

*Petri-dish petty?*

*Cultured meat?*

*In-vitro meat?*

*Vegetarian meat?*

*Animal- Friendly meat?*

*Fake meat?*

*Synthetic meat?*

*Steak of the art?*

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## Making sense of In- Vitro meat

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In- Vitro meat; Frames and narratives in the Dutch public.

*Real meat?*

*Intro flesh?*

*Test-tube burger?*

*Beaker burger?*

*Mock meat?*

*Tissue engineered meat?*

*True meat?*

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Cor van der Weele

**“It’s not that juicy, but the consistency is perfect. This is meat to me...”.**  
Ruetzles (2013)

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# Making sense of In- Vitro meat

In- Vitro meat; Frames and narratives in the Dutch public.

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## Abstract

The first In- Vitro meat (IVM) hamburger was presented on August 2013 in London. It remains however a question how people frame IVM. This study focusses on the frames and narratives which Dutch public use to make sense of IVM by analyzing a focus group (which consisted of six flexitarians) discussion and 96 Dutch news articles about IVM. The media analyses indicates that IVM-related news articles commonly discuss ten different types of frames; of which the animal welfare frame and the sustainability frame are mentioned most often. In total, two narratives were distinguished throughout the news articles; the dominant 'pro-IVM narrative', which favoured the production of IVM, and the second narrative; 'the counter narrative', which frames IVM as something negative, though is supported by a minority.

The present frames within the 'pro IVM' narratives were mostly provided by one person. The production of IVM was in general favoured because it (according to the Dutch news articles) could solve the problems which the current meat industry causes. The counter narrative framed IVM as something; unnatural, not animal friendly, unsustainable. The workshop with the focus group participants resulted in nine different frames, in which the Public health frame and Consumption frame were most dominant among the nine different frames which were used to frame IVM. Additionally, the results suggests that Dutch people base their opinion about IVM not only on the physical product, but on the immaterial aspects, such as for example the IVM producers. The results suggest that the information provided in the news articles regarding the production process of IVM was not sufficient for the focus group participants to decide whether they would like to try IVM. Further research is needed, to validate the focus group results and to create a clear understanding, into why the frames which were mostly mentioned by the media and the focus group participants differ.

Keywords: In-Vitro meat, Frames, Narratives, Media analysis, Focus group, Dutch public.

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## **Fore word**

I would like to thank my family, friends, roommates, classmates and the focus group participants without you this study was not possible. Most of all, I would like to show my appreciation and gratitude for the involvement of my supervisors, Peter Feindt, Cor van der Weele and Marielle Bruijnis.

Wageningen, March 2015

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# 1. Introduction

Acceptance by society is crucial for the future success of an innovation. Technology and society have an interdependent relationship, technological innovations enhance societal development but are dependent of social acceptance (Ronteltap, et al., 2012); (Ronteltap et al., 2007); (Rivers, 2002). People compare new products with products with which they are familiar, hereby they make sense of a new product. These comparisons give an indication of how people frame things and how they make sense of them, or not. Comparisons could give an indication of the conceptualization for In-Vitro Meat (IVM), which could answer the question whether people would accept IVM (Van der Weele & Driessen, 2014). Consumer studies of regular meat, for example, show that the price is not always decisive, rather other process values like justice, animal welfare, sustainability and food security are also of importance (De Baker & Dagevos, 2010).

On August 5<sup>th</sup>, 2013, Mr. Post presented the first In-Vitro burger in London (Maastricht University, 2014). This burger was made out of one stem cell and was produced with the use of calf serum. Current research is focused on scaling up the production of IVM and on the realization of a vegetable substitute for the calf serum (M. Post, Personal communication, 27-05-2014). If these aspects are successfully integrated, it would no longer be necessary to use animals to produce meat (Welin & Van der Weele, 2012). Although IVM is not yet commercially available some people already talk, write and discuss about it. Hundreds of news articles have been written about IVM in the Dutch newspapers (LexisNexis, 2014). Researchers are exploring the subject and discussions are ongoing in scientific literature. A few examples of both pros and cons of the concept of IVM are listed here below.

The article by Mark Post (Post, 2012) positions IVM as the solution for possible food shortage and environmental pollution. Calculations indicate that the production of IVM saves approximately 78 to 96 GHG emissions and it could degrade land use with 99 percent (FAO, 2011). IVM could also reduce the risk of animal-borne disease in meat, due to the controlled conditions in which IVM will be produced (Datar & Betti, 2010). Hopkins and Dacey (2008) explore the possible reactions of IVM and state among other things that 'the development of IVM is not merely an interesting technological phenomenon, but something we may be morally required to support' (Hopkins & Dacey, 2008). Peter Singer (Writer of the book Animal liberation) wrote the following statement in The Guardian: 'I haven't eaten meat for 40 years, but if in vitro meat becomes commercially available, I will be pleased to try it' (Singer, 2013). IVM could be an outcome for people who would like to be vegetarians for ethical reasons, but love the taste of meat too much to withdraw themselves from it, according to Schaefer & Savulescu (2014) and Holm & Mohl (2000). PETA (Animal welfare organization) stated that they would give 1 million euro to the first person who would develop In-Vitro meat (PETA, 2012). There are also several critics of IVM, The F.O.E. (Friends of the Earth) state in the Meat Atlas (2014), for example, that IVM is the 'new nadir in the alienation of people from their food sources, and the natural cycle' (F.O.E., 2014). Schaefer (2014) discusses in his work that people prefer: 'a meat-eating world, where the meat would be received from so called 'happy animals' which live fulfilling lives, than the realization of an IVM eating world' (Schaefer & Savulescu 2014). It is also argued by Mrs. De Boo (The vegan society) that IVM will lead to more inequalities in the world and that it will not solve the perceived food shortage problem. In Mrs. De Boo's opinion, would it be a better solution if people shift over to a vegetarian diet (De Boo, 2013). According to the Vegetarian butcher there are several developed vegetarian hamburgers which cannot be distinguished from beef burgers (Vegetarian butcher, ZD).

## **1.2 Knowledge gap**

Several workshops and interviews held in the Netherlands indicated that IVM would be accepted in general because it could provide a solution for people who feel ambivalence when they eat meat (Chivers, 2013); (Van der Weele & Driessen 2013); (Van der Weele & Driessen 2014). For many people, however, the negative aspects of meat result in mixed feelings about eating it (Van der Weele & Driessen (2014). Within the study performed by Van der Weele & Driessen (2014) several distinctions were made in the composition of the focus groups (age, residential place etc.). One of the results of the study was that the focus groups participants aged 15- 25 preferred IVM to be as similar as possible to their current meat products. IVM reminded the older population about all the different food related changes they have experienced in their lives, such as the introduction of margarine. A study performed by De Baker et. Al. (2010) indicates that there were several types of meat-eaters in the Netherlands. They speculate that there are three types of 'groups'. They are classified by the following: people who eat meat on a daily basis, people who eat meat, but not every day and people who do not eat meat or fish (vegetarians). The group of (possibly several millions of) people who do not eat meat every day, do not perceive meat eating as something which is normal to do. The researchers speculate that these people could influence other to reduce their meat consumption (Baker et al, 2010). The above mentioned studies explored several existing scenarios, but some of them also raised new questions regarding the influence of In-Vitro meat on the understanding of meat, the current meat industry and on the moral and value orientations towards animals and nature (Welin & Van der Weele, 2012);(Van der Weele & Driessen, 2014). The current study expands on these issues and builds partly on the study performed by Van der Weele & Driessen (2014), and consists of the following:

### **General Research Question**

How do Dutch people make sense of In-Vitro meat?

In order to provide a solid and complete answer to this GRQ, the following research questions will need to be answered:

### **Research questions**

1. Which frames are present in the Dutch media concerning In-Vitro meat?
2. How do Dutch people frame In-Vitro meat?

### **Research objective**

The objective of this research is to expand our knowledge of how Dutch public make sense of In- Vitro meat by exploring how they frame it.

These findings will provide communication specialists, governments and the general population with opportunities for strategic communication methods, to use in enhancing the acceptance of In-Vitro meat.

## 2. Theoretical framework

This chapter will explain the theoretical framework on which this research is built on. In chapter one the development of IVM will be described in more detail. Chapter two will give a short summary of the research performed by Van der Weele & Driessen (2014). The concept of framing and narratives will be explained in chapter three and four.

### 2.1 In-vitro meat

As mentioned before IVM is produced with the use of animal stem cells, these are obtained from cows' muscles through biopsy. Thereafter, the stem cells multiply on calf serum. Scientist are currently working on a replacement for the growth medium, for example through the use of a synthetic medium or by the use of nutrients like algae. The cells concentrate in bundles and are trained with the use of a bioreactor (this also occurs spontaneously on a smaller scale). As the muscle cells grow, they need to be continuously supplemented with nutrients. This eventually results in several pieces of animal tissue. To match the taste of meat, proteins and fat tissues are added to the tissue (Maastricht University, 2014).

### 2.2 Relevant research regarding In-Vitro meat

Although IVM is not yet commercial available, a lot of research and discussions already exist. As mention before this research will be built on the earlier performed research by van der Weele and Driessen (2014). Their findings are summarized below.

The study performed by van der Weele and Driessen (2014) tried to create insight in people's associations of IVM. They explored the association and types of frames people used to construct their opinion of IVM. These frames will shape the opinion of society towards IVM and hereby give an indication of a possible acceptance or rejection of IVM. The exploration of people's associations was done by the use of workshops with five focus groups. These groups varied in age and residence (city centred or more on the country side). The opinion showed in these focus groups regarding IVM was in general positive. The primary reason was that IVM would be better for the welfare of production animals in comparison with the current meat production (Van der Weele & Driessen, 2014). People compared IVM with other products like regular meat, biotechnologic innovations and other innovations like the mobile phone. GMO's were not associated with IVM by the focus groups, instead IVM was seen as a different type of product. It was perceived as technological, uncontrollable and unnatural but it was also recognized as a possible solution for several problems. Furthermore IVM raised a lot of questions about a possible alienating between people and nature and the impact of IVM on the current meat industry. One of the outcomes of the workshops was the idea of a pig in the backyard. The stem cell which is needed to produce IVM could be taken from this pig. This reduced the idea of IVM alienating people from the nature (Van der Weele & Driessen, 2014). Several interesting differences were found in the way elderly and young people talked about IVM. Elderly people made more comparisons with other innovations, for example margarine. The focus groups participants aged 15- 25, would accept IVM if it would taste and look similar to the current meat products they eat. In most of the focus groups the discussions shifted from IVM to regular meat. The research showed that a lot of people feel moral unease about eating meat, but that they (due to conflicting reasons) do not change their meat eating behaviour. Some people love the taste of meat, but feel unease about the moral reputation of meat caused by the sometimes poor animal welfare in factories and the associated environmental problems (Van der Weele & Driessen, 2014). IVM could provide a promise for these people; it could make it possible for them to eat IVM without this moral unease. IVM therefore places the view on the current meat practices in a new light.

## 2.3 Framing

People use frames to give meaning to the world around them. Frames connect unfamiliar aspects, to something they are familiar with. Framing is a consciousness and unconsciousness (ongoing) process. Simpsons (1989) defines framing; “the action, method, or process, of constructing making or shaping anything whether material or immaterial”. Through the use of frames people can link their notion to their values. Hereby frames help construct meaning and to guide action (Benford & Snow, 2000). Framing clarifies how specific ideas are constructed and connected. Additionally, it provides a way for people to make sense of a situation (van Gorp, 2010). Framing depends on people’s specific sets of values, norms, objectives, interests, convictions and knowledge at a certain moment (Aarts & Van Woerkum, 2006). Within the theoretical concept of framing there are two different types of traditional views distinguished: the cognitive and the interactional view. The cognitive view claims that frames are ‘representations of the world out there’ and stored in our memory. The interactional view claims that frames are a result of the construction of meaning, produced by an ongoing interaction between people (De Wulf et al., 2009). According to Aarts & Woerkum (2006) these different views do not exclude one another, but are mainly focused on a ‘different aspect of the framing processes’. Although the different views cannot be merged, they can occur alternately. When two people discuss a new phenomenon, for example, people bring their ‘cognitive frame’ into the conversation and hereby start to construct and/or reshape reality (De Wulf et al., 2009); (Aarts & Woerkum, 2006). Frames are selective due to the fact that when people talk, they mention a certain topic and thereby undermine another one (Dietram & Scheufele, 2000).

### 2.3.2 Media framing

Frames are “essential feature of the news” (Tuchman, 1978). Recent studies indicate that frames used by the media can affect an individual’s belief about a particular item (Shah, 2006). Kleinschmit & Krott (2008) indicate that the media content is one of the most important information source for people. Additionally, do they state that; ‘it also serves as an indicator of public opinion’ (Kleinschmit & Krott, 2008). Additionally the media serves as an important setting for competitive frames (Colleen, et al, 2011). The recall effect of frames enables people to connect new information to a frame which has already been given to them (Cappella & Jamieson, 1997). Journalists use frames to make their pieces newsworthy. Hereby the journalist not simply states about ‘the world out there’ but adapts this reality to the media formats (Gerhards and Schaëfer, 2007,). A method used to increase this news value is by presenting several contested frames (Feindt & Kleinschmit, 2011). By identifying the frames which are used in the media, one can reveal some of the underlying messages which they are sending (Gould, 2004). Furthermore, mass-media spreads several narratives and hereby provoke conversations (Leeuwis & Aarts, 2011).

### Standing

Within a news article the journalist has several choices; one could, for example, choose to quote a person who is linked to the subject. Hereby a specific person gets a ‘voice in the media’, also called standing. If the person who had ‘standing’ is has more power than another person, then the issue could also have more power (Gerhards and Schäfer, 2007). According to Snow et al. (2004), *‘being visible and quoted defines for other journalists and a broader public who really matters’*. Standing can be analysed by counting how many times a certain person has ‘a voice in the media’ (Kepplinger, 1992).

## 2.4 Narratives

Stories are a product of discourse between people in which thoughts and beliefs are exchanged. According to Fischer (2003) 'narratives serve on a cultural level to give cohesion to shared beliefs and to transmit basic values'. Narratives consist of the following elements;

- A begin, middle and end (Fischer, 2003)
- Sequence of events, unfolding in a time dimension (McBeth, Shanahan & Jones, 2005).
- The narrative need to end in a plot and include characters' (McBeth, Shanahan & Jones, 2005).
- An overall moral within the story (Fischer, 2003)

Interesting elements of media narratives are the actors and speakers that are named within the article. By addressing the actors, the actors that had success in the media and which frames contributed to this success can be discovered (Brandt, 2014). Additionally the person who is the spokesperson can have a lot of influence on the way the issue is portrayed (Gould, 2004). These actors may shape the text in a particular way. The speaker could also be the person who wrote the story. The specific actors that are selected in the article can give information about the focus of the issue (Feindt & Kleinschmit, 2011). The issue can, for example, be perceived as more relevant and/ or caused by the government or by scientists. Through a narrative analysis the arguments which are hidden in the story can be found (Fischer, 2003). A narrative analysis provides according to Todorov & Weinstein, (1969) the possibility to analyse the narratives in three different ways. By;

- 1) studying the narrative syntax (plot)
- 2) studying the theme (the story)
- 3) Studying the rhetoric (style) ( Todorov & Weinstein, 1969).

Through the analysis of story frames, one can create insight into which topics reporters connect to cognitive frames (Gould, 2004). By analysing Dutch news articles which contain information about IVM, information could be gathered about possible cognitive frames that Dutch people possess. (See paragraph 3.2.2 for more information about the media analysis). Literature distinguishes two types of narratives; first- order narratives which focus on the formulation of individual identities (for example; narratives which a person tells during a job interview). The second-order narrative is used by people to make sense of the world (Elliott, 2005). This research focuses on the second- order narrative. Since IVM is quite new, several aspects have not yet been explored. To explore the frames more broadly, there will be, in addition to the media analysis, a workshop conducted with the contribution of a focus group (see paragraph 3.3.3). The combination of both approaches will result in a more complete understanding of the framing process.

## 2.5 Flexi-tarians

The study performed by De Baker et al. (2010) indicated that there are several types of meat eaters in the Netherlands. They speculate that there are three types of 'groups'. They are classified by the following; people who eat meat on a daily basis, people who do not eat meat every day (flexi-tarians) and vegetarians. The flexi-tarians group consist out of (possible several millions of) people who do not eat meat on a daily basis and do not perceive meat eating as something obvious (they are more or less conscious about it). Their study indicates that most people in the Netherlands can be characterized as flexi-tarian (Baker et al., 2010).

## 3. Methodology

### 3.1 Design of the study

This research is approached from an interpretivism point of view. From an interpretivism view, there are multiple realities and these are socially constructed. Therefore research can be conducted in an interactional settings (Haverlan & Yanow, 2012). The research design will have an inductive focus, which refers to an approach which develops theory based on data, received through the use of a structured data collection method (Thomas, 2006). The research method will consist of qualitative and quantitative research. The data which is used in the study, is collected by a multiple case study. Hereby, multiple cases are highlighted and are in general studied by fieldwork, observations, interviews and/ or a with document analysis (Yanow et al., 2008). A multiple case study provides the opportunity to explore the differences between several cases (Baxter & Jack, 2008). The focus in qualitative research is on the description of how people experience a particular issue. Here, beliefs and opinions of individuals are taken into account. Hereby a complex understanding can be made of a particular case (Mack et al, 2011). With a quantitative research method a phenomenon can be analysed through the use of 'numerical data' (Creswell, 2003). The combination of a qualitative and quantitative research provides better insight into a case (Kolhlbacher, 2006).

