Redistribution of leftover food from municipal canteens in Sweden to avoid food waste

Environmental, social and economic effects

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Redistribution av matrester från kommunala storkök i Sverige för att undvika matsvinn
Klimatmässiga, sociala och ekonomiska effekter

Sammandrag

I december 2015 skrev den svenska regering under FN:s Agenda 2030 bestående av 17 hållbarhetsmål med tillhörande 169 delmål. Mål 12, delmål 3 lyder: *"Till 2030, halvera det globala matsvinnet per person i butik- och konsumentledet, och minska matsvinnet längs hela livsmedelskedjan, även förlusterna efter skörd."* Att fullt ätbar mat slängs belyser alla tre aspekter av begreppet hållbarhet på ett effektivt sätt; det är varken ekonomiskt eller etiskt försvarbart och ett slöseri med naturresurser. Svenska storkök lagar och serverar mat till barn, elever och äldre inom olika kommunala verksamheterna och tillsammans genererar de ca. 73 000 ton matavfall årligen. Enligt FAO definieras matavfall som minskning av kvantitet eller kvalitet av mat, och matsvinn som kasserande och icke-konsumtionsrelaterad behandling av mat som är säker för förtäring.

Syftet med denna uppsats har varit att undersöka matavfallet från kommunala storkök i Sverige och hur mycket av detta som utgörs av matsvinn. Frågor som utgjort grunden för arbetet berör totala mängder matavfall, andelen matsvinn som skulle kunna tas omhand och redistribueras, samt miljömässiga, sociala och ekonomiska effekter av en sådan redistribution. För att kunna besvara dessa genomfördes en litteraturstudie, en intervju, en mer omfattande och två kompletterande enkäter samt en fallstudie. Målet var att formulera ett förslag på hur överproducerad mat från de kommunala storköken skulle kunna redistribueras för att optimera samtliga tre hållbarhetsparametrar.

Data från den mer omfattande enkäten kategoriserades utifrån huruvida enkäten besvarats från kommunen centralt eller inte, och vidare vilken typ av kök deltagarna representerade. Totalt erhölls 121 enkätsvar med representanter från 84 kommuner. Resultat från denna enkät indikerar att det årliga matavfallet varierar från 3.5 kg per person för tillagningskök, till 8.6 kg per person uppskattat av de som svarat på kommunal nivå. Beräkningar på matavfallet för den genomsnittliga kommunen uppskattades till dryga 40 ton per år, av vilket i genomsnitt 19 ton utgjordes av matsvinn. Utsläpp av växthusgaser relaterat till behandlingen av dessa matsvinnsmänger beräknades till 2.6 ton CO_2-ekv. per år och kommun, vilket motsvarar ca 0.002 % av kommunens totala utsläpp. Vidare skulle det ätbara svinnet kunnat tagits omhand och motsvara närmare 58 500 portioner. Kostnader som kommunen kunnat undvika för avfallshanteringen av matsvinnet uppskattades till 5 500 SEK per år.

Det konstaterades att ett förslag med optimerad hållbarthetsprestanda, enbart utifrån uppsatsens resultat, inte kunde ges. För detta skulle det krävas mer omfattande studier på såväl klimatmässiga, sociala som ekonomiska effekter av svinnet. Vidare konstaterades det, i enighet med EU:s avfalls hierarki, att fokus bör ligga på att motverka uppkomsten av matsvinn. Det ska också belysas att alternativet att redistribuera sådant som annars blivit matsvinn inte får legitimera överproduktion.

Slutsatser som dragits från erhållna resultat är att stora mängder ätbar mat slängs från de kommunala storköken. Svinnet uppstår främst i form av tallrikssvinn och från de bleck med mat som varit ute i servering. Resultat från den mer omfattande enkäter tyder på osäkerhet bland de som arbetar i köken kring var som får och inte får göras med den mat som riskerar att bli svinn. Att redistribuera överproducerad mat från storköken skulle bidra till ett mer hållbart matsystem, även om de klimatmässiga och ekonomiska vinsterna är små.

Nyckelord

Matsvinn, redistribution, hållbarhet, kommunala storkök

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Abstract

In 2015 the Swedish government signed the UN Agenda 2030 comprising of 17 Sustainable Development Goals and a total of 169 sub targets. Goal 12 target 3 reads as follows: *"By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses."* Wasting eatable food effectively highlights all three parameters of the concept of sustainability; it is neither economically nor ethically defensible and it is a waste of natural resources. In Sweden the public canteens serving children, students and elderly within various municipal activities, generate food loss amounting to 73 000 tonnes annually. According to FAO food loss refers to the decrease of quantity or quality of food whilst food waste is the discarding and non-food related treatment of food that is safe for human consumption.

The aim of this thesis was to investigate food loss from Swedish canteens and the share constituting of food waste. Research questions establishing the foundation of this work regarded food loss quantities, the share constituting of food waste which could be redistributed and environmental, social and economic effects from a potential redistribution. To answer the research questions a literature study, one interview, one more extensive and two complementing surveys and a case study were conducted. The goal was to present a suggestion on how overproduced food from municipal canteens could be redistributed, aiming at optimizing all three parameters of sustainability.

Data from the larger survey was categorized based on whether the respondent answered from a municipal position or not, and further on the type of kitchen the respondents represented. A total of 121 attendants answered the survey, representing 84 municipalities. Thesis results imply annual food loss quantities varying from 3.5 kg per person for kitchens solely cooking, to 8.6 kg per person for attendants answering from a municipal position. For the average municipality, food loss quantities was estimated to 40 tonnes of which approximately 19 tonnes is suggested to be food waste. Resulting greenhouse gas emissions was calculated to 2.6 tonnes of CO_2-eq. per year, corresponding to 0.002 % of the total greenhouse gas emissions from the municipality. The 19 tonnes of eatable food could have been served to approximately 58 500 persons and expenses avoided from reduced waste management costs would have corresponded to 5 500 SEK.

It was concluded that a redistribution suggestion with optimized sustainability performance, solely based on thesis results, could not be given. This would require more profound research on both environmental, social and economic effects from the food waste. In line with the EU waste hierarchy, focus should be that of working preventively from generating food waste. It should also be emphasized that redistribution must never legitimize the overproduction of food.

Conclusions from thesis results aret hat large food waste quantities are generated from Swedish public canteens. Food waste primarily arise from plate scrape off and from trays with food that have been up for service outside of the kitchen. It is believed, based on results from the larger survey, that canteen staff are unsure of what they may and may not do with leftovers to reduce food waste. To redistribute overproduced food from the municipal canteens would contribute to a more sustainable food system, even though environmental and economic gains are small.

Keywords

Food waste, redistribution, sustainability, municipal canteens

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Preface

First of all I would like to thank my supervisors Eva, Charlotte and Mattias without whom this thesis could not have been completed. Thank You for all Your helpful comments, constructive critiques and feedbacks throughout my work and for answering sometimes late, long and confused emails.

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Moreover I would like to express great appreciation to my boyfriend Adam for all Your support and encouraging words, and for Your patience with me being in Bengt-mode. To my family for great support and positive energy, and to all of You that I have imposed to eat food with expired best-before-date.

Abbreviations

CO_2-eq. = Carbon dioxide equivalents

EU = European Union

FAO = The Food and Agriculture Organization of the UN

FLW = the EU Platform on Food Losses and Food Waste

LCA = Life Cycle Assassment

NGO = Non governmental organization

UN = United Nations

Translations

Canteens = large-scale kitchens, *storkök*

Food disintegrator = *matavfallskvarn*

Contents

1 Introduction

1.1 Background

"As scientists of the IPCC have made it clear that climate change is caused by human behaviour, it is only natural that we have to change our behaviours to keep this only planet Earth environmentally sustainable for our succeeding generations."

This was said by the general secretary Ban Ki Moon during the United Nations conference of climate change in Marrakech, 15^{th} of November 2016. Superseding the Millenium Development Goals, member states of the UN established a new road-map called Agenda 2030 to ensure global sustainable development post 2015. Agenda 2030 constitutes of 17 Sustainable Development Goals aiming at ending poverty and inequalities whilst ensuring economic growth and the tackling of climate challenges (UN 2018c). Each Sustainable Development Goal comprise of several sub targets and the third target of goal number 12, Responsible Consumption and Production, reads as follows:

"By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses." (UN 2018a)

Food waste occurs throughout the entire food chain, from the crops never leaving the farmers cultivation land to the forgotten leftovers in the freezers of the households. According to the Food and Agriculture Organization of the UN, FAO, one third of all food produced in the world is lost or wasted (FAO 2018). It is also estimated that 25 - 30 % of the global greenhouse gas emissions originate from the food production system (Tilman and Clark 2014). Furthermore, producing food that is not consumed causes unnecessary emissions. Wasting eatable food effectively highlights both the essence of Agenda 2030 and the three aspects of sustainability; it is a waste of natural resources and neither ethically nor economically defensible.

In a world where up to 30 % of all food produced is wasted, over 800 million people are undernourished. The majority of the undernourished live in developing countries but families are struggling to get food on their tables in more developed countries as well. According to UN (2018b) the global food and agriculture system must be redesigned to assure food security, fair economic terms and conditions and environmental sustainability. Adding to the environmental and socioethical aspects of food waste, monetary losses arise from this as well. Annual economical value of global food waste amounts to an estimated 990 billion US$, corresponding to nine thousand billion SEK (FAO 2018).

Around the world these food related issues have gained large attention lately. Initiatives saving and redistributing food that otherwise would have been wasted

can be found in several countries. Various businesses, both NGOs and private companies, with various solutions to the problem have emerged. From businesses saving groceries from wholesalers and redistribute it to charity organizations (Allwin 2017a), to companies that via an app connect private persons with restaurants, cafes and bakeries selling daily leftovers to reduced prices (Karma 2018; ResQ 2018a).

In 2016 the public canteens in Sweden generated 73 000 tonnes of food loss making them the largest public food loss generators on the consumer side of the food chain. Although approximately 40 % of the food loss generated was biologically degraded (Naturvårdsverket 2018) utilizing food for its intended purpose of feeding people is environmentally a better option (Eriksson, Strid, and Hansson 2015), even though the best alternative would be not generating any waste at all. To optimize a system, not causing any waste at all, is a difficult task. Reusing what could be reused would then, according to the waste hierarchy, be the best option (Naturvårdsverket 2017).

As the government and the local municipalities with them formulate and constitute laws and regulations it should be in their interest to act as good examples saving food that risk becoming food waste, which is where this thesis picks up. If not reusing overproduced food and serving it within the own canteen, municipalities may redistribute it. Redistribution, especially to charity, could contribute to a more sustainable food system, both environmentally and socially. Focus of this thesis will be to explore hos overproduced food from municipal canteens can be managed and utilized more resourceful, with the foundation built on the three pillars of sustainability.

1.2 Goal and research questions

The aim of this thesis is to evaluate how Swedish municipalities can manage and reuse leftover food more sustainable. The goal is to investigate food loss and food waste quantities from Swedish public canteens. This as to approximate environmental effects in the form of greenhouse gas emissions as well as resulting social and economic consequences from a potential redistribution.

Research questions to be answered are:

- How large are food loss and food waste quantities from the municipal canteens in Sweden?
- What are the environmental, social and economic benefits from redistributing overproduced food from municipal canteens?
- How could a food redistributive solution for the canteens be designed in order to optimize environmental, social and economic benefits?

1.3 Scope

The thesis focuses on Swedish municipal canteens serving food in public kindergartens, schools and care homes. Food loss and food waste terms will be used as defined by the Food and Agriculture Organization of the UN, FAO, further described in chapter 2.2.1. Regarding the environmental perspective emphasis is put on greenhouse gas emissions solely and calculations on economical consequences are investigated from a municipal perspective. Social effects are primarily measured in the form of number of portions available from the food waste, although other aspects are discussed as well.

1.4 Method and disposition

Throughout this thesis, methods applied are:

- Literature study
- Interview
- Survey
- Case study

The literature study forms the base of the theory chapter, knowledge valuable for later analyses. Further a semi-structured interview with representatives from the municipality of Partille was conducted in the very beginning of this project as to give insight in the everyday work performed in municipal canteens, a prerequisite formulating later surveys.

In total three surveys were performed throughout this thesis; one more extensive and two complementing. The larger survey constitutes the foundation of the thesis and addressed municipal canteens. It was filled in digitally in order to facilitate statistical analysis and the sample group comprised of all 290 municipalities in Sweden. This was complemented by two smaller, semi-structured surveys communicated via e-mail. One of the surveys investigated how municipal food waste is currently treated and the other focused on charity organizations working with food redistribution. Additionally a case study on the municipality of Kristianstad was conducted, examining waste management costs. Data from the surveys and the case study are predominantly quantitative while data from the literature study and the interview are mainly qualitative. More profound and detailed descriptions of methods applied are to be found in chapter 3.

The paper is initialized by a theory chapter declaring findings from the literature study, followed by key data from conducted interview. After this results from the surveys and the case study are presented, results on which calculations are performed. Findings and calculation results are further analyzed and based on these a suggestion to a redistribution solution is presented. Lastly results are discussed and summarized.

2 Theory

In this section findings from the literature study are declared, knowledge that is of importance to later understand and be able to analyze conducted interview, surveys and case study.

2.1 Laws and regulations

To ensure food safety and human health, there are several laws and regulations on how food is to be handled and treated throughout the food chain. EU legislation apply to all member states and is often formulated so that each country form their own modified version, ensuring compatibility with existing national legislation.

2.1.1 EU regulations

Regarding handling food and food waste EU regulations relevant for this thesis are:

- Regulation (2002/178/EG). General principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety,
- Regulation (2004/852/EG). Hygiene of foodstuffs,
- Regulation (2004/853/EG). Specific hygiene rules for food of animal origin,
- Regulation (2004/882/EG). Official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules,
- Regulation (2011/1169/EG). Provision of food information to consumers

Below follow brief descriptions of above mentioned regulations. The legislation constitutes of a significantly large scope but only that concerning handling and redistribution of food is to be presented.

