

**REPLACING GROUND BEEF WITH FAVA BEAN  
PRODUCTS**  
-  
**PROJECT WORK FOR SERVICE CENTRE HELSINKI**

**Jyväskylä University School  
of Business and Economics**

**Project report**

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# 1 INTRODUCTION

The goal of this project is to study impact identification and assessment in the context of public procurement. This project focuses on two broadly used products in Service Centre Helsinki's food services: ground beef and fava bean products. To achieve the goal of this project, this report defines what the term 'impact' means in the context of procurement of animal-based and plant-based protein. The formatting of the definition is based on the IOOI method, and the impact chain of replacing ground beef with fava bean products is determined. This project has primarily been conducted through a literature review. In addition to the literature review multiple meetings were held together with the Service Centre Helsinki.

The project was implemented in cooperation with Service Centre Helsinki in the spring of 2022. Service Centre Helsinki partners with city schools, day care centres, senior centres, service homes and hospitals. In addition to other services, they deliver over 100 000 meals every day (City of Helsinki, 2022). Service Centre Helsinki employs approximately 1400 people, and the origins of their operations goes back to 1917 (Palvelukeskus Helsinki, 2021). While Service Centre Helsinki has many services which they offer, including logistics services and telephone services, we focus on the food services in this project.

## 1.1 Public procurement

Procurement refers to the purchase and investments of "internal and external services, materials, supplies and goods" (City of Helsinki, 2020). Over 50 percent of Helsinki's expenditures are procurements and Helsinki spends roughly four billion euros per year on their procurement volume, which makes Helsinki the largest operator within public procurement in Finland (City of Helsinki, 2020).

There are specific rules for those taking part in public procurement and this applies to Service Centre Helsinki as well. The City of Helsinki's procurement strategy aims to promote making responsible procurements (Sustainable Helsinki, n.d.). One of the actions supporting this is the environmental impact assessments which need to be conducted in all procurements that exceed the national threshold value (Sustainable Helsinki, n.d.).

Public procurement is covered by national legislation as well as by procurement directives of the EU. The fundamental principles of procurement are "transparent and efficient tendering" and "equality and non-discriminatory treatment of tenderers" (Ministry of Economic Affairs and Employment, n.d.). As an example, this means that those who have sent out invitations for tenders are not allowed to restrict the location of the product that they are procuring, meaning that Service Centre Helsinki would not be able to request products to

be of certain origin in invitations to tender (City of Helsinki, 2017). Another important principle of public procurement is that the decision to whomever the contract is awarded to must be based on their tender being either “the most economically advantageous tender” or having the “lowest price” (Ministry of Economic Affairs and Employment, n.d.).

## 1.2 Background

Climate change is an ongoing challenge in today’s society and the recent IPCC report shows that urgent measures need to be taken to combat it (Masson-Delmotte et al., 2021). Climate change has many uneasy consequences such as rising temperatures, extreme weather conditions and risks for human and animal health. These all have further impacts, for example, rising temperatures can raise sea levels as glaciers melt and extreme weather conditions can lead to flooding and decrease water quality (European Commission, n.d.). In addition to climate change, there are many other existing societal issues. Poverty, racial discrimination, gender inequality, crime, unemployment, and several health issues are only examples of the various existing problems. Service Centre Helsinki would like to mitigate their part in advancing climate change and to increase their role in solving societal issues. In this project it is assessed how Service Centre Helsinki could create a positive impact by changing their division of public procurement and start to procure fava bean products to partly replace ground beef.

Food production and especially the production of animal protein advance climate change, and they have significant impacts on the loss of biodiversity (Garnett, 2008). In general, vegetable products, poultry products and certain seafood products have low carbon footprints, while ruminant meat and some types of seafood have high carbon footprints (Nijdam et al., 2012). Aiking and de Boer (2018) have studied the environmental effects of animal-based protein, and according to their findings, one of the simplest ways to lower food related carbon footprint is by reducing meat consumption and replacing it with alternative proteins. Despite this finding, developing countries such as India and China are still increasing their meat and milk product consumption (Aiking and de Boer, 2018). According to the United Nations’ (2017) growth evaluation, there will be 10 billion people on Earth in 2050, and the environment will not be able to handle the current state of meat consumption then.

When it comes to replacing meat with vegetable protein, there are a multitude of benefits in addition to decreasing negative impacts on the climate. According to the report of EAT-Lancet Commission (2019), reducing meat consumption is one of the key elements in achieving so-called planetary health, which refers to “the health of human civilization and the state of the natural systems on which it depends”. The report states that the consumption of fruits, vegetables and nuts should double, and the consumption of meat and sugar should halve in order to achieve a healthy diet by 2050. However, there is one

problem; the initial setting of increasing the production of vegetable products is difficult in Finland, since the current competitive advantage lies in domestic animal production and greenhouse production (Saarinen et al., 2019a). This is why Finnish agriculture could benefit from big procurers favouring Finnish plant-based protein options; without demand, there cannot be development in this regard.