### 3.2 Validity

Prior to data collection and analysis the validity of the study was assessed. Studies from an interpretivism oriented research cannot be simply generalized to a larger public nor can the internal validity easily be evaluated. To evaluate the research design one could look at the communicative validity, pragmatic validity, transgressive validity, and take the interpretive awareness into account (Sandberg, 2005). Within this research the pragmatic validity cannot be measured because this refers to the link between what people say and what they do. If a person in the workshop says that he would never buy IVM, then it would be impossible to check this. Communicative validity refers to the degree in which the interpretations are coherent. To increase the communicative validity of this research the results were discussed with other researchers who perform research on a similar field. The transgressive validity was taken into account by focusing on the contradictions rather than only on the coherence of the collected data. The interpretive awareness relates to the degree in which a researcher is aware of the possible effect of his or her own interpretations. To increase the interpretive awareness the obtained results were reflected on, and several examples of the original results (from the media analysis and the focus group) were added in the final report (Sandberg, 2005). Furthermore, will the data collection be discussed with the research assistant this will contribute to more reliable results.

### 3.3 Data collection

Each of the research questions (RQ) had a different data collection method. The RQ's will be mentioned in table one, including the specific data collection methods. The additional paragraphs below will provide more detailed information about the specific steps which were taken to collect the data. Figure one at the end of the chapter shows an overview of all the used data collection methods.

Research question	Data collection method
1. Which frames are present in the Dutch media concerning In-Vitro meat?	- Media analysis / Review
2. How do Dutch people frame In-Vitro meat?	- Focus group / Review

Table 1. Overview of the RQ's with the specific data collection methods.

### 3.3.1 Literature review

First, a scientific literature study was done on the concept of IVM. The factor of animal welfare played a large role in the selection criteria within the study performed by Van der Weele & Driessen (2014). To explore In-Vitro meat, a clear understanding of the concept was needed. The way IVM is produced and how this could affect animals and the environment was explored. Special attention was given to the concept of animal welfare in the production cycle of IVM. The current meat production methods were also explored and compared with the production of IVM. This provides crucial information, which was needed for the workshop with the focus group. Special attention was also given to the features of meat and IVM, which were framed in the news articles. Hereby it can be investigated whether there is incorrect and/or incomplete information published in the news articles.

### 3.3.2 Media analysis

Newspapers were selected for the media analysis because they are according to Rosenstiel et al. (2011) the most relied media source. The articles which were used for the media analysis were received through the program called Lexis Nexis. Lexis Nexis is a corporation which provides an overview of journalistic articles obtained through newspapers (Lexis Nexis, 2014). (The articles obtained by the Lexis Nexis program contained no pictures). The news articles were selected with the search term; 'Kweekvlees' (Dutch for In-Vitro meat). Synonyms like In-vitro meat, gekweekte vlees, kunstvlees were also scanned in Lexis Nexis. These search synonyms did not provide a lot of new articles. Most of the articles included the word; 'kweekvlees' and therefore were already taken into account. Two others articles did not referred to IVM with the word; kweekvlees, however these articles will not be taken into account because they did not met the (narrative) criteria which is listed here below.

The following time period was selected; August 5<sup>th</sup>, 2013 until October 13<sup>th</sup>, 2014. The first presentation of an IVM burger by Mark Post was held on August 5<sup>th</sup> in 2013. It was assumed that this caused a lot of media attention. The selected time period resulted in 447 articles, and after duplications with a 'high similarity' were removed 351 articles remained to investigate. However, 100 +/-articles desired in performing a media analysis (Gould, 2004), so a selection needed to be made. The articles which met the following criteria were taken into account within this research;

- contain a frame towards IVM
- contain a narrative in which the overall theme of the story was related to IVM

In the selected time period, the program Lexis Nexis included magazines into the search results therefore only a total of 96 articles of the 351 articles met the requirements.

### 3.3.3 Focus group

Conducting focus groups is a data collection method which is comparable with conducting interviews, however focus groups also include the discourse between the people within the group. This interaction is essential for making meaning of an innovation, people hereby (re-) order the world around them (Leeuwis & Aarts, 2009). With the use of focus groups, exploration of how people talk about a certain aspect and which form of communication they use in their talk takes place. Through the use of open ended questions the participants are encouraged to explore one particular aspect (Kitzinger, 1995). Hereby the different frames which people have towards IVM were explored. The study performed by Van der Weele & Driessen (2014) showed that the use of a focus group is a good way to explore the different meaning and ideas people have regarding IVM.

## Participants

The participants for the focus group were all flex-itarians, which (as mention before) represent the largest amount of the residents of the Netherlands. The focus group participants were selected by critical case sampling which is one of the non-random sampling methods. Hereby individuals with a particular phenomenon (being flex-itarian) were selected. The aim of the sampling method is to maximize understanding of a particular phenomenon (Onwuegbuzie et. al, 2007). Additionally selecting individuals from different ages, genders and education level was attempted. The aim was to have a group with mixed gender and education level. All the members were of Dutch nationality. In total six people participated; 4 woman and 2 men in the focus group which was held on January 17<sup>th</sup>. The age range was between 23 and 65 years. Their education and profession varied. The participants had one thing in common, they were all flexitarians. The workshop lasted around one and a half hours. Before the workshop, the participants were asked a few questions (see attachment V for the survey). Five of the six participants answered the questionnaire.

## Workshop

The workshop of van der Weele and Driessen (2014) was used as guidance's for the workshop. The results of the media analysis and the literature review were integrated in the workshop design. To prevent any framing in advance within this current research, was IVM named 'a product' during the workshop. During the focus group workshop will a research assistant be present. Here role during the workshop was making notes and observations. This research assistant is a BSC student (she studies to become a primary school teacher).

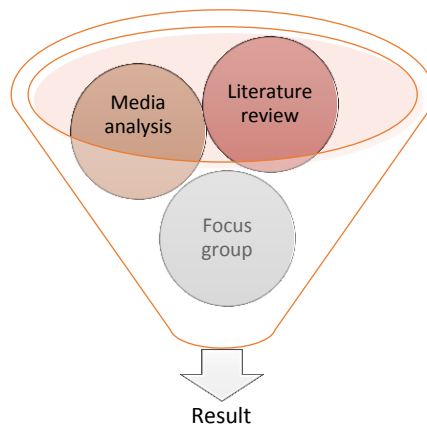


Figure 1. Overview of the different data collection methods.

### 3. Data analysis

#### 3.3.1 Literature review

Relevant information was obtained, summarized and divided per subject. Thereafter it was divided into frames.

#### 3.3.2 Media analysis

The media analysis of the news articles was focused on the following aspects;

- Article name
- Writers name
- Date
- Frame choices\*
- Standing
- Narrative elements; - speaker, actors, metaphors, comparisons, moral evaluation, theme of the story.

Other possible interesting aspects were also explored within the articles.

The selected articles (N: 96) were analysed and relevant information was gathered. These segments were labelled and coded. The labelled frames were reviewed to prohibit the occurrence of double frames. Afterwards were the codes counted and analysed. Figure two provides an overview of these analysis steps.

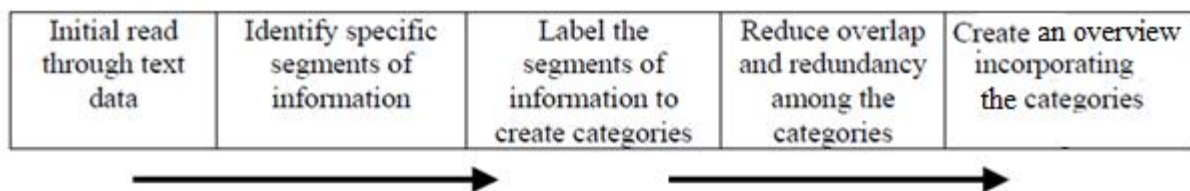


Figure 2. Adapted from Thomas (2003)

#### 3.3.3 Focus group

Permission to tape the sessions was asked before the session. The information received from the workshop was written out, labeled and analyzed, and thereafter the results were transcribed with the use of Jefferson transcription (Jefferson, 2004). Results which could be interpreted in different ways were discussed with the research assistant.

## 4. Results

### 4.1 Literature review

The concept of animal welfare was mentioned in every workshop performed by Van der Weele & Driessen. (2014). The concept of animal welfare in the production cycle of IVM therefore received special attention. To explore In-Vitro meat, a clear understanding of the concept was needed. In this chapter the current meat production method (and other factors) is explored and compared with the production of IVM. This provided crucial information, which was needed for the workshop with the focus group. The news articles framed features of meat and IVM received special attention. The information published in the news articles could be investigated in terms of accuracy.

#### 4.1.1 In Vitro meat

##### History of IVM

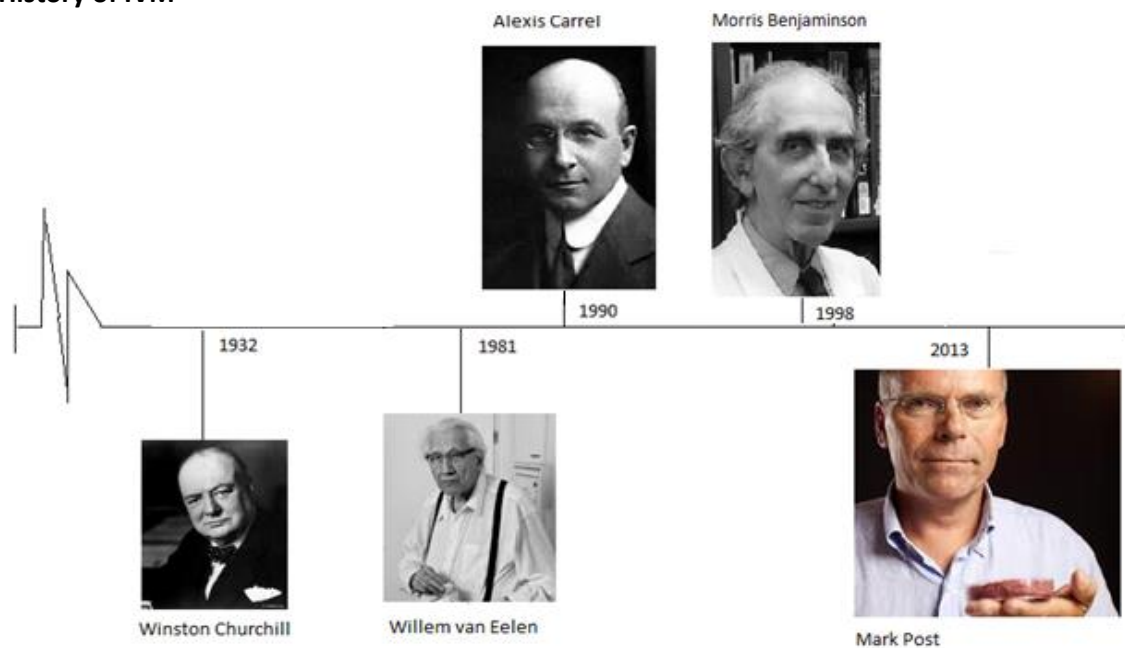


Figure 3 Historical overview, developed by the author.

*"Fifty years hence we shall escape the absurdity of growing a whole chicken in order to eat the breast or wing by growing these parts separately under a suitable medium."* (Winston Churchill, 1932).

On August 5, 2013 Mark Post Professor of Vascular Physiology and Tissue Engineering at Maastricht University (Faculty of Health, Medicine and Life Sciences) presented the first IVM burger ever made. This burger was the result of his new project which was launched in October 2011. M. Post however is not the first scientist which worked on the realization of IVM. The first underlying concepts regarding the concept of IVM were demonstrated by Alexis Carrel in the 1900's. He kept an embryonic chicken heart alive outside the chicken for a long period of time in which the muscle tissue grew considerably. Hereby he proved that muscle tissue could survive outside the animal's body if it received the necessary nutrients. Alexis Carrel's ideas inspired other scientists, including Willem van Eelen, who begun working on the cell culturing method in the year 1981. A group of scientists led by Morris Benjaminson started a research project for the NASA to produce IVM in 1998. As a result from the project, Benjaminson and his team demonstrated the scaffold-

based method (Maastricht University, 2014) ; (NASA, 1998). In 1999 van Eelen, together with Van Kooten and Westerhof, received an international patent for the 'industrial production of meat using cell culture methods (van Eelen, et. Al., 1999). van Eelen initiated the first study in the Netherlands on IVM in 2004. The 2 million euro study was funded by the Dutch government. A consortium was formed of three universities (UvA, UU and TU/e) and Meester Stegeman BV, an industry representative (Maastricht university, 2014). Figure 3 provides an overview of the above mentioned information.

### IVM Production cycle

The first IVM burger was made out of one stem cell with the use of calf serum. M. Post's focus is on producing a replacement for the Fetal Bovine Serum (FBS) in the years after the presentation in August, 2013. FBS alternatives are already available, for example one made from Maitake mushroom extract. This serum achieves a much higher growth rate than FBS. Most of these serums, however, are supplemented with purified proteins made from animals. Further research focuses on developing an affordable, non-animal origin medium for the cell to grow in (Lanza, 2014). The process of IVM is not yet commercialised, however several possible IVM production cycles are already written on paper. Datar & Betti (2009) worked out an example of an IVM production scheme (See attachment I).

### Fetal Bovine Serum (FBS)

Calf serum is essential in order for cells to grow in-vitro. The serum has nutritional value and a protective working. Calf serum is used widely because it is a high quality serum and it is readily available. The medium, Fetal bovine serum (FBS), contains basic components, such as hormones and growth factors. The FBS is made out of blood where the cells, platelets and clotting factors are separated (ISIA, 2011). FBS is obtained from slaughtering pregnant cows , young cows and from 'donor animals' which give blood more than once (Jochems. et al., 2002); (ISIA, 2011). Donor cattle are bred, in special controlled herds. FBS is commonly harvested by cardiac puncture. This minimizes the chance of contamination of the fetus or the environment. Fetuses need to be at least 3 months old to be suitable for harvesting serum. Figure 4 summarizes the general procedure of cardiac puncture (Jochems et al.,2002). After the blood is clotted, the substance is be separated through refrigerated centrifugation. The fetus is processed and used for animal feed. It is suggested that sheep, horses, pigs and bovine fetuses are able to feel pain and discomfort when they are unanaesthetised during the above mentioned procedure. The time that elapses between the death of the mother and the fetus from the regular slaughter varies from around 5 to 25-30 minutes. It is assumed that the fetus is alive during the time period in which the blood is collected (Jochems et al., 2002).

Diagram summarizing the fetal blood collection process

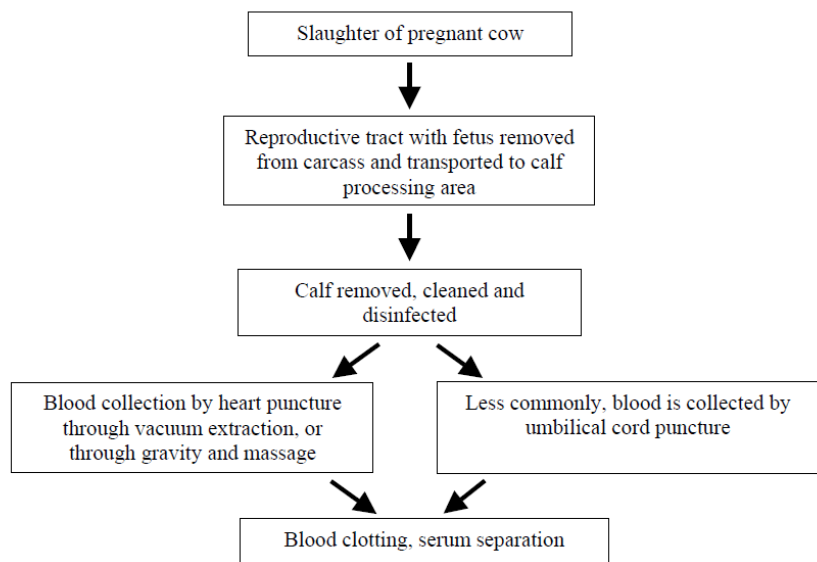


Figure 4 FBS Collection process (Jochems et al., 2002)

### **Health aspects of IVM**

Several production factors of IVM can be controlled, such as the ratio of fatty acids in the meat. IVM also gives the possibility to control and remove certain (possible harmful) substances. Additionally the nutritional value could be increased through the use of beneficial ingredients (ISEMA, 2013). Furthermore, the ratio of foodborne disease could significantly be reduced, according to Edelman et al., (2005). The FBS, however, could be contaminated with bacteria, fungi and viruses (Jochems, 2002).

### **Environmental aspects of IVM**

The life cycle assessment performed by (Mattos, 2011) indicated that the production of IVM will result in a smaller impact (in all aspects except energy consumption) than the current meat production. Additionally the production of IVM will, according to Mattick et al. (2015), *'almost certainly be accompanied by unintended consequences as well as unforeseen costs and benefits that accrue disproportionately to different stakeholders'* (Mattick et al., 2015). The exact environmental implication of IVM is unknown.

### **Terminology regarding IVM**

The study by Verbeke et al. (2014) indicated that people, in general, are not open to the idea of IVM. The study performed by Van der Weele and Driessen (2014), however, indicated that people are open to this idea. Both studies made use of focus group to explore the opinions and remarks people had regarding IVM. One of the main differences between the research performed by Verbeke et al. (2014) and van der Weele & Driessen (2014) was the name which they gave IVM. The study performed by Van der Weele & Driessen (2014) used the classification of 'kweekvlees' (translated: cultured meat). The study performed by Verbeke et al. (2014) named IVM synthetic meat. Hereby they instantly gave IVM a technological frame, which could have influenced the results.

