

The public perception of *in vitro* meat in The Netherlands

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Preface

This thesis is the result of the final project of my master study, Science education and communication (SEC) at the University of Twente. The research in this thesis provides a broad view on the public perception of *in vitro* meat (IVM) in the Netherlands and factors influencing this perception. This information, about a technology that will not be available for at least the next five years, can be valuable for people with personal interest and for professionals working with IVM or in related fields.

The motivation for choosing IVM as the topic is related to my previous study and background in biomedical research. During the master SEC, I learned about different forms of communication of new technologies. I was allowed to choose a topic for assignments in various courses and IVM soon got my attention. The technology showed to be particularly suitable and interesting for me: it is new, relevant and involves biomedical techniques that I easily recognize and understand. More importantly, IVM seemed to evoke different reactions among authors and people whom I spoke to. This surprised me, as I was enthusiastic about IVM as soon as I read about it. Therefore, I chose to investigate people's reactions to IVM more closely in my graduation project.

This required me to perform qualitative research, in which I had no experience at all. Indeed, it proved to be difficult for me and the project took a lot more time than planned. However, with a lot of hard work and help from my supervisor Anne Dijkstra, I managed to finish the research and write this thesis. Therefore, I would like to start by thanking my supervisor Anne for her help with the content of the thesis, and Margot Kuttschreuter for assisting the process as the second supervisor. I would also like to thank all the respondents for their time and effort during the interviews and focus group discussions. Furthermore, I would like to thank the people from Kennislink.nl for their help with arranging a location for the group discussion in Amsterdam. Finally, I thank my girlfriend Kim for her support and patience during the long process of completing my master thesis.

Bob Steenhuis

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Abstract

The production of meat for human consumption is related to significant downsides, such as environmental stress, harmful effects on human health and declining animal welfare. *In vitro* meat (IVM), edible meat produced in the laboratory with tissue engineering techniques, is a possible alternative to reduce the problems with meat production.

The public perception and acceptance of food technologies received considerable attention, since new foods often raise suspicion among consumers. Other food technologies in the past, such as GM, have shown that new food technologies are not automatically accepted by the public. This study provides insight in the public perception of IVM in the Netherlands, so that early information about perceptions can be used to understand public reactions, and ultimately acceptance or rejection.

Current literature on the perception of IVM is limited, as is the knowledge of consumers about IVM. Therefore, this study aims to explore the public perception of IVM, by researching how IVM is perceived by people with different backgrounds in the Netherlands, and what factors influence this perception. This was done with qualitative methods. Seven relevant stakeholder fields were indentified, and a total of nine interviews was conducted with stakeholders. In addition, four focus group discussions were conducted with people with different backgrounds. The questions were organized in four themes, based on the literature study: attitudes and associations, characteristics of society and the individual, communication and framing and trust and uncertainty.

The results show that stakeholders and focus group respondents hold a variety of perceptions. For the focus group respondents, IVM was still relatively unknown, exemplified by many questions. Both negative (e.g. disgust, unnaturalness) and positive (e.g. curiosity, sympathy) reactions were expressed by stakeholders and focus group respondents. Subsequently, several risks were mentioned, such as unnaturalness, health and safety, product flaws (such as a high price, or limited meat resemblance) and the loss of farms and farm animals. Perceived benefits included less environmental stress, global food security and less animal suffering. Mixed feelings caused different outcomes regarding the willingness to try IVM: the idea is good, but hesitant feelings (unnatural, disgust) are stronger, or hesitant feelings are in turn overruled by curiosity.

The popularity of biological foods was recognized by the stakeholders and focus group respondents. According to them, this trend could have a negative effect on people's perceptions of IVM. Furthermore, focus group respondents expressed low confidence about food, which was caused by a combination of communication and trust related aspects. This had several implications for the communication and trust issues regarding IVM.

This study contributes to the limited literature yet conducted on public perceptions of IVM. In addition, this study provides valuable information for parties that are concerned with the introduction, communication or policy decisions surrounding IVM. Further studies could find frequencies of arguments and other quantitative values.

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1. Introduction

Food innovations of the past and in the future: that is the central theme of the current exposition “Foodtopia” in the Dutch museum Boerhaave in Leiden (figure 1). Worries and ideals about food have existed for much longer than today. In the exposition, there is attention for solutions to food problems in the Netherlands since 1900. One topic that has been of interest for a long time, is meat.



Figure 1: Food innovation exposition “Foodtopia” in Museum Boerhaave

Meat is part of the daily menu for many people. Meat products are available in plentiful amounts in supermarkets, for prices within the budget of most costumers in the Western world. However, the production of meat is related to significant downsides, such as environmental damage, human health risks and decreasing animal welfare.

Environmental problems can be exemplified by the emission of greenhouse gases: meat production is responsible for eighteen percent of the global emission of greenhouse gases, which is higher than that of the global traffic sector (Tuomisto & de Mattos, 2011). Additionally, considerable amounts of land (30%) and water (8%) are used for meat production (Tuomisto & de Mattos, 2011).

Human health is also affected by meat production, which is exemplified by the prevalence of diseases related to (intensive) farming of animals, such as mad cow disease (BSE) and bird flu. Furthermore, farm animals are fed antibiotics in various countries. In the Netherlands, the use of antibiotics in animals is the highest of Europe, and leads to antibiotic-resistant strains of bacteria (Grave, Torren-Edo & Mackay, 2010). Infection with these resistant bacteria, for example by eating insufficiently heated meat, leads to 25000 deaths per year in Europe (Norrby et al., 2009) and to 5000 deaths per year in the US (Pluhar, 2010).

Animal welfare is undermined by methods used in the industry to produce meat. Pluhar (2010) mentioned that living conditions decline in various ways, causing current practices to become more factory-like and ethically unjustifiable. Also general public awareness of animal welfare is growing. This can be seen, for example in the Netherlands, from the increase in popularity of animal friendly foods (e.g. “Goed nieuws voor dieren en milieu”, 2015) and the great societal attention for

“plofkippen”: chickens raised in such a way that they grow unnaturally fast and become much heavier than regular chickens (e.g. “Jumbo doet als eerste supermarkt plofkip in de ban”, 2014).

Despite the significant problems concerning meat production and the public awareness of the Dutch public regarding at least some of these problems, the consumption of meat remains popular. In the Netherlands, 4,5% of the population ate vegetarian in 2012 (Dagevos, Voordouw, Van Hoeven, Van der Weele & De Bakker, 2012). Post (2012) stated that the global demand for meat is even rising because of the growing population in general and the increasing consumption in developing countries. Meat consumption is expected to double over the coming 40 years, while production capacity is almost at its limit (Post, 2012).

***In vitro* meat**

Researchers are working on an alternative for regular meat to reduce meat production problems: *in vitro* meat (IVM). This new food technology represents edible meat produced from stem cells using tissue engineering. The meat, or muscle tissue, is grown in the laboratory from cells that can be taken from living animals, and without killing these animals. Researchers have found several ways of producing IVM, and are currently working on improvement and further development.

IVM can be produced in roughly two methods: scaffold based IVM and self-organizing IVM (Edelman, McFarland, Mironov & Matheny, 2005). Scaffold based IVM starts with a muscle biopsy from the animal of which meat is wanted, for example a pig (see figure 2). Specific cells (myosatellite cells) are harvested and placed in a controlled environment where they are allowed to grow (proliferate). Besides growing, the cells must also form muscle tissue. To accomplish muscle growth, the cells are exercised with a scaffold (such as a meshwork).

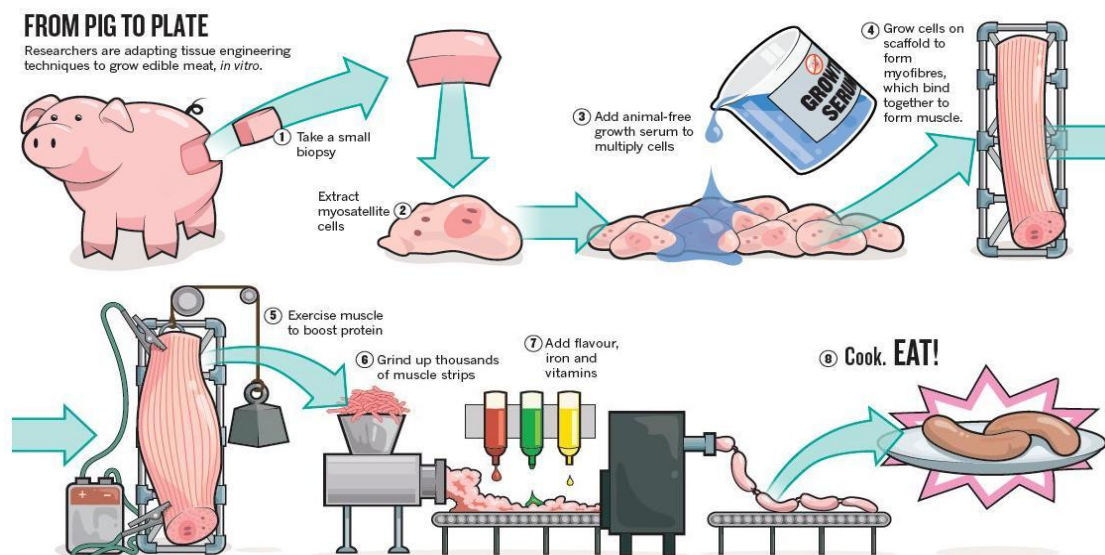


Figure 2: Schematic representation of the process of IVM production using the scaffold based technique (Jones, 2010).

Cells can attach to the scaffold, which will be put under physical stress or electrical shocks (Edelman et al., 2005; Jones, 2010). After formation of muscle fibers, the tissue can be used to create processed meat products, such as hamburgers or sausages.

The scaffold-based technique does not provide a way to create highly structured pieces of meat, such as steak. The self-organizing technique is needed to this end, that starts with muscle explants which are expanded. However, research in this area has only yielded small pieces of slowly

grown meat (Benjaminson, Gilchrest & Lorenz, 2002). Large pieces with many cell layers are problematic, because only the outer layer can be fed with nutrients with current tissue culturing techniques (Benjaminson et al., 2002; Post, 2012). Therefore, the scaffold based method is seen as the most promising (Datar & Betti, 2010). The first, and so far only, hamburger produced this way was shown in 2013 by Mark Post from the Maastricht University (Jha, 2013). It was cooked and eaten in public during a television show in London.

According to various authors, IVM has potential to contribute significantly to the major problems that arise from conventional meat production (e.g. Langelaan et al., 2010; Pluhar, 2010; Post, 2012; Schaefer & Savulescu, 2014).

Tuomisto and de Mattos (2011) conducted a life cycle analysis to determine the potential environmental improvements of IVM production (figure 3). Despite some assumptions that had to be made in order to calculate the impact of IVM, Tuomisto and de Mattos (2011) conclude that IVM has much potential to substantially reduce the environmental stress. Examples are the use of energy, land and water and the emission of greenhouse gases. A comparison of these impacts with regular meats is shown in figure 3.

With respect to health concerns, Datar and Betti (2010) expect that IVM could make a significant contribution. The controlled conditions in IVM production allows for safer and healthier meat products, by preventing the spread of animal-borne diseases and declining the incidence of epidemic zoonoses (animal diseases that can be transferred to humans) (Datar & Betti, 2010). Furthermore, the controlled conditions also allow for manipulation of the product, so that it becomes healthier or fits specific dietary needs (Datar & Betti, 2010).

Finally, and perhaps most importantly (considering the current societal attention), animal welfare could be improved by the use of IVM. Animals are only involved in the beginning of the process, and producing meat is much more efficient (Tuomisto & de Mattos, 2011). For example, no parts are grown that would otherwise be unused (such as blood and bones), and thus less nutrition is needed for equal amounts of meat (Pluhar, 2010; Tuomisto & de Mattos, 2011). This could mean that less animals need to be kept and raised, and farming practices can become less factory-like. More importantly, animals no longer have to die for meat.

IVM is in a developmental phase, which means that production methods are still being updated. For example, it is still very expensive to create an IVM hamburger. The first hamburger cost \$300.000 (Schaefer & Savulescu, 2014). Therefore, scalability is a much mentioned issue (Datar & Betti, 2010; Jones, 2010; Langelaan et al., 2010; Pluhar, 2010; Post, 2012). Also, several aspects of the culturing process itself still have to be optimized, such as cell choice, culture media and safety of all the used materials. Therefore, even for processed meat products, there are various technical hurdles that need to be accounted for, before IVM can be brought onto the market. However, the general expectation among scientists is that the technical difficulties can be solved with sufficient years of research and funding (Jones, 2010; Langelaan et al., 2010).

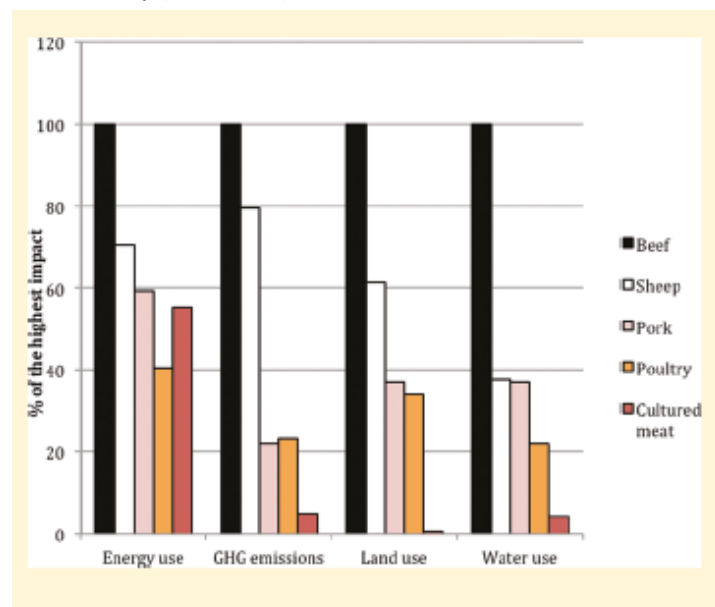


Figure 3: Graph with energy use, greenhouse gas emissions, land use and water use for traditional farming of sheep, pork, poultry and IVM, compared to cows (largest value, set as 100%) (Tuomisto & de Mattos, 2011).



Figure 4: One of the first IVM hamburgers, at "Foodtopia" in Museum Boerhaave

Public perception and acceptance

When a new technology is developed and brought onto the market, it could either be easily accepted (e.g. mobile phones) or receive higher levels of resistance (e.g. nuclear energy). According to various authors, public acceptance is considered a very important determinant of successful implementation of a new technology, together with socio-cultural and historical contexts that influence peoples attitude (Frewer et al., 2014; Siegrist, 2008).

Public perception and acceptance of food technologies received considerable attention in the social psychology literature, since foods have to be ingested by the consumer and therefore often raises suspicion and caution (Ronteltap, van Trijp, Renes and Frewer, 2007). An example of a case in which the public is suspicious when it comes to novel foods, are the genetically modified (GM) foods in Europe. This technology had, like IVM, lots of potential benefits for the quality of food and its production (e.g. improved shelf-life or resistance against infections), but raised a lot of public concerns and distrust (Frewer et al., 2011). Public acceptance is therefore also a relevant topic for IVM.

According to Datar & Betti (2010), public acceptance could form the greatest stumbling block for the development of IVM, as it determines the commercial implementation. Post (2013) also reported on the importance of public attitudes, and the lack of systematic research in this area. Verbeke et al. (2015), who were one of the few authors that addressed consumers' attitudes towards IVM, found that IVM does not only evoke positive reactions.

Furthermore, it is important to investigate public perceptions of a technology for two reasons. First, as Frewer et al. (2011) argued, research often occurs subsequent to public rejection of a newly introduced food technology. Therefore, studies often identify only reasons for rejection, not reasons for acceptance (Frewer et al., 2011). This was also seen in the case of GM. For GM, several factors are proposed to have caused the worries and rejection by the public, but no factors are found that could improve acceptance (Frewer et al., 2014). Second, Siegrist (2008) states that there is an increased consumer interest in food production technologies, and their risk perception may differ from that of experts which makes it harder to predict public reactions. When the public perception is

investigated before a technology is brought onto the market, possible concerns and ideas of the public can still be taken into consideration during its development and introduction. Information about early stage public attitudes (such as risk perceptions) is therefore very important for implementations of new food technologies such as IVM.

Aim and research questions

This study aims to get insight in the public perception of IVM in the Netherlands. As stated, IVM is still in development and it will probably take another ten to fifteen years before IVM hamburgers can be bought. However, early stage perceptions could be very helpful for understanding public reactions when a technology is introduced. Therefore, *the aim of this research is to explore the current public perception of IVM in the Netherlands and the factors that influence this perception*. The following research questions have been formulated:

- *How is IVM perceived by the public in the Netherlands?*
- *What factors influence the perception of IVM in the Netherlands?*

Both within these aims and within the remaining chapters of this thesis, there are various references to “the (Dutch) public”. It is important to note that within this study, the public could be defined as “consumers”. However, as this study examines consumers’ perceptions of IVM, a product that does not exist yet, the public is defined here as “potential consumers of IVM”.

Post (2013) mentioned that there was not much known about the public perception of IVM. A few studies reported on this topic since then, although there are many social psychology studies about perceptions of food technologies in general, as well as philosophical studies on IVM. Therefore, the research questions will be addressed with qualitative methodologies (see chapter 3 for more details and justification of the methods). Focus group discussions with different types of public will be organized to discuss their perception on IVM, and capture different opinions and viewpoints. However, to prepare the focus group discussions, stakeholders from a range of fields will be interviewed, to explore their views on the public perception of IVM.

Overview of the thesis

In the next chapter, literature about the public perception of IVM is reviewed. In chapter 3, the methods that are used to answer the research questions are described. Chapter 4 presents the results, in four themes: attitudes and associations, characteristics of society and the individual, communication and framing and trust and uncertainty. The main conclusions and a discussion are provided in chapter 5.

2. Literature study

In this chapter, current literature is reviewed. Literature that is used for this review is introduced in section 2.1. Section 2.2 includes literature from the field of social psychology. Section 2.3 includes literature from (applied) philosophy. The chapter ends with a review of recent studies that examined the public perception of IVM in section 2.4.

2.1 Social psychology

Studies on consumer acceptance of food and food technologies are widespread. To review relevant literature for this study in the field of social psychology, the framework developed by Ronteltap et al. (2007) provides a particularly helpful starting point (see figure 5). These authors review a wide range of literature concerning the acceptance of technology-based food innovations, whereby they notice that previous studies vary greatly in abstraction level of determinants that are discussed, and that there are many measures of acceptance being distinguished. The authors review not only literature on food innovation acceptance, but also on technology based innovations in general, besides food (such as information technology).

Ronteltap et al. (2007) proposed a framework for the anticipation of future consumer acceptance of emerging food technologies and identification of potential barriers to consumer acceptance (see figure 5). In this framework, consumer decisions are determined by the intention to use the technology. Two sets of determinants are distinguished in the framework. The first set are proximal determinants that influence the intention directly. The other set exists of distal determinants, that influence the intention indirectly by affecting the proximal determinants. Since characteristics of the social system affect the framework more generically, this determinant is placed 'around' the framework. Lastly, communication factors were placed in between the proximal and distal determinants, as they link innovation features to consumer perceptions.

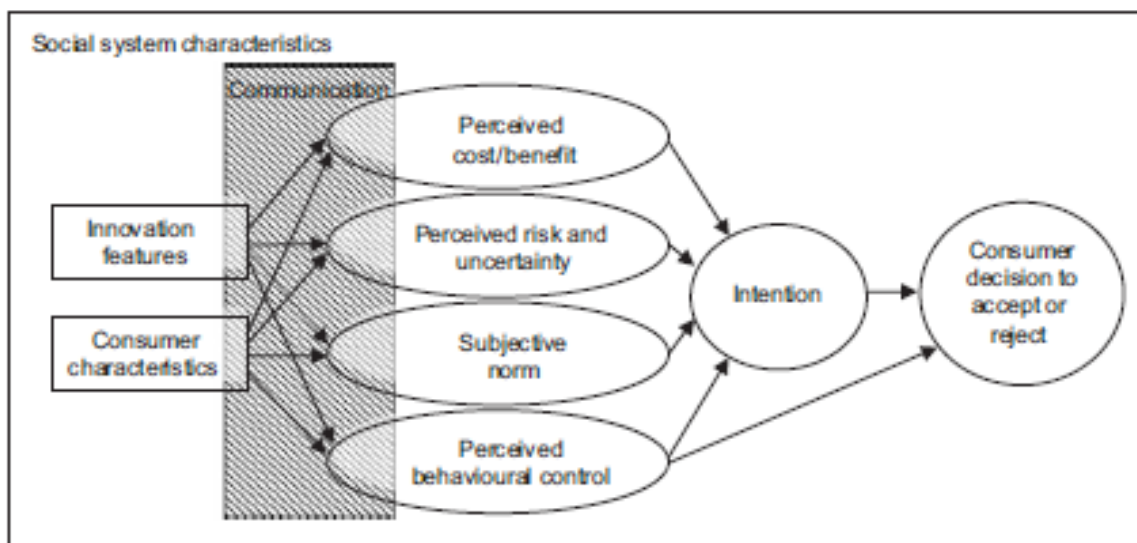


Figure 5: Conceptual framework for research on acceptance of technology based food innovations (Ronteltap et al., 2007)

The determinants in the framework of Ronteltap et al. (2007) will be discussed in more detail in this section, along with several other studies. The studies consider different factors and organizational systems. Therefore, in the remaining of this section, factors were grouped so that those related to each other are together. This led to a new grouping of factors that could play a role in the public perception of IVM: attitudes and associations, characteristics of society, the individual and technology features, communication and framing and trust.

Attitudes and associations

In this first group, attitudes, the factors and concepts that influence this and associations are discussed. Attitudinal models have been widely applied to explain adoption of innovations (Ronteltap et al., 2007). The definition of attitude varies, but generally it is considered the way in which a certain object is evaluated for its favorableness (Ajzen, 2001). According to Ajzen and Fishbein (2000), attitudes are enduring and not easy to change, but yet they are learned and thus can be changed as a result of changing circumstances or perspectives.

A factor that has received the most attention in several fields of attitudinal research, are perceived benefits (Ronteltap et al., 2007). Therefore, perceived benefits could also play a major role in the attitude formation of the public towards IVM. Furthermore, Ronteltap et al. (2007) mentioned that a distinction can be made between personal benefits, such as health benefits, and societal benefits, such as environmental benefits.

In line with the benefits (and sometimes formulated as one concept, such as “perceptions of risk and benefit”), many authors mentioned risks and concerns to play a major role in attitude formation (Frewer et al., 2011; Frewer et al., 2014; Gupta, Fisher & Frewer, 2011; Siegrist, 2008). According to Ronteltap et al., (2007), risks and concerns are of interest for all technology based innovations, but receive considerable attention in the food regime. This may be explained by the fact that consumers hold a intimate relationship with novel foods, as they have to be ingested into the human system (Ronteltap et al., 2007).

Gupta et al. (2011) mentioned that the emotional approach to risk perception has become more dominant. They state that several studies describe this as the “affect heuristic”: the attitudes towards technological risks and benefits are influenced by “risks as feelings”. Siegrist, Cousin, Kastenholtz & Wiek (2007) also linked this “affect heuristic” to risk perceptions, and used it to determine the willingness to buy nanotechnology foods. Similarly, Ronteltap et al. (2007) mentioned feelings affecting the risk perception of consumers, such as anxiety. What feelings are expressed to IVM is uncertain, although some philosophical studies pay considerable attention to *disgust*, or the “yuck reaction”. This is further discussed in section 2.3.

Much like benefits are sometimes formulated as one concept with risk, the concept of uncertainty is sometimes considered together with risk. For example, Ronteltap et al. (2007) mention “perceived risk and uncertainty” (see figure 5). They argue that uncertainty exists when details of situations are unclear (e.g. ambiguous, complex, unpredictable or probabilistic), when information is unavailable or inconsistent or when people feel insecure about their own knowledge or the state of knowledge in general. Similarly, Frewer et al. (2011) mentioned uncertainty in the concept “perceived scientific knowledge/uncertainty”. These authors found that uncertainty was associated with scientific knowledge and with risks or negative impacts for several food technologies. Siegrist (2008) connected uncertainty to risk, stating a high “general confidence” means uncertainty is low

and perceived risks are also low. Uncertainty also holds a connection with the concept of trust, as will be addressed further on.

Ronteltap et al. (2007) argued that uncertainty can trigger strategies to deal with this, such as seeking information to manipulate uncertainty in the desired direction. This is similar to what Frewer et al. (2014) mentioned about ambivalence. They describe ambivalence as an unpleasant state of not holding a positive nor a negative attitude towards nanotechnology, which is different from the definition about uncertainty given by Ronteltap et al. (2007). However, Frewer et al. (2014) argued that ambivalence is, like uncertainty, addressed by shifting a person's attitude towards non-ambivalence through the selection of information that strengthens their attitude in one direction.

Lastly, associations to other technologies and products upon introduction are also considered important. Frewer et al. (2011) and Siegrist (2008) expected people to have relatively low knowledge on new food technologies, resulting in comparisons/associations with other concepts or images.

Characteristics of society, the individual and technology features

The second group of factors includes characteristics that could exist apart from and independent of each other. Cultural and societal factors were mentioned to have an influence on the perception of innovative foods (Frewer et al., 2011; Ronteltap et al., 2007). An example is the difference in acceptability of food packaging including nanotechnology in France and Germany (Frewer et al., 2014).

Characteristics of the product itself are also important for public perception (Ronteltap et al., 2007; Siegrist, 2008). One example that received much attention is perceived naturalness (Frewer et al., 2011; Frewer et al., 2014; Siegrist, 2008). The naturalness of IVM is discussed in more detail by philosophical literature, which is reviewed in section 2.3 Other examples of relevant product features are the price, complexity, convenience, and the production process (Ronteltap et al., 2007). For food innovations, taste, texture and physical appearance is also important.

Biomedical literature or studies on future prospects about IVM (e.g. Datar & Betti, 2010) mentioned mainly technical difficulties on the process of making IVM. Datar & Betti (2010) and Tuomisto and de Mattos (2011) paid only little attention to public perceptions or acceptance of IVM. Factors that are posed to influence public acceptance in this type of literature are costs, characteristics of the product and similarity to traditional meat (taste/look/feel), and safety (Datar & Betti, 2010; Post, 2012; Tuomisto & de Mattos, 2011).

Finally, several authors mentioned that the perception of a technology could be influenced by characteristics of the individual evaluating it (Gupta et al., 2011; Ronteltap et al., 2007; Siegrist, 2008). Examples are socio-demographic variables, knowledge of the technique and general attitudes towards science and technology in general. Ethical considerations of an individual were also seen to play a role in acceptance of food technologies in general (Frewer et al, 2011) and in nanotechnology foods (Frewer et al, 2014). The ethical justifiability of IVM is further discussed in section 2.3.

Ronteltap et al. (2007) also mentioned the influence of the subjective norm (social pressure experienced by a person, from people in their surroundings) and self efficacy (a person's beliefs of their own ability/control to perform a desired behaviour). The authors noted that both factors did not receive much attention in the literature. However, subjective norms could particularly be present when considering food technologies, since eating is a social activity (Ronteltap et al., 2007). In addition, Ronteltap et al. (2007) noted that although verification is needed, self efficacy was seen in other studies to influence acceptance and perception.

Another category comprises factors regarding the communication about and framing of new food technologies. This starts with the way the technology is discussed in public (Ronteltap et al., 2007) and public awareness of the technology (Frewer et al., 2011).

The type and amount of information provided could influence the public perception of a new food technology. Several studies propose certain types of information to be important. For example, Frewer et al. (2011) mention the importance of labeling to facilitate consumer choice. Ronteltap et al. (2007) also discuss the positive influence of labels for foods with an non-conventional production method and foods that the public is suspicious about. However, Siegrist (2008) argues that some experts are uncertain about the use of labels, since it is not certain whether consumers pay attention to them, and they may sometimes enhance risk perceptions (following the precautionary principle).

Also concerning the information providence, Frewer et al. (2011) stress the importance of a transparent regulatory framework on risk assessment and management. This also takes a prominent place in the Public perceptions of agricultural biotechnologies in Europe (PABE) research report, in which a study is presented on the GMO discussion (Marris, Wynne, Simmons & Weldon, 2001). This study took a closer look at why there was a lot of public concern and controversy about GMO's. Besides information about risk assessment and management, Marris et al. (2001) found that the public demands information about benefits and who will benefit, about who decided on the development of the technique and about alternatives and accountability for made choices.

Related to the type and amount of information, a lot depends on the source of the information that is provided. Also shown by the case of GM foods, is the importance of trust in the information source (Ronteltap et al., 2007). Important sources for communication and information are the media (Frewer et al., 2011; Ronteltap et al., 2007).

Siegrist (2008) uses the successful marketing of organic/natural food as an example to show that framing can influence (enhance) the public perception of foods. Another way of framing, is the name that is given to a food product (Frewer et al., 2011; Ronteltap et al., 2007).

Lastly, according to Ronteltap et al. (2007), the method of communication, or communication strategy could play a role in the public perception of IVM. In science communication literature, there is a strong preference for more public engagement to enhance acceptance of new technologies by moving away from the top-down way of communication (e.g. Rogers-Hayden & Pidgeon, 2007; Wildson & Willis, 2004). Since the last decades, with controversies like the BSE crisis and the GM controversy, this way of communication, often referred to as "the deficit model" (or phase 1) in science communication literature, received much criticism. Many authors report on two consecutive phases, often referred to as dialogue (phase 2) and participation/engagement (phase 3) (e.g. Pieczka & Escobar, 2013; Trench, 2008; Wildson & Willis, 2004). Dialogue represents the phase in which the public is being heard, and input is taken into consideration for decisions about scientific developments, policy and communication. In the engagement phase, the public and scientific experts set the agenda together and negotiate about policy and communication strategies.

This movement from phase 1 to phase 3 has received much attention during the GM controversy. However, current literature on public acceptance of food technologies does not emphasize participation much, or even questions the phase movement. Siegrist (2008) mentions that public engagement can have a false negative influence on technology: people with a negative attitude towards the technology are often more willing to engage. In addition, many discussions and other participation events can imply riskiness and create suspicion. Siegrist (2008) states that more

research is needed to determine the influence of public engagement/participation methods on risk perception. Also Frewer et al. (2014) state that engagement is not necessarily the way to go, as it is yet unclear how much influence these participation events should have. Furthermore, there is no real proof that public engagement leads to trust and acceptance.