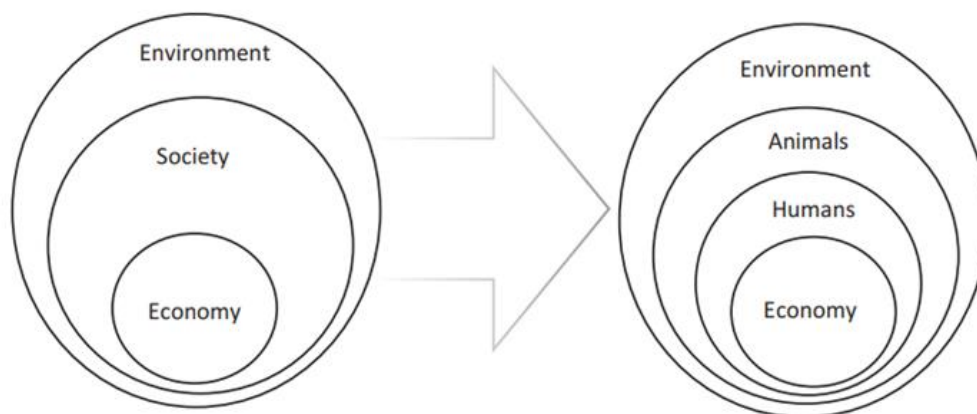
## 2 MEASURING IMPACT

Measuring impact is not simple. The realised impact can be far away from the wanted impact, and situations vary a lot. However, as we understand it, the wanted impact is usually in line with practices that are consistent with sustainable development. It needs to be carefully assessed how impact and sustainability interact together in order to find the most efficient ways to achieve good results. To do this, we will discuss the basics of sustainability. When it comes to measuring impact, it is beneficial to break the process of creating it into pieces. To break up the process, we utilise the IOOI method.

### 2.1 Sustainability as the basis of impact

The foundation for the definition of sustainability was created at an UN World Summit on Sustainable Development. It was stated that sustainability was based on three pillars: environmental responsibility, social responsibility, and economic responsibility (United Nations, 2002). The pillars of sustainability are often illustrated as three interlaced circles or as literal pillars. While the three pillars model has achieved an established position over time, recently it has been questioned. Markus Vinnari, a senior lecturer of economics and management at the University of Helsinki, has familiarised himself with sustainable development and suggested that animal welfare should be included in the definition of sustainability (Figure 1). The dimension of animal welfare would include both domesticated animals and wild animals, and it would require actions such as decreasing animal-derived raw materials, adding the consumption of vegan meals, and restricting the use of animals for organisational purposes (Vinnari & Vinnari, 2021). In this report, we will use Vinnari's four dimension model instead of the common three pillar model when addressing sustainability.

Figure 1: One way of including animals in sustainability (Vinnari & Vinnari, 2021).



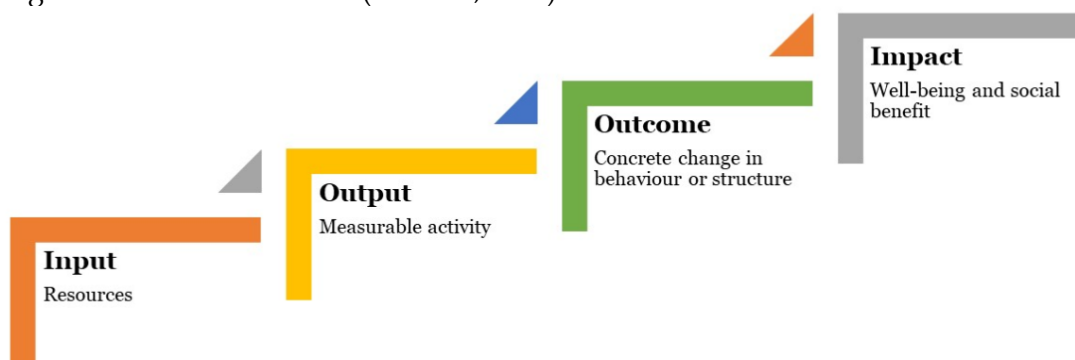
When the sustainability of food is discussed, the environmental factors are often highlighted, and animal welfare is not always mentioned. Additionally, the working conditions of employees are sometimes left out of discussions related to food sustainability. Bravo et al. (2021) represent factors to look at when assessing the sustainability of a food supply chain; the factors are represented as parts of environmental, social and economic sustainability and include the following: green processing, packaging and transportation, natural resources conservation, health and safety, work and human rights, and sustainable sourcing. As it can be seen, animal welfare is not on the list.

Evaluating and comparing the sustainability of food products is not simple. For example, pork has a smaller carbon footprint than beef and its production is more efficient, but cows usually have more living space (Xue et al, 2019). Therefore, it could be assumed that the welfare of cows is on a better level. Because of these contradictions in meat production, it is important to determine which dimensions of sustainability are the most important ones when it comes to creating impact. Sadly, it can be impossible to find absolutely perfect solutions; usually it has to be chosen whether animal welfare or small carbon footprint is valued more.

## 2.2 IOOI method as a tool in measuring impact

The IOOI method (Figure 2) is based on logic models that were developed in the 1970s which according to Zappalá and Lyons (2009) are supposed to tackle the issue of making evaluations solely in the end of a project. Because of this, multiple projects did not achieve desired goals as the focus was only on the outputs rather than the outcomes. The logic models are different to this, as they provide a framework that embeds evaluation and performance assessment in each life cycle process of the programme (Zappalá and Lyons 2009). Logic models are a visual way to share the relationships between the resources that are needed to run the project (inputs), the activities that are executed (outputs) and the results that the project aims to achieve (outcomes and impact). Based on these logic models, the Bertelsmann Stiftung Foundation created the IOOI method, which Sitra has further developed.

Figure 2: The IOOI method (Aistrich, 2014).