Regulation (2002/178/EG)
This regulation establishes the European Food Safety Authority as well as common principles and responsibilities. It forms the general principles regarding food and food safety at community and national level. Further, it states that the regulation shall be applied to all stages of production, processing and distribution of food for commercial purposes. (European Parliament and the Council, 2002/178/EG)

Food business is defined by the regulation as:

"...any undertaking, whether for profit or not and whether public or private, carrying out any of the activities related to any stage of production, processing and distribution of food"

It is also stated that food business operators are responsible to ensure that all stages under their control meet requirements of food laws relevant to their activity. (European Parliament and the Council, 2002/178/EG)

Ensuring traceability, regulation (2002/178/EG) declares that food business operators must be able to identify both the supplier from whom they received any foods and to whom their products have been delivered. Traceability is of great importance especially in the case when unsafe or contaminated food is brought to the market and its origin has to be traced. (European Parliament and the Council, 2002/178/EG)

Regulation (2004/852/EG) and Regulation (2004/853/EG)
To assure proper handling of food, regulation (2004/852/EG) lays down general rules on hygiene for food business operators. In line with above regulation, the food business operators are responsible for meeting relevant laws on food hygiene at all stages under their control. It is within the food business operators responsibility to ensure an unbroken cold chain and that the so called Hazard Analysis and Critical Control Points, HACCP, is applied. In short, HACCP states that food business operators must identify potential hazards and work to prevent, eliminate or reduce those to acceptable levels. It also states that operators must have a system on how to handle potential problems. (European Parliament and the Council, 2004/852/EG)

Within regulation (2004/852/EG) requirements on registration of food business operators are declared. This as to allow for official controls, further described in regulation (2004/882/EG). (European Parliament and the Council, 2004/852/EG)

Regulation (2004/853/EG) is a supplement to regulation (2004/852/EG) regarding specific food hygiene requirements related to food, processed as well as unprocessed, of animal origin. (European Parliament and the Council, 2004/853/EG)

Regulation (2004/882/EG)
Regulation (2004/882/EG) declares rules on official controls practiced to verify compliance with existing regulations in order to prevent, eliminate and reduce risks that may harm humans or animals. It aims at ensuring fair trade of food and protecting the interests of the consumers. The regulation states that controls shall be performed by competent authorities, domestic as well as foreign, and that it is within the scope of the member states to monitor that these controls are carried out regularly and with appropriate interval. (European Parliament and the Council, 2004/882/EG)

Regulation (2011/1169/EG)
In line with general rules laid down in regulation (2002/178/EG), this regulation aims to protect consumers with regards to food information. It establishes general principles on food labeling with special regards to ingredients, allergens, durability, origin and nutrition declaration. This is of importance to food redistributive activities as redistribution may include selling leftover food. (European Parliament and the Council, 2011/1169/EG)

2.1.2 Swedish regulations

In Sweden there are four laws relevant to municipal food redistribution:

- Swedish Food Law (SFS 2006:804),
- Swedish Food Decree (SFS 2006:813),
- LIVSFS, The National Food Agency's regulations – Code of Statutes
  - (LIVSFS 2005:21) on official controls,
  - (LIVSFS 2005:20) on food hygiene,
  - (LIVSFS 2014:4) on foodstuff information,
- Municipal Law (SFS 2017:725)

The Swedish Food Law (SFS 2006:804) corresponds to and complements regulation (2002/178/EG) as stated within the aim and scope of the EC regulation. Decree (SFS 2006:813) is the Swedish law on hygiene and controls complementing regulation (2004/852/EG),(2004/853/EG) and (2004/882/EG). In the Swedish Food Decree (SFS 2006:813) general rules are declared while Code of Statutes present more specific details. (LIVSFS 2014:4) is the Swedish equivalent and complement to regulation (2011/1169/EG) defining national deviations to that stated in the EU regulation (Livsmedelsverket 2014). Food redistributive activities fall under regulation (2002/178/EG):s definition of food business and as Swedish laws fall within the scope of common EU regulations (Hanssen et al. 2015), these are not further analyzed.

Moreover there are local municipal laws obliged to public canteens. Municipal Law (SFS 2017:725) regards, amongst others, regulations on how municipal economical businesses should be conducted. Important for potential redistribution are principles stating that municipalities may not pursue profit-making activities. The law further includes regulations on financial support to individual organizations (Finansdepartementet 2017). However, the Swedish National Food Agency recently published a statement on their website specifically targeting food redistribution within municipal businesses. It was stated that municipalities are allowed to donate food, receive donated food and sell overproduced food, as long as laws on procurement and competition are met (Livsmedelsverket 2018).

2.2 Food loss and food waste

2.2.1 Definitions

It is highly important to clearly define what food loss and food waste refers to, as to avoid misunderstandings. According to FAO food loss refers to decrease in quantity or quality of food, whilst food waste is discarding or alternative, non-food use of food that would have been safe and nutritious for human consumption. With these definitions food waste is a part of food loss, and both occur throughout all parts of the food chain (FAO 2018). Throughout this paper food loss and food waste will be used as defined by FAO.

2.2.2 Food loss throughout the food chain

After exiting the farm gates food and groceries undergo several steps before ending up as food on someones plate. These steps of the food chain are categorized into:

- Primary production,
- Processing,
- Wholesalers and supermarkets,
- Restaurants and canteens,
- Private households

(Lagerberg Fogelberg 2014)

Below follow brief descriptions of the most common reasons to why food loss occurs within respective category.

Primary production

In defining primary production, regulation (2002/178/EG) includes production, breeding and cultivation of primary products. It includes harvesting, milking

and production of foodstuff producing animals before slaughter. Hunting, fishing and collecting wild products are also included in the definition. (European Parliament and the Council, 2002/178/EG n.d.)

In cultivation food loss mainly occur as a consequence of inconsistent ripeness of crops, too low market prices making harvesting unprofitable, crops being damaged during the harvest process, poor storage conditions, environmental growing conditions reducing crop quality and products being discarded due to not meeting expectations and standards on size, shape and look. (Lagerberg Fogelberg 2014)

Common reasons for food loss in animal breeding, fishing, fish farming and for foodstuff producing animals are euthanizing of sick or injured animals and animals dying during birth, breeding and transports to slaughterhouses. Furthermore, fishes in fish farms die during breeding, fishes from fishing boats are discarded due to quotas and size requirements and eggs are discarded due to cracks or diseases. (Franke 2013)

Processing

Products from the first step in the food chain are processed in various types of industries, e.g. milling of cereals and peeling of roots and vegetables. It also includes more extensive refining and preparation of products into eatable foods, e.g. industrial bakeries, pasteurization of dairy products and peeling, cutting and precooking root vegetables. (Jordbruksverket, Livsmedelsverket, and Naturvårdsverket 2013)

Reasons to food loss in food processing industries are reduced quality on delivered products, errors in production, overproduction due to uncertainties in customer orders, incorrect storing and/or handling of products and products being discarded due to not meeting expectations and standards on size, shape and look. (ibid.)

Wholesalers and supermarkets

Wholesalers hold large quantities of food and from the wholesalers regular supermarkets buy their products, as a supermarket for the supermarkets. Hence reasons for food loss in wholesalers and supermarkets are similar.

Food loss from wholesalers and supermarkets often arise from expired best-before-date which may be related to oversized orders, wide product range lowering the grocery and food turnover, unpredictable variations in customer demands, poor packaging and inappropriate storing, handling and exposure of products. (Eriksson 2015)

Restaurants and canteens

This category includes all restaurants, canteens and catering activities. Canteens and catering firms cook and sometimes also distribute food, often in larger quantities. Food served in kindergartens, schools, hospitals and elderly care homes are often prepared and cooked in canteens.

Common reasons to food loss in restaurants and canteens are poor storage conditions, careless handling and preparation of groceries and waste from customers plates which may be linked to serving too large portions. Other reasons are buffés which cause large losses and difficulties in predicting the number of guests to be served. There may also be a lack of knowledge or uncertainties regarding laws and regulations on what could be stored for later service. (Naturvårdsverket 2013)

Private households

In more than 70 % of the Swedish municipalities, households have the possibility of separating food loss from domestic waste. Additional to the food sorted out, approximately one fourth of the food loss is poured out or flushed down the sewage system (Naturvårdsverket 2018). Of the sorted food loss from households 35 % is estimated to constitute of food waste (Jordbruksverket, Livsmedelsverket, and Naturvårdsverket 2013).

From private households food loss is often generated as a consequence of poor planning, purchasing and cooking of food, too large purchases, lack of knowledge regarding best-before-labeling and not emptying packages. It could also arise from poor storage conditions, not using all edible parts of vegetables and fruits and not eating or reusing leftovers. (Naturvårdsverket 2013)

Figure 1 below summarizes the causes of food loss in the various parts of the food chain, as reviewed above.

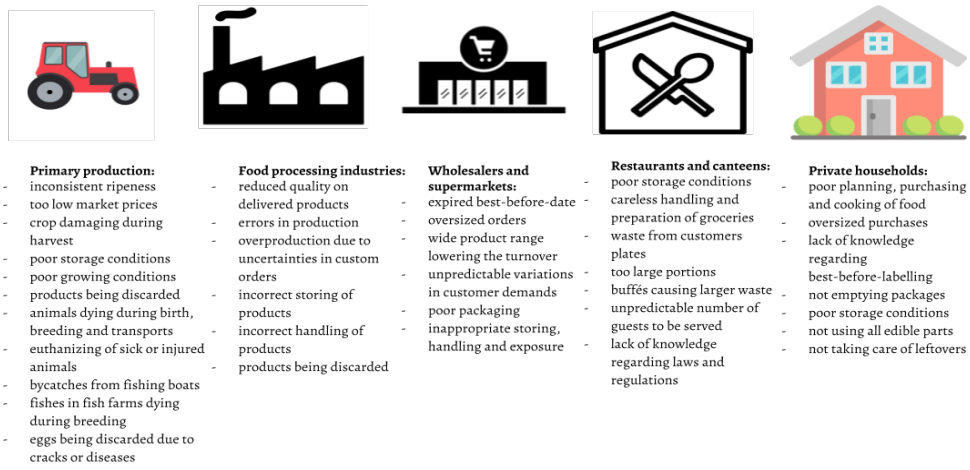

Figure 1: *Causes of food loss throughout the food chain*

2.2.3 Statistics on food loss and food waste in Sweden

In 2016 the total food loss in Sweden, including food waste, amounted to 1 255 000 tonnes. Accounting for the whole food chain this corresponds to 129 kg of food per person and year. In table 1 food loss quantities for each category are presented. Data include both separated food and food thrown in the unsorted bin, as well as food flushed down the sewage system (Naturvårdsverket 2018).

Table 1: *Food loss from various parts of the food chain, Sweden 2016. Numbers given in tonnes. * Numbers from 2014 as no data for 2016 was available. (Naturvårdsverket 2018)*

Primary production	98 000 t*
Food industries	43 000 t
Wholesalers and supermarkets	30 000 t
Restaurants	71 000 t
Canteens	73 000 t
Private households	938 000 t
Sum	**1 255 000 t**

Regarding Swedish canteens, a survey from 2017 was conducted on behalf of the Swedish Energy Agency investigating food waste from 19 public canteens. The results show that approximately 5,6 tonnes of prepared and cooked food within the 19 canteens was wasted each year. Adding the weight from wasted

groceries, a standard portion á 320 g generated 20 g food waste (Pettersson, Breitholtz, and Olsson 2017). These numbers however do not include waste from plate scrape off. Another case study comprised in the Municipality of Sala, Sweden, investigated food waste from a total of 40 schools, kindergartens and elderly care homes. Results from Sala imply a much larger waste, 75 g on average per standard portion of same size (Eriksson, Malefors, et al. 2016). The article further implies that kitchens solely serving food, i.e. receiving already cooked food, generate larger food waste quantities than kitchens solely cooking and kitchens both cooking and serving. A much larger food loss, 18.2 kg food per person and year, is suggested by Stare et al. (2013). It should be stressed that food waste quantities per portion is not comparable to that per person served.

Numbers in above examples only account for what actually ends up in the sorted bin. According to Stare et al. (ibid.) 13 % of the food wasted is found in the regular bin, despite kitchens having food waste separation. The report further estimates that 52 % of the food loss constitutes of food waste. Moreover food loss and food waste are generated from different stations within the canteens. In Göteborgsmodellen, described in the section below, it is estimated that half of the food waste from canteens originate from plate scrape off and half from within the kitchen (Måltid Göteborg 2016).

2.2.4 Food waste reducing measures in canteens

As previously stated, utilizing food for its intended purpose of being consumed is more sustainable compared to treating it by anaerobic digestion, composting or incineration (Eriksson, Strid, and Hansson 2015). Even better would be not producing leftovers at all as according to the waste hierarchy. Since issues related to food waste have been brought to the agenda several waste reducing initiatives, both on local and national levels, have emerged.

In Gothenburg, Sweden, a model called *Göteborgsmodellen* has gained large attention. Göteborgsmodellen is a concept for school canteens to reduce food waste quantities and it has been spread and implemented by many other municipalities. Established in 2016 Göteborgsmodellen is a practical instrument based on 9 key measures aiming at reducing the food waste.

1. Measuring, monitoring and follow-up on food waste quantities. This in order to identify hotspots within the kitchen where the largest quantities arise.
2. Menu planning. A flexible menu allows serving leftovers and/or converting it into new dishes.
3. Calculating portion sizes. Based on reasonable, adaptive portion sizes amounts food to prepare and cook can be calculated.
4. Good communication with other instances of the school. A system to report absent students allows for the kitchen to regulate food quantities.
5. Routines on purchases. A well functioning system with delivery close to cooking date and packages of varying sizes decrease the risk of food getting old.
6. Storing. Keeping good order and overview of what is in stock is important and further to use the oldest groceries first.
7. Cooking. When cooking it is important that recommended amounts calculated from previous measures are followed and if possible the kitchens may serve in trays of various sizes.
8. Service. Measures in service could be using cutlery of appropriate sizes and solely having one tray of each component up for service.
9. Using leftovers. Both reheated and served again and incorporated in new dishes.