However, according to Frewer et al. (2011, 2014), inclusivity in the process can have a positive influence on public acceptance, since concerns and ideas at an early stage of development can be used to implement in the technique and to compose a regulatory framework, especially for (potentially) controversial technologies. In addition, as mentioned earlier, early stage perceptions can help determine what factors are leading to acceptance, rather than rejection, and to understand the reactions when a technology is introduced.

Trust

Finally, as mentioned by Ronteltap et al. (2007), another widely researched and considered important factor in the public perception of technology, is the concept of trust. For example, Siegrist (2008) mentions that there is no agreement on how trust must be conceptualized, but one way that has been proposed links trust to shared beliefs between institutions and the public. Trusted institutions are those that behave in a way that reflects a person's values (Frewer et al., 2014; Ronteltap et al., 2007).

Trust becomes important in cases where when the public is not able to evaluate the benefits and risks themselves, which is the case with food (Siegrist, 2008). Social trust (willingness to rely on decisions made by others) is in this case important: the public is dependent on information and judgments from other parties, such as the industry and monitoring instances (Ronteltap et al., 2007; Siegrist, 2008). Consumers cannot verify the safety and the exact content of products. Therefore, trust in the producer/industry, scientists and controlling agencies (such as the government) is needed. This is also the reason why trust holds an important relation with uncertainty: uncertainty about risks and a lack of knowledge is especially low when trust in authorities, such as risk regulators and managers, is low.

2.3 Ethical studies

The ethical justifiability of IVM

Several studies have been conducted to determine the ethical justifiability of IVM. Hopkins and Dacey (2008) list thirteen potential ethical objections, but argue that all of them can be overcome by ethical theories and reasoning. Some of the objections are also discussed by others, for example Pluhar (2010), who discusses several types of alternatives to "factory farming". After determining that current meat production is ethically unjustifiable, she concludes that IVM is the best option to tackle the problems with factory farming, when compared to humane animal farming and vegetarianism. Schaefer and Savulescu (2014) discuss three objections also listed by Hopkins and Dacey, and counter them from ethical perspectives as well. In sum, most ethical studies concluded that IVM is justifiable. In the remainder of this section, two (moral) objections often associated with IVM are discussed: disgust and naturalness.

Disgust: the “yuck” factor

Some topics discussed in social psychology studies, focused on consumer and attitudinal research, are mentioned very shortly, or are more emphasized in ethical studies. An example are feelings or emotions, such as anxiety (Ronteltap et al., 2007). Some early glances at public reactions to IVM (e.g. internet polls etc.) show disgust and feelings of repulsion (Pluhar, 2010; van der Weele, 2010b). In the context of new technologies, reactions in this sense are often referred to as a reaction to “the yuck factor”: “*an instinctively reaction of repugnant things*” (Schmidt, 2008). According to Hopkins & Dacey (2008), disgust is sometimes considered a mechanism built in by evolution (e.g. the universal repulsive reaction to green, slimy substances), or a culture dependent reaction (e.g. the differing reaction to consumption of dog meat in Asia and Europe, or to mixed race babies).

Using the yuck factor as a moral argument is considered problematic by Hopkins and Dacey (2008); evolutionary or cultural feelings as illustrated by previous examples, may not provide sufficient, rational arguments in a moral discussion. These authors, as well as Smith (2008) argued that feelings of disgust should not count as an end argument, but should be first followed by reasoning. This process has been noted in the case of IVM, as people’s disgust reactions are sometimes short and turned around after more consideration (e.g. of the possible benefits) (van der Weele, 2010a).

Although Schmidt (2008) agrees with the low moral strength of the yuck factor argument, he does emphasize this reaction should be taken seriously. It can open up a debate with the public, and force scientists to make a stronger case for why a technology should be developed. Schmidt (2008) also stated disgust can come from other sources than the product itself. Violations of morality can be perceived by the public, and cause disgust (e.g. “playing God” in the GM case). Communication sources are also important: these should be publicly trusted instances, not directly benefiting from the technology. That way, “financial disgust” may arise. Framing influences the disgust trigger of a technology as well (e.g. “Frankenfood” as a reference to GM food).

Naturalness

A second topic that is considered in social psychology literature is naturalness. Naturalness is generally a positively evaluated concept by the public, and associated with better looks and taste (Siegrist, 2008). Therefore, advertisements are often associated with nature. However, Frewer et al. (2011) stated that unnaturalness in itself is not necessarily having a negative influence on acceptance. They argued that perceptions of bioactivity and limited control over bioactivity are more important, and may result in rejection.

However, naturalness is not considered a valid moral argument for rejection of IVM by several authors in the ethical literature. Several reasons are given, for example that naturalness is a concept that is very hard to define. This means that evaluating the naturalness of IVM can lead to many conclusions (Hopkins & Dacey, 2008; Welin & van der Weele, 2012). Even if it were possible to determine this, naturalness does not equate with what is good for humans. A related argument against IVM could be that by becoming dependent on a technology, humans estrange themselves from nature and animals. This is objection countered by Hopkins & Dacey (2008), by comparing it to its alternatives (veganism, hunting or current practices), and arguing that these not very natural either. Another counter argument, used by Schaefer and Savulescu (2014), is the fact that the relation with animals is not affected by IVM if the animals are still kept responsibly, and cells are

taken from time to time. In addition, Welin & van der Weele, 2012 argue that by doing this, the relationship between humans and animals might even improve.

In sum, the reasons for why naturalness is not considered a valid moral argument by several authors, is also the reason why it can still become a problem for the acceptance IVM. It may not be influential in ethical reasoning, but people can still give their own interpretation and use it as a guide to judge (and possibly reject) IVM.

2.4 The public perception of IVM

Except for the following three studies, no studies have been found which examined the public perception of IVM. The first study was conducted by Tucker (2014), who looked at the responses to different practices that are related to the reduction of red meat consumption. These practices included IVM, along with eating nose-to-tail (finishing as many parts of an animal as possible to increase efficiency), entomophagy (including insects in the diet) and reducing red meat consumption. All participants resided in New Zealand and were researched with focus group discussions.

Tucker (2014) found that for all practices, sensory appeal was most problematic for the participants, although they did recognize the ecological rationale. Specifically for IVM, Tucker (2014) found an overall negative view. Participants rejected IVM on the basis of their sensory perceptions of it, together with perceptions of unnaturalness, which was linked to unhealthiness (Tucker, 2014). This could mean that the “product features” concept from the model of Ronteltap et al. (2007) is very important for IVM. Positive aspects that were mentioned by participants were the improved animal ethics and the capacity to increase protein productivity.

The second study was conducted by Hocquette et al. (2015), who evaluated opinions on IVM among 1890 educated people (scientists or students) from around the world using a survey (with closed questions). Hocquette et al. (2015) found that a minority of the respondents thought that IVM would be healthy and tasty, similar to the findings of Tucker (2014). This further emphasizes the importance of the “product features” construct in the model of Ronteltap et al. (2007).

Furthermore, Hocquette et al. (2015) showed that the majority of respondents acknowledged the problems the meat industry faces, but preferred eating less meat over eating IVM. As Hocquette et al. (2015) argued, this result is not supported by the world’s consumer behaviour: the demand for meat continues to grow. The authors hypothesized that this is a result of the respondents not being convinced of the safety, taste and healthiness of IVM. These factors are also key priorities, next to animal welfare and environmental issues. In addition, respondents were not convinced of the benefits of IVM: the environment would still suffer from the incubators needed to grow the cells for IVM, and the lack of a need for farm animals could become problematic.

In addition, Hocquette et al. (2015) discussed the fear of consumers for artificial products, and compared this to GMO’s. The fact that IVM is artificial and new may create this fear, again because it is not surely healthy, tasty nor is it clear how it is made, just as with GMO’s. This emphasizes the importance of emotions, also discussed by other authors (Gupta et al., 2011) and present in the model of Ronteltap et al. (2007).

Finally, in a study published by Verbeke et al. (2015), the public perception of IVM was researched in three European countries: Denmark, Portugal and the United Kingdom (UK). 179 meat consumers were introduced to IVM and their reactions were examined in focus group discussions. Verbeke et al. (2015) did not elaborate on the differences between the countries, but did state that Belgian participants were most in favor of IVM, and that participants from the UK opposed the

strongest opposition. The factors naturalness and disgust to be very prominent in first reactions to IVM, further emphasizing the importance of this specific product feature and emotion, respectively. In addition, Verbeke et al (2015) found a relation between the two. It seemed that the disgust reaction, widely adopted with the participants, influenced their judgment considering naturalness. The strong yuck-factor of the production process (not the product itself per se) led to several negative associations (e.g. creating babies, Frankenstein's monster and science fiction), which in turn lead to a "negative" evaluation towards naturalness. This shows that besides disgust, also 'naturalness' has an emotional appeal in the context of food, as suggested by some researchers (Verbeke et al., 2015).

Besides findings in terms of naturalness and disgust, Verbeke et al. (2015) found that benefits were also an important aspect. These were not per se personal benefits experienced by the respondents, but more societal benefits in the sense of the environment and global food security. Interestingly, this differs from the reactions of respondents in the study of Hocquette et al. (2015), who were more skeptical about the benefits of IVM.

Important risks found by Verbeke et al. (2015) were uncertainties about safety and health, and about the loss of existing eating traditions and the loss of rural livelihood. Another aspect found by Verbeke et al. (2015) to be relevant was the proper labeling of IVM products. This is in line with statements of Frewer et al. (2011) and Ronteltap et al. (2007), who also mentioned that labeling is important to consumers.

Finally, Verbeke et al. (2015) found one aspect to be of importance that was not mentioned in previous literature: submissive feelings towards "the inevitable" scientific progress. Respondents included in the study apparently associated (the development of) IVM to general technology proceedings in today's society. More importantly, they became more open to IVM because of this feeling of not being at power to resist scientific progress.

In sum, benefits and risks were shown by all three studies to be of importance for IVM and that perceptions are largely similar in different countries. Perceived benefits included mainly the reduction of environmental damage and efficient production of proteins. However, the perceived risks, such as product features (naturalness, taste, health, safety) and emotional reactions towards IVM (disgust) caused respondents in some studies to prefer eating less meat or vegetarian products instead of IVM.

In conclusion, few studies have been conducted on the public perception of IVM. However, several studies discuss the public perception or acceptance of new food technologies in general, or that of other food technologies. Also, literature that focuses on other aspects of IVM mention public acceptance. Through the review of this literature, several factors and concepts, such as perceived benefits, perceived risks and trust, were obtained that may influence the public perception of IVM in the Netherlands. These factors and concepts were used to develop qualitative research methods, which is further explained in the next chapter.

3. Methods

Choices regarding the methodologies are explained in section 3.1. The interview and focus group discussion structure and contents are described in 3.2. Section 3.3 focuses on the selection and recruitment of respondents. The chapter ends with a description of the analysis in 3.4.

3.1 Qualitative research

The aim of this research is to gain insight in the current public perception of IVM in the Netherlands, and to find what factors influence this perception. Early insight in the public perception of a technique is important for understanding public reactions at the time of its introduction and to provide information about the public acceptance of IVM.

As can be seen in the literature study (chapter 2), little is known about the public perception of IVM, and about what factors play a role in this perception. Therefore, this area represents a new topic that has to be explored. Qualitative methods, in which broad, personal opinions or behaviours are acquired, are appropriate to this end (Baarda, de Goede & Teunissen, 1995; Hopf, 2004). They provide insight in properties and arguments, rather than information about frequencies or quantities (Baarda, 2009; Baarda, de Goede & Van Der Meer, 1998; Morgan, 1996). Furthermore, interviews and focus group discussions generate in depth information about personal views and arguments, rather than information about existing behaviour obtained in other strategies such as observation.

In this study, interviews are conducted with stakeholders, while focus group discussions are held with members of the public. Qualitative interviews with stakeholders can provide insight in the public perception of IVM. In addition, they can be a preparation for the focus group discussions with the public.

Focus groups are used for a variety of research purposes. It is a research technique that collects data through group interaction on a topic determined by the researcher (Morgan, 1996). Although the public could also be considered a stakeholder, perceptions and views of members from the public can be explored better with focus group discussions than with interviews. People currently have little knowledge of IVM, and may not hold an extensive opinion on this subject that is necessary for interviews. Another advantage of focus group discussions is that respondents listen and respond to each other, and explain their opinions. This provides deeper insight in perceptions and topics that would be overlooked in individual interviews (Baarda, 2009; Morgan, 1996).

However, this “group effect” also poses a possible limitation. Certain respondents in a group might have a dominant opinion or view (Morgan, 1996). In addition, discussions could become sidetracked to irrelevant issues (Kidd & Parshall, 2000). To minimize both these possible limitations, an experienced moderator is required. This is important for qualitative data generation in general, since moderating a discussion can also influence the data.

3.2 Respondents

The aim of this research is to obtain a variety of views, thoughts and opinions about IVM that play a role in the Netherlands. For the stakeholder interviews, several fields were identified that have a relation with IVM in some way. These fields include professions in several areas such as scientific research and popular media, and represent a variety of viewpoints. Seven stakeholder types were included in this study:

- Scientific experts (biomedical researchers): researchers who are involved in the development of IVM, and have the knowledge about technical aspects of IVM (biomedical engineering).
- Philosophers: Societal and ethical researchers who study the moral justifiability of IVM, or possible societal and moral implications of IVM.
- Politicians and governmental institutions: stakeholders who regulate development and communication of new technologies in general.
- Policy and advisory institutions: stakeholders who give advice to the government about (new) food policies, and evaluate or control scientific developments and new food products.
- Industry: parties that produce, sell or market meat.
- Artists: stakeholders who are involved with facilitating public discussions about IVM, by visualizing the concept.
- Public representative: stakeholders who are in direct contact with the public regarding food or IVM.

For the focus group discussions, groups with different characteristics were included in the study to ensure a variety of views and opinions. These types are aimed to represent different kinds of public characteristics, while still maintaining practical feasibility. As a result, the following four focus groups were formed:

- Vegetarian group: people with a specific eating pattern (no meat).
- Students group: biomedical engineering students who have a technical background.
- Citizens: people from the Dutch public.
 - o Urban group: Citizens from the Western part of the Netherlands, where eating habits are high in (cultural) diversity and where large cities are localized.
 - o Rural group: Citizens from the Eastern part of the Netherlands, where eating habits are more traditional, and many farms exist.

3.3 Organization and procedure

Given the explorative nature of the study, respondents in the interviews and focus group discussions need to be able to freely bring up or elaborate on topics. Non directive, open questions are preferred for exploring ideas and opinions about new technologies (Baarda et al., 1998). However, open or unstructured interviews and focus group discussions are not preferred, since they do not allow the researcher to bring up certain topics, but instead might lead the conversation to irrelevant topics. Therefore, the stakeholder interviews and focus group discussions were semi structured, and a topic guide was used. A topic guide allows an interviewer or moderator to bring up certain topics, while leaving enough room for the respondents to bring up or elaborate on topics of their particular interest (Baarda et al., 1998).

The topic guide for the interviews and focus group discussions of this study was based on the literature study in chapter 2. This way, factors that could influence the public perception of IVM could be explored. The following themes were used to divide the concepts and topics from the literature study, and to form the topic guide:

- Theme A: Associations and attitude.
- Theme B: Characteristics of the society and individual.
- Theme C: Communication and framing.
- Theme D: Trust and uncertainty.

The factors within the themes are summarized in a analytic scheme (Appendix A), which was used to construct the questions and the topic guide for the interviews (Appendix B) and focus group discussions (Appendix C).

The topic guide for the interviews differed only a little from the topic guide for the focus group discussions. Stakeholders were asked to reflect on the public's perception, while respondents in focus groups were asked to express their own perception. Therefore, certain questions were revised or omitted (e.g. a question about age influence).

Relevant stakeholders were identified, guided by the categories defined in the previous section. They were approached by email. At least one stakeholder per category was included. One interview was conducted through Skype, all others were conducted in person at the institution where the stakeholder was active. Interviews lasted approximately one hour, and were conducted by the researcher of this study.

Respondents for the focus group discussions were recruited by a combination of convenience sampling (invitations via several social media platforms, websites and vegetarian stores) and snowball sampling. At least five respondents per group were included. The respondents volunteered to participate: a small token of appreciation and a refund for travel expenses were provided. The group discussion with citizens from the urban area was conducted in the building of Science center NEMO in Amsterdam (West Netherlands), the other groups were conducted on the campus of the University of Twente in Enschede (East Netherlands). Focus group discussions lasted approximately 90 minutes, and were guided by an experienced moderator.

The focus group discussions started with an information video about IVM (see Appendix D for a link and a written version of the text in the video), to provide all respondents with the same basic information. The video was selected to be as neutral as possible, because suggestive or directive information could impair the data. Therefore, the video only explained the production process by which the first IVM hamburger was made. In this way, respondents could get an idea of what the technology looks like. Respondents were asked to not discuss their first reactions and thoughts with each other, but to write them down. The discussion was then initiated by presentation of the written down reactions. The video was not shown to stakeholders, since they were assumed to have a proper basic understanding of IVM through their connection/field of profession.

3.4 Data analysis

The interviews and focus group discussions were recorded with consent of the respondents, and transcribed verbatim. Transcriptions were then analyzed and coded with qualitative analysis software, Atlas Ti 7.2. Coding was done in a deductive manner, using concepts from the literature study and the analytic scheme (Appendix A). Key concepts from the literature study functioned as codes in the analysis, specific examples mentioned by respondents were given a sub-code within a code. The following citation can be used to exemplify this process:

“Er wordt ook positief gereageerd op het idee dat er dus minder dierenleed aan te pas komt.”

In the example citation, the main code used for this fragment is “benefits”, the sub-code is “animal welfare”. New codes were also composed as trends or topics which emerged that did not fit into concepts from the analytic scheme.

4. Results

In this chapter, findings of the stakeholder interviews and the focus group discussions are presented. First, characteristics of the respondents are given for both the interviews and the focus group discussions in section 4.1. After this, findings of the methodologies will be presented in sections 4.2 through 4.5. Attitudes and associations (theme A) are presented in 4.2, followed by characteristics of society, the individual and technology features (theme B) in 4.3. Communication and framing (theme C) is given in 4.4, trust (theme D) in 4.5. In every theme, data from the stakeholder interviews are presented first. Then the views of the focus group respondents are presented. Finally, at the end of every theme, an overview and comparison is given.

4.1 Respondents

Interviews respondents were stakeholders with different backgrounds. A total of nine stakeholders were included, with at least one stakeholder in each category to ensure a wide diversity of opinions, arguments and viewpoints. All but one of the stakeholders were Dutch and active in the Netherlands. One stakeholder was an Italian philosopher, working in Germany. Stakeholder institutions and differing professions are listed in table 1.

Table 1: Overview of included stakeholders

Stakeholder category	Institution	Position
Scientists biomedical engineering (n=1)	Maastricht University	Professor in physiology, lead scientist in the development of IVM, creator of the first IVM hamburger
Scientists philosophy and ethics (n=2)	Wageningen University	Bioethicist and applied philosopher, conducted research on ethical aspects of IVM and its impact on society
	Karlsruhe Institute of technology	Bioethicist and philosopher, conducted research in (animal) ethics and politics, involved with technology assessment of IVM in Germany
Artists (n=1)	Next Nature Network	Bio-artist and philosopher, focuses on humans co-evolutionary relationship with technology, wrote a book containing IVM recipes
Politicians/ governmental institutions (n=1)	Partij voor de Dieren (Party for the animals)	Party leader of the province of Overijssel, for the Dutch political party whose highest priority is animal welfare and the respectful treatment of animals
Policy/advisory institutions (n=1)	National institute for public health and the environment (RIVM)	Senior scientific advisor “Food and food safety”, from the centre of food, prevention and care department
Meat industry (n=2)	Centrale organisatie voor de	Communication advisor for COV, spokesman

	Vleessector (COV) (central organization for the meat sector)	of public information foundation website vlees.nl
	Dutch meat association (NVV)	Owner of a pig farm, regional chairman of Twente for NVV
Public representative (n=1)	Museum Boerhaave	Conservator at Museum Boerhaave, currently hosting a exhibition about food that includes a preserved sample of the first IVM hamburger

Four group respondents were selected for the focus group discussions, as defined in section 3.3. A total of 25 respondents (twelve men, thirteen women) were included, with a minimum of five and a maximum of eight respondents per group. The age range was between 19 and 55. Respondents of the rural area and the students group lived in several cities in East Netherlands, respondents from the urban group lived in Amsterdam. The vegetarian group was a mix of these. A summary of their characteristics (gender, age range and cities of residence) is given in table 2. Apart from the biomedical engineering group, respondents with several professional backgrounds participated, e.g. industrial designer, supermarket manager, skin therapist, arts teacher, unemployed citizens and self-employed citizens.

Table 2: Summary of focus group respondents

Group	Gender	Age range	Cities of residence
Vegetarians (n=5)	2 male 3 female	27-55	Amsterdam, Enschede, Hengelo
Biomedical engineering students (n=6)	3 male 3 female	22-25	Almelo, Enschede, Hengelo
Rural area (n=8)	3 male 5 female	25-51	Albergen, Borne, Enschede, Hengelo
Urban area (n=6)	4 male 2 female	19-52	Amsterdam

In addition, respondents were asked about their eating and cooking habits, such as frequency of cooking, frequency of eating vegetarian and whether they maintained other specific diets.

The frequency with which respondents cook at home (for themselves and/or others) differed within groups, although there was little difference between the groups. Most respondents indicated that they cook “on a regular basis” (+/- three days a week) or “often” (more than five days a week). Five respondents in total indicated to seldom or never cook.

The groups were also asked about their consumption of vegetarian foods and other dietary habits. Four respondents in the vegetarian group ate neither meat nor fish, one only refrained from eating meat. A variety of reasons was given for choosing a vegetarian diet, e.g. animal ethics, trust in meat products, personal health and the environment. One respondent ate vegan and one refrained from eating gluten.

In the other groups, two respondents (one in the biomedical engineering students group and one in the rural group) regularly ate vegetarian for taste and/or health reasons. The remaining

respondents seldom or never ate vegetarian, mainly because they appreciated the taste of meat. The argument of health or a varied diet was also a reason for eating meat. Furthermore, only one respondent (in the students group) maintained an additional, specific diet. She refrained from eating a few specific products for medical reasons.

Results of the interviews and focus group discussions are presented in the remainder of this chapter. Constructs from the analytic scheme (some of which were grouped together) have been used as headings to present the results within the themes. For every heading, first, a table is given with citations of respondents. The tables are followed by a description of the table contents.

4.2 Theme A: Attitudes and associations

Theme A includes first thoughts and feelings upon introduction of IVM, associations with other products or technologies, benefits, negative aspects and risks. In addition, the question of whether the respondents would try eating IVM is addressed. The respondents were asked if they would be willing to try IVM when it would be available at this moment. This was done twice, at the end of theme A and at the end of the complete discussion. Stakeholder and focus group respondent views are ordered in such way that topics within this theme and with a positive view are presented together, and those with a negative view are presented together.

4.2.1 Stakeholder interviews

Positive attitudes and associations

Table 3: Positive public attitudes and associations, expected by stakeholders

Positive	Citations
First reactions	
Good idea	<i>"Bijna iedereen die er voor het eerst van hoort, dat gold voor mijzelf trouwens ook, denkt "oh!". En dan zeggen mensen of: wauw, wat een goed idee." SH1, I25, philosopher</i>
Wow	<i>"Sommigen zijn ook van wauw, wat bijzonder dat het kan." SH9, I49, public representative</i>
Emotions	
Surprise	<i>"En daar zijn dus wel echt emoties van mensen die denken van wauw, je kunt hier echt hele totaal andere gerechten mee maken. Wat een feest eigenlijk." SH8, I50, artist</i>
Hope	<i>"Nou, bijvoorbeeld hoop. Veel mensen zien dus de problemen rond vlees, die zien zichzelf niet als een pionier op dat gebied. Niet als iemand die vegetariër gaat worden. De meeste mensen vinden dat een beetje te extreem, of willen zich niet te ver verwijderen van wat er in hun omgeving gewoon is. Maar ze hopen ondertussen wel op nieuwe mogelijkheden." SH1, I64, philosopher</i>
Pride	<i>"Ik proef dat heel erg, het aantrekkelijke van dat wij zo veel kunnen als Nederland, sowieso speelt dat ook een rol, de nationale identiteit, van wat zijn wij goed op dat gebied." SH9, I57, public representative</i>
Associations	
Meat/meat	<i>"Mijn ervaring is dat mensen het gewoon associëren met vlees van een dier."</i>

products	<i>SH8, I66, artist</i>
Other current products	<i>"Mensen vergelijken het bijvoorbeeld met margarine. Zo van: ja dat was in het begin ook heel raar, maar daar zijn we ook aan gewend geraakt na een tijdje. Ze hebben het over broccoli wat we vroeger niet kenden, of nasi goreng. Maar ook aan technologie in het algemeen, magnetrons." SH1, I48, philosopher</i>
Meat problems	<i>"Omdat wat dan blijkt, is dat ze van kweekvlees al snel op de problematische kant van vlees komen. Ze zien die problematiek wel, ook als ze zelf vlees eters zijn. Heel veel mensen zijn toch heel dubbel over vlees. Tamelijk negatief zelfs, ook vlees eters." SH1, I30, philosopher</i>
Benefits	
Animal welfare	<i>"Ik denk dat ze wel het voordeel zullen zien van nou, er lijden dan in ieder geval niet zo veel dieren voor vleesconsumptie." SH2, I52, politician</i>
Global food security	<i>"Maar op een gegeven moment, als we steeds meer vlees gaan eten in de wereld, dat een serieus probleem is, op een gegeven moment krijg je dat echt niet meer geproduceerd. Dit zou een alternatief zijn." SH3, I41, policy maker</i>
Environment	<i>"Je zou je in het geval van dit kunnen voorstellen dat veel burgers zeggen van nou, dat lijkt me wel duurzaam en een lagere CO₂ et cetera." SH5, I21, industry</i>
Health	<i>"Het is niet belangrijk dat er een stuk vlees gemaakt wordt, het is belangrijk om de juiste voeding binnen te krijgen. Zodra je dat zou kunnen sturen, kun je ook hart en vaat ziektes verminderen en ja, zeg maar wat er nog meer van komt. [...] Dus de gezondheid van de mensen zou je wat mee kunnen, als voordeel." SH7, I62, industry</i>
More important: environment vs. animal welfare	<i>"I'm not saying there is no animal rights issue, there are groups, but they are not in the majority. So the question of animal rights, or animal ethics, is secondary with respect to the question of sustainability which is very anthropocentric, at least in the German debate." SH4, I58, philosopher</i> <i>"Ik denk dat voor het publiek het grootste voordeel is dat je in principe geen dieren ervoor zou te hoeven slachten. Dus de ethische aspecten, ik denk dat die voor het publiek belangrijker zijn dan de milieuoverwegingen en de voedselzekerheidsoverweging." SH6, I37, scientist</i>

When stakeholders were asked about how the Dutch public would conceive IVM, reactions varied widely. Positive evaluations are summarized in table 3. Examples of first reactions and emotions, expected by several stakeholders, are that IVM would be perceived as a good idea, surprising and accompanied by a "wow" factor.

Most stakeholders thought that the public would associate IVM with vegetarian products or meat products. Furthermore, problems with meat and the bad reputation of meat were mentioned by some stakeholders. This association was referred to in both a positive and a negative way. One philosopher and the politician thought meat problems cause a more negative view of IVM and make the public suspicious. This kind of link with meat problems returns in the trust theme, in section 4.5. Here, comments of one philosopher and the artist are considered, who expected the relation with meat problems to be beneficial for IVM. They said that the Dutch public might view IVM as promising because it offers an alternative for them to help reduce the problems with meat. Finally, one philosopher expected the Dutch public to associate IVM with other positive, previous food developments, such as fried rice, broccoli and margarine as a replacement for butter.

The three most important benefits mentioned by the stakeholders are less animal suffering and killing, the contribution of IVM to global food security and less environmental damage and improved sustainability. The potential for IVM to become a much cleaner, safer and/or healthier product was brought up once, by a respondent from the meat industry.