Aistrich (2014) and Heliskoski et al. (2018) describe the IOOI method comprehensively, and they have a similar understanding of the method. In this chapter, their work is used as help in explaining the method. **Input** stage focuses on the factors of production, essentially everything that is needed to create the product in question. The input stage can help to understand what kind of resources are needed for the output. Resources are not only purely financial, but they also include aspects such as time, materials and staff among many other aspects. **Output** means the measurable work that will be done. Outputs are the most direct consequences of inputs. They can be measured by how many reports have been made, how many hours have been used, how many pages have been produced or how many people were taught to do something. **Outcome** defines the concrete changes that were achieved in the core audiences or in the systematic change after the output phase. It can be something tangible such as changes in the law, or intangible such as behavioural change, new acquired values or learning. **Impact** might sound quite the same as outcome, but it is something more profound and far going. Impact is something concrete and often measurable. It refers to the change in wellbeing and the societal benefits that have been possible thanks to the three previous steps. Impact helps to estimate if the work done has been useful or not. Sometimes this might be difficult because unlike outcomes, true impact might be seen even years after the work has been done.



## 3 THE INGREDIENTS

For this project we first described and compared three ingredients; two plant-based products, fava beans and pulled oats, and one animal-based ingredient, ground meat. As a result of the comparison, we chose fava beans out of these two plant-based ingredients for a deeper analysis with ground meat.

### 3.1 Fava beans

*Vicia faba* L. is the botanical name which more commonly is referred to as broad bean, fava bean and faba bean and many more (Multari et al., 2015). In this report the bean will be referred to as fava bean. Fava bean is “an annual legume” which can grow in various climate zones (Heusala et al., 2020). Since fava beans can grow in different climates, it is a versatile crop and can be consumed both in its raw form and processed forms (Multari et al., 2015).

Fava beans have been used as the main ingredient to various plant-based protein products recently as it can be processed to a product that can replace animal proteins in foods (Heusala et al., 2020). In Finland especially, fava bean has recently emerged to the markets as a plant-based protein alternative to the beef-based ground meat. These processed fava bean products include plant-based variations of ground meat, meatballs and hamburger patties. In Finland the more commonly known producer of fava bean-based substitute products for meat is Beanit, and the product is called Härkis. While fava bean is available on the markets for human consumption it is more commonly used as feed. Fava bean is the “third most important feed grain legume” which is mainly used for pigs, poultry, horses and pigeons (Singh et al., 2013).

The nutritional information of fava bean protein products depends on the manufacturer. As an example, the Härkis Original produced by Beanit, contains 206 kcal per 100g. The product has 10g of fat, 16g of protein, 9g of carbohydrates, 6.1g dietary fibres and 1.3g of salt (Beanit, n.d.a). When fava beans are boiled with salt they contain 102 kcal per 100g from which 0.4 g is fat, 7.6g is protein, 14.1g is carbohydrates and 601.3mg is salt (Fineli, n.d.). Considering that the nutritional values of fava bean products can change drastically once they are further processed, the health benefits as well can change. There also may be differences between fava bean products depending on how they are processed.

As seen in figures 3 and 4 fava bean requires various inputs in order to create the final product. For the cultivation of fava beans, Heusala et al., 2020 found that this process requires mineral fertiliser N and mineral fertiliser P as well as fuel and that the quantities depend on whether it is a high-yield or low-yield scenario. The figures left out a few needed inputs for the cultivation process which in our opinion are fava bean seeds, water, land, labour, money, and

energy. Heusala et al. (2020) looked into the inputs for the processing of fava bean protein concentrate in figure 4, which most likely are needed also for the processing of fava bean protein products. Figure 4 shows that this process requires fava bean grains, energy and transportation. The input for this stage will most likely also require machinery, facilities, labour, money, and water in addition to those mentioned in figure 4.

Figure 3: Inputs and outputs of fava bean cultivation (Heusala et al., 2020).

FABA BEAN CULTIVATION	Low yield	High yield
<b>Input</b>		
Mineral N fertilizer (kg N ha <sup>-1</sup> )	0	0
Mineral P fertilizer (kg P ha <sup>-1</sup> )	44	16
Fuel consumption (l ha <sup>-1</sup> )	45	47
<b>Output</b>		
Faba bean yield (kg ha <sup>-1</sup> )	1500	3600

Figure 4: Inputs and outputs for processing fava bean protein concentrate (Heusala et al., 2020).

FABA BEAN PROCESSING	Amount	Unit
<b>Input</b>		
Faba bean grains	4.3	kg FU <sup>-1</sup>
Energy consumption	1.1	kWh FU <sup>-1</sup>
Transport	2.1	tkm FU <sup>-1</sup>
<b>Output</b>		
Faba bean concentrate	1.0	kg
Faba bean flour	0.2	kg FU <sup>-1</sup>
Faba bean starch	2.0	kg FU <sup>-1</sup>
Faba bean hulls	1.0	kg FU <sup>-1</sup>

Environmental sustainability is a highly discussed topic within agriculture and there are various measures through which it can be assessed. Together with VTT and Biocode, Beanit conducted a life-cycle assessment (LCA) on their fava bean chunks product. This cradle-to-gate LCA showed that the farming process itself is a “low-emission process”, however, Beanit’s products include pea protein, which requires more energy to produce (Kajan, 2021). This indicates that depending on how the fava bean product is further processed, the emissions can differ as well. The LCA study also found that a 250g retail package of their product produces 2,5kg of CO<sub>2</sub>/kg and their 2,5kg wholesale package creates 2,1 CO<sub>2</sub>/kg (Kajan, 2021). Showing that when purchased in larger quantities, the carbon dioxide emissions are lower per kg when compared to retail packages.

