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The Tragedy of Meat:
A risk analysis of the climate impact of meat

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Abstract

In the following thesis, I deal with meat as an example of a tragedy of the commons. The tragedy of the commons, a metaphor coined by Hardin in 1968, is a situation in which an open resource gets depleted by being accessible to all. Two issues, formulated as questions, result from the tragedy of the commons: what could solve it? And who should solve it? I answer both questions in the thesis by assessing what solution is the most equitable to counter the environmental impact of meat consumption. By using Wolff's risk analysis (2010), I evaluate five different socio-technical solutions by listing their cost-payers and beneficiaries. Next, again by using Wolff's risk analysis, I evaluate the two most promising solutions by assessing their decision-making processes. The latter part ties into the question of responsibility and whether individual or collective responsibility is needed to solve this tragedy of the commons. I suggest combining the two types of responsibility by referring to Hourdequin (2010) and Middlemiss (2010). On the one hand, individual consumers of the developed world are required to act upon their individual responsibility by changing their consumption patterns. On the other hand, I suggest that developed nations are required to act upon their collective responsibility by rationing, the controlled distribution of goods. The thesis is divided into four chapters: the first chapter lays out the environmental issues caused by meat and explains Wolff's (2010) risk model; the second chapter describes five different socio-technical solutions which combine technical and social elements to different extents; the third chapter assesses the cost-payers and beneficiaries of each solution; the fourth chapter assesses the decision-makers of the two most equitable solutions out of the aforementioned five, and explains why individual and collective responsibility are equally important. I conclude that the socio-technical solution Reductitution is the most equitable solution to solve this tragedy of the commons.

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Introduction

Controversial TV chef Gordon Ramsay once stated in an interview that he would electrocute his children if they turned vegetarian ("Macca slams", 2008). Although his statement is quite violent, it clearly shows the importance some people place on meat. Currently, there are strong global changes and contradictions visible in meat consumption patterns (Godfray et al., 2018, p. 1). On the one hand, in middle-income countries such as in East Asia there is a stark rise in the demand for meat. On the other hand, in industrialized countries there is a clear shift from carnivorous diets to vegetarianism and veganism. A growing number of people in the industrialized world, predominantly teenagers, are changing to plant-based diets. The BBC refers to this dietary change as a 'trend' (Barford, 2014) while The Guardian refers to it as a 'movement' (Marsh, 2016). The main reason behind the latter dietary changes is the growing concern about the sustainability of meat for environmental well-being (Barford, 2014; Marsh, 2016). The sustainable issue with meat is shortly but well-explained by Barnhill, Doggett & Budolfson (2018): animals kept on factory farms need to be fed. This food needs to be produced. Once the animals get fed, they produce waste. These are simply put two of the biggest problems related to meat[1]: the food production for farm animals and the waste the animals produce. Both lie at the heart of the environmental issues surrounding meat production. Although the awareness surrounding the environmental issues of meat is increasing, pragmatic solutions to solve these same environmental issues on a global level are scattered. My aim is to assess the social impact of five alternatives to meat on a global level and determining which solution is the most equitable decision making process. Even though meat might not be an original case-study, it is an easy and clear example to start from and explore how to determine what the most equitable sustainable solution is to current climate issues by using a relevant framework.

Research question

The main research question is as follows: which suggested solution combatting the environmental impact of meat consumption is the most equitable? To answer this question, I will ask the following two sub-questions:

[1] Animal welfare in food production is another problem but I will not focus on animal well-being in the thesis

1) What type of socio-technical solution to counter the climate change caused by meat consumption is the most equitable for the global population?
2) Who should be held responsible or accountable for implementing this solution?

Value

By providing an answer to the research question and its two sub-questions, I will approach the search for sustainable solutions to fight the environmental impact of meat consumption in a different perspective. Instead of using an empirical analysis which determines which solution is the most sustainable, I will use Wolff's risk analysis (2010) to analyze the social impact of five sustainable alternatives to current meat consumption. This analysis brings about two different ethical points which should be taken into consideration when assessing sustainable solutions: 1) It showcases the social (in)equality a new consumption pattern can cause or prevent and 2) it deals with the question of who should be held morally responsible for introducing a new sustainable alternative. The analysis in this thesis could help policy makers, for example, to build more tailored risk assessment methods when introducing new sustainable solutions. It helps with deciding on and determining the fairest sustainable alternative to meat.

Methodology

In order to answer these questions, I will use a literature review. The literature will consist of various approaches in the field of philosophy. First, I will use Hardin's (1968) thought experiment of the tragedy of the commons. Hardin's paper will provide the foundation of the thesis and explain why I will focus on the two above-mentioned sub-questions. Second, I will use Science and Technology Studies (STS) literature to expand on the different definitions of socio-technical solutions and to build my own continuum. On the continuum, I will place five sustainable solutions which combine technical and social elements to different degrees. Third, I will refer to literature about risk assessment, with a focus on Wolff's (2010) risk assessment, to assess the five different socio-technical solutions and its social effect. Last, I will use ethics literature on collective and individual responsibility in climate change to determine who and what should be held responsible for implementing sustainable solutions and solving a tragedy of

the commons.

Overview of the chapters

This thesis is divided into four chapters.

First chapter

I will start the first chapter by giving an overview and explaining the environmental damage meat consumption has caused and still causes. I will continue by explaining Hardin's (1968) tragedy of the commons and comparing the environmental problems of global meat consumption to a tragedy of the commons. Having explained why meat is an example of a tragedy of the commons, I will introduce the two main questions asked in this thesis: 1) what type of solution is required to solve the tragedy of the commons? and 2) who is responsible for solving the tragedy of the commons? I will end this first chapter by explaining Wolff's risk assessment which serves as the framework to answer the two above mentioned questions.

Second chapter

In the second chapter I will look into and describe five different solutions to reduce the environmental impact of meat. I will do this by first discussing Hardin's distinction between technical and social solutions. By referring to STS literature, I will explain that the social and technical are always interrelated. I will clarify my own definitions of the social and technical and how I use them in this thesis. Next, I will draw out my continuum on which I will place five different types of solutions which use social and technical elements to different extents. Then, I will match five sustainable alternatives to combat the climate issues surrounding meat to the five solutions on the continuum.

Third chapter

In the third chapter I focus on the first part of Wolff's (2010) risk assessment. I will start with a stakeholder analysis to determine who the cost-payers and beneficiaries are of the five sustainable solutions discussed in chapter 2. Last, I will conclude which solution(s) is/are the most equitable when comparing and contrasting the different cost-payers and beneficiaries.

Fourth chapter

In the fourth and last chapter I will focus on the last category in Wolff's (2010) assessment: the decision-maker. By drawing upon literature discussing collective and individual responsibility in relation to climate change and the tragedy of the commons, I will determine who and what should be held responsible in order to choose and create the most equitable solution to battle the climate issues meat consumption causes.

Scope of the thesis –simplifications

It should be noted that the five solutions I will assess are idealized alternatives to meat. I treat them as thought experiments to the following question: which of the five alternatives would be the most equitable if one had to be adopted by the entire global population tomorrow? Despite this idealization, it does not prevent the solutions to be turned into plausible, realistic alternatives to meat that could be deployed over time eventually. Each of the five solutions is based on scientific literature and substantiated claims on how to combat the environmental impact of meat. Nevertheless, I will treat the solutions as simplified and, hence, idealized thought experiments in order to assess their social impact within the scope of this thesis. The simplifications I will make are the following. First, I will define vegetarianism and a vegetarian diet as abstaining from meat and poultry. Correctly speaking, a vegetarian abstains from both fish and meat. A diet which only leaves out meat but not fish is usually referred to as pescatarianism. However, due to the scope of the thesis, I will not look into fish and therefore define vegetarianism as abstaining from meat and poultry only.

Furthermore, I will not look into vegan diets or plant-based diets, which is the practice of abstaining from all animal products, including meat, fish, dairy, eggs and honey. Again, this is due to the scope of the thesis and not having the space to assess all aforementioned categories separately if I had chosen to focus on vegan or plant-based diets. I am aware that dairy is a byproduct of keeping animals for meat. If the global population continues to consume dairy, animals will continue to be kept. In that way, food production for animals and animal waste (the two problems Barnhill et al. (2018) calls the two biggest issues related to meat consumption) continue to exist. However, focusing merely on meat gives me the opportunity to give an in-depth assessment of this product.

Thirdly, since I am concerned with solutions which could already be implemented tomorrow, I am not focusing on a solution such as in-vitro meat, also known as cultured meat. Fresco (2012) explains that in-vitro meat at this point in time is an unaffordable alternative to meat: a kilo of in-vitro beef costs 200,000 euros (p. 147). Although in-vitro meat could be a future solution, at the moment it is not (idib. p. 147). Therefore, I am not considering in-vitro meat as an alternative to meat in this thesis. Fourthly, when assessing the impact of the five solutions on the global population I need to assume that all global citizens live in a democracy and all nations are democratic. If I do not, issues of responsibility and decision-making are of no relevance anymore since these can only exist in democratic nations. Lastly, I will leave out animal wellbeing in this thesis but, instead, only concern myself with the environmental issues surrounding meat.

1.

1.1 - Meat and climate change

Meat is rooted in technology in two essential ways. First, it relies heavily on the industrial model that dominates farming in the developed world (Barnhill, Budolfson & Doggett, 2018). Today's industrial agriculture is known for its large-scale, highly mechanized farms that only grow one type of crop and which rely heavily on technology such as synthetic fertilizers and pesticides as well as genetically modified seeds (ibid. p. 3). Their purpose is to have the highest quantity of food by using the smallest amount of space and labor to keep their overall production costs as low as possible (ibid. p. 4). The same industrial model dominates animal farming too (ibid. p. 5). Yet, instead of growing one crop on a large-scale, one type of animal is raised in dense, large-scale, mechanized farms which are concentrated in just a number of locations. Similar to industrial farming, the goal is to have the highest quantity of meat for the smallest amount of space, labor and cost.

Second, the way in which animals are treated and used in industrial animal farming has turned animals into a food-production technology themselves ("Tackling", 2018). Animals have been mechanized by the machines they are surrounded by, connected to and penetrated by (Callicott, 1980, p. 335). Already since prehistoric times humans have kept and used animals for their milk, meat, and wool. However, the industrialization of animal farming which started in the Industrial Revolution has turned animals into nothing more than a means to an end ("Tackling", 2018). They are kept to transform their plant biomass into a good for human beings to use and consume.

The industrialization of animal farming and the transformation of animals into a food-production technology are the two ways in which meat and technology are interrelated. Nowadays, meat production and consumption are directly linked to the practices of industrialized factory farms. However, the industrial model that dominates the meat industry has turned meat, and especially the future of meat, into a much debated topic. The large quantities of meat the meat industry can produce have led to environmental issues and concern. Meat is a large contributor to climate change, even though it has often been overlooked or underrepresented in climate debates up until the beginning of the 21st century (Stehfest et al., 2009, p. 83): "Climate change mitigation policies tend to focus on the energy sector, while the livestock sector receives

surprisingly little attention, despite the fact that it accounts for 18% of the greenhouse gas emissions and for 80% of total anthropogenic land use" (ibid. p. 83). Although previously overlooked, meat significantly contributes to environmental degradation. According to Godfray et al. (2018), meat production should even be counted among the most important ways in which human beings affect the environment (p. 1). Vinnari (2008) predicts that the environmental and ethical implications surrounding meat consumption will only grow in the future (p. 893).

Until a decade ago, the ethics of the consumption of meat was mainly covered and contested in animal rights literature (Ilea, 2008, p. 154). The environmental perspective was often missing or incomplete (ibid. p. 154). However, since 2008 there has been a growing focus on the environmental problems caused by livestock production and meat consumption. Specifically, two environmental reasons to quit meat have gained more attention (ibid. pp. 154-155). The first focuses on the negative effects of meat on the environment in general. The second points out how an increase in the world population, which goes hand in hand with an increase in animal protein sources, could increase the pressure of meat on the environment. Both reasons require elaboration to understand their magnitude.

To start, meat production contributes to greenhouse gases and puts pressure on natural resources such as water and land. When it comes to greenhouse gas emissions, it is estimated that today about 14.5 to 15 percent of the world's anthropogenic greenhouse gas emissions are caused by (mainly industrial) livestock farming (Godfray et al., 2018; Stoll-Kleemann & Schmidt, 2017). Overall, the three most important anthropogenic greenhouse gas emissions are carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) (Godfray et al., 2018, p. 1). Meat production results in all three (ibid. p. 1). These emissions are caused by three main reasons.

First off, the reason why meat production causes methane emissions is a result of enteric fermentation (ibid. p 1). In less academic literature, enteric fermentation is often referred to as "cow farts" (Irvine, 2015). Yet, it is not only cows that cause the large production of methane emissions, though. Besides cows, sheep and goats are the animals - all grouped together as ruminants - who are responsible for the largest source of methane through enteric fermentation (Stehfest et al., 2008, p. 84).

Secondly, nitrous oxide is caused by the large amounts of manure and fertilizer used in animal farming (Stehfest et al., 2008, p. 83). The latter, often nitrogen fertilizers, are used for the

intensification of crop production but damage the soil due to the nitrogen in the fertilizers leaching into ground and surface waters (Jankowski et al., 2018).

Thirdly, the two main reasons behind the emissions of carbon dioxide are the changes of land-use and overall agricultural energy use (Stehfest et al., 2008, p. 84). The former is emphasized as a main factor of CO**2** emissions (ibid. p. 84). These are large grazing lands necessary for ruminants to live on and feed from: "Grazing land for ruminants covers more than 25% of the global land surface, and about 70% of global agricultural land" (ibid. p. 84). Yet, due to the enormous size of these graze-lands, they affect the entire carbon cycle and are responsible for deforestation as well as land degradation (ibid. p. 84).

Besides contributing to these three emissions, livestock farming has a widespread effect on land use, energy and water (Vinnari, 2008, p. 895). In general, agriculture uses more freshwater than any other human activity. A third of the water used in agriculture is needed for livestock farming of which 98 percent is needed to grow animal feed (Godfray et al., 2018, p. 5). As a result, meat production puts a lot of pressure on the environment in especially dry, water-deprived areas and is simultaneously a competitor for other uses of water in those areas (ibid. p. 1).Of all the different types of meat, the production of beef consumes the most water. Poultry production requires a third of the water of beef (ibid. p. 5).