(Måltid Göteborg 2016)

Another example of a food waste reducing measure was introduced in the municipality of Kiruna. During lunch servings, all serving trays were removed from the public canteens. Instead cutlery and napkins were placed on the tables and

more stations for drinks and bread were organized. Result from this reduced food waste quantities by approximately 50 % (Jordbruksverket, Livsmedelsverket, and Naturvårdsverket 2013). Also in line with this is a suggestion by Ryderheim and Westerlund (2014), investigating canteen food waste in the municipality of Lomma. According to the authors smaller plates could be used to limit food waste by decreasing the risk of putting too much food on the plate.

2.3 Climate impact of the food system

Each year tonnes of anthropogenic carbon dioxide is emitted to the atmosphere, forcing climate changes and global warming. It has been estimated that up to 30 % of all greenhouse gas emissions can be attributed to the global food system, from fertilization production to packaging and transports. This corresponds to 16 900 million tonnes of carbon dioxide equivalents, CO_2-eq., each year (Vermeulen, Campbell, and Ingram 2012). In Sweden corresponding number is approximately 14 % (Statistiska Centralbyrån 2018). In the earlier presented Göteborgsmodellen it is estimated that 1 kg food waste cause emissions corresponding to 1.6 kg CO_2-eq..

Producing groceries and food consumes both energy and resources. Fertilizers and fodder must be produced, both animals and plants need water, tractors used are often fueled with diesel, materials for packaging must be produced, products and materials are transported, energy is needed for both heating and cooling and the residuals of it all must be processed. A large number of Life Cycle Assessments, LCA:s, have been conducted on several groceries. Several of these have been summarized by Röös (2014). Figure 2 below illustrates the most common groceries and related emissions. Unless other is declared values are given for food produced in Sweden.

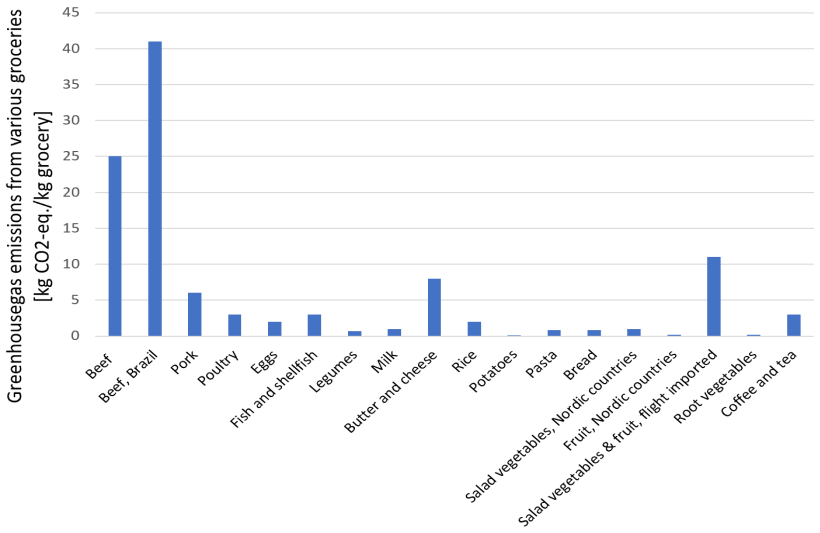

Figure 2: *Greenhouse gas emissions related to various groceries. Numbers after Röös (2014).*

For a wider scientific base data from Röös (2014) were compared with other LCA:s. Seven articles investigating greenhouse gas emissions from seven different groceries were studied. Results along with numbers from Röös (ibid.) are presented in table 2.

Table 2: *LCA results on greenhouse gas emissions related to different groceries. Numbers given in kg CO_2-eq./kg.*

Grocery	**Values, Röös (2014)**	**Values, other LCA**	**Author**
Fish	3	2.15	(Pelletier et al. 2009)
Pork	6	3	(Sonesson et al. 2016)
Beef	26	20	(Mogensen et al. 2015)
Milk	1	1	(Cederberg and Mattsson 2000)
Cheese	8	8.8	(Berlin 2002)
Legumes	0.7	0.3	(Abeliotis, Detsis, and Pappia 2013)
Tomatoes	1	0.5	(Ntinas et al. 2017)

In addition to greenhouse gas emissions the food system also cause other negative environmental effects, e.g. eutrophication, soil erosion, loss of biodiversity and spreading of chemicals (European Environment Agency 2012). As this paper focus on the emission of greenhouse gases solely, these impacts are not further investigated.

2.4 International and national goals on food waste

In September 2015 the UN General Assembly came to a global agreement on sustainable development, Agenda 2030 (UN 2018c). The Swedish government was one of 150 world leaders to sign the agenda, thereby undertaking the task of striving towards reaching all 17 goals and 169 sub targets (Regeringskansliet 2016). Although target 12.3 is the only concrete, measurable goal concerning food waste in Sweden, there are national goals on sustainability adding to the global agreement. In this chapter international and national targets regarding food waste are presented.

2.4.1 International goals

As stated sub target number 3 of goal number 12 regards food waste. The goal is to, by 2030, halve the food waste on retail and consumer levels and reduce food losses along the whole food chain, including post-harvest losses. Several initiatives have started to mobilize for this reduction.

Supporting the development towards target 12.3 the EU Platform on Food Losses and Food Waste, FLW, was established in 2016. The task of FLW is to prevent food waste and the group composes of EU institutions, stakeholders and member state experts. In the terms of references it is stated that FLW work cover areas on definition, measurements and monitoring of food waste. It also include research, awareness and knowledge campaigns, implementation of EU legislation and facilitation of food redistribution. Moreover, they work for enabling knowledge and experience sharing on best practices and the identification and implementation of appropriate actions in order to maximize the contribution of all actors. (European Commission 2016)

One of the five sub groups of FLW is a group especially working with food donations. The objectives of this group are to investigate current practices and regulations of food donations within member states, prepare for EU guidelines on food donations and to constitute a pilot project as to do research on food redistribution and dissemination of future guidelines. The time frame for the sub group stretches to 2019. (European Commission 2017)

2.4.2 National goals

Before Agenda 2030 the Swedish Environmental Protection Agency proposed a food loss reduction of 20 % calculated over the whole food chain but the primary production. The target was set to 2020 compared to 2010 levels. Cutting food loss by 20 % would call for a 34 % reduction of the food waste. For the primary production the goal was to, by 2016, establish a road-map for reduced food waste quantities (Naturvårdsverket 2013). As this target was suggested in 2013 it was overruled by goal 12 and target 3 of Agenda 2030.

On behalf of the Swedish government the Swedish Board of Agriculture, the Swedish National Food Agency and the Swedish Environmental Protection Agency are the authorities working to reduce food waste in Sweden. After the signing of Agenda 2030 the three instances have through surveys, interviews and workshops constituted a road-map on how to reach the Sustainable Development Goal 12, target 3. The road-map regards all actors throughout the food chain and consists of 42 concrete measures, divided into 9 subjects. Within this it is clearly stated that there is a need for pronounced guidelines regarding food donations and the importance of facilitating for food redistribution is further highlighted. (Livsmedelsverket, Jordbruksverket, and Naturvårdsverket 2018)

Besides the goals of Agenda 2030 national goals on improved resource management concerns and affects the generation of food loss and food waste. The Swedish government has set a target to by 2018, a minimum of 50 % of the consumer level food loss should be separated and biologically degraded with recycling of nutrients. Of these, 40 % should be further treated by energy recovery (Naturvårdsverket 2015a). From a food waste point of view this may seem counter-intuitive. However the purpose of this target is to make food separation accessible to more people rather than increasing the amount wasted. Statistics from 2016 illustrate that with two years to go the separated food loss needed to increase by 10 percentage units (Naturvårdsverket 2018). If the target is met remains to be seen until statistics from 2018 year have been compiled.

2.5 Economical aspects of food waste

Purchasing, storing, preparing and cooking food that is not consumed does not only cause unnecessary greenhouse gas emissions, but results in economic losses as well. On a global scale the economic value of food loss amounts to a corresponding 9 000 billion SEK annually (FAO 2018). Data from 2016 imply that 73 000 tonnes of food loss was generated from Swedish canteens (Naturvårdsverket 2018) and according to Stare et al. (2013) 52 % of this constitutes of food waste.

The monetary value of avoiding food loss from public canteens have been estimated to 11 900 SEK per tonne. Applied to statistics from 2016 this would result in annual savings of 870 million SEK for the municipalities, given that no food loss were to be generated (Naturvårdsverket 2015b). Assuming that 52 % constitutes of food waste, avoiding these quantities would result in economic savings of 452 million SEK annually. Furthermore, calculations performed and declared in Göteborgsmodellen suggest a monetary value of 30 SEK per kg food waste (Måltid Göteborg 2016).

On a national level reducing food loss quantities by 20 %, as suggested before Agenda 2030, would according to Naturvårdsverket (2015b) result in savings of 10 - 14 billion SEK per year. However these numbers do not include costs for potential, necessary measures. Data on how much individual municipalities may save on redistributing overproduced food could not be found in performed literature study. In section 4.3.1 conducted case study is presented in which invoices on waste management costs for 18 kitchens in the municipality of Kristianstad are analyzed.

2.6 Alternative food loss treatments

To enable calculations on environmental benefits from redistribution of food, one must consider the alternative treatment. In Sweden food loss is either biologically degraded, by anaerobic digestion or composting, or incinerated (Avfall Sverige 2018a). Following subsections briefly describe the three treatment options. Additionally environmental effects resulting from the various alternatives are declared along with corresponding values for redistribution.

Food waste from canteens is believed to consist of a mix of groceries, both meat, vegetables and various types of carbohydrates. These all have different properties in term of water and energy content which, according to Eriksson, Strid, and Hansson (2015), are the main properties affecting the outcome of the various waste treatment options. Thus, from an environmental standpoint, there is not one superior alternative for all groceries (ibid.). In the literature study only two articles applicable to this investigation was found. One was published in 2015 and the other in 2017, both conducted in Sweden. Other papers were reviewed but with conditions not considered as representative for and comparative to this case. Thereby only the two Swedish articles were used for this comparison.

Eriksson and Spångberg (2017) investigate five fruit and vegetables; bananas, tomatoes, apples, oranges and peppers. The other paper by Eriksson, Strid, and Hansson (2015) evaluates different groceries; bananas, grilled chicken, lettuce, beef and toast bread. As water and energy content are the main factors affecting resulting emissions, these were further investigated for the groceries studied. From the database Livsmedelsverket and Matkalkyl.se (2018) water and energy content of the various fruit and vegetables were studied. It was concluded that values for tomatoes, apples, oranges, peppers and iceberg lettuce were similar and thus, one average for each treatment alternative was calculated for the fruits and vegetables. Hence emissions calculated are based on both articles. This approach was also applied on the bananas, calculating one average using both articles. Moreover calculations performed in the two articles include transports of food to the various treatment plants.

Depending on what the groceries replace, both in terms of raw material otherwise used to extract energy and the outcome of the process, the various treatments of the various groceries may cause either net savings or net emissions of greenhouse gases. Net savings imply that utilizing wasted groceries would cause lower emissions compared to using the regular raw materials. Net emissions on the other hand implies that utilizing the wasted groceries would cause larger emissions compared to using the regular raw materials.

2.6.1 Anaerobic digestion

In the process of anaerobic digestion microorganisms convert organic waste into biogas and biofertilizers in the absence of oxygen. In addition to food loss, sludge from sewage plants and organic matter from agriculture, forestry and slaughterhouses are also treated by biological degradation. The biogas generated mainly consists of methane and carbon dioxide and is often upgraded to biomethane by removal of carbon dioxide. Thereafter the biomethane is either distributed to the natural gas network or used as vehicle fuel. Besides biogas, biofertilizers are generated from the process. Biofertilizers from biogas production are certified for usage in ecological agriculture. (Energigas Sverige 2017)

As stated in section 2.4.2 there is a national goal on increasing the biological degradation of food loss generated in Sweden. Statistics from 2016 imply that 32 % of the food loss was treated by anaerobic digestion. The goal for 2018 was to treat 40 %, results expected to be presented in 2019. (Avfall Sverige 2018c)

According to the articles, there is a lack of substrate in the anaerobic digestion plants (Eriksson, Strid, and Hansson 2015; Eriksson and Spångberg 2017). In the anaerobic digestion scenario of the two articles it is assumed that the food loss does not replace any income substrate but rather add up to the total waste treated. The outcomes of the process, biogas and biofertilizers, are assumed to replace fossil fuels and mineral fertilizers.

All groceries evaluated in the two articles caused net saving of greenhouse gas emissions utilizing anaerobic digestion (Eriksson, Strid, and Hansson 2015; Eriksson and Spångberg 2017). For the fruit and vegetables the average number calculated, using both articles, imply net savings of 0.081 CO_2-eq./kg. The average value for bananas was calculated to 0.3 CO_2-eq./kg net savings. Eriksson, Strid, and Hansson (2015) also suggest savings of 0.26 CO_2-eq./kg for chicken, 0.67 CO_2-eq./kg for beef and 0.55 CO_2-eq./kg for bread.

2.6.2 Composting

Composting, or aerobic digestion, is a process where organic matter is converted into a nutrient rich soil holding a broad spectra of microbes. There are various composting techniques utilized but the one most commonly referred to when speaking of composting in general is hot composting. In a hot compost microorganisms dissimilate organic molecules to build biomass. Unlike the process generating biogas and biofertilizers, composting requires oxygen. (Ohm and Löthman Kaliff 2015)

Of the food loss generated in Sweden in 2016, 8 % was treated by composting. The target was to reach a level of composting corresponding to 10 % of the food loss in 2018 (Naturvårdsverket 2018). Whether this was achieved or not is expected to be announced in 2019.

Calculations performed in the article by Eriksson, Strid, and Hansson (2015) are built on the assumption that the composted food loss did not replace any compost substrate. Resulting compost was assumed to be used as soil amendment in landfills and that this compost did not replace any similar product.

Only one of the two articles studied examined the alternative of composting. For all groceries resulting net emissions were 0.043 CO_2-eq./kg. In the article it is assumed that the composting product did not replace any similar product. (ibid.)