### 3.2 Pulled oats

Pulled oats is a Finnish innovation created by a company Gold&Green Foods that was launched in January 2016. The ingredients for pulled oats are Nordic oats, water, salt, and oil, but also fava beans and pea protein. Oats have only 2.4 co2/kg impact on climate and only 4.6 litres of water is used to produce 1 kilogram of pulled oats (Gold&Green Foods, n.d.a; Gold&Green, n.d.b). Oats are an important feed for livestock and in 2013 most of the oats were produced to feed animals like cattle, sheep and horses (Elke & Emanuele, 2013). As a human nutrition it has often been used as a breakfast product like oatmeal or oat flakes and for baking biscuits or bread. If the nutritional properties of oats are compared with other cereals, oats have more protein and fewer carbohydrates (Elke & Emanuele, 2013). In Finland oats are one of the most important export products of cereals and oats grow well in Finnish terrain with an ability to withstand cold weather and rain well. Oats can also have positive effects on the soil because oats can have very deep roots, allowing oats to use moisture from deeper into the ground. At the same time, oats cultivate the soil and produce valuable organic pulp into the soil (Arctic Food from Finland, n.d.).

### 3.3 Ground meat

Ground meat is a very widely used ingredient and especially popular in Finnish everyday meals. In Finland, the ingredients of ground meat are usually beef and pork, but also for example broiler, lamb and deer are possible. According to Yle's TV programm Kuningaskuluttaja (2013) which focused on Finnish consumer affairs, half of the meat sold in groceries in 2012 was ground meat. About half of all ground meat was beef and pork mixture and a bit under a half was beef. The carbon footprint of ground meat varies a lot and there are multiple factors that affect it. The meat type used in ground meat is the main determining factor; different animals are ranched in different circumstances which naturally causes different kinds of emissions. For example, beef production requires 28 times more land and 11 times more water than pork or broiler production (Eshel et al., 2014). In the chain of beef production, the most significant greenhouse gases are caused by the ruminating process of the cows which causes methane emissions (WWF, n.d.). In this report only ground beef is being considered since it is the most used ground meat type by Service Centre Helsinki.

### 3.4 Fava beans vs. pulled oats

When deciding which one to choose for the comparison, we compared fava beans and pulled oats. We came to the conclusion that fava beans would be the

better option as there was more research available compared to pulled oats or similar processed oat products. In addition, in our opinion fava bean resembles ground meat with its taste, colour and usability, which further led us to our decision.

While this project was taking place, Laitinen (2022) from Helsingin Sanomat reported that Paulig would be selling Pulled oats to Valio, as they were not able to make it profitable. He stated that Paulig sold their R&D to Valio and started co-operation negotiations which led to the termination of 57 employee contracts. According to Laitinen (2022), the factory will shut down at the end of April and the business will be run down by June and for now it is unknown what Valio will do with the brand, which makes the future of Pulled oats uncertain.

### 3.5 Division of ingredient procurement

Service Centre Helsinki sends invitations to tender every 4 years. Therefore, the amounts of ingredients are always listed as 4-year amounts. We got to know the meat and processed food offer request packages that Service Centre Helsinki sent in March 2020. We summed up the relevant ingredients and created a chart that can be seen in figure 5. In the chart it can be seen that in 4 years, Service Centre Helsinki consumes 1 621 834 kilograms of raw meat. The amount of raw ground beef consumed in 4 years is 350 858 kilograms, and the amount of fava bean products is 47 239 kilograms. Together the amount of ground beef and fava bean products is 398 097 kilograms, and out of this number ground beef covers 88.12 percent and fava bean products 11.87 percent.

Figure 5: Meat, ground beef, and fava bean products consumed in 4 years (Service Centre Helsinki, 2020).

CONSUME / 4 YEARS	
Raw meat (including raw ground beef)	1 621 834 kg
Raw ground beef	350 858 kg
Fava bean products	47 239 kg
Raw meat + fava bean products	1 669 073 kg
Raw ground beef + fava bean products	398 097 kg
$\frac{\text{Raw ground beef}}{\text{Raw ground beef + fava bean products}}$	88.12 %
$\frac{\text{Fava bean products}}{\text{Raw ground beef + fava bean products}}$	11.87 %
$\frac{\text{Raw ground beef}}{\text{Raw meat + fava bean products}}$	21.02 %
$\frac{\text{Fava bean products}}{\text{Raw meat + fava bean products}}$	2.83 %
$\frac{\text{Raw ground beef}}{\text{Raw meat}}$	21.63 %

## 4 REPLACING GROUND BEEF WITH FAVA BEAN PRODUCTS

This chapter describes estimated impacts that occur when Service Centre Helsinki would replace ground beef with fava bean products. Estimated impacts are based on general information found from academic sources and that information has been used to assess the possible impacts that Service Centre Helsinki could have when replacing a certain amount of ground beef with fava bean products. The impacts have been divided by the four dimensions of sustainability and the IOOI method is used to assess the impacts. In all the estimated impact chains the input, output and outcome phases remain the same.

In a four year period from 2016 to 2020 Service Centre Helsinki used 350 858 kilograms of raw ground beef. In the same time period Service Centre Helsinki used 47 239 kilograms of fava bean products. If Service Centre Helsinki would replace 25 percent of ground meat, they currently use with fava bean products, Service Centre Helsinki would use about 87 714 kilograms of fava bean products in a four year period. Should Service Centre Helsinki replace 50 percent of ground meat they currently use with fava bean products, they would use about 175 429 kilograms of fava bean products in a four year period.