Furthermore, animal farming has been responsible for 30 percent of current global biodiversity losses, mainly due to the previously mentioned changes in land use (Stoll-Kleemann & Schmidt, 2017). Godfray et al. (2018) refer to this latter issue as the most substantial way in which meat production affects the environment (p. 6). Natural habitats are turned into grassland for cattle to graze or converted into arable fields for the production of grain and soy to feed livestock. According to certain estimations, 70 percent of South American rainforest deforestation is a result of cattle ranching (ibid. p. 6). Another 14 percent can be linked to the growth and production of crops for animal feed, including soya (ibid. p. 6). Three other ways in which meat production threatens biodiversity and, in the end, entire ecosystems is through overgrazing by cattle, the trampling of cattle causing soil erosion and reduced diversity in plant species, and shared diseases (ibid. p. 6).

Next, the second reason mentioned by Ilea (2008) is discussed. The world population is estimated to reach nine billion people by 2050 (Fresco, 2012, p. 146). This increase in world population goes hand in hand with an increase in animal protein, especially in transition states

such as China or Brazil as well as developing nations (Stoll-Kleemann & Schmidt, 2017). Since these nations will get wealthier, it is predicted that their meat consumption will increase and reach the consumption levels of industrialized countries. Meat is considered a normal and desirable good - appreciated for its taste and value for money and health - which means that a rise in income levels will most likely cause a rise in meat consumption (Vinnari, 2008, p. 894). However, considering the burden meat poses on the climate currently, a potential growth in the industrial meat industry to provide for the growing demand of meat could have detrimental effects: "It is difficult to envisage how the world could supply a population of 10 billion or more people with the quantity of meat currently consumed in most high-income countries without substantial negative effects on environmental sustainability" (Godfray et al., 2018, p. 7).[2]

1.2 - The Tragedy of the Commons

Having reviewed the effects of meat consumption on the environment, there are two pressing concerns which now arise, as brought forward by the American psychologist Garrett Hardin in his essay "The Tragedy of the Commons" (1968). The first asks what types of solutions are necessary to combat the polluting effects of meat consumption. The second question asks whose responsibility it is to introduce these solutions. Both questions are complex and cannot be given an immediate, single solution or answer. Hardin explains why.

To begin, Hardin's (1968) tragedy of the commons is a metaphor which refers to the depletion of an open resource due to it being accessible to all. To explain this more in detail, Hardin uses the thought experiment of a few herdsmen who share the same piece of land for their cattle to graze on (p. 1244). One herdsman then decides to increase their herd by adding one more animal since this is more profitable. However, all the other herdsmen reach this same conclusion and decide to add one more animal to their herds. What happens then is that the piece of land gets ruined because there are too many animals grazing on and sharing the same land. Hence, the common source gets depleted and all the herdsmen lose their land. The tragedy of the commons can therefore be summed up in the following sentence: what is rational to do for one is

[2] Even though this thesis does not focus on the moral status of animals, considering that currently around 65 billion land animals are annually slaughtered for meat consumption (Bregman, 2017, "Hierdoor werd ik") and the probable rising of this number add to the concern of a growing demand for meat.

not necessarily rational for the entire community. Hardin concludes that freedom in a commons leads to ruin to all since it leads to overuse (ibid. p. 1244).

Pollution, in the eyes of Hardin (1968), is just as much a tragedy of the commons but in a reversed way. Instead of taking something out of an open resource or overusing it, pollution is the effect of putting something in an open resource which, as the term implies, pollutes it. Similar to the herdsman who adds another animal to his herd, someone decides to discharge some of their waste in an open resource since releasing waste in the common costs less than recycling it. Since this seems rational to everyone, the open resource gets polluted and turns into a waste disposal. Meat production belongs to both categories of Hardin's tragedy of the commons since it both puts pressure on natural resources and releases greenhouse gases.

Hardin's metaphor (1968) shows how individuals acting out of their own self-interest ruin shared resources or common land. Yet, this leads to the following two questions. First, what type of solution is required to solve or prevent the tragedy of the commons? Second, who exactly should be held responsible or accountable for solving the tragedy of the commons? These two questions are dependent on each other. In order to answer the question who should be held responsible for introducing a solution to the tragedy of the commons, it should first be established what the solution is. I will answer these two questions in this thesis by taking meat consumption as an example of a tragedy of the commons.

1.3 - Wolff's risk assessment

In order to answer these two questions, Jonathan Wolff's (2010) ethical risk analysis will be applied which draws heavily on the risk assessment model, in this thesis referred to as the Standard Model, by Swedish philosophers Hermansson & Hansson (2007). In short, risk assessment is about calculating the risk of certain decisions. The Standard Model is a common qualitative model used to calculate the ethical factors in risk issues. It focuses on the ethical relationships amongst three parties during risk: a cost-payer or a risk exposed, a beneficiary, and a decision-maker. The cost-payer is the one who bears the possible costs in a risk situation, the beneficiary is the one who reaps the possible benefits in this same situation, and the decision-maker is the one who decides whether the risk should be taken (Wolff, 2010, p. 154).

However, according to Wolff (2010), the Standard Model falls short in several aspects. He therefore has come up with a new risk assessment model which consists of five different scenarios in order to classify different cases of risk (p. 154). By categorizing a situation with the help of his model, Wolff shows which situations are inherently riskier than others. This helps to decide whether the risk should be taken and what is at stake. To each scenario, Wolff has assigned the three parties as determined by Hermansson & Hansson (2007) which differ from each other in each scenario. The five cases are the following: Individualism, Paternalism, Maternalism, Externalities, and Adjudication. They can be explained as follows:

1)
First, in the case of Individualism (indicated as AAA), which is the simplest and least problematic scenario, one party fulfills all three roles of cost-payer, beneficiary and decision-maker. For example, someone who gambles in a casino with their own money fits this scenario. The gambler will pay the costs when money is lost but will benefit if money is won. The gambler, therefore, occupies all three roles.

2)
In the second case of Paternalism (indicated as ABB), the decision-maker is different from the beneficiary and the cost-payer, but the beneficiary and the cost-payer are the same party. An example of such a case is a doctor making a decision for a patient. The patient would be both a beneficiary and cost-payer since they will benefit if the medical treatment or surgery goes right but will pay the costs if the surgery goes wrong. The doctor, on the other hand, is merely the decision-maker and will neither benefit nor pay costs.

3)
In the case of Maternalism (indicated as ABA), the decision-maker will be the cost-payer but not the beneficiary. Acts of self-sacrifice serve as an example here such as the poetic self-sacrifice of a mother for the sake of her children or the Biblical self-sacrifice of Jesus Christ. Acts of self-sacrifice are often perceived as selfless or noble since the decision-maker will only pay the costs but not benefit from their own decision.

4)

The fourth scenario of Externalities (indicated as AAB), which is the opposite of the third scenario, is the most risk-prone. The reason why is because the decision-maker will be the beneficiary but not the cost-payer. This means that the costs of the decision will fall on others. Wolff himself mentions the economic crash in 2007 and 2008 as a case of Externalities. Bankers took huge risks with money which was not their own. The ones paying the costs were eventually the people who loaned their money to the banks.

5)

In the last and fifth scenario (indicated as ABC), which Wolff calls Adjudication, the three roles are divided over three parties. An example of such a case is an independent adjudication between two parties. In such a case, the decision-maker will decide for a second party while a third party will pay the costs.

Wolff's table

	Cost-payer	**Beneficiary**	**Decision-maker**
Individualism	A	A	A
Paternalism	A	A	B
Maternalism	A	B	A
Externalities	A	B	B
Adjudication	A	B	C

According to Wolff (2010), the two least risk-prone and, hence, ideal cases in his risk assessment model are Individualism and Paternalism because the costs and benefits are shared among the same party (p. 156). Yet, he mentions that from an ethical standpoint Maternalism is untroubling as well (ibid. p. 156). Wolff, however, does not clarify why he only classifies Individualism and Paternalism as ideal scenarios if Maternalism is ethically untroubling too. This thesis assumes that Wolff's reason for not adding Maternalism is because it is risk averse. The decision-making

party will only pay costs but not receive any benefits when a solution resembles Maternalism. Due to not receiving benefits but solely paying costs, decision-makers contemplating Maternalism are risk averse. However, when the decision-makers choose a Maternalistic solution they can be considered big risk takers: by not receiving anything in return they are sacrificing themselves. Yet, exactly because of the sacrificial nature of Maternalism, Individualism and Paternalism can be considered more ideal scenarios. Hence, I will stick to Wolff's conclusion that Individualism and Paternalism are the least problematic scenarios and will not add Maternalism to the list. I will also stick to his conclusion that the closer a decision matches the fourth scenario Externalities, the more unethical it is.

Wolff's (2010) risk analysis will be used to answer the following two questions: what type of socio-technical solution to counter the climate change caused by meat consumption is the most equitable for the global population? And who should be held responsible or accountable for implementing this solution? I will answer these two questions in two different parts. To start, I will answer the first question by using Wolff's analysis and assessing who the beneficiaries and cost-payers are of five sustainable alternatives to meat. After having established these two parties and what the most ethical solution(s) is/(are) based on those two parties, I will move on to the second part. This part will revolve around the question who should be held responsible for introducing the solution found in the former part. I will answer this question by analyzing and assessing the decision-making party in the Wolff's model.

The reason for choosing to answer the two above-mentioned questions by applying a risk assessment is because I am not interested in an empirical analysis to establish which solution works best. Instead, I want to analyze how equitable the different solutions are for the global population. For this reason, I will apply Wolff's model.

2.

2.1 – The technical versus the social

In this following chapter I will deal with the first question that results from Hardin's (1968) metaphor: what type of solution is needed to combat the environmental impact of meat? In order to answer this question, I will take the dichotomy Hardin poses between technical solutions and social solutions as a starting point.

In the beginning of his essay (1968), Hardin distinguishes between technical and social solutions to solve global problems. He defines a technical solution as one that draws on the techniques in the natural sciences (p. 1243). Social solutions, on the other hand, draw on a change in human values and morality (ibid. p. 1243). Hardin states that technical solutions are almost universally brought forward to any problem under discussion in Western societies: "An implicit and almost universal assumption of discussions published in professional and semi popular scientific journals is that the problem under discussion has a technical solution" (ibid. p. 1243). Hardin, however, is of the belief that the problem(s) of global pollution require(s) a social solution and not a technical one. Technical solutions look for ways to get rid of pollution without getting rid or touching upon the privileges enjoyed by the people who pollute. Hardin states that this is impossible. Instead, social solutions which challenge our current ways of living are needed to solve pollution.

Similar to Hardin's dichotomy, the British philosopher Rob Lawlor (2014) presents technical solutions and social solutions as two opposing approaches to combat climate change. According to Lawlor, these two approaches both represent a different but particular mindset about how to reach sustainable development. First, he mentions that social solutions can be referred to as the radical interpretation (p. 22). This is because social solutions do not focus on finding ways to continue to support our current lifestyles but instead look for a change in our value systems. They try to find new ways of sustainable living. On the other hand, technical solutions are interested in looking for and developing innovative and efficient technical solutions which leave current systems intact but do make them more sustainable. Lawlor refers to this as the conservative interpretation. To sum up, the difference between the two approaches is that the conservative interpretation focuses on developing sustainable technical solutions to maintain current lifestyles whereas the radical interpretation focuses on social changes to guarantee sustainable living.

Historians and philosophers of technology have called problem solving which relies on technology to fight environmental issues by leaving current societal values and structures in place as a technological fix or technofix. The term technofix was first coined in 1966 by Alvin Weinberg in his essay *Can Technology Replace Social Engineering?*. Weinberg asks whether it is possible to find a long-term solution for a social problem by only using technology without people having to change their social attitudes (p. 5). Weinberg believes it is difficult to change

people's bad behavior into good behavior and, hence, technology can be useful. It helps circumventing or reducing the problem at hand (ibid. p. 7). An example of a technofix is seatbe. lt buckling detection which mechanically forces car drivers to fasten their seatbelt (Brey, 2006, p. 358). Instead of leaving the decision to fasten your seatbelt up to car drivers, technology is used to force drivers into the safer habit of wearing a seatbelt.

Critics of technofixes (to which Hardin seems to belong as well) argue differently from Weinberg. Huesemann & Huesemann (2011) and Brey (2006) state that there are always unexpected side-effects and consequences attached to technology and science. Technologies therefore do not offer lasting solutions. To return to the seatbelt example, many car drivers have found illegal ways to remove the detection system so they do not have to wear their seatbelt (Brey, 2006, p. 358). Another example, related to sustainability, is LED lights. Many households nowadays use eco-friendly LED lights instead of the traditional light bulbs. Since LEDs have the reputation to be greener, people keep the light on for longer stretches of time because they assume it is harmless. In this way, LEDs waste more energy than traditional light bulbs because of the former's green image. Both examples show the unforeseen side-effects of technofixes and their failing to steer human behavior into adopting long-term safer or sustainable habits.

However, this dichotomy between the technical and social is criticized by STS scholars (Pritchard, 2012, p. 236). Distinguishing between technical and solution solutions reinforces the idea that the two are separated (ibid. p. 236). Yet, according to STS, the technical and social are interrelated and affect each other. A well-known STS paper which discusses the close relationship between the two is Langdon Winner's (1980) *Do Artifacts Have Politics?*. In his paper, Winner discusses the public official Robert Moses' low bridges over the parkways on Long Island in New York City. According to Winner's interpretation, the bridges were constructed deliberately low so buses could not pass and reach the beaches. Since mostly poor, and therefore predominantly black people, travelled by bus Moses' bridges had racism and social bias built-in. On the one hand, Winner's example illustrates how racism affected the architecture of the bridges. On the other hand, the bridges themselves denied the buses' access to the beaches on Long Island. Exemplified by Winner's paper, the distinction made by Hardin between technical solutions and social solutions would be considered too simplistic by STS scholars. The question whether our current climate problem requires a technical solution or social solution is not asked in STS since one automatically implies the other.