2.6.3 Incineration

Approximately half of the Swedish domestic waste is incinerated. In Sweden incineration plants can extract 3 MWh per tonne waste. Due to the high efficiency Swedish incineration plants are classified as recycling, according to the EU Waste Framework Directive. (Avfall Sverige 2018b)

Energy recovery through incineration is performed either in a heat and power station, a so called cogenerator, or in a thermal power station. In a cogeneration plant both heat and electricity is produced, while a thermal power station solely produces heat. The general technique applied utilizes heat from the combusted waste to vaporize water. The high pressure and high temperature vapour is transferred directly to the district heating system, as in the case of a thermal power plant, or to a turbine generating electricity, as in the case of a cogenerator. After passing the turbine, remaining heat in the vapour from the cogeneration plant is transferred to the district heating system. (Avfall Sverige 2018d)

The incineration scenario in the article by Eriksson, Strid, and Hansson (2015) builds on the assumption that the food loss replaces peat in the incineration plant. Produced energy was assumed to replace electricity and heat from the grid that otherwise would have been produced elsewhere. In the article by Eriksson and Spångberg (2017) it was not stated what raw materials the incinerated food replaced but only that the energy produced replaced electricity and district heating from the grid.

Eriksson, Strid, and Hansson (2015) suggest that incineration causes net emissions of greenhouse gases for all groceries but chicken and bread. For those two groceries the authors suggest net savings of 0.31 CO_2-eq./kg and 0.67 CO_2-eq./kg for chicken and bread respectively. As for beef the same article implies net emissions of 0.003 CO_2-eq./kg. According to the more recently published article, incineration only showed to cause marginal net savings for bananas (Eriksson and Spångberg 2017). Together with the article from 2015 average net emissions for incinerating bananas was calculated to 0.04 CO_2-eq./kg. Average emissions for all greens evaluated was calculated to 0.07 CO_2-eq./kg.

To be able to tell environmental effect from redistribution, one must take into account what the donated food replaces. Eriksson and Spångberg (2017) assume that the groceries investigated replace other greens by 30 %, junk food by 30 % and nothing by 30 %. Remaining 10 % is assumed to be wasted along the donation process. In the article by Eriksson, Strid, and Hansson (2015) the authors instead assume donated groceries replace bread. If comparing values with emissions from table 2 in section 2.3, one may note that emissions presented in the figure are larger that those presented in the case of food being donated. This can be explained by what the groceries are assumed to replace. If a grocery were to replace the exact same grocery environmental savings would correspond to values presented in chapter 2.3. However, environmental effects may not be as large if a resource-intense grocery like beef replaces less resource-intense groceries.

Average values for fruit and vegetables were calculated using emissions from both articles studied. Concluding this section numbers on emissions are complied in table 3 below. Note that negative numbers imply net emissions of greenhouse gas emissions while positive numbers indicate net savings.

Table 3: *CO_2 emissions [kg CO_2-eq./kg grocery] for various waste treatment alternatives. Numbers after Eriksson, Strid, and Hansson (2015) and Eriksson and Spångberg (2017).*

Grocery	**Redist.**	**An. digestion**	**Composting**	**Incin.**
Av. Fruit & vegetables	0.46	0.081	-0.043	-0.07
Av. Bananas	0.36	0.3	-0.043	-0.04
Chicken	0.35	0.26	-0.043	0.31
Beef	0.31	0.67	-0.043	-0.003
Bread	0.61	0.55	-0.043	0.67

2.7 Food redistributive activities

Redistributing leftover food enables for synergism of all three aspects of sustainability; resources are most efficiently used if utilized for its original purpose of feeding people, it is of great value to those in need who are offered food and often both the donor and the receiver benefit from it economically. The activity of redistribution of food, regardless how it is performed, is covered by food laws presented in chapter 2.1. Amongst others it calls for an unbroken cold chain and traceability. Donors must also ensure that other relevant laws on food hygiene, storing temperatures etc. are met. Below, Swedish examples of food redistributive activities are presented. As this paper focus on public canteens only those options suitable for the municipalities are declared for.

For every food redistributing alternative social effects are reviewed. People considered the most vulnerable are homeless as they must rely on others cooking and serving them food. Others exposed are those struggling economically but who have a home where they can cook themselves. It should here be clearly stated that categorizing people based on how exposed or vulnerable they are is very hard and requires great humility. However in a technical report this is required as to make simplifications of reality.

2.7.1 Food banks

The first food bank, St.Mary's food bank, was established in 1967 by Johan van Hengel in Phoenix, USA. Van Hengel volunteered for a catholic church collecting food donated from supermarkets for their common soup kitchen. The concept of food banking spread and in Europe the first food bank was opened in France 1984. Two years later Fédération Européenne des Banques Alimentaired, the European Federation of Food Banks, FEBA was born (FEBA 2018). The Global FoodBanking Network, a worldwide foodbanking collaboration, was established in 2006 and today more than 800 food banks in over 30 countries are registered (The Global FoodBanking Network 2018).

Although not registered at the Global FoodBanking Network, there is one Swedish redistribution company operating in Gothenburg, Stockholm, Malmö and Lund. Their redistributive activities started in 2006 via Stiftelsen Gemensamt Engagemang, a foundation for common engagement, but it was not until 2010 Allwin was founded. Allwin collects food and groceries primarily from supermarkets, and redistribute it to the Church of Sweden and other charity organizations feeding people in need through redistributing activities of their own. (Allwin 2017b). As donors are predominantly supermarkets donations mainly consist of unprocessed groceries (Allwin 2017c). Unlike other similar food bank organizations in the Nordic region, Allwin is not a typical food bank as they do not store food and groceries but redistribute it the same day as collected (Gram-Hanssen et al. 2016).

Through their collaboration with Samhall, a socially responsible company, Allwin offers jobs to people struggling to establish on the labour market. A monthly fee matching costs for regular waste management is charged the donors as to cover expenses for staff salaries, leasing cars, tolls and administration (Allwin 2017b). Besides positive social effects from offering jobs via Samhall, several other positive effects arise from the activities of a food bank. In the case of Allwin food is redistributed to more than one receiver performing more than one food related activity. Food donated and redistributed via food banks may be used in soup kitchens, food bags or social supermarkets as described in the sections below, thereby targeting both the most vulnerable and those struggling economically. Further redistribution via food banks may enable for better utilization of food donations as supply and demand could be matched by the operating redistributor.

2.7.2 Direct redistribution

More common than food banking organizations are the less structured direct redistributing activities. These are small scale donations where either the donor or the receiver is responsible for food transports. It is a two-part arrangement with no intermediaries and where all administration and compliance of relevant laws are managed by the donor and the receiver. Often the collaboration is built on informal, verbal contracts and agreements (Gram-Hanssen et al. 2016).

Likely there is only one receiver of the directly redistributed food. Hence social benefits from this varies depending on the food related activities offered by the receiver. If the receiving organization, most probable a charity organization, offers free meals it could open for larger social benefits compared to when donated food is sold to reduced prices.

2.7.3 Apps

Recently developed are apps aiming at reducing food waste. The service provided is a communication channel to private persons. Supermarkets, restaurants, bakeries and cafes connected to the app offer what have not been sold during the day to reduced prices. Businesses can make money from food that otherwise would have been wasted and buyers may save money. Karma is an example of a food redistribution app, started in Stockholm in 2016. The app connects over 150 000 users with more than 1 500 food retailers in over 150 Swedish cities, and recently they launched in London (Karma 2018). Another app is ResQ, which operates in three countries. According to ResQ (2018b) food retailers connected to their app can increase their revenue by up to 6 %.

As stated, this type of redistribution targets private persons and it is further a prerequisite having a smart phone. Although offering food to reduced prices it is likely that if being in a tight economic situation one buy groceries from a supermarket.

2.7.4 Food bags from donated groceries

Similar to food bags offered by supermarkets or other businesses, charity organizations perform this service as well. Uppsala Stadsmission, The City Mission of Uppsala, is one example. Subscribers are offered one food bag per week consisting of groceries and hygiene items donated by local supermarkets, products that otherwise would have been wasted. To subscribe one cannot have an income exceeding 9 290 SEK/month or one must receive some sort of financial support (Uppsala Stadsmission 2018b). The food bag activity only handle donated groceries, cooked food is currently not redistributed (Wahlby 2018).

This activity primarily targets those who struggle financially but who at least have a home. Homeless who do not have kitchens where food can be cooked may not be able to benefit from groceries in the donated food bag, i.e minced meat, dry pasta or potatoes.

2.7.5 Social supermarkets

A concept initialized by Stockholm Stadsmission, the City Mission of Stockholm, is the social supermarket Matmissionen. Two social supermarkets in the Stockholm region offer groceries donated from wholesalers and supermarkets, products that for various reasons are regarded as unsaleable. As well as short best-before-dates items are donated due to packaging damages. According to their website prices at Matmissionen are approximately one third of regular supermarket prices and the supply of products vary with the donations. To become a member and shop in the supermarkets one must fulfill the same prerequisites as stated for the food bag (Uppsala Stadsmission 2018a).

Similar to the case of food bags only donations of groceries are accepted (Wahlby 2018). However unlike food bags one may choose what groceries to shop, which perhaps allows for homeless to buy food that does not have to be cooked. Still one must be able to pay for purchases, perhaps excluding those who solely may benefit from free, cooked meals.

2.7.6 Social refrigerators

Inspired by the food sharing community in Germany, Solikyl is a business enabling for local food sharing. Anyone may donate food, from retailers, restaurants and cafes to private persons. For businesses wanting to donate food on a regular basis Solikyl offers pick up free of charge. Donations are transported to one of the six refrigerators located in the area of Gothenburg. No membership is needed as the refrigerators are open for anyone to both take and donate (Solikyl.se 2018). The basic rules of Solikyl is not to put anything in the fridge with passed expiry date or food that oneself would not want to consume (Solikyl.se 2016).

To tell social effects from food redistribution via social refrigerators is hard as it depends on what is donated. Assuming there is a variety of both groceries and cooked food, both homeless and those with economical struggles may benefit from it. As in the case of social supermarkets one can choose from what is in the refrigerator based on what one needs, but with the advantage of being free of charge.

3 Research methods

Before presenting interview, surveys and case study results, this chapter is initialized by describing methods applied throughout thesis research. Depending on the purpose of a thesis various methodologies can be practiced. Different techniques for data gathering and analysis can be utilized also depending on the purpose and methodology of the thesis. The four main methodologies are:

- survey,
- case study,
- experiment,
- action research

(Höst, Regnell, and Runeson 2006)

In this thesis methodologies applied are both survey and case study. Data can be collected either through interviews, observations or archive analysis, of which the method of interview will be used in this thesis. If conducting an interview it could by character be a structured, semi-structured or open interview. A structured interview follows predefined questions in a predefined order. In a semi-structured interview there is more room for changing both the order and the questions, if the situation allows for it. With an open interview, it is more or less up to the person interviewed what to bring up on the interview. Questions asked could be either open-ended, allowing for a descriptive answer, or closed-ended, which are answered by yes or no. (ibid.)

Obtained data could by character be either qualitative or quantitative. Qualitative data are words and explanations with details and nuances, while quantitative data are countable. By using several methodologies, data characteristics and types of questions a more comprehensive and correct representation may be obtained (ibid.). This is why various types of methodologies and character of questions were applied. As the interview and survey questions were formulated, literature by Höst, Regnell, and Runeson (ibid.) was used.

Regarding ethical aspects of research and the relationship between the ones sharing information and the researcher, there are four main prerequisites that shall be fulfilled; information to attendants, approval from attendants, confidentiality of personal information and right of usage. (Vetenskapsrådet 2002)

Information to the attendants on their role in the research and what the data will be used for should be communicated. The ones conducting the research shall have an approval from the participants sharing information to the research. Moreover, sensitive data e.g. on personal information must be handled with great care and confidentiality. Personal information to individual persons shall be censured and stored in a way that is inaccessible to unauthorized. The

last prerequisite regards the right of usage of information given by research participants. This means that gathered data may not be utilized for other purposes than that of the research. It may not be used or shared for a commercial or non-research purpose. (Vetenskapsrådet 2002)

Main purposes of this thesis are to investigate food waste quantities from Swedish municipal canteens, how it is currently treated and possibilities for redistribution. This as to evaluate environmental and economic effects from redistributing leftover food. Additionally, social effects from redistribution are to be reviewed and a suggestion optimizing environmental, economic and social effects from this redistribution is to be presented. Both an interview, a case study and three surveys have been performed throughout this work. Data from the case study and the surveys are predominantly quantitative while data from the interview are mainly qualitative.

3.1 Interview with Municipality of Partille

To gain larger knowledge and insight in how municipal canteens are run and to identify food loss hotspots, all valuable when later formulating the surveys, an interview was held over Skype with Pia Nystedt and Maria Mattsson. The interview was semi-structured with both open-ended and close-ended questions, as described in the section above. Interview questions were formulated using literature by Höst, Regnell, and Runeson (2006). Onwards, hotspots refer to places within the kitchen activity where the largest quantities of food loss are generated. The interview was held in the very beginning of this project as to later be able to formulate adequate surveys and survey questions, and it was complemented by e-mail correspondence which allowed for eventual clarifications.

Nystedt is head chef at one of the municipal kitchens cooking for high school students and an elderly care home. Mattsson is the dietary manager of the municipality, responsible for overall kitchen services within the municipal activities. Questions asked, both during the interview and over mail, concerned waste management, how canteen kitchens are run and thoughts on food waste redistribution. Also, the more extensive survey were answered and peer-reviewed by Nystedt, allowing for eventual changes and clarifications before conducting the actual survey. The interview was taped and transcribed and the full interview can be found in appendix 9.1.

3.2 Survey on food loss and food waste from municipal canteens

The sample group of the more extensive survey constitutes of all 290 municipalities in Sweden. From contact via general information e-mail addresses to the municipalities given on their web page, addresses to representatives able to answer survey questions were compiled. Some attendants preferred answering from a central position, often the dietary manager of the municipality, while others forwarded the survey to head chefs working within municipal canteens. In order to facilitate statistical analysis the survey was filled in digitally. Google forms were used as a platform conducting this larger survey, as this was considered the most suitable free online service. A link to the survey was sent to the representatives earlier contacted and the survey was open for four weeks. Reminders were sent once to twice a week to those who had not yet attended. After closing the survey answers were compiled, categorized and analyzed.