Figure 6 shows the average prices for ground meat and fava bean products. When comparing the product pricing, we used the market price of a regular grocery store, as the actual purchasing prices of Service Centre Helsinki acquisitions are trade secrets. Because of this we agreed that the regular store prices are sufficiently accurate to make the comparisons. An average price of ground meat has been calculated from the cheapest and the most expensive beef ground meat product. Products are not organic or under high-end brands. An average price of fava bean products has been calculated from two products of Beanit®. All prices for the price comparison are from Prisma Kannelmäki. The price per kilogram of fava beans is 15.08 euros and the price per kilogram of ground meat is 11.34 euros. Based on these figures, fava bean products are 32.98 percent more expensive than ground meat. The prices used in a comparison are common market prices for customers, so the purchase prices of Service Centre Helsinki presumably differ from these comparative prices.

Based on these calculations, replacing ground meat with fava bean products, would have an estimated increase in costs (input) of ~33 percent. When calculated at 25 percent, the output would be 87 714 kilograms of fava bean products which will be used in a four year time period. When calculated at 50 percent, the output is that 175 429 kilograms of fava bean products will be used in a four year time period. Currently ground beef is used 7 times more than fava beans in the meal production of Service Centre Helsinki (Figure 5). Because of this, we estimate that the financial outcome would be an increase in costs. However, this analysis does not include the possibility of lower pricing

when purchasing in a larger quantity and if the product pricing would decrease when demand grows.

Figure 6: Price comparison between ground meat and fava bean products (Foodie, n.d.a; Foodie, n.d.b).

Product	Price (€ / kg)	Average price of the product group (€ / kg)
Beanit® Härkis Original härkäpapuvalmiste, 250 g	15.80	15.08
Beanit® Maustamaton Härkäpapumuru, 250 g	14.36	
Kotimaista Naudan Jauheliha, 400 g	9.95	11.34
Snellman Kunnon naudan paistijauheliha 7%, 400g	12.73	

When replacing ground meat with fava bean products, an outcome is that the amount of vegetarian or vegan food increases in the operation area of Service Centre Helsinki. Service Centre Helsinki serves 100 000 meals a day. Replacing even 25 percent of the currently used ground meat with fava bean products could lead to more people trying vegetarian or vegan meals. It can be assumed that vegetarian meals will be easier to reach and the threshold for eating vegetarian food lowers. We estimate that it can have an impact on a national level and not just in Service Centre Helsinki's operational area. Someone always leads a change; Helsinki can be trendsetters to other cities and organisations.

#### 4.1 Impacts on the environment

On average, an animal-based diet is particularly stressful for the environment. In order to raise farm animals, it is necessary to produce a large amount of fodder, which takes up a lot of arable land and requires fertilisers and pesticides. Animal production also has negative impacts on the climate due to animal digestion and manure. Ruminants, such as cows, produce large amounts of methane, which is harmful to the climate. Agriculture is also the biggest factor influencing eutrophication in the Baltic Sea in Finland. About 70 percent of Finland's arable land is used to produce animal-based food and more than half of the agricultural land is used for the production of dairy products and beef (WWF, n.d.).

In 2021, more than 86 million kilograms of beef were produced (Luonnonvarakeskus, 2022) and in 2019 an average Finnish person ate around 142 grams of meat per day (Saarinen et al., 2019b). Compared to the current Finnish

diet, a “meat to half” diet could decrease the impact on the environment by 13 percent, in a “meat to one-third” diet by 19 percent and in a vegan diet by 37 percent (Saarinen et al., 2019b). In addition, cutting meat consumption from the diet reduces the effects of food production, for example on eutrophication and natural impoverishment (WWF, n.d.). Kuhmonen et al. (2019) evaluated that if Finland would shift to a completely plant-based diet it could mean that fields that had been used to grow feed are freed up for other uses like afforestation, energy production or left as unmanaged fields. They found some possible negative impacts as well, for example, they estimated that in some specific best growing field areas the negative impacts for the environment could even rise when the cultivation would be concentrated in those areas (Kuhmonen et al., 2019).

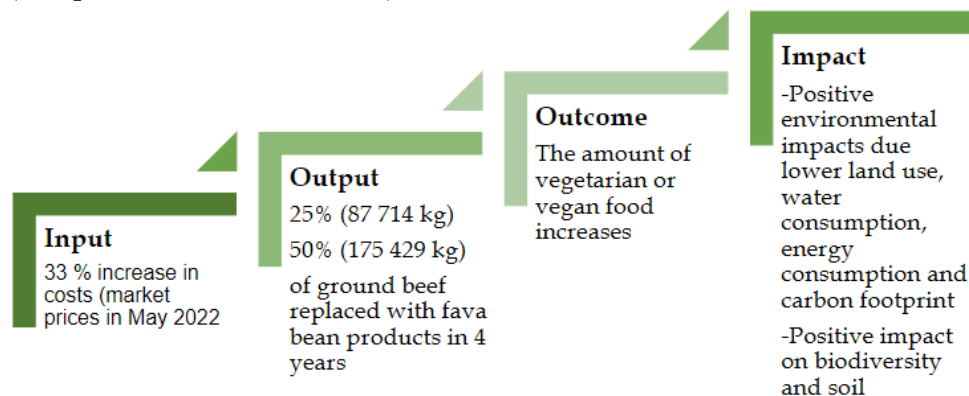
From the figure 7 can be seen CO<sub>2</sub> emissions of plant-based and meat products. Fava beans impact to the environment is 1.9-3.4 CO<sub>2</sub>/kg depending on whether it is low-yield or high-yield (Heusala, 2020). The estimates of the impact of meat on the environment vary. HK (n.d.) informs that the impact to the environment of their ground beef is 8.2 CO<sub>2</sub>/kg and Atria’s (n.d.) 13.4 CO<sub>2</sub>/kg. In addition to the comparison, another plant-based protein product’s pulled oats (Gold&Green, n.d.) impact is 2.5 CO<sub>2</sub>/kg. According to Köpke & Nemecek (2010), fava beans “enables diversification of the agroecosystem”. They state that through the diversification of crop rotations it enhances the diversity of flora, fauna and soil microbes which all can affect the agricultural systems’ sustainability.