Finally, two stakeholders made contrasting comments on what benefit the Dutch public would appreciate most. One philosopher mentioned that people mainly value the benefits for the environment and sustainability, and that the decline in animal suffering is secondary. The scientist expected this to be the other way around, as can be seen in the following citation:

“Ik denk dat voor het publiek het grootste voordeel is dat je in principe geen dieren ervoor zou te hoeven slachten. Dus de ethische aspecten, ik denk dat die voor het publiek belangrijker zijn dan de milieuoverwegingen en de voedselzekerheidsoverweging.” SH6, I37, scientist

Negative attitudes and associations

Table 4: Negative public attitudes and associations, expected by stakeholders

Negative reactions	Citations
First reactions A reserve, resistance Mixed reactions Extreme, scary	<i>“En dan denken ze dus oh, het wordt dus gemaakt in een lab en het is niet van... ze zien geen dier. Hoewel, ik weet niet hoeveel mensen nog een dier zien als ze vlees in de supermarkt zien, maar dat is weer wat anders. En dan zie ik toch een soort van weerstand.” SH9, I49, public representative</i> <i>“Of ze komen onmiddellijk in een meer gemengde golflengte terecht, waarin ze denken dat het aan de ene kant wel een goed idee is, maar aan de andere kant is het wel erg onnatuurlijk.” SH1, I25, philosopher</i> <i>“Ik denk dat ze op dit moment, wat ik net al aanhaalde, het wat vreemd vinden. Dat vlees geproduceerd wordt in een laboratorium, en dat ze dat wat extreem, of eng, of vreemd vinden.” SH2, I44, politician</i>
Emotions Unnatural Yuck factor	<i>“Het zijn emoties misschien van verlies van romantiek, hoe het vroeger was en hoe het hoogtechnologisch gaat worden in de toekomst. Het wordt onnatuurlijk genoemd, wat als je daar even over nadenkt geen rationele term is maar echt een emotionele term. [...] En het wordt fabrieksmatig genoemd in de zin van “zo meteen zijn alle producten hetzelfde”. Zeg maar het eenheidsworst sentiment.” SH6, I49, scientist</i> <i>“Ik krijg wel het gevoel dat men er ook iets meer vertrouwd mee is dan 5 jaar geleden. En dat de yuck reactie iets van nuanceren heeft gekregen.” SH8, I38, artist</i>
Associations Other (food) technologies - GMO	<i>“I think they will immediately do the association with GMO. Also because in the public there is a very messy perception of what genetics and biotechnology is, also because it is a difficult technology of course. But to technically distinguish very much the biomedical engineering from</i>

- Laboratory, manipulation	<i>biotechnology is not so easy. So I expect that the connection with GMO will come very soon.” SH4, I71, philosopher</i> <i>“Wat ik er zelf van denk is dat het idee van de associatie met het laboratorium, dat dat wel een ding is. Terwijl als je gewoon kijkt, dan worden producten als melk ook helemaal, alleen is dat laboratorium dan heel grootschalig. [...] Ik denk dat het idee van laboratorium en het bewerken van iets levends, dat dat een associatie wekt, maar dat is misschien een persoonlijke hang up hoor, met iets manipuleren, een leven manipuleren, snap je? Dus een levend iets manipuleren, en dan denken mensen aan embryo’s manipuleren, klonen, wat vaak ook op 1 hoop geveegd wordt.” SH9, I65, public representative</i>
Downsides Unnaturalness Uncertainty Lack of use Loss of farm animals Product flaws	<i>“Je hebt ook mensen die omdat het een laboratorium associatie heeft, die zullen daar misschien ook meteen het idee van onnatuurlijk opplakken, en je merkt wel, en dat is misschien in bredere zin in de tentoonstelling, dat mensen bang zijn voor het onnatuurlijke, of althans wat zij dan als onnatuurlijk bestempelen.” SH9, I85, public representative</i> <i>“De eerste tegenberichten die mensen vaak geven is dat het niet natuurlijk is. Ik ben dit niet gewend, het is nieuw, ik heb er geen zin in.” SH8, I54, artist</i> <i>“En dan is het toch wel zo dat mensen het heel moeilijk vinden om er überhaupt iets van te vinden. Want het bestaat nog niet, je kunt niet proeven en je kunt het niet zien.” SH1, I30, philosopher</i> <i>“Onzekerheid is onbekendheid. Als men de achtergrond niet kent... dingen die onbekend zijn, zijn gevaarlijk. En daar is een goeie veiligheids-, risk assessment, is belangrijk. En dat moet je goed communiceren.” SH3, I132, policy maker</i> <i>“Maar wat denk ik belangrijk is als je het over kweekvlees hebt, is dat je kijkt van: waarom zou men dat willen eten? Voedingskundig heb je het niet nodig. Dus je kunt je eiwitvoorziening best uit andere bronnen halen. Als dan normaal vlees niet mogelijk is, dan kan ook door een goede combinatie van andere voedingsmiddelen, dat is geen enkel probleem.” SH3, I25, policy advisor</i> <i>“Misschien vinden ze het ook wel jammer, want heel veel burgers houden ook van koeien in de wei, als doel op zich. Geen boerderijen meer is toch wel heel raar, denk ik. Mensen kunnen dat dus ook beoordelen als heel raar dat je dat je zowel een dierlijk product hebt, maar geen dieren meer.” SH5, I41, industry</i> <i>“Maar of dit zich gelijk leent voor massaproductie op consumenten niveau, dat vind ik een hele lastige. Omdat ik denk dat de consument dit niet snel zal accepteren als een volwaardig vervangend product, omdat het dat ook niet is, en het heel technisch tot stand is gekomen.” SH5, I45, industry</i>

Negative reactions to IVM were mentioned by the stakeholders, with varying degrees, as can be seen in table 4. Some stakeholders referred to a reserve or resistance in people's first reactions, or to a mixed reaction such as impressive but costly, or good idea but unnatural. Feelings of unnaturalness were also mentioned by the scientist, and that this causes other emotions, such as "the loss of romance, of how things used to be" and sentiments about all products becoming the same.

Stronger negative reactions were also mentioned, such as that the idea of IVM is perceived as "extreme" (politician) or "scary" (politician, respondent from the industry). Also the yuck reaction came up a few times, although it was expected to be less present than a few years ago, with more nuance towards IVM, as was explained by the artist:

"Ik krijg wel het gevoel dat men er ook iets meer vertrouwd mee is dan 5 jaar geleden. En dat de yuck reactie iets van nuanceren heeft gekregen." SH8, I38, artist

Associations with a negative accent included other (food) technologies, with genetic modification being the most frequent (two philosophers and the scientist). The scientist further mentioned cannibalism and cloning. The public representative added laboratory associations and manipulation of life.

Several downsides to IVM were given by the stakeholders, especially by the politician, as shown in the bottom row of table 2. The first, most mentioned negative aspect is the unnaturalness of IVM. Other, similar terms used were industrial, artificial and laboratory or technology made. All stakeholders referred to (one of) these terms, except the policy maker and one respondent from the industry.

Secondly, a much mentioned downside of IVM was the fact that it does not exist yet and could cause uncertainty. According to a philosopher, this makes it hard for the Dutch public to form an opinion on IVM in general. The policy maker added wonderings about the taste and consistency. The scientist mentioned that the abstractness causes limited insight in what the technology is and how it is produced, which in turn causes suspicion or risk perceptions. The production process was also the most mentioned feature that stakeholders expected the Dutch public to have questions about. The scientist said that people would find it hard to determine the risks, but that this is also largely unknown for scientists themselves. Furthermore, uncertainty received little attention from the stakeholders. Several stakeholders expected the Dutch public to be uncertain about safety and health. However, this was expected to be the case mainly at the beginning, when IVM is still new and unfamiliar, and not much information is present.

Another downside of IVM, according to the politician, policy maker and a philosopher, was the lack of a use for the product. They mentioned that people could wonder why we need IVM, since we don't need meat nutritionally and/or because there are already other products that could replace meat.

Two stakeholders mentioned the fact that farm animals would become unnecessary. This is in part positive, but can also be considered by the Dutch public as a negative aspect, as shown in the following citation:

"Misschien vinden ze het ook wel jammer, want heel veel burgers houden ook van koeien in de wei, als doel op zich. Geen boerderijen meer is toch wel heel raar, denk ik. Mensen kunnen dat dus ook beoordelen als heel raar dat je dat je zowel een dierlijk product hebt, maar geen dieren meer." SH5, I41, industry

A fifth negative topic includes flaws of IVM as a product, mentioned by several stakeholders. Examples are that it would be weird for people to consume, that all products would become the same and that production costs would be too high. A representative from the industry did not expect IVM to be accepted by the Dutch public as a meat replacement.

Risks

Table 5: Risks perceived by the public, according to stakeholders

Risks	Citations
Health and safety	<i>"I think mainly two, the first and strongest being health risks. Connected with the fact that if it's, one way is the nutritional component, if it's enough to gain up nutritional components and whatever. And the other will be if it's safe, because it is another way of being produced. We must also consider that many people will have suspicion about things which happen in the lab. So in a sense I don't know if they will be so keen to accept this "what is in the lab is clean".</i> " SH4, 187, philosopher
Product flaws	<i>"De ervaring van nu heb ik zin in sparerib en dat is een combinatie van factoren die jou tot die zin drijven. En met dat stukje kunstmatig hamburger gaat hem dat niet worden. Dat zou je dus volgens mij niet 1 op 1 kunnen vervangen."</i> SH5, 153, industry
False suggestion necessity of meat	<i>"Want je creëert toch weer de behoefte bij mensen dat zij overmatig vlees willen consumeren. Met het risico dat mensen zeggen, kweekvlees is kunstmatig, doe mij maar het echte weer."</i> SH2, 176, politician
Technological future	<i>"Nou ja, misschien maken ze zorgen over van hoe gaat dat dan op grote schaal plaatsvinden, en hoe ziet dat er dan uit. Is dat dan een bioreactor waarin dan op grote schaal, een beetje science fiction achtig voelt het dan misschien voor mensen."</i> SH9, 177, public representative
Commercial realization	<i>"Groot = eng, industrieel = eng. En dan gaan we op eens iets maken wat en groot, en industrieel en technisch is. En dat gaan we dan in de supermarkt leggen en doen alsof dat vlees is. Het is natuurlijk marketingtechnisch spelen met vuur denk ik. Er hoeft maar dit te gebeuren en zo'n productgroep is weg. Vanuit hun belang zou je eigenlijk denken van probeer het vooral in te zetten als alternatieve grondstof voor dierlijke eiwitten. En niet die lat naar consumentenproducten te halen."</i> SH5, 1132, industry
Caution from other parties	<i>"Het is ook nog wel een politiek probleem, ook voor voedselbedrijven en imagerisico of ze het wel op de markt moeten brengen. Omdat ze het gevoel hebben dat het door de consument wel eens afgewezen zou kunnen worden en als slecht voor het imago van het bedrijf. Datzelfde geldt misschien voor politici, slecht voor het imago van politici als ze hier al te enthousiast over gaan worden, en als ze belaagd worden door de lobby van de vleesindustrie. Dus politieke overwegingen spelen uiteindelijk ook een rol."</i> SH6, 1105, scientist

Stakeholders expected the Dutch public to be concerned about an arrange of risks, as listed in table 5. First, the most mentioned risks are health and safety, mentioned by all stakeholders except the

artist. Several stakeholders referred to this as health concerns, and concerns about long term risks, mutations and nutritional value. Others referred to safety risks, such as the chance of infections and the necessary use of antibiotics, unwanted additions and the increased dependency on human involvement and thus higher chances on errors. The unnaturalness and laboratory association increases people's concerns about health and safety, according to several stakeholders.

Second, many stakeholders mentioned risks about features of the end product. For example, that IVM will not resemble meat (respondent from the industry) and therefore people will return to regular meat (politician). According to the politician, this is not only caused by the fact that IVM is inferior to real meat, but also by the development of IVM itself. This creates (falsely) the perception that meat is necessary. One philosopher and the artist mentioned IVM living up to promises made as risks perceived by the Dutch public, such as the actual effectiveness and animal welfare improvements.

A third set of risks, mentioned by several stakeholders, were the uncomfortable feelings of the Dutch public about the technological/science fiction-like future. These included concerns about what the agriculture will look like (respondent from the industry), the loss of the human contact with nature (artist and public representative) and the production of IVM on a large scale (public representative).

Another risk, according to some stakeholders, has to do with the commercial realization of IVM. One philosopher and the scientist mentioned the farmers and the rest of the meat industry could have no interest in cooperating with a potential competitor. Marketing-wise, IVM could be a risk according to a respondent from the industry, since it represents negatively evaluated concepts such as industrial and laboratory-made.

Finally, the scientist added risks in terms of caution from other parties than the public. IVM is entirely new and the public responses and risks are unknown. Politicians and food companies could therefore be hesitant to react positively, and afraid to damage their image by premature enthusiasm for IVM.

Willingness to eat or try IVM

Table 6: Expected public willingness to try IVM

Expected willingness to try	Citations
Positive	<i>"Sommigen die zeggen van ja natuurlijk wil ik dat proeven! Dan moet ik ook zeggen, vaak ook vanuit nieuwsgierigheid. Dat zijn dan vooral de mensen met die wauw reactie. Maar eigenlijk zouden heel veel mensen het wel willen proeven. Ook de mensen die misschien wat terughoudender zijn, zouden het toch wel willen proberen. Ze willen toch wel weten hoe het smaakt, dat is natuurlijk ook wel belangrijk want het is voedsel." SH9, I97, public representative</i>
Not sure, depends	<i>"If it will reach a mature status on the market, sincerely I don't know. It will depend on many different things. It will depend on money invested, on the advertisement on the label." SH4, I103, philosopher</i>
Negative	<i>"Ten eerste heeft het dus met de productie te maken. Het duurt eerst nog jaren voordat het uitontwikkeld is, en dat het ook een fatsoenlijk product is. En 2 is dat ik</i>

	<i>denk dat mensen... Ik denk niet dat het snel gaat gebeuren, nee, als ik eerlijk moet zijn.” SH2, I84, politician</i>
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Answers varied to the question if people will eat IVM, or is willing to try it. Three types of answers were given by the stakeholders, of which examples are shown in table 6. Most stakeholders expected that the Dutch public is willing to try it and potentially keep eating it, albeit under different (combinations of) conditions such as curiosity, taste/smell/appearance, price, health/safety, benefits compared to regular meat and the presentation and labelling of IVM. Two respondents were not sure. One of the philosophers thought that it depends on many different things, such as the money that is invested and the advertisements and labels, one respondent from the industry mentioned the high technology factor has to be overcome first. The politician was the only stakeholder who did not think the public would try IVM, since it is linked to negative aspects of regular meat (lack of health of meat and trust in meat).

4.2.2 Focus group discussions

Uncertainty

Table 7: Questions of respondents during focus groups

Uncertainty	Citations
Health	<i>“Mijn associatie was nog wel laboratoriumvlees. Clean eten, er wordt geen troep aan toegevoegd, maar is het gezond?” Vegetarians, I45, female, 55</i> <i>“Maar ik vraag me af: hoe wordt het eerste deeltje, of het eerste celletje geselecteerd? Is dat bijvoorbeeld ook afgenomen bij een dier wat ook antibiotica heeft ingenomen? Wordt de antibiotica ook doorgegeven in het systeem, in de andere cellen? Welke gevolgen heeft dat? Kanker, resistentie bij antibiotica?” Rural area, I59, female, 34</i>
Product features	<i>“En ik vroeg me af hoe het zou smaken en of het mogelijk zou zijn om verschillende versies te maken.” Vegetarians, I53, male, 27</i>
- Taste, versions	<i>“Ja, maar je hebt natuurlijk variëteit in vlees. Want dit was rund, maar kan het ook met kip? Of met varkensvlees?” Urban area, I181, male, 41</i>
- Efficiency	<i>“Mijn eerste vraag is eigenlijk hoe lang het zou duren om bijvoorbeeld een hamburger te kunnen kweken, en is het dan nog effectief om alle mensen op de wereld daarmee te verzorgen?” Student, I26, male, 25</i>
- Production	<i>“En ik vroeg me daarna ook meteen af: hoe veel stukjes heb je nodig om 1 hamburger te maken? Want het zag er uit als 1 die naar 1 miljoen nog wat, maar dan heb je een string. Maar hoeveel strings heb je dan nodig om er blaadjes van te maken en hoe stapelt dat dan op naar zo’n dikke hamburger?” Urban area, I25, female, 42</i>
Meat industry, farms and farm animals	<i>“En ik vraag me af wat er met die dieren gebeurt. Blijven die in leven, of worden die alsnog geslacht?” Students, I20, female, 25</i> <i>“En de tweede gedachte was een iets minder positieve gedachte. Ik kom zelf dus uit de Achterhoek, en praktisch de hele familie werkt op een boerderij of heeft een boerderij. En dus dacht ik: werkgelegenheid, en er</i>

Goal and commercialization of IVM	<i>is al een probleem met ontvolking van de Achterhoek. En het schijnt in Twente hetzelfde. Wat gebeurt daar dan mee?” Urban area, I49, male, 25</i>
- Goal of IVM?	<i>“Ik heb eigenlijk nog wel een hele andere vraag. Wat is eigenlijk het doel van de mensen die daar mee bezig zijn, met dat kweekvlees? Wat is eigenlijk hun main doel wat ze er mee willen bereiken?” Rural area, I615, male, 25</i>
- Food for Third World?	<i>“Als daar de focus op ligt, dat de gewone consument het meer ziet als het melkpoeder van de Derde Wereld van vroeger zeg maar. Dat je daardoor denkt van, nou laat maar. Dat hoort daar.” Rural area, I627, female, 44</i> <i>“Maar wie gaat die ontwikkeling dan betalen? Als er niks aan verdiend wordt, dan gaat deze vlieger nooit op, want dan gaan ze er niet mee door. Uiteindelijk draait het allemaal om de euro.” Rural area, I647, male, 29</i>

First reactions of the focus group respondents varied widely, and are here presented in the same way as the previous section (positive and negative). However, many first reactions of the respondents were *questions* about IVM. Therefore, this type of first reaction, as well as questions in the remaining part of the discussions, are presented first under the title “uncertainty”. An overview of the topics within this concept is given in table 7.

Most of the questions in all groups were about health. In the vegetarian group, two respondents had mixed thoughts about health, both mentioning more control over the production and thus possibly increased health, and wondering about a sufficient nutritional value. In the urban group, both these wonderings were expressed apart from each other. In the rural group, several respondents wondered about the nutritional value and contents as well. Biomedical students wondered also about nutritional value, as well as long term health and problems with infections and quality involved with scaling up the production process.

Another topic that respondents raised questions about, were the product features. In all groups, at least one respondent wondered about the taste and possible different versions of IVM. Other practical, product oriented questions were about the price, whether all meat products could be made and what still needs to happen until IVM becomes available. Furthermore, two respondents from the urban group and one from the rural group raised questions about the production process. Lastly, two respondents from the students group and one from the vegetarian group wondered about the actual benefits in terms of efficiency (time and resources) of IVM.

A third topic were the farms and farm animals. Several biomedical students had a discussion about whether there was still killing involved or not (for both the cell extraction and the growth of the cells afterwards), while one respondent from the rural group (male, 35) and one from the urban group (male, 25) wondered about farms and farmers potentially disappearing when IVM becomes available (see table 7).

Lastly, a discussion arose in the rural group about the goal of the creators of IVM and who would be willing or able to pay for IVM. This is illustrated by the following citations:

“Ik heb eigenlijk nog wel een hele andere vraag. Wat is eigenlijk het doel van de mensen die daar mee bezig zijn, met dat kweekvlees? Wat is eigenlijk hun main doel wat ze er mee willen bereiken?” Rural area, I615, male, 25

“Als daar de focus op ligt, dat de gewone consument het meer ziet als het melkpoeder van de Derde Wereld van vroeger zeg maar. Dat je daardoor denkt van, nou laat maar. Dat hoort daar.” Rural area, I627, female, 44

“Maar wie gaat die ontwikkeling dan betalen? Als er niks aan verdiend wordt, dan gaat deze vlieger nooit op, want dan gaan ze er niet mee door. Uiteindelijk draait het allemaal om de euro.” Rural area, I647, male, 29

Positive reactions

Table 8: Positive reactions of focus group respondents

Positive reactions	Citations
First reactions	
Curious	<i>“Ik vind het wel interessant, en ik ben ook wel nieuwsgierig.” Urban area, male, 22</i>
Good idea	<i>“Ja het lijkt mij een heel goed idee.” Rural area, I163, male, 25</i>
Emotions	
Excitement	<i>“Het eerste is dat ik het eigenlijk heel gaaf vind dat dit kan.” Students, I28, female, 23</i>
	<i>“In het begin dacht ik echt van: oké, dit is echt supervet, als in je kunt hiermee echt heel veel dingen doen.” Urban area, I49, male, 25</i>
Fascination	<i>“Ik was wel gefascineerd door de hoeveelheid die uit 1 cel gemaakt, geproduceerd, gekweekt, ik weet niet precies hoe ik het moet zien, kan worden.” Rural area, I57, female, 51</i>
Sympathy	<i>“En het derde was: dit soort onderzoeken hebben ontzettend mijn sympathie, omdat alles wat dierenleed kan voorkomen, dat moet gewoon onderzocht worden vind ik. Dus ik sta daar wel heel welwillend tegenover.” Urban area, I37, male, 52</i>
Associations	
Other technologies	<i>“Ik dacht zelf aan in de medische wereld, dat ze daar ook huid laten groeien, dat soort dingen. Ik moest daaraan denken.” Rural area, I165, female, 34</i>
Meat/meat products	<i>“Ik denk dat ik het in mijn hoofd wel zou blijven vergelijken met een daadwerkelijk vleesproduct.” Students, I120, female, 23</i>
	<i>“In principe is het ook niet vegetarisch, want het blijft vlees.” Students, I126, female, 25</i>
Vegetarian products	<i>“Maar soms zie je ook bij de vegetarische slager een hele slagerij vol eten waarvan ik eigenlijk niet zo goed weet waar dat dan precies van gemaakt is. Ik had daar wel meteen een soort associatie bij, dat ik dacht oh ja dat ziet er dan wel zo uit zoals je dat dan soms in de supermarkt ziet liggen. In ieder geval niet echt vlees of zo.” Urban area, I123, female, 42</i>
Benefits	
Animal welfare	<i>“Maar ik zou het prettig vinden als het wel zou kunnen vanuit het perspectief dat je dan geen dieren meer hoeft dood te maken om mensen van voedsel te voorzien. Dat is meer mijn gedachtestroom, in die richting.” Vegetarians, I49, female, 53</i>
Global food	<i>“Het eerste wat in mij opkwam is dat ik dacht van nou, dan is wereldwijd het</i>

security	<i>voedselprobleem snel opgelost. Althans, als het zich zo kan uitbreiden.” Rural area, 135, female, 44</i>
Health	<i>“Ik zie nog wel een ander voordeel. En dat is ook de reden waarom ik geen vlees eet. De belangrijkste reden is dat er met vlees heel erg wordt gerommeld. Dat je helemaal niet weet hoe of wat, wat je eigenlijk uiteindelijk eet. Ik zie eventueel wel een mogelijkheid, en dat weet ik niet zeker natuurlijk, vandaar die nieuwsgierigheid, dat het wel een iets gecontroleerder proces kan worden.” Vegetarians, 193, female, 55</i>
Environment	<i>“Maar ik denk qua milieu, we hebben het nog niet eens gehad over CO₂ uitstoot, maar als al die koeien geen mest meer produceren, dat heeft enorme voordelen voor allerlei enorme milieuproblemen waar we nu geen oplossing voor hebben.” Urban area, 1433, male, 41</i>
Available room/space	<i>“Ik denk dat het echt een oplossing is voor de toekomst, omdat dieren nemen nou eenmaal ook heel veel ruimte in op de wereld. En we krijgen ook steeds meer bevolking natuurlijk.” Students, 160, female, 25</i>

Besides the many questions about IVM, caused by the abstractness of IVM, positive first reactions were also expressed in all groups, listed in table 8. At least one respondent in every group expressed curiosity. The words “interesting” and “good/smart idea” also came up in all groups, and were often mentioned because of perceived benefits (presented below). Other feelings included excitement, fascination and sympathy, as the following citation illustrates:

“In het begin dacht ik echt van: oké, dit is echt supervet, als in je kunt hiermee echt heel veel dingen doen.” Urban area, 149, male, 25

Many associations included other (medical) technologies, such as tissue engineering and test tube babies. The students group did not make any associations with other technologies (in a positive or a negative sense). They only related IVM to meat products, and specifically not vegetarian products. One respondent from the urban group (female, 42) made the association with vegetarian products.

The most important benefits perceived by the respondents are the decrease in animal suffering/killing and the potential to solve world hunger. Both these benefits were mentioned at least once in all groups. The potential of IVM to make meat a healthier product was mentioned by respondents in the vegetarian group the urban group. Furthermore, several respondents in the rural and urban group referred to the improvements for the environment, such as reduction in CO₂ emissions. Lastly, one student (female, 25) mentioned the reduced amount of space dedicated to animals would be a benefit of IVM.

Negative reactions

Table 9: Negative reactions of focus group respondents

Negative reactions	Citations
First reactions	
Unnaturalness	<i>“Onnatuurlijk. Door die kunstmatige celdeling, het is manipulatie.” Vegetairans, 117, female, 44</i>

Getting used to IVM	<i>"In eerste instantie dacht ik: kweekvlees, nep. Het is niet echt het vlees, vind ik." Urban area, I63, male, 22</i> <i>"Is dat niet een mate van gewenning? Tenminste, dat zou ik denk ik voor mezelf heel erg hebben, zo van in het begin kijk je er raar van op, en vervolgens wen je er aan. En dan heeft niemand het er meer over."</i> <i>Urban area, I231, male, 41</i>
Emotions Unappealing, unappetizing Scary to eat	<i>"Het nodigt mij ook absoluut niet uit als ik het zie van nou, dat lijkt me echt smakelijk of zo." Vegetarians, I81, female, 53</i> <i>"Ik bedoel, want als de structuur al niet hetzelfde is, een lekker biefstukje heb je niet met een vetrandje of wat dan ook maar, het is gewoon een gemalen iets. Nou, dat klinkt zo niet aantrekkelijk om te kopen, voor mij dan." Rural area, I121, female, 34</i> <i>"Ik zou het ook niet... ik vind het best wel eng zeg maar om zoiets te eten denk ik." Urban area, I65, female, 19</i>
Associations Other technologies - GM - Cancer research - Cloning Cannibalism Chemical industry and transport	<i>"Nou, als je het hebt over gemodificeerd eten, zoals die maïs etcetera. Het is wel zo dat ik me inderdaad dan ook bij dat kweekvlees afvraag zo van: wat zijn de gevolgen uiteindelijk? Is er niet toch iets wat we over het hoofd zien, waardoor er nieuwe ziektes kunnen ontstaan etcetera? Die vraag was in het verleden ook gesteld bij dat gemodificeerde voedsel." Urban area, I111, male, 52</i> <i>"Het deed me ook wel heel erg denken aan kankeronderzoek. Dat is de associatie met de celdeling." Vegetarians, I157, female, 55</i> <i>"Ik heb een beetje een kloon idee erbij." Rural area, I177, female, 44</i> <i>"En een andere dat, stel dat kweekvlees van mensenspiercellen wordt gekweekt, zou je dat willen eten? Dat gaat dan richting kannibalisme, zeg maar." Vegetarians, I31, male, 49</i> <i>"Ja, chemische industrie he. En veel vervoer ook. Er zal toch wel weer 1 fabriek zijn en dan moet dat vervolgens weer de hele wereld over worden verscheept." Vegetarians, I143, male, 49</i>
Downsides Product flaws - Nutritional value - No proper alternative for meat Still animal based food, unnecessary	<i>"Sterker nog, dat is niet zo. Want ze gaven aan dat het vet en spiercellen waren, en er ontbreken al de bloedcellen, en er ontbreekt bindweefsel, en er ontbreken witte bloedlichaampjes. Een hele reeks cellen ontbreekt." Vegetarians, I125, male, 49</i> <i>"Zolang je het niet kunt vergelijken met een biefstuk of een sukadelap of wat dan ook, gaat het nooit vlees vervangen." Rural area, I149, male, 29</i> <i>"Ik blijf het dierlijke voeding vinden in plaats van energie produceren op plant basis." Vegetarians, I37, female, 44</i> <i>"Dat het van mij niet zou hoeven. Ik heb veel meer geredeneerd vanuit het vegetariër zijn. Ik eet geen dieren, en ik heb ook geen enkele behoefte om daar iets van vervanging in deze zin voor te hebben, dus voor mij hoeft het niet." Vegetarians, I49, female, 53</i>

Of the negative first reactions, the unnaturalness of IVM was most often mentioned (see table 9). Respondents sometimes referred to unnaturalness with a related concept such as chemical, technical, artificial or industrial. These were mentioned in all groups, except for the students group. In the urban group, there was only one respondent that did not mention unnaturalness or a related concept (male, 25). For various respondents in the vegetarian, rural and urban group, this caused negative feelings towards IVM, making it unappealing, unappetizing or even scary to eat. It also led to scepticism and questions (presented as “abstractness” before) about the health (risks) and taste of IVM. One respondent (urban group, male, 41) added that feelings of unnaturalness and repulsion could also be a matter of habituation, illustrated by the following citation:

“Is dat niet een mate van gewenning? Tenminste, dat zou ik denk ik voor mezelf heel erg hebben, zo van in het begin kijk je er raar van op, en vervolgens wen je er aan. En dan heeft niemand het er meer over.” Urban area, I231, male, 41

Negative associations were mostly present in the vegetarian group. Two respondents mentioned GM foods (vegetarians, female, 44 and urban group, male, 52). Another technology that was being related to IVM was cancer research, and the worries it caused for controlling the cell division in IVM production (vegetarian group, female, 55). Also in the vegetarian group, one respondent (male, 49) associated IVM with the chemical industry, high amounts of transportation of IVM produced in large factories, and IVM made with human cells (cannibalism). Lastly, one respondent in the rural group (female, 44) mentioned the link with cloning. The students group made no associations with negatively evaluated concepts.

The perceptions of unnaturalness could also be defined as downside of IVM, in which case it is the most mentioned downside. As stated, unnaturalness (or related concepts) came up as negative evaluations in all groups, and caused the main reason for resistance or unappealing feelings towards IVM. Besides unnaturalness, product related features were also mentioned as downsides. One respondent from the vegetarian group (male, 49) expected IVM not to have the same nutritional value as meat. Also in the rural group, one respondent (male, 29) said that IVM could never replace meat as long as it cannot be compared to steak. Several vegetarians added the fact that IVM is unnecessary, at least for them. The following citation exemplifies this:

“Dat het van mij niet zou hoeven. Ik heb veel meer geredeneerd vanuit het vegetariër zijn. Ik eet geen dieren, en ik heb ook geen enkele behoefte om daar iets van vervanging in deze zin voor te hebben, dus voor mij hoeft het niet.” Vegetarians, I49, female, 53

The students group did not mention any downsides, apart from scepticism/perceived risks towards certain aspects such as health, and the practical feasibility. These are given in the next section.

Risks

Table 10: Risks perceived by the respondents

Risks	Citations
Health/safety - Added chemicals	<i>“Ik maak me zorgen of, tenminste ik kan me voorstellen dat de micro ingrediënten, dus die in hele kleine percentages aanwezig</i>

	<i>zijn, dus bijvoorbeeld dat die cellen gaan delen zeg maar, dat die uiteindelijk in kweekvlees in een percentage aanwezig zijn waardoor het niet meer op de ingrediëntenlijst hoeft.”</i> <i>Vegetarians, l462, male, 49</i> <i>“Nou, ik denk dat als je zo’n lange procedure hebt, dat er dan heel veel bacteriën wel bij kunnen.” Urban area, l69, female, 19</i> <i>“Hoe wordt het dan gekweekt, en wat is er voor nodig om dat proces te bewerkstelligen? En wat voor gevolgen heeft dat al, want het vergt... voedsel is al genoeg bewerkt, en dat heeft al genoeg oorzaken. Van verschillende kanker soorten, laten we het alleen daar al over hebben. Dat zou mij zorgen maken.” Rural area, l159, female, 34</i> <i>“Het tweede wat in mij op kwam is hoe zit het qua gezondheid op lange termijn voor de mensen als wij dit gaan eten?” Students, l18, female, 24</i> <i>“Wordt de antibiotica ook doorgegeven in het systeem, in de andere cellen? Welke gevolgen heeft dat? Kanker, resistentie bij antibiotica?” Rural area, l59, female, 34</i> <i>“En voor de rest, ja je verliest natuurlijk wel calorieën want je moet het toch omzetten van de ene soort naar de ander. En dat wordt een industrieel proces, ja... dat is een beetje zonde.” Vegetarians, l109, male, 49</i>
Nutrition	
Product features	
- Price	<i>“Als het zo technisch is en zo ingewikkeld moet, en met zo veel cellen, ookal heb je er triljoenen uiteindelijk, hoe kan het ooit voor een prijs gemaakt worden die kan concurreren met echt dierlijk voedsel.” Urban area, l33, male, 52</i>
- Taste	<i>“En als ik dit zo zie denk ik, ik kan me niet voorstellen dat dit naar rundvlees smaakt.” Urban area, l29, female, 42</i>
- Commercial viability	<i>“Ik vraag me af of dat commercieel wel haalbaar is, hoe ga je mensen triggeren om dat vlees te kopen?” Rural area, l87, male, 29</i>
- Efficiency	<i>“En ik vraag me ook af of het efficiënter is op het vlak van kost het minder voeding om te maken dan het tegenwoordig met gewoon vlees kost.” Students, l94, female, 23</i>
- Animal serum	<i>“Over dat serum, dat is nog wel een punt, waarin gekweekt wordt, want dat serum is nu nog dierlijk weet ik.” Vegetarians, l69, male, 49</i>
Meat industry and farmers	<i>“En wat ik daarna eigenlijk dacht, maar goed dat ligt misschien een beetje aan mijn achtergrond, is hoe het dan zit met de vleesindustrie, hoe die er eigenlijk over denkt. Want dit is eigenlijk de strop voor de vleesindustrie als dit doorgezet zou worden.” Rural area, l21, male, 35</i>
Suggests (falsely) necessity of meat	<i>“Ik zie het risico dat er toch de gedachte er mee wordt ingeplant dat vlees nodig is, zeg maar. Om gezond te blijven heb je het helemaal niet nodig, het is zelfs beter om het te laten staan. En je</i>

	<i>gaat toch weer de suggestie wekken dat het erbij hoort. Dat vind ik een risico.” Vegetarians, I109, male, 49</i>
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Several risks involved with IVM were mentioned in the focus group discussions, some of which were formulated as questions or expressed as wonderings (see table 10). Therefore, some risks perceived were also marked “uncertainty”, since they could also be defined as demands for more information.