Literature by Höst, Regnell, and Runeson (2006) was used as the survey was designed and questions were formulated. To minimize the risk of misinterpretations, informative text in the beginning of every part was included. Additionally, the survey was peer-reviewed by representatives from the municipality of Partille. Further, to fulfill ethical requirements, as according to Vetenskapsrådet (2002), sensitive information on survey attendants have been removed from the answers declared for in appendix. If not censured, approval have been given by the persons in question. Information to survey attendants on what the data would be used for, was sent before conducting the surveys.

The survey was divided into three parts including 26 questions in total. It was initialized by questions regarding what type of kitchen the attendants represented, numbers served, if food loss was separated from domestic waste, if and how food loss were weighted and whether having a policy on food purchases or not. Next chapter of the survey regarded food loss and food waste, both quantities and where it was generated. Further attendants were asked to estimate the share of the food loss consisting of food waste, both per station and as a percentage of the total food loss. This chapter also included questions on groceries most commonly wasted, how overproduced food was managed and if and how they worked with informing the ones served on food waste consequences. The last section of the survey investigated attendants approaches to food waste redistribution. Questions asked regarded thoughts on possibilities as well as hindrances for food waste redistribution and attendants possibility of storing leftover food and groceries. They were also asked whether they thought redistribution would be more time consuming compared to their regular routines for food loss management within the kitchen. If positive they were further asked to estimate how much longer. The full survey is to be found in appendix 9.3.

As the survey was closed attendants were split into four categories; the ones

answering from a central position with responsibility for more than one kitchen, kitchens both cooking and serving, kitchens solely serving and kitchens solely cooking. Each category was analyzed individually as well as answers from all attendants as one unit. Answers and resulting values were used in calculations later performed. Lastly results were applied to a national level.

When answers were examined it appeared that some answers would not be useful in the upcoming calculations. The most common reason was free texts answers that lacked of unit. In order not to affect calculations by guessing if units were given in kg per day or per week, the decision on removing these answers was made. Another common error was found in the free text answers on questions regarding food loss quantities, where attendants instead answered with food waste quantities. There were also cases when the answer given clearly had no connection to the question asked. An example of this was the answer "we waste a lot of rice as we cannot save this" on the question "How large is the food loss days when a lot of food is wasted?".

3.2.1 Sensitivity analysis

A part of the survey addressing the municipal canteens included questions on variations in food loss quantities. The intention with this was to allow for a sensitivity analysis on how quantities and consequent evironmental, social and economic effects may vary. As presented in section 4.2.1, the low response rate of these specific questions affected the results so that results with this approach were regarded as not useful. Hence, an additional sensitivity analysis was performed using the software MatLab. Values given by the survey attendants as estimated averages were, based on the numerous answers, assumed to follow a normal distribution. The commands fitdist, normfit, paramci and normpdf were used with a confidence interval set to of 95 %. MatLab code and returned values can be found in appendix 9.8.1.

Values on food loss per person and year was calculated for all respondents. These were inserted as vectors in MatLab from which lower and upper boundaries were calculated for each category, using the command normpdf. Detailed calculations are to be found in appendix 9.8.2. As stated the confidence interval was set to 95 % which implies that the expected value of the food loss quantity will, most likely, fall within this interval. The lower and the upper boundaries correspond to the minimum and the maximum expected values on food loss quantity respectively.

3.3 Survey on municipal waste treatment

To those municipalities attending the larger survey on canteen food loss and food waste, a new e-mail was sent. Addresses used were either the same general e-mail addresses as in the larger survey, e-mails to the municipal department working with waste management or to the local waste management business.

This as to find adequate representatives able to answer questions regarding canteen food loss treatment. Hence, contacts both from municipalities and waste management operators attended this complementing survey.

The survey was conducted via e-mail, asking how food loss from the municipal canteens were treated. The two e-mails can be found in appendix 9.12. From the answers data was compiled and used in calculations on environmental effects from redistribution of food waste over current food loss treatment.

3.4 Case study on food waste treatment costs

Alongside the complementing survey on waste treatment a case study on the municipality of Kristianstad was conducted, investigating in municipal expenses related to food loss management. Originally it was initialized as a small survey but as a consequence of low response rate it was converted into a case study. The goal was to obtain and dissect waste management invoices from municipalities with various waste fees as to estimate representative costs. Of the municipalitites attending the larger survey, ten municipalities were randomly chosen of which two were willing to share waste invoices. Due to uncertainties in how to read and interpret invoices from the other municipality only data from Kristianstad was used.

From a municipal commissioner representing Miljö- och hälsoskyddsnämnden, the Swedish Association of Environmental Health Professionals, invoices from 18 municipal canteens were acquired. Those were reviewed and data on municipal expenses related to waste management was categorized and analyzed. Additionally the number of children, students or elderly within each object were gathered from e-mail contacts with administrative staff. If data could not be attained this way statistics from Skolverket, the National Agency for Education, were used. Obtained values on costs per person were applied to results from the more extensive survey. Costs included in calculations were paper bags for food loss as well as rental, disposal and cleaning of both containers and food loss disintegrators.

3.5 Survey on charity organizations

Lastly a survey addressing Swedish charity organizations, receiving donated food, was conducted. The survey intended to collect data on the type of food and quantities handled, numbers served, their approach to receiving food from canteens and if there are legal or other restrictions on what they can accept. Using online search engines several charity organizations performing food serving activities were contacted using e-mail addresses given on their web page. The survey was performed via e-mail and included five questions. For the full e-mail, see appendix 9.13.1. Answers were later used in estimating social effects from food redistribution and in designing the redistribution suggestion.

4 Thesis research results

The following chapter presents results from conducted interview, surveys and case study.

4.1 Interview: Municipality of Partille

The municipality of Partille is situated approximately 10 km east of Gothenburg. It is an average sized municipality with 37 000 inhabitants (Partille kommun 2017). There are 32 public canteen kitchens in the municipality; 1 cooking for elderly care homes, 3 cooking for both elderly care homes and a school, 9 cooking for schools and 19 cooking for kindergartens. Approximately 9 000 portions per day are served within schools and kindergartens in total, and 300 portions per day within the elderly care homes (Nystedt 2018a).

Nystedt is working in a medium sized school with 387 students serving an average of 306 portions per day, five days a week. Within their canteen food is both cooked and served. However there are three types of canteens, which are all organized in different ways. If not performing both cooking and serving, either of the two is performed. Kitchens solely cooking prepare and cook food which is transported and served somewhere else. The opposite are kitchens receiving already prepared food thus solely serving. As these types of kitchens either do not cook or do not serve food, data on food loss and food waste from the two likely differ from corresponding data from kitchens both cooking and serving.

According to Nystedt there are four hotspots within the kitchen generating food loss and hence food waste: the area in the kitchen where vegetables and greens are peeled and prepared, plate waste scraped off by the ones served, food from trays that has been up for service outside of the kitchen and waste from the dish washing room. Nystedt further declares that in their kitchen the majority of the food waste arise from serving trays followed by plate scrape off. She also states that food wasted is predominantly cooked food. Regarding the economic aspect of food waste, Nystedt estimates that costs for groceries amounts to 9.60 SEK per portion. (Nystedt 2018b)

For waste management the kitchen Nystedt is working in utilizes six containers á 140 L for food loss and one container á 660 L for residual waste, all disposed once a week. Of the total residual waste generated by all activities within the school an estimated 7.6 % can be ascribed the kitchen, for calculations see appendix 9.2. (ibid.)

Regarding redistribution Nystedt and Mattsson highlight economical aspects as well as administrative and legislative obstacles, referring to the Swedish Food Law, the Swedish Food Decree and the Municipal Law. Both Mattsson and Nystedt (2018a) claim that if cooked food were to be sold, e.g as lunch boxes to

the staff, it would require lists of ingredients. According to (LIVSFS 2014:4) on foodstuff information however, a list of ingredients is only required if the person buying the food asks for it.

Compared to regular waste management Nystedt estimates that preparing overproduced food for redistribution would be equally time consuming. In her kitchen groceries and leftover food that has not left the kitchen is chilled and stored for later service. They further work actively with informing both teachers and students about food waste quantities and related issues. (Nystedt 2018b)

After the interview Nystedt and Mattsson were asked to answer and review questions intended for the larger survey, allowing for adjustments and/or clarifications if needed. However, according to Nystedt this was not needed and hence no changes in the survey were made.

4.2 Survey on municipal food waste

A larger, online survey addressing Swedish municipalities was conducted over a period of four weeks during fall 2018. Dietary managers in all 290 municipalities in Sweden were contacted via e-mail. Of all municipalities 84 attended the survey, corresponding to a reply rate of 29 %. As some preferred answering from a central, municipal position whilst others forwarded the survey to head chefs working in municipal canteens, the number of attendants does not coincide with the number of municipalities. Consequently attendants are of both dietary managers from municipalities as well as chefs and kitchen staff working in municipal canteens. Results are categorized based on whether the survey was answered from a central position or not, and on the type of kitchen. A total of 128 attended the survey. Due to unclear answers, misunderstandings of questions and uncertainties in how to interpret data some answers were removed. How this was done is described in section 3.2 above. After this editing 121 answers remained, representing 84 municipalities in total.

The survey was divided into 3 sections initialized by a more general part with questions regarding the activity performed, numbers served, food waste management, policy restrictions and communication regarding food waste. In the second part attendants were asked to estimate food loss and food waste quantities. Questions included food waste both as a share of the overall food loss generated and specific for each of the four hotspots. The last part regarded attitudes towards redistribution and potential problems and possibilities related to this. The full survey and all answers are to be found in appendix 9.3 and 9.4.1 respectively.

It should be highlighted that not all attendants answered all questions and that the level of detail in the answers varied widely. If uncertainties in interpreting answers arose these specific answers were discarded as not to risk biasing and altering of results. Furthermore, all respondents offer lunch but four also serve breakfast and/or a smaller snacks, e.g a fruit or a sandwich. In those cases only numbers of lunches served were included in calculations and further, food loss quantities are assumed to solely originate from lunch servings.

51 of the 121 attendants answered from a central position, representing more than one kitchen. 55 were kitchen both cooking and serving, 11 were kitchens solely serving and 4 were kitchens solely cooking. For respondents answering from a central position the number of activities averaged to 28 and numbers served per day averaged to 4 878 persons. For kitchens both cooking and serving the average number served was 913, 246 for kitchens solely serving and 137 for kitchens solely cooking. In total the survey attendants serve 325 690 persons per day. Replies from attendants were sometimes given in different units, kg/week or kg/day. Hence, several answers were converted into one common unit. Although not all respondents represent school canteens, in order to facilitate calculations it was assumed food serving activities occur five days a week and 38 weeks per

year as this is the average length of a school year (Åkesson 2015).

4.2.1 Food loss and food waste quantities

Answers from the 51 attendants covering more than one kitchen estimated food loss to an average of 8.6 kg per person and year. In approximating food waste the average percentage given was 45 %. This implies annual food waste of 3.8 kg per person.

Those representing kitchens performing both cooking and serving estimated the food loss to 5.6 kg per person and year. The avoidable waste percentage averaged to 52 %, implying annual food waste of 2.9 kg per person.

Food loss from the 11 kitchens solely serving was estimated to 8.1 kg per person and year of which 55 % was estimated to compose of food waste, corresponding to 4.4 kg per person and year.

Lastly results from the 4 kitchens preparing but not serving food amounted to an annual of 3.5 kg food loss per person. On average the food waste percentage was estimated to 51 % suggesting food waste of 1.8 kg per person and year. All results are presented in table 4.

Table 4: *Food loss quantities, average estimated percentage constituting of food waste and corresponding food waste quantity per person and year.*

Category	**Food loss [kg/p,y]**	**Food waste [kg/p,y]**	**Food waste [%]**
Central	8.6	3.8	45
Cooking + Serving	5.6	2.9	52
Solely Serving	8.1	4.4	55
Solely Cooking	3.5	1.8	51

In summarizing food loss quantities the attendants generate food loss quantities amounting to a rounded 1 300 tonnes every year. This was calculated by multiplying average food loss per category with respective total number of persons served annually. Multiplying estimated share of food waste with the food loss amounts for respective category, estimated annual food waste amounts to almost 600 tonnes. Also an average for attendants answering from a central position was calculated, implying annual food loss quantities of 42 tonnes per municipality. With the approximated food waste share of 45 %, food waste quantity totals to just below 19 tonnes. On a national level this corresponds to 5 500 tonnes. For full calculations see appendix 9.5.

Further the attendant were asked to estimate the share of overall food loss arising from each of the hotspots identified in previously conducted interview, presented in section 4.1. For every hotspot an average was calculated. Rounded off, 22 % of the food loss arise from activities within the kitchen. On average

46 % was estimated to originate from plate scrape off. Food loss from service trays was estimated to generate 35 % of the total food loss. Lastly 17 % arise from the dish washing room and/or other. It should be stressed that adding up results exceeds 100 %. Nevertheless results do imply that the majority of the food loss arise from plates scraped off and service trays. Results are illustrated in figure 3.

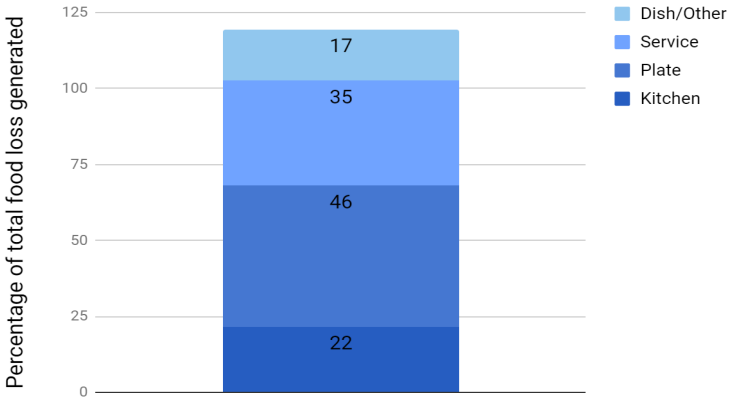

Figure 3: *Estimated food loss, in percentage, per hotspot.*

Attendants were also asked to estimate the food waste share within each hotspot, i.e how much of the percentage previously estimated constituting of food waste. One average per stations was calculated utilizing answers from all four types of kitchens. Results indicate that the hotspot with the largest share of food waste is plate scrape off, followed by food waste from service trays, preparations in the kitchen and lastly from the dish washing room/other. Rounded numbers calculated were 23 % from the kitchen, 50 % from plate scrape off, 32 % from serving trays and 16 % from dish washing/other, illustrated in figure 4 below. As approximations are given in percentage this does not necessarily mean that the largest quantity of food waste is generated from plate scrape off. This depends on the quantity of the food loss for each station. For full calculations see appendix 9.4.2.