Drawing from Hardin's and Lawlor's dichotomy between the technical and social, it is possible to reply to this criticism by looking at the technical and social as two ends of a continuum. They represent two approaches in reaching and creating sustainable development but not the only two. It is important to stay away from presenting technical and social solutions as a dichotomy or opposing strategies since this is too narrow and one-sided, as STS has pointed out. Furthermore, Lawlor describing technical solutions as conservative and social solutions as radical should be put into perspective as well. Certain technical solutions can be considered radical just as much certain social solutions can be called conservative. I, therefore, acknowledge the interrelatedness between the technical and social as pointed out by STS. I, however, also acknowledge the distinction and difference between what Hardin and Lawlor call technical and social solutions. To do justice to both interpretations, I will focus on where the solutions place their emphasis. When the emphasis lies more on a change of society's norms and values regarding behaviors and/or practices, the solution will be called social. When the emphasis, however, lies more on a technofix, the solution will be called technical. Calling a solution either technical or social does not deny that the technical and social are interrelated but refers to their emphasis. For that reason, I present these strategies as two ends of a continuum.

The next step is to add nuance to these two sustainable development strategies by filling in the continuum. I will add three other solutions to the technical (conservative) and social (radical) solution which are as follows: 1) a middle position, 2) a mildly-technical solution placed in between the technical solution and middle position, and 3) a mildly-social solution placed in between the social solution and middle position. In total, the continuum is made up of five different sustainable development positions and shows how if one moves away from the technical the more and more social the solution gets. The reason for only covering five different positions is because I want to cover most of the spectrum but not all. I want to give a representation of the continuum and assessing these five positions will be representative of it.

Technical solution	Mildly-technical solution	Middle position	Mildly-social solution	Social solution

Having established the five different positions on the continuum which range from technical to social, I will match the five positions to five different solutions to reduce the environmental

impact of meat next. Then, in order to answer the first question of what solution is needed to reduce the environmental impact of meat, I will establish the beneficiaries and cost-payers of these five solutions by using Wolff's (2010) risk model.

2.2 - Five alternative solutions

In the following section, I will describe and explain the five different solutions placed on the continuum. To start, I will give five short descriptions of the solutions. As defined by Lawlor (2014), the technical solution relies on using innovative technology to make current industrial processes and standards of living more sustainable. However, it does leave the processes in place. Second, the mildly-technical solution can be defined as a solution which uses less innovative technology to make processes more sustainable. Similar to the technical solution, it leaves the processes in place. Third, the middle position offers a solution which relies on both technical and social components. It will take components of both the technical and social solution by combining them. Fourth, the mildly-social solution focuses on slightly changing our value system to get rid of polluting processes. Lastly, the social solution looks into ways to change our value system completely to get rid of polluting processes. I will start this section by describing the technical solution and then continue to explain the options along the continuum in order. I will therefore end with the social solution. As a note, I presuppose that the empirical research of the literature discussing the below-mentioned solutions is correct. I take their conclusions that reducing the climate impact of meat in their suggested ways is correct and will benefit the environment.

2.2.1 - The technical solution

To start, the first solution on the continuum is the technical solution. A well-supported and popular technical solution to tackle the environmental impact of meat is replacing meat with meat-substitutes from the two American brands Beyond Meat and Impossible Foods. Beyond Meat was founded by Ethan Brown in 2009 while Impossible Foods was founded by Patrick O'Reilly in 2011. The UN Environment branch publicly supports these two initiatives. It applauds Brown's and O'Reilly's products as breakthrough products which can replace meat and

offer sustainable choices to consumers all over the world ("Tackling", 2018). Their meat substitutes are of such high quality and taste so much like 'real' meat that they have the possibility to replace meat altogether (ibid. "Tackling"). In this way, the environmental issues attached to meat could be tackled. For that reason, the UN Environment granted Beyond Meat and Impossible Foods the highest environmental honor of 2018: the Champions of the Earth awards ("Plant-based meat", 2018).

What sets Beyond Meat and Impossible Foods apart is their unique formula. Different from lab-grown meat, plant-based meat does not use stem cells to create the meat but derives its sources solely from plant sources. However, unlike regular meat substitutes which are made of soybeans (Schösler et al., 2012, p. 40), Beyond Meat and Impossible Foods mimic the structure of meat by stripping down the core components of meat and replacing them with plant(-based) sources (ibid. "Plant-based meat"). Both companies are therefore vegan and gluten free. As explained by Rabang (2019), meat is made up of four key components: amino acids, lipids, minerals and water ("Impossible Foods"). By extracting those same components from plants, meat can be created without having to use animals. The main ingredient in Beyond Meat's products is pea protein powder whereas Impossible Foods uses heme, which is a protein derived from soy plant roots (Reiley, 2019, "From lab to table").

The missions of the two plant-based meat initiatives overlap: they want to combat climate change with their products. Impossible Foods writes on their website that by switching to plant-based meat it is possible "to eat all the meat we want, for as long as we want" and simultaneously "save the best planet in the known universe" ("We're On a Mission", n.d.). Beyond Meat's website reads that choosing their products over meat is a "savory solution" which helps to solve four of the biggest environmental issues linked to livestock production: human health, climate change, natural resource constraints and animal welfare ("Our Mission", n.d.). Brown's and O'Reilly's mission to leave current consumption patterns intact by simply replacing meat with a more sustainable meat like product matches Hardin's definition of a technical solution (e.g. leaving current practices in place by making them more sustainable). Plant-based meat is therefore a good example of a technical solution to combat climate change.

2.2.2 - The mildly-technical solution

The second position on the continuum is the mildly-technical approach. Similar to the technical position, this position uses technology as a solution to fight climate change but not to the extent as the former. Hence, a solution which fits the mildly-technical position is less advanced[3] types of meat substitutes made with soybeans, the most commonly used ingredient to create meat substitutes (Schösler et al., 2012, p. 40). Since there are various companies and brands which make plant-based meat with soy, one company will be picked to focus on for the mildly-technical solution. I decided to focus on the Vegetarian Butcher which is referred to as one of the most promising plant-based meat producers by Ingenbleek & Yuan (2019). The reason behind choosing soy-based meat substitutes as a mildly-technical solution is because they resemble meat less closely than the above-mentioned companies Beyond Meat and Impossible Foods. A global shift to replacing meat with soy-based meat substitutes, such as the ones by the Vegetarian Butcher, will therefore require more social adapting since the products are further removed from the taste and texture of animal meat than the products by Beyond Meat and Impossible Foods.

The Dutch company de Vegetarische Slager, in English the Vegetarian Butcher, was founded in the year 2006 by Dutch farmer Jaap Korteweg. His products are made with soy, water and wheat gluten, and range from sausages to chicken nuggets to smoked bacon. Besides meat, the Vegetarian Butcher also makes fish substitutes such as tuna and shrimp. Even though an originally Dutch company, the Vegetarian Butcher can be purchased internationally and is currently active in 17 different countries - 16 different European nations and Japan. Korteweg's goal is to change the structure of the meat industry with his products and he actively focuses on expanding its company to foreign markets (Ingenbleek & Yuan, 2019, p. 303). Similar to Beyond Meat and Impossible Foods, the Vegetarian Butcher hopes to substitute meat with its own meat substitutes. Because meat substitutes made of soybeans are less technically advanced than the products by Beyond Meat and Impossible Food, the Vegetarian Butcher is a good example of a mildly-technical solution.

2.2.3 - The socio-technical solution

The socio-technical solution is next on the continuum. As the central position on the continuum, it balances out the two ends. This means it combines elements of both a social and technical

[3] Less advanced in comparison to Beyond Meat and Impossible Foods

approach. A solution which fits the socio-technical description is the combination of meat reduction and the consumption of meat substitutes by Beyond Meat, Impossible Foods and the Vegetarian Butcher to compensate for the meat reduction. On the one hand, the social aspect of this solution focuses on meat reduction since it breaks with the current food practices in place. It forces people to focus on different consumption patterns and become aware of the amount of meat they eat.

According to Apostolidis & McLeay (2016), Spiller & Nitzko (2015), Fresco (2012) and Ilea (2008), reduced meat consumption releases pressure on the environment caused by the livestock sector: "Less meat would be produced, and thus there would be fewer greenhouse gas emissions, less harm to local communities, and less damage to our water supplies. Fewer intensive livestock farms would be built, locally or internationally" (Ilea, 2008, p. 162). To adopt a sustainable intake of meat, several authors (Apostolidis & McLeay, 2016; Fresco, 2012) suggest people to consume no more than 70 grams of meat per day or a total of 490 grams of meat (seven times 70 grams) per week. Considering that UK men currently consume 226 grams of meat per day and UK women consume 163 grams per day (Apostolidis & McLeay, 2016, p. 2), 70 grams of meat per day will only be a third of the current intake of UK men[4].

On the other hand, the technical aspect of this third solution focuses on meat substitutes. The products by Beyond Meat, Impossible Foods and the Vegetarian Butcher give consumers the flexibility to consume plant-based meat next to the recommended daily 70 grams of meat. Since having to cut down on meat to 70 grams can be considered as a large structural change of current diet lifestyles (especially in the Global North), the meat substitutes offer a way to keep these lifestyles in place with the help of technology. In short, the socio-technical solution combines the social aspect of reducing meat consumption with the technical aspect of using meat substitutes to compensate for the meat reduction to release pressure on the environment.

2.2.4 - The mildly-social solution

The fourth position on the continuum is the mildly-social solution which focuses on a mild change of our value system. A type of solution which fits the mildly-social position is to cut

[4] Although I follow the authors' example by using the term reduction, I am aware that for developing countries 70 grams of meat per day might not be a reduction of their meat consumption but instead an increase. I will, however, continue using the term reduction.

down on meat which, as aforementioned, suffices to reduce pressure on the environment (Apostolidis & McLeay, 2016; Spiller & Nitzko, 2015; Fresco, 2012; Ilea, 2008). Meat reduction fits the mildly-social solution since, as established above, it breaks the current food practices by forcing people to revise the way they eat. Important to note is that this solution does not use meat substitutes to replace meat.

However, Spiller & Nitzko (2015) and Ilea (2008) are of the opinion that the industrialized countries should carry the sole responsibility in cutting back on meat. Ilea (2008) argues that it is unreasonable to demand the starving and/or poor to reduce their consumption (p. 162). Instead, it is the industrialized countries, and especially North America and Western Europe, which need to cut down significantly on meat (ibid. p. 162). Spiller & Nitzko (2015) add that if consumers in industrialized countries or the growing middle class in developing countries cut down on meat they will still be provided with the necessary nutrients, unlike those in developing countries (p. 197). Western diets are namely characterized by a high intake of meat and animal products which far exceed the recommended daily amount of such products (Apostolidis & McLeay, 2016, p. 2).

As already mentioned in the section of the mildly-technical solution, a sustainable consumption of meat consists of around 70 grams of meat per day or a total of 490 grams of meat per week (Apostolidis & McLeay, 2016; Fresco, 2012). Unlike the socio-technical solution, the reduced meat is not compensated with the help of meat substitutes. This type of diet uses plant-based protein sources such as beans and pulses. It therefore fits the description of a mildly-social solution well since it slightly breaks with current food practices by forcing people to reduce their meat consumption.

2.2.5 - The social solution

Last on the continuum is the social solution which, in contrast to the technical solution, emphasizes a change in moral human behavior to make meat consumption more sustainable. Vegetarianism is an example of a social solution since it breaks with the processes that make meat consumption possible. Unlike the technical solution, it requires effort to change completely to a vegetarian diet since people need to learn to eat differently. The vegetarian solution I propose here is one consisting of replacing meat with plant-based foods but not with any meat

substitutes. I therefore distinguish between vegetarianism where meat is replaced with substitutes (see 2.2.1 and 2.2.2) and vegetarianism that does not substitute meat in any way.

Schösler et al. (2012) stress the difference between vegetarian meals which substitute meat with mock meat and vegetarian meals that are not necessarily consumed to substitute meat (p. 45). This distinction is important to clarify since the technical solution, the mildly-technical solution and the social solution are technically all vegetarian. However, their approach to vegetarianism – replacing meat with meat substitutes versus replacing meat with plant-based proteins – differs. Also, as Brey (2006) points out, there are always unforeseen consequences attached to technofixes such as meat substitutes. The social solution avoids these types of complications by relying solely on plant-based proteins.

Moral vegetarianism has globally become a more and more popular way to protest the consumption of meat (Linzey & Linzey, 2019). Especially in the West, which does not know long-standing traditions of vegetarianism such as China or India, there is a visible growth in vegetarians who quit eating meat out of moral concerns. Linzey & Linzey refer to this type of ethical vegetarianism as a moral protest. Thornes (2016) and Salonen & Helne (2012) all see vegetarianism as a rational choice to promote sustainable living and development. The latter authors (2012) state that if the world were to go vegetarian, the environmental issues linked to the livestock- and meat industry such as emissions and land use could be solved (ibid. p. 10). This argument is supported by Thornes (2016). According to him, human beings have the responsibility to take immediate action in combating climate change. Since livestock farming is such a large contributor to climate change, a change to a vegetarian diet is a direct step to concretize this action.

Bregman (2017), however, adds that the only morally acceptable way of being a vegetarian is when adopting a full-time vegetarian diet. His argument therefore goes against Ilea's (2008) about solely *reducing* meat consumption in order to release pressure on the environment. Bregman is of the opinion that since it is clear how harmful meat is for the environment, we should abstain from it completely. From a moral standpoint, it is senseless to only consume less meat. Hence, the social solution on the continuum is a full-time vegetarian diet that should be globally adopted.

2.2.6 – Summary

In summary, the continuum consists of five different approaches to make meat consumption more sustainable. All five perspectives combine technical and social components to a different degree. To sum up, the five approaches are as follows: 1) swapping meat completely for Beyond Meat and Impossible Foods meat substitutes, 2) swapping meat completely for soy-based meat substitutes by the Vegetarian Butcher, 3) a diet consisting of reduced meat intake and Beyond Meat and Impossible Foods meat substitutes, 4) meat reduction, and 5) adopting a vegetarian diet. Having laid down these five positions on the continuum, the next step is to identify the stakeholders of the five solutions. Only after having established the stakeholders, Wolff's table can be populated.