Figure 7: CO<sub>2</sub> emissions of the ingredients (Atria, 2019; Gold&Green, n.d.a; Heusala, 2020; HK, n.d.).

Ingredient	CO <sub>2</sub> /kg
Fava beans	1.9-3.4 (depending on low-yield/high-yield) (Heusala 2020)
Pulled oats/Oat protein	2.5 (Gold&Green, n.d.)
Ground beef (Finnish/Swedish)	8.2 / 13.4 (HK, n.d) / Atria, 2019)

Figure 8 shows the estimated impacts on the environment when replacing ground meat with fava bean products. We estimate that it will have positive environmental impacts due to the reduced land use, water consumption, energy consumption and carbon footprint, and also positive impact on soil and biodiversity. The environmental impact of plant-based protein products is significantly lower than meat products. When less land is needed compared to producing meat including fodder production, land areas can be used in other ways.

Figure 8: Impact chain of replacing ground beef with fava beans: environment (Adapted from Aistrich, 2014).



## 4.2 Impacts on animals

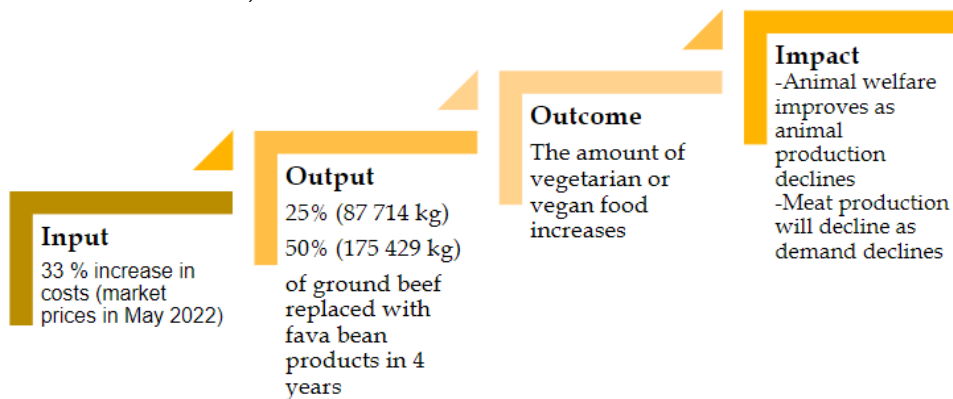
Service Centre Helsinki uses mainly meat produced in Finland (City of Helsinki, 2017). In Finland, animal health care is part of a quality strategy as a way to strengthen national food production. Its purpose is to ensure good quality and safety of food, good animal health and the reasonable use of medicines for farm animals. However, there are deficiencies in the conditions of farm animals (The Ministry of Agriculture and Forestry, 2022). The purpose of the Finnish Animal Welfare Act is to protect animals from unnecessary suffering, pain and suffering and to promote animal welfare and good treatment (Animal Welfare Act 247/1996).

The meaning of animals and their status in our society has changed significantly since the Animal Welfare Act was implemented in 1996 and animal welfare has become a more important topic in politics and media discussion. Livestock production has been undergoing a change, the number of farms has decreased, and the size of farms has increased which means new risks to animal welfare, e.g. due to technology dependency (Kupsala, 2011). While a new Animal Welfare Act has been prepared, SEY states in 2018 that “although the starting points of the bill are modern and commendable, the bill lacks several important concrete reforms. In the case of farm animals in particular, the bill is far too flawed and the derogations, which cover a very large proportion of animals, undermine the purpose of the law.”

Figure 9 shows the estimated impacts for animals when replacing ground meat with fava bean products. We estimate that animal welfare improves as animal production declines and meat production will decline as demand declines. As mentioned before, consumers are increasingly interested in animal welfare, so when vegetarian and vegan food becomes more familiar and it is found to taste good, there should be a lower threshold to choose vegetarian or vegan food in future.



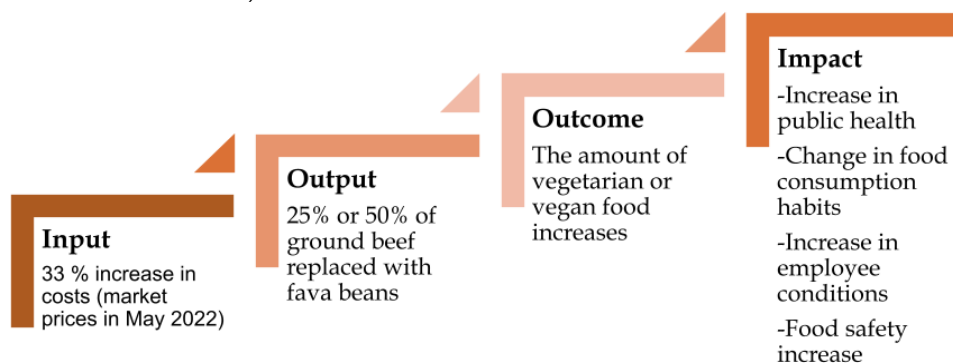
Figure 9: Impact chain of replacing ground beef with fava beans: animals (Adapted from Aistrich, 2014).



