat is uw geslacht?

- Man
- Vrouw

Q24 Wat is uw leeftijd?

Q25 Wat is uw hoogst genoten opleiding?

- Middelbare school
- MBO
- HBO
- WO
- Anders, namelijk: _____

Q26 Hier kunt u kwijt wat u verder nog zou willen zeggen over het onderwerp 'insectenconsumptie' of over dit onderzoek in het algemeen.