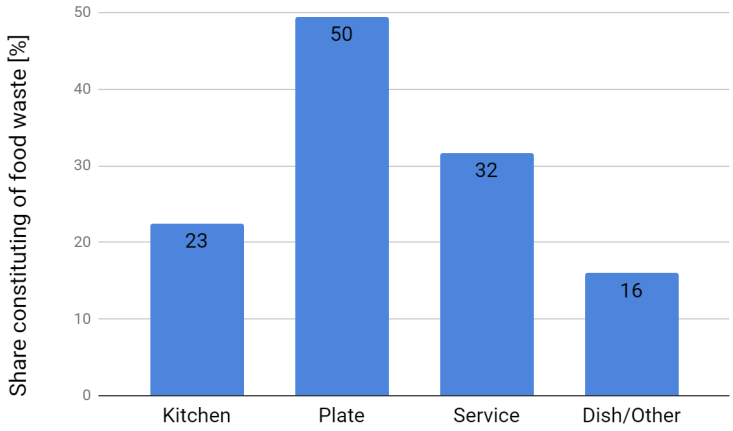

Figure 4: *Estimated share of food waste, in percentage, per hotspot.*

According to the attendants predominantly cooked food is wasted. Groceries stated as most frequently discarded are various carbohydrates, primarily potatoes and pasta, salad vegetables and mixed food from what have been served.

Sensitivity analysis

A sensitivity analysis was performed to estimate food waste variations. Survey attendants were asked to estimate food loss quantities that was generated days when large respectively small quantities of food was wasted. Based on answers given one average per category were calculated. Calculations on the interval for attendants answering from a central position are based on 13 answers. Corresponding numbers for kitchens both cooking and serving, solely serving and those solely cooking are 39, 6 and 3 answers respectively.

The lower value of the interval for respondents answering from a central position was estimated to 3.8 kg food loss per person and year. Attendants solely cooking had a minimum value of 0.42 kg per person and year. Previously calculated average exceeds the estimated maximum food loss for the two categories. The interval for kitchens both cooking and serving stretches from 2.7 to 8.7 kg food loss per person and year. For attendants answering for kitchen solely serving food a larger interval from 3.7 to 11.5 kg was estimated. Results are presented in figure 5. All calculations are to be found in appendix 9.6.1.

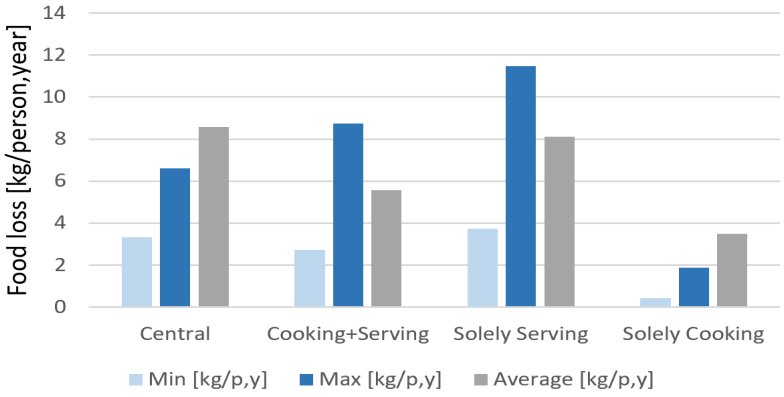

Figure 5: *Interval of food loss quantities, per person and year, per category as estimated by survey attendants.*

As the number of attendants estimating minimum and maximum food loss quantities was rather low compared to the total number of survey attendants, and consequently the averages fell outside the interval, estimations made may not be regarded as representative. Thus an additional sensitivity analysis was performed calculating the normal distribution of the average food loss quantities, as estimated by the survey attendants. The software MatLab was utilized and the code is to be found in appendix 9.8.1. The commands fitdist, normfit, paramci and normpdf were used with a confidence interval set to of 95 %.

Returned values for the attendants answering from a central position indicates a food loss interval stretching 4.7 to 8.7 kg per person and year. For kitchens both cooking and serving the interval varied from 4.4 to 5.7 kg per person and year. Corresponding values for kitchens solely serving spans from 5.4 to 11.7 kg per person and year. The interval for kitchens solely cooking varied from 1.2 to 6.5 kg per person and year. These values are to be used as the environmental, social and economic variations are calculated. It should be highlighted that for kitchens solely serving and kitchens solely cooking, the number of answers are rather low to be used as foundations for calculations on normal distribution and that it may not be appropriate to draw general conclusions from these. Results are illustrated in figure 6.

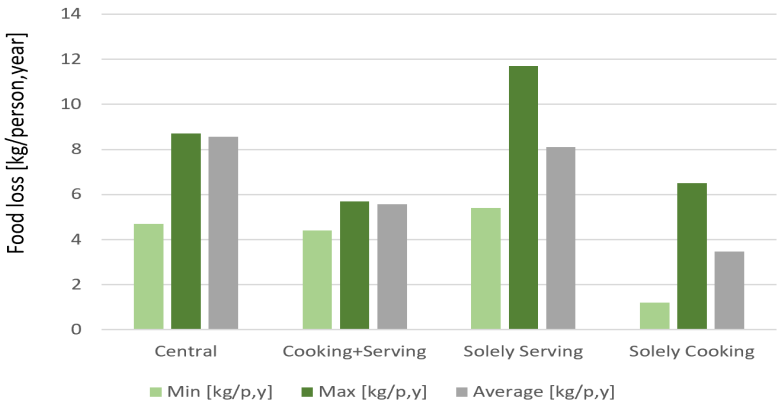

Figure 6: *Interval of food loss quantities, per person and year, per category calculated from lower and upper expected values.*

In table 5 values on food loss quantities from both sensitivity analyses are concluded, together with previously estimated averages.

Table 5: *Food loss quantities [kg/person,year]. Results from conducted sensitivity analyses, both as estimated by survey attendants and from min. and max. calculated by standard deviation.*

	Category	**Min. value**	**Max. value**	**Av. value**
Attendants	Central	3.3	6.6	8.6
	Cooking and serving	2.7	8.7	5.6
	Solely serving	3.7	11.5	8.1
	Solely cooking	0.42	1.9	3.5
Normal distribution	Central	4.4	8.7	8.6
	Cooking and serving	4.4	5.7	5.6
	Solely serving	5.4	11.7	8.1
	Solely cooking	1.2	6.5	3.5

4.2.2 Food waste: Management and communication

In this part of the survey attendants answered questions regarding how food waste was managed and if they acted on guidelines and/or restrictions in the form of steering policies. They were also asked to describe how they communicated about food waste, both internally and externally. Several questions in this part included free text answers.

Over one fifth, 27 of the 121 answering, did not separate food loss from domestic waste. This despite the fact that in thirteen of these municipalities food loss is collected and treated biologically. Remaining 94 attendants stated that they did separate food loss from domestic waste.

114 attendants responded to work actively with reusing leftover food and groceries in various ways. Cooked food that had not left the kitchen was often chilled or freezed and served some days later. Several attendants declared that both cooked food and left over groceries were reused and converted into new dishes. A frequently reoccurring answer was that although working preventively, cooked food that have left the kitchen must be discarded due to health and environmental regulations. Solely seven respondents answered that leftover food and groceries were wasted without further explanations.

The majority of the attendants said to act on various guidelines, policies, bids, agreements or procurements decided on local, regional or national level. 61 of the respondents stated concrete examples of targets on buying a given percentage ecological, locally or Swedish produced groceries, MSC labelled fish or seasonal products. Of all attendants 19 either did not answer this question or answered that they did not know, or did not have any policy.

Most respondents, almost 80 %, said to work actively with informing both coworkers and the ones served about food waste, generated quantities and environmental as well as economic effects from it. Several attendants performed so called food waste weeks more or less frequently, measuring plate waste primarily. Results from these waste weeks were either presented in numbers or by illustrative comparisons. Another reoccurring example was arranging competitions on minimizing food waste where winners were rewarded in various ways.

General information on food waste was often communicated via student food councils, teachers and in classes but also via posters and/or informative notes within the dining hall. 29 of the attendant either did not answer this question or stated that they did not, or only to a limited extent, inform the ones served regarding food waste. Some attendants further asked for better coordination with principals, other staff members and responsible representatives from the municipality. It was also stated that communicating information is a matter of the age of the ones served.

4.2.3 Prerequisites, prospects and attitudes towards redistribution

The very last part of the survey included questions regarding attitudes towards redistribution and potential problems and possibilities related to this. Attendants were in this part able to write free text answers.

Allowing for reusing or redistribution of leftover food and groceries the kitchens must have the possibility of safe storing, either heated or chilled. 17 of the respondents did not have this possibility of which seven were attendants answering from a central position and six were kitchens receiving already prepared food. Remaining attendants declared to have either cold spaces for storing, or both chilled and heated storing possibilities.

Moreover, attendants were asked whether they thought preparing leftover food and groceries for redistribution would be more time consuming than regular food loss management or not. If positive, they were further asked to estimate this extra time. One third, 40 attendants, believed preparing for redistribution would require more time than ordinary food loss management. Of those, 29 attendants estimated the extra time to an average of 34 minutes. On the same question 28 either did not answer, did not know or clearly answered something else than requested. Remaining 53 attendants did not believe that redistribution would be more time consuming compared to regular food loss management.

Lastly attendants were asked to specify both potential obstacles but also possibilities related to food waste redistribution. Most frequently stated hindrances were legal aspects and requirements on hygiene and food safety, especially for food that had been heated. On the same topic concerns regarding responsibilities if someone were to get sick from donated food were raised. Another potential problem expressed was not challenging laws on competition if food were to be sold. Additionally attendants believed that selling food would require labeling and lists of ingredients, also stated as a potential obstacle.

Many attendants thought that logistics, both with regards to packaging and transport, and limited storage capacities would pose difficulties. Some expressed that management through redistribution would require more resources, personnel and economic as well as time wise. Further organizational hindrances were mentioned referring to extra time for communication, charging and accountancy. Importantly highlighted was also the risk of redistribution legitimizing over production of food. Some attendants expressed difficulties in continuity, that quantities would not be significant for redistribution and that there is no demand or no charity organization closely to receive leftovers.

On the contrary possibilities for redistribution mentioned was selling leftovers as lunch boxes, either to staff members or to parents or relatives to the ones served. Some attendants suggested doing this after restaurants had closed and

to cost prices as not to challenge competition. Another suggestion on this topic was using overproduced food for lunch boxes served to elderly or disabled within the municipality receiving prepared food. Possibilities of donations to charity organizations or to farms as animal feed were also mentioned. Further, several attendants expressed the need for greater involvement and steering from higher instances. Also proposed as a solution was better communication and exchange of groceries and food between kitchens within the same municipality. Several attendants had a positive approach, expressing that there were many and good possibilities for redistribution but without giving concrete suggestions.

4.3 Complementing surveys and case study

4.3.1 Survey: Municipal waste treatment

To calculate the environmental benefits from redistribution, the alternative treatment must be considered. Therefore a small, semi-structured survey was conducted via e-mail, gathering data on how municipal food loss was treated. An email was sent to the 84 municipalities represented in the larger survey. In approximately half of these the survey was answered by a local waste management company and the other half by someone working within the municipality.

All 84 municipalities contacted replied to this complementing survey. Rounded off, 77 % of the food loss from municipal canteens was treated by anaerobic digestion. 21 % treated food loss by incineration. Only one municipality, corresponding to just over 1 %, utilized composting as food loss treatment in combination with incineration. The municipality in question answered that composting was the dominant treatment applied to over 90 % of the generated food loss. Results are illustrated in figure 7. Values obtained are to be used in later calculations on environmental effects from food redistribution.

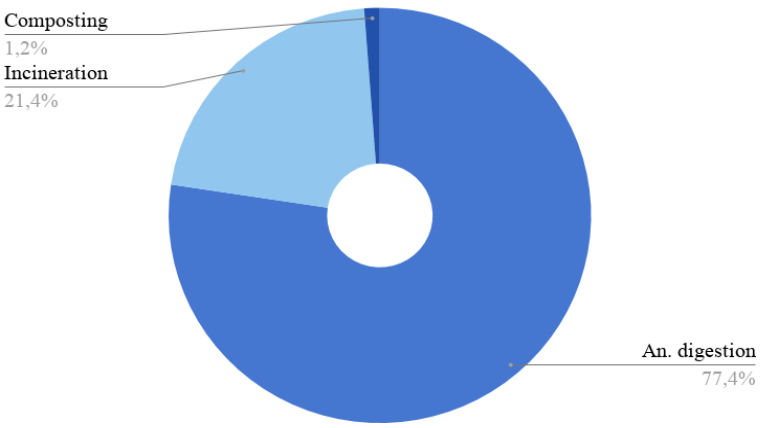

Figure 7: *Waste treatments utilized by municipalities attending the larger survey*

Comparing environmental effects in the form of reduced greenhouse gas emissions, numbers from chapter 2.6 and the articles by Eriksson, Strid, and Hansson (2015) and Eriksson and Spångberg (2017) are utilized. One average for fruit and vegetables and one average for bananas were calculated using numbers from both articles, under assumptions and conditions previously stated. Net effects from redistribution compared to anaerobic digestion, composting and incineration respectively are calculated simply by subtracting the environmental effects

from each treatment alternative from that of redistribution, for every grocery. Results are presented in table 6. Numbers given will be used to calculate environmental effects from the food waste quantities generated by attendants of the larger survey.