## **4.1.2 Meat.**

### **Definition**

'Meat' refers to all the parts of an animal which are suitable for human consumption (Forrest et al., 1975), which includes the organs of an animal and muscle tissue (Ward, 2014). Meat is mostly made of muscle tissue which consists of approximately 75% of water, 20% protein and 5% fat (Exploratorium, ZD). Muscles are made of bundled cells (called fibers). These fibers consist of two proteins; actin and myosin, which give the muscle structure (Ward, 2014).

### **Meat quality**

Meat can be distinguished by the meat quality, nutritional quality (for example the fat ratio), and by the palatability factors. Factors which are important for the meat quality are the visual identification, smell, firmness, juiciness, tenderness and the flavour. The visual identification of meat does not only refer to the colour but also to the type of marbling which is used. The juiciness is dependent on the amount of water in the cooked product. The amount of water in the meat can be increased by marbling the meat and by adding fat around the edges. By ripening the meat one could increase both tenderness and the juiciness. The flavour refers to the sensation consumers have when they eat meat, for example bitter or sweet taste.

Different cooking and preservation methods can also affect the meat flavour (FAO, 2014). The interpretation of these meat quality factors is highly subjective to the consumer.

## **Meat production process**

It is impossible to provide an overview of all the meat production methods, due to the countless animal production methods (Van Drunen et Al., 2010). Attachment II gives one example of the many pork production methods. The lives which production animals live, strongly depends on the type of farm in which they spend most of their lives. In the Netherlands, laws and classifications have been developed regarding (among other factors) the treatment and housing of meat production animals in farms.

## **Animal welfare**

It is impossible for humans to scientifically determine whether an animal is happy or not. The framing of animal welfare is therefore dependent on human interpretations. Animals may behave in a certain way which could be characteristic for stress and discomfort. Discomfort can be observed by looking at the animal's health or the degree of anxiety. There are several possible methods which people use to 'check' whether the animal welfare is sufficient (Duncan, 2005). One of the many methods is through the use of five freedoms, cited here below (FAWC, 1993).

- Freedom from hunger and thirst
- Freedom from discomfort
- Freedom from pain, injury and disease
- Freedom to express normal behavior
- Freedom from fear and distress

The legislations which take animal welfare into account differ worldwide (The focus of this research is on the Netherlands so the legislation of other countries will not be taken into account.)

## **Legislation**

The law and regulations regarding animal production are defined in the 'wet Dieren' (Rijksoverheid, 2012). Additionally the 'nota Dierenwelzijn' is implemented. The nota Dierenwelzijn is formulated per animal species regarding several aspects, the legislation of the transport of the animals, living conditions, and the slaughter process, for example. The focus here is to improve the quality of life of animals in livestock farms. Additionally, it aims to support innovations and to invest in new types of farming systems (Stichting Vlees, ZD). The Dutch Food and Consumer Product Safety Authority (NVWA) is responsible for the monitoring and the implications of these laws (Joustra et al., 2014). The extent to which these law and legislations are implemented by the livestock farms is arguable. A report made by the Vakens in Nood & Dier in Nood states that almost all farms violate the above mentioned laws (Baaij, 2014). For farmers it often costs money to increase the animal welfare of their livestock. These costs are often added to the price which the consumer needs to pay for the meat. Consumers from other countries, could therefore prefer meat products from their own countries which are cheaper. This could result in an uneven competition position. It is therefore important that the legislation which is implemented in the Netherlands also should be implemented in the rest of Europe (Stichtingvlees, ZD).

## **Classification**

Besides the established regulations there are other directives, with which Dutch farms can choose to comply. These directives are established by the Dierenbescherming. Farmers have the option to adjust the living conditions of their animals and thereby earn stars on their products (Dierenbescherming, 2014). The price of three star meat and meat products without stars differs.

This price difference is often too much for consumers, and the classification provides a mid-way for the consumers, according to the Dierenbescherming (2014). The classification is as follows; the first star indicates among other things, that the animals receive more space and better animal feed. A second star refers to a distraction element and to a free range. Three stars refers to a production method which meets the highest demands (listed by the Dierenbescherming) regarding the animal welfare standards (Dierenbescherming, 2014).

### External effects

The study performed by van Drunen et. al. (2010) tried to create insight into the external costs of the average pig meat product. The external costs refers to the unintended side effects of production. Their study used the approach of Friedrich et al. (1998). They made an inventory of the possible aspects which could lead to external effects. Thereafter these effects were quantified and their values were calculated (note that in practice it is shown that not all effects can be quantified). Within their study they investigated the following effects: climate change, animal welfare, biodiversity and zoonosis for conventional and biological meat. Figure 5 provides an overview of their results (Drunen et. al., 2010).

*External costs and subsidy's of 1 kg pigmeat € (price level 2008).*

	Conventional	Biological
Costs climate change	0,18	0,22
Costs animal welfare	1,10 – 4,60	0 – 3,50
Costs biodiversity	>0,44	> ≈0,38
Costs zoonosis	>>0,32	>0,32
Subsidy	<0,02	<0,02
<b>Total</b>	<b>&gt;2,06</b>	<b>&gt;0,94</b>

**Figure 5 Adjusted by author from; Drunen et al. (2010).**

\*Note that these numbers are based on an estimation and that there are several limitations.

Additionally the literature refers to the greenhouse gas emissions (GHG) produced by the livestock sector. The livestock sector produces 18% GHG's of the total produced GHG's (measured in CO<sub>2</sub> equivalents) according to the FAO (FAO, 2006).

This literature review is aimed at providing an overview of the different aspects related to IVM and thereby by meat. The findings of this chapter are not only noteworthy, but are also relevant for the other elements of this research: data collection, data analysis and the interpretation of the results. The results was integrated in to the focus group workshop and media analysis. The analysis of the frames will help decide which news articles are based on facts or opinions. In the next chapter the results of the media analysis are shown.

## 4.2 Results of the media analysis

This chapter shows the results of the media analysis and provides an answer to the first research question - which frames are present in the Dutch media concerning In-Vitro meat? It is important to find out which frames are present in the news regarding IVM, because these frames could influence the perceptions Dutch public have of IVM. Additionally, other noteworthy aspects are highlighted, such as the type of the newspaper in which the news article was present in, and which actors were mentioned and which appear as speaker.

### 4.2.1 Newspapers

Figure 6 shows an overview of the different newspapers from which the news articles originate (N:96). The news articles regarding IVM are widely spread in different kinds of newspapers. IVM is covered in local new papers for example the 'Leeuwarder Courant', and in national newspapers for example 'De volkskrant'. This indicates a broad interest in IVM. IVM was developed by Mark Post who works for the University of Maastricht, which could explain why the newspaper 'De Limburger' covers 15 news articles regarding IVM. (Maastricht is the capital of Limburg).

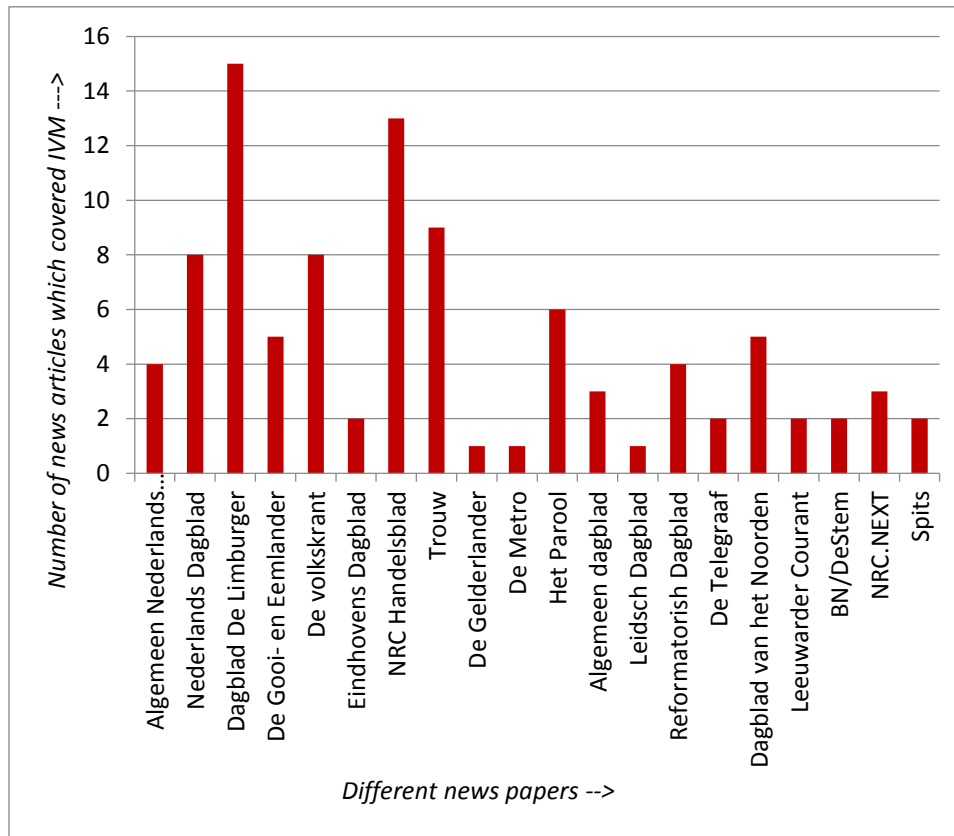


Figure 6 Overview of the different newspapers from which the news articles were selected (N:96), made by author.

\* Note: more news articles regarding IVM were published, figure 6 only gives the names of the newspapers included in this study.

### 4.2.2 Actors

A lot of individual actors were mentioned within the different newspapers (see figure 7). Mark Post was mentioned the most frequently (70 times). He produced the first IVM hamburger, which was presented in London. Sergey Brin, the person who financed the production of IVM, was also mentioned a many times. Furthermore, a lot of different scientists were mentioned. The scientists were often used by journalists to back up their story. The journalists sometimes referred to a specific group of actors and wondered about their reaction on IVM, for example the reaction from consumers, vegetarians, NGO's and the meat industry. Jaap Korteweg, the owner of the vegetarian butcher (he owns a meat replacement store), held a presentation of his new hamburger in London on the same day as Mr. Post. This could be one of the reasons why he was mentioned several times in the news articles. The middle class of Brasilia, China and India was mentioned in 9 news articles. In these news articles these countries were often referred to their fast growing economies. Their growing economies was framed as a possible factor which could increase the demand for meat in the future.

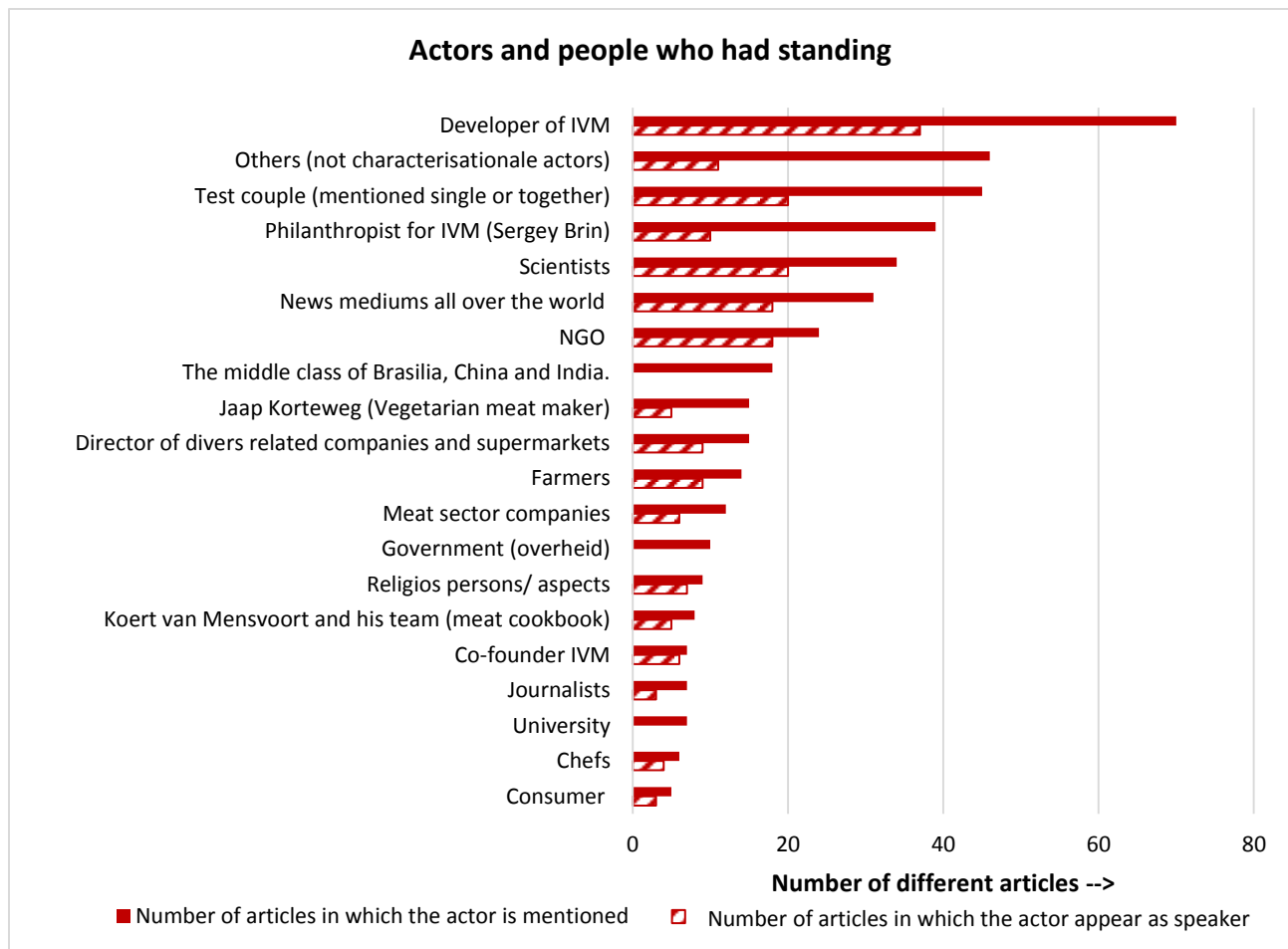


Figure 7 Overview of the actors and the people who appear as speaker (N:96), made by author.

### Actors which appeared as speaker in the media

The amount of times the actors appear as speaker in the media provides an indication of the ascribed power of the actor. Figure 7 provides an overview of the different actors that were mentioned in the selected news

articles, and the people that appear as speaker in these articles. Mark Post appeared most frequently as speaker of all the actors, namely in 35 different news articles.

The test couple, which tasted the first IVM burger on the August 5, 2013 appeared as speaker in 20 different news articles. In these articles their opinion about the taste of IVM was cited. Additionally, the opinion of several different scientists was asked. Noticeable is that not only were 20 different scientists were asked about their opinion regarding IVM, but also almost all of the scientists appear only once as speaker in the news articles. The expertise of the scientists varied, including among others cardiology, philosophy, (micro-) biology, and molecular defenses. Additionally, the opinion of other environmental, animal, meat and vegetarian NGO's, regarding IVM was cited. The actors who appear as speaker had the opportunity to present the frame regarding the issue which they preferred. The selected speaker, however, chooses sometimes to criticize other selected spokespersons, for example when a person presents the preferred frame poorly.

Noteworthy is the large contrast in which companies and farmers (related to the meat industry) were quoted. The companies related to the meat industry were cited in full name, position in the company and title. 'Albert Jan Maat, *Chairman of LTO Netherlands, an interest organization of farmers*'<sup>1</sup> (De Vries, 2013). Farmers sometimes were only mentioned by their profession or by their name. It was often unknown what kind of company the farmer had, or what their positioning in the company was. 'The man, a former farmer out of Apeldoorn' or 'the farmers' (De Vries, 2013). The exact identity and the exact type of profession of the farmers was here perceived as less relevant.

#### 4.2.3 Frames

Several frames were presented in the news articles. As mentioned before in chapter 3, the frames were developed out of the information which was listed within the news articles (this is also called a deductive or bottom-up approach). The frames are classified according to the different subjects which are discussed in the news articles. An inventory of all the different frames present within the news articles is listed below. Added to this inventory are the different arguments which were presented within the news articles. These frames are listed according to the subject to which they discussed in the news article.

##### What IVM Is

What IVM exactly is, is framed in different ways. The frames are used to explore what IVM is and (thereby indirectly) what it is not. The frames, which are mentioned here below, indicate that the opinions about what IVM is differ. The following four frames are distinguished:

- **Science high-tech frame:** here arguments mostly referred to the technological aspects of the production of IVM. - The amino acids of a laboratory burger do not differ from those of a bio hamburger<sup>2</sup> ('Zou u zo n gekweekte hamburger eten', 2013).
- **Consumption frame:** here the focus was on the taste of IVM. A physiology professor has a muscle vascular cultured into a healthy and tasty piece of beef<sup>3</sup> (Simons, 2013). 'The meat burger of M.

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<sup>1</sup> Translated from; 'Albert Jan Maat, voorzitter van LTO Nederland, de belangenorganisatie van boeren en tuinders'.

<sup>2</sup> Translated from; 'De aminozuren van een laboratoriumhamburger verschillen niet van die van een bio hamburger'.

<sup>3</sup> Translated from; 'spierweefsel die de hoogleraar vasculaire fysiologie heeft opgekweekt tot een lekker en gezond stukje rundvlees'.

Post is almost identical to meat'. 'Unlike IVM, can meat replacers not escape from their fake image'. 'IVM has no fixed form, it is an alternative but it can be so much more' (Jansen-Dings, 2013).

- **Unnatural frame:** 'I hope it fails, I am a nature person'<sup>4</sup>. Hereby the actor indirectly states that IVM is not natural (Schravesande, 2013).
- **Religion frame:** two articles mention that IVM is kosher. They state that IVM is kosher because the animal does not need to be killed and it could mean the end to ritual slaughter (Schinkelshoek, 2013); (De Vries, 2013).