The most important risk, mentioned by all groups, was health and safety. Comments varied from general remarks about health to more specific concerns, such as chemicals used in the process or the chance on infections. Two respondents from the urban group (both female, both 34) expressed health concerns because of the industrial nature of IVM, illustrated by the following citation:

“Hoe wordt het dan gekweekt, en wat is er voor nodig om dat proces te bewerkstelligen? En wat voor gevolgen heeft dat al, want het vergt... voedsel is al genoeg bewerkt, en dat heeft al genoeg oorzaken. Van verschillende kanker soorten, laten we het alleen daar al over hebben. Dat zou mij zorgen maken.” Rural area, I159, female, 34

Several students mentioned long term risks. One respondent from the urban group (male, 52) also mentioned long term consequences, thereby referring to previous questions asked during the GM discussion such as long term consequences and new diseases. One respondent from the rural group (female, 34) expressed concerns about antibiotics fed to the cell donating animal.

An important risk topic that is related to health, is the nutritional value of the end product. This was mentioned by all groups, except for the students (who wondered about it, but did not perceive it as a risk). Concerns were expressed about a low nutritional value and low calorie value due to the multi-step process.

A third group of perceived risks included other product features, such as the money invested and a competitive price, the taste and the commercial viability/the possibility to trigger the public to buy IVM. Furthermore, several respondents from the students group thought the video shown at the start of the meeting was quite optimistic about IVM. They mentioned concerns about the efficiency of the eventual process, in terms of time and nutrients. In the vegetarian group, scepticism was expressed about the current use of animal serum in the process of making IVM.

Several respondents from the rural group and one respondent (male, 25) from the urban group added the effect of IVM on the meat industry and farmers as a risk. They worried about the future of these farmers, and the employment in rural areas and agriculture.

Finally, one respondent in the vegetarian group (male, 49) mentioned that by creating IVM, the necessity of meat for humans is suggested. This was also considered a risk.

Willingness to eat IVM

Table 11: Focus group respondents' willingness to eat IVM

Willingness to try	Vegetarians	Students	Rural area	Urban area
Positive	<i>“Ja, ik zou er op zich positief</i>	<i>“Ja, als het in de winkel ligt zou ik</i>	<i>“Ik zou het uit nieuwsgierigheid</i>	<i>“Ik vind het wel interessant, en ik ben</i>

	<i>tegenover staan. Ik zou best bereid zijn om het te proberen, maar ik heb er ook niet heel veel behoefte aan.”</i> L149, male, 27	<i>het wel willen proberen. Kijken hoe het smaakt, en of het lekkerder is.”</i> L148, male, 22	<i>alleen al willen proberen.”</i> L211, female, 44	<i>ook wel nieuwsgierig. Dus ik zou het wel een keer kopen om gewoon een keer te proberen.”</i> L163, male, 22
Depends, not sure			<i>“Ik kan niet zeggen of ik het wel of niet zou eten. Ik denk dat ze niet te veel de nadruk moeten leggen op dat het uit het laboratorium komt. En het geen kweekvlees noemen.”</i> L927, male, 29	
Negative	<i>“Ik zou kijken of ik daarmee mijn gezin zo ver zou krijgen, maar voor mezelf niet.”</i> L153, female, 53	<i>“Dat ligt er aan hoe veel er over bekend is. In eerste instantie niet, want dan weet je er gewoon te weinig vanaf. Maar als je alle informatie binnen hebt, en alles goed is, positief, dan zou ik het wel willen kopen. Maar op dit moment, als je het nu zou vragen, zou ik zeggen nee.”</i> L132, female, 24	<i>“Mijn gevoel is niet veranderd. Ik zou het niet eten.”</i> L909, male, 35	<i>“Nee, ik ben iemand die echt wil weten wat ik eet, dus ik denk dat ik dan een schap verder ga.”</i> L161, female, 19
Mixed feelings Good idea, but unappealing			<i>“Ja, het idee en concept snap ik wel. Het idee is wel positief, en heeft wel positieve kanten op dat gebied. Maar als je puur erover</i>	

Unappealing, but curious			<i>denk aan wat jij ook zegt, dat gekweekt wordt, dat doet me helemaal niks. En inderdaad, het is emotie, eten, dat vind je lekker.” L147, male, 35</i> <i>“Ik had verwacht dat hier wel een proefmonstertje zou liggen. Ik zou het wel willen proeven, maar ik ben niet overtuigd van nou dan heb ik een lekker en gezond iets.” L957, female, 34</i> <i>“Ja, ik ga het wel proberen. Maar ook omdat ik er over mee wil praten daarna.” L939, female, 51</i>	<i>“Bij mij zou de nieuwsgierigheid het winnen van dat ik me... ik zou het in ieder geval 1 keer geprobeerd willen hebben, gewoon omdat ik nieuwsgierig ben naar hoe het smaakt.” L169, female, 42</i>
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At the end of the first theme, focus group respondents were asked if they were willing to try IVM, or buy IVM when it would be available in the supermarkets. This question was repeated at the end of the discussion. Examples of the reactions are given in table 11.

In the vegetarian group (first column of table 11), all respondents indicated that IVM did not appeal to them, or was not something they were looking forward to. However, two vegetarians (male, 27 and female, 55) indicated that they would be open to try IVM. The other three respondents from this group indicated that they would not try IVM. When the question was again asked at the end of the discussion, positions had not changed.

In the students group, almost all respondents indicated that they would try IVM, mostly out of curiosity for the flavour. Only one respondent (female, 24) expressed hesitance, and wanted more information first. This remained the same at the end of the discussion.

After first question, four respondents of the rural group said they would try IVM, the other four would not. At the end of the discussion, the four respondents that were positive before, were still positive about trying IVM, mostly out of curiosity, as illustrated by the following citation:

“Ik zou het uit nieuwsgierigheid alleen al willen proberen.” Rural group, I211, female, 44

Two respondents that were negative before, were still negative. One of the respondents that was negative before (female, 34) changed her opinion and would be willing to try IVM, although she was still not convinced about its health and taste. Another respondent (male, 29) switched from a negative attitude to an unsure attitude, indicating he did not know yet.

Four respondents of the urban group were positive the first time, one respondent (female, 19) did not want to try IVM. At the end of the discussion, all respondents were positive about trying IVM, mostly because of curiosity of the taste. Although, several respondents indicated more information is desired.

Finally, several respondents indicated to hold mixed feeling towards IVM, which resulted in different outcomes (see bottom of table 11). Some respondents were positive about the idea of IVM, but were too hesitant to be willing to try it. In contrast, some others that were also hesitant indicated that they were still (too) curious and that they would try it, despite the unappealing feelings.

4.2.3 Attitudes and associations: Comparison and overview

This section summarizes and compares the variety of perceptions of topics in theme A, given by the stakeholders and the focus group respondents.

When first reactions and emotions are considered, the stakeholders mentioned many concepts that were similar to the ones found in the focus groups. This was the case for both the positive concepts (good idea and interest) and the negative concepts (unnaturalness, a reserve, unappetizing/yuck). Also for the associations, stakeholders referred to many of the same products and technologies as the focus group respondents did, such as meat/meat products and other technologies. GM was mentioned by both groups, although stakeholders expected this to play a much larger role than was seen in the focus groups.

The perceived benefits that were mentioned by stakeholders were almost the same as the ones mentioned by the focus group respondents. The most important ones being animal welfare, global food security, environment and health. Downsides mentioned by the stakeholders and the focus groups include unnaturalness, that IVM is unnecessary and product flaws such as high costs and the resemblance to meat. Also concerns about a low nutritional value and the loss of farms/farm animals came up in both groups.

Uncertainty was mentioned by some stakeholders as a downside, because this would make it hard for the public to form an opinion about IVM. Furthermore, stakeholders expected uncertainty to mainly revolve around unfamiliarity: when more information about IVM is presented, uncertainty will decline. Indeed, the uncertainty played a role in the focus group discussions, shown by the many questions of the respondents about IVM. Most of these were about the health and the production process, as expected by the stakeholders (perceived risks). In some cases however, questions of the focus group respondents were casual wonderings. In others, it had positive influence (curiosity, perceived potential) or negative influence (hesitance, scepticism).

Also for risks, some of the concepts were mentioned by both stakeholders and focus group respondents, such as concerns about health, safety and nutrition. These topics were the most important risks for both groups, although the focus group respondents were more concrete, and mentioned specific aspects. Several product flaws (taste, costs, effectiveness) and the false suggestions of the necessity of meat were also mentioned by both groups. However, stakeholders also mentioned risks from a more corporate/commercial view, such as the fear for a technical future, the risk of caution from other parties that need to be involved with IVM and the risk of commercialization.

Finally, expectations about the willingness of the public to try IVM was generally positive for the stakeholders. Five stakeholders answered positively to the question “do you expect the public to

be willing to try eating IVM?”, three were not sure and one was negative. For the focus groups, the answers to the question “would you try eating IVM if it becomes available?” were similar. At the end of the discussions, eighteen focus group respondents were positive, six were negative and one was unsure.

4.3 Theme B: Characteristics of society, the individual and product features

Theme B includes views on what type of public is relevant for IVM, characteristics of the social system, the technique and of the individual that may influence the perception of IVM, the influence of the subjective norm and the influence of self efficacy.

4.3.1 Stakeholder interviews

Type of public

Table 12: Types of public, identified by stakeholders

Type of public	Citations
Motivated/open to change	<i>“Dat is eigenlijk die bovenlaag. Die bedoel ik met rationeel, gemotiveerd van we willen wel eens wat nieuws proberen. Het zou een wereldvraagstuk oplossen en we gaan er vanuit dat het ook zo wordt geframed, dus daar zal een voorhoede zich gevoelig voor tonen, en een groep volgers enigszins, en dan krijg je de grote middengroep, die ziet het misschien als een goed alternatief maar het moet niet te gek worden.” SH5, I172, industry</i>
Everyone	<i>“Ik denk dat, in principe, iedereen te maken heeft met vlees. Zelfs als je vegetariër bent, dan heb je er ook mee te maken. Dan kom je ook heel vaak tegen en zie je hoe veel vlees er om je heen is. Dus dit is een onderwerp, een thematiek die eigenlijk iedereen aangaat.” SH8, I22, artist</i>
Meat eaters	<i>“Het publiek, dat zouden de mensen zijn die het eventueel zouden gaan eten in de buitenwereld. Jij en ik. Mensen die nu vlees eten, zouden eventueel naar kweekvlees kunnen of willen of moeten overstappen.” SH3, I17, policy maker</i>
Vegetarians?	<i>“Als je vegetariër bent, waarom was jij nou eigenlijk vegetariër? Is het omdat je vlees gewoon niet lekker vindt? Nou dan is kweekvlees ook niet voor jou. Maar als je vegetariër bent vanwege de dierenvriendelijkheid, ben je dan nog wel vegetariër? Dat soort voorkeuren, die keuzes moeten mensen ook zelf maken.” SH8, I138, artist</i>

In addition to questions about societal and personal characteristics, the stakeholders were asked about how they would define the potential public for IVM (see table 12). Most stakeholders thought this could be the part of the public that is open to changes in general, or that wants to actively contribute to animal well being or the environment. These parts of the Dutch public are also expected to be willing to pay more for the technology. One philosopher mentioned that everyone is a potential consumer of IVM, since everyone eats and thus is a consumer. However, she also added that everyone has a role in society, and this partly defines how you perceive IVM. Also the artist thought everyone is considered a potential consumer for IVM, since everyone is involved with meat

in their surroundings. Two stakeholders defined meat eaters as potential consumers of IVM, since these are the ones that could switch over (policy maker) and have to be targeted to reduce current problems with meat (scientist). The artist mentioned the suitability of IVM for vegetarians, which depends on the motivation for being vegetarian (see the bottom of table 12).

Social system characteristics

Table 13: Influences of the social system, according to stakeholders

Social system	Citations
Western world	<i>"First of all, I would to clarify that in my opinion, if this innovation comes, it will only be an innovation for the Western world. I don't see, well maybe a part of the Asian world that is very technologized, for example Japan. But I don't see it could be an innovation worldwide, like for example also Africa or South America. [...] But I see that from a cultural perspective it is very much connected with the way of conceptualizing food and relationships and also conceptualized in socio-political relationships which is very keen to the Western mentality. So when I then consider the public, I consider this part of the world." SH4, I43, philosopher</i>
Culture in countries	<i>"Er zijn ook verschillen in hoe er van land tot land op gereageerd wordt. Als ik naar de publiciteit kijk als vertaling van hoe de mensen er kennelijk over denken, dan wordt er in Duitsland, Engeland en Nederland veel nuchterder over gedacht en Scandinavië, en is men in Spanje, Frankrijk en Italië veel sceptischer." SH6, I121, scientist</i>

Only a few remarks were made about the influence of the societal context or culture, as shown in table 13. One philosopher said that IVM could probably only work in Western countries, since this part of the world can afford it to be concerned with IVM. Other parts of the world have less interest in developing or applying the technology, caused by different cultures and priorities. Furthermore, the scientist expected Germany, England, The Netherlands and Scandinavia to be more pragmatic about IVM, while Italy, France and Spain would have more sceptical perceptions of IVM. One philosopher also mentioned this, but included Germany and France as the more sceptical countries.

Features of IVM

Table 14: Features of IVM valued by the public, according to stakeholders

IVM features	Citations
Taste, structure, appearance	<i>"Dus de smaak moet in orde zijn, het moet in elk geval lekker zijn, of het nou vlees is of niet. Anders koopt geen hond het, dat is logisch. Het moet ook te betalen zijn. Maar of het nou precies vlees moet zijn, dat is nog maar de vraag, en of het precies zoals vlees moet smaken. [...] Maar voor sommige consumenten moet het zo vleesachtig mogelijk zijn/zo veel mogelijk op vlees moeten lijken, en andere consumenten kan dat wat minder schelen. En ik denk dat het heel moeilijk speculeren is daarover, en hoe zich dat ontwikkelt." SH1, I157, philosopher</i>
Price	<i>"Kijk als het de helft van de prijs wordt, dan wordt het ook al weer aantrekkelijk want een van de belangrijkste aankoop factoren voor vlees is, los van dat mensen</i>

Practical use	<i>het lekker vinden, althans een hele grote groep, 96%, betaalbaarheid. Als het 2x zo duur wordt, dan wordt het al een beetje anders. En als het de helft goedkoper is, als er een alternatief komt, wat kunstmatig gefabriceerd wordt, waardoor het veel goedkoper wordt zal het toch voor groepen mensen aantrekkelijk worden. En dat zal ook weerstanden kunnen helpen overwinnen.” SH5, I86, industry</i>
Production method	<i>“Kijk, en dat is met het kweekvlees wel belangrijk: de smaak, hoe het er uit ziet en wat kun je er mee.” SH7, I74, industry</i> <i>“Maar het is wel de reden waardoor de mensen in onze focusgroepen een bepaald soort enthousiasme hadden voor het idee dat je het heel kleinschalig kan doen. Zoals een varken op een stadsboerderij, waar je dan niet van vervreemd bent. Waar je dan elke paar weken een paar cellen uit haalt, en dat doe je dan in lokale fabriekjes. Dus het idee om het een beetje dichterbij te halen en niet grootschalig in verre fabrieken maar juist een soort stads landbouwproduct.” SH1, I36, philosopher</i>

Statements about the importance of aspects of the technology itself are listed in table 14. First of all, what matters most for the Dutch public, according to the stakeholders, is the taste (mentioned by all stakeholders, except the politician and the artist). In line with this, the smell, structure or “bite” and the physical appearance were mentioned. One philosopher thought the meat resemblance depends on how IVM is eventually marketed and what people at that time expect from IVM. One respondent from the industry mentioned the possibility for IVM to become something different, concerning the looks. He also considered the possible use of IVM as “ground material” for processed meat types, such as the Dutch “frikandel”.

Secondly, the price (or price-quality ratio) is a very important feature, mentioned by all stakeholders except the two philosophers and the politician. One respondent from the industry added that a low price could help overcome barriers experienced by some people. The public representative added that the current high price of IVM causes people to see it as something far away, in the future.

Furthermore, several respondents made remarks on the practical use of IVM. The policy maker said that IVM should be something that is easy and accessible to use. One respondent from the industry and the artist added the importance of what kinds of dishes can be made with IVM.

The industrial nature of IVM was mentioned several times in the previous section, as a downside of IVM. But some stakeholders also mentioned it when discussing relevant or influential product features. The public representative repeated that the production process could be a characteristic that people do not comply with. One philosopher and the artist expected that a small scale production method of IVM would be positively evaluated and increase the acceptance, especially when it can be done at home, by the consumers themselves. This also has to do with trust, and will return in section 4.5.

Characteristics of the individual

Table 15: Characteristics of the individual, influencing the IVM perception, according to stakeholders

Individual	Citations
Ethical considerations	<i>“En in dit geval zijn bijvoorbeeld dierenrechten organisaties in eerste instanties verrast en verdeeld, maar uiteindelijk zijn veel dierenrechten organisaties voor,</i>

Knowledge	<i>omdat ze het een hoopvol idee vinden voor dieren. Dus dat zijn mensen die toch al gewend zijn om het voortouw te nemen, sowieso mensen die hun nek uitsteken, vooral als het over dieren gaat.” SH1, l86, philosopher</i> <i>“Ja, ik denk vooral in het negatieve van het vlees van vandaag. Is het wel ethisch om vlees te eten? Ik eet zelf ook vlees, te veel vlees, net als de meeste Nederlanders. [...] Ik ben dus in een luxepositie vergeleken bij de rest van de wereld. Is dat dan ethisch?” SH8, l142, artist</i> <i>“Als je bij biologiestudenten komt, dan zegt bijna niemand “yuck”, en als je bij sociaal wetenschappelijke mensen komt, dan is het aantal wat groter.” SH1, l29, philosopher</i>
Age	<i>“Oudere mensen hebben hier meer moeite mee dan zeg maar dertigers. En kinderen beneden de 15 begrijpen niet wat het probleem is. Die vinden het fantastisch, die zeggen die moeten we onmiddellijk gaan doen.” SH6, l121, scientist</i>
Religion?	<i>“Religie, ja dat zal zo zijn dat als je geen varkens mag eten, dan zul je ook geen kweekvlees van varkens eten. Die connectie maak je wel. Maar goed, dat mogen de mensen in de lokale geloven dan uitzoeken.” SH3, l156, policy maker</i>
Commercial interests	<i>“Ik denk dat veel van mijn collega’s het niet zien zitten. [...] Concurrentie. Je ziet toch gauw als je niet oppast, om het kweekvlees te kunnen promoten, ik wou zeggen dat er dan een andere sector gedepromoteerd wordt. En dat zijn wij dan.” SH7, l183, industry</i>
Division: early adopters vs. suspicious	<i>“Ja, er zijn mensen die openstaan voor nieuwe dingen, en er zijn mensen die nieuwe dingen eerder met een soort terughoudendheid of met wantrouwen bekijken. En nogmaals, ik denk dat dit soort verschillen er niet zo ontzettend veel toe doen. Want op een gegeven moment, als iets zoals kweekvlees, een product wordt wat een succes wordt, dan vallen die verschillen op een gegeven moment weg. Dan wordt het gewoon een succesvol product. Bij ieder nieuw product heb je natuurlijk voorlopers en mensen die het nog een poosje aanzien, of het met wantrouwen bekijken.” SH1, l74, philosopher</i>

From the personal characteristics that influence IVM perceptions, listed in table 15, ethical considerations were mentioned several times to be relevant for IVM, since no alive animals are consumed anymore. This was already a much mentioned benefit, but some stakeholders added that ethical considerations regarding regular food patterns could influence the perception on IVM. One philosopher mentioned the influence of people’s view on the human position in the world, and on what beings should receive moral consideration. The policy maker and the other philosopher expected IVM to be acceptable for people who value animal ethics, and do not want to eat killed animals. The artist referred to the ethical considerations around the (excessive) meat consumption in the Western world.

Another personal feature that is referred to several times, is the knowledge about the technology. The public representative expected people from the food industry to be less hesitant towards the processed nature of IVM. Several stakeholders mentioned that people with knowledge about the laboratory (e.g. students) experience less disgust/discomfort and more enthusiasm for the idea of IVM, as illustrated by the following citation:

“Als je bij biologiestudenten komt, dan zegt bijna niemand “yuck”, en als je bij sociaal wetenschappelijke mensen komt, dan is het aantal wat groter.” SH1, I29, philosopher

However, one philosopher indicated that scientists could have critical questions. She also added that little scientific knowledge could cause faulty information to be interpreted as true, or that IVM is associated with GM because both technologies are quite complex.

One philosopher and the scientist referred to the influence of age. According to them, younger people have more acceptance towards IVM, because they are more interested and more used to technological developments. A few stakeholders mentioned religion, but in the sense that they did not know if it would influence the perception of IVM.

One respondent from the industry added the commercial and economical interests that some people might have, because of their profession. According to him, offering IVM automatically degrades the traditional meat industry.

Lastly, one philosopher and a respondent from the industry mentioned a division between two parts of the Dutch public, based on how they make food choices: a part of the public which generally adopts new (food) technologies easily in general, and a part that is more hesitant and suspicious (see table 15). According to them, the early adopters are the ones that are motivated to switch to IVM for ethical (animal welfare) or rational (world food problem or environmental problems) reasons. These differences will only play a role in the beginning, before products become more mainstream.

Biological food trend

Table 16: Stakeholders' vision on (the influence of) the biological food trend

Biological food trend	Citations
Negative effect of biological trend on IVM	<i>“So there is a very strong movement against this, going back to more localized, regionalized way of producing food, not only animal products in general. So away from GMO or the power from multinational companies in general. And this industrial mass scale production.” SH4, I49, philosopher</i> <i>“In Duitsland heb je veel mensen die heel erg op de biologische tour zijn. Die vinden het ook lang niet altijd een goed idee. Soms wel, uit redenen van dierenwelzijn. Maar soms zweren ze bij het “terug naar de natuur” idee.” SH1, I70, philosopher</i> <i>“Maar het staat haaks op de trend dat alles zo naturel mogelijk moet, het liefste streekproducten, biologisch is hot, ook al is dat niet duurzaam, het is wel hartstikke hot. Want dat is zo naturel en zo eerlijk. Dus wat ik wil zeggen: die technologische oplossing van het voedselvraagstuk, staat vanuit consumentenperspectief haaks op de trend naar het moet naturel zijn en het moet bij Delden uit de buurt komen. Want dan is het goed, want ik ken de boer, en ik ken de slager en die hebben hetzelfde accent als ik, dus is het goed.” SH5, I45, industry</i>

The division of early adopters and more suspicious parts of the Dutch public, as presented above, counts for technologies in general. One philosopher divided the Dutch public into two other segments, more specific to the situation with IVM. According this stakeholder, the part that adopts

the technique believes in technology as a solution for major problems, such as durability. This part will accept and adopt IVM. However, the other part is concerned with more local food production and less multinational companies producing industrial food. This is currently an upcoming trend, and could have a negative effect on the perceptions of IVM (see table 16).

Many other stakeholders also recognized this ‘biological food trend’, and expected this to negatively influence the IVM perception. They viewed IVM as something that is (almost) the opposite of what this biological food currently represents, illustrated by the following citation:

“Maar het staat haaks op de trend dat alles zo naturel mogelijk moet, het liefste streekproducten, biologisch is hot, ook al is dat niet duurzaam, het is wel hartstikke hot. SH5, I45, industry

The two philosophers both mention that in Germany, this trend is currently ongoing and that the public therefore does not consider IVM as a good idea. The politician expects the trend will cause doubt and suspicion about the health and safety of IVM. A respondent from the industry mentioned that people have more trust in biological food, produced on a small scale. He also thought that new foods are generally first adopted by a small group, “the elite”, after which it may or may not flow through to the rest of the Dutch public. This elite could reject IVM because of the biological food trend, and thus never reach the broad range of consumers.

Human – food relation and attitude behaviour gap

Table 17: Stakeholder expectations of influence of human-food relation and attitude-behaviour gap on public IVM perception

Human – food relation	Citations
Ingestion, suspicion	<i>“Voedsel ligt heel gevoelig. Het sluit aan op wat ik al zei, je stopt niet zomaar iets in je mond. Dat is heel basaal, heel primair.” SH5, I82, industry</i>
Food = emotion	<i>“Het is ook heel intiem. Het komt letterlijk in je lichaam. En als het dan een heel technologisch proces wordt, dan zijn mensen ook sceptisch. En terecht, en met een reden.” SH8, I78, artist</i>
Attitude – behaviour gap: rejection of IVM	<i>“Er is altijd emotie. Alles wat je in je mond stopt is emotioneel. Dat is onvermijdelijk. Heel veel discussies over voedsel, ook de genetische modificatie, is emotioneel. Daar zit heel weinig rationeels aan.” SH6, I45, scientist</i> <i>“Er een onderscheid is tussen publiek en consument, of eigenlijk tussen burger en consument, lees je vaak terug. En dat is wel een belangrijk verschil, omdat heel veel burgers sterke opvattingen hebben en ook uitspreken, maar als consument soms, nou ja, iets ander gedrag vertonen. Soms een volledig ander gedrag. Je zou je in het geval van dit kunnen voorstellen dat veel burgers zeggen van nou, dat lijkt me wel duurzaam en een lagere CO₂ et cetera, geen dieren meer nodig, dat lijkt me wel wat. Maar wanneer ze in de winkel staan denken: het lijkt me wel wat, maar niet voor mij. Leuk voor de buurman, zoiets. En dat is natuurlijk waar je wel vaak tegen aan loopt als het gaat om allerlei zaken met betrekking tot vlees, en de productie daarvan, of alternatieven voor vlees. Daar kun je best als burger over</i>

Curious for IVM	<i>meedenken, maar als consument zie je dat ie heel traditioneel is, en eigenlijk doet wat ie altijd al doet: vlees kopen in de aanbieding en daar iets lekkers van maken.” SH5, I21, industry</i> <i>“Er zit dus eigenlijk een verschil tussen, ik noem het altijd de burger en de consument. Die burger praat filosofisch, en die reflecteert ook moreel. De consument denkt ‘oh dit is nieuw, eens effe proberen, oh dat smaakt wel goed’. Dat is een hele andere dynamiek. Ik heb daar zelf wel eens mee geëxperimenteerd, wij hebben een barretje neergezet op een festival, wat dan kweekvlees ijsjes presenteerde. En dan zeg je gewoon, “alstublieft, wilt u een vlees ijsje?”. En mensen pakken het gewoon aan en eten het op. Het gaat dus helemaal niet meer om zou u het eten of zo. Hier heb je hem, en hup ze eten het gewoon op. Dus daar zitten heel duidelijk verschillen in gedrag.” SH8, I86, artist</i>
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Related but separate to the influence of factors included in this theme, is the relation between humans and food in general (see table 17). This is mentioned by several stakeholders, who refer to it because it also influences the public perception on IVM. They mentioned that food is always a precarious subject, because it has to be ingested. This evokes caution and suspicion, especially regarding technical foods, according to the artist.

Another aspect of the relation between humans and food, is that there is always emotion involved. The scientist stated that food is about emotion, and that discussions about food, including the one about GM, are also lead by emotions. One respondent from the industry added that in the specific case of eating meat, it is also about the experience, with which almost primary emotions are involved.

Also according to this respondent from the industry, the importance of emotions and experience in food creates the difference between “civilians” and “consumers”, set apart by “the attitude – behaviour” gap. He refers to the fact that people often mention rational arguments when talking about food, such as animal well being, durability and the environment. However, consumers in the supermarket are more influenced by emotions (and the experience of eating meat). This causes a difference (gap) between the “rational” attitude of the civilian and the “emotional” behaviour of the consumer. An example in the other direction was given by one philosopher, who mentioned the German public is against GM foods, but still keeps buying them (although she adds that this might also be caused by deficient labelling). Finally, the artist also refers to the attitude – behaviour gap this sense: he described a situation in which he offered “meat ice cream” to the public, illustrated in the following citation:

“Er zit dus eigenlijk een verschil tussen, ik noem het altijd de burger en de consument. Die burger praat filosofisch, en die reflecteert ook moreel. De consument denkt ‘oh dit is nieuw, eens effe proberen, oh dat smaakt wel goed’.” SH8, I86, artist

Subjective norm

Table 18: The role of the subjective norm, according to stakeholders

Subjective norm	Citations
Influence the same as any new food	<i>“Wat ik dan zou doen, is zeggen: kijk, op woensdag eten wij kweekvlees. Wil je daar aan meedoen of wil je liever wat anders? Als het iemand is die het redelijk goed kent. En hoe andere mensen daar mee omgaan, misschien zijn die daar wat minder expliciet in. Die doen het meer inschattend. Zo van: die kan ik dat wel voorzetten, of die niet. Die houdt alleen maar van echte biefstuk, dus vooruit dan. Eigenlijk zoals dat gewoonlijk gaat in het sociale leven.” SH1, I174, philosopher</i>
Acceptance	<i>“Kijk, als het over een jaar of 3 of 5 of 10 volledig geaccepteerd is, ja dan wordt het een ander verhaal. Maar je gaat nu niet in deze experimentele fase, het is ook niet verkrijgbaar, maar het is wel heel exotisch om dan met kweekvlees om de hoek te komen. Dan moet je wel een paar fases verder zijn in de consumenten acceptatie.” SH5, I66, industry</i>
Framing	<i>“Kijk als het hip wordt, dat mag ik tegenwoordig niet meer zeggen geloof ik, mijn kinderen zeggen dan hier kun je aan zien dat je oud bent, je gebruikt het woord hip. Maar ja het is denk ik een afgeleide daarvan. Als je bereid bent het zelf te eten, en je ziet de voordelen ervan, dan zul je dat ook met je gasten delen denk ik.” SH6, I125, scientist</i>

Stakeholders were also asked about to what extent other people’s opinions are taken into account by consumers. For example, when choosing a restaurant that serves IVM, or when preparing a dinner that includes IVM at home. This way, the influence of the subjective norm (perceived pressure to perform certain behaviour) was explored, shown in table 18.