In reviewing emissions a negative numbers imply the latter alternative to reduce emissions to a larger extent than redistribution. Even though both redistribution and the reviewed alternative cause net savings, the latter one may cause larger savings which is why the comparison may result in a negative number. In that case redistribution is the less favorable alternative. From table 6 it can be concluded that redistribution is the most favorable alternative for all groceries and treatment options but anaerobic digestion of beef and incineration of bread. The results for beef could be explained by the conditions earlier stated, assuming donated meat replaces other not equally resource demanding groceries. It might also be explained by the assumption that biogas resulting from anaerobic digestion replaces diesel as vehicle fuel, causing large savings of greenhouse gases. The likely reason to why incineration of bread would be the better treatment alternative could be due to the low water content making it suitable for incineration and the low energy content making it less suitable for donation. All calculations are to be found in appendix 9.11.

Table 6: *CO_2 emissions [kg CO_2-eq./kg grocery] comparing redistribution to anaerobic digestion, composting and incineration respectively.*

Grocery	**Redist. - An. dig.**	**Redist. - Comp.**	**Redist. - Incin.**
Av. Fruit & vegetables	0.38	0.51	0.53
Av. Bananas	0.06	0.4	0.4
Chicken	0.09	0.39	0.04
Beef	-0.36	0.35	0.31
Bread	0.06	0.65	-0.06

4.3.2 Case study: Canteen waste treatment costs

To estimate municipal expenses for waste management and treatment, a small case study communicated via e-mail was conducted in the Municipality of Kristianstad. Originally it was initialized as a small survey but as a consequence of low response rate it was converted into a case study. From a municipal commissioner a total of 18 invoices from canteens serving both children, students and elderly, were examined. Invoice data was categorized and further analyzed. Calculations were performed relating waste management costs to the number of persons served within each object. Information on the numbers served was gathered from e-mail contacts with administrative staff working at the objects in question. If data could not be attained this way statistics from Skolverket, the National Agency for Education, were used. It should be stressed that obtained values are based on one single municipality and that these may not be representative nor generalizable.

Costs included in calculations were paper bags for food loss, rental and disposal of containers and food loss disintegrators, as well as costs for waste treatment. As the kitchens are integrated parts of the various objects, i.e schools, kindergartens and care home, invoices do not tell how many containers are utilized solely by the kitchens. However, it was assumed all food loss containers and food loss disintegrators could be ascribed the canteens.

Items in the invoices were divided into food loss and residual waste related expenses. These were summarized and related to the average number of persons served within the objects. According to Nystedt (2018a) their kitchen uses one container á 660 L for residual waste. This was applied to the canteens investigated, presuming all utilize one container for residual waste á 660 L each. A difficult task was to estimate the share of treated residual waste, from the object as a whole, that could be attributed to the kitchens. Nystedt estimated that the kitchen is responsible for 7.6 % of the total residual waste generated by the overall school activities, a number applied as calculations on residual waste were performed. Results for both food loss and residual waste, as averages per person served, are presented in table 7 below.

Table 7: *Average waste management and treatment costs calculated from case study.*

Food loss [SEK/p,y]	**Residual waste [SEK/p,y]**	**Total [SEK/p,y]**
2.02	1.31	3.34

Results from conducted case study implies annual municipal expenses for waste management amounting to 3.34 SEK per person and year. For the 18 activities within the municipality of Kristianstad this corresponds to a total of 258 776 SEK per year. Of this 61 % arise from food loss and remaining 39 % from residual waste. The largest individual post was disposal and treatment of food loss from food loss disintegrators.

4.3.3 Survey: Charity organizations

With the intention of investigating potential receivers of food donations from public canteens, an online inventory was performed. From internet research and mail contacts 36 food redistribution activities was identified. Trough a smaller e-mail survey the offering of donated food within these organizations were studied and compiled. Survey questions regarded the number of persons benefiting from their food serving activities, how much of the food currently served constituting of donations and if able to receive larger quantities of food. Results were later used in estimating social effects from redistribution of leftover canteen food. The e-mail and questions sent are to be found in appendix 9.13.1.

Several organizations perform more than one food redistributive activities, why the number of organizations do not coincide with the number of activities. Combining food redistribution and charity, most activities and organizations found have religious influences and are members of various branches of Christianity. The organizations differ in terms of how food is redistributed and from who food donations are received. Referring to meal servings only breakfast, lunch and dinner were included, whilst the offering of coffee, tea, fruits, sweet breads and cookies were excluded.

The majority of the activities, 27 in total, offered meal servings. Of these 17 were free of charge while remaining ten charged their clients a symbolic sum. Two of the activities were so called social supermarkets, described in section 2.7.5, and four were activities redistributing food via food bags. There was one activity functioning as a food bank redistributing donated food within the own organization to either of the two social supermarkets. The food bank was not listed as a separate activity as it was regarded to fall under the social supermarket activities. Within two organizations clients were offered free groceries from an open pantry. Lastly, there was one organization allowing for food redistribution and food sharing via social refrigerators. All activities, organizations and their locations are summarized in appendix 9.13.2.

Neither the social supermarkets nor the food bag activities handle cooked food (Stegrud 2018; Wahlby 2018). Similarly, one of the two open pantries only handle groceries (Hammega 2018). Several e-mails were sent to the second organization but no answer was received. Their website do however imply that solely groceries are offered from the pantry. According to Nystedt (2018b) food

waste generated from canteens mainly consists of cooked food from serving trays, which was further confirmed by survey results. Activities solely handling groceries were therefore excluded and hence, only activities performing meal servings and the social refrigerators were regarded as suitable receivers of canteen leftovers. Only results from those activities are further investigated and declared for.

Of the 27 activities offering meals, 12 serve breakfasts and remaining 15 serve either lunch or dinner. As leftovers from the municipal canteens constitute of cooked food, not suitable for breakfast servings, solely activities offering lunch or dinner are considered as adequate receivers. Ten of the 15 relevant activities estimated the number of persons served within their work to an average of 152 persons every week. Most respondents performed meal serving activities more frequently than once a week. The share of the food offered to clients constituting of donated food and groceries was estimated to 55 %. Numbers calculated are based on five answers from seven organizations performing meal servings. All but one of the seven respondents confirmed that they would be able to accept larger donations and they were all positive to a collaboration with municipal canteens. The one not able to receive more food were hindered by insufficient storing spaces. From e-mail correspondence with representatives from the charity organizations it appeared that the receivers were the ones responsible for transporting food donations. Answers and calculations are to be found in appendix 9.13.2.

Practical obstacles in terms of cleaning and re-transportation of trays was highlighted by representatives from the social refrigerators but despite this, they were positive to a collaboration with public canteens.

A conclusion from this complementing survey is that the number of canteens highly exceed the number of potential receiving organizations. Most of the organizations are located in more densely populated areas and there are many municipalities not having suitable receivers close by, why redistribution do not always pose an option. As for all food businesses compliance of current laws and regulations must be ensured in performing food redistribution, guaranteeing food safety and peoples health.

5 Calculations on thesis research results

In this section calculations on environmental, social and economic consequences arising from food waste are to be performed. Calculations are based on results attained from conducted surveys, interview and case study. Comments on obtained results are saved for the discussion, chapter 7.

5.1 Environmental effects

From the more extensive survey, presented in section 4.2, the 121 attendants estimated an annual food loss amounting to 1 300 tonnes all together. Multiplying this with estimated share of food waste for respective type of kitchen, results implied annual food waste of just below 600 tonnes. Corresponding value for the average municipality was 42 tonnes food loss, of which 19 tonnes was estimated to constitute of food waste. In performed calculations it is assumed that all food waste would have been left in the service trays, taken care of and redistributed as food for human consumption.

Results from the complementing survey on food loss management, described in chapter 4.3.1, imply that 77 % of the municipalities convert food loss into biogas and biofertilizers utilizing anaerobic digestion. 21 % incinerate the food loss, converting it into district heating and electricity. Only one municipality, corresponding to just over 1 %, utilize composting as main food loss treatment.

According to attendants of the larger survey, food and groceries most commonly wasted are potatoes, pasta, vegetables and a mix of what have been served. Based on written answers from 95 attendants it was estimated that of the overall food loss 60 % consists of potatoes or pasta, 20 % are vegetables and 20 % are either chicken or beef. Emissions related to various groceries and food treatment methods, as declared in section 2.6, are now utilized in calculations. Again, transports are included in all cases.

None of the articles studied investigated in emissions related to the waste treatment of potatoes or pasta. According to the authors of one of the article studied, key factors affecting the environmental effects from the waste treatment alternatives are energy and water content of the groceries (Eriksson, Strid, and Hansson 2015). As these were reviewed for boiled potatoes and pasta it was concluded that the most similar grocery studied was bananas (Livsmedelsverket and Matkalkyl.se 2018). It was therefore assumed that emissions related to various waste treatments of potatoes and pasta could be equated to that of bananas and thus, emissions for bananas are used for potatoes and pasta in further performed calculations. For chicken and beef one average per treatment alternative was calculated.

Resulting values for the two meats averaged to net saving of 0.33 and 0.47 kg

CO_2-eq./kg for redistribution and anaerobic digestion respectively. Utilizing composting results imply net emissions of 0.04 kg CO_2-eq./kg and for incineration corresponding net saving was 0.15 kg CO_2-eq./kg. Environmental effects from redistribution instead other treatment alternatives were calculated by subtracting emissions from respective waste treatment option from that of redistribution. Values utilized in calculations are summarized in table 8 below. Negatives imply the latter alternative to cause larger savings of greenhouse gas emissions compared to redistribution.

Table 8: *Average CO_2 emissions [kg CO_2-eq./kg grocery] comparing redistribution to anaerobic digestion, composting and incineration.*

Grocery	**Redist. - An. dig.**	**Redist. - Comp.**	**Redist. - Incin.**
Fruit & vegetables	0.38	0.51	0.53
Potatoes/Pasta	0.06	0.4	0.4
Chicken & beef	-0.14	0.37	0.18

The annual food waste quantity of 600 tonnes generated by the survey attendants was multiplied with percentages resulting from the complementing survey on waste treatments methods. Results imply that 460 tonnes were treated by anaerobic digestion, 130 tonnes by incineration and 7 tonnes was composted.

Of the anaerobically degraded food 270 tonnes consisted of potatoes or pasta and 90 tonnes each were vegetables and meats. Corresponding numbers for the incinerated food were 80 tonnes potatoes/pasta and 25 tonnes each for vegetables and meats. For the composted food waste 4 tonnes were potatoes or pasta, and 1.4 tonnes respectively were vegetables and chicken/beef. Values presented, rounded off, are summarized in table 9.

Table 9: *Annual food waste quantities [tonnes/year] per grocery and waste treatment.*

Treatment	**Total [t/y]**	**Potatoes/Pasta [t/y]**	**Veg. [t/y]**	**Chicken/Beef [t/y]**
An. digestion	460	270	99	90
Incin.	130	80	25	25
Comp.	7	4	1.4	1.4

Values from table 8 were multiplied with values from table 9 as environmental effects from anaerobic digestions, composting and incineration compared to redistribution, was calculated for respective quantities and groceries. For complete calculations see appendix 9.11.

If all eatable food currently discarded from the canteens investigated were to be redistributed, annual emissions of 88 tonnes of CO_2-eq. could be avoided. For the average municipality corresponding emissions amounted to 2.6 tonnes of

CO_2-eq. every year. Amplified to a national level redistribution of food waste could result in evaded greenhouse gas emissions of close to 800 tonnes CO_2-eq. annually. Data from Nationella emissionsdatabasen (2018) and the year 2016 imply annual, overall greenhouse gas emissions for the average municipality in Sweden of 180 000 tonnes CO_2-eq.. The 2.6 tonnes calculated from survey results would, based on this statistics, correspond to 0.002 % of the annual municipal greenhouse gas emissions.

5.2 Social effects

Social effects are in this thesis measured by the number of portions available from the food waste from public canteens. It is assumed that the food waste would have been left in the trays of the canteens, making it appropriate for redistribution. The two articles by Pettersson, Breitholtz, and Olsson (2017) and Eriksson, Malefors, et al. (2016) both used a standard portion size of 320 g, a number which is further utilized in performed calculations.

Annual food waste as a total of all attendants of the larger survey, presented in section 4.2, totaled to an estimated 600 tonnes. Assuming a portion size of 320 g the food waste could have been converted into approximately 1 800 000 portions. On a municipal level the average food waste totaled to 19 tonnes each year, food corresponding to approximately 58 500 portions. If this number was to be representative for all municipalities in Sweden, a total of almost 17 million portions could have been served to people in need.

According to contacts from charity organizations, as presented in chapter 4.3.3, the share of donated food within the food serving activities was estimated to 55 %. Further all but one organization claimed to be able to receive larger quantities, implying that there is a demand and possibility of redistributing parts of the canteen food waste. These numbers are based on the assumptions that no food is wasted along the donation process and that there are charity organizations able to receive and serve overproduced food.

5.3 Economic effects

Cutting food waste quantities does not only entail environmental benefits. By reducing food waste, costs for waste management would decrease. 29 of the attendants of the larger survey estimated that preparing food for redistribution would require an estimated 34 minutes of extra work. However, it is assumed that this preparation would be performed during regular working hours. No expenses for staff salaries are therefore included in calculations. If reusing overproduced food within the own canteen, instead of redistributing it, purchases of groceries can be avoided. This will be investigated as a separate case in the end of this section. Full calculations are to be found in appendix 9.12.3.

As calculated from invoices from the municipality of Kristianstad, section 4.3.2, costs for food loss management amounts to 2.02 SEK per person and year. Results from the more extensive survey indicate that food waste quantities differ among the various types of kitchens. Calculating one average for all types of kitchens imply annual food waste of 3.23 kg per person. Dividing estimated waste management costs by the average food waste quantity per person further implies food waste management costs of 0.63 SEK/kg. If all food waste were to be redistributed annual economic savings from avoided waste management costs would correspond to 0.006 SEK per person person, based on the survey attendants serving a total of 61 881 100 persons per year. This implies that from redistribution of the food waste, attendants of the larger survey could save just over 368 000 SEK every year. Corresponding savings for the average municipality serving 926 820 persons every year, was calculated to approximately 5 500 SEK per year. Applied on a national level economic benefits could total to almost 1 600 000, or approximately 1.6 million, SEK per year. This builds on the assumption that the food waste otherwise would have been separated and anaerobically degraded, as this is the case in the municipality of Kristianstad.