3.

3.1 - Stakeholder list

This third chapter will continue with the question posed in the beginning of chapter 2: what type of solution is needed to combat the environmental impact of meat? I laid out five different alternatives to current meat consumption practices in chapter 2. In chapter 3, I will answer the question posed in chapter 2 by determining the cost-payers and beneficiaries of each of the five solutions by using Wolff's (2010) risk analysis. The third party in Wolff's table, the decision-maker, I will determine in chapter 4 when the question of responsibility comes up.

First, in order to populate Wolff's table, the stakeholders need to be determined. For this part of the risk analysis, it is relevant to list the stakeholders that 1) benefit from and 2) are negatively affected by changing the impact of the production and consumption of meat on the environment. Even though the five solutions described in chapter 2 all differ from each other, what they have in common is their attempt to decrease the negative effects of meat on the climate. The stakeholder analysis will for that reason focus on groups that are involved in or affected by finding sustainable solutions for meat.

To start, I identify two human stakeholders, which are 1) carnivores and 2) people who work in the food sector. However, the carnivores are divided in sub-groups since there are large global differences in the amount of meat consumed. Sustainable changes in the meat industry will affect nations, and entire parts of the world, differently. Hence, to incorporate those differences, I split up the stakeholder group carnivores into the following two stakeholders, as

done by Spiller & Nitzko (2015) and Ilea (2008): the developed nations and the developing nations. Since none of the authors specify which of the nations they consider developed or developing, I need to do so myself. Hence, I will refer to the developed nations as the Global North, including the BRIC countries (Brasil, Russia, India and China), and the developing nations as the Global South. For the stakeholder group of developed nations, I will focus specifically on men. The reason for doing so is because particularly Western men, in comparison to Western women, have a strong cultural and social relationship to meat (Rothgerber, 2012).

Second, the other main stakeholder group is people who work in the food sector. I will divide this stakeholder group into two different groups: people who work in the meat industry (referred to by Nuwer (2016) as carnivorous careers) and people who work in the meat substitute industry. I will divide the meat substitute industry into three sub-groups, those being the three meat substitute industries mentioned in chapter 2: Beyond Meat, Impossible Foods and the Vegetarian Butcher. Due to the limit of the scope, I will not divide the meat industry nor the meat substitute industry into other sub-groups. I, however, recognize the size of both industries and their complex socio-technical networks.

Next, I focus on a non-human stakeholder which Jacobs (1997) describes as the voiceless: the environment. The environment is often overlooked for two reasons. First, exactly because it is voiceless, it is frequently overlooked or completely forgotten (ibid. p. 25). Second, it is common in stakeholding to only include people. However, as Jacobs explains, the environment affects and contributes to economic performance in multiple ways such as supplying the economy with raw materials or collecting the waste materials of the economy (ibid. p. 26). It is therefore valid to include the environment in this stakeholder analysis since sustainable solutions for meat will affect the environment. On top of that, improving the health of the environment is the main reason for analyzing these five alternatives to meat in the first place. Consequently, the environment is an important stakeholder.

Furthermore, Jacobs (1997) states that future generations can be included in stakeholding as well since he perceives them as an extension of the environment. The health of the environment is of interest for future generations and, hence, non-contemporaries are indirectly part of the climate debate and the current economy. This implies that whenever the environment benefits, future generations do; when the environment is a cost-payer, so are the future generations. I extend Jacob's stakeholder of future generations by adding younger current

generations. Future generations therefore do not only include non-contemporaries, but also the young contemporaries who benefit from climate reform and will live long enough to directly benefit from it. In a way it could be argued that all contemporaries, or current generations, benefit from climate action. However, if the world would stop eating meat or decrease its meat consumption drastically by tomorrow, the environmental effects would not be immediately noticeable (Nuwer, 2016). As Nuwer points out, the environmental restoration and conversion which result from the world quitting meat take time, planning and investment. Hence, I do not treat current generations as immediate or automatic beneficiaries of environmental alternatives to meat since these benefits take time to manifest. Lastly, for the purpose of this thesis, the environment is a stakeholder for which mitigation of climate change and biodiversity both matter. I do no treat them as separate stakeholders but will emphasize when the five alternatives benefit or disadvantage climate change and/or biodiversity. Even though biodiversity is affected by climate change as well and the two are in certain ways interrelated, I will treat them separately in this stakeholder analysis. This leaves us with the following stakeholder list:

1. *Human stakeholders*Carnivores
    a. Developed world
    b. Developing world
2. Food sector
    a. Meat industry
    b. Meat substitute industry

Non-human stakeholder(s)

1. Environment (future generations implied)
    a. Climate change
    b. Biodiversity

Lastly, there are two points that require short elaboration prior to the stakeholder analysis. First, even though non-contemporaries will in the future be human contemporaries, I frame them as non-human since they do not exist yet. Second, I will not treat animals as a separate stakeholder group even though they are part of the environment and the meat industry. Throughout this thesis I leave out animal well-being and, hence, I will not focus on animals in the stakeholder analysis either.

3.2 - The beneficiaries and cost-payers

Next, after having established the stakeholders, I will populate Wolff's table. However, before starting, I need to make four notes. First, not all literature that discusses and offers sustainable solutions to combating the climate impact of meat consumption, clearly indicates who exactly should change their diet. It remains unclear whether the entire current global population of 7.7 billion people should adapt their diet or only certain socio-economic groups or nations need to. Besides a few authors such Apostolidis & McLeay (2016) and Ilea (2008), no other authors specify this. For that reason, I have decided to assess the global impact of all five solutions. Since meat is a globally consumed product it is fair to assess the impact on a global scale since it will affect almost everyone.

Second, there are two universal beneficiaries in all five solutions: 1) the environment and 2) future generations. Since all five solutions have the best interest of the environment at heart by wanting to fight climate change[5], the environment itself (with an emphasis on climate change) as well as future generations automatically benefit. Therefore, I will not mention the environment or future generations explicitly as beneficiaries in any of the five upcoming analyses since they are already implied. I will only mention them if a solution benefits them more than average.

Third, I will practice each solution such that the input on climate change of each is equivalent. The point is not to empirically determine which solution is most effective, but which is most fair. This can only be done when it is assumed that the environmental impact of the five solutions is equivalent.

Fourth, the five solutions will share certain cost-payers and beneficiaries for similar reasons. In order to not get too repetitive, the reasons will not be repeated if they have been mentioned before. Instead, the text will refer to previous explanations. This means that the explanations for each solution will gradually get shorter.

3.2.1 - Meat substitutes: Beyond Meat and Impossible Foods

[5] In Chapter 1, I discuss the details of how meat consumption affects the environment. These will not be repeated again due to the scope of this thesis. However, the five solutions all share the goal of getting rid of these environmental issues mentioned in chapter 1.

Beneficiaries

To start, the two parties which benefit from replacing meat completely with Beyond Meat and Impossible Foods meat substitutes are the two meat substitute companies themselves and the developed world (especially the US and Europe).

First, the reason why the developed world is a beneficiary is because it has the easiest (and at this point the only) access to Beyond Meat and Impossible Foods products. In 2016, Beyond Meat was introduced to 51 different Whole Foods Markets spread over the US (Shaban & Heath, 2019, "Beyond Meat"). Since then, the popularity of the company has only risen in the US. In the first week of May 2019, Beyond Meat had the strongest stock market debut of any company of 2019 (Reiley, 2019, "From lab to table"). Its standing out on the stock market has only helped the company's growth and in 2020 Beyond Meat will start its production in Europe. This will give Europeans (greater) access to Beyond Meat products as well. Impossible Foods, on the other hand, has closed a deal with the fast food chain Burger King. Burger King will put an Impossible Whopper (made with the company's vegan patties) on the menu in 7,200 of its US locations. This means that for current US citizens and for Europeans from 2020 onwards, the products are and will be widely available. On top of that, their availability seems to only increase. High availability is crucial if a dietary shift from meat to Beyond Meat and Impossible Meat products needs to take place.

Next to the availability and accessibility of the products, replacing meat with meat substitutes will be beneficial for developed nations since it requires little to no changes in the way they structure their meals. Especially in Western European countries, such as the Netherlands, it is common for meals to have a tripartite structure (Schösler et al., 2012, p. 40). Meals consist of meat, one or two vegetables, and a staple with meat making up the most important component of a meal (ibid. p. 40). Taking into consideration that the developed world currently has the highest meat consumption, meat substitutes offer an easy solution since they keep the tripartite structure in place. Beyond Meat and Impossible Foods therefore play a role in the cultural continuity of dietary habits in the Western world. In China and India, for example, meals are composed differently and meat substitutes might therefore play a different role in their cuisine. Yet, in the Western world, the quality of Beyond Meat and Impossible Foods products

smoothen the transition from meat to meat substitutes. Furthermore, the fact they mimic the structure of meat closer than other meat substitutes makes the transition even smoother since they will be as close to meat as it (currently) gets.

Second, a shift to replacing meat with Beyond Meat and Impossible Foods is beneficial for the two companies since it helps their industry grow. A growth of their industry creates more jobs and benefits the, at least still for now, US and European economy. As above-mentioned, the collaboration between Impossible Foods and Burger King as well as the European production of Beyond Meat are two concrete examples which show the economic effects of the rise in popularity of their products. A global shift to their products should continue this type of economic growth. Further, it also helps attracting new customers which benefits the two companies greatly. Failing to attract new customers is one of Beyond Meat's biggest business risks and, hence, important to address according to Shaban & Health (2019, "Beyond Meat").

Cost-payers

In contrast, the five parties which pay the costs of replacing meat with meat substitutes are the environment, the developed world (especially men in the developed world), the developing world, the meat industry, and the meat substitute industry.

To start, even though the environment benefits from a dietary shift to meat substitutes[6], in other ways it has to pay costs. As Galer (2017) and Nuwer (2016) explain, certain environments benefit from the grazing of animals. If those animals are no longer kept due to the world switching to Beyond Meat and Impossible Foods, these environments and their biodiversity suffer. Galer (2017) and Nuwer (2016) mention that the Scottish Highlands are a type of environment that thrive because of animal grazing. Sheep have been kept there for centuries and without them the biodiversity is greatly affected. Lush (2009) adds that livestock production can benefit certain land types which are useless for human food production but suitable for livestock (p. 114). Cows, for example, turn grasses and forages into meat and milk. Furthermore, cattle, hogs, and chickens do not need to be raised on high-quality, productive land unlike fruits and vegetables (ibid. p. 114). When speaking of land efficiency, the production of fruits and

[6] As the environment does in all five proposed solutions

vegetables is more inefficient than livestock production since the latter can be raised on relatively unproductive lands (ibid. p. 114).

Next, similar to biodiversity being both a beneficiary and a cost-payer in this solution, the developed world is also both. The developed world pays the cost of meat substitutes being perceived as less satisfying and tasty than animal meat. Even though the meat substitutes by Beyond Meat and Impossible Foods are considered to be the most realistic meat substitutes available at the moment (the latter brand even found a way to make their burgers "bleed"), they are still not considered the exact same product as meat. Globally, there exist strong sociocultural and socioeconomic ties to meat consumption (Stoll-Kleemann & Schmidt, 2016; Fresco, 2012). These ties should not be underestimated since they affect the way meat substitutes could be reviewed and accepted. In fact, Hoek et al. (2011) point out that the less meat substitutes people consume, the more they require meat substitutes to be similar to real meat.

For example, Capritto (2019) mentions how in a taste test involving an Impossible Burger, a Beyond Burger and a beef burger, tasters could distinguish the animal meat from the plant-based meat. For some, the texture and taste of the plant-based burgers did not live up to the quality of the beef burger. This ability to distinguish between plant-based meat and animal meat can cause problems for the chances of success for Beyond Meat and Impossible Foods. Especially Western men place a lot of value on eating meat since meat is historically and traditionally linked to masculinity. The notion of "real men eat meat" is widespread and strongly prevalent in Western societies (Rothgerber, 2012, p. 364). Red meat in particular is strongly linked to masculinity. However, red meat is one of the most difficult types of meat to imitate, even for brands such as Beyond Meat and Impossible Foods. Having (red) meat replaced with meat substitutes could be perceived as a huge loss of a precious cultural tradition and identity.

Furthermore, the prices of Beyond Meat and Impossible Foods meat substitutes are higher than regular meat products. The current American retail price of two Beyond Meat patties is $5,99. In the Dutch supermarket chain Albert Heijn, two Beyond Meat burger patties are sold for €6. The price for which Beyond Burgers are sold lies thus 71% higher than that of organic, grass-fed beef. The main reason for the high price of meat substitutes is the lengthy process to create the substitutes (Reijn, 2019, "Vleesvervangers"). Plant-based products are usually cheap but shaping them into substitutes is not (ibid. "Vleesvervangers"). Further, an argument often brought forward against these type of price comparisons is that the price of meat lies generally

too low and is, in fact, not a fair price. However, consumers are used to paying a certain price for meat. If a new product with the goal of replacing meat costs more than twice as much as the old product this creates an issue. The price of meat substitutes is currently so high that also in the developed world only the rich can afford them on a regular basis.

Yet, besides the developed world, the developing world pays the costs of shifting to a meat substitute diet. The main issue for the developing world is limited to no access to Beyond Meat and Impossible Foods products. As above-mentioned, Beyond Meat is only about to expand its production to Europe in 2020. Considering that the company was founded in 2009, it took more than 11 years to go overseas. The question therefore comes up when and if Beyond Meat and Impossible Foods will bring their production to the developing world. Taking into account the severity of the current climate crisis, having to wait another decade before Beyond Meat and Impossible Foods will expand to the non-Western world and set up a global production might take too long to neutralize the climate impact of meat. Besides the relatively slow pace in which these companies are expanding, not having access to any of these meat substitutes can become a problem for the non-Western world. Ilea (2008) points out that demanding malnourished people to refrain from eating certain foods such as meat can even be fatal if these foods are not compensated for. Last, the high prices of Beyond Meat and Impossible Foods products are problematic for the developing world.