#### How IVM is made

The way in which IVM is produced is framed differently in the news articles. A clear distinction can be made in the way they outline a certain element of IVM. A few statements are listed here below towards the production method of IVM. Noteworthy is that the first half of the list has a positive undertone, which can be characterized by the following words; pure and fair. The second half of the list contains sentences with a more negative point of view, these aspects are often exaggerated. From the results shown here below it cannot be with certainty derived what the actors tries to indicate with the used exaggeration. Noteworthy is that incorrect information was presented in several of the presented arguments. One of the articles indicates that for the production of IVM no cow needs to be slaughtered. However, as mentioned before in the literature review calf serum is needed for the production of IVM.

##### **Positive undertone**

- **Science high-tech frame:** 'IVM is an enormous innovative piece of meat. Muscle fibres that are trained with electrical pulses to firm muscles' (Stelling, 2014). The words 'innovative' and electrical indicate a science frame.
- **Unnatural frame:** one of the news articles state that - 'IVM is not natural but the way in which the intensive industry handles animals is also not natural'<sup>5</sup> (De Vries, 2013).
- **Sustainability frame:** one of the news articles state that - 'IVM is pure and fair out of the lab' (Hosselet, 2014)<sup>6</sup>.
- **Animal welfare frame:** four news articles states that - An IVM hamburger is made out of beef for which no cow is slaughtered (Redactie kerk, 2013); (Van der Kloor, 2013); (Den Hartog, 2013); ('Boerhaave verovert de kweekburger; de eerste gekweekte burger', 2014) .
- **Consumption frame:** two news articles stated that - It is real meat, the same which lays in the supermarkets ('Kweekburger smaakt naar normaal vlees', 2013); ('Wetenschapper presenteert gekweekte hamburger', 2013). Within this frame the journalists compare IVM with meat.

##### **Negative undertone**

- **Science high-tech frame:** one of the actor's states that it should be clear what IVM is and what it is not. The actor states that - 'the makers of IVM use calf serum and antibiotics and that they do not use GMO's and that IVM is real meat' (van der Kloor<sup>a</sup>, 2013).
- **Animal welfare frame:** the use of calf serum for the production of IVM is only discussed in a few articles. Within one of the articles IVM was framed as something which is not good for the animal

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<sup>4</sup> Translated from; 'Ik hoop dat het mislukt', zegt hij. „Ik ben een natuurmens’.

<sup>5</sup> Translated from; 'Kweekvlees is niet natuurlijk, maar dat geldt ook voor de manier waarop wij in de intensieve veehouderij met dieren omgaan’.

<sup>6</sup> Translated from; 'puur en eerlijk uit het lab’.

welfare of farm animals. 'Cell culture supplement is extracted from the beating heart of a castration calf fetus after the slaughter of the mother' (Stelling, 2014).

- **Unnatural frame:** in one of the descriptions of the IVM production process a kind of sarcasm is noticeable - 'In petri dishes full of growth hormones and proteins let Post, muscle stem cells from a cow, multiplying into muscle fibres, which he trained with electrical pulses into firm muscles. He bundle the stuck together, and voila, three lab burgers' <sup>7</sup> (Stelling, 2014).

### The name of IVM

The name of IVM was discussed within the consumption frame;

- **Consumption frame:** one of the articles states that IVM has no name, whilst Mr. Post clarifies that he just wants to name IVM 'meat', because (in his opinion) it is meat <sup>8</sup> (Van der Kloor <sup>a</sup>, 2013). The word "gewoon" (translated: just) can be interpreted as if this decision was against their expectations. But it indicates also a statement of normality about IVM. Willem van Eelen, who is stated in several articles as the spiritual father of culture meat, claims that the product of Mark Post cannot be called 'Cultured meat' because it consists of loose fibres. In his opinion the word 'meat' refers to a 'one piece product' like, for example, beef.

### The taste of IVM

This feature of IVM was mentioned in one third of the news articles they framed IVM as firm, however they indicated that the taste of IVM comes close to the taste of meat (N: 11). The news articles frame the taste as something which could be improved if fat cells would be added. M. Post is still working on this. These fat cells could increase the juiciness of IVM which the test panel missed (N: 24). The exact texture and flavor of IVM is mentioned in the articles with a large variety. The examples described here below do not only give an indication about the interpretations of the taste of IVM by the news articles, but it also gives an indication about the type of fallacies which are present within the news articles.

- **Consumption frame:** several articles refer to the texture. Other articles mention that IVM tastes tough. Hereby they place IVM as something which tastes between a vegan burger and a Big Mac (N: 2). Noteworthy is that different actors frame IVM differently, even without tasting IVM. The conservator Bart Grob from museum Boerhaave for example claims that the taste of IVM is exactly the same as a real hamburger (N:3). Additionally, the reaction of the test panel was framed differently in several newspapers - 'According to the world press IVM tasted like nothing, at least not to meat' <sup>9</sup> (van der Kloor <sup>a</sup>, 2013). This example framed the taste of IVM as disappointing. While other news articles framed the taste as almost like meat - 'you do miss the fat...', 'almost real meat'<sup>10</sup> ('Prof zoekt geld voor nog meer kweekvlees', 2013).

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<sup>7</sup> Translated from; 'In Petri schaaltes vol groeihormonen en eiwitten liet Post spierstamcellen van een rund vermenigvuldigen tot spiervezels, die hij met elektrische pulsen tot stevige spierbundels trainde. De bundels plakte hij aan elkaar, en voilà, drie lab burgers'.

<sup>8</sup> Translated from; 'We hebben nog geen naam bedacht voor dit product, maar eigenlijk wil ik het gewoon vlees noemen. Want dat is het'.

<sup>9</sup> Translated from; 'het oordeel van de wereldpers toch redelijk vernietigend: het smaakt nergens naar, in elk geval niet naar vlees'.

<sup>10</sup> Translated from; 'bijna naar vlees smaken'. 'Je mist het vet... 'Bijna echt vlees'..

### Safety of IVM

Less than ten articles discussed the safety of IVM. In several articles the lack of transparency of the meat industry is criticized. Several of the examples shown below indicate a kind of distrust in the laboratories.

- **Power and control frame:** one article mentioned - 'who will guarantee the safety of IVM?' It also wondered if big companies would not receive too much power with the production of IVM. Additionally, one article mentioned that the labeling of IVM will be a problem - "How do you guarantee that people know what they eat?"<sup>11</sup> ('Smakelijk, maar niet sappig', 2013). Another article questions the trustworthiness of the lab - who knows what kind of rubbish the lab puts in IVM<sup>12</sup> (Hiskemuller, 2013)? M. Post claims that IVM is safe because he would even give it to his children. He also claims in several news articles that the volunteers did not sign an 'own risk contract' because M. Post knew that IVM would not be risky to eat. According to M. Post IVM is safe because - 'it is developed in a sterile environment' and 'IVM could be safer than the meat which can be bought in the supermarkets, because it is free from bacteria'. One of the news articles referred to the taste event in London. Asked was if Mr. Post would eat IVM, (hereby they referred to the BSE- scandal in which the minister of agriculture made his daughter eat a burger for the camera) M. Post claimed that he already ate IVM and his children would also love to taste IVM (Van der Kloor, 2013<sup>b</sup>).
- **Public health frame:** one of the actors wanted to know what the effects of IVM are on public health and if the cell division of IVM could have possible negative side effects on people (Baaij, 2013).

### The future of IVM

Around 60 news articles made statements about the future and the possible influence of IVM on, among others, the meat market and society. Different aspects and scenarios were mentioned regarding IVM. The scenarios do not only differ in topic, but also (clarify this, I don't know if the certainty does or does not differ between articles) in the degree of certainty of the realization of these scenarios. Some news articles made statements which indicate a kind of hesitation, whilst other news articles perceive the future as something which is certain - 'IVM has the future' (Spaink, 2013).

### Time span

The indication of how many years it will take before IVM will be sold in the stores differed between articles. Four news articles described that IVM will not have a future and that IVM will not be commercialized. It appears that an actor which perceives IVM as beneficial, frames the time in which IVM will be commercialized shorter than the actors who sees IVM as a negative and an irrelevant product. It is noteworthy that most actors mention that IVM could replace the current meat industry. The scenario in which the meat and IVM regime co-exist is mentioned only a few times. Several examples of comments are here below:

**Mark Post:** 'Expects that cultured meat will lay in the supermarket *after* ten years, next to the old-fashioned burgers and steak' (van der Kloor, 2013<sup>a</sup>).

....'But it will take anyway thirty to forty years before cultured meat becomes available for every consumer'.  
**Floris de Graad**, director of the Vegetarian Society (Hellinga, 2013).

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<sup>11</sup> Translated from; 'Hoe garandeer je dat mensen weten wat ze eten?'

<sup>12</sup> Translated from; 'Wie weet wat ze in het lab nog meer voor rotzooi instoppen?'

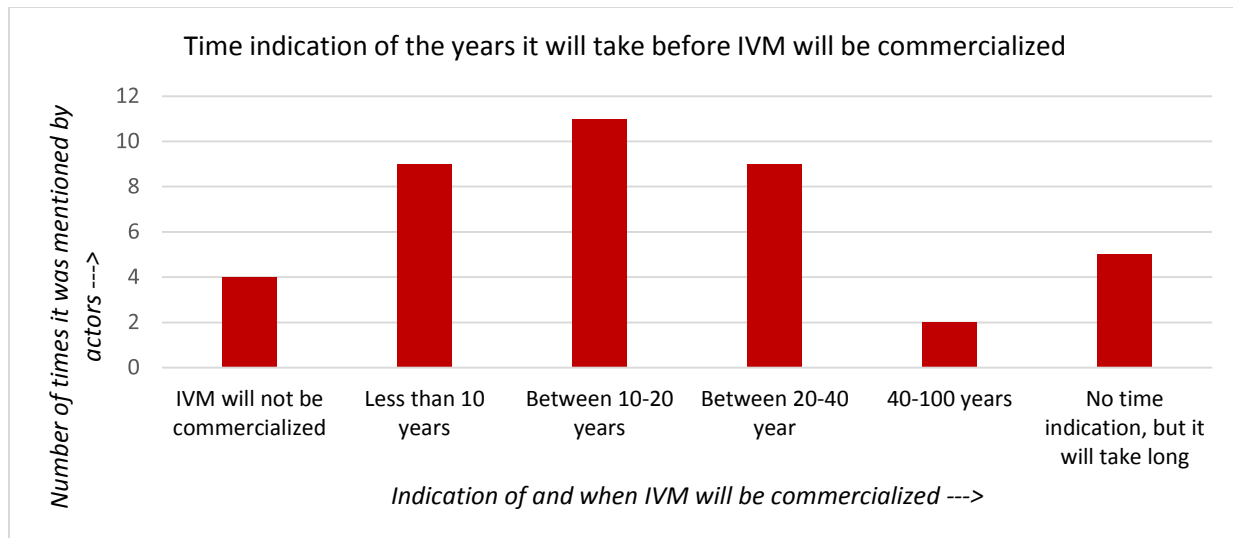


Figure 8 Estimated time span of the commercialization of IVM, made by author.

Several news articles speculate how IVM will integrate into the market. Figure 8 gives an overview of all the different time frames which are mentioned. The focus here is mainly on the commercialization of IVM and on the integration of IVM in the market. The frame which explains this in more detail is listed here below.

- **Business frame:** one of the journalist wondered whether IVM is the end of the food production as we know it. Others state that the communalization of IVM is almost factual - 'IVM will change people's worldview and it will create new products think of Lady Gaga meat and IVM balls. 'It remains imaging of what is possible' (van den Nieuwenhof, 2013). Another journalist states that it remains to be seen whether all the McDonald's in the world will be replaced over a few years with the burgers produced by the Post Burger chain. The production is concentrated on the products with minced meat, for example burgers, sausages, meatballs, because they make up half of the consumption of meat. Especially promising are composited products such as chili con carne or pizza (De Vre, 2014).

#### Considerations of the advantages and disadvantages of IVM

Several articles refer to the advantages and the disadvantages which they perceive IVM to have. Several articles indicate that IVM will not solve the problem which they perceive as the most relevant. The different viewing points are listed here below.

#### **Disadvantages of IVM**

- **Sustainability frame:** an actor outlines that if IVM will be produced on a large scale (what some scientists doubt), then it will provide time for the third world to increase its prosperity. The news article indicated that this will ultimately create additional pressure on nature, the environment, and on the animal welfare. The actor claims that the focus should be laid on minimizing the meat consumption (Ubels, 2014). Others suggest that a conscious diet, with attention to sustainability aspects, would be better than to invest enormous amount of money to develop small amounts of IVM. 'For a solution should not be looked for technological options but within the culture'. 'A change of mind is in their opinion cheaper and more efficient'. IVM will cause problems according to one of the actors because - 'places in the world can only be used for animal husbandry. 'If you take away the

cattle then you will get wild herbivores in return, which will produce CO2 but yield no food'. 'Besides if we want to drink milk, we should also have a destination for the bull calves which are born, now they go straight to the meat industry. If we maybe can ensure in the future that only female calves will be born, then that would save an awful lot' (Stelling, 2014). What is noteworthy of this fragment is that the perspective of the actor is 'black and white' regarding the introduction of IVM.

- **Business frame:** one of the articles state that it is unethical to buy lab meat when, at the same time, a lot of small farms go bankrupt (Boersma, 2014). This could indicate that the journalist likes farmers more than the people who develop IVM.
- **Animal welfare:** one of the actors mentioned that IVM grows on calf serum (blood out of a beating heart of a calf fetus) which is not animal friendly. Growth hormones in the calf serum are essential for the growth of the muscles. An animal friendly alternative has not yet been developed (Stelling, 2014).
- **Combination of the Unnatural and Business frame:** one of the articles mentions that IVM goes against consumer trends which aims at real food, which should be produced in the most natural way, whereby animal welfare and the environment aspects are well regulated (with as little technology as possible) (Heesen, 2013) .
- **Combination of the Unnatural and Power frame:** one of the news articles state that we are already so far removed from 'real food'. 'The food industry is fooling us'. IVM will increase the distance between people and nature (Hellinga, 2013). These sentences refer to two different frames - first, it frames the industry as powerful, and the second, frames IVM as something unnatural. Thereafter 'We get meat out of the nature, that's been the case since the creation. What are we doing?', states an actor in one of the news articles (Schravesande, 2013).

### Advantages of IVM

IVM was stated in several articles as a solution for a problem. The exact problem for which IVM could be a solution differed. Most of these problems were, according to the majority of the news articles, caused by the current meat industry. This could indicate a dissatisfaction in the current meat industry. Figure 9 shows the amount of times a specific problem was mentioned for which IVM could be the answer. Each of the aspects are explained in more detail here below.

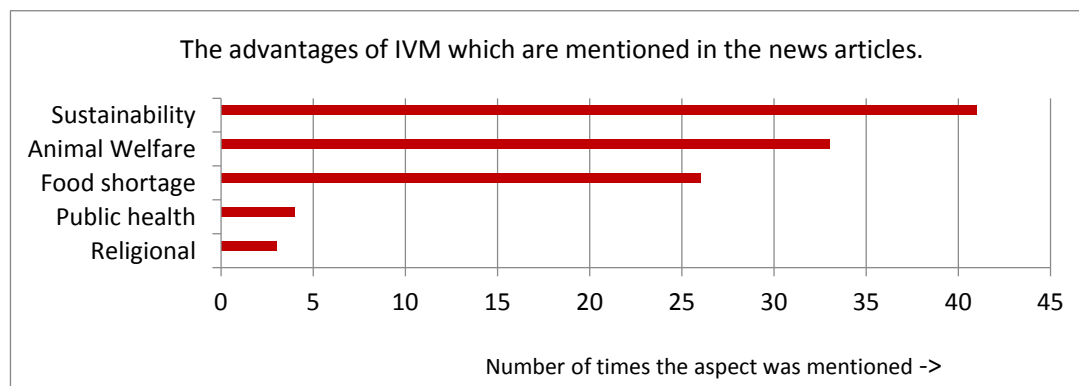


Figure 9 Overview of the advantage of IVM, made by author.

\*Note: sometimes within one news article multiple problems were formulated for which IVM could be a solution.

- **Religion frame:** three news articles mention that IVM could be kosher. One of the articles states that it is forbidden for Jews to cut meat of living animals, which is needed to produce IVM. However, according to Mosje Feinstein (1895-1986), does the Thora not forbid invisible things (stem cells are not visible to the human eye)? Another article states that IVM would be ideal for illiterate Jewish people because they cannot read every package to verify if it is kosher or not<sup>13</sup>. Additionally, it was mentioned that IVM could result in the end of ritual slaughter (van Beek, 2013).
- **Public health frame:** one of the news articles states the following - "The unnatural meat factories, the production of in vitro meat is not accompanied with the use of antibiotics in animal breeding, medication which could harm people "<sup>14</sup> (Geleen, 2013). Hereby the news articles frame IVM as something which is healthier than meat.
- **Consumption frame:** Several news articles list that it is not yet possible to make beef out of IVM. However, they mention that it is possible to produce all kind of grinded meat (chicken, fish etc.).
- **Food shortage frame:** half of the meat consumption is grinded meat according to one of the news articles. Hereby according to the news articles IVM could solve a large part of the problem of the rapidly growing meat demand ('Google-burger smakelijk en stevig, maar niet zo sappig', 2013).
- **Animal welfare:** some newspapers frame IVM as a 'possible' solution which could avoid animals suffering. Most of the news articles do not mention that the production of IVM requires calf serum. IVM could be the solution for animal suffering according to the news articles because no animals need to be butchered - 'Even if there are still animals used for the production of IVM, it is more efficient'. 'From one stem cell 100.000 hamburgers can be made'. In one of the articles it is stated that - there is an increasing in the realization that our eating habits are not good for the animal welfare and our health'<sup>15</sup>. Two articles stated that IVM provides a relief for people who have gnawing guilt feelings regarding the animals which need to be killed to produce meat. 'Great, technology that relieves me of a bad conscience'<sup>16</sup>. This could indicate a kind of ambivalence towards meat eating ('Kweekvlees wel of niet', 2013);('Kweekburger smaakt naar normaal vlees', 2013).
- **Sustainability frame:** according to several news articles IVM could, if it grows in to an alternative for meat, be beneficial for the environment and living animals. They mentioned that for the production of IVM less animals, less farmland, less CO2 emissions, less energy and water are needed. Noteworthy is that several of the news articles do not provide any background information to support these statements.