Stated in chapter 4.1, Nystedt (2018a) estimated cost for groceries to 9.60 SEK per portion. As calculated above the annual food waste of 600 tonnes could be converted into 1 800 000 portions. Corresponding savings thus amounts to approximately 17 700 000 SEK per year. The average food waste per municipality totaled to 19 tonnes each year, food that could have been converted into 58 500 portions. The economic value of groceries used amounts to 561 00 SEK per year, assuming the food waste were to be reused and served again within the own canteen. Applied to all municipalities in Sweden this implies savings of almost 163 million SEK annually. In this thesis however the leftover food is assumed to be redistributed and hence these numbers are not further reviewed.

Environmental, social and economic effects from redistribution, both as average values per municipality, as a total of all survey attendants and for all municipalities in Sweden, are concluded in table 10. Calculations does not include savings from avoided grocery purchases as the food waste is assumed to be redistributed.

Table 10: *Environmental, social and economic consequences of food waste redistribution, as averages per municipality, as a total of all survey attendants and applied to all municipalities in Sweden.*

	Av. municipality	**All attendants**	**Sweden**
Waste quantities [t/y]	19	600	5 500
Emissions [t CO_2-eq./y]	2.6	88	800
No. portions from food waste [no./y]	58 500	1 800 000	17 000 000
Avoided costs [SEK/y]	5 500	368 000	1 600 000

5.4 Sensitivity analysis

To enable for calculations on variations in food waste quantities attendants of the larger survey were asked to estimate food loss quantities days with large respectively small quantities wasted. Due to the low number of attendants responding to this question previously estimated averages fell outside the intervals for two of the four categories. Hence an additional sensitivity analysis was performed utilizing normal distribution of the estimated averages given by survey respondents.

Calculations were performed on both sensitivity analyses. Together with previously approximated values on the food waste share and the total number of persons served within each category, variations in related environmental, social and economic consequences were calculated. Food waste quantities are from section 4.2.1, table 5.

5.4.1 Maximum and minimum estimated by survey attendants

In performed sensitivity analysis averages on minimum and maximum food waste per person and year, based on responded answers, were calculated for all four categories. Although not all attendants approximated food loss variations, numbers are applied to the total number of persons served within each category. As earlier highlighted average values on food loss per person exceeded estimated maximum values for attendants answering from a central position as well as for kitchens solely cooking. Therefore in calculating total maximum amount of food waste for those categories, the two average values were used. For the remaining two categories, estimated maximum values were used. All calculations are to be found in appendix 9.7.1, 9.7.2 and 9.7.3.

Quantities resulting from performed calculations imply variations of annual food waste from 270 to 660 tonnes as a total for all survey attendants. For the average municipality results imply food waste quantities varying from 7.5 to 13 tonnes each year. Applied on a national level this corresponds to quantities stretching from roughly 2 200 to 3 800 tonnes annually. It should be noted that previously calculated averages exceed the two latter estimated maximum values.

Calculating environmental consequences, the same methodology was used as for previous calculations on greenhouse gas emissions. Based on variations in food waste quantities for all survey attendants the interval for resulting emissions stretches from 40 to just below 100 tonnes CO_2-eq. per year. On a municipal level emissions from food waste quantities varies from 1.1 to 2 tonnes CO_2-eq. annually. Nationally this implies a span of annual greenhouse gas emissions from 330 to 570 tonnes CO_2-eq.. As a consequence of the estimated average food waste quantity being larger than estimated maximum, resulting average emissions previously calculated exceeds the estimated maximum emissions.

Social effects were calculated and measured in number of portions available from estimated food waste quantities. Assuming a standard portion size of 320 g, food waste quantities from all survey attendants could have been converted into between approximately 838 000 to 2 000 000 portions. Corresponding numbers for the average municipality roughly stretches from 23 400 to 41 000 portions. On a national level the number of portions available varies from 6.8 to 11.8 million portions per year.

Furthermore, variations in waste management expenses were calculated. Similar to previously performed calculations on waste management costs, one average food waste quantity for all categories was calculated. As explained earlier, in calculating maximum expenses both the two averages and the two estimated maximum values were used. Results imply annual costs evaded for the survey attendants stretching from approximately 203 000 to 206 000 SEK. Once again the earlier calculated average, 368 000 SEK per year, falls outside of the interval. This is also true for the average municipality where estimated interval spans from just over 3 000 SEK to almost 3 100 SEK annually. Applied to all municipalities in Sweden, redistribution of food waste from municipal canteen could save between 0.88 to 0.9 million SEK per year.

5.4.2 Maximum and minimum from normal distribution

As estimated values from survey attendants were regarded as insufficient, an additional sensitivity analysis was performed based on normal distribution of averages previously estimated by the survey attendants. Intervals on food loss were calculated for each category using lower and upper expected values as described in section 4.2.1. To calculate food waste quantities, returned values on food loss quantities were multiplied with the share constituting of food waste as previously estimated by the survey attendants. All calculations are to be found in appendix 9.9.

Based on values obtained from lower and upper expected values from performed normal distribution, the food waste quantities as a sum of all attendants stretches from 350 to just over 600 tonnes per year. Food waste quantities for the average municipality spans from 10 to 19 tonnes annually and applied on a national level, corresponding interval stretches from 3 000 to 5 500 tonnes.

Furthermore using the same algorithm as previously, intervals for emissions related to the treatment of the food waste quantities were calculated. For all survey attendants results imply annual emissions to span from just over 50 to 90 tonnes CO_2-eq.. Calculated interval for the average municipality varies from 1.5 to close to 3 tonnes CO_2-eq. every year. If values are applied to a national scale corresponding emissions stretches from 450 to almost 850 tonnes CO_2-eq..

If the food waste from the canteens investigated would have been saved and

served, estimated quantities could have been converted into between 1.1 to 1.9 million portions approximately. For the average municipality corresponding numbers varies from roughly 32 000 to 60 000 portions. If all food waste from the Swedish municipalities were utilized to feed people, between 9 to 17 million portions could have been served.

Lastly economic consequences were calculated applying the same methodology as previously. Expenses evaded from redistributing the food waste from all survey attendants spans from almost 150 000 to 181 000 SEK every year. For the average municipality corresponding expenses varies from 2 200 to 2 700 SEK. On a national level the interval stretches from an annual of 0.65 to 0.79 million SEK. Compared to previously calculated averages, all values fall outside the intervals. The reason to this is the values attained from the case study which is given in costs per person rather that costs per weight waste. Thus, larger food loss quantities per person results in lower costs per person and thereby the total costs are lower for the largest quantities compared to estimated average.

Results from both sensitivity analyses are illustrated in figure 8 to 15. All values are summarized in table 11 below.

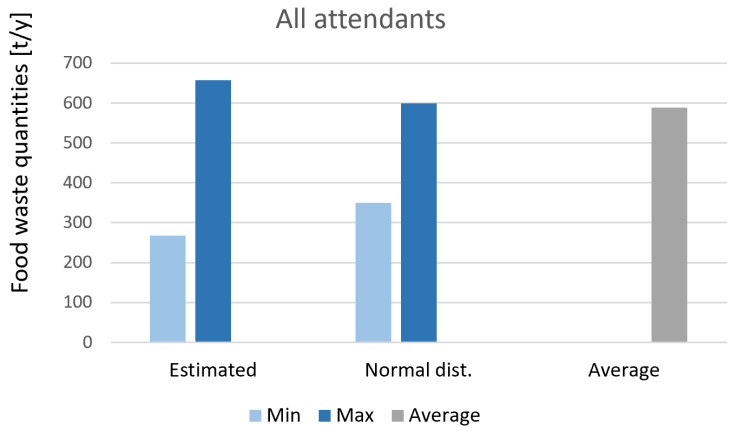

Figure 8: *Results from both sensitivity analyses. Minimum, maximum and average food waste quantities for survey attendants.*

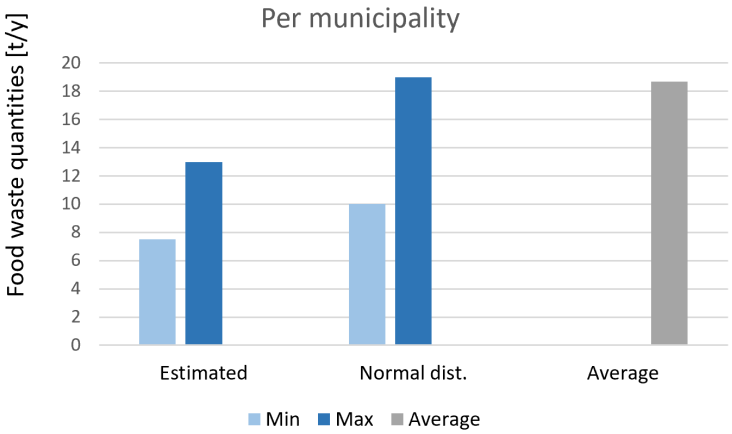

Figure 9: *Results from both sensitivity analyses. Minimum, maximum and average food waste quantities for the average municipality.*

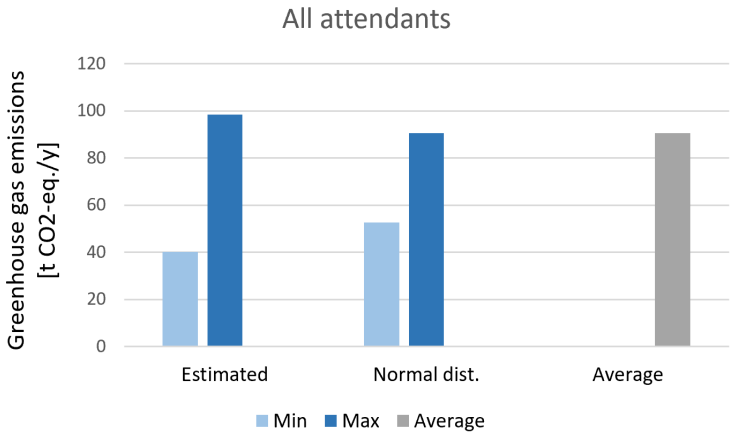

Figure 10: *Results from both sensitivity analyses. Minimum, maximum and average greenhouse gas emissions for all survey attendants.*

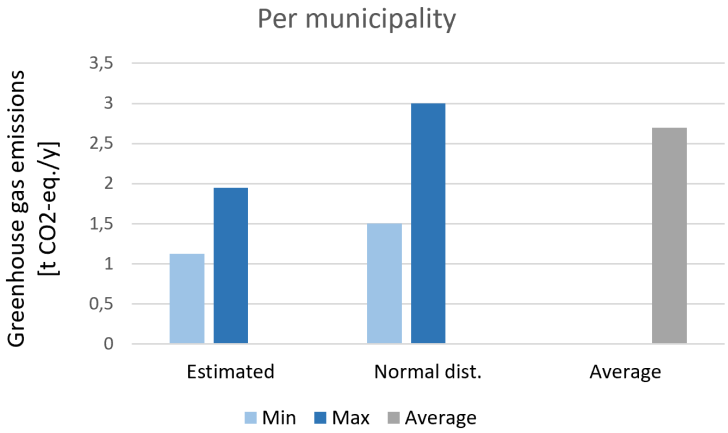

Figure 11: *Results from both sensitivity analyses. Minimum, maximum and average greenhouse gas emissions for the average municipality.*

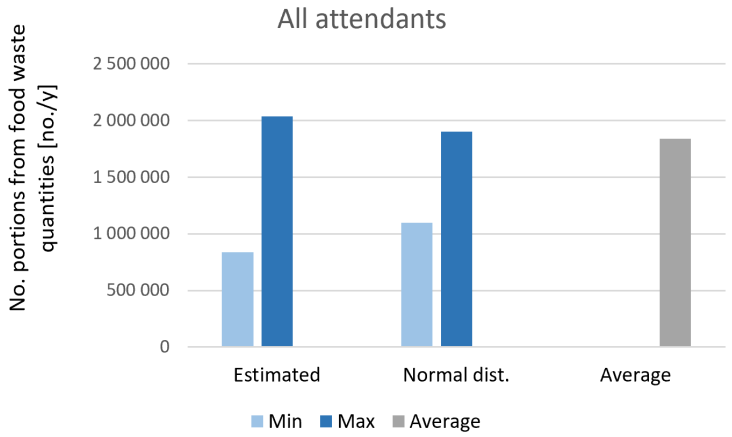

Figure 12: *Results from both sensitivity analyses. Minimum, maximum and average number of portions from food waste from all survey attendants.*

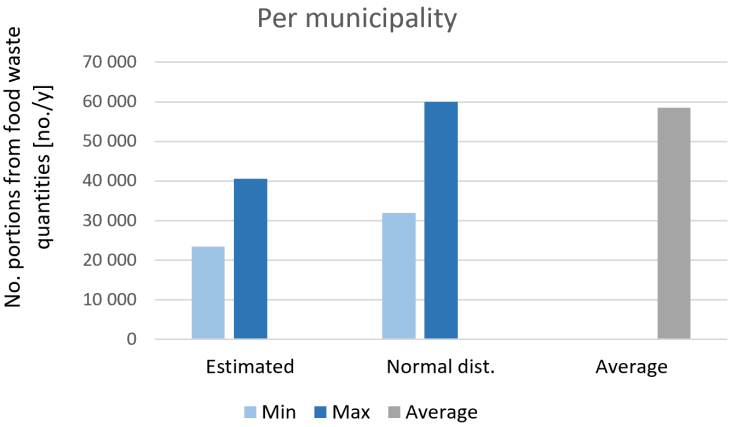

Figure 13: *Results from both sensitivity analyses. Minimum, maximum and average number of portions from food waste for the average municipality.*