Several stakeholders expected the subjective norm to play a role when considering IVM. The politician and one philosopher expected that IVM is considered different from other foods, just like vegetarian food. This might cause extra attention when eating with new people. A respondent from the industry also mentioned that IVM is different, and that this might cause people to avoid IVM in social situations such as preparing food for others.

However, the extent to which other people’s opinions are taken into account by consumers is, according to a respondent from the industry and the scientist, very dependent on the general acceptance: if IVM is accepted, the influence of the subjective norm will diminish. The scientist and one philosopher also added that it depends on if IVM can become popular and positively framed. This could also reduce the effect of the subjective norm.

Self efficacy

Table 19: The role of self efficacy in the public IVM perception, according to stakeholders

Self efficacy	Citations
Openness, free choice	<i>“Onderschat gewoon het publiek niet. Ze zijn niet dom. Soms gedragen mensen zich misschien wel heel basic, maar mensen hebben wel degelijk door of iets over ze uitgerold wordt of dat ze zelf kunnen kiezen. Dus juist het open zijn en zelf kunnen</i>

Price and availability	<i>kiezen is denk ik de beste ingang.” SH8, I208, artist</i> <i>“Ik moet er niet aan denken dat we dit op een gegeven moment aan iedereen op gaan dringen. Dus ik denk dat de vrijheid van keuze een enorm belangrijk criterium is. Mensen moeten niet het gevoel krijgen van: ik moet wel. Daarvoor moet het qua prijs en beschikbaarheid niet al te ver af liggen van het gewone vlees. Je kunt niet naar de supermarkt gaan brengen wat je eens in de 2 maand beschikbaar hebt, en wat 100 euro per hamburger kost. Dat gaat niet werken, en daarvoor moet de prijs en de beschikbaarheid dus allebei goed zijn.” SH6, I129, scientist</i>
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To determine if stakeholders expected self efficacy or perceived behavioural control (the perceived ability to perform preferred behaviour) plays a role in the public perception of IVM, a question was asked about the possibility for the public to freely choose or try IVM (see table 19). It was evident to all stakeholders that were asked (those in favour and against IVM) that it was crucial that the public always has a free choice regarding any foods, thus also regarding IVM. The scientist and the artist added this could be achieved by being open and honest about it. Lastly, one philosopher did mention the possibility that the intensive agriculture becomes forbidden when IVM becomes a success (with a proper production and price).

4.3.2 Focus group discussions

Type of public

Table 20: Public views on the relevant types of public for IVM

Type of public	Citations
Vegetarians	<i>“Ik ben juist als vegetariër meer geneigd naar een meer plant gebaseerd dieet wat ik al eerder aangaf, en ik neem dat ook waar onder andere vegetariërs in mijn sociale kring, dan dat ik dus naar een inrichting van kweekvlees zou gaan.” Vegetarians, I508, female, 44</i> <i>“Volgens wat jij net zei zou een vegetariër dat dus gewoon kunnen eten, want die mag wel dierlijke eiwitten eten.” Urban area, I139, male, 41</i> <i>“Bijvoorbeeld. Vegetariërs die misschien toch weer overgaan op vlees.” Rural area, I399, male, 29</i>
Meat eaters	<i>“Ik denk dat voor kweekvlees, even in platte marketing termen, je eerste doelgroep gewoon wel vleeseters zijn.” Vegetarians, I508, female, 44</i> <i>“Ik denk dat vlees eters denken: daar moet ik niks mee. Gechargeerd gezegd.” Vegetarians, I275, female, 53</i>
Third World countries	<i>“Wij hebben ook veel keuze er in, om het wel of niet te nemen. Maar als je echt het voedselprobleem er mee wil oplossen, dan zullen mensen die minder keuze willen hebben het heel graag willen aannemen denk ik.” Rural area, I633, male, 25</i> <i>“Als daar de focus op ligt, dat de gewone consument het meer ziet als het melkpoeder van de Derde Wereld van vroeger zeg maar. Dat je daardoor denkt van, nou laat maar. Dat hoort daar. [...] Ik denk dat het 2 verschillende dingen zijn, je eet het gewoon als consument of het gaat in grote dozen op de vrachtwagen of container op de boot naar Afrika of zo.” Rural area, I627, female, 44</i>

	<i>“Maar wie gaat die ontwikkeling dan betalen? Als er niks aan verdiend wordt, dan gaat deze vlieger nooit op, want dan gaan ze er niet mee door. Uiteindelijk draait het allemaal om de euro.” Rural area, I647, male, 29</i>
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Although the focus group respondents were not specifically asked to define the potential public for IVM, there were comments placed in this regard within all groups, except the students group, listed in table 20.

In the vegetarian group, all respondents did not see IVM as something that could become part of their daily menu, although some respondents were interested in trying IVM at least once. One vegetarian (female, 44) mentioned that meat eaters are the first target audience for IVM, and that vegetarians have no interest in any kind of meat, because they look for a more plant based diet in general. However, another vegetarian (female, 53) thought also meat eaters would have no interest in a replacement for meat. In the rural and urban group, several respondents expected that IVM could both appeal to meat eaters and vegetarians because of the benefits for animals.

Respondents from the rural group also wondered about developing countries as a potential public for IVM (see the bottom of table 20). Several respondents mentioned that people in developing countries would possibly have less problems with IVM since there is more need for food. In Western countries, there is a variety of food to choose from and the people are therefore more critical towards IVM. However, one respondent (male, 29) was sceptical about this idea from an economical perspective: he wondered who would pay for IVM in that case, since developing countries have little financial resources. Another respondent (female, 34) added that the current food problem in Third World countries is not caused by a food shortage, but a problem in the distribution of food.

Features of IVM

Table 21: Public views on IVM features

IVM features	Citations
Taste, texture, meat resemblance	<i>“Ik heb opgeschreven dat de smaak gelijk moet zijn, wat jij ook hebt. Maar ook de structuur. Dat als je bijvoorbeeld een biefstuk hebt, dat het ook moet voelen als een biefstuk, en niet wat anders.” Rural area, I29, male, 25</i> <i>“Ja, ik vond het wel grappig om te horen dat zij alle twee met smaak bezig waren. Ik heb mezelf geen enkele vraag over de smaak gesteld. Ik vroeg me nu af waarom dat was. En ik denk omdat ik destijds op tv heb gezien dat men zei, er waren een paar proefpersonen die ik dat zag eten, en die zeiden “ja smaakt lekker”. Ik heb me daar eigenlijk geen enkele illusies over gemaakt of dat wel goed zou zijn, of komen.” Urban area, I33, male, 52</i>
Appearance	<i>“Buiten dat, vlees is, niet voor iedereen, maar voor heel veel mensen een beleving.” Rural area, I93, male, 29</i>
Price	<i>“Nou, als het er niet uit ziet, eet ik het echt niet. Dan krijg ik het niet weg.” Rural area, I293, female, 44</i> <i>“Of het efficiënt kan zijn, en of het goedkoper kan zijn dan gewoon vlees. Zo niet, dan vraag ik me af of de consument het ooit zou willen en of het dus ooit goed ontwikkeld zou kunnen worden.” Students, I94, female, 23</i>

Health & safety	<i>“Het is nieuw, het is anders dan normaal. In principe houden mensen er gewoon niet van om dan over te stappen. Dus ik dacht, als je het dan goedkoop kunt aanbieden, dan helpt dat mensen misschien over de drempel.” Rural area, I331, male, 25</i> <i>“En als het te goedkoop is, dan denken mensen het kan niet wat zijn.” Rural, I335, female, 51</i> <i>“Ja uiteraard moet het beest schoon zijn waar je mee begint. [...] Misschien moet het ook totaal iets anders zijn dan een hamburger of een worst, dat je die associatie niet hebt maar...” Rural area, I181, female, 44</i> <i>“Volgens mij zit er heel erg een verschil tussen duurzaamheid en gezondheid. Het is volgens mij heel duurzaam, maar het voelt niet zo gezond. Tenminste, ik weet niet of het gezond is. [...] Want als ik het kan associëren met duurzaamheid EN gezond, dan is het voor mij echt gewoon dat ik denk ja.” Urban area, I395, female, 42</i>
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A summary of IVM features is given in table 21. The most mentioned feature was the taste, mentioned by several respondents in all groups except the vegetarian group. Related to this are the structure and the visual appearance. One respondent from the urban group (male, 52) expected that the taste would be good because it was tested during the public introduction in London in 2013. Other respondents from this group were sceptical about the taste of IVM, consisting of only muscle cells. One respondent from the rural group (male, 29) added that he was sceptical about IVM providing the same “experience” as meat does.

Second, a low or competitive price was mentioned in all groups, except in the vegetarian group. One respondent (male, 25) from the rural group added that a low price would help overcome barriers that people could experience, such as a “chemical” perception. However, another respondent in this group (female, 51) that a low price could cause scepticism about the product, as can be seen in the following citation:

“En als het te goedkoop is, dan denken mensen het kan niet wat zijn.” Rural area, I335, female, 51

Health and safety were mentioned by several respondents from all groups, except the vegetarian group. One respondent in the rural group (female, 44) mentioned that IVM should perhaps not look like a meat product, since there are concerns with antibiotics involved with meat. If IVM looks like something different, less associations with meat problems could be made. One respondent in the urban group (female, 42) stated she would be very interested in IVM if it could combine healthiness with durability/environmental benefits.

The vegetarian group nearly mentioned any IVM characteristics that they found to be of interest. Only one respondent (female, 44) mentioned that IVM could need a high wow factor, based on an experience she had with fried insects. She indicated that people were interested in these insects as food, but were disappointed in the actual end product, and that this may also play a role for IVM.

Table 22: Influence of characteristics of the focus group respondents on their eating pattern

Personal food choices	Citations
Animal well being	<i>"Ja, die zijn heel breed. Maar wel inderdaad als eerste uitgangspunt diervriendelijkheid." Vegetarians, I239, female, 44</i>
Price	<i>"Ik zou geen plofkip kopen, als je het daarover hebt." Rural area, I309, female, 34</i> <i>"Ja, het enigste wat ik hierbij heb is dat ik geen vlees ga kopen waarvan ik weet dat het beter geproduceerd is omdat het heel duur is. Maar ik vind dat was je kan doen is dat je minder vlees eet. Heel veel mensen eten elke dag vlees, en dat is niet de hoeveelheid die je nodig hebt. Ik denk dat als je 2 of 3 keer per week vlees is, dat dat voldoende is. Misschien kun je dan op die manier iets doen." Students, I276, male, 25</i>
Taste	<i>"Prijs is voor mij altijd van belang ook. Altijd." Urban area, I211, male, 52</i> <i>"Ik eet eigenlijk waar ik zin in heb, en waar mijn gezin zin in heeft. Over het algemeen ben ik niet zo van het vettigere voedsel." Rural area, I255, female, 44</i> <i>"Ik ook de smaak, de kwaliteit en wat ik lekker vind, dat koop ik en dat eet ik." Rural area, I261, male, 29</i> <i>"Maar ook smaak, en hoe het er uit ziet. Je kijkt toch wel eerst voordat je iets pakt." Urban area, I217, female, 19</i>
Health	<i>"Gezondheid en smaak denk ik. En verder wil ook ik niet dat dieren een slecht welzijn zouden moeten hebben of zo. Maar dat zou niet mijn primaire, ethische kwestie zijn. Meer gezondheid voor mensen die, nou ja, alle mensen moeten eten." Vegetarians, I221, female, 55</i>
Pragmatism, food security	<i>"Ik vind zelf pragmatisme ook een belangrijk iets, en vooral ook voedselbeschikbaarheid, verspreid over hele wereld." Vegetarians, I219, male, 27</i>
Parents	<i>"Ik heb het van mijn ouders nooit echt sterk meegekregen dat we er echt heel sterk op letten. Mijn ouders zijn er ook best wel soepel in, die willen best vaak nieuwe dingen proberen, dat maakt ze verder niet zo heel veel uit." Students, I476, female, 23</i>
Religion	<i>"Ik ben al mijn hele leven vegetariër omdat ik geboren ben, mijn ouders die waren bij het Rozenkruis. En een van de uitgangspunten als je daarvoor kiest is dat je ook meegaat in een vegetarisch dieet. Het idee daarbij is niet een verbinding met het dierlijke." Vegetarians, I239, female, 44</i> <i>"Ja, ik mag alleen geen varkensvlees. Maar ze maken dit neem ik aan vanuit koeien. [...] Ja, ik haal het meestal, ik ben zelf Turks van afkomst, en ik haal meestal bij een Turkse slager vlees." Students, I154, male, 22</i>
Other people	<i>"Ja, er zijn weinig mensen die echt boodschappen doen omdat ze echt voeding binnen moeten krijgen. Ze kopen wat ze lekker vinden, of wat ze denken lekker te vinden." Rural area, I103, male, 29</i> <i>"Ja, de mensen die daar [dierenwelzijn] echt bewust op winkelen wel. Maar het gros niet, die interesseert het niet." Rural area, I369, male, 29</i> <i>"Nou, prijs is denk ik wel belangrijk, want als alle dieren werkelijk zo zouden leven</i>

	<i>als we allemaal zouden willen, zou het vlees dubbel zo duur worden, maar we zouden het er niet voor willen betalen.” Rural area, I357, female, 34</i>
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The respondents in the focus groups were asked what aspects played a role in their personal choices for food (see table 22). Overall, the most important aspects were taste, price and animal well being. Other aspects that were mentioned are health, pragmatism, global food security, raising by parents and religion.

The most important aspect in the vegetarian group was animal well being, mentioned by all except one respondent. This respondent (female, 55) indicated that animal well being is not primary, but health is the most important. Furthermore, religion, pragmatism, world food and water security and taste were mentioned.

For the students group, the price was the most important aspect regarding food choice. Several students indicated that animal well being and global food security are both important to them as well, but that they lack the financial resources to contribute to these subjects. However, one student (male, 25) indicated that he consumed less meat (2-3 days a week) for animal well being and health reasons. Furthermore, one student (male, 22) was Muslim, and thus indicated to buy his meat from a Turkish butcher. In addition, he expected to be allowed to consume IVM if animal slaughter and pig components are excluded from the production process. Lastly, one student (female, 23) indicated that the influence of her parents affected her food choices.

In the rural group, several respondents indicated to base their food choices on whatever they felt like eating. Important arguments were taste, quality, presentation and structure. Price and animal well being were also mentioned. One respondent (female, 34) added that animal well being might not be more important than price: if animals would truly have the lives people want them to have, meat would have a price people wouldn't want to pay. Lastly, some of the respondents in the rural group reflected on how other people in society make food choices. One male (29), who was a supermarket manager, mentioned that most people choose their food on what they perceive as tasting good, not on what foods simply contain necessary nutrients or on animal friendliness. Some consumers pay more for animal friendliness, but most of them do not care, according to him. One respondent (female, 34) added that this also depends on the price: some people simply cannot afford meat from better treated animals.

In the urban group, the price of food was mentioned several times. Also the taste and looks came up, as well as health and the environment.

Biological food trend

Table 23: Focus group respondents' view on the biological food trend

Biological food trend	Citations
Own food choices	<i>“Dat het gezond is en dat het ook puur is, en niet iets bewerkt is.” Rural area, I237, female, 34</i> <i>“Ik let vooral op de E nummers, vanwege dus de pakjes vooral, die kant en klaar. Ik eet niks kant en klaars.” Rura area, I243, female, 34</i> <i>“Maar als ik zou mogen kiezen zou ik ook kiezen voor wat meer pure dingen. Dus dat je niet van die poedertjes hebt, dat vind ik allemaal niks.” Rural area, I271,</i>

General trend	male, 25 <i>“Ik merk de laatste paar jaren dat het bij het publiek belangrijk is om, veel meer dan een paar jaar geleden, dat het veel belangrijker is om te weten wat je eet, en gluten dit en superfood dat.” Students, I500, female, 23</i> <i>“Mensen worden steeds bewuster, willen meer biologisch of in ieder geval eerlijk eten. Als het dan in een groene verpakking zit en er staat een koe in de wei op, dan nemen ze het al. Of het dan ook echt eerlijk is, is helemaal niet meer zo belangrijk. Het is maar wat de mensen geloven.” Rural area, I337, male 29</i> <i>“Nou, ik geloof wel dat toen ik echt jong was, toen was dat niet z'n issue. Toen werd er ook over E nummers bijvoorbeeld absoluut niet gepraat. Dat zijn wel dingen die, het belang van gezonde voeding, ik denk dat dat natuurlijk altijd is geweest, maar het is wel toegenomen de laatste 10-15 jaar.” Urban area, I315, male, 52</i> <i>“Maar ik denk dat het vroeger ook beperkt was tot een soort groepje mensen in van die sandalen, en nu... Bij ons om de hoek zit de Marqt, daar kun je bijna niet onder de 150 euro boodschappen doen. Maar het is er altijd druk. En dat was vroeger echt niet zo.” Urban area, I337, male, 41</i>
Difference East/West	<i>“Ja, je kunt hier bij wijze van spreken op iedere hoek van de straat, overal is biologisch, fairtrade, alles is hier te koop. Maar als je bijvoorbeeld in Hengelo of Enschede kijkt moet je heel goed zoeken om zoiets te vinden.” Urban area, I359, male, 22</i>
Hype vs. persistent	<i>“Maar ik ben wel bang dat dit een trend is die ook zo weer overgewaaid is. Daar is Amsterdam wel typisch in.” Urban area, I365, male, 41</i> <i>“Dat denk ik niet, eigenlijk. [...] Ik ben toch wel gehecht geraakt aan bepaalde ingrediënten, en dat je dan, als je ineens weer normale in plaats van verse biologische, dat je dan toch wel schrikt van het grote smaakverschil.” Urban area, I375, female, 19</i>
Positive vs. negative influence on IVM	<i>“Alleen wat ik al zei, echt biologisch en alsof je het net van het land haalt, dat is compleet wat anders dan kweekvlees. Dat vind ik wel grappig. Terwijl misschien kweekvlees wel veel beter is.” Urban area, I387, male, 41</i> <i>“Ik denk dat veel jongere mensen, als ik zo mag generaliseren van oké dat zou ik wel een keer willen proberen. En al helemaal omdat in mijn omgeving is iedereen er heel erg mee bezig om groener en gezonder te leven.” Urban area, I269, male, 25</i>

As with the stakeholders, the trend with more attention for biological/natural/organic food (terms often used interchangeably) also received attention from the focus group respondents (see table 23). Some respondents refer to it as valued guidelines for choosing food, some respondents reflect on how they perceive the trend among others.

Biological (or related) foods are especially appreciated in the rural group, as illustrated by the following citation:

“Dat het gezond is en dat het ook puur is, en niet iets bewerkt is.” Rural area, I237, female, 34

Also in the urban group, some respondents valued biological food for health reasons, but also for the environment and taste.

In addition to respondents indicating that biological foods are important to themselves, all groups also recognized the trend in general. In the vegetarian group, one respondent (female, 55) said that her vegetarianism was sometimes very positively evaluated. One student (female, 23) noticed that currently many people want to know more about what is in their food, and that there is much more attention for gluten and “superfoods”. A respondent from the rural group (male, 29) also mentioned that more people want biological food, or at least a biological “experience”, and that this is also used for advertising:

“Mensen worden steeds bewuster, willen meer biologisch of in ieder geval eerlijk eten. Als het dan in een groene verpakking zit en er staat een koe in de wei op, dan nemen ze het al. Of het dan ook echt eerlijk is, is helemaal niet meer zo belangrijk. Het is maar wat de mensen geloven.” Rural area, I337, male 29

The urban group, the biological trend received most attention of the respondents. In this group, several respondents recognized the increasing attention to healthier, more biological and durable food compared to about 10 years ago. According to them, it has become more mainstream instead of niche, and many people are currently willing to pay more for biological foods. Several respondents also expected the biological trend to be more prominent in the urban West than in rural East Netherlands. Conflicting comments were made about the biological trend being a hype that will soon pass or that it will stay and become more permanent (see table 23).

There were also conflicting thoughts about the influence of the biological food trend on IVM within the urban group (see table 23). One respondent (male, 41) expected that the trend is the opposite of IVM, which has a more industrial/chemical background. These terms are negatively evaluated among many people who support the biological trend, and therefore IVM could also be negatively evaluated. He himself thought IVM is potentially healthier than regular meat, since there is more control over the production process. Also another respondent (male, 25) and his social group were positive about IVM, since they valued “green” food and durability, and IVM could possibly contribute to these goals.

Human – food relation and attitude – behaviour gap

Table 24: Focus group respondents' views on the influence of human-food relation and attitude-behaviour gaps

Human – food relation	Citations
Ingestion, suspicion	<i>“Maar ik bedoelde, kijk het zal sowieso niet iets zijn wat mensen snel zouden kopen. Het is nieuw, het is anders dan normaal. In principe houden mensen er gewoon niet van om dan over te stappen.” Rural area, I331, male, 25</i>
Food = emotion	<i>“Buiten dat, vlees is, niet voor iedereen, maar voor heel veel mensen een beleving.” Rural area, I93, male, 29</i> <i>“Ja, er zijn weinig mensen die echt boodschappen doen omdat ze echt voeding binnen moeten krijgen. Ze kopen wat ze lekker vinden, of wat ze denken lekker te vinden.” Rural area, I103, male, 29</i>

The focus group respondents did not make many statements about the precarious human – food relation and the attitude behaviour gap, since this would require them to reflect on their own behaviour, which was not specifically part of the discussion. However, some respondents in the rural group did mention things concerning the difficult, emotional human – food relation (see table 24). One respondent (male, 29) mentioned that for many people meat is an experience, and that food in general is chosen on the basis of urges and taste, not on pragmatic nutrient consumption. Another respondent (male, 25) expected that people would be suspicious of IVM, only because it is new and different from other foods.

Subjective norm

Table 25: Role of subjective norm, according to focus group respondents

Subjective norm	Citations
Mention IVM	<i>“En ik zou mensen wel eerst inlichten voor ik het ze zou voorzetten. Dan hebben ze nog wel de keus.” Rural area, I419, female, 36</i>
Not mention IVM	<i>“Ik zou zeggen, als het in de winkel verkrijgbaar is, en dan ga ik even uit van de aanname dat het niet slecht voor je is, dan zou ik het denk ik niet eens noemen als ik het voorschotel. Het zou eigenlijk niet eens bij me opkomen om het specifiek te noemen. [...] Om dezelfde reden als dat ik nu het niet opdien met “dit is gras gevoede koe in plaats van hooi” of zo.” Students, I370, male, 25</i>

The respondents were asked whether they would take the opinion of others on IVM into account when receiving guests for dinner. This was done to explore the subjective norm (social pressure) that might play a role in IVM perception. Results are listed in table 25.

For most respondents, the opinion of others would influence their behaviour when IVM was available. Several respondents indicated that they would serve IVM, but at least mention that was no regular meat so that guests would have a choice. However, in the students group, several respondents would serve IVM without mentioning it, as long as it was safe.

The vegetarian group reflected only on how others react on their eating habits, and how they deal with certain situations. Some of the respondents in this group thought the acceptance for vegetarianism could be improved, others felt more like it is generally accepted.

Self efficacy

Table 26: The role of self efficacy, according to focus group respondents

Self efficacy	Citations
Freedom of choice	<i>“Ik vind dat die keuze er moet zijn.” Urban area, I201, female, 42</i>
IVM replacing meat	<i>“Ik ben helemaal niet zo voor vrijheid, want ik ben er voorstander van dat de overheid het gaat verbieden dat dieren gebruikt worden om opgegeten te worden. De overheid verbied zo veel. Je mag ook niet links rijden.” Vegetarians, I201, male, 49</i> <i>“Ik bedoel dat stel dat die keuze er niet meer is, omdat jij daarmee... omdat we hebben bedacht: als we alleen maar dit eten, dan hebben we de hele</i>

Low self efficacy in food choices	<i>wereldbevolking heeft eten. Om die reden zou ik het niet erg vinden om geen keuze te hebben.” Students, 1232, female, 25</i> <i>“Nou, ik vind het in het algemeen heel erg moeilijk om echt vrijheid van keuze te hebben in eten. We hadden het er in het begin al over van dat het heel vaak afhankelijk is van of je geld hebt of niet. Verantwoorde keuzes, daarvan zeggen ze dan wel, daar hoef je dan weinig geld voor te hebben maar slecht eten is vaak goedkoper. Dat zie je gewoon. En als je echt gezond wil eten dan moet je het bijna zelf gaan kweken. En dan moet je er ook weer heel veel tijd en aandacht voor hebben, en kennis. Want het is ook nog heel ingewikkeld. Dus ik heb dat eigenlijk wel een beetje opgegeven dat het optimaal zou kunnen worden. Dus je zit dan altijd met een suboptimale eetbeleving.” Vegetarians, 1193, female, 55</i> <i>“Maar als ik eerlijk ben, ik let eigenlijk nergens op. Suiker wil ik nog wel eens op letten, dat dat er niet te veel in zit, met name ook voor de kinderen. Ik moet zeggen, ik heb daar ook geen tijd voor als ik in de supermarkt ben.” Rural area, 1277, female, 36</i>
Uncertainty about food in general	<i>“Dus ik word heel onzeker, in die zin, van dat ik niet kan bepalen voor mezelf of iets nou goed is.” Urban area, 1545, male, 52</i> <i>“Nou, ik was in het begin wel wat positiever, ik ben nu best wel een beetje pessimistisch eigenlijk. Ook over voedsel in het algemeen. Nu moet ik alles gaan lezen op die pakjes.” Vegetarians, 1664, female, 55</i> <i>“Want net wat ik zeg, ik kijk er nooit naar, ik zoek het ook niet op. Maar als ik dit zo hoor dan denk ik, ik mag het nog wel druk gaan doen.” Rural area, 1865, female, 36</i>

Self efficacy or perceived behavioural control (the perceived ability to perform preferred behaviour) was examined with a question about the possibility to choose one’s own food, or the possibility to choose between IVM and regular meat (see table 26). Almost all respondents valued the possibility to choose, or not to choose IVM. Two respondents (students, female, 25 and urban area, male, 41) added that they would comply with the idea of IVM eventually replacing regular meat, for potential benefits of IVM. Only one respondent (vegetarian, male, 49) preferred more regulation from the government and less free choice of food, for health reasons.

Furthermore, several respondents mentioned that they felt unable to perform their desired behaviour, regarding food choices. For example, they mentioned their lack of knowledge and/or time to find out what foods are healthy or unhealthy, and what certain ingredients or additions mean. In addition, neither specific marks (e.g. labels, stickers or stamps) that indicate healthiness or naturalness are always trusted, nor the food industry in general. Therefore, the self efficacy cannot be improved by omitting the lack of knowledge or time by relying “blindly” on marks or trust in the food industry. One vegetarian mentioned that she has accepted that her eating experience is not optimal, one respondent from the rural area mentioned she does not have enough time to pay attention to all important aspects (see table 26). The main reason for the low self efficacy for students was their budget. This limited their ability to take valued aspects into account, such as animal friendliness and the environment.

Finally, the low self efficacy caused uncertainty about food in general for some respondents. Not many respondents specifically indicated to be uncertain about specific aspects around food or IVM, except one respondent from the urban group (male, 53), that also brought up the issue of the

lack of proper information about health, and the lack of instances that provide this information. Other respondents also mentioned this, but did not indicate to become uncertain. Finally, two respondents indicated that they became more skeptical towards food in general, because of the argumentations of others, heard during the discussion.

4.3.3 Characteristics of society, the individual and product features: Comparison and overview

In comparison, the stakeholders were rather explicit about potential consumers of IVM, mainly stating that it could be for trendy (meat eating) people who are open for changing their diet. The focus group respondents were more unsure about this, pointing at different types of public, such as vegetarians, meat eaters and the developing countries. However, vegetarians did not consider themselves as potential audience for IVM. The influence of culture and different countries was mentioned by stakeholders, not by focus group respondents. Religion did not receive much attention from both groups.

Stakeholders and focus group respondents mentioned many of the same factors to be important for food choices, such as price, taste, structure (that should be similar to meat) and ethical considerations. Also mentioned extensively by both groups: the biological food trend. This trend was recognized by several stakeholders and focus group respondents, and represents the general trend of people accounting greater value to biological foods (many other terms were also used, such as natural or organic). Both groups expected this trend to be perceived as something opposite to what IVM offers and represents, and therefore to have a negative effect on the IVM perception. However, some focus group respondents thought IVM could also appeal to people who support or are part of the biological food trend, since IVM could offer a sustainable, healthy alternative to meat.

One aspect that mostly received attention from the stakeholders, was the precarious relation between humans and food. Several stakeholders mentioned the fact that humans are inherently cautious and suspicious about food, and that the relationship is heavily influenced by emotions. This was also recognized by a few focus group respondents. However, stakeholders also mentioned the attitude – behaviour gap: the difference between the rational civilian (basing a positive attitude on rational IVM benefits) and the emotional customer (basing food choices on emotions rather than rational benefits). This type of reflecting on own behaviour did not take place in the focus group discussions, and this thus did not come up with the focus group respondents.

The influence of others' opinions on IVM was according to the stakeholders mostly dependent on the general public acceptance of IVM. Focus group respondents indicated that they would serve IVM to guests, on the premises that it is tasty and safe. Most respondents would in that case at least mention IVM, several students indicated they would serve IVM without mentioning it.

The influence of self efficacy (perceived ability to perform desired behaviour) was examined by asking questions about the freedom of choice in food/IVM. This was generally considered self-evident by both groups. However, focus group respondents made several statements about low self efficacy in their eating behaviour. Several respondents in all groups mentioned that they were uncertain about foods being healthy or unhealthy. They pointed at a lack of knowledge and the lacking opportunity to improve this because of complicated labels and ambiguous information in general (section 4.4). Additionally, they were not able to choose their food without this knowledge, purely on the basis of specific marks (health stamps or naturalness stickers), since these were not always trusted (section 4.5). Furthermore, students indicated to not have the budget to take important things into consideration when choosing food, such as animal welfare and the

environment. These considerations caused uncertainty about food in general for at least one respondent who mentioned this specifically. Two other respondents mentioned to have become more sceptical about food in general because of arguments heard in the discussion.