<sup>13</sup> Translated from; "Ook de ongeletterde zou in de toekomst kunnen genieten van een lekkere lab-burger'.

<sup>14</sup> Translated from; '..' die onnatuurlijke vleesfabrieken dat de productie van in-vitrovlees niet gepaard gaat met het toedienen van antibiotica aan fokvee, medicatie die mensen schade kan berokkenen'.

<sup>15</sup> Translated from; ' Vlees eten heeft in onze cultuur iets dubbels. We doen het graag en veel, maar tegelijk is er dat knagende en toenemende besef dat ons eetgedrag niet goed is voor het milieu, het dierenwelzijn en onze gezondheid'.

<sup>16</sup> Translated from; 'Geweldig, technologie die me verlost van een slecht geweten'.

### 4.2.3 Narratives

The narratives present within the media were analyzed, resulting in five distinguishable groups. The focus of most of these narratives in general was on the moral aspects of IVM. Varying narrative types all contained Sustainability frames and Consumption frames. The different narratives are discussed below, the different types of frames which were used several times within each specific narrative are added. The narratives are classified according to the overall conclusion regarding IVM which were made within the narrative. In appendix IV examples of the different news article narratives are listed.

#### 1. Pro-IVM narrative (N: 86)

The pro-IVM narrative was the most dominant narrative. It framed IVM positively because it could solve the problems which were associated with the current meat industry. Within this narrative 10 different frames were used, these frames are science high-tech-; consumption-; unnatural-; sustainability-; religion-; power and control-; animal welfare-; public health-; business- ; and, food shortage- . Most of the arguments referred to the positive sides of these frames. Several news articles made a kind of cost- benefit-analysis of the advantages and the disadvantages of IVM. Therefore, most of the pro-dominant IVM narratives also contain frames which are listed in a negative way towards IVM. The food shortage, public health, sustainability, and the religion frames were only framed from the positive point of view. Some of the news articles also indicate that IVM is a Dutch breakthrough and that they feel proud of it. This could be partly explained due to the fact that a lot of articles chose to only list the opinion of Mr. Post regarding IVM. The narrative plot which is listed here below indicates which frames as used within the plot. An overview of all the different frames used within the narrative can be found in table 2.

##### The plot of the Pro-IVM narrative;

- The demand for meat has risen and will in the coming years continue to rise and this is problematic. IVM could be / is the solution to this problem.
- With the production of IVM it could be possible to meet the rising meat demand.
- IVM could possibly replace the current meat industry. This is beneficial because:
  - IVM is better for the environment than the meat which is currently available (Sustainability frame).
  - IVM is better for the welfare of the farm animals as no animals need to be killed (Animal welfare frame).
  - IVM is healthier than meat which is currently available because it contains no antibiotics and hormones (Public health frame)
- IVM probably will be commercialized within a short period of time (10 – 20 years)\*.

\* The frames which are most dominant within the narratives are included in the plot characterization.

#### 2. Counter narrative (N: 10)

The focus of this narrative type was to decline the pro-IVM narrative. This narrative outlined mostly negative aspects of IVM. Within this narrative the following frames were used: Unnatural-; Science high-tech-; Consumption-; Animal welfare-; Public health-; Business-; Food shortage-; and, the Sustainability-. Articles with a negative view state that it is absurd to fix a so called 'social problem' with a technical solution. Furthermore, some of these narratives indicate that it will take a long time before IVM will be available, thus

taking, in their eyes, too long and therefore other solutions need to be developed. A few articles quote farmers which claim that IVM is a product which is made in conspiracy with the politics and the environmental movement. The narrative plot listed here below indicates which frames as used within the plot. An overview of all the different frames used within the narrative can be found in table 2.

#### The plot of the counter narrative

- The demand for meat has risen and will in the coming years continue rising and this is problematic.
- IVM, however, is not the solution to this problem because;
  - IVM is not natural (Unnatural frame).
  - IVM is not animal friendly because calf serum is used for the IVM production (Animal welfare frame).
  - The production of IVM requires a lot of energy (Sustainability frame).
  - IVM goes against the market, which is focused on natural products (Business frame and Unnatural frame).
  - IVM is a technical solution to a social problem. People should eat less meat as this would solve the problem.
- IVM could be a threat to farmers, however it will take a long time before IVM will appear on the market. Therefore, farmers do not need to be worried. (Business frame)\*.

\* The frames which are most dominant within the narratives are included in the plot characterization. Noteworthy of this plot is that almost all of the frames, which have been listed as advantages (in the pro-dominant narrative) of IVM are countered within this plot.

Narrative types		1. Dominant pro IVM story	2. Attack/ decline of the established
	Frames +/-		
<i>Unnatural frame</i>	+		
	-	x	x
<i>Religion frame</i>	+	x	
	-		
<i>Science high-tech frame</i>	+	x	
	-	x	x
<i>Consumption frame;</i>	+	x	
	-	x	x
<i>Power and control frame</i>	+	x	
	-	x	
<i>Animal welfare</i>	+	x	x
	-	x	x
<i>Public health frame</i>	+	x	
	-		x
<i>Business frame</i>	+	x	
	-	x	x
<i>Food shortage frame</i>	+	x	
	-		x
<i>Sustainability frame</i>	+	x	x
	-		x

Table 2; Overview of the frames present within the different narratives, made by author.

### Roles within the narratives

Within the narratives the following roles can be distinguished - the 'hero, villain, and the victims'. These classifications did not provide a holistic overview of the media results. To classify all of the different roles the classification of 'witnesses' is added. The classification of witness refers to the persons who appear as speaker and, thereby, were used as a kind of 'witness' to confirm the moral of the stories. The 'witness' is added to the table to give more insight in to the roles and standpoints of the different actors. What is noteworthy is that the news articles did not mentioned which actors would benefit from the possible commercialization of IVM. An overview of the different roles within the narratives is stated below in table 3.

Narrative	1.Dominant pro IVM story	2. Counter narrative
Hero	- M. Post - Serge Brin	- Not mentioned
Villain	- The society - The meat industry	- M. Post - Meat eating society
Victims	- The animals - The environment - People	- Differed - Farmers
Witness	- Scientists - M. Post	- Several actors

Table 3: overview of the different actors within the narratives, made by author.

\* The above scenarios were showed in the dominant plots.

### Frames overview

An overview of all the different frames that were mentioned in the chapter is given in table 4. A description of the content of the frame is also listed; most frames contain both, negative and positive information regarding IVM.

	Frame	Description of the frame
1	<b>Science high-tech</b>	Mostly referred to the technological aspects of the production of IVM.
2	<b>Consumption</b>	Focus was mainly on the taste of IVM, and whether or not it will taste like meat which is currently available in the stores.
3	<b>Unnatural</b>	Focus on meat and on IVM, both were perceived as unnatural.
4	<b>Sustainability</b>	Refers to several different aspects, all related to the methods which are used for meat production. The focus on the meat production is from a sustainable point of view.
5	<b>Religion</b>	Focus was on the Judaism. Due to IVM, would it be possible for Jews to eat certain meat products which are currently not allowed to be eaten. It also indicated that IVM could mean the end for ritual slaughter.
6	<b>Power and control</b>	Within this frame is the accent on the desire of a kind of guarantee that IVM is safe, with appropriate levels of quality assurance.
7	<b>Animal welfare</b>	Focuses on the use of animals for the production of meat and IVM.
8	<b>Public health</b>	Effects of IVM on people health are discussed.
9	<b>Business</b>	Focuses on the possible marketing of IVM.
10	<b>Food shortage</b>	Indicates the effect of IVM on the perceive food shortage in the world.

Table 4 overview of the different frames, made by author

The results will be integrated into the workshop. Attention will be paid on different kinds of framing. The results of the focus group workshop can be found on the next page.

### 4.3 Results of the focus group workshop

A focus group workshop was conducted to answer the second research question - how do Dutch people frame In-Vitro meat? The workshop was held amongst six flexitarians who all varied in age, gender and educational level. An overview with detailed information of the participants is listed in appendix V. The results, described here below, are linked to the specific frames and divided amongst the questions which were asked during the workshop. Page 26 will provide an overview of the different frames which were used by the participants. The workshop consisted out of three different parts, these parts are indicated with a small introduction.

#### Part 1

At the beginning of the workshop specific question were asked regarding the way the participants made sense of the current food and meat production methods. This was undertaken to indicate the possible link (which was present in the media analysis results) between a perceived problem and IVM as the solution to that specific problem.

#### Question 1: What is your opinion about the current food production?

The associations people had with the current food production were mostly negative. Several aspects were mentioned;

##### ***Sustainability frame***

- soil exhaustion due to intensive land use
- the focus is on cheap food and not on responsible production

##### ***Unnatural frame***

- The participants had the idea that the food products were manipulated. 'Quantity above quality'<sup>17</sup>, the food properties are manipulated'.

#### Question 2: What are your ideas about the current meat production?

The participants' ideas about the current meat production varied.

- ***Animal welfare frame***; the participants' ideas about the current meat production varied. A few participants spoke of an improvement of the sector. They saw for example less 'plofkip' in the grocery stores. (Plofkip is an expression which is used in the Netherlands to indicate a chicken from a special breed, which grows fast).
- ***Unnatural frame & Power and control frame***; in their eyes the monitoring of our food has increased and the use of hormones has been reduced. Other participants claimed that one can never know what they are buying, hereby they referred to the horse meat scandal (the horse meat scandal took place in 2013, where horse meat was passed off as beef). One of the participants reacted hereon with the following comment; There is a chance that you have meat on your plate, originated from three continents<sup>18</sup>.
- ***Animal welfare frame & Power and control frame***; another participant reacted hereon that, for him, it is unclear how IVM exactly is processed and under what kind of circumstances. "Even if you buy biological meat, then you still cannot be sure that the animals had a free range or that they were

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<sup>17</sup> Translated from: 'Kwantiteit voor kwaliteit'.

<sup>18</sup> Translated from; "Dan eet je dus een stukkie vlees van drie continenten op je bord".)

standing with the ten of them on a square meter'. One participant concluded that in order to prevent this, you could go to the butcher, then you know what you buy.

### Question 3: How would you describe your favourite meat product?

All participants referred to the taste of their favorite meat product which can be classified under the **Consumption frame**. The younger participants mentioned that the easiness of preparing the meat is also relevant to them. 'I think schnitzels are delicious, or a similar processed product, because it is easy to prepare'. 'It tastes soft and crispy, tasty sun crisp edge on it and then comes the meat'. 'It is easy and delicious'. One of the other participants commented hereupon with; 'The herbs do their work'. The older participants chose products with a longer preparation time. Meat products specifically identified were old braising steak, (hereby they referred to the old days 'my dad used to make them for me'), corned beef or shawarma (this is roasted meat which is marinated before roasting from the Muslim butcher.) Most of the participants never ate pig meat, due to health reasons for example stomach pain or rash. One participant pointed out that she cannot eat certain meat products which are too tough because of her health condition.

### Question 4: How important do you perceive meat (this is inclusive of chicken and fish)?

Marks were used to give an indication on how important the participants believed meat was in their diets. The marks given by the participants, as well as the arguments put forward for the marks, varied largely. The participants who gave meat high marks perceive meat as healthy, easy, and necessary. Two participants gave IVM lower marks because it is in their opinion unnecessary and expensive. Several examples of their statements are listed here below, added is the mark indication which the participants gave:

#### ➤ **Consumption frame**

- 7 'It is maybe more a habit and therefore I give it a high mark, but to my opinion it belongs with it<sup>19</sup>. I can go without, then it can be compensated with something else, then you really need to think<sup>20</sup>. It is very easy to just add it.

#### ➤ **Public health frame**

- 8 'I think that there are a lot of important nutrients in meat, and in fish such as omega 3'.  
'I think it is occasionally just a habit of everybody'.  
8 'Building material for your body'<sup>21</sup>.

The participants who gave meat low marks indicated that;

#### ➤ **Consumption frame**

- 2 Meat is unnecessary and expensive. 'Because I can go easily without'<sup>22</sup>.  
According to the participant opinion there are various dinner recipes without meat which are also delicious.  
4,5 Another participants agrees with the statement which is described here above and gives an example of a recipe without meat.

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<sup>19</sup> Translated from; 'Is het misschien meer een gewoonte dat ik, dat ik het een hoog cijfer vind dat ik het erbij hoor vinden'.)

<sup>20</sup> Translated from; ik kan ook wel zonder maar dan is het wel, vaak compenseren met wat anders, dan moet je echt gaan nadenken, en het is ook wel heel makkelijk om het er gewoon bij te doen.)

<sup>21</sup> Translated from; grondstoffen he, voor je bouwstoffen voor je lichaam.)

<sup>22</sup> Translated from; 'Omdat ik dus ook makkelijk zonder kan'.

## Part 2

To discover how people frame IVM, open questions were asked during the workshop regarding IVM. The literature study indicated that the terminology of a product could affect the opinion people had towards it. Therefore, the opinion of the participants about IVM was asked without the use of any terminology to describe IVM. VM was referred solely as 'a product'. Questions about the participant's favorite meat product were asked to find out which elements of meat the participants perceive as important.

### Question 5: First responses on the product (without an explanation on how it is made).

The reactions are listed here below, added is the frame to which the arguments refer.

- **Religion frame:** the first reactions were anxious, ('angstig') one of the participants reacted with; 'Thus, that is not how God intended it. Or perhaps, it is, because we are now in the year 2015'.
- **Power and control frame:** one of the participants would eat it if it looks like a normal piece of beef. Some of the participants wanted more information about the production process of the product, before they could give an indication wherever they would be interested in it<sup>23</sup>. (One of the participants referred to an old saying; a farmer does not eat what he does not know<sup>24</sup>. They also mentioned that you never know what they did with it, how such a cell is cultivated; or if it is really safe, and if it is from a cow. The participants envision that meat could be cultured on fungi's. They additionally noted that people who were allergic to fungi probably would not be able to eat these products. They conclude that they wanted to wait to see if the product is safe and thereafter they would try it<sup>25</sup>. The reactions of the participants were very hesitant to the idea of IVM. From the reactions above it can be deduced that the idea of IVM without detailed information and without a terminology is too vague to form an opinion about it.

### Question 6: Extra information was provided about the production process of IVM (see figure 10) thereafter was asked; what the participants ideas were about the product.

When more information about the product was given, some of the participants perceived it as a very interesting movement. Most of the comments regarding IVM focused on the possible taste and nutritional value of IVM. Five of the six participants claimed that they would like to try an IVM product out of curiosity.

This question also raised a lot of additional questions. The questions vary from the development process of IVM, the effect of IVM on the human body, and the future consequences of IVM. A summary of the different questions is listed here below;

- Would it also be possible with vegetables?
- Why use only one cell?
- Is it genetically modified?

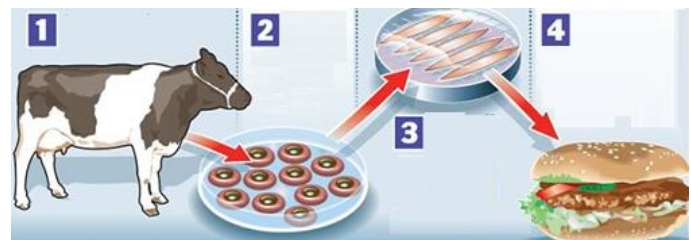


Figure 10 Schematic overview of the production process of IVM. Adjusted from (Woollaston, 2013)

<sup>23</sup> Translated from the sentence; 'Als je niet weet wat het allemaal precies is. Dan heb ik ook zo iets van, dan hoef ik dat niet'

<sup>24</sup> ; Translated from; 'wat een boer niet kent eet hij niet'.

<sup>25</sup> . Translated from the sentence; 'Eerst de buurvrouw en als die het overleeft'

- It could be cheaper, but how long will it take to grow such a hamburger?
- If it will be produced and people will eat less meat, what will happen to the animals which remain?
- What is the name of the product?
- Could you also apply it to humans?
- What is added to make it grow and what is the nutritional value?
- What are the long term effects on the human body?

#### Opinions

- **Unnatural frame:** some of the participants perceived it as a very interesting movement. Some of them also refer to the taste of the product. Others reacted more hesitant - 'It is created out of one cell, normally you just have one piece of meat'. This cell has lived, and in which a certain diversity has gone through. It had grass and oxygen and it develops, yes I still find it crazy<sup>26</sup>.
- **Consumption frame:** other participants discussed the taste of IVM; if it is a muscle than it will be tough product<sup>27</sup>. One of the other participants reacts hereon and refers to the heart, which is also a muscle, which seems to be in his opinion quite tasty. One participant mentioned that the product will save a lot of cow lives.

### Part 3

The last part of the workshop was developed to get an idea of the opinions of the participants towards several different IVM products. First, their opinion was asked towards a certain meat product, for example a hamburger. Thereafter, participants were asked if it would make a difference if the hamburger was made out of IVM. (The media analysis indicated that among some journalist a social norm of accepting IVM was formed.) Several questions about meat and meat replacers and IVM were asked during the workshop to find out if the participants also had specific (social) norms. Finally, questions were asked about the perceived benefits and disadvantages of IVM.