### 4.3 Impacts on humans

In Finland, public mass catering has a strong influence in shaping the society's nutrition preferences according to Finnish National Agency for Education (n.d.). Mass catering is provided in schools, day care centres, hospitals and even in some workplace cafeterias. When changing the selection of meals, we are able to change behaviour and affect the everyday life of Finns.

Figure 10. Impact chain of replacing ground beef with fava beans: humans (Adapted from Aistrich, 2014).



The impacts on humans and society would overall be quite positive and the impacts can be seen in the figure 10. The increase of fava beans would reduce the amount of meat Finnish people consume, which according to Valsta et al. (2018) currently the consumption is way over the nutrition recommendations as women consumed 26 percent and men consumed 79 percent more than recommended. We assume that in the long term, this would lead to long lasting effects, when people who consume food in mass catering are influenced by the new option and they could change their eating habits at home as well. This could potentially have drastic effects on the health of society, as according to

Salter (2018) meat products cause a lot of health issues like heart and vein diseases and cancer.

According to Kannas et al. (2004) humans learn food patterns already when they are children, which would decrease the hardship of behavioural change in the later stage in life, as they have learnt it since they were young. However, there can be challenges in the beginning of the transition as based on previous reactions, we assume that there would be some opposition against vegetarian and vegan food. In addition, there are people who suffer from allergies and other food related limitations which need to be taken into consideration. The quality of the food also needs to be good, it is not enough to only provide food, but it needs to taste good as well.

When increasing the use of fava bean products, food security also increases and stabilises. According to Beanit (n.d.b) their fava beans product Härkis can be stored for up to 8 months longer in room temperature when compared to ground beef. In addition, Rokka et al. (2018) has reported that fava beans are sturdy as they tolerate cold temperatures well and only rarely suffer from pests and plant diseases. They have stated that fava bean allergies are not common, which further strengthens its position as a replacement for ground beef.

When compared to traditional meat production the employee welfare differs as well. Regarding employee welfare, a study conducted by Slade and Alleyne (2021) showed that those working in slaughterhouses for the production of meat have endured negative mental trauma since and the working conditions in some locations are poor.

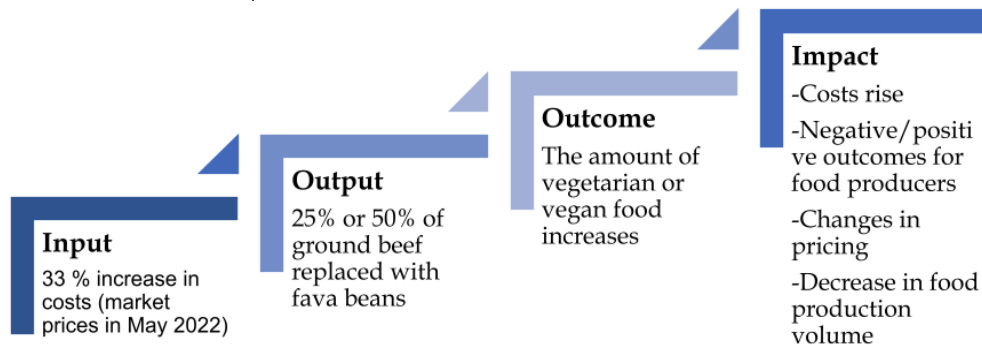
#### 4.4 Impacts on the economy

The replacement of ground beef with fava beans has both negative and positive impacts on the economy. In addition, it raises questions for future opportunities. As mentioned in the introduction, Service Centre Helsinki is the biggest actor in public procurement in Finland and uses roughly 4 billion euros yearly on purchases, which indicates that they can possibly have a large impact with their purchasing decisions. All the estimated economic impacts can be seen in the figure 11 and they are further explained in this chapter.

We estimate that the increased demand of fava beans would support local farmers to produce high quality fava beans that are aimed towards human nutrition, instead of feed for animals. Newton and Blaustein-Rejto (2021) state that the increase of need in human nutrition could possibly bring higher profits to farmers as the plant-based meat companies create new market opportunities, and as the demand grows and the farmers can utilise them in their crop rotation. Meanwhile if the demand of ground beef decreases, the authors assume that it could affect the meat producers negatively. As they have large facilities and expensive gear, the losses could be dramatic and in the worst case some producers could hypothetically go bankrupt if the public procurement has a

large importance in their production. However, the authors assume that the change will most likely be gradual, which opens the possibility to adapt to the change.

Figure 11. Impact chain of replacing ground beef with fava beans: economy (Adapted from Aistrich, 2014).



This would also have an effect on the crop production, as mentioned in the fava bean chapter, in Finland the majority of the fava bean crop is grown to feed animals. However, this opens an opportunity for the country as Kaukovirta-Norja et al. (2015) have stated, the increase of plant protein production and the possibility to import it would have an overall positive impact on the country's economy. Or as Heusala et al. (2020) argued, the food production could be scaled down and then costs would be saved as the land use decreases and it would not require as much resources. In addition, we assume that the costs would decrease a little as there is no need to provide as much vegan and vegetarian food separately for those who have required it previously. By producing larger batches, the costs and resource use will decrease.