4.4 Theme C: Communication and framing

Theme C includes topics around communication. Views on the current public discussion about IVM, the type of information desired by the public, the influence of framing and general communication strategies for IVM are presented.

4.4.1 Stakeholder interviews

Public discussion

Table 27: Stakeholders' view on current public discussion about IVM

Public discussion	Citations
IVM: hot or not	<i>"Dus het is niet een onderwerp wat "hot" is." SH2, I138, politician</i> <i>"Nou ja, weet je, er is wel heel veel publiciteit over. Heel veel reuring. Men vindt het spannend, interessant, controversieel, maar ja het is beter dan niks." SH6, I169, scientist</i> <i>"Maar ik vraag me dat af, of mensen erover praten. Misschien wel net na die lancering. Misschien een dag na het NOS journaal is er over getweet of zo, daar heb ik geen flauw idee van. [...] Maar het feit dat ze het dus willen delen met de wereld geeft wel aan dat mensen het interessant genoeg vinden om dat te gaan verspreiden." SH9, I205, public representative</i>
Discussion topics: - Benefits, health and safety, price and taste - Use - Moral acceptability	<i>"Ik denk op basis van wat ik tot nu toe hoor in de focusgroepen, denk ik dat het zal gaan over de afweging: milieu en dieren, en andere mensen zich zullen afvragen of het ook ergens naar smaakt. [...] En: wat kost het dan, en zo. Kun je dat wel vertrouwen? Krijg je daar niks van? Als dat allemaal gunstige antwoorden krijgt, dan zullen mensen het overwegen. Dus de normale consumenten thema's denk ik." SH1, I203, philosopher</i> <i>"Poeh, dan komen al die dingen weer langs. Is het voedingskundig nodig? Is het wel veilig? Is het moreel wel acceptabel? Moeten we dit wel doen?" SH3, I198, policy maker</i>

Some stakeholders commented on the extent to which IVM is a popular topic, as seen in table 27. Their views varied, from "not so much a hot topic" (politician) to a lively topic, receiving much publicity and interest from the Dutch public (scientist). The view of the public representative was in between these views. She did not expect IVM to be a much discussed topic, but that those who encounter IVM show interest, and tend to share and discuss it with others.

Comments varied about current public discussions. Most mentioned topics currently discussed were the benefits for animals and the environment, safety/health risks and the price and taste. According to a philosopher, these were regular consumer themes, discussed for any new

product. Also mentioned several times was the necessity of IVM. The policy maker also added the moral acceptability of IVM.

Framing

Table 28: Role of framing in the public perception of IVM, according to stakeholders

Framing	Citations
Introduction	<i>"En dan denk ik: ja, ach, het is allemaal een beetje spelerei zolang er geen product is. Je kunt consumenten op allerlei sporen zetten, afhankelijk van hoe je het framed." SH1, I131, philosopher</i>
Positive forms	<i>"Dus ik denk dat dit op een andere manier gaat gebeuren, en dat je bijna á la Tesla een eigen distributiesysteem moet hebben, aanvankelijk gefocust op rijke hippe mensen die bereid zijn om daarmee op te scheppen, en dat verhaal te vertellen. En dan moet het dus in trendy restaurants geserveerd worden, en dan moet in het lokale krantje of in de regionale krant staan van "kijk, wij zijn de eerste wijk die een restaurant heeft die kweekburgers serveert"." SH6, I93, scientist</i>
- Trendy/wealthy first	
- Benefits/win-win	<i>"It depends on if you will succeed to promote it with this typical win-win situation and with the idea of moral progress, not only technical progress, but also civic progress. And then I can expect that these narratives can be appealing for many people." SH4, I171, philosopher</i>
- Other, familiar foods that use technology	<i>"Maar ik kan me wel voorstellen dat het kan helpen door het bijvoorbeeld te vergelijken met het bier brouwen, dat is ook technologisch proces, kaas maken. Als je dat gesprek hebt dan worden mensen wel opener." SH8, I66, artist</i>
- Company image	<i>"Degene die het product in de markt brengt. Is dat een groot concern waar een paar grote bazen achter zitten die het in de markt moeten drukken, of wordt het zo'n hippe stijl, dat het in zo'n klein winkeltje achterin Amsterdam is. Dat zijn verschillende manieren, maar het zal zichzelf moeten bewijzen." SH7, I233, industry</i>
Negative forms	<i>"Wat je wel ziet, als je het dan vergelijkt met de belendende dingen als additieven en GMO, is dat er soms wel degelijk gebruik gemaakt wordt van het publieke wantrouwen versus deze technieken om het te positioneren. Je ziet best wel eens producten met "additive free". Of "geen E nummers" en dergelijke. [...] Ik weet niet of het gerechtvaardigd is, maar men maakt daar dan wel gebruik van. Dat zou dan op een gegeven moment met kweekvlees ook kunnen gebeuren: "geen kweekvlees"." SH3, I178, policy maker</i>
Name	<i>"Het ligt er wel een beetje aan hoe het gaat heten denk ik." SH9, I217, public representative</i>
Parties involved	<i>"Maar het zal dan liggen aan de mensen die het in de markt zetten,</i>

	<i>en hoe de journalistiek het gaat oppakken. Als die het positief oppakt, en krijg je het goed verkocht, dan kan het heel snel gaan. Dan mag het zelfs wel iets duurder zijn. Pakt de media het verkeerd op, dan komt het nooit op de markt.” SH7, I203, industry</i>
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Both after the interview question about the role of framing, and while discussing other topics (from other themes), framing was brought up many times by the stakeholders (see table 28). They generally consider it a very important aspect for the public perception of IVM, because it is very new and abstract. Several stakeholders mentioned the importance of the introduction or first presentation and information, as can be seen in the following citation:

“En dan denk ik: ja, ach, het is allemaal een beetje spelerei zolang er geen product is. Je kunt consumenten op allerlei sporen zetten, afhankelijk van hoe je het framed.” SH1, I131, philosopher

Different forms of framing were mentioned, largely forms that affect IVM perceptions in a positive way, such as first introducing it in fancy restaurants with top chefs, to wealthy and trendy customers. After this, IVM could slowly become more mainstream and flow to “lower”/cheaper regions of the market. Media attention in leading television shows, with famous chefs was also considered to contribute to a positive IVM perception, as was proper communication of the benefits/win-win situations of IVM. The artist added that comparisons with other, familiar foods could be beneficial for a positive IVM perception. One respondent from the industry said that the public perception of IVM also depends on the image of the company that produces it: whether this is a small, trendy company, or a big company with rich managers.

Besides forms of framing that have positive influence, two stakeholders mentioned that negative framing could also occur. The policy maker exemplified this with products being labelled “GMO free”, or “additive free”, making use of possible distrust and feeding it. The scientist referred to an example in which a famous comedian ridiculed the introduction of a Heineken sub-brand with non alcoholic beer. As a result, this sub-brand failed entirely shortly after introduction.

The artist and the public representative also mentioned the influence of the name. Currently, several names are used for IVM, such as artificial, laboratory or synthetic meat. Which one is eventually used influences the perception of the Dutch public as well.

Parties involved in framing are all parties that communicate about IVM (see above), including the Dutch public. However, the scientist and one respondent from the industry emphasized the influence of journalists and the media: whether they were positive or negative about IVM could have much influence on the public perception of IVM.

Type of information

Table 29: Role of information in the public perception of IVM, according to stakeholders

Type of information	Citations
Health and safety	<i>“Ja, en eerlijk zijn over dat het daadwerkelijk niet schaden kan.” SH7, I229, industry</i>
Assessment/guarantee	<i>“En wat er wordt gedaan om het tot een betrouwbaar product te maken.</i>

Ingredients, taste, costs	<i>Hoe de consument kan weten of het wel gezond is.” SH1, I211, philosopher</i> <i>“Maar wat ze er over willen weten is wat er in zit, en waar het van gemaakt is.” SH9, I225, public representative</i> <i>“Nou ja, waar kan ik het kopen? Heb ik het nodig? Hoe duur gaat het zijn? Wat zijn de producten? Hele praktische vragen.” SH8, I192, artist</i> <i>“Hoe het gemaakt wordt, denk ik. Misschien niet tot in detail, maar wel in grote lijnen.” SH1, I211, philosopher</i>
Production process?	<i>“Hoe het gemaakt is, dat weet ik niet of ze het willen weten. Nu willen ze het wel weten, omdat het een interessant proces is. Maar uiteindelijk als het in de winkel ligt... Ja, mensen willen niet van alles weten hoe het gemaakt is, dan wordt je helemaal gek.” SH9, I225, public representative</i>
Commercialization	<i>“And how it will be used and commercialized for example. For example, I expect that people will be interested in the question of ownership, and who will be making profit of this. And at which costs, who’s going to pay, for example.” SH4, I211, philosopher</i>
Negative aspects of meat	<i>“Nou ja, niet per se terughoudend. Maar gericht op de nadelen aan vlees en vleesconsumptie. Wat mij betreft zou communicatie, en wat wij dus ook proberen, om het publiek te laten zien dat het voor de leefomgeving, veiligheid en gezondheid van dieren en mensen en ook van natuur en milieu, beter zou zijn dat we naar een meer plantaardig dieet gaan.” SH2, I176, politician</i>
Labelling	<i>“Je laat de informatie voorziening eigenlijk voornamelijk aan de consument over. Ze moeten de labels gaan lezen, en ze moeten de prijs gaan lezen.” SH6, I93, scientist</i>

Most of the stakeholders’ expectations about what kind of information people desire (listed in table 29), were about health and the safety of IVM. Several stakeholders also mentioned that it is important to communicate the safety is assessed, or guaranteed.

Product features were also mentioned several times, such as what IVM exactly contains, how it tastes, how much is costs and where it can be bought. Opposing views were present about public interest in information about the production process. Both philosophers mentioned this as something the public wants to know more about, while one respondent from the industry and the public representative expect the opposite. This is illustrated by the following citations:

“Hoe het gemaakt wordt, denk ik. Misschien niet tot in detail, maar wel in grote lijnen.” SH1, I211, philosopher

“Hoe het gemaakt is, dat weet ik niet of ze het willen weten. Nu willen ze het wel weten, omdat het een interessant proces is. Maar uiteindelijk als het in de winkel ligt... Ja, mensen willen niet van alles weten hoe het gemaakt is, dan wordt je helemaal gek.” SH9, I225, public representative

Also the scientist was not sure about people wanting to know how the production process takes place. He referred to other foods for which the public deliberately does not want to know about the production process (such as the Dutch “frikandel”).

One stakeholder, a philosopher, mentioned the commercialisation as something people want to know about. She mentioned the question of ownership, the costs of developing IVM, who is investing and who will be making profit.

The politician, who was against IVM, mentioned that information should mainly focus on the negative aspects of meat production and consumption, and on the benefits of a more plant based diet. Also, “myths” about the necessity and benefits of meat consumption should be debunked, according to the politician.

Finally, the influence or value of labels on foods or IVM was not brought up by the stakeholders, except by a philosopher and the scientist. The philosopher mentioned labels for GM. These are often not read, even when people are against GM, possibly because people do not have/take the time for it. The scientist mentioned that labelling IVM is not enough when considering communication/information sources, but that more efforts are needed (this topic, communication method and strategy, is described later in this section).

Communication method and strategy

Table 30: Stakeholders' views on communication methods and strategies

Communication method and strategy	Citations
Openness and transparency	<i>“Je moet open en eerlijk zijn, dat geldt voor vlees en vleesproducten. [...] Ter algemene geldt: voor alle voeding en voedingsmiddelen die tot stand komen, je kunt niks verbergen.” SH5, I192, industry</i>
Exclusively factual	<i>“Dus communicatie erover is heel belangrijk, transparantie is heel belangrijk, het niet doen van beloften die niet waargemaakt kunnen worden. Dus het reëel schetsen van de ontwikkeling.” SH6, I141, scientist</i> <i>“Dat bepaalde mensen een geloofsperceptie hebben over feiten, en ja, dat kun je niet winnen of zo. Dat moet je laten gebeuren. En dat hangt af van de belangen die er achter zitten. Alles wat je kunt doen, net als bij additieven, is eerlijke informatie neerleggen via de site van voedingscentrum.” SH3, I258, policy maker</i>
Public involvement	<i>“Ik denk dat je heel goed moet weten wat je wil vertellen. Dat datgene wat je vertelt ook absoluut juist en controleerbaar is. En dat is het denk ik. Ik denk dat je daar niet al te veel aan moet doen. Ik heb zelf wel de neiging om te zeggen van nou er zijn nog een aantal dingen die ik ook niet weet. Laten we het daar eens met elkaar over hebben. Dat is niet zo handig, om dat te doen. In de traditionele voedselwereld geldt het adagium dat als je uit moet leggen wat je aan het doen bent, dan heb je al verloren.” SH6, I181, scientist</i> <i>“Een klein groepje vind het interessant en die willen betrokken worden. Maar de grote massa die vindt het belangrijker wat Jolanthe doet of zo...” SH7, I249, industry</i> <i>“Nee, ze willen er genoeg van weten om er een beetje vertrouwen in te kunnen hebben, maar verder betrokken zijn... Nee. Een kleine minderheid misschien.” SH1, I231, philosopher</i>

	<i>"So I think there is an interest but it very much depends of how the results of these focus groups and other participatory elements are then incorporated in the decisions. Because it is not sufficient if you interview people and then do not use the results. This generates frustration." SH4, I235, philosopher</i> <i>"Dus het idee om het een beetje dichterbij te halen en niet grootschalig in verre fabrieken maar juist een soort stads landbouwproduct. En dan vermengt het zich juist met het "terug naar vroeger". SH1, I36, philosopher</i>
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When stakeholders were asked about the best way of communicating about IVM (table 30), most of them mentioned openness and transparency in communication as the most important aspects. According to several stakeholders, this was also the way communication could deal with people's concerns: clear and correct/verifiable information. This is illustrated by the following citation:

"Je moet open en eerlijk zijn, dat geldt voor vlees en vleesproducten. [...] Ter algemene geldt: voor alle voeding en voedingsmiddelen die tot stand komen, je kunt niks verbergen." SH5, I192, industry

However, the policy maker mentioned that only facts can be discussed and provided to the Dutch public, and that communication can thus only go as far as the facts. Matters of faith and belief are therefore not part of the communication, discussions in this regard cannot be "won" and should therefore be left alone. The scientist also mentioned that communication should be verifiable. Both citations can be seen in table 30. Although he was among the stakeholders who mentioned openness, discussing uncertainties was not the best way of communication, according to him. He referred to a saying from the food industry, stating that if one has to explain what he is doing, he has already lost.

Inclusivity and engagement of the Dutch public did not receive much attention. After asking about the importance of people's opinions, most stakeholders only referred to consumer inclusivity in a similar way as with other products: for marketing purposes. The Dutch public was also not expected to be very interested in inclusivity or engagement by several stakeholders. Two stakeholders mentioned that people are interested in engagement. One philosopher who did added that people are sometimes frustrated when the influence of this engagement is unclear. According to her, an example of engagement could be collecting opinions about technology as a way to deal with concerns. The artist referred to the current trend in which consumers seed their own small vegetable gardens. According to him and one philosopher, this exemplifies that people want to be more involved with their own food and that a similar possibility should be created for producing IVM at home (see the bottom of table 30).

Communication parties

Table 31: Important communication parties, according to stakeholders

Communication parties	Citations
Producer/manufacturer	<i>"Ja, de producent. Wie dat is in de toekomst weet ik niet. Wie anders? Ik weet het niet." SH9, I229, public representative</i>

Media	<i>"Kijk, bij zo iets als kweekvlees zul je ook wel een soort begeleidende publieke discussie hebben, in de krant en zo. Dat gebeurt sowieso. Dat is ook communicatie, maar geen hele gerichte communicatie." SH1, I219, philosopher</i>
Government	<i>"Dat is net als in het algemeen met voeding en voedingsveiligheid, de overheid natuurlijk." SH3, I214, policy maker</i>
Scientists	<i>"Want geheel onafhankelijk zijn de wetenschappers natuurlijk niet meer die dat proces ontwikkeld hebben met geld van derden. Daar moet je op zijn minst echt onafhankelijke wetenschappers tegenover zetten die kritische punten nog eens goed onder de loep nemen. En dat is met name de techniek en de veiligheid en noem het maar op." SH5, I156, industry</i>
Consumer platforms	<i>"De spreekbuis van de consument is vaak de consumentenbond. Of het voedingscentrum. Die kun je dan een beetje van de consument naar de overheid rekenen. Van voorzichtig aan kijkt." SH3, I218, policy maker</i>
NGO's	<i>"De beweging die het eigenlijk niet nodig vindt, de conservatieve milieubeweging. Ik zeg conservatieve er bewust bij omdat binnen die milieubeweging zijn er natuurlijk ook een heleboel verschillende posities. [...] En mogelijk ook ontwerpers, kunstenaars. Een beetje wat wij doen. Wij spelen ook een rol in de communicatie. Door dus dingen te visualiseren die nog niet helemaal in de schappen liggen." SH8, I196, artist</i>
Artists	
Supermarkets	<i>"De producenten, maar ook natuurlijk de supermarkten. De tussenlagen tussen de fabrikant en de consument. Die spelen daar natuurlijk ook een rol in." SH2, I188, politician</i>

A variety of parties were mentioned by the stakeholders to be important for communication about IVM, as can be seen in table 31. The most mentioned party was the manufacturer or producer of IVM, who is responsible for the advertising and positive framing, but also for information about safety, health and contents. This party is expected to make a good "case" for IVM in general. The media was also mentioned several times, mainly to report on information communicated by the producer and the third party involved in communication: the government. The government was expected to communicate factual/neutral information. A fourth party mentioned were scientists, other than the ones working on the technology ("independent scientists"), for example to communicate the safety of IVM. Also for safety, platforms for consumer information (Consumentenbond and Voedingscentrum) were mentioned. Critical parties that are involved with communication were mentioned by a philosopher and the artist. They referred to NGO's and ("conservative") environmental organizations. The artist also added his own profession, as they are involved with visualization of IVM while it still does not exist. Lastly, the politician added supermarkets, as a "bridge" between the manufacturer and the consumer.

4.4.2 Focus group discussions

Public discussion

Table 32: Current public discussion about IVM

Public discussion	Citations
Food in general	<i>"Ja, zeker, wij eten wel vaak met andere mensen, we zitten in zo'n eet gebeuren. En ik vind eten heel lekker, en gezellig ook vooral. Altijd met verjaardagen ook. Helemaal in onze vriendenkring is er altijd eten bij feestjes en zo." Rural area, I457, female, 44</i>
Familiarity of IVM	<i>"Ja, of het nou op het journaal was of een actualiteitenprogramma. Ik heb er een stukje van gezien ja, niet heel veel. Maar ik heb er toen wel even iets van gezien." Urban area, I73, male, 52</i>
Reactions of others	<i>"Ik denk dat ze dan gewoon niet weten, nu weten ze het ook niet, maar mensen denken graag dat ze wel weten wat er met hun vlees nu gebeurt. En dan komt er opeens iets nieuws op de markt waarvan ze echt geen idee hebben, en waarschijnlijk kunnen ze zich daar ook een heel moeilijk beeld van vormen. Dan zien ze allemaal van die horror dingen voor zich." Student, I356, female, 23</i> <i>"Of ze denken aan een genetisch gemodificeerd iets." Student, I358, female, 24</i> <i>"Dit is chemisch, zal men heel snel denken." Rural area, I29, male, 25</i>

Food in general was a topic that most focus group respondents indicated to talk about with others regularly, mainly about different flavours and recipe's or about the healthiness of foods. However, almost all respondents indicated to never have heard of IVM before, or only once after the public hamburger cooking in August, 2013 (see table 32). Only the students had previously discussed IVM with others before, and two vegetarians knew about it before the public cooking in 2013. Generally, it was not a current topic of discussion amongst the respondents.

Some focus group respondents also reflected on how they thought other members of the public would perceive IVM. The students were sceptical about the perception of others, and that they would have trouble imagining what it exactly is because of their lack of knowledge and information. Therefore, they expected the public would think IVM was scary, and associate it with GM foods. Also the rural group thought others would experience resistance towards IVM, like some of themselves.

Framing

Table 33: The role of framing in the public perception of IVM

Framing	Citations
Recipe's and chefs	<i>"Dus als je er iets mee zou willen dan zouden er ook wel recepten en mooie kookboeken moeten komen. En mooie websites. En misschien ook wel voorvechters, dus koks die iets leuks er mee doen." Vegetarians, I340, female, 55</i>
More attractive name	<i>"Sowieso als je het woord kweekvlees hoort, dat klinkt niet echt heel aantrekkelijk. Ik bedoel, daar mag nog wel een marketingdeskundige naar</i>

Less laboratory associations	<i>kijken.” Urban area, I97, male, 41</i> <i>“Ik denk dat je het wel een beetje, ten minste wat mij betreft, uit dat laboratorium weg moet halen. [...] Ik zou graag mij een beetje focussen op het eindresultaat, wat krijg ik dan op mijn bordje, en als dat dan lekker is dan moet het misschien een soort automatisme worden dat het er gewoon bij hoort. Ik moet een beetje die knip zetten tussen dat lab en wat ik uiteindelijk op mijn bord krijg.” Rural area, I603, female, 44</i> <i>“En ik dacht vanuit het perspectief dat mensen uiteindelijk overtuigd moeten worden om dit te kopen. En ik denk dat het op dit moment dan nog wat klinisch en wetenschappelijk overkomt, en ik denk dat dat negatief werkt.” Students, I24, male, 25</i>
Soothing/reassuring messages	<i>“Ik ga er vanuit dat niet iedereen een expert is, dat niet iedereen erin verdiept is, en zo lang het maar bekend is dat het veilig is moet het meer richting geruststellend zijn.” Students, I468, male, 25</i>

Focus group respondents mentioned the importance of framing several times during different parts of the discussion, also in other themes. An overview is given in table 33. Comments on framing always referred to ways in which IVM perceptions of others and respondents themselves could be *positively* influenced. All groups generally wondered about how IVM acceptance could be improved. The vegetarian group was least concerned with (positive) framing of IVM: one respondent (female, 55) mentioned the use of good recipe's and websites, and famous chefs that promote IVM. This was also mentioned in the rural group (female, 44). The name 'cultured meat', currently most often used for IVM, was perceived to have a negative influence on the product: several respondents in the rural and urban group mentioned a better, more attractive name is desirable for IVM. The following citation illustrates this:

“Sowieso als je het woord kweekvlees hoort, dat klinkt niet echt heel aantrekkelijk. Ik bedoel, daar mag nog wel een marketingdeskundige naar kijken.” Urban area, I97, male, 41

Two respondents in the rural group (male, 29 and female, 44) mentioned that IVM should be distanced from the laboratory association. This was for themselves a reason for resistance, and they wanted to change this by this framing. Finally, the students group was mainly concerned with the negative influence of too much emphasis on “clinical science” and small health risks. They mentioned communication should be accurate and true, but not 'soothing and not per se complete.

Type of information

Table 34: The role of information types, according to focus group respondents

Type of information	Citations
Quality control	<i>“Want wie is er uiteindelijk verantwoordelijk voor de kwaliteit van het eten? Is dat de consument, jij zelf die elke keer goed moet kijken dit wel of dat niet. Of moet inderdaad zoals jij zei de overheid heel erg bepalend worden? Ik vind dat wel een issue.” Vegetarians, I494, female, 55</i>

More or less information	<i>"Dus mensen zijn wel nieuwsgierig, maar dan willen ze het naadje van de kous weten. Daar kan je vergif op innemen. Want er werd zo veel gekloddert met eten tegenwoordig, en het is zo money making business." Vegetarian, 1336, female, 44</i> <i>"Nou, ik zou het sowieso, nog meer dan het nu al was, in een soort Jip en Janneke taal verpakken. Want mensen snappen het na dit denk ik ook al niet meer." Students, 1492, female, 23</i>
Costs/emission/feasibility	<i>"Er is zo veel minder CO₂ uitstoot, of de kosten zullen in 20 jaar zo veel zijn. Dus dat we daar een soort onafhankelijk oordeel over krijgen. Dat is volgens mij verreweg het belangrijkste wat nu moet gebeuren. En dat er meer informatie komt of het wel überhaupt mogelijk is om het in de toekomst te maken, dat vlees." Urban area, 1473, male, 52</i>
Labelling	
- Lack of knowledge about labels	<i>"Ja, met wat jij begon, ik heb er dus bijna een dagtaak aan om als ik nog verder op schuif. Dat krijg je dan. Dus ik hou ook wel weer van versimpeling van labels, dat je wel de grootste en ergste dingen weet." Vegetarian, 1488, female, 55</i>
- General lack of food knowledge	<i>"Maar ik moet je wel erbij vertellen: ik heb nog nooit, de laatste jaren vind ik wat je op internet kunt vinden over wat slecht is of goed is, ik heb nog nooit zo'n wijdverbreide vertakking gezien van wat men vindt van bepaalde producten." Urban area, 1545, male, 52</i> <i>"Gezond eten voor iedereen. Dat is natuurlijk een heel rekbaar begrip, want wat is gezond eten?" Vegetarian, 1229, female, 55</i>
- Labelling IVM	<i>"Maar ik zou zelf vinden dat als er kweekvlees in zit, dat dat apart vermeld zou moeten worden. Niet per se een icoontje, maar wel in de ingrediënten lijst op zijn minst." Vegetarian, 1458, male, 27</i>

Communication and information about IVM and food in general received considerable attention from the focus group respondents. An overview is given in table 34. All groups, except the students, expressed that they desired information about the quality control of IVM, and who would be responsible for this. Furthermore, one vegetarian (female, 44) mentioned that more information was desired than shown in the introduction video at the beginning of the discussion, because of the "meddling" with food by the industry. One student (female, 23) also expected people to request more information about the contents of IVM. She ascribed this to the 'biological food trend', discussed in section 4.3. However, some students also expected that the public would not be interested in all the details, and could value simplified information because they would otherwise not understand. Lastly, one respondent from the urban group (male, 52) added that he wanted information about the costs, actual emissions and the feasibility of producing IVM.

When respondents were asked about their current use of labels on foods, reactions varied. The vegetarians used labels most frequently, to check vegetarian friendliness or gluten. The students and urban groups did not make much use of labels, the rural group used labels a little to check the additives.

What came up in all groups except the rural group, was the experienced difficulty in understanding food labelling. Several respondents mentioned they were unable to fully interpret labels, emblems or contents information about additives, and that they could use simplification and

clarification, such as a respondent from the vegetarian group (see table 34), or a respondent from the urban group:

“Ja, ik kijk ook wel af en toe op die dingen, maar ik ben me er ook direct van bewust dat mijn kennis te weinig is om daar flinke duiding aan te kunnen geven.” Urban area, I541, male, 52

Related to this, several respondents from all groups, except the students, mentioned a general lack of knowledge about food and proper information to improve this. One vegetarian (female, 55) mentioned “healthy food” is a broad and unclear term. Several respondents from the urban group mentioned inconsequent information that is widely available on the internet, and the fact that this information changes over time, as seen in the following citations:

“Maar ik moet je wel erbij vertellen: ik heb nog nooit, de laatste jaren vind ik wat je op internet kunt vinden over wat slecht is of goed is, ik heb nog nooit zo’n wijdverbreide vertakking gezien van wat men vindt van bepaalde producten.” Urban area, I545, male, 52

“Het verandert ook de hele tijd.” Urban area, I547, female, 42

“En met eieren dan. 10-20 jaar geleden zeiden ze je moet maar 1 ei per week eten, want dat is echt heel ongezond. En nu is het geen probleem om elke dag een ei te eten.” Urban area, I557, male, 41

For several respondents, this caused a low self efficacy (discussed in section 4.3) and higher uncertainty about their own food choices.

Regarding labelling of IVM, most respondents indicated to want information about the contents and about health of the product. Several vegetarians indicated a specific IVM emblem wasn’t necessary, but it should be listed in the contents on the label. One vegetarian (male, 49) added concerns about ingredients that are present in current foods in such small amounts, they were not mentioned on the labels (micro ingredients). He expected this to also be the case with IVM.

Communication method and strategy

Table 35: Focus group respondents' perception of the role of communication about IVM

Communication method and strategy	Citations
Neutral information	<i>“Ze zouden er vooral eerlijk over moeten communiceren. Niet alleen maar positief, ik zou zeggen eerlijk.” Urban area, I435, female, 42</i>
Not all details, soothing information	<i>“En eerlijk gezegd, hoeven mensen de details niet te weten. Ik ga er vanuit dat niet iedereen een expert is, dat niet iedereen erin verdiept is, en zo lang het maar bekend is dat het veilig is moet het meer richting geruststellen zijn.” Students, I486, male, 25</i> <i>“Maar ik denk dat behalve belangen voor de gezondheid, hangen er ook grote belangen aan vast zoals we al eerder besproken hebben, het wereld</i>

Public involvement	<i>voedselprobleem. Dat het best wel misschien iets kan zijn dat niet nu al als complete vervanger maar wel dat het dan langzaam een beetje ingebed kan worden, dat mensen er in elk geval niet bang voor zijn.” Student, I558, female, 23</i> <i>“Als er een markt voor is, en het is allemaal helemaal veilig, dan hebben ze mijn inspraak in principe niet nodig. Want het verdient zichzelf wel weer terug. En wat betreft de smaak, uiteindelijk heeft de consument altijd inspraak, heb ik het idee. Anders koop je het niet. Dus wat dat betreft is mijn inspraak niet direct nodig door bijvoorbeeld een referendum of zo.” Urban area, I449, male, 25</i> <i>“Maar daarvoor moet natuurlijk eerst inderdaad nog de ethische vraag worden gesteld, of voedsel zo op deze manier geproduceerd mag worden.” Urban area, I463, male, 41</i> <i>“Nou, ik denk dat dat uiteindelijk alleen, zeg maar, door te stemmen op politieke partijen zal... dus de enige politieke partij is ervoor, de ander is er tegen en dan ga je daar op die manier het landelijk beleid invoeren. Ik denk niet dat dat op een andere manier zal gaan.” Urban area, I447, male, 52</i>
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Specific ways of communication about IVM did not receive much attention from focus group respondents. Remarks on communication were more generic, as seen in table 35. In the vegetarian and in the urban area group, one respondent mentioned that neutral and factual information were important, with the possibility of a free choice. As mentioned with framing, the students group thought the public does not need to know all the details, for example about uncertainties or small risks. This is illustrated by the following citation:

“En eerlijk gezegd, hoeven mensen de details niet te weten. Ik ga er vanuit dat niet iedereen een expert is, dat niet iedereen erin verdiept is, en zo lang het maar bekend is dat het veilig is moet het meer richting geruststellen zijn.” Students, I486, male, 25

In addition, one student (female, 23) emphasized soothing/non scaring information, because of the potential of IVM and its necessity for the world’s food problem. However, they thought the information about IVM, such as the production process, should always be available and truthful when requested by interested people. In the rural group, one respondent (male, 29) suggested a strategy in which the industry would replace some kinds of processed meat products (such as lasagne) with IVM without informing the public. However, this comment received critical replies from the rest of the group.