Even though I earlier established that Beyond Meat and Impossible Foods economically benefit from replacing meat with their meat substitutes, they suffer in certain other aspects. To start, Beyond Meat dealt with product shortages in 2017 and 2018. The rising popularity of their products had led to the company not being able to keep up with the demand (Taylor, 2019, "A looming"). However, Beyond Meat founder Ian Brown has claimed that for the next two years the company is able to handle a growing demand (idib. "A looming"). Shaban & Heath (2019) put the reliance of Beyond Meat on pea protein to make their products into question though. They call it a risk factor since Beyond Meat is dependent on a limited amount of raw material suppliers: if anything happens to those suppliers, Beyond Meat cannot produce. However, whereas Beyond Meat is doing better at the moment, Impossible Foods is struggling (Taylor, 2019, "A looming"). In the past year, Impossible Foods has been dealing with shortages. Right after fast food chain Burger King introduced its new Impossible Whopper, Impossible Foods announced their struggles to meet demands. Considering the facts that 1) both companies are still

only US based and 2) Beyond Meat has only recently made plans to start their production in Europe in 2020, the question arises whether these types of shortages and dependencies can be avoided or circumvented in the future. If both US companies still struggle meeting the US demand it seems challenging to meet a global demand.

Moreover, the meat industry is a cost-payer since it becomes completely superfluous if meat disappears. Consequently, jobs in the meat industry disappear as well. Nuwer (2016) states that if these former meat industry employees do not receive help transitioning to other industries, jobs or careers, significant issues with unemployment and social disruption arise. This goes especially for jobs being lost in rural communities that are closely connected to the meat industry. Nuwer suggests former employees shift to agriculture or help out with jobs such as reforestation and the production of bioenergy from crop byproducts which are currently fed to livestock. However, Nuwer's advice is given in a case where meat gets replaced with a vegetarian diet. When meat is replaced with meat substitutes it might be possible for former livestock employees to switch to jobs into the meat substitute industries though. Furthermore, it should be noted that the losses the meat industry supposedly will suffer are not considered as extreme by every author. Ilea (2008) points out that the intensive meat industry does not create many jobs at all since most processes are industrialized on factory farms and do not require many people to keep them running (p. 164). In fact, factory farms drastically reduced jobs when they were introduced (ibid. p.164). According to this viewpoint, the disappearance of the meat industry should not cause great socio-economic disruption.

Lastly, in the case the global population switches to Beyond Meat and Impossible Foods, the Vegetarian Butcher becomes obsolete and, hence, a cost-payer. However, although the company and its employees pay the costs of such a change, considering that the Vegetarian Butcher is a small-run company that does not create many jobs the socioeconomic disruption is likely to be relatively small.

3.2.2 - Meat substitutes: the Vegetarian Butcher

Beneficiaries

Second, similar to a global shift to Beyond Meat and Impossible Foods meat substitutes, a global shift to soy-based meat substitutes by the Vegetarian Butcher benefits the Vegetarian Butcher and the developed world.

The developed world, and especially Europe, is a beneficiary because it has the easiest access to products by the Vegetarian Butcher. Currently, the Vegetarian Butcher sells its products in 16 European countries. It has plans to expand to China and India but these have not been concretized yet. Also, similar to a global shift to Beyond Meat and Impossible Foods products, replacing meat with Vegetarian Butcher meat substitutes keeps the current tripartite structure in place. It guarantees the continuation of the meat culture as it is known in the developed world.

Furthermore, the Vegetarian Butcher itself benefits from a shift to their products. A growth of their company and an increase in their market share lead to more economic growth and wealth. Whereas Beyond Meat and Impossible Foods might run into problems when the demand for their products will expand due to resource scarcity and resource insecurity, the Vegetarian Butcher seems to benefit from a larger demand. The reason for that is as follows. The Vegetarian Butcher products are made with a Couette device which can produce large pieces of meat substitutes with strong fiber structures. Despite the fact that the Couette device gives the Vegetarian Butcher the opportunity to produce a large amount for relatively low costs, the prices of the Vegetarian Butcher products are currently still high (Ingenbleek & Yuan, 2019, p. 301). Yet, a growth in their market and a growth of their customer base can lower the prices which is beneficial for the company as well as the customers (ibid. p. 301).

Cost-payers

Then, the cost-payers for a global shift to soy-based meat substitutes by the Vegetarian Butcher are the environment, the developed world (especially men in the developed world), the developing world, the meat industry, and Beyond Meat and Impossible Foods. The environment, the developed world, and the developing world have to pay the costs in similar ways as they do in a shift to Beyond Meat and Impossible Foods.

First, as mentioned in 3.2.1, certain environments which benefit from the grazing of animals suffer without livestock production (Galer, 2017; Nuwer, 2016; Lush, 2009). Both the subsequent loss of biodiversity as well as the more demanding production required for fruits and vegetables can put a strain on the environment.

Second, the strong ties the developed world, and especially men in the developed world, has with meat are difficult to break. The less people are used to eating meat substitutes, the more realistically the latter need to mimic animal meat (Hoek et al., 2011, p. 663). Considering that Beyond Meat and Impossible Foods did not pass the tasting mentioned by Capritto (2019), brands such as the Vegetarian Butcher might struggle. Soy-based meat substitutes are generally considered less advanced as the products by the two former brands which might make it difficult for the Vegetarian Butcher to win the developed world over to switch to their substitutes.

Further, similar to the high prices of Beyond Meat and Impossible Foods, the Vegetarian Butcher is notorious for its high prices. A kilo of chicken nuggets at Dutch supermarket chain Albert Heijn costs €3,90 whereas a kilo of Vegetarian Butcher nuggets cost € 14,31 in comparison (Reijn, 2019, "Vleesvervangers"). The price of Vegetarian Butcher nuggets lies 3.6 times higher than chicken nuggets (ibid. "Vleesvervangers"). Similar to the explanation in 3.2.1, the products used to create substitutes are often cheap, but turning them into an actual meat substitute is not.

Third, also the Vegetarian Butcher is only accessible to the developed world at this point in time. Even though the company has plans to expand their market to countries such as China and India (Ingenbleek & Yuan, 2019, p. 305), these plans have not been set up yet. The Vegetarian Butcher states that before they can enter these markets, they need to gain more experience about their markets and what type of products they are interested in (ibid. p. 305).

Next, even though the meat industry is a cost-payer in this alternative as well, a global shift to Vegetarian Butcher products might be more harmful for the meat industry than a shift to Beyond Meat and Impossible Foods meat substitutes. The Vegetarian Butcher does not create many jobs to which former meat industry employees can switch. Currently, only 40 full-time employees work for the Vegetarian Butcher and the last 20 employees added to the team solely focus on operational management capabilities (Ingenbleek & Yuan, 2019, p. 303). Former meat industry employees might therefore struggle finding new jobs.

Last, when meat substitutes by the Vegetarian Butcher are adopted globally, Beyond Meat and Impossible Foods cease to exist. They are therefore cost-payers in this solution. Although a shift to the Vegetarian Butcher has consequences for the two companies and its employees, widespread socioeconomic disruption seems unlikely because of the sizes of the companies; both companies are still only US based.

3.2.3 - Reductitution

Beneficiaries

The beneficiaries of the third solution on the continuum which combines meat reduction with meat substitutes by Beyond Meat, Impossible Foods, and the Vegetarian Butcher – and which can be referred to as Reductitution (a combination of the words substitution and reduction) – are the following four: the environment, the developed world, the meat industry (especially the farmers), and the meat substitute industry.

First, even though I established at the beginning of chapter 3 that the environment is a beneficiary in all five solutions, it should be stressed that the environment in this particular solution benefits from an increase in land efficiency as well. Lusk (2009) points out that reducing meat consumption but not completely eliminating it has beneficial effects on the environment since less land is required which benefits land efficiency (p. 114). In addition, as pointed out by Galer (2017) and Nuwer (2016), certain environments such as the Scottish Highlands require livestock to flourish. If meat only gets reduced but not eliminated, these environments and their biodiversity might remain intact.

Second, the developed world is a beneficiary since this solution leaves the current tripartite meal structure completely intact. Even though meat intake is reduced to a third of the current intake[7] this loss will be compensated with the help of meat substitutes by Beyond Meat, Impossible Foods and the Vegetarian Butcher. Third, Ilea (2008) points out how meat reduction benefits the meat industry. A reduced demand for meat lessens the production and might even get rid of farm factories: since less meat is produced smaller-scale farms suffice to meet the

[7] A third of the meat intake of UK men (Apostolidis & McLeay, 2016, p. 2)

demand (idib. p. 157). This has beneficial consequences for especially the farm factory workers. The latter tend to suffer from devastating, long-term health consequences due to the conditions in current large-scale, industrialized farms (idib. p. 158). Smaller-scale farms can create an environmentally friendly environment for the animals which requires less use of antibiotics, ammonia and pesticides. As a result, the farm employees benefit from these healthier working conditions. Simultaneously, it guarantees better quality of meat which in its turn benefits the customers' health.

Fourth, Beyond Meat, Impossible Foods and the Vegetarian Butcher are beneficiaries since a global shift to a mixed diet of meat and meat substitutes increases the demand of their products. This, as mentioned in both 3.2.1 and 3.2.2, improves their businesses in economic terms.

Cost-payers

The cost-payers of this solution, on the other hand, are the developed world and the developing world.

To start, even though meat is included in Reductitution, it is only a third of the current intake. This can be considered as a great loss of the strong Western sociocultural and socioeconomic ties attached to meat. Even though the 70 grams per day are balanced out with meat substitutes, the latter are not perceived as satisfying as meat (Capritto, 2019). Further, 70 grams is a small amount in comparison to what we are used to. Fresco (2012) mentions that two slices of ham on a sandwich usually already count for 50 grams of meat (p. 152). In addition, the fact that meat substitutes cost roughly 3.6 times more than meat (Reijn, 2019, "Vleesvervangers"), the developed world is a cost-payer in Reductitution. Even though the developed world does not know poverty in the way the developing world does, if meat substitutes will continue to stay this expensive only richer households in the developed world will have access to these types of products.

Next, the developing world pays the costs in similar ways as discussed in 3.2.1 and 3.2.2: first, it is dangerous to demand malnourished or starving people to cut down on meat (Ilea, 2008). Second, the accessibility to meat substitutes by Beyond Meat, Impossible Foods and the

Vegetarian Butcher might either be difficult or not even possible. The developing world is therefore exposed to two strong risks.

3.2.4 - Flexitarianism

Beneficiaries

The beneficiaries of the fourth solution, Flexitarianism, are the environment, developing world and the meat industry (specifically the employees).

To start, Flexitarianism benefits the environment since the reduction of meat has a positive effect on biodiversity and land productivity. It benefits the environment better than the elimination of meat and the livestock sector all together (Galer, 2017; Nuwer, 2016; Lusk, 2009, p. 114).

Second, the developing world benefits from Flexitarianism since it is completely excluded from abstaining from meat. As mentioned in 3.2.3, Ilea (2008) explains that forcing developing countries to not eat meat at all or reduce their meat consumption can be fatal. The fact that the developing world is not forced to make changes in its diet with Flexitarianism makes them a beneficiary.

Third, similar to Reductitution, Flexitarianism will benefit the meat industry. As explained in 3.2.3, reduced meat intake leads to small-scale farms with higher health conditions which consequently benefit the farm employees.

Cost-payers

The cost-payers of Flexitarianism are the developed world and the meat substitute industry.

As above-mentioned, the developed world pays the costs by having to radically decrease their meat intake. On top of that, since Flexitarianism does not balance meat reduction out with meat substitutes, it might be considered as a more radical solution than Reductitution. Flexitarianism forces the developed world to learn how to prepare meals that might not have the typical tripartite structure of meat, vegetables, and staple common in its culture. It forces the developed world to create new meal structures that may combine Western-European style meals merged

with different cuisines which have stronger traditions in vegetarian cooking. The Indian cuisine is a good example of the latter and is rich in plant-based proteins such as lentils and pulses (which are known to be cheap as well). Learning how to prepare and adopt such a cuisine takes an active change and effort.

Second, the meat substitute industry is a cost-payer since its products become superfluous in a Flexitarian diet. This has large consequences for the three meat substitute companies Beyond Meat, Impossible Foods, and the Vegetarian Butcher. The companies cease to exist if there is no market for their products. However, as mentioned in 3.2.1 and 3.2.2, the socioeconomic disruption is most likely relatively small.

3.2.5 - Vegetarianism

Beneficiaries

Lastly, Vegetarianism does not have beneficiaries besides the environment and future generations according to the current means of consideration.

Cost-payers

The cost-payers, however, are the following five stakeholders: the environment, the developed world, the developing world, the meat industry and the meat substitute industry.

To start, biodiversity suffers the same consequences as it does in the first and second solution: certain environments benefit from the grazing of animals. Quitting meat completely (whether it is done by a global shift to meat substitutes or by going vegetarian) will get rid of any cattle and harm environments which benefit from the animals' grazing and manure.

Second, removing meat from all diets and not balancing this out with the help of meat substitutes can be perceived as disrupting the sociocultural and socioeconomic ties linked to meat. The developed world would therefore pay a high price for this solution. Fresco (2012) argues that meat has played a vital role for thousands of years: banning it would not do justice to its role and importance (p. 152). Simultaneously, Vegetarianism forces the developed world to build a different type of meal structure and completely abandon the tripartite meal structure. As

mentioned in the previous analysis for Flexitarianism in 3.2.4, certain cuisines have long-standing vegetarian traditions and are suitable to adopt, such as the Indian cuisine. However, this takes effort and adaptation.

Third, the developing world is a cost-payer since, as established, forcing starving and malnourished people to go vegetarian can have a fatal outcome (Ilea, 2008). In fact, people in the developing world might benefit from including (more) meat in their diet instead of quitting it.

Fourth, a global shift to a vegetarian diet harms the meat industry since it will be superfluous. Again, the socioeconomic consequences are not by all authors recognized as severe, but employees nevertheless will have to switch jobs and careers. Considering the fact that Vegetarianism does not include meat substitutes as the first three solutions do (see 3.2.1, 3.2.2, and 3.2.3), switching to this industry is not an option. Nuwer (2016), however, suggests former meat industry employees to switch to jobs in agriculture, deforestation and bioenergy.