#### Question 7: What is your opinion about hamburgers in general?

The opinions were divided on this subject. Two (younger participants) of the six participants like hamburgers, whereas older participants did not like hamburger because of the poor taste and the unknown additives which are in it.

- **Consumption frame:** "It is easy and cheap . . . sometimes I buy it because it still is bovine<sup>28</sup>." "I do not buy them often, maybe there is not a lot of flavor to it, but then I put some ketchup on it<sup>29</sup>." The other four remaining participants did not like hamburgers, saying that they found them boring or not tasty and tough.

<sup>26</sup> Translated from; 'het ontstaan uit een cel, normaal heb je gewoon een heel stuk vlees. het al die tijd in leven geweest, en heeft het, zuurstof, gras, alles en nog wat gehad en daarvan ontwikkeld het. Ja. Dat blijf ik gek vinden.'

<sup>27</sup> Translated from; 'Als het een spier is dan wordt het een hele taaie bedoeling'.

<sup>28</sup> Translated from; 'Lekker makkelijk, en goedkoop...Soms koop ik het wel, ja het is toch, het is toch rund.'

<sup>29</sup> Translated from; 'Ik heb ze niet heel vaak zelf, .. er zit misschien een beetje weinig smaak aan maar dan doe je er ketchup op'.

- **Power and control frame:** according to the four participants it is a product in which they create a lot of mess to make it stick. 'There are always things which need to be added, than that you just have one piece of meat'<sup>30</sup>.
- **Public health frame:** they compared the hamburgers with shoe soles. Hereby one of the participant referred to a research study which indicates that the burgers from the McDonalds or Burger King cannot be digested by the human body.

#### Question 8: What are your ideas about a product (IVM) hamburger?

Two participants would not eat the IVM hamburger. They did not like normal hamburgers and they did not know what the IVM hamburger would do to their bodies. The other four participants did not give a clear indication if they would like to eat the hamburger, but they kept it as a possibility. One of the participants mentioned that it would depend on what kind of product they make from IVM. For him there was a difference between beef and hamburger products. The participants indicated several business methods which the producers of IVM probably would use to sell IVM. The participants frame these business methods as a method to manipulate/trick consumers. Additionally, one of the participants indicates that it would be foolish to not buy an IVM hamburger when it is cheap. This indicates a kind of norm regarding what is perceived as acceptable and what is not. Examples of their reactions on the questions are listed here below:

- **Consumption frame:** it depends whether it is fresh or not, and what the shape of the product will be. Do they need to make hamburgers from it? If it becomes beef, it will be sold at the butchers. Eventually, as a figure of speak, because then it is very normal. 'When it is a special product then I will think differently about it'. 'That will be a real consideration for me'<sup>31</sup>.
- **Business frame & Power and control frame:** one of the participants mentioned that things are constantly changing - 'previously you always had the butcher, that was the place where you brought your meat. Then came the supermarket who suddenly also began to sell meat. Thus it is possible. 'Price technically, it is possible. If it is cheaper, then we are obviously stupid if we did not do it. Consumers might fall for it'<sup>32</sup>. 'They know what kind of information we need, throw a good campaign against it, there is a big chance that I will fall for it.' 'They will offer it as something exclusive, therefore everybody will taste it.'

#### Question 9: What are your ideas about the magic balls (produced out of meat which is currently available)?

Most of the participants did not like the idea of the magic balls (see figure 11 on the next page). Some participants mention that the meat industry already adds colors to their food. The arguments and the frames to which they can be classified are listed on the next page.

<sup>30</sup> Translated from; 'Het is als waren een product waar ze altijd zooi doorheen gooien, waardoor het plakken blijft. Er moet altijd meer aan toegevoegd worden dan dat je gewoon een stukje vlees hebt.'

<sup>31</sup> Translated from; 'Moeten ze daar nou perse hamburgers van maken? Want ja kijk als er biefstuk van komt en het wordt gewoon bij de slager verkocht. Op den duur, van wijs van spreken, omdat het dan heel normaal is. (.) Ja, dan denk ik dat ik dan toch (.) er heel anders over na ga denken dan dat het nu in de speciaal een product is... Dat zal voor mij wel echt een afweging zijn denk ik.'

<sup>32</sup> Translated from; 'Prijs technisch inderdaad, en het zou kunnen dat dat hier ook heel goed, mogelijk zou kunnen zijn. Als het goedkoper is, dan zijn we natuurlijk dom als we het niet zouden doen. De consument zou er zo in kunnen trappen'.

- **Unnatural frame**; because it was different from which they are used to. 'It does not match with what you see'.
- **Public health frame**: another participant mentions that - 'It depends on what kind of coloring substances are in it. In the past, we never ate something which was blue because it was toxic'. One of the participants was positive towards the magic balls. She explains that - 'they already add color to the current hamburgers and other meat products in the grocery stores'. 'They are used to maintain the right color, so that we will fall for it and buy it'. She thinks for example that a pink hamburger is a good option, because - 'we actually eat them already'. Another participant reacted more neutral; she claimed for example that children would find these magic balls attractive.
- **Business frame**: furthermore, participants were wondering about the sale opportunities. One participant referred to the green ketchup and blue cauliflower which were no success and therefore they were quickly removed from the stores. She doubted if someone would buy the magic balls.



**Figure 11 Visualisation of the magic balls. (Stinson, 2013)**

#### **Question 10: What is your opinion about Magic balls made out of the product (IVM)?**

According to one of the participants this could be a good start, because it will become a new product.

- **Business frame**: It distinguishes itself from existing meat due to the colors. This could give new associations. (The other participants agreed to this, according to them it has something).
- **Public health frame**: one participant was more critical and wondered if it was colored by natural- or chemical substances. According to the participant, chemical color substances are not good for anybody.

#### **Question 11: What are your ideas about mammoth meat made from IVM?**

Five of the participant are open to taste it in the future, because they are curious about the product, which is in their opinion a whole new product.

- **Business frame**: they mention that people will buy it pure out of curiosity<sup>33</sup>. They doubt if people would buy it consistently after they tried it. The participants claimed that they would not eat it weekly, 'Friday mammoth day'. This depends, according to the participants, on different factors like, for example, the price, the taste, and the story behind the product.
- **Consumption frame**: several participants mentioned that the product stays the same, whether you take it from a cow, or a horse, or a mammoth. 'Animal meat is animal meat'. 'We used to eat it in the past, for that matter'<sup>34</sup>. The fact that the mammoth is extinct for thousands of years did not appeal to all participants; 'The mammoth is dead for many years, in principle one would then eat a dead piece of meat, I do not know'. One of the participants did not want to taste the mammoth product. In her opinion there are enough possibilities to eat in a good way, one could for example eat products of the season.
- **Public health frame**: one of the participants noted that the meat could be very healthy. Another participant reacts hereon and adds - "with the antibiotics which they put in the meat" (is this a

<sup>33</sup> Translated from; 'Ik denk dat heel veel mensen het dan wel zouden kopen, maar dan puur uit nieuwsgierigheid'.

<sup>34</sup> Translated from; 'We aten het voorheen ook dus wat dat betreft'.

quote?). One participant noted that the name mammoth meat appeals to him because he envisions an enormous piece of meat.

- **Power and control frame:** the conversation shifted away from the question to a discussion about salmon (fish). One of the participant mentions that - 'They call it salmon but it is definitely not a salmon but just white fish, with components which are added<sup>35</sup>'. Another participant reacts hereupon 'We are getting fooled in front of our own eyes<sup>36</sup>'. This example shows that the participant does not trust the food production companies, and that they have the idea that their food products are manipulated.

#### Question 12: Would your best friend eat an IVM burger?

One of the participants thought that her friends would not dare to eat it. The other five participants claimed that their friends would like to try it.

- **Consumption frame:** some of them would try IVM out of curiosity, others would buy it if it is cheap and easy to prepare. One of the participants comments was that people do not really think further ahead.<sup>37</sup> Furthermore, it would depend on how it looks 'if it looks really good, then people would try it'. It is noteworthy that the participants think that their friends would eat it, especially as the participants were more hesitant to try IVM themselves.

#### Questions 13: Does your preference go to a plant based or a meat based burger?

Most of the participants would choose a hamburger made out of plant material if the taste, nutritional value and the appearance is guaranteed to be exactly the same as meat. The comments here below, given within the animals welfare frame, indicate that the participants do not take it for granted that an animal is needed to produce meat. They like the taste of meat, but they prefer an alternative for meat for which no animal would be needed.

- **Animal welfare frame:** their main argument was that it saves animal lives. 'If it would taste the same then why would you slaughter an animal for something which you could also do with plants'. 'To my opinion that's.. If you would kill an animal, do it because it is really necessary. Do not do it when you can replace it with something which looks and taste the same'<sup>38</sup>.
- **Consumption frame:** another participant mentioned that; 'If it would not taste exactly like meat, then it would be a real disappointment, you see meat then you also expect meat'. Two of the participants mention that the plant based burgers would probably require a different cooking method than a hamburger made out of meat. One of the participants claims that it is Utopia and that there are not yet plant based burger which taste exactly the same as meat. Another participant responses and claims that there are enough vegetable burgers.

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<sup>35</sup> Translated from; '*het heet zalm maar, het is absoluut geen zalm meer maar ze geven het, hetzelfde voer met hetzelfde kleurtje, maar dan is het absoluut geen zalm maar gewoon wit vis, wat toegevoegde dingen zijn*'.

<sup>36</sup> Translated from; '*Je wordt voor de gek gehouden waar we bij zijn*'.

<sup>37</sup> Translated from: '*Kijk er wordt niet echt verder gedacht*'.

<sup>38</sup> Translated from: '*Kijk als het gewoon hetzelfde smaakt dan, dan denk ik van ja waarom zou je dan. Een dier gaan slachten voor iets wat ook met plantjes zou kunnen*'. *Dat vind ik dan een beetje.. 'Als je een dier zou doden, doe het echt omdat het dan nodig is en niet als je het kan vervangen door iets wat hetzelfde eruit ziet en hetzelfde smaakt*'.

#### Question 14: Could IVM offer something which a meat replacer does not?

The participants perceive IVM as something which is closely related to meat products. In their opinion meat replacement products are something completely different than IVM. One of the participants hopes that the farmers will still earn money after the introduction of IVM. This is noteworthy, because she indicates that it is unkind when a lot of money goes to the people in the lab. She frames her answer negatively towards the producers of IVM and positively towards farmers.

- **Consumption frame:** it is a completely different product according to one of the participants. If you take one cell, then you have meat. This is not really a meat replacer, because you would still eat meat<sup>39</sup>.
- **Business frame:** one of the participants hopes that the farmers would also receive some money in the future and that not a lot of money will go to the people in the lab. Because this would be in her opinion 'a little bit unkind'<sup>40</sup>. Another participant mentioned that - if the product will be realized than it could solve a part of the food problem. Participants react hereupon and mention that there are a lot of people who benefit from the food problem, and that they will not be happy with it.

A discussion about cows starts. The discussion indicates a kind of dissatisfaction regarding the current meat production. The participants mention that IVM could improve cows' lives but this is not guaranteed according to the participants. They also envision negative future effects of IVM, for example the disappearance of cows on the dikes, which is a cultural related tradition in the Netherlands.

The statements and comments are listed here below:

- **Animal welfare frame:** one of the participants mentions that with the production method of IVM, meat could be produced and the cows can still run around in the meadow. 'Then it would be possible to create meat of course, a meat replacer, a cow replacer as a matter of fact'. I think that vegetarians would like that. Then there would exist more cows from which the cells can be modified<sup>41</sup>. Another participant mentions that the current living conditions of the cows are poor, 'cows nowadays do not even go outside out themselves'.
- **Power and control frame:** this would lead to less cows, nowadays they are produced for consumption. If this would decrease then it could improve their lives, however this is not guaranteed.
- **Culture frame:** one of the participants wondered if we would still have cows after 30 years, 'then we do not need cows'. The other participants comment hereupon; 'then they will build the whole

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<sup>39</sup> Translated from; *'in principe als je die ene cel pak, dan heb je nog steeds vlees. Niet echt een vleesvervanger want je eet dan nog steeds vlees'*.

<sup>40</sup> Translated from; *'Ik hoop dat al het geld evengoed een beetje naar de boer blijft gaan dat er niet al te veel naar degene gaat die al die Petri schaaltjes neer legt in zijn lab. Dat is natuurlijk ook een beetje, dat is natuurlijk zou ook een beetje onaardig zijn'*.

<sup>41</sup> Translated from; *'die koeien hebben ook wel een bestaansrecht, die kunnen lekker door de wei blijven dartelen. Dan zouden ze evengoed vlees kunnen maken natuurlijk, een vlees vervanger, koe vervanger eigenlijk. Dus wat dat betreft, denk ik dat de vegetariërs dat wel weer leuker vinden. Dan zouden er meer koeien bestaan die, die dan cellen kunnen modificeren'*.

Netherlands full with house'. 'Then nobody will look after the cow's on the dike' because, nobody earn money with them anymore<sup>42</sup>.

#### Question 15: What do you think is the biggest disadvantage of IVM?

This question raised a lot of questions which were also previously asked by the participants. It provided also new questions regarding the dying process of IVM.

- **Public health frame:** these questions were mainly focused on the nutritional value of IVM, and regarding the production process and the influence of IVM on people's health.
- **Consumption frame;** One participant raised a question which had not yet been raised - what is the shelf life? Is it the same as meat, or can it remain a long time? Or will it grow inside the fridge? One of the other participants reacted and mentioned - 'that you never have to go to the store anymore. A normal piece of meat, dies and then the dying process starts and then they add things to it. 'So that it can be kept longer'. 'How would that go, with a piece of meat that been dead for a long time'<sup>43</sup>.. The older participants compared the product with T4 yogurt because it has a similar development process.
- **Business frame:** one of the participants mentions that many farms will go bankrupt - They will become unemployed because people will just choose the replacement. Another participant mentions that IVM could become very expensive or very cheap because everything is on one place. 'There is no animal which for example needs to go to the butcher'. 'If it will becomes cheaper than vegetables than it could also be a disadvantage because, it could create a large difference in the food proportions'.

#### Question 16: What do you think are the biggest benefits of IVM?

The participants mention a few benefits, but also mention more possible negative aspects of IVM. One of the participants mentioned she cannot say a lot about the product because she does not know what the nutritional value is. The following aspects are mentioned:

- **Power and control frame & Public health frame:** 'That it is produced on one place, this could also be a disadvantage if one looks at the export. Then it could be easier accessible for competition forgery'. 'If we would all get completely dependent on it than that is a big disadvantage'. If something happens like the bird flu for example, then the entire harvest must be deposited. Would there still be one healthy cell from which new meat could be made<sup>44</sup>?
- **Business frame:** 'You could produce IVM everywhere, also in countries in which meat could not be produced due to for example water scarcity'. One participant reacted hereon - 'A disadvantage would be that there would be less exported'.

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<sup>42</sup> Translated from; *Dat ze dan op de dijk lopen en dat er niemand er meer naar om kijkt. Want niemand kan zijn geld er mee verdienen.*

<sup>43</sup> Translated from; *'Hoef je nooit meer naar de winkel.... Want een normaal stukje vlees, gaat dood en vanaf dan start het afstervingsproces en vanaf dan voegen ze dingen toe. Zodat het langer mee kan. En hoe gaat dat met een stuk vlees dat al langer dood is'*

<sup>44</sup> Translated from; *'Dat is ook wel een groot nadeel want wat nou als we helemaal afhankelijk worden, dat vlees. En daar gebeurt iets mee zoals vogelgriep dan is de hele oogst weggooien. Is er dan nog wel, die ene waar je dan een gezonde cel van gaat plukken? En waarmee je opnieuw vlees van kan maken'.*

- **Consumption frame:** ‘Easy and cheap, this could be beneficial for people who are poor, they could eat meat more regularly and they could have more options to choose from in the store’.
- **Environmental frame:** ‘That it is easy to produce food in an environmental friendly way because you do not need animal transports’. Another participant mentions that the production of meat costs a lot of water. In her eyes, IVM could be way more environmental efficient. She wonders if it also has an effect on the human digestion system and envisions that one then needs less toilet paper.

## Chapter summary

This chapter indicates that flexi-tarians use 9 different frames when they discuss IVM. It provides an indication of the different aspects to which the participants link IVM. Most of the results link with the previous findings obtained by the media analysis. The results are linked to the literature findings and discussed in more detail in chapter 5. Within the workshop with the focus group 9 different frames are distinguished, the frames and their content are listed here below.

	Frame	Description of the frames
1	<b>Consumption</b>	Within the consumption frame was the taste and the appearance of IVM most often discussed. The shape and the nutritional value of IVM was also discussed several times.
2	<b>Sustainability</b>	Within this frame was the focus on the environmental benefits, which will occur when IVM would be produced instead of the current meat.
3	<b>Unnatural</b>	One of the participants could not get used to the idea.
4	<b>Religion</b>	Within this frame was the opinion of god towards IVM explored
5	<b>Power and control</b>	The focus within this frame laid on distrust, manipulation and the idea of the participants that they are often fooled by the food industry.
6	<b>Animal welfare</b>	IVM could be beneficial for animals because it could save animal lives and could improve their animal welfare.
7	<b>Public health</b>	The focus of IVM and meat within this frame was towards the nutritional value of it and the use of chemical substances.
8	<b>Business</b>	The arguments linked to this frame focused on the commercialization of IVM and the perceived consequences hereof.
9	<b>Culture frame</b>	The participants envisioned a future with IVM and were afraid among other aspects, that cows would disappear.

Table 5 overview of the different frames which are used in the focus group workshop, made by the author.

## 5. Discussion

The findings are discussed in this chapter and linked to the literature. Furthermore the limitations of the research will be discussed.

### Frames

Within the selected news articles the following frames distinguished - science high-tech-; consumption-; unnatural-; sustainability-; religion-; power and control-; animal welfare-; public health-; and, business-. These frames can be classified as a type of characterization frame, as they try to characterize IVM (Grey, 2003). The frames which were used within the focus group workshop were almost identical to the frames which were used within the news articles. The culture frame, however, was only mentioned within the focus group workshop. Even though the different types of frames match, there is a large difference in the frequency in which the frames were used. The two frames which were used most often in the news articles were the Sustainability frame and the Animal welfare frame. The Consumption frame and the People's health frame were used most often within the focus group workshop.

The difference between the focus group results and the results of the media analysis could be partly caused by the fact that M. Post has standing in most of the news articles. Additionally, the difference could be caused due to the media demands to which the journalist needs to comply to (which are mentioned in chapter 2). Furthermore, it could be suggested that the workshop participants frame IVM from a consumer perspective, and the journalist frame IVM from a more distant and observing point of view. From the results of this research it cannot be derived if this is the cause, as a result further research need to be performed to create more insight in to this phenomenon. Both the news articles and the discussion of the focus group participants not only framed IVM in a particular way but also other factors which they perceived as relevant, for example the related production processes and the companies which could produce IVM. The Consumption-, and Unnatural- Science frames described the material features of IVM. The Animal welfare- and Sustainability- frames refer to the process related to the production of meat. The Business frame and the Power & Control frame refer more to immaterial features which they use to characterize the companies which developed and will (possibly) process IVM.

Both the news articles and the discussion of the focus group participants often linked the discussion about IVM to meat. This indicates that people were reminded of the process of the conventional meat production when they discussed IVM. The media analysis and the focus group workshop both framed the current meat industry and practices often as something problematic. The results indicate that IVM, in general, is framed positively because it could provide an alternative for the current meat industry and practices.

The frames which the focus group participants used towards IVM were in generally positive, though with some hesitations. According to the participants, the hesitations were caused by a lack of information regarding the production processes of IVM. The participants indicated that they wanted to receive mores information to give a clear indication as to whether they would accept IVM. The same amount of information about the production process which was present within the news articles, however, was given to the focus group participants. This could indicate that the news articles regarding IVM do not contain enough information for the Dutch public to form their opinion about IVM. The results of the focus group partly match with earlier research undertaken by Van der Weele & Driessen (2014). They indicated that the basic attitude in general regarding IVM was positive with some hesitations and doubts.

## **The (meat) industry**

A concept that occurred multiple times was the idea that the focus group participants had that their food was manipulated by 'them'. This often referred to an institution in general, which sells and produces meat. Most of the comments towards the current food industry are not framed positively. They indicate that they are not satisfied with the way cows are currently kept. They also mention that the focus is too much on production. One of the participants hopes that the farmers would also receive some money in the future and that not a lot of money will go to the people in the lab because this would be, in her opinion, 'a little bit unkind'. Additionally, several negative statements are made regarding the current meat industry and the lab (in which IVM is made) indicating a degree of distrust. 'We are getting fooled in front of our own eyes'. These negative expectations of 'the other' indicates a distrust in the perceived others. The focus group results also suggest that the participants frame the IVM industry negatively.

## **Narratives**

The media analysis suggested that two different narratives are present in the Dutch media regarding IVM - the dominant Pro-IVM narrative and the Counter narrative. The idea within the dominant Pro-IVM narrative was that IVM could solve one of the main problems related to meat. These findings match the findings of an earlier preformed media analysis related to IVM, performed by Goodwin & Shoulders (2013). Their study investigated the covering of IVM in newspapers in Belgium and in the USA. The study performed by Goodwin & Shoulders (2013) indicated that most of the news articles contained statements which '*primarily supported or favoured the production of cultured meat*'. Additionally, their study indicated that mainly beneficial factors of IVM were discussed in the news articles. These also matched the themes that were discussed regarding the perceived problems with the current meat industry (Goodwin & Shoulders, 2013). The results of the media analysis partly match the media study performed by Hopkins (2015). One of his key findings, however, was that the opinion of vegetarians was quoted a lot of times within the online media. This does not match the findings of this media analysis. This could partly be explained due to the fact that online news articles and print news articles need to suffice to different quality standards.

## **False information**

Based on the literature review findings can be suggest that a lot of frames within the newspapers contained a lot of false dilemmas, or half-truths. The taste of IVM for example is framed in several different ways. This is despite the fact that most of the news articles often refer to the same two volunteers who tasted IVM, during the presentation in London. Additionally, only a few news articles mentioned that for the production of IVM calf serum is needed. Tomic (2013) indicates that this form of reasoning is fallacy. These can be seen as false obstructions, in which certain elements of the truth are missing (Tomic, 2013) It cannot be derived from the results if these fallacies are intentionally listed by the journalist or that they are the results of the media formats.

## **Research methodology**

The frames which were present IVM in the news articles were also present within the focus group discussion. The focus group context, however, provided an insight in to how the different frames were used in active dialogue. The media analysis provided new information which was not present in the literature, for example that IVM probably will be kosher and, therefore, could mean the end of ritual slaughter. Additionally, suggests the literature review that the terminology which is used to name IVM, could influence how people frame IVM. From these examples it can be concluded that the combination of the three different research

methods was a success, with each of the research methods indicating key findings which were of great importance for the research. The theoretical framework which was used for this research created further relevant insights. The narratives characterization of hero, villain and victims had, however, one shortcoming. It did not provide an insight in to which person, or organizations, were used as witness for the statements of the journalists; therefore, the aspect of 'witness' was added. Hereby an indication about the person who received the responsibility within one specific narrative was given.

The results of this study were compared with related studies. The study by Goodwin & Shoulders (2013) based their results on a data collection which is not valid. The results of the study performed by Goodwin & Shoulders (2013) for example is based on 30 news articles. These articles were obtained in Belgium and in the USA within a time period of 10 year. However as mentioned in chapter 2, requires a reliable media analyze a sample size of +/- 100 news articles. Therefore, these findings are deemed questionable.

### **Limitations**

It is important to note that the researcher's interpretations of the news articles and the focus group results could limit this study. The mental frame constructs of the researcher can for example interfere with the identification of the different frames (Van Gorp, 2010). This limitation is common with qualitative research (Pauly, 1991). The assistance of the research assistant was aimed to reduce this limitation. Although the research aimed to select a representative group, all participants grew up in a village in the North of the Netherlands, which could affect the frames which they used to make sense of IVM. The IVM focus group workshops performed by Van der Weele and Driessen (2014), however, suggested that there is no differences in the way people (which live in the country side or more city centered environments) frame IVM. Furthermore, the facilitator aimed to give all the participants within the focus group the opportunity to share their views, however a dominant participant could have influenced the focus group. The focus of one of the research questions was on how Dutch people frame IVM.

This research did not indicate how people who eat meat every day, or vegetarians, frame IVM in active dialogue, as only flexitarians participated on the focus group workshop. However, the large majority of the Dutch people are flexitarian and, therefore, provides this explorative study relevant hypothetical insights in to how Dutch people fame IVM. The first hamburger was presented in August, 2013, though most of the products discussed during the focus group workshop were hypothetical products. Nevertheless, the results of this study match earlier preformed research related to IVM. The researcher declares to have no conflict of interest.

## 6. Conclusions and Recommendations

In this chapter the conclusions of each research question are drawn from the results. Additionally, recommendations for further study are provided.

**First research question:** Which frames are present in the Dutch media concerning In-Vitro meat?

The examination of news articles indicated that the Dutch newspapers use 10 different frames (see page 27 for the frame overview) to discuss IVM. These frames are characterization frames as they try to characterize IVM. The present frames within the news articles were mostly provided by M. Post. Several different scientists also appeared as speaker within the news articles. In total, two narratives distinguished throughout the news articles; the dominant 'pro-IVM narrative', which frames IVM as something positive, and the second narrative; 'the counter narrative', which frames IVM as something negative and is in the large minority.

The formulation of 'the main problem' stands out in these types of narratives. According to the 'pro-dominant narratives' IVM can strive to solve the main problems caused by the current meat industry. The Animal welfare frame & Sustainability frame are used within this narrative the most to support this argumentation. The counter narrative opposes these argumentations related to the animal welfare & environmental frame. The counter narrative states that IVM is not a good thing.

**Second research question:** How do Dutch people frame In-Vitro meat?

The participants of the focus group used the following nine frames during the workshop (see page 37 for the frame overview). These frames characterized the material aspects of IVM (amongst other; consumption; unnatural;- frame) but also the immaterial aspects (amongst other Business;- Power & control frame). The Consumption frame and the Public health frame received the most attention and were valued the most by the focus group participants. The participants discussed not only what their opinion about IVM was but they also mentioned which kind of problem IVM could solve. The focus group framed IVM positively because it could solve the problems which the current meat industry. However, the participants indicated that the given information about the production process of IVM was not enough to decide if they would like to try IVM.

**General research question:** How do Dutch people make sense of In-Vitro meat?

From the results it can be suggested that the Dutch people use a wide variety of different frames to make sense of IVM. The results indicate that the frames (animal welfare frame and the environmental frame), which are present most frequently within Dutch media regarding IVM, do not match with the frames (consumption frame and the people health frame) Dutch people value the most regarding IVM. This study suggests that Dutch people are, in general, dissatisfied with the current meat industry and it causes, in their point of view, too much pressure on the environment and with poor animal welfare. IVM is framed as a product with a promise. The study suggests that Dutch people frame IVM as something which could change the current meat industry and solve the associated problems. Additionally, the results suggested that Dutch people base their opinion about IVM not only on the physical product but also incorporate other immaterial aspect in their framing such as, for example their view on the IVM producers and the associated effects of IVM. However, the results of this study suggest that the information which is provided about the production process in the Dutch newspapers is too little for Dutch public to indicate if they would like to try IVM.

## Recommendations

Based on the aforementioned conclusions and considering the available timeframe, it can be recommended that;

### For research regarding IVM

- More research is required to validate the hypothesis which suggests that there is a lot of uncertainty about IVM. Additionally, more research is needed to verify the hypothesis that the information about the production process of IVM in the Dutch newspapers is too limited for Dutch public to frame their opinion about IVM and to indicate if they would eat IVM or not.
- The results suggest that the news articles are in favor of IVM because of the implications which could be beneficial for the animal welfare and the environment. Additionally results from the focus group suggested that the Consumption frame and the Public health frame are perceived as most important aspects of IVM. Further research is needed to not only validate the focus group results, to create a clear understanding, into why these two frames valued the most by the focus group participants do not match the two frames which were most mentioned within the Dutch news articles.
- Additionally more research is required to find out what specific kind of information Dutch people need to receive to decide if they would like to try IVM. Future studies should take the immaterial and the material aspects of IVM into account. Finally, it should be investigated which frames intensive meat eaters and vegetarians use when they try to frame IVM.
- This research hypothesizes that Dutch people not only frame IVM but also the immaterial aspects (for example the Business frame and Power & control frame) and which they link to IVM. More research is needed to indicate to which degree (if there are more) these immaterial aspects influence the framing of IVM.
- The literature review results indicate that the terminology which is used to define IVM influences the reactions of people to IVM and sometimes already frame IVM and thereby influences the perception of people regarding IVM. Further research could test this hypothesis.

### For research in general

- This research indicated that the theoretical framework of narrative was a good method to characterize the findings. It is recommended that social research regarding IVM conduct their research with the use of a theoretical frames such as framing. This will create more clarity and structure within the research and it will make the results of the research more comparable with earlier performed work.
- According to the findings of this research, the different roles defined within the narratives; hero, villain, and victims had shortcomings. It did not indicate who appeared as speaker within the narrative. Therefore can be suggested that the theory may be extended with the role of the witness.

### For IVM developers

- As IVM is still under development, several aspects of the product can currently only be speculated about. However this research hypothesizes that the different type of IVM product (magic balls or an IVM hamburger) and the influences the reaction of people towards IVM. This should be taken into consideration within further research and with the development of IVM.

### **Research reflections**

The results indicate, that people use a broad variety of frames when they try to frame IVM, solving partly the knowledge gap which was pointed out at the beginning of the research. Framing is however as mentioned in chapter one, an ongoing process and therefore the frames which are presented within this study give only the frames used within the selected time period. Therefore it is important to inquire how IVM is framed over time and if new developments change the currently defined frames.

The findings of this study suggest that framing and narrative are good theoretical approaches to indicate how the Dutch public makes sense of IVM. As mentioned earlier in the recommendations, suggest this research that the theoretical framework of narratives should be expand with the role of the witness. Thereby provided this research not only new insights in how the Dutch public frame IVM but it suggested also an additional aspects within the theoretical approach of narrative analyses. The results show that the use of two data collection methods (qualitative and quantitative) create new relevant knowledge within the research field of IVM. The results suggest, additionally, that framing of IVM involves more aspects than the physical product only, it takes into account the frames of other immaterial aspects like for example the producers of IVM. By doing so, the focus of the framing is shifted from the psychical product to a more holistic approach which includes several immaterial aspects. Research on how Dutch public frames certain innovative products, can benefit from this information.

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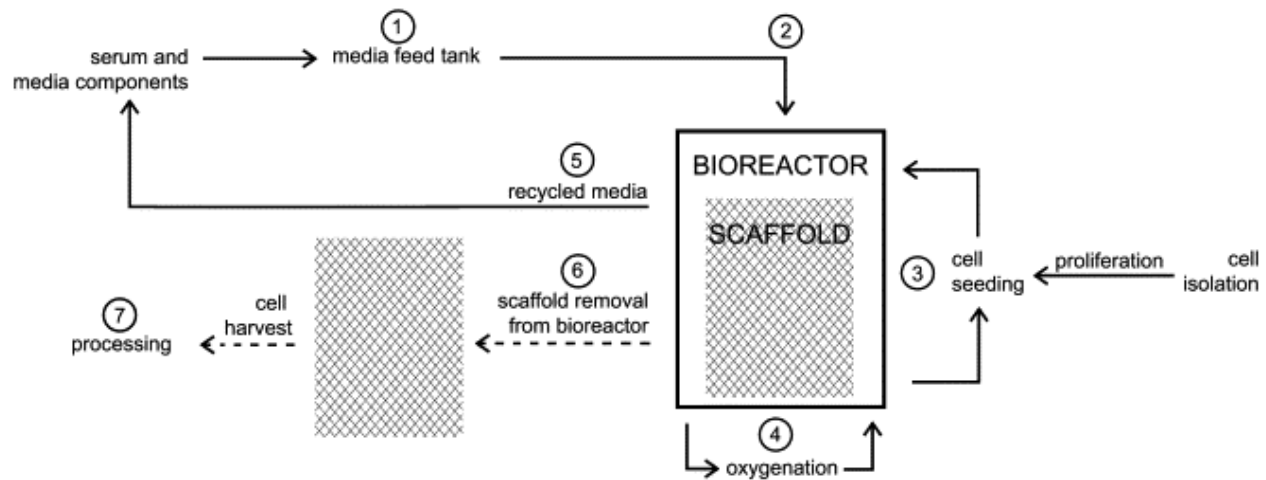
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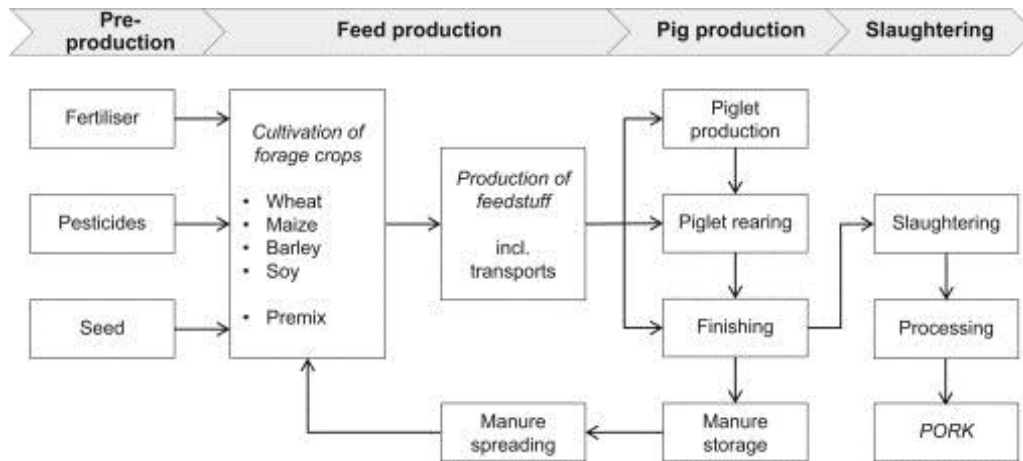
## Attachment I In vitro meat production scheme



**Figure 7** A possible in vitro meat production scheme adapted from Datar & Betti, (2009)

According to Datar. I. & Betti. M, (2009) could a production scheme consist out the following components; (1)" Media is formulated and kept in a feed tank before being deposited(2) into the bioreactor containing the scaffolding system. Flow of media allows cells previously isolated and expanded to be seeded (3) onto the scaffold within the bioreactor. During the culturing process, media is being constantly oxygenated in an external fluid loop (4). When culturing is complete, media can be recycled (5) and reformulated, while the scaffold and cultured tissue are removed from the bioreactor (6). Harvest of the tissue involves separation of tissue from the scaffold for further processing (7)".

## Attachment II Pork product chain



**Figure 8** Pork production chain (Reckmann, 2013)

## Attachment III

### Persons within the category 'Remaining'

1. M. post kinderen (N:2)
2. Critics
3. Studiegenootje Larry Page
4. Modern meadows
5. People who read the magazine Boederij
6. Writers of books (N:5)
7. Cabaretier van Rooyackers,
8. Conservator Bart Grob van Museum boerhaave
9. Non related companies like (American Express, Vodafone) (N:3)
10. Gerda Verburg, Diplomaat
11. Limburg
12. Maastricht Health Campus
13. Pharmacist
14. Nasa
15. Paul McCartney Member of the Beatles
16. Kunstenaars (N:3)
17. Futurologen
18. Slager
19. Bill gates
20. Dutch inventor
21. Museum
22. Mc donalds
23. Random persons (Prison guard etc.) (N:5)

## Attachment IV example of different narratives

1. Example of a Pro IVM narrative obtained out of; Leeuwarder Courant august 6 2013 by Jaap Hellinga  
Artikel 93

### 'Kweekburger smaakt naar normaal vlees'

Nederlandse onderzoeker presenteert vandaag in Londen voor internationale pers hamburger uit het laboratorium.

LONDEN - "Het smaakt gewoon naar vlees", zegt wetenschapper Mark Post over zijn in een laboratorium gekweekte stuk rundvlees. De eerste 'kweekburger' wordt deze maandag in Londen officieel gepresenteerd en geproefd, maar Post heeft zelf alvast een hapje genomen. Er hoeft wat de hoogleraar vasculaire fysiologie aan de Universiteit Maastricht betreft geen twijfel te bestaan over de echtheid van zijn kweekhamburger. "Dit is echt vlees, hetzelfde als wat in de supermarkt ligt." Volgens Post kan de smaak wel wat verbeterd worden, er zit namelijk geen vet in zijn kweekburger, wat een normale hamburger juist lekker maakt. De wetenschapper denkt echter dat het wel mogelijk is om op den duur ook vet aan de kweekburger toe te voegen. Dat is een kwestie van nog meer onderzoek en ontwikkeling, aldus Post. De smaak van de hamburger is voor de wetenschapper niet het belangrijkste nieuws. "Het gaat erom dat we nu kunnen laten zien dat dit kan", zegt Post. "Dit kan betekenen dat de mens in de toekomst op een ethisch verantwoorde en milieuvriendelijke manier vlees kan produceren."

De kweekburger is gemaakt van stamcellen uit spierweefsel van een koe. In een laboratoriumbakje groeien deze uit tot stukken vlees. Volgens Post kan dezelfde techniek ook worden toegepast op vlees van andere dieren, zoals kippen en varkens. Het kan nog wel even duren voordat we de eerste gekweekte ham- of kipburgers in de schappen van de supermarkt vinden. "In het meest positieve scenario zijn de kweekburgers over tien tot twintig jaar te koop voor consumenten", zegt Post. Mensen die huiverig zijn voor het eten van kunstmatig geproduceerd vlees stelt de wetenschapper graag gerust. "Dit vlees is veilig", zegt hij. Volgens hem heeft het kweekvlees zelfs voordelen boven het huidige consumptievlees, omdat het laboratorium een steriele omgeving is. Mogelijk is een kweekhamburger daarom zelfs veiliger omdat het vrij is van kiemen en bacteriën.

De presentatie en het proeven van de burger gebeurt deze maandag in Londen onder het oog van de internationale pers, en is ook live te volgen op internet.

2. Example of a counter narrative towards IVM

Artikel 7; **Kweekvlees De boer gruwet van 'labvlees'**; Dagblad De Limburger August 6, 2013 by Peter Heesen  
**KWEEKVLEES** 'Zolang zo'n hamburger 250.000 euro kost, is ie geen bedreiging voor veehouderij'

Hoogleraar Mark Post van de Universiteit Maastricht presenteerde gisteren de hamburger van **kweekvlees**. Voelen veehouders in Limburg zich bedreigd? Mark Post tegen de NOS: Over 20 jaar vragen we ons af hoe we ooit zo barbaars hebben kunnen zijn om dieren te slachten. "Rundveehouder en suikermaïsteler Giel Hermans uit Kessel, benoemd tot agrarisch ondernemer van 2011:

Beroepsmatig zou ik naar de presentatie van dat **kweekvlees** moeten kijken, maar ik durf het niet. Ik vind het zó goor, zó vies. Ik gruw ervan. Het is knap dat ze zoiets kunnen bedenken, maar ik verwacht niet dat we massaal **kweekvlees** gaan eten. Het doet me denken aan die film van Louis de Funès in de jaren zeventig, waarin hij als Michelin-inspecteur een vleesfabriek bezoekt. Kip wordt gemaakt door pasta over een skeletje te gieten en daarna met verf in de juiste kleur te spuiten. Misschien kunnen ze een gehakt-achtige smurrie maken, tussen een broodje duwen en hamburger noemen, maar dan heb je nog geen entrecote." Geitenhouder Frank Brinkhaus uit Heythuysen, bekend van Boer zoekt Vrouw: Als ik aan **kweekvlees** denk, denk ik aan insecten. Toen ik voor het eerst hoorde dat ze meelwormen en sprinkhanen gingen kweken voor menselijke consumptie, zag ik dat niet als bedreiging van de veehouderij. De introductie was tig jaar geleden, maar ze staan nog steeds niet op de kaart, laat staan dat ze in de supermarkt te koop zijn. Ik kan de ontwikkeling van **kweekvlees** moeilijk inschatten, maar ik denk dat het decennia duurt voordat het op grote schaal te produceren is.

En dan is het nog de vraag hoeveel het kost. Want als burgers diep in de portemonnee moeten tasten, worden ze gauw minder principieel. Ik vind het sowieso een beetje vaag dat iedereen zo bezig is met nepvlees. Ik zag het ook bij Solar. Daar verkochten ze vegetarische producten als kebab en chickenburger. Ik heb zo iets van: eet vlees, en noem het zo, of eet een appel." Directeur Jan Janssen van diervoederbedrijf Vitelia in Oirlo: Zolang een hamburger van **kweekvlees** 250.000 euro kost, is het geen bedreiging. Ik vergelijk het met de vegetarische hamburger, die wordt ook nog niet veel gegeten als eiwitvervanger. **Kweekvlees** klinkt nog erg als sciencefiction, maar het is ook moeilijk om de toekomst te voorspellen. Twintig jaar geleden hadden we geen idee wat de mobiele telefoon teweeg zou brengen. Als het mogelijk blijkt op goedkope wijze een goed stuk vlees te kweken, zou dat revolutionair zijn. Daar moet je de ogen niet voor sluiten." Voorzitter Mark Tijssen van de vakgroep varkenshouderij van de LLTB in Roggel: Ach, ze hebben al vaker het einde van de veehouderij voorspeld. Nu zal het ook zo'n vaart niet lopen. Het duurt nog zeker een mensenleven voordat deze techniek toepasbaar is. In de tussentijd hebben we dierlijk eiwit hard nodig. En dan gaat het niet alleen om vlees, maar ook om eieren en melk. Bovendien neemt de wereldbevolking sterk toe, naar negen miljard mensen in 2050. Een groot deel is gedwongen vegetariër, omdat ze geen vlees kunnen kopen. Voorlopig hoeft de veehouderij niet te vrezen. En laten we wel wezen: er gaat niets boven een écht stukje vlees." Vlees.nl: **Kweekvlees** gaat in tegen consumententrends richting real food, met steeds meer interesse in zo natuurlijk mogelijk geproduceerd vlees (en dus zo min mogelijk technologie), waarbij zaken als dierenwelzijn en milieu goed geregeld zijn."

## Attachment V; Candidate selection questions

Beste X,

Voor mijn studie ben ik bezig met een opdracht en daarom wil ik graag een workshop organiseren voor circa zes mensen. De workshop zal 1,5 uur duren. Tijdens de workshop zullen verschillende onderwerpen besproken worden. Dit onder het genot van een kopje koffie/thee met huisgemaakte appeltaart. De workshop zal op 17 januari van 19.00 tot 20.30 uur plaatsvinden. Voor de workshop ben ik opzoek naar mensen met bepaalde karakteristieken, zou je als je mee wilt doen aan de workshop de onderstaande vragen willen invullen en terug sturen? De gegevens worden anoniem verwerkt en zullen niet aan derden verstrekt worden.

Alvast bedankt en hopelijk tot 17 januari.

1> Wat is je leeftijd?

-.....

2> Wat voor opleiding heb je gehad?

- WO
- HBO
- MBO
- Anders

3> Met hoeveel mensen woon je in een huis?

-Met, .....

4> Heb je huisdieren?

- Ja, namelijk.....
- Nee,

5> Leest u de krant?

- Zo ja, Welke.....
- Nee

6> Bent u degene die in huis verantwoordelijk is voor de boodschappen?

- Ja ik winkel voornamelijk bij.....
- Nee

7> Eet je wel eens vlees, kip of vis?

- Ja, elke dag van de week
- Ja, maar niet elke dag van week
- Nee, ik eet geen vlees, kip of vis.

8> Wat komt er bij je op als je nadenkt over het huidige voedselsysteem?

9> Wat vind je inspirerende ontwikkelingen in de voeding?

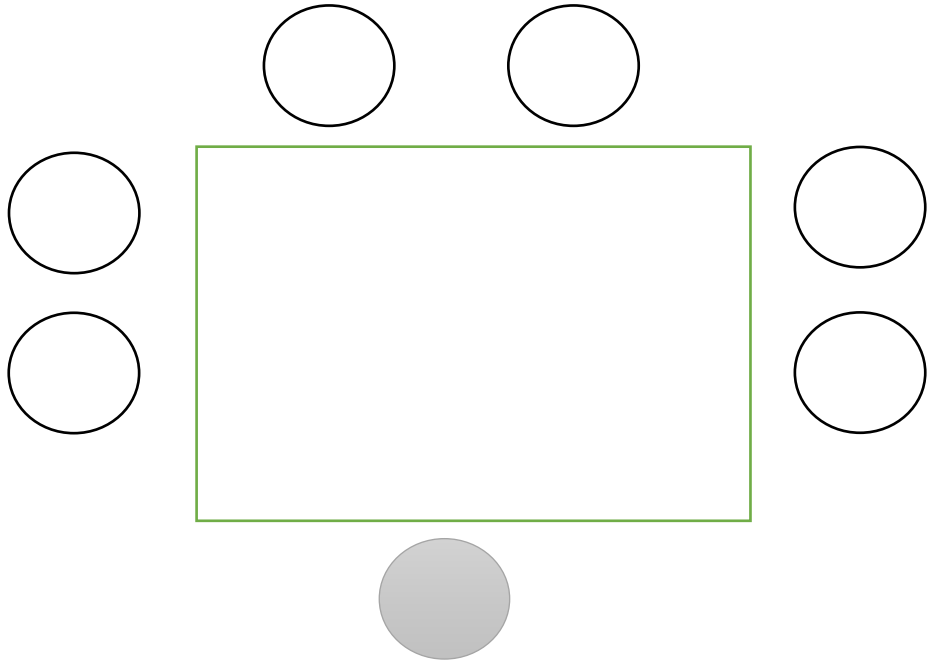
10> Wat vind je zorgelijke ontwikkelingen m.b.t voeding?

## Attachment VI; Focus group workshop (Dutch version)

Tijd	Onderwerp	Vragen	Zoek voor	Opmerkingen	Benodigheden
<b>Deel een</b>	<b>Exploratie</b>				
0-5 min	Introductie	Eerst wordt er een algemene inleiding gegeven met uitleg over het doel van het onderzoek.		Vermeld dat alle antwoorden en reacties goed zijn.	- Naamkaarten - drinken - eten -zachte muziek
5-15 min	Voedsel systeem	1- Waar denk je aan als je nadenkt over de manier waarop ons voedsel wordt geproduceerd.	- Frames - vergelijkingen	Er moet gezorgd worden dat iedereen evenveel praat.	
15- 30 min	Exploratie van de aspecten	Een neutrale introductie van het product zonder voordelen of nadelen * Overzicht 1 geeft de productie van het product weer.  2- Wat zijn jou ideeën over dit product?		Extra tijd is gereserveerd voor extra opmerkingen.	-Productie schema van IVM - strategieën om het gesprek op gang te houden.
<b>Deel twee</b>	<b>Scenario's</b>				
30-60 min		3-Wat vind je van een hamburger, die op deze wijze geproduceerd wordt? (zie figuur 1) * In dit scenario lijkt het product zoveel mogelijk op vlees, er wordt een hamburger gebruikt voor visualisatie (zie figuur 2).  4 Wat vind je van de Magic Balls, waar het product verwerkt wordt tot gekleurde ballen om het aantrekkelijker te maken (zie figuur 3). *  5- Wat vind je van vlees gemaakt van uitgestorven dieren: zoals Dodo vlees? (zie figuur 4)			- Visuele kaarten
<b>Third part</b>	<b>Verhalen</b>	<b>Specifieke vragen</b>			
60-90 min	IVM, vlees en vlees vervangers	6- Wat is je favoriete vleesproduct? 7 Wat is hier bijzonder aan?  8 Welke van de twee hamburgers heeft uw voorkeur? (één gemaakt uit plantaardig materiaal de andere uit dierlijk materiaal)  9- Denk je dat het product iets anders dan vleesvervangers kan bieden?	-indicatie van de positie van mensen tegen over dieren.		- Visuele kaarten (twee identieke foto's)

		<p>10- Beschouwd je vlees als iets gezonds en essentieels?</p> <p>11- Wat denk je dat het grootste nadeel van het product is? En waarom?</p> <p>12- Wat denk je dat het grootste voordeel van het product is? En waarom?</p>			
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Table position



Legend



Facilitator



Participants

# Attachment VII Workshop Questionnaire answers

Name	Age	Education	Living condition	Pets	Newspapers	Responsible for groceries	Do you eat meat, chicken or fish?	Ideas about the current food system?	Inspiring developments	Worrying development
Jonica,	- 28	- WO	With husband	1 bird and a fish	NRC Next	- <i>Ja at the groenteboer, bakker, slagerij, AH, DEEN, DEKA</i>	Ja maar niet elke dag van de week.	"Welcome bij de consumenten society. "	<i>De biologische en paleo-trends.</i>	<i>De verwerkte suikers in producten die je in eerste instantie niet associëren zou met suiker.</i>
Marijke	60	X	Alone		Culemborgse krant	Yes at; Co-op en Plus.	Ja maar niet elke dag van de week.	Te veel rage,s en fabrieksvoedsel.	Meer groente van het seizoen eten.	Te veel fast-foot ,geen tijd nemen om goed eten te bereiden.
Els	65	Huishoud school	2	Cat	NHD	Deka en deen	Ja maar niet elke dag van de week.	Dat het steeds meer kant en klaar wordt, dat vind ik niets. Ik hou meer van verse producten en spel brood. Daarom haal ik mijn eten bij lokale boeren.	Eten wat goed is voor je, zoals quinoa etc. Ik heb reuma en hierdoor werkt mijn immuunsysteem slechter, door gezonde voedingsproducten te eten verminderen mijn klachten verminderen.	Dat er zo ontzetten veel eten is, zo veel chips. Kijkt naar Amerika daar zijn zoveel mensen te dik
Lucas	24	- HBO	2	no	no	Yes at Alberthein and Deen.	Ja maar niet elke dag van de week.	Ik heb het idee dat het huidige voedselsysteem fout is en dat het niet zo door kan.	Technologische ontwikkelingen die voor meer en makkelijk eten zorgen.	Dat onze voedingsbronnen opraken.
Paula	23	-MBO	5.	No	No	No	Ja maar niet elke dag van de week.	De eetgewoonten van mensen blijft hetzelfde terwijl het voedsel veranderd waardoor de eetgewoonten aangepast zouden moeten worden.	Steeds meer merken richten zich op voedsel in de pure vorm en promoten dit actief, zoals biologisch vlees en producten van natura	Dat de voedingswaarden in voedsel sterk afneemt en er in voorverpakte producten steeds meer E nummers en suikers worden toegevoegd.

Overview of answers on the questionnaire (which was send in prior to the workshop.)

Name	Age	Education	Living condition	Pets	Newspapers	Responsible for groceries	Do you eat meat, chicken or fish?	Ideas about the current food system?	Inspiring developments	Worrying development
Jonica,	- 28	- WO	With husband	A bird and a fish	NRC Next	- Ja at the groenteboer, bakker, slagerij, AH, DEEN, DEKA	Yes, but not every day of the week.	"Welcome to the Consumer society. "	Biological and paleo-trends.	Processed sugars in products not associate you might initially with sugar.
Marijke	60	X	Alone		Culemborgse krant	Yes at; Co-op en Plus.	Yes, but not every day of the week.	Too much rage, s and factory food.	More eating of season vegetables.	There is too many fast-foot, they do not take time prepare good food.
Els	65	Huishoud school	2	Cat	NHD	deka en deen	Yes, but not every day of the week.	That there is more Pre-prepared food, i do not like that. I like more fresh food and spelled bread. Therefore I buy my food at local farmers.	Eat what is good for you, like quinoa etc. I have arthritis and because my immune system is worse, by eating healthy foods reduce my symptoms.	That there is so much to eat, look at the people in America, there are so many people to fat.
Lucas	24	- HBO	2	no	no	Yes at Alberthein and Deen.	Yes, but not every day of the week.	I feel that the current food system is wrong and that it cannot continue	Technological developments that provide more and easy food.	That our food source run out.
Paula	23	-MBO	5.	No	No	No	Yes, but not every day of the week	The eating habits of people remain unchanged while the food changes so the diet should be adjusted.	More and more brands focus on pure food and promote this, such as organic meat and products of Natura	That the nutritional values of food is greatly reduced and in pre-packaged products more E numbers and sugars are added.

#### Piet

Piet is 64 years old, he is a tulip farmer and married to Els. He did not fill in the questionnaire.