Involvement of the public in communication did not receive much attention from the groups, except for the urban group. One respondent (male, 25) mentioned there was no a need for engagement/involvement, since the choice of buying or not buying IVM would be the sufficient. Several other respondents discussed the possibility of being involved in choices about ethical issues, but also concluded that this involvement could be accomplished by voting for political parties, that would have to take a position in this regard.

Table 36: Important parties for communication about IVM, according to focus group respondents

Communication parties	Citations
Manufacturer	<i>"Ik denk in eerste instantie degenen die het produceren." Urban area, I433, male, 41</i>
Media	<i>"Ik denk dat de media het grootst is in de communicatie." Students, I580, male, 22</i>
Government, experts	<i>"Ik denk vooral dat het gecontroleerd moet worden ook door de overheid. Maar dat het ook wel fijn is misschien om informatie te krijgen van specialisten op het gebied van voeding. Dus artsen die precies weten wat je precies nodig hebt en of dit mogelijk een vervanging kan worden." Students, I562, male, 25</i>
Lack of authoritative source	<i>"En dat is dus wel iets waar ik tegenaan loop de laatste jaren. Er is geen baken meer, in feite, die zegt van jongens, geen gezeik, dat is goed en dat moet het zijn." Urban area, I545, male, 52</i> <i>"Ik associeer het RIVM altijd eerder met griep epidemieën, of een alarm en dat je heel erg op moet letten. Ik zou dat dan eerder bij de, hoe heet dat, Voedsel en Warenautoriteit, daar zou ik het logischer vinden. Voor mij is het RIVM gewoon ziekten of zo." Urban area, I693, female, 42</i> <i>"Het zijn nogal abstracte lichamen voor mij. Allebei." Urban area, I695, male, 41</i> <i>"Ja, maar Voedsel en Warenautoriteit, dan zie ik die Rob van SBS voor me die met zijn thermometertje..." Urban area, I697, female, 42</i> <i>"Maar het probleem is juist: die programma's en de consumentenbond, die nemen het voortouw. En dat vind ik vreemd. Zulke organisaties, die moeten naar buiten komen. Die moeten een soort autoriteit uitstralen, maar dat is helemaal niet zo." Urban area, I701, male, 52</i> <i>"Dus ik hou ook wel weer van versimpeling van labels, dat je wel de grootste en ergste dingen weet. En dat je misschien een keuringsdienst van waarde hebt in Nederland die veel beter kijkt dat er niet al te gekke dingen gebeuren." Vegetarians, I488, female, 55</i>

Several parties were mentioned by the focus group respondents, such as the manufacturer or producer (promotion), the government (control and monitoring), the media and (food) experts (safety and health) (see table 36).

Furthermore, in the urban group, some respondents also mentioned the lack of a communication source/party that provides clear and decisive information about health and safety of foods, and about control and monitoring. This came up during the discussion about the unsatisfying information about food and health in general. There is currently no authority that provides conclusive information about safety and health of foods. Also one vegetarian mentioned that one, trustworthy party that communicates and maintains safety would be desirable.

4.4.3 Communication and framing: Comparison and overview

Stakeholder expectations of the extent to which IVM is discussed in public varied. Possible public discussions were mainly about benefits and risks of IVM. However, focus group respondents indicated it is not a very popular topic.

Stakeholders and focus group respondents both focus on a fairly traditional type of communication. They both mentioned openness and honesty from the industry and the government, but they also emphasized the importance of (positive) framing and did not pay much attention to public inclusivity or engagement.

The way in which IVM will be introduced was considered very important by stakeholders and focus groups. Focus group respondents thereby only mentioned positive forms of framing, few stakeholders also mentioned negative forms. Both groups mentioned the a possible role for famous chefs and the influence of the name, whereby the current name ('cultured meat') was not seen as favourable. Several focus group respondents expected the laboratory association to negatively influence the public IVM perception (both for themselves and for others), and that framing could be used to diminish this association.

Stakeholders held a fairly correct view on what type of information the public wants, such as insight in quality control and assessment. Both groups were divided about the desired amount of details, for example about the production process or uncertainties. Labels were hardly mentioned spontaneously by the stakeholders, focus group respondents indicated to not use them so much, except the vegetarians. In case labels were used, this was for health reasons or additives. There were also varying views on public involvement: most stakeholders did not elaborate on this, besides consumer research. Focus group respondents also did not pay much attention to public involvement.

Finally, one important aspect only came up in the focus group discussions: the experienced lack of knowledge about food, health and labels. Focus group respondents indicated to sometimes have too little knowledge about food to make confident decisions, and that clear and unambiguous information about this is not provided anywhere. Labels were often not understood or not interpretable. Several respondents experienced uncertainty from the fact that information about food is often conflicting, that information changes over time and that there is not one authoritative source that provides conclusive answers about health and safety of foods.

4.5 Theme D: Trust

Theme D includes topics around trust. Views on trust in general, on IVM specifically and trust in certain instances are presented.

4.5.1 Stakeholder interviews

Trust in food

Table 37: Role of trust in food in general, according to stakeholders

Trust in food	Citations
Importance of trust	<i>"Je hebt maar 1 schandaal nodig om ze jaren lang van je te vervreemden. Dus vertrouwen speelt een enorme rol, zowel bij de consument als bij de angst van de producent om dat vertrouwen te verliezen." SH6, I77, scientist</i>

Superficial distrust	<i>“Dan zie je dat er toch wel, in zo’n situatie als dat al te lang blijft doorgaan, die publiciteit, dat mensen toch zoiets hebben van gadverdarrie, ik vind het even niet zo fijn. Maar je ziet ook dat het geen diepliggend wantrouwen is wat ze hebben, want zodra het uit het nieuws is, zakt het ook weer weg. Dus het is oppervlakkig wantrouwen. Zo lang het in het nieuws is, wijken we maar even uit naar een andere productgroep, of een andere vleessoort.” SH5, I98, industry</i>
Little attention for trust	<i>“Maar een groot deel van de bevolking houdt zich daar ook wat minder mee bezig denk ik. Die is al blij dat die voldoende eten heeft en voldoende geld heeft om dat allemaal rond te krijgen. Dus we moeten denk ik ook niet doen alsof iedereen het zich kan permitteren om zich daar zorgen over te maken.” SH9, I105, public representative</i>
Trust in food is currently low	<i>“En dat heb ik gemerkt ook bij het maken van de tentoonstelling, dat het vertrouwen eigenlijk op de een of andere manier minder wordt in zijn algemeenheid, terwijl de controles worden eigenlijk steeds groter, hoger.” SH9, I105, public representative</i>

All stakeholders emphasize the importance of public trust in IVM as a technology and in the (food) industry in general, as can be seen in table 37. The two respondents from the industry ascribe this to the fact that IVM, as all food, has to be ingested by consumers (see also section 4.3, about the human – food relation). Trust comes slowly, but can reduce rapidly and cause consumers to stay away from a product for years, according to the scientist and one respondent from the industry. However, one respondent from the industry mentioned that distrust is sometimes quite superficial: consumers tend to stay away from a product as long as it receives attention from the media, but after this, consumers return to the product. In addition, the public representative mentioned that some people pay little attention to which foods they should or should not trust, because of financial reasons.

Currently, people’s trust in food (technologies) and the food industry is low according to several stakeholders. The main reasons mentioned are incidents (such as the horse meat incident) and the GMO controversy. The policy maker added conflicting research results on for example safety, to cause a lower trust in food.

Trust in IVM

Table 38: Stakeholders' views on public trust in IVM

Trust in IVM	Citations
Low trust in IVM	<i>“Ik denk dat het wantrouwen ten opzichte van gewoon vlees een rol speelt. Mensen staan heel wantrouwig tegenover vlees.” SH1, I102, philosopher</i> <i>“En ook door de schandalen die de afgelopen jaren, de grootschaligheid, die zich dan voordoen en ook best groot en ingrijpend zijn, daardoor heeft het vertrouwen volgens mij wel een deuk opgelopen en ik kan me voorstellen dat dit dan bij kweekvlees heel erg op gaat spelen.” SH9, I105, public representative</i>
Influence of framing/media	<i>“De journalistiek, als eerste. Hoe gaan zij, en de media, het in het licht</i>

	zetten. Zijn die in het begin heel erg positief, en het is gezond en dierwelzijn en het is allemaal goed, dan kan het zijn dat het binnen de kortste keren een succes is. Gaan die het als angst naar buiten brengen, dan schrijf het maar af, dan wordt het niet wat.” SH7, I118, industry
Reducing trust in IVM	
- Incidents	“Een goeie ramp, of een goed schandaal. Denk aan het paardenvlees, en gekke koeienziekte. Nou speelt dat allemaal niet mee met kweekvlees. Maar als er een mediaberichtje komt dat er kanker groeit in het kweekvlees en dat je het absoluut niet moet eten, ja dan neemt het vertrouwen af.” SH8, I110, artist
- IVM little credit	“Het heeft nog geen krediet opgebouwd natuurlijk. Dus er is weinig voor nodig om het in diskrediet te brengen.” SH5, I106, industry
Improving trust in IVM	
- Transparency	“En ik denk dat het ontzettend belangrijk is om nieuwe technologieën open te maken, in de zin dat het transparant is. Dat mensen kunnen zien hoe iets wordt gemaakt en het liefst ook dat ze het zelf kunnen doen.” SH8, I98, artist
- Benefits	“Vertrouwen is heel belangrijk. Zonder vertrouwen in een product heb je niet erg de neiging om het te eten. [...] Maar aan de andere kant, eerlijkheid gebied ook te zeggen dat er ook pluspunten zijn die mensen zouden kunnen doen kantelen van ja, dat mag allemaal zo zijn. Ik hoor de discussie over veiligheid, en ik hoor dat het technisch geproduceerd wordt. Maar 1-2 keer per week wil ik het best wel doen, want de pluspunten zijn het niet meer hoeven gebruiken van landbouwdieren, het beperken van de milieudruk.” SH5, I112, industry
- Health and safety	“Ik vind het aspartaam voorbeeld wel een mooie. Er zitten tientallen jaren van onderzoek en evaluatie zitten eraan. [...] Met eindconclusie: dit is veilig. 100%. Nou, er zijn altijd mensen die zeggen: ik vertrouw het niet. En ja, dan til je het uit de wetenschap, want mensen gaan dan met enkele, laten we zeggen geïsoleerde, studies aan de haal die ook nog eens niet goed zijn. En die laten dat niet opwegen tegen, laten we zeggen, de massive amount of data, de grote hoeveelheid gegevens, die het tegendeel bewijzen. Nou ja, oké, dan kun je niet verder.” SH3, I116, policy maker
- Benefits and health facts don't work	“Ook al zou je ik weet niet hoe veel wetenschappelijke feiten hebben en zeggen van ja, het is veilig, het is zus en het is zo, er is geen dierenleed, we hebben geen mestoverschot. Er zitten dus alleen maar positieve kanten aan. Dat het toch enorm lang zal duren voordat mensen overwegen om het een keer uit te proberen.” SH2, I130, politician

Trust was expected to play a role in the public perception of IVM in different ways. An overview is given in table 38. The current low trust in food in general causes reduced trust in (the health and safety of) IVM as well, according to several stakeholders. The meddling and incidents with meat and the GMO debate will negatively influence the public trust in IVM. The politician also mentioned the negative influence of the “industrial” nature of IVM.

Also mentioned by several stakeholders, was the influence of the media on the public trust of IVM. Positioning, framing, promotion (and what parties are involved in this) and journalists and the media were expected to have considerable impact on the public trust of IVM, as illustrated by the following citation:

“De journalistiek, als eerste. Hoe gaan zij, en de media, het in het licht zetten. Zijn die in het begin heel erg positief, en het is gezond en dierwelzijn en het is allemaal goed, dan kan het zijn dat het binnen de kortste keren een succes is. Gaan die het als angst naar buiten brengen, dan schrijf het maar af, dan wordt het niet wat.” SH7, I118, industry

Decreasing of trust could, as with foods in general, mainly be caused by incidents, lies or not living up to made promises. One respondent from the industry also mentioned that trust in IVM might be even more delicate than in food in general, since it is a new product without any “credit”. The politician added research results showing negative effects of meat could also decrease the trust in IVM.

Improving trust was expected to be achieved by openness and transparency, and without holding behind information (scientist, artist and respondent from industry). The artist exemplified openness by showing how the technique works and developing a production process in which consumers could make IVM themselves, at home. By involving people this way, trust in IVM could grow. A philosopher and one respondent from the industry mentioned clear information about benefits as an example of growing trust. The policy maker emphasized the importance of safety and research on this topic. However, he mentioned that this topic is often distrusted by people who do not “believe” in the safety or study results on safety. According to him, this can then not be improved as beliefs cannot be discussed: facts can be discussed. Finally, the politician mentioned that both information on benefits and health and safety would not work for improving trust, although knowledge about the production process and risks might.

Trust in parties

Table 39: Relevant parties regarding public trust, according to stakeholders

Trust in parties	Citations
Industry	<i>“Technologische bedrijven zelf zijn in principe in the lead, denk ik. Die spelen de belangrijkste rol, en die hebben ook niet helemaal een schoon blazoen naar het verleden toe.” SH8, I98, artist</i>
Supermarkets	<i>“Ik koop in de supermarkt vlees, het is anoniem, betaalbaar, houdbaar. En ze maken er iets lekkers van, en daar houdt het op. Ze weten eigenlijk niet wie ze wel en niet vertrouwen. De supermarkt is wat dat betreft het eerste aanspreekpunt.” SH5, I94, industry</i>
Scientists	<i>“Maar de wetenschappers, in brede zin dan misschien, dat mensen zo denken, die houden zich bezig met het bewerken van ons eten.” SH9, I109, public representative</i>
NGO's	<i>“For some people in the population, not for everybody but for people also in NGO's. For example the one who are critical, observing critically scientists or the innovator.” SH4, I115, philosopher</i>
Government	<i>“De overheden natuurlijk. Het beleid en het toezicht.” SH3, I92, policy maker</i>

The most important party for the aspect of trust, was the industry/manufacturer, mentioned by all stakeholders except one respondent from the industry. According to him, the manufacturer is often unknown with meat products, and the supermarket is the mediator for consumers:

“Ik koop in de supermarkt vlees, het is anoniem, betaalbaar, houdbaar. En ze maken er iets lekkers van, en daar houdt het op. Ze weten eigenlijk niet wie ze wel en niet vertrouwen. De supermarkt is wat dat betreft het eerste aanspreekpunt.” SH5, I94, industry

However, many stakeholders also mentioned that the industry is also the party that is least trusted.

Another group that is relevant for trust are the scientists. They are generally more trusted than the industry, according to one philosopher. Also mentioned by her were the non-governmental organizations (NGO's), that are sometimes critical towards technological developments. They have gained trust since the GMO debate, according to this stakeholder. Finally, the government was mentioned by the policy maker and the public representative, largely trusted and responsible for control and regulation.

4.5.2 Focus group discussions

Trust in food

Table 40: The role of public trust in food in general

Trust in food	Citations
Low general trust	<i>“Ja paardenvlees, wat een onrust daar was. Dat soort dingen zorgen er bij mij wel voor dat ik denk van nou, je moet er wel bovenop zitten wil je zorgen dat alles wel gewoon netjes is.” Urban area, I605, female, 19</i>
Distrust in labels	<i>“Nou ik heb toch veel meer mijn twijfels gekregen over of dat werkt, die labeling. Uiteindelijk weet je nooit of het goed is.” Vegetarians, I448, female, 55</i> <i>“Mensen worden steeds bewuster, willen meer biologisch of in ieder geval eerlijk eten. Als het dan in een groene verpakking zit en er staat een koe in de wei op, dan nemen ze het al. Of het dan ook echt eerlijk is, is helemaal niet meer zo belangrijk. Het is maar wat de mensen geloven.” Rural area, I337, male, 29</i>
Dealing with distrust	<i>“Ik zal het inderdaad proberen na te zoeken. En ik ken mezelf wel, op een gegeven moment denk ik, het is wel goed. En op een andere dag denk ik gatverdarrie het staat me allemaal tegen. En dan sla ik het gewoon over en dan eet ik geen vlees. Even gewoon wat anders. Maar ik kan heel goed zonder vlees, ik kan wel overstappen. Dus als het me allemaal te veel wordt, dan denk ik: laat maar zitten. Dan doe ik gewoon niet meer.” Rural area, I871, female, 51</i>
- Extra information	
- Time/money	<i>“Nou, jullie hebben het over labels. Ik vind eigenlijk wel dat ik als consument er op mag vertrouwen dat als er een soort van oké etiket op zit, dat het ook een soort van oké is. [...] En ik kan ook heel snel boodschappen doen, dus het moet ook allemaal een beetje vlot.”</i>

- Own feelings - Deliberately ignoring labels - Accept suboptimal eating experience - Trust returns quickly - Obligatory trust High general trust	<i>Rural area, 1825, female, 44</i> <i>"Ik denk dat ik heel pragmatisch met eten omga in wat ik wel en niet vertrouw. Dus het neemt in die zin, ik denk dat het veel meer ingegeven is door gevoel, wat ik denk dat goed voelt om te eten of dat het daar meer mee te maken heeft. Ik denk dat er een heleboel niet deugt, maar daar heb ik geen vat op. Dus ja, daar ben ik pragmatisch in."</i> Vegetarians, 1590, female, 53 <i>"Ik verbaas me er heel vaak over wat er toch nog in zo'n stukje kipfilet allemaal voor producten zitten."</i> Urban area, 1535, male, 41 <i>"Dat wil ik ook allemaal niet weten, daarom..."</i> Urban area, 1537, female, 42 <i>"En misschien calculeer ik ook wel in dat ik misschien een X aantal jaar korter leef omdat je in een samenleving leeft waar het eten niet altijd fris en vrolijk en blij is. En dat je ook wel slechte dingen eet en drinkt. Dat calculeer ik dan wel in."</i> Vegetarians, 1550, female, 55 <i>"Vertrouwen is natuurlijk heel belangrijk, maar ik denk dat de meeste mensen daar niet zo veel problemen mee hebben. Als ik keek naar de hele kwestie van paardenvlees, en dat dat verwerkt zat in rundvlees. Ik vind dat heel erg, ik bedoel, dat kun je gewoon echt niet maken. [...] Maar als je zo ziet dat het in de maatschappij schijnbaar niet zo'n hele grote impact heeft..."</i> Students, 1636, male, 25 <i>"Ik denk dat je er in het algemeen bij voedsel op moet vertrouwen dat wat er ook aan regels is, aan kenmerken en ijkmerken, dat dat ook daadwerkelijk zo gebeurt en dat dat ook genoeg getest of gecontroleerd wordt. Je moet er maar op vertrouwen dat het ook zo gebeurt."</i> Students, 1634, female, 23 <i>"Ik heb 3 kinderen, en ik doe mijn boodschappen en ik heb zo iets van ik vertrouw ze gewoon op dat het goed is. Als er iets in de schappen ligt dan mag het verkocht worden."</i> Rural area, 1277, female, 36
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In all groups except the students group, respondents were fairly negative about their general trust in food and food products (see table 41). This was because of incidents, such as the horse meat incident or messages about germs found in foods in restaurants, but also because of the lack of knowledge and proper information (see also section 4.4). Labeling also played a major role here, since quality marks, logo's and in some cases ingredients lists are not trusted by some of the respondents from all groups, except the student group. For some respondents in the vegetarian and the rural group, labels and quality marks (e.g. for biological or vegetarian foods) are increasingly meant to merely evoke a "satisfying feeling" for consumers or to cover up harmful information. This is illustrated by the following citations:

"Je hebt die beter leven keurmerk, en die zit bij ons op bijna al het vlees. Meestal is het dan 1 sterretje, en dan denken mensen dat ze echt een beter leven hebben gehad maar 1 sterretje... Dan zitten ze minder vast, en kunnen ze een stapje naar links en een stapje naar rechts. Maar dat maakt niet uit, er zit een beter leven keurmerk op en hij heeft een sterretje. Dus het verkoopt." Rural area, 1347, male, 29

“Als je er ’s nachts maar beter van slaapt dan he?” Rural area, I353, female, 34

Respondents dealt with the distrust in foods in different ways (see table 41). Several respondents indicated to look up more information themselves, on the internet or other media. One respondent (rural area, 51) indicated that this sometimes still is not satisfying and causes distrust, because there is so much (conflicting) information, and that she then chooses to omit meat entirely. Some respondents indicated to not be able to pay attention to trustworthiness of foods because of money or time reasons, to rely on their own feelings or to deliberately ignore labels at all (see table 41). One vegetarian (female, 55) indicated to value an untroubled experience of eating, by just bearing in mind that food can sometimes be bad. Respondents from the students and the urban group also mentioned trust coming back quickly, exemplified by the horse meat incident. One student (male, 25) mentioned that after this incident, consumers very shortly refrained from products in question, but not for long. One respondent from the urban area added that people lost trust in meat, but at the same time were curious about eating the horse meat. One restaurant that appeared to have sold horse steak instead of beef steak for a long time, suddenly became wildly popular, *after* the incident:

“En ineens kwamen ze er dus achter dat het paardenvlees was. En toen dachten ze dat dit het einde van het restaurant was. Maar het tegenovergestelde was waar: de volgende dag zat het helemaal vol met mensen die dus benieuwd waren naar paardenvlees. Maar er zijn er in 20 jaar een heleboel belazerd. Dat is echt bizar.” Urban area, I623, male, 41

Finally, two students (female, 23 and male, 25) mentioned that consumers are powerless, and eventually *have* to trust their food.

In contrast, the students group generally had trust in foods available in the supermarket. According to them, foods only end up in supermarkets after proper control tests by European instances, so the foods can be trusted once they are in the supermarket. Also in the rural group, some respondents indicated to trust food available in the supermarket.

Trust in IVM

Table 41: The role of trust in IVM according to focus group respondents

Trust in IVM	Citations
Low trust in IVM	<i>“Ik denk heviger. [...] Ik denk dat het een hele markt is die te winnen valt, en daar zijn ontzettend veel belangen.” Vegetarians, I612, female, 44</i>
Monitoring and control	<i>“Kijk, op het moment dat zij zeggen dit kweekvlees, om het maar zo te blijven noemen, is betrouwbaar en onderzocht door dat en dat en dat bedrijf, dan zou ik het nog niet vertrouwen. Want door wie wordt het bedrijf weer gefinancierd? Ik zou dus echt heel kritisch zijn.” Rural area, I765, female, 34</i> <i>“Als het, om maar een extreem voorbeeld te noemen, erg kankerverwekkend is, dan neem ik aan dat het gewoon verbannen wordt. En als dat een grijs gebied is, want op het moment kan ja ook discussiëren dat sommige andere voedsel duidelijk meer kankerverwekkend zijn dan anderen en die worden ook niet verbannen, dan zal er denk ik gewoon een waarschuwingslabel op worden geplakt.” Students, I82, male, 25</i>

Much attention about trust, was about trust in food in general. However, some remarks were made about trust in IVM (see table 42). In the rural group, one respondent (female, 34) indicated to have low trust in IVM, because of the low trust in food in general. In addition, she mentioned her worries about meddling with meat also made her suspicious of IVM. In the vegetarian group, one respondent (female, 44) thought trust in IVM is even more an issue than with other foods, since IVM enters a new market, for which the stakes are high.

In the vegetarian group and the rural group, external/independent monitoring from parties that have no stake in IVM, was mentioned to be important. The students group had, as with regular foods, trust in (the monitoring) of IVM. They mentioned control of foods in Europe is trustworthy, and that possible health risk would be indicated on the labels.

Trust in parties

Table 42: Relevant parties for public trust, according to focus group respondents

Trust in parties	Citations
Industry	<i>"Ik denk dat ik de mensen niet vertrouw of geloof die alleen maar een financieel voordeel heeft als ik het product koop." Students, I682, male, 25</i>
Lobby groups	<i>"Ik denk inderdaad niet dat ik heel veel vertrouwen zou hebben in de industrie." Students, I694, female, 23</i>
Government/controlling instances	<i>"En ook lobbygroepen en zo, ik ben er heilig van overtuigd dat er heel wat lobby plaatsvindt op dit gebied. Ik denk ook vooral dat de balans een beetje weg is tussen de belangen van de lobbygroep en de belangen van de losse consument, de losse burger zeg maar. En dat maakt ook denk ik dat mijn vertrouwen wat minder is." Vegetarians, I558, male, 27</i>
Instances unknown	<i>"Ik heb daar nog nooit zo over nagedacht, ik denk dat ik de overheid en de levensmiddelencontrole wel vertrouw, dat moet je wel. Misschien een bedrijf niet, maar wat er in de winkel terecht komt, daar vertrouw ik wel op dat er in zit wat erop staat. [...] Zonder controle niet, maar het komt niet in de winkel te liggen zonder controle. En ja, ik weet niet of ik die controle altijd kan vertrouwen, maar je hebt ook geen andere keus dan het te doen. En als ik nu de hele dag moet nadenken of dat nu goed is of niet, dan wordt je daar ook niet gelukkig van." Students, I674, male, 25</i>
Scientists	<i>"Ik vertrouw het ook niet helemaal of zo. Dat heeft ook wel met toezichthouders of toezichtorganen te maken. Ik weet niet of die er zijn, maar die zou je wel willen hebben." Urban area, I643, female, 42</i>
Self produced foods	<i>"Ja, dan hangt het vooral af van wie er bezig is met die ontwikkeling. En als dat vanuit de wetenschap gebeurt heb ik daar nog iets meer vertrouwen in dan als dat vanuit het bedrijfsleven gebeurt." Vegetarians, I618, male, 27</i>
	<i>"Nou ja, eigen producten. Dus het zelf maken van producten zo veel mogelijk. Heel basaal. Misschien ook wel wat jij zegt, die planten. Maar ja, dus wel iets meer vertrouwen in jezelf en in je eigen..." Vegetarians, I578, female, 44</i>

Several parties were mentioned in discussing trust in food and IVM (see table 43). Among all groups, trust in the food industry is generally low, because this is the party that wants profit and has caused incidents in the past. Two respondents from the vegetarian group (male, 27 and female, 44) also did not trust lobby groups, who were also expected to play a role in the food market.

The students group and some respondents from the rural group had relatively high trust in food, because they trusted control and monitoring of the government and other instances that should always take place between the industry and the supermarket. Therefore, they also trusted supermarkets. The students also mentioned that one has to trust these types of control, that there is no other choice. Otherwise, no one can be trusted and everything has to be checked, which was indicated to be undesirable and unpleasant (see table 43).

One vegetarian (male, 27) was the only respondent to mention a specific monitoring instance, the NVWA (Dutch food authority), which he trusted. Respondents from the Amsterdam group found it hard to pinpoint an instance they expected to perform the control and monitoring. Popular media (TV shows) and the Consumentenbond (Dutch platform for representing general consumer interests) were mentioned by one respondent (male, 52) to communicate about food, while more authoritative instances usually remain on the background.

Scientists were mentioned by all groups, except the rural group, to be trustworthy, as long as they remain independent, for example scientists that work at a university.

Finally, the vegetarian group and the students group mentioned self-made foods were the most trustworthy, since you can control the process yourself and guarantee the health and safety of products.

4.5.3 Trust: Comparison and overview

Both groups emphasized the importance of trust, and the fact the current trust in food is low. More specifically, trust in the food industry is low. According to stakeholders, the main reason for this are incidents that happened in the recent past, such as the horse meat incident in the Netherlands and the GMO controversy, and contradicting research results about health and safety. Focus group respondents also mentioned both these reasons. However, focus group respondents mentioned the lack of a possibility to gain proper, trustworthy information about food as well. Trust in food labels was low for most respondents, and thus not a proper source of information. This was not mentioned by stakeholders. Focus group respondents mentioned several ways of dealing with the lack of trust, some of which were also mentioned by the stakeholders, such as paying less attention to it, or “surrendering” and distrusting food only superficially and short.

Concerning IVM, both groups mentioned that trust would be low at the beginning, as a result of the low trust in food and meat in general. Incidents or a bad reputation in the beginning was considered fatal for IVM by both groups as well. Stakeholders mentioned that framing of IVM will have much impact on the trustworthiness of IVM. Openness/transparency, benefits and research on safety should improve trust in IVM, according to stakeholders. Focus group respondents only mentioned clear information about health and safety, and insight in how this was determined and by who. Independent instances/researchers should be involved, according to them.

Besides the industry, parties that were relevant for trust in IVM were scientists, the government and supermarkets, according to both groups. One stakeholder mentioned (critical) NGO's as well. The recent controversy over GM foods increased public trust in NGO's, according to a philosopher. However, GM received little attention from the focus group respondents, and they did

not mention NGO's. Except one vegetarian that mentioned the Dutch food authority (NVWA), both groups did not mention any specific instances/parties that were relevant for trust in IVM. Focus group respondents indicated that ultimately, self produced food would be trusted the most.

Finally, distrust mainly came forth from the lack of trust in the industry, and the lack of knowledge and information (providence) about health and safety of food to improve this trust. Other parties that are trusted, such as the government or independent scientists, were not "visible" enough for the respondents.

5. Conclusions and discussion

In section 5.1, the most important findings are presented. These are then discussed by connecting them to the literature in section 5.2. The section ends with limitations to the study and recommendations for further research.

5.1 Main conclusions

This study explored the factors that play a role in the public perception of IVM in the Netherlands, by aiming to answer the research questions: how is IVM perceived, and what factors influence this perception in the Netherlands? To answer these questions, qualitative methods were used. Nine interviews with stakeholders and four focus group discussions were conducted. A topic guide structured the questions and topics explored during the interviews and focus group discussions. The questions were divided over four themes, which were based on the literature study. These themes related to attitudes and associations, characteristics of society, the individual and technological features, communication and framing and trust.

Respondents hold a variety of perceptions of IVM

Several findings provide answers to the first research question: How is IVM perceived? These findings are based on the examination of several concepts related to attitudes and associations, found in the literature (section 2.2): uncertainty, emotions, risks, benefits and associations.

Findings show that stakeholders and focus group participants hold a variety of perceptions. Considering the written down reactions of the focus group respondents first, different thoughts and emotions were expressed. These included both positive reactions such as interest, curiosity or sympathy, and negative reactions such as feelings of unnaturalness and disgust. In addition, questions were raised about IVM after the introduction to the respondents. This is an indication of unfamiliarity and uncertainty about IVM, and was also expected by stakeholders.