It is important to remember that Service Centre Helsinki is a large actor in public procurement in Finland. If other mass food production service centres would follow along, it could have a massive impact on the Finnish food production system as a whole. Service Centre Helsinki's action could influence others to join, thus increasing demand. We assume that once demand increases the manufacturers could improve their processes which would reduce the price of the product in the future. This would then ease the costs of procurement and the budget would not grow. However, in the short time span, the costs will go up as the price of fava beans is currently a lot higher as we can see from figure 6.

## 5 RESULTS & LIMITATIONS

### 5.1 Results

First, a little recap: Climate change can be tackled only by making concrete changes in consuming habits, and the food we consume is one of the most significant changes we can make. Public procurement has a big role in this sense, since the demand of different types of food determines the future of the supply. When creating impact, values related to sustainable development are essential. Sustainability comprises environmental, social, and economic responsibilities, and in this project animal welfare as well. The IOOI method helps to understand the inputs, outputs, outcomes and impacts of the impact chain.

There are multiple reasons why replacing ground beef with fava bean products is a good idea: the harmful environmental impacts of fava bean products are undeniably smaller than that of ground beef. These impacts include carbon emissions, land use, freshwater consumption and primary energy. Also, the nutritional values of fava bean products are healthier than those of ground beef. However, it is important to remember that once processed, the nutritional information can change depending on the manufacturer. Which means that the health benefits of fava bean products depend on how they are processed and what other ingredients are added.

Replacing ground meat with fava bean products or with some other plant-based products would have a concrete effect on climate and also positive impact on biodiversity due lower land use, freshwater consumption, energy consumption and carbon footprint. Negative impacts were found limitedly and only if Finland would switch to a completely plant-based diet. Generally speaking, fava beans are a low-emission source of protein, they are rich in fibre, and the production requires little land use compared to many other ingredients; the CO<sub>2</sub> emissions of the production of 1 kilograms of fava bean concentrate vary between 1.9–3.4. Overall, offering more plant-based options can increase the amount of people switching to plant-based foods which can thus make larger changes within the agriculture industry.

We found out that even though a new Animal Welfare Act is being prepared, the new act does not guarantee the welfare of farmed animals. Therefore, the most significant way to influence animal welfare is to support plant-based products. The role of animals in society is and has been changing, however all the change is not good for the animals. Although animal welfare is now better understood, production conditions have changed from small to larger farms, which brings new animal welfare problems into production. We simply state that animal welfare improves as animal production declines.

The effects of replacing ground beef with fava beans would be mostly positive when observing humans. Currently Finnish people consume too much meat and the introduction of replacement options during the early life stage,

this could be changed. In addition, the life expectancy and quality of life would most likely increase as meat consumption is heavily linked to cancer and cardiovascular diseases. However, while fava bean products may be healthier than ground beef, the nutritional value of fava bean products can change once processed. This means that the benefits need to be valued based on the specific fava bean product as different products can have different impacts on health. In addition, the society's food safety would increase as the fava beans rarely suffer from pests and plant diseases. There also may be an improvement in working conditions, if those working in slaughterhouses could instead work at fava bean production locations. The downsides of replacing ground meat is the potential opposition against plant based options and any possible allergies that people may have.

Service Centre Helsinki has an opportunity to affect public procurement standards as they are the biggest single purchaser in Finland within public procurement. Because of this, the long-term costs of fava bean procurement could get lower as the demand grows and production processes improve to increase supply. In the beginning the procurement costs would go up as fava beans are more expensive than ground beef, but we estimate that the gap will close in the long run. The negative economic impacts would affect meat producers as the demand would decrease, however we estimate that with proper precautionary measures the negative effects could be avoided as the farmers could prepare for the change. The increased demand of fava beans could have positive effects on farmers' and Finland's economy as it could create an opportunity for importing. Generally speaking, fava bean production could open up possibilities for the economy.

## 5.2 Limitations

The most obvious limitation in this project is the lack of exact data about the life cycle of fava bean products. For example, the precise number of carbon emissions was not available in this project through scientific literature. Fava bean products are not yet common on a global scale, so gathering enough data about the environmental impacts to draw definitive comparisons was not possible. There were also challenges in finding applicable data on the environmental impacts of ground beef. We assume this is because the process of ground beef is not separated from general beef production. Additionally, the results vary drastically depending on the farm where they are measured, thus making it challenging to find applicable data to compare. Because of the lack of this kind of data, this report should be seen as an introductory overview of the impacts of replacing ground beef with fava bean products.

Another limitation concerning this project is the financial numbers. The prices used in this project are common market prices and there might be differences in the price ratios when brought to B2B scenarios. For this report we had a page restriction from the university. Due to this limitation, the report only

scratches the surface of the potential impacts that would come with replacing ground beef with a plant-based protein. Because of this, we recommend having a deeper analysis of the possible impacts. Also, in this paper, outputs are measured by how much ground meat is replaced by fava bean products. In a more detailed report, it would be important to evaluate other output factors as well. Other output factors could be how much research, planning and implementation work would be needed.

In the future, the research could be taken forward in many ways. Helsinki Service Centre originally gave us four steps from which we have now completed the first one. The following steps would be:

- To model or simulate the impact chains and/or the impact ecosystem.
- To define the most impactful procurement criteria in terms of advancing positive changes in biodiversity, animal welfare and climate change.
- To build an impact identification and assessment tool for procurement.

These steps create a natural path to move forward on. In addition to these steps, we think it would make sense to study other plant-based protein options that could replace meat products – for example, quinoa and buckwheat are domestic grains rich in protein.

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