Lastly, as mentioned in 3.2.4, the meat substitute industry ceases to exist if there is no market for its products. They are therefore cost-payers in the case of vegetarianism too.

3.3 - Technical or social?

Having described the different beneficiaries and cost-payers for all five solutions, the next step is to draw five tables to establish how the parties are divided and which solution, judged from its beneficiaries and cost-payers, is the most equitable.

1)

The first solution, which promotes a shift to meat substitutes by Beyond Meat and Impossible Foods, has the following beneficiaries: the environment (specifically climate change), future generations, the developed world, and the meat substitute companies Beyond Meat and Impossible Foods. The cost-payers, on the other hand, are the environment (specifically biodiversity), the developed world, the developing world, the meat industry, and the meat substitute industry.

Cost-payers	**Beneficiaries**
Environment (biodiversity) + future generations Developed world Developing world Meat industry Beyond Meat/Impossible Foods The Vegetarian Butcher	Environment (climate change) + future generations Developed world Beyond Meat/Impossible Foods

2)

The second solution, which suggests a shift to soy-based meat substitutes by the Vegetarian Butcher, has the following beneficiaries: the environment (specifically climate change), future generations, the developed world, and the meat substitute company the Vegetarian Butcher. The cost-payers of this second solution are the environment (specifically biodiversity), the developed world, the developing world, and the meat industry.

Cost-payers	**Beneficiaries**
Environment (biodiversity) + future generations Developed world Developing world Meat industry Beyond Meat/Impossible Foods	Environment (climate change) + future generations Developed world The Vegetarian Butcher

3)

The third solution, dubbed Reductitution, has the following beneficiaries: the environment (both climate change and biodiversity), future generations, the developed world, the meat industry, and the meat substitute industry. The cost-payers are the developed world and the developing world.

Cost-payers	**Beneficiaries**
Developed world Developing world	Environment (climate change + biodiversity) + future generations Developed world Meat industry Meat substitute industry

4)

The fourth solution, which introduces Flexitarianism as a solution, has the following beneficiaries: the environment (both climate change and biodiversity), future generations, the developing world and the meat industry (specifically the employees). The cost-payers of Flexitarianism are the developed world, and the meat substitute industry.

Cost-payers	**Beneficiaries**
Developed world Meat substitute industry	Environment (climate change + biodiversity) + future generations Developing world Meat industry

5)

The last and fifth solution, Vegetarianism, has the following beneficiaries: the environment (specifically climate change) and future generations. Its cost-payers are the environment (specifically biodiversity), the developed world, the developing world, the meat industry, and the meat substitute industry.

Cost-payers	**Beneficiaries**
Environment (biodiversity) + future generations Developed world Developing world Meat industry Meat substitute industry	Environment (climate change) + future generations

Summary

When analyzing the beneficiaries and cost-payers of all five solutions, four points stand out. First, the developing world is in four out of the five solutions a cost-payer but not a beneficiary. Only in the fourth solution is the developing world a beneficiary and not a cost-payer. The developing world is from the start a vulnerable party due to it having limited or no access to (financial) resources or social resources. After the analysis, it turns out that the developing world is an extra vulnerable stakeholder since it benefits only in one of the five solutions.

Second, biodiversity is affected in the first, second and fifth solution and is in all three alternatives a cost-payer. Only in the third and fourth solution climate change and biodiversity

are both beneficiaries. Since the environment, consisting of both climate change and biodiversity, is the key stakeholder in this thesis it is undesirable when the environment is a cost-payer. Considering this concern, the third and fourth solution are the most environmentally-friendly.

Third, swapping meat for Beyond Meat and Impossible Foods meat substitutes – the technical solution on the continuum – is undesirable due to Beyond Meat and Impossible Foods being both beneficiaries and cost-payers at the same time. Since this solution revolves around these companies' meat substitutes it seems contradictory if they are victimized by their own solution. The problem with this solution lies in the companies not being able to keep up with the demand of their products. The technical solution is therefore undesirable.

Fourth, Vegetarianism – the social solution on the continuum – is the solution with the least beneficiaries. Vegetarianism only benefits climate change whereas biodiversity and all the other human stakeholders are negatively affected and pay costs. It is therefore the least desirable option. Although the amount of beneficiaries does not determine whether the solution should or should not be considered, in the case of vegetarianism it plays a role. The food industries, the global population, and biodiversity all pay costs without receiving any benefits. The number of people negatively affected by this solution is too large to ignore. For that reason, Vegetarianism is an undesirable solution.

To sum up, after the assessment three things have become clear: 1) the third and fourth solution are the most environmentally-friendly, 2) the first and fifth solution are not desirable options, and 3) the developing world is the most vulnerable stakeholding party. A few conclusions can be made based on these three statements. To start, it seems that neither of the two positions at the end of the continuum – the technical and social solution – are equitable alternatives to meat. Instead, the mildly-technical position, the middle position and the mildly-social positions offer the best alternatives when their cost-payers and beneficiaries are assessed with Wolff's risk analysis. It can therefore be concluded that when it comes to meat consumption, looking for environmentally-friendly solutions which either only use technical means or social means are not desirable options. Instead, the solutions which combine technical and social means to different extents are more desirable for both the human and non-human stakeholders.

Out of those three positions, the middle position and the mildly-social position are the

most environmentally-friendly since they benefit both climate change and biodiversity unlike the mildly-technical position. In the latter solution, the meat industry is a cost-payer whereas in the middle position and mildly-social position the meat industry is a beneficiary. As explained, a reduction in meat benefits biodiversity more than abstaining from meat. Since the mildly-technical solution cuts meat out completely, biodiversity is a cost-payer. Considering how essential environmental well-being is in finding an alternative to current meat consumption practices, it can be stated that Reductitution and Flexitarianism are the two most suitable alternatives. Hardin's first question – what type of solution is required to solve or prevent the tragedy of the commons – can therefore be answered as follows: In order to reduce the environmental issues of meat consumption, either a Reductitutionist diet or a Flexitarian diet is desirable. The former solution combines technical and social elements whereas the latter solution is a mildly-social solution.

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4.

4.1 - The decision makers

In the previous chapter, I answered the first question inspired by Hardin's metaphor: what type of solution is the most equitable to combat the polluting effects of meat consumption? By applying Wolff's risk analysis, it became clear that the third solution Reductitution and the fourth solution Flexitarianism are the most equitable. This means that a socio-technical and/or a mildly-social solution are best to reduce the environmental impact of meat. In chapter 4, the second question inspired by Hardin will be assessed: who should be held responsible for solving the tragedy of the commons? I will answer this question by looking at the third party in Wolff's table - the decision-making party. Even though the beneficiaries and cost-payers for all five solutions have now been established, populating the decision-making party in Wolff's table will give a clearer picture of how fairly the roles are exactly divided. This will only be done for the third and fourth solution, however.

Currently, the decisions to reduce meat consumption and/or choose meat substitutes instead of meat are left to the personal choice of developed world consumers and developed world markets. These two stakeholders therefore form the decision makers. The tables can therefore be populated as follows:

1) Reductitution

Cost-payers	**Beneficiaries**	**Decision makers**
Developed world Developing world	Environment (climate change + biodiversity) + future generations Developed world Meat industry Meat substitute industry	Consumers (developed world) Market (developed world)

2) Flexitarianism

Cost-payers	**Beneficiaries**	**Decision makers**
Developed world Meat substitute industry	Environment (climate change + biodiversity) + future generations Developing world Meat industry	Consumers (developed world) Market (developed world)

As I discussed in chapter 1, section 1.3, Wolff distinguishes between five different ways in which the three parties can be divided: Individualism, Paternalism, Maternalism, Externalities, and Adjudication. The two most ideal scenarios are Individualism and Paternalism since in both cases the costs and benefits are shared among the same party (Wolff, 2010, p. 156). In Individualism, the three roles of beneficiary, cost-payer and decision-maker are all occupied by the same party. In Paternalism, on the other hand, the benefits and costs fall on the same party but the decision is made by another party. In contrast to Individualism and Paternalism, the least ethical scenario is Externalities due to the beneficiary and the decision-maker being the same party but different from the cost-paying party. Since the latter is a different party, it will fall victim to a decision it did not play a part in.

When studying the two above-mentioned tables, it becomes clear that neither of the two solutions fits any of Wolff's five scenarios exactly. It therefore suffices to try to match the two solutions to the scenario that matches it the closest. Also, for both solutions there are some elements that make the proposed solution ideal and some elements that make the solution unethical. First, in the socio-technical solution - Reductitution - the developed world occupies all three roles: it is a beneficiary, cost-payer and decision-maker. However, the only role fulfilled by the developing world is that of the cost-payer. The developing world is therefore a vulnerable

party in Reductitution. The fact that the developing world is neither a decision-maker nor a beneficiary next to being a cost-payer makes Reductitution most similar to Externalities.

Second, in the mildly-social solution - Flexitarianism - the developed world is the decision-maker and the cost-payer but not the beneficiary. Instead, the developing world is the beneficiary. Flexitarianism therefore resembles the case of Maternalism the closest in which the decision-making party sacrifices their own benefits for the beneficiary's sake[8]. However, in the case of Maternalism the decision-maker often will not sacrifice itself since it will not gain any benefits from doing so. Hence, although Wolff (2010) stated that Maternalism is an ethically untroubling scenario (p. 156), Individualism and Paternalism are still preferable over Maternalism since there is less risk involved. Unfortunately, Wolff does not extend on the reason why he believes Maternalism to be ethically untroubling but still less preferable than Individualism and Paternalism. I believe that the risk in Maternalism lies in the fact that it is risk averse: the decision-maker might not take the risk since it will only pay the costs but not profit from any benefits. Instead, the benefits go to another party.

Since Reductitution resembles Externalities and Flexitarianism resembles Maternalism, neither of the two solutions match the two ethical scenarios Individualism and Paternalism. To assess how Reductitution and Flexitarianism could match Individualism and Paternalism, I will first make three suggestions to make Reductitution more equitable. These suggestions include levelling down the beneficiary to the level of the cost-payer; turning the cost-payer into a decision-maker; or leaving out the developing world out completely. Next, to make Flexitarianism more equitable, I will again make three suggestions. These include making the developing world a decision-maker; making the developing world a cost-payer; or turning the developed world into a beneficiary.

4.1.1 – Reductitution

First, Reductitution will be discussed. The main problem with this solution is that the developing world is a cost-payer but not a decision-maker. Instead, the developed world fulfills both the role

[8] Since the meat substitute industry only fulfills the role of cost-payer in Flexitarianism, it could be stated that Flexitarianism also resembles Externalities. However, because the socioeconomic disruption of the loss of the meat substitute industry is not severe on a global scale, I decided to focus on the other cost-payer (the developed world) instead.

of beneficiary and decision-maker. The first solution to make Reductitution more equitable is by levelling down. Levelling down is a concept that suggests introducing costs to the best off stakeholder(s) in order to increase equality. Hirose (2011) defines levelling down as lowering the well-being of a better off party to the level of the worse off party without it necessarily benefiting anyone (p. 88). According to telic egalitarians (also referred to as intrinsic egalitarians by Gosepath (2011)), who are of the belief that any type of inequality negatively affects the state of affairs, levelling down is considered to be a reasonable approach to reduce inequality. The goal of reducing inequality is the most important, even when this reduction does not benefit anyone (ibid. pp. 89-90).

In the case of Reductitution, introducing costs to the developed world in order to lower their level to the level of the developing world does not benefit anyone beyond the mere act of increasing equality. Levelling down could be done by charging consumers of the developed world and its markets (either the three meat substitute industries Beyond Meat, Impossible Foods and the Vegetarian Butcher or the meat industry). If the costs that the developed world has to pay outweigh the benefits it receives, the solutions become more egalitarian since the costs are spread out among and shared by all different stakeholders. Yet, even though this would mean complete equality, no one benefits. The developing world will not be raised out of their misery whereas the developed world will be reduced to the same misery as the developing world. Furthermore, it seems counterintuitive to introduce costs to the beneficiaries and decision-makers of a solution that tries to find sustainable ways of reducing the climate impact of meat. Punishing the better-off in Reductitution by lowering them to the level of the cost-payers of Reductitution seems to be unreasonable and not serving any other purpose besides true equality.

Exactly due to this common issue of levelling down not benefitting anyone, it has received strong criticism in the form of the levelling down objection (Hirose, 2011, p. 90). The levelling down objection states that if the goal is to reduce inequality but it does not produce better circumstances for anyone involved it is unclear why true equality should be desired (Gosepath, 2011, par. 5.1). In certain circumstances, equality can only be reached if the resources of the ones who are better off are taken away from them. However, this will leave them to be just as poorly off as the others (ibid. par. 5.1). Hence, the levelling down objection asks the question whether equality just for the sake of equality is desirable. Christiano & Braynen (2008) argue, for example, that some inequalities are less unjust than some equalities (p. 394). Instead, an

alternative to levelling down and making the developed world a cost-payer too is turning the developing world into a decision-maker. Making the developing world a decision-maker will change Reductitution from Externalities to Maternalism. The developing world will namely be both a cost-payer and decision-maker but not a beneficiary. As aforementioned, even though Maternalism is not considered to be ethically troubling, it is a risky scenario since it is not guaranteed that the decision-maker will take the risk and sacrifice itself.

The question therefore arises whether the developing world will sacrifice itself for the benefit of the developed world. However, in this scenario, the answer to this question is not dependent on the willingness of the developing world to take this decision but its capacity. As Ilea (2008) points out, it is dangerous and unreasonable to demand the developing world, which suffers from widespread hunger, starvation and poverty, to reduce its consumption of meat. If the developing world decides upon reducing its meat consumption but increasing its meat substitute consumption, this would be dangerous. As determined in section 3.2.3, the developing world has limited to no access to meat substitutes. Meat reduction without meat substitutes could therefore be harmful and even fatal. Hence, turning the developing world into a decision-maker does not make Reductitution a more equitable solution.

Lastly, a third solution to turn Reductitution into Individualism or Paternalism is by leaving the developing world entirely out of the solution. If the developing world is left out, Reductitution becomes a solution which only affects the developed world. There will no longer be a party that suffers the consequences but is neither a beneficiary nor a decision-maker. The developed world will occupy all three roles of decision-maker, beneficiary and cost-payer. Furthermore, leaving the developing out will turn Reductitution into a similar solution as Flexitarianism. Just as Flexitarianism only demands the developed world to decrease their meat consumption, Reductitution will only demand the developed world to adopt a diet of reduced meat consumption combined with meat substitutes. If Reductitution leaves out the developing world, it will become a solution that resembles Individualism since the developed world will pays the costs, benefit and make the decision.

To sum up, out of the three different suggestions to turn Reductitution into Individualism or Paternalism, the third suggestion is the most preferable. The third option suggests leaving out the developing world of the solution entirely. This entails that the developing world is not required to change and adapt its diet to a Reductitution diet. If the developing world no longer

has to participate, the developed world is the party that fulfills all three roles in Reductitution. It therefore turns into a case of Individualism and, hence, an equitable solution.

4.1.2 – Flexitarianism

Having assessed three different options to make Reductitution equitable – e.g. levelling down, turning the cost-payer into the decision-maker, or leaving the developing world out – I will discuss Flexitarianism next. To start, Flexitarianism is less problematic than Reductitution since it resembles Maternalism instead of Externalities. However, as I pointed out above, Maternalism is still risky since it is risk averse. In the case of Flexitarianism, the risk exists that the developed world will not sacrifice itself for the benefit of the developing world. Hence, a first suggestion to make Flexitarianism more equitable is by making the developing world a cost-payer which can be done by levelling down. Costs would be introduced to the developing world to reduce their levels to those of the developed world. However, levelling down is problematic in this scenario. Although the developing world is the beneficiary in Flexitarianism, it cannot lower its levels to that of the developed world. The developed world has more resources than the developing world and is better off overall. The developing world reducing its levels to those of the developed world is therefore impossible since the levels of the developing world are lower than those of the developed world.

Since levelling down does not work to make Flexitarianism more equitable, a second option is to turn the developing world into a decision-maker. The developing world will then fulfill both the role of decision-maker and beneficiary and no longer solely benefit. Together with the developed world, the developing world will decide whether to run the risk. However, turning the developing world into a decision-maker makes Flexitarianism less equitable. Instead of resembling Maternalism where the developed world sacrifices itself for the developing world, Flexitarianism would resemble a combination of Maternalism and Externalities. The developing world will benefit from taking the decision while the developed world will pay the costs. The developed world would still be part of the decision-making process which prevents Flexitarianism from completely resembling Externalities. Nevertheless, a combination of Maternalism and Externalities does not make Flexitarianism less troublesome.

A third and last suggestion is to turn the developed world into a beneficiary. If the developed world is a beneficiary, Flexitarianism will resemble Individualism since the developed world will occupy all three roles. Simultaneously, the developing world will benefit from the decision the developed world makes. This would be the most equitable and, hence, preferable option. However, there is no obvious way in which the developed world can be turned into a beneficiary. The reason why the developed world is cost-payer in Flexitarianism in the first place is because it needs to reduce its meat consumption with 66% without the compensation of meat substitutes. A big shift in diet is required from the developed world in which it pays the costs of letting go of a highly-valued food tradition which breaks with the tripartite structure of the Western meal. There is, however, no solution which makes the developed world a beneficiary too in this case.

Having gone over three different suggestions to turn Flexitarianism into either Individualism or Paternalism – e.g. levelling down, turning the developing world into a decision-maker, or making the developed world a beneficiary – , it has turned out that none of the three options are successful. However, if Flexitarianism cannot be turned into Individualism or Paternalism, it continues to stay risk averse. It is not assured that the developed world will take the risk for the sake of the developing world. How can it thus be guaranteed that the developed world will take the risk of reducing its meat consumption when it does not benefit? Furthermore, even though Reductitution can be successfully turned into Individualism by leaving the developing world out, the question whether the developed world will take the actual decision to reduce and consume differently is not guaranteed. Although taking the decision will not be risk-prone it is unclear whether every individual will do so. In the last section of this fourth chapter, I will therefore look into the following question: is individual responsibility enough to adopt sustainable diets on a global scale? To answer this question, I will explore the notion of responsibility in the next section of this chapter.

4.2 - Collective and individual responsibility

Responsibility is concerned with the question whether we can hold ourselves and others morally responsible for the consequences of actions and behavior (Talbert, 2019). Moral responsibility, more specifically, is defined by Shockley (2013) as being the proper subject of praise or blame for a certain act or state of affairs (p. 1). He adds that moral responsibility usually involves the

morally responsible agent having an intention or acting in a way which is independently morally praiseworthy (ibid. p. 1).

The specific question related to responsibility this thesis is interested in is that of individual and collective responsibility in climate change. To start, it is important to clarify the basic difference between these two types of responsibility. Individual responsibility, on the one hand, asks the question what an individual person is responsible for. Collective responsibility, on the other hand, asks the question what a group of people is responsible for. Individual responsibility and collective responsibility play an essential role in climate change action since they ask the question what ethical obligations people have to live sustainably. There is, however, strong disagreement whether climate change should be solved by individual action or collective action among authors such as Stoll-Kleemann & Schmidt (2016), Shockley (2013), Hiller (2011), Hourdequin (2010), Jamieson (2010), Sinnott-Armstrong (2005) and Johnson (2003).

Johnson (2003) links the debate between individual and collective moral responsibility to Hardin's tragedy of the commons. He states that individual responsibility for commons users is Kantian in nature: it demands that every commons user is morally obligated to use a commons in a sustainable level or, else, reduce their use to a sustainable level (ibid. p. 2). Johnson himself, however, disagrees with the concept of individual responsibility in a commons. He lays out three reasons for rejecting individual responsibility by referring back to Hardin's metaphor of the herdsmen sharing a commons (ibid. p. 9). First, it is clear that one herdsman adding another cow to his cattle does not produce harm. Second, instead the harm consists of the actions of all herdsmen combined. Third, this means that one herdsman by himself cannot prevent the harm done to the commons by merely removing one cow (ibid. p. 9). This is Johnson's argument for why individual responsibility in a commons does not work. Alternately, in order to solve climate change, we should not be focused on reducing our individual impact on the environment but instead opt for socio-economic change that impacts aggregate behavior (ibid. p. 16): "'The right thing' is not, however, a fruitless, unilateral reduction in one's use of the commons, but an attempt to promote an effective collective agreement that will coordinate reductions in commons use and therefore avert the aggregate harm" (ibid. p. 14). Johnson holds the collective therefore responsible instead of the individual.

Another strong proponent of collective responsibility and well-known name in the debate about climate change and responsibility is Sinnott-Armstrong (2005). He states that it is unclear

what he as an individual should do about global warming: global warming occurs on such a large scale that it is neither individuals who have caused it nor individuals who need to fix it (ibid. p. 312). To strengthen his point, Sinnott-Armstrong gives the example of a river that is flooding downstream due to torrential rain. Neither him pouring a quart of water into the river upstream nor scooping out a bucket of water will have any positive or negative effect on the flood. Instead, his actions are negligible: they do not cause the flood or make it worse (ibid. p. 298). To Sinnott-Armstrong, global warming is exactly the same. His individual actions that might be perceived as harmful for the climate are nevertheless not the cause of global warming. Instead of individuals, governments carry the responsibility to fight climate change. They should collectively fix our environmental problems (ibid. p. 312).

Hiller (2011) directly responds to Sinnott-Armstrong's argument. The former does not agree with Sinnott-Armstrong's conclusion that an individual act does not contribute to combating climate change, which he refers to as the *individual causal inefficacy* claim (ICI) (p. 349). He disagrees with Sinnott-Armstrong's way of reasoning because of the following. If individual acts which are known to be polluting (such as taking a plane to a (faraway) holiday destination) do not cause climate change, what exactly causes climate change? If one individual taking the plane does not cause climate change but everyone taking the plane does cause climate change, "everyone's flying" would become an entity that cannot be reduced to a number of individual acts. This is metaphysically odd (ibid. p. 354). Although Hiller himself does not refer back to Hardin's tragedy of the commons, the same metaphysical argument goes for the example of the herdsmen. If one herdsman adding another animal does not cause the depletion of the commons but all herdsmen combined adding another animal do, the latter also becomes an irreducible entity.

Even though Hourdequin (2010) criticizes Sinnott-Armstrong's definition of what individuality means too, she mentions two different reasons from Hiller. Hourdequin is of the opinion that Sinnott-Armstrong's stance on individuals not having moral obligation in reducing their emissions is based on the assumption that an individual is an isolated, rational actor (ibid. p. 452). However, by relying on Confucian morality, Hourdequin points out that persons are part of a community and are defined relationally (ibid. p. 452). This means that an individual's choices, thoughts and actions influence other individuals around them. When seeing the individual as a part of a larger relational structure instead of an isolated actor, it becomes clear that individual

moral obligation does matter on a large scale: “Because individuals are constituted relationally, their actions have moral significance both in the context of their local interactions and in the context of larger communities” (ibid. p. 457).

On top of that, Hourdequin argues for the importance of personal integrity. From a moral perspective, it is inconsistent to demand change on a larger societal level but not put in any work yourself as an individual. Also, when seeing ourselves as part of a larger societal structure, it becomes evident that change on an individual level and change on a societal level cannot be clearly divided and distinguished. Nefsky (2018) adds to Hourdequin’s latter statement that individual responsibility is a non-instrumental form of responsibility: it does not concern itself with large instrumental contributions but rather with morality itself (p. 3). Just because an individual’s act such as taking their bike instead of their car to work is negligible in numbers does not make the act in itself negligible. In fact, it is an act of morality.

4.3 - Who should be held responsible?

Having introduced different standpoints in the debate about individual and collective responsibility for climate change, I return to the question posed at the end of section 4.2: in which ways can the developed world be held responsible for changing to either Reductitution or Flexitarianism? In responding to this question, I will simplify the options to three: corporations, individuals and governments. Hence, NGOs and transnational bodies will not be included. To start, as mentioned in the beginning of section 4.1, currently developed world consumers and developed world markets are the decision-makers of both proposed solutions. This means that the decisions to consume less meat and/or buy meat substitutes are completely left to the responsibility of individual consumers. For that reason, both solutions rely on individual responsibility even though the markets are involved.

To demonstrate this, Kwan (2009) mentions that if markets are in control this can be referred to as corporate responsibility. In this case, corporate responsibility means that food industries, such as the meat industry or the three meat-substitute industries (Beyond Meat, Impossible Foods and the Vegetarian Butcher) create an environment which fosters to either adopt a Reductitution diet or Flexitarian diet (ibid. p. 479). Kwan sums up the three ways in which markets can create their desired environments: offering stable food supplies, ensuring

affordable foods, and supplying nutritional information (ibid. pp. 479-480). By adopting these three ways, the meat industry and the meat substitute industries could build and design their desired market. However, Kwan points out that since the choice of actually buying the goods and taking in the nutritional information the food industries supply fall upon the individual, corporate responsibility still (currently) rests on the responsibility of the individual. This means that the decision-making in both Reductitution and Flexitarianism relies on individual responsibility.

For both solutions, it seems precarious to solely rely on individuals taking responsibility in changing their diet. Since Flexitarianism resembles Maternalism, the risk exists that the developed world will not take the decision due to being only a cost-payer and not a beneficiary. Even though Reductitution resembles Individualism if the developing world is left out, leaving the decision only up to individual responsibility still seems risky. A clear example to underpin this uncertainty is the international non-profit campaign Meatless Monday. Since 2003, Meatless Mondayhas suggested that consumers eat vegetarian once per week for the sake of environmental health and personal health ("About Us", 2019). This implies cutting back on meat by 15%. Considering that the dietary recommendation by Meatless Monday is still not adopted on a global level proves the difficulty of letting the responsibility of adopting sustainable dietary choices completely up to the individual consumer. Especially when taking into consideration that Flexitarianism demands a 66% reduction on meat which is 4.4 times as much. Hence, it can be questioned whether individual responsibility suffices.

Middlemiss (2010) strengthens this latter point by stating that individual responsibility cannot be seen as just an individual obligation whenever it concerns sustainable consumption (p. 159). Whereas Hourdequin (2010) points out that the individual affects the collective, Middlemiss (2010) points out that the collective affects the individual in turn. The influence of the collective on the individual should be taken into account to understand the limitations of individual responsibility more thoroughly. Middlemiss suggests viewing responsibility as a relational concept in which an individual's context determines to what extent they can put their responsibility into practice (ibid. p. 159). She therefore comes up with a conceptual model: the so-called contextualized individual footprint (ibid. p. 160). In the middle of this model, she places individual responsibility which represents an individual's responsibility to use sustainable resources. Around this middle part, she places four different categories which all affect the amount of responsibility an individual can take. These categories are cultural capacity;

organizational capacity; infrastructural capacity; and personal capacity (ibid. p. 160). Cultural capacity revolves around an individual's norms and values as well as their relationship to sustainability. Organizational capacity focuses on the sustainable recourses an individual has access to. Infrastructural capacity stands for the sustainable facilities an individual can access. Lastly, personal capacity focuses on an individual's own resources which allows for living sustainably, such as understanding of sustainability, finances and mobility (ibid. p. 160).

In short, Middlemiss' (2010) model indicates that individual responsibility in relation to sustainable living is dependent on having adequate personal and contextual capacity (p. 160). To clarify this, we can apply her four categories to the cases of Reductitution and Flexitarianism. For example, 1) an individual's lack of knowledge about the importance of a Reductitution or Flexitarian diet, 2) limited knowledge on how to prepare and cook vegetarian, 3) limited financial resources to afford the more expensive meat substitutes, and 4) a lack of available meat substitutes in this individual's local supermarket are a few examples which limit individual responsibility. Hence, with her footprint model, Middlemiss poses the question to which extent consumers have the power to choose sustainable alternatives (ibid. p. 164). She ends her paper with two conclusions about individual responsibility. First, an individual's personal and structural context can make certain sustainable actions difficult or even impossible. Second, sustainable individual responsibility is not straightforward to ascribe (ibid. p. 163).

Therefore, to ensure that Reductitution or Flexitarianism are adopted by the developed world it is essential that governments in the developed world take responsibility in ensuring that its citizens will change their current diet. Governments should ensure that cultural capacity, organizational capacity, infrastructural capacity, and personal capacity do not limit its citizens in adopting a sustainable diet. As pointed out in the reference to the Meatless Mondays' campaign, it has already appeared difficult to have people cut back on their meat consumption with 15%, let alone 66%. For that reason, governments have the responsibility to offer alternatives which are in line with the Reductitution or Flexitarian diet. It should not leave room for unsustainable consumption patterns.

However, even though collective responsibility is essential to take into account, individual responsibility is equally important. In fact, both types of responsibility are required to instill long-lasting change. Therefore, a combination of Hourdequin's (2010) outlook on how the individual affects the collective and Middlemiss' (2010) take on how the collective affects the

individual should be applied. One cannot fully flourish without the other. The problem with solely adopting collective responsibility is namely as follows. When authors in favor of collective responsibility, such as Sinnott-Armstrong (2005), refer to "the government" they seem to define it as a single entity which will install new environmental laws: "[…] governments still have moral obligations to fight global warming, because they can make a difference" (p. 312). The issue with defining collectives as a single entity is what Hiller (2011) refers to as a metaphysical oddity. The government is not a single entity but instead a collective made up of individuals. In order to make sure governments will ensure Reductitution or Flexitarianism is adopted by the developed world, it is essential that the politicians making up our governments are aware of the importance and reasoning behind having to switch to a different type of diet with a strongly reduced meat intake.

To exemplify this statement, let's look at a Dutch political party called Partij voor de Dieren (PvdD), in English translated as Party for the Animals. The party has been considered by other Dutch political parties as having extreme standpoints concerning the reduction of meat consumption and environmental well-being. Some political parties even referred to the PvdD representatives as "animal loonies"[9] (Wijnberg, 2014, "Waarom") who put the importance and well-being of animals before the well-being of the people they represent. Besides this latter statement being unrepresentative of the party's program, more knowledge about the ways in which meat affects the climate will lead to better contextualization of environmental standpoints, such as done by the PvdD. As mentioned and established in section 1.1, having to reduce meat consumption to combat climate change is not an extreme or "loony" measure but in fact necessary to guarantee long-term environmental health. Politicians that are well-informed and take their individual responsibility in reducing their meat consumption will also understand the importance of establishing laws and policies on a governmental level when it comes to meat consumption. Parties such as the PvdD will be taken more seriously by the other parties and not shoved aside. Furthermore, individuals who take their responsibility seriously will also recognize the importance of voting for parties such as the PvdD to ensure the government will take climate action. It seems contradictory to expect the government to solve our climate crisis if the actual citizens do not participate or educate themselves about the crisis.

[9] Translated from the Dutch word "dierengekkies"

At the same time, the government can bring about the necessary large-scale change by establishing those same laws and policies which will present Reductitution or Flexitarianism as the only options. Although individuals can take their responsibility in combating climate change by adopting either diet, it might be less clear what governmental responsibility looks like. Again, when taking a look at Sinnott-Armstrong's quote about the moral obligations the government has, he does not specify in which ways the government can fulfill its moral obligations. A current real life example of governmental help in combating climate change is Germany debating whether it should place a higher tax on meat. Whereas the current tax on meat in Germany is 7%, Germany is discussing increasing its tax on meat to 19%. Similar to the high taxes on cigarettes and alcohol, high taxes on meat are supposed to reduce the amount of meat consumers buy and consume. In this way a government takes the initiative in restricting consumers' food choice to reduce emissions and environmental damage (Lykkeskov & Gjerris, 2017). In the Netherlands, the green party GroenLinks[10] wants to introduce a higher meat tax too to stimulate the switch to responsible food supplies (Snels, "Vleestax").

Although the underlying goal is to force consumers to eat differently and more sustainably, taxing a product such as meat is controversial. Meat is perceived as a central part of the meal in the Western world (Fresco, 2012). Consumers therefore respond negatively to the taxation of meat (Vanhonacker et al., 2013 in Hyland et al., 2017, p. 9). Furthermore, even though a meat tax should change consumers' outlook on buying meat, it mostly inconveniences and hits the poor(er) consumers of developed nations (Noor, 2019, "Caroline Lucas is wrong"). Only rich people will be able to either choose or not choose meat while the poor do not have this choice at all since they can no longer afford it. This point of critique could be countered by pointing out that meat is a product that should not be purchased (or at least, should be purchased less) and that inability to afford it is beneficial for the environment. However, Noor (ibid.) rightfully points out that "if something is wrong in principle, it should be wrong for everybody, not just the poor." A meat tax only sends out a message to the poor and not the entire developed world. It therefore does not affect developed world consumers equally.

Hence, an example of a more just way in which the government can contribute is by rationing, as proposed by Lawlor (2014). Rationing is the controlled, equitable distribution of scarce goods. Lawlor points out that rationing is built on two factors which the taxation of meat

[10] Can be literally translated as Green Left

lacks. First, unlike a meat tax, rationing is impartial; and in its impartiality, it is a just measure. Second, rationing receives wide acceptance of the general public because of its correctness (Roodhouse, 2007 in Lawlor, 2014, p. 19). In the cases of adopting a Reductitutionist or Flexitarian diet, governmental rationing could be a just measure to make sure every person receives 1) the same amount of meat and 2) the amount of meat which is line with both the Reductitutionist and Flexitarian diet.[11] A Reductitutionist or Flexitarian rationing scheme affects rich(er) and poor(er) developed world consumers equally. I therefore perceive it as a just way in which developed world governments can take their responsibility.

Despite rationing being an equitable measure, Lawlor adds that rationing can be perceived as negative since it is not voluntary but forced upon citizens (ibid. p. 19). Yet, a voluntary change in diet is reliant on individual responsibility. As I previously established in this same section 4.3, it is difficult to the point of impossible to rely solely on individual responsibility. As Middlemiss pointed out, individual responsibility is affected by the collective. In order for an individual to take their responsibility, their contextual capacity needs to provide sustainable opportunities which allow individuals to adopt more sustainable habits and patterns. Collective responsibility in the form of rationing could be a fair way of distributing meat among developed world consumers and making sure Reductitution or Flexitarianism is adopted. I am aware, however, that the desirability and feasibility of rationing is questioned and even objected. Introducing rationing as a solution, therefore, introduces new discussions and problems that cannot be discussed within the scope of this thesis. Nevertheless, my goal behind introducing rationing as an example is to clarify what collective responsibility could entail.

The final tables could be populated as follows:

[11] The Flexitarian diet proposes no more than 70 grams of meat per day per person or 490 grams of meat per week per person

Reductitution

Cost-payers	**Beneficiaries**	**Decision makers**
Developed world	Environment (climate change + biodiversity) + future generations Developed world Meat industry Meat substitute industry	Consumers (developed world) Market (developed world) Governments (developed world)

Flexitarianism

Cost-payers	**Beneficiaries**	**Decision makers**
Developed world Meat substitute industry	Environment (climate change + biodiversity) + future generations Developing world Meat industry	Consumers (developed world) Market (developed world) Governments (developed world)

In summary, in the beginning of this chapter, I asked how Reductitution and Flexitarianism could resemble a more equitable scenario since the former resembles Externalities and the latter Maternalism. While Reductitution can be turned into Individualism when the developing world is left out entirely, it is not possible to turn Flexitarianism into a more equitable case such as Individualism or Paternalism. Flexitarianism therefore stays risk averse: will the developed world take the risk even though they have to pay the costs of taking the risk? Although Reductitution is no longer a problematic scenario, the question whether individuals will actually take their responsibility is also relevant for this solution. Hence, in order to ensure the developed world will run the risk, I explored the notion of responsibility for both Reductitution and Flexitarianism, and asked the following question: does individual responsibility suffice to adopt sustainable diets on a global scale?

Following Middlemiss' and Hourdequin's arguments, I concluded that the collective shapes the degree to which individuals can take responsibility and individuals shape the collective in their turn. Responsibility cannot, and therefore should not, be reduced to solely

individual responsibility. Both Reductitution and Flexitarianism benefit from a combination of collective responsibility and individual responsibility. I also provided a concrete example in which the collective can take its responsibility. Governments of developed nations could ration the amount of meat per citizen and ensure that no one consumes more than is in line with the sustainable amount of 70 grams per person per day. Nevertheless, even though both Reductitution and Flexitarianism are turned into responsible, equitable solutions when combining collective and individual responsibility, in the end I prefer Reductitution over Flexitarianism. The reason behind this choice is as follows. Reductitution resembles an equitable solution, Individualism, when excluding the developing world as a stakeholder. This makes Reductitution initially a more preferable than Flexitarianism, which resembles Maternalism and cannot be altered.

Conclusion

In conclusion, I started this thesis with the following research question: which suggested solution combating the environmental impact of meat consumption is the most equitable? By comparing the impact of meat consumption on the environment with Hardin's metaphor of a tragedy of the commons, I divided the thesis into two parts. The first part focused on the question what type of solution is needed to solve a tragedy of the commons. The second part concerned itself with the question who is responsible for implementing this solution. To help answer both question, I used Wolff's (2010) risk analysis. His model consists of three parties – the cost-payer, the beneficiary, and the decision-maker – divided over five different scenarios: Individualism, Paternalism, Maternalism, Externalities, and Adjudication.

In order to answer the first question, I started by drawing a continuum on which I placed five solutions which use technical and social elements to different extents. On one end of the continuum, I placed a social solution which focuses on breaking with current norms and values, and replacing those with new ones. On the other end of the continuum, I placed a technical solution which leaves practices intact but makes them more sustainable with the help of technology. To balance the two ends out, I placed three other solutions on the continuum: a mildly-social one, which slightly breaks with dominant norms and values; a socio-technical one, which mixes the technical and social equally; and a mildly-technical one, which looks for less-

groundbreaking sustainable technical solutions. Since I chose meat as my case-study, I looked for five solutions for meat which match the positions on the continuum. These were the following five:

Social solution – Vegetarianism
Vegetarianism is a social solution since it breaks with the traditional norm of eating meat and the tripartite meal structure. Instead, consumers are forced to prepare and arrange different types of meals.

Mildly-social solution – Flexitarianism
Flexitarianism suggests developed world consumers to not eat more than 70 grams of meat per day per person. Since such a diet only reduces meat, Flexitarianism fits the description of a mildly-social solution.

Socio-technical solution – Reductitution
Reductitution is a diet consisting of 70 grams of meat per day per person and meat substitutes of the brands Vegetarian Butcher, Beyond Meat and Impossible Foods. The reduction of meat combined with meat substitutes to balance out the smaller amounts of meat is a solution that uses social and technical elements equally.

Mildly-technical solution – Vegetarian Butcher meat substitutes
Replacing meat with soy-based meat substitutes by the Vegetarian Butcher is a mildly-technical solution. It uses technology to replace meat and keep meat central in consumers' diets. However, soybean substitutes are less advanced than the substitutes by Beyond Meat and Impossible Foods (see the technical solution below).

Technical solution – Beyond Meat and Impossible Foods meat substitutes
Replacing meat with meat substitutes by Beyond Meat and Impossible Foods is a technical solution. Currently, the substitutes by these two brands are the most advanced on the market. They therefore leave our norm of eating meat in place with the most realistic mock meat available.

After linking five different alternatives to the five positions on the continuum, I determined the stakeholders and sorted them by applying Wolff's risk model. However, instead of looking at all three of Wolff's parties, I focused on the cost-payers and beneficiaries first. By comparing and contrasting the cost-payers and beneficiaries for all five alternatives, I concluded that Reductitution and Flexitarianism are the most equitable. The first question could therefore be answered as follows: the solution required to solve the environmental issues caused by meat is a socio-technical solution or a mildly-social solution.

Next, in order to answer the second question, I looked into the decision-making party in Wolff's analysis. When adding the decision-making party to complete the stakeholder analysis, I concluded that Reductitution resembled Externalities and Flexitarianism Maternalism, which are both problematic scenarios. To turn Reductitution and Flexitarianism into the equitable scenarios of Individualism or Paternalism, I looked into the notion of responsibility. By relying on Hourdequin's (2010) and Middlemiss' (2010) arguments, I concluded that Reductitution is the most equitable solution for meat when the decision-making party consists of both individual responsibility and collective, governmental responsibility. The second could therefore be answered as follows: individual, developed nation consumers and the governments of developed nations are responsible for implementing the Reductionist diet. This answer to the second question led me to my overall conclusion that the most equitable solution to combat the environmental impact of meat is a socio-technical solution consisting of reduced meat intake and meat substitutes. In order to implement Reductitution, the developed world is required to combine individual and collective responsibility. Individuals are required to change their consumption patterns whereas the governments can take their responsibility by rationing meat.

Lastly, in the thesis I have left certain areas untouched. First, I am aware that my stakeholder analysis is broad and could be made much more specific by adding more stakeholders and/or breaking stakeholders down in different sub-stakeholders. The scope of the thesis did not allow me to widen my stakeholder analysis but doing so could have made the assessment perhaps more accurate and nuanced. Furthermore, future research areas could specifically focus on unpacking and exploring a few of my simplifications. First, I have discussed vegetarianism only in terms of meat. Future research could perhaps focus on vegetarianism which rejects both meat and fish. Another option could be to focus on veganism since dairy is a byproduct of keeping animals for meat. If the global population continues to

consume dairy, animals will continue to be kept. In that way, food production for animals and animal waste (the two problems Barnhill et al. (2018) called the two biggest issues related to meat consumption) continue to exist.

Second, I have assumed that the environmental impact of the five solutions is equivalent to each other. It could be explored whether this simplification is actually true. This would be an empirical research objective but nevertheless relevant and essential in finding long-term environmentally-friendly dietary solutions. Third, the risk analysis I have done in the thesis can also be applied on (more) local levels instead of on a global level. Think, for example, of a European level or even national level. Such an assessment could bring about more concrete policy recommendations. The methodological approach I used can be further applied and developed. The scope of this thesis did not allow me to dive deeper into these three topics but they serve as promising future research objectives.

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