Stakeholders connected uncertainty to questions about risks regarding the safety and health of IVM. Questions and concerns about these risks were indeed present in the focus group discussions. Other risks mentioned, by both the stakeholders and the respondents in the focus group discussions, were unnaturalness, product flaws (such as low meat resemblance and nutrition) and the loss of farms and farm animals. Some vegetarians (who in general did not perceive IVM as something they would consume) and stakeholders also mentioned the perceived lack of need for IVM and the false suggestion of the need for meat in general (caused by the development of IVM). Positive emotions, such as curiosity and interest were related to the perceived benefits of IVM. Stakeholders and focus group respondents perceived similar benefits, including advantages for animal welfare, global food security, the environment and (to a lesser extent) human health.

In sum, the findings from the stakeholder interviews and focus group discussions show that perceptions include several negative and positive sides: there is uncertainty and concern, but also interest and curiosity, leading to several perceived risks and benefits. In addition, the different feelings and perceptions of risks and benefits, seem to lead to mixed feelings. Quite a few focus group respondents experienced this, which led to different outcomes regarding their willingness to try eating IVM. Some of them thought IVM was a good idea and supported the concept, but would not try it because of the unnaturalness or unappealing feelings. In contrast, some respondents were

also hesitant and indicated that IVM did not sound very appealing to them, but were at the same time curious for its taste and thus indicated to be willing to try it. Interesting is that stakeholders mentioned these outcomes, by referring to “attitude behaviour gaps”. On the one hand, one stakeholder (industry) anticipated a negative outcome, in which the public supports IVM and acknowledges potential benefits, but is still hesitant to try it because of the unnaturalness and feelings of disgust. On the other hand, two stakeholders (artist and public representative) mentioned the importance of the curiosity of the public, when it comes to food. According to them, the possibility to try it, and see what it tastes like, may sometimes overrule negative attitudes and concerns about unnaturalness or disgust.

The biological food trend and confidence in food decisions

Regarding factors influencing the public perception of IVM, an important finding is the biological food trend within the Dutch public. This trend represents a wide appreciation for biological foods, and was recognized and emphasized by both the stakeholders and focus group respondents. Several stakeholders thought that this trend will have a negative effect on the public perception of IVM, since IVM is expected to be associated with terms that oppose the biological food trend (e.g. unnatural, industrial).

Following from the biological food trend, both the stakeholders and the respondents in the focus group discussions emphasized the importance of the framing of IVM so that the product loses its industrial and unnatural image. In addition, they emphasized the importance of the introduction and the final name of IVM as important influence on public perceptions. Several focus group respondents and stakeholders mentioned ways to positively frame IVM so that the product gets distanced from their own industrial and laboratory related associations. Stakeholders also added that framing could strengthen the negative effect of the biological food trend on IVM, such as giving it certain names (e.g. fake meat or Frankenstein meat).

In addition, focus group respondents experienced a lack of confidence around food in general and struggled with making satisfying food choices. This is comparable to the idea of “perceived behavioural control”, that Ronteltap et al. (2007) described (section 2.2), as well as to uncertainty or ambivalence. A relatively straightforward reason for this, was that some respondents, such as the students, did not have the budget or time to make the desired or proper (healthy) food choices. However, it had also connections with communication and trust in food and the food industry.

The focus group respondents, but not the stakeholders, mentioned that they had limited knowledge about food and its healthiness. Focus group respondents indicated that food information was complicated (e.g. complex food labels), inconsistent and changing over time, and that they did not know of any authoritative information source to assist them. These findings may indicate that communication about food in general could be improved for the Dutch public, as they struggle with complex or ambiguous information whilst not perceiving authoritative sources to assist them.

A way of dealing with the lack of knowledge about food, is to trust food labels with accessible information, such as logo's or stamps. However, respondents indicated they did not completely trust labels that should provide quick and easy information about foods (such as “animal friendly” or “natural” logos). In addition, stakeholders and focus group respondents mentioned that there is distrust in food and the food industry in general. Food incidents, especially the ones with horse meat (that was sold as if it were beef) were the mentioned as examples for distrust in food according to

focus group respondents, as well as the lack of an authoritative source that provides decisive information about healthiness and trustworthiness of foods.

The lack of confidence around food in general, as a result of the low perceived knowledge and trust in food and the food industry, has several implications for the communication around food and IVM. Both stakeholders and focus group respondents emphasized the importance of openness and honesty about food, especially about the monitoring of health and safety. Focus group respondents indicated that decisive and transparent information about food health and safety, provided by independent and trusted institutions (e.g. scientists and the government) can improve both the perceived knowledge and trust in food, and thus IVM. Furthermore, some stakeholders mentioned the opportunity for IVM to be produced by consumers themselves, as a means to improve trust in IVM. This was not mentioned by focus group respondents, although they indicated that food produced by themselves (such as fruits and vegetables) were the most trusted foods.

5.2 Discussion

This study provides more insight in the public perception of IVM in the Netherlands. IVM is a novel food technology that is still in development, with only one proof of concept shown in 2013. The importance of early insight in the public perception and acceptance of novel food technologies is stressed by the GM controversy in the past, as well as by studies about innovative food technologies (Frewer et al., 2014; Siegrist, 2008).

Role of emotions and uncertainty

Several attitudinal factors were proposed by authors (e.g. Ronteltap et al., 2007) to influence the perception of IVM, one of which are perceived risks. Stakeholders in this study related uncertainty to the lack of knowledge about IVM or scientific knowledge in general, which leads to more perceived risks as also found in other studies (e.g. Frewer et al., 2011; Ronteltap et al., 2007). In addition, emotions were linked to perceived risks and uncertainty, such as anxiety (Ronteltap et al., 2007). This relationship was also found in a study by Verbeke et al. (2015) and in the focus group respondents in this study: questions about risk concerns and the science behind IVM were raised.

However, uncertainty and emotions were not only related to risks by the stakeholders and focus group respondents in this study. Questions were also expected by the stakeholders and raised by the focus group respondents about the potential taste, different versions and when/where it becomes available: questions that are not underpinned by concern or necessarily lead to perceived risks. They are possibly also influenced by curiosity, sympathy or fascination, which are emotions that are also not necessarily related to increased perceived risks and uncertainty. These factors receive no attention in the literature, but do seem to influence the perception of the respondents in this study.

One result of the differences in perceived benefits and forms of uncertainty and emotions, could be the additional difference in indications of willingness to try IVM. Verbeke et al. (2015) mentioned that participants saw more societal than personal benefits, and therefore recognized the potential of IVM, but not for themselves. Additionally, feelings of unnaturalness and scepticism about the taste and structure played a role in this decision. This was also the reason for many participants in the studies of Hocquette et al. (2015) and Tucker (2014) to reject IVM. Instead, participants in the study of Verbeke et al. (2015) thought it could be useful for developing countries, which is referred to as NIMBY-ism (not in my back yard) by the authors.

In contrast, both the focus group respondents in this study were willing to try IVM, as was also expected by the stakeholders. As in the other studies, some focus group respondents indicated that IVM did not appeal to them for similar reasons. However, respondents in this study indicated to be curious for the taste of IVM, to such extent that they were willing to try it *despite* these feelings. In addition, two stakeholders mentioned the importance of curiosity for taste. Taste is often mentioned as important for all foods, and thus for food technologies (Ronteltap et al., 2007), but this dynamic with curiosity overcoming hesitance is less described, though seemingly important in the IVM perception.

Uncertainty about food in general

As said, uncertainty was connected by the literature to the lack of knowledge about IVM or scientific knowledge in general (Frewer et al., 2011; Verbeke et al., 2015). In addition, stakeholders in this study also expected uncertainty to play a role in the public's knowledge about IVM, such as the production and safety. Furthermore, Ronteltap et al. (2007) mentioned that food technologies are associated with "credence qualities": costs and benefits that cannot be verified by the consumer. These credence qualities of a new technology could cause uncertainty, especially with inconsistent information, low trust in authorities and insecurity about their own knowledge.

However, respondents in this study indicated that a main source of uncertainty was the uncertainty about *food in general*. This resulted from a combination of aspects regarding communication and trust. Respondents felt like they did not have proper knowledge about food and health in general, since information was too complex, inconsistent and changing over time.

In addition, respondents had little trust in food and the food industry in general, which thus did not provide a solution to the perceived lack of knowledge about food. In contrast to the perceived lack of knowledge about food, the low trust was expected by the stakeholders. The low trust in food was caused by incidents in the past, such as the one with horse meat. This could explain why Verbeke et al. (2015) did not find this trust issue: the incidents with horse meat did not take place at the time of their data generation. In addition, it was seen in this study that distrust is also caused by the lack of an authoritative source which provides trustworthy and decisive information about the health and safety of foods. As also mentioned by Siegrist (2008), the public has low trust in the industry, as opposed to independent scientists and consumer organizations. However, this study has also shown that respondents find it hard to pinpoint such independent parties for conclusive answers to their questions.

Public involvement

Respondents of this study paid little attention to public engagement in the process of IVM development. This is in contrast to the movement towards a situation with more public engagement proposed by science communication literature to improve the relation between science and society, trust in science and acceptance of new technologies (e.g. Wildson & Willis, 2004). Focus group respondents indicated that they did not see *how* engagement could take place, similar to findings of Besley (2012). This author also found that participants see little opportunity to have meaningful engagement with decision makers. Both focus group respondents and stakeholders often mentioned regular consumer or market research methods: procedures that the industry regularly applies to find consumer interests and preferences.

However, stakeholders in this study mentioned that people do want to be more involved with their food and its production. Besides open and honest information about health and safety of food products, involvement in the production of their own food could improve trust in food. Therefore, several stakeholders mentioned the opportunity for the development of an IVM production system in which IVM can be produced at home, by consumers themselves. According to them, this form of engagement could improve trust and public acceptance of IVM.

Focus group respondents did not mention such production system, but did indicate that self-produced food is the most trusted of all foods. Although it was not feasible to grow enough to satisfy their consumption, some respondents cultivated their own fruits and vegetables because they trusted these. This finding could indicate that a production system to produce IVM at home, as proposed by some of the stakeholders, could be an effective form of public involvement to increase trust in, and possibly acceptance of the technology.

Limitations

In this study, qualitative methods were used to explore the public perception of IVM. This means that a variety of viewpoints and argumentations were collected. This variety was gathered by using a combination of stakeholder interviews and focus group discussions with respondents with different backgrounds. The combination of both methodologies generated insights that would be overlooked when only one of these methods was used. However, qualitative data cannot be generalized for the entire Dutch public, or that of other parts of the world.

Limitations specific for the focus group discussions are the influence of the “group effect” (dominant views of a few respondents) and sidetracking of the conversation (Morgan, 1996; Kidd & Parshall, 2000). Both these limitations were reduced to a minimum by using an experienced moderator. Furthermore, findings are based on statements of the respondents *about* their perception. This does not necessarily mean their behaviour is in line with what was found in this study: the attitude – behaviour gap could play a role here.

Recommendations

This study provides one of the early insights in the public perception of IVM in the Netherlands. The nature of the study is explorative and, as such, can be a starting point for more quantitative research. Future research could, for example, focus more on the differences between different types of public (such as students or vegetarians) or generate quantitative data about the different arguments and viewpoints found in this study.

In addition, it could be interesting to see how the perceptions of different groups of the public change over time to gain more understanding of the formation of attitudes and perceptions. For example, this study showed that the disgust reaction might be less present than in studies conducted several years ago. Disgust and other factors in the perception of IVM will probably evolve further over time. Keeping track of developments of IVM perceptions could be done by conducting more focus group discussions as the technology is developed further, becomes less abstract and more specific cases or situations can be discussed (such as the possibility to produce IVM at home, emerging names or particular facts about safety, risks and benefits). In this way, more understanding can be obtained about the public acceptance of IVM and new technologies in general.

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Appendix A: Analytic scheme

Theme A: Attitudes and associations

- Perception of risk/concerns
 - o Uncertainty
 - o Emotions/affect
 - “Yuck factor”
- Perceptions of benefits
 - o Personal
 - o Societal
- Associations and concepts related to the technology
 - o Other technologies, like GM
- Willingness to try IVM

Theme B: characteristics of society and the individual

- Social system characteristics/socio-cultural differences
- Characteristics of the technique
 - o Process of production
 - o Price
 - o Complexity
 - o Convenience related features
 - o Taste properties
 - o Physical appearance
 - o Perceived naturalness
 - Uncontrollability, control over bioactivity
- Personal characteristics
 - o General confidence
 - o Socio-demographic variables
 - o General, stable attitudes towards science and technology
 - o Knowledge
 - o Ethical considerations
- Subjective norm (pressure (from others) to choose)
- Self efficacy/behavioral control: person’s beliefs of own ability to perform particular behavior
 - o Control over usage of the technique/consumption

Theme C: Communication about IVM

- Public discussion and awareness
- Type and amount of information
 - o Transparent regulatory framework on risk assessment and management
 - o Labeling
 - o Safety and handling information
 - o Openness to uncertainties and unknowns
 - o Benefits/use
 - o Alternatives and accountability for choices
 - o Amount of information

- Communication sources
 - Trust in communication (and sources)
 - Media
- Framing/given name
- Communication methods/strategies
 - Inclusivity/engagement/involvement

Theme D: trust and uncertainty

- Trust
 - Social trust
 - Raises when views/opinions (on benefits) align
- Trust in parties:
 - Government facilities
 - Industry/producers of IVM
 - Science/scientists

Appendix B: Topic guide stakeholder interviews

Interview protocol stakeholders *in vitro* vlees (60 min. totaal)

Introductie: mijzelf (5 min.)

Ik ben Bob Steenhuis en ik voer een afstudeeronderzoek uit voor de opleiding wetenschapscommunicatie aan de Universiteit Twente. Doel van mijn onderzoek is om inzicht te krijgen in de publieke perceptie van kweekvlees. Hiervoor zal ik een aantal focusgroep discussies uitvoeren met verschillende groepen Nederlandse burgers. De interviews met u en andere betrokkenen dienen als voorbereiding hierop, maar ook om de uitkomsten van beide methoden te vergelijken: Wat zijn uw ideeën en opvattingen over de publieke perceptie van kweekvlees? Welke aspecten spelen volgens u en andere betrokkenen daarbij een rol? Hiervoor zal ik vragen stellen aan de hand van een aantal thema's. Vindt u het goed als dit interview wordt opgenomen voor latere analyse? Het zal slechts voor dit onderzoek gebruikt worden.

Introductie: geïnterviewde/openingsvragen (5 min.)

- Kunt u kort vertellen wie u bent en wat uw functie is?
- Op welke manier(en) bent u betrokken bij het onderwerp kweekvlees? Professioneel (voor uw werk) of persoonlijk (uit interesse)?

Dan zou ik nu graag de thema's met u langsgaan. Het zijn er 4, en ze variëren van gedachten van het publiek over kweekvlees tot communicatieaspecten. Het is de bedoeling ze alle 4 ongeveer 10 minuten aan bod te laten komen.

We gaan het in dit interview hebben over het publiek en kweekvlees, zowel huidige percepties en in de toekomst. Uiteraard zijn er nu nog geen consumenten, want het product is er nog niet. Hoe definieert u het publiek bij kweekvlees op dit moment? Toekomstige consument? Of anders?

Thema A: Attitude en associatie (15 min.)

Ik zou graag beginnen met uw ideeën over de gedachten van het publiek over kweekvlees. Hoe denkt u dat het publiek denkt over kweekvlees?

- In hoeverre denkt u dat het publiek de techniek zal associëren/vergelijken met andere producten of technieken? Welke?
- Welke voordelen denkt u dat het zij zullen zien in kweekvlees?
- Welke nadelen zullen er spelen?
- Wat voor emoties kan kweekvlees oproepen?
- Wat voor risico's of zorgen denkt u dat het publiek zal zien?
- In hoeverre denkt u dat er zaken zijn die het publiek mogelijk niet begrijpt? Aan welke zaken denkt u dan?
- Zullen mensen het eten denkt u?

Thema B: Vertrouwen en onzekerheid (10 min.)

Het volgende thema gaat over het vertrouwen van het publiek in de techniek. Welke rol speelt vertrouwen volgens u in de vorming van een houding van het publiek t.o.v. kweekvlees?

- Op welke niveaus speelt vertrouwen een rol?
- Welke partijen spelen een rol bij vertrouwen in de techniek?
 - o Bij welke aspecten van kweekvlees speelt vertrouwen in deze partijen een rol?
- Welke partijen vertrouwt het publiek volgens u wel of niet?
- Hoe kan vertrouwen in verschillende partijen volgens u toenemen of afnemen bij het publiek?

In hoeverre speelt onzekerheid of twijfel volgens u een rol?

- Waarover denkt u dat het publiek onzeker is of twijfelt? Hoe komt dat?
- Welke gevolgen kan onzekerheid volgens u hebben?

Thema C: Kenmerken en overwegingen van individu en maatschappij (10 min.)

Het derde thema gaat over overige overwegingen die een rol kunnen spelen bij opvattingen over kweekvlees. Welke andere overwegingen spelen volgens u nog meer een rol bij de houding tegenover kweekvlees?

- In hoeverre spelen eigenschappen van de techniek een rol?
- Welke eigenschappen zijn van belang?
- Welke rol spelen persoonlijke eigenschappen van een individu?
 - o Aan welke eigenschappen denkt u dan? (kennis, algemene houding t.o.v. wetenschap, religie)
- Wat zouden nog meer overwegingen/invloeden kunnen zijn op de houding van het publiek?
 - o In hoeverre spelen ethische overwegingen een rol?
 - o In hoeverre denkt u dat consumenten rekening houden met kweekvlees als ze met anderen buiten de deur gaan eten? Of juist rekening houden met de mening over kweekvlees van te ontvangen gasten?
 - o Welke rol speelt de mogelijkheid om te kiezen/proberen volgens u?

Thema D: Communicatie en framing (10 min.)

Als laatst zou ik u graag een aantal vragen stellen over de communicatie over kweekvlees. Welke rol speelt communicatie volgens u in het vormen van een houding over kweekvlees?

- Wat voor discussie denkt u dat er gevoerd zal worden binnen het publiek? Zal men er over praten? Op welke manier? Over welke aspecten?
- Hoe denkt u zelf dat het publiek de discussie zouden moeten voeren?
 - o Wat voor informatie wil het publiek denkt u?
 - o Hoeveel informatie wil het publiek denkt u?
- Welke partijen spelen een rol in de communicatie over kweekvlees? Waarom deze?
- In hoeverre denkt u dat framing een rol zal spelen? Welke partijen spelen daarbij een rol?
- Wordt er iets gedaan met de mening van het publiek?
 - o In hoeverre denkt u dat zij betrokken zouden willen zijn?

- Hoe kan er het beste worden omgegaan met zorgen van het publiek als het gaat om communicatie?

Afsluiting: (5 min.)

We zijn aangekomen bij de afronding.

- Heeft u nog aanvullende opmerkingen of vragen?
- Bent u geïnteresseerd in de resultaten van het onderzoek?
- Ik dank u hartelijk voor uw medewerking. Als u achteraf nog vragen of opmerkingen heeft, kunt u weer contact met mij zoeken.

Appendix C: Topic guide focus group discussions

Focus groep discussie protocol publiek *in vitro* vlees (90 min. totaal)

Introductie: (15 min.)

Wie zijn wij?

Allereerst, hartelijk dank voor uw komst en deelname aan deze focus groep discussie.

Ik zou graag beginnen met onszelf voor te stellen. Mijn naam is Anne Dijkstra, docent en onderzoeker bij de masteropleiding wetenschapscommunicatie aan de Universiteit Twente. Ik ben de afstudeerbegeleider van Bob Steenhuis, student van de opleiding en verantwoordelijk voor het afstudeeronderzoek waar jullie middels deze bijeenkomst aan bijdragen. Ik zal vandaag het gesprek modereren, terwijl Bob aantekeningen maakt en de apparatuur verzorgt.

Het doel van het onderzoek en deze gesprekken, is om inzicht te krijgen in de opvattingen ofwel perceptie van kweekvlees bij het Nederlandse publiek. Jullie zijn één van de vier groepen die wij spreken over jullie mening over verschillende aspecten van kweekvlees. Deze aspecten zijn ondergebracht in een aantal thema's.

Vindt u het goed als dit gesprek wordt opgenomen voor latere analyse? Het zal slechts voor dit onderzoek gebruikt worden.

We beginnen zo met een voorstelronde en een video. Daarna zullen we u vragen stellen over kweekvlees aan de hand van vier thema's. Deze thema's variëren van vragen naar uw gedachten over kweekvlees tot communicatieaspecten rondom kweekvlees. Het is de bedoeling elk thema ongeveer een kwartier aan bod te laten komen.

Spelregels, inhoud gesprek en voorstelrondje respondenten

Voor we met de voorstelronde beginnen wil ik eerst nog even een paar spelregels voor het gesprek doornemen. Ik zou graag willen benadrukken dat het voor het onderzoek belangrijk is dat u vrijuit spreekt, dat we geïnteresseerd zijn in uw mening en motivatie en dat er geen goede of foute antwoorden zijn. U mag gerust van mening verschillen, wij streven niet naar consensus, maar wilt u elkaar wel laten uitspreken.

Verder zou ik willen vragen of u uw telefoon wilt uitzetten tijdens dit gesprek. Ook willen we het gesprek opnemen om zo de verschillende opvattingen te kunnen analyseren. De opnames worden alleen voor dit onderzoek gebruikt en uw persoonlijke gegevens worden hierbij anoniem verwerkt.

Dan nu de voorstelronde:

Kunt u zich kort voorstellen? Wie bent u (uw naam), hoe oud bent u, waar komt u vandaan en wat doet u voor werk of studie of anders?

Noteer tafelschikking tijdens voorstelronde

Opening en video (5 min.)

Dan zullen we nu de video afspelen. Na deze video is het de bedoeling dat u niet meteen met anderen in de groep in discussie gaat, maar uw reactie nog even voor uzelf houdt. Wilt u uw eerste drie gedachten op het papier voor u noteren?

Thema A: Attitude en associatie (15 min.)

Wat zijn uw eerste gedachten? Kunt u ze toelichten?

- In hoeverre had u al eens gehoord van kweekvlees? Waar dan? In welk verband?
- Wat zijn uw gevoelens ten opzichte van kweekvlees?
 - o Positief? Nieuwsgierigheid? Verbazing?
 - o Negatief? Yuck factor? Natuurlijkheid?
 - o Welke voordelen of nadelen ziet u bij kweekvlees?
 - o Welke risico's ziet u?
- In hoeverre heeft u dubbele of gemengde gevoelens bij kweekvlees?
- In hoeverre maakt u vergelijkingen/associaties met andere technieken of producten? Welke?
 - o Genetisch gemodificeerd voedsel
 - o Nanotechnologie
 - o Vleesproducten
 - o Vegetarische producten
- Als kweekvlees beschikbaar zou zijn in de supermarkt of slager, zou u het dan willen proberen?
- In hoeverre vindt u het belangrijk om het te kunnen proberen of het te kunnen kiezen? In hoeverre is voor u de vrijheid om te kiezen belangrijk?

Thema B: Kenmerken en overwegingen van individu en omgeving (15 min.)

Dan gaan we nu naar het volgende thema, die draait om keuzes die u maakt omtrent eten: hoe u uw keuze bepaalt voor wat u eet. Wat vindt u in het algemeen belangrijk bij uw keus voor eten?

- Op basis van welke waarden maakt u keuzes omtrent eten?
- Welke overwegingen spelen nog meer een rol? Aspecten uit thema A en B zijn:
 - o Emoties
 - Yuck factor bij kweekvlees?
 - Nostalgisch
 - Ervaring van vlees eten
 - o Voordelen/nadelen/risico's. Voor kweekvlees:
 - Dierenwelzijn
 - Ziekte uitbraken (mens en dier)
 - Gezondheid
 - o Vrije keus/keuzemogelijkheid
 - o Persoonlijke kenmerken
 - Algemeen zelfverzekerdheid over voedsel
 - Betrokkenheid bij voedsel
 - Socio-demografische eigenschappen
 - Religie
 - Kennis
 - o Eigenschappen van het product/techniek zelf
 - o Ethische overwegingen
 - Milieu
 - Dierenwelzijn
 - De mensheid en het wereldvoedselprobleem

- Financiële overwegingen
- Sociale invloeden

In hoeverre spelen de genoemde overwegingen als kweekvlees te koop zou zijn?

- Hoe denkt u dat anderen daarover denken?
 - Zou u, wanneer u gasten op bezoek krijgt voor het eten, eerst vragen om hun mening over kweekvlees?

Thema C: Communicatie en informatie (15 min.)

Het derde thema gaat over communicatie en informatie: welk belang u hecht aan het praten over eten en informatie over eten. In hoeverre vindt u communicatie over eten in het algemeen belangrijk?

- Praat u daar wel eens over met anderen?
- In hoeverre bent u geïnteresseerd in communicatie en informatie over eten?
 - In hoeverre wilt u geïnformeerd worden over eten?
 - Waarover zou u meer informatie willen?
- Wat is er van belang bij de manier, methode of toon waarmee communicatie plaatsvindt?
 - Overtuigend?
 - Informerend, bijdragend aan zelf maken van keus/beslissing?
 - In hoeverre zou u inspraak willen omtrent etenswaar en de productie daarvan? Hoe dan?
 - Bijvoorbeeld door publieke debatten
 - Discussie pagina's/websites
 - In hoeverre hecht u belang aan labeling van producten? Wat voor informatie zouden deze moeten bevatten?
 - Keurmerken

Hoe is dat voor kweekvlees? In hoeverre vindt u communicatie over kweekvlees belangrijk?

- Praat of discussieert u daar wel eens over met anderen? Met wie, en waarover dan?
- In hoeverre zou u geïnformeerd willen worden over, of bent u geïnteresseerd in kweekvlees?
 - Zijn er aspecten die u niet (helemaal) begrijpt/snapt?
 - Waarover zou u meer informatie willen?
- Wat is er van belang bij de manier, methode of toon waarmee communicatie over kweekvlees plaatsvindt?
 - Overtuigend?
 - Informerend, bijdragend aan zelf maken van keus/beslissing?
 - In hoeverre zou u inspraak willen omtrent kweekvlees en de productie daarvan? Hoe dan?
 - Bijvoorbeeld door publieke debatten
 - Discussie pagina's/websites
 - In hoeverre hecht u belang aan de labeling van kweekvlees? Wat voor informatie zouden deze moeten bevatten?
 - Keurmerken

Welke partijen spelen volgens u een rol in de communicatie over eten? Waarom? Op welke manier?

- Zijn dezelfde partijen van belang bij kweekvlees?
- Hoe denkt u dat anderen over deze communicatieaspecten denken?
- Hoe zouden partijen om kunnen/moeten gaan met zorgen of vragen van u en uw omgeving?

Thema D: Vertrouwen (15 min.)

Het volgende thema gaat over vertrouwen.

In hoeverre speelt vertrouwen een rol bij uw houding tegenover voedsel in het algemeen?

- Op welke niveaus speelt vertrouwen in voedsel een rol?
 - In hoeverre is vertrouwen belangrijk voor risico's (bijv. veiligheid, gezondheid)?
 - In welke aspecten heeft u wel of juist geen vertrouwen?
- Welke partijen spelen voor u daarbij een rol?
 - Vertrouwen in overheid:
 - Nederlandse voedsel en waren autoriteit (NVWA), controleert kwaliteit en **veiligheid**:
 - Producenten
 - Handelaren
 - Horeca
 - Diervoeders
 - Voedingscentrum, informatie over **gezondheid**
 - Centrum voor Ethiek en gezondheid (CEG), plaatst ontwikkelingen op **ethische agenda** van overheid
 - Alliantie verduurzaming voedsel, via dit steunt overheid bedrijven in **duurzame** productie
 - Autoriteit consument en markt (ACU)/Consuwijzer, **praktisch advies** voor consumenten
 - Vertrouwen in industrie:
 - Producent kweekvlees
 - Verkooppunten
 - Vertrouwen in wetenschap(pers):
 - Rijksinstituut voor volksgezondheid en milieu (RIVM), meet wat Nederlanders eten en drinken
 - Gezondheidsraad, adviseert overheid als onafhankelijk, wetenschappelijk adviesorgaan
 - Bedenkers/ontwikkelaars kweekvlees

Sociaal vertrouwen (bereidheid een ander te vertrouwen bij het maken van technologie management gerelateerde beslissingen)

In hoeverre speelt vertrouwen een rol bij u houding tegenover kweekvlees?

- Op welke niveaus speelt vertrouwen in voedsel een rol?
 - Risico's (veiligheid, gezondheid)
 - Beloftes over voordelen
 - In welke aspecten heeft u wel of juist geen vertrouwen omtrent kweekvlees?

- In hoeverre zijn voor kweekvlees de partijen die daarbij een rol spelen anders?
- Hoe kan vertrouwen in bepaalde partijen voor u toenemen? En hoe juist worden geschaad?

Afsluiting (10 min.)

We zijn inmiddels aan het einde van het gesprek gekomen.

- Vragenronde: Wat is nu, aan het eind van het gesprek, uw gevoel over kweekvlees in het kort? Zou u het eten?
- Heeft u zelf nog vragen of opmerkingen?
- Bent u geïnteresseerd in het eindverslag?

Ik wil u hartelijk bedanken voor uw tijd en het gesprek. U krijgt zo een presentje uitgedeeld samen met een formulier voor declaratie van de reiskosten. Als u achteraf nog vragen of opmerkingen heeft kunt u weer contact zoeken met ons. Wij wensen u een goede reis terug naar huis en een prettige rest van de dag of avond.

Appendix D: IVM information video

Name of the video: How world's first test-tube burger was grown

Uploaded by: The Telegraph

Link: https://www.youtube.com/watch?v=gyxPxcE_4to

Text in words, spoken in the video:

"Muscle tissue is a key component of the meat we eat, and it's first harvested in a small and harmless procedure. Next, the tissue is cut into miniscule pieces, to separate the muscle fibers and cells. And this is how it looks close up. The muscle tissue consists of fat cells and muscle cells, which are separated to produce cultured beef. By dissecting the muscle cells, individual cells can be removed and cultured. The cells start dividing. Eventually, from one muscle cell, more than one trillion cells can be grown. These cells naturally merge, to form so called myotubes, which are no longer than 0,3 millimeters. The myotubes are then placed in a ring, around a central hub of gel. Muscle's innate tendency to contract causes them to put on bulk, growing into a small piece of muscle tissue. From one small piece of tissue, this pioneering technique can produce more than a trillion strands. When all these little pieces of muscle are layered together, we get exactly the same thing we started with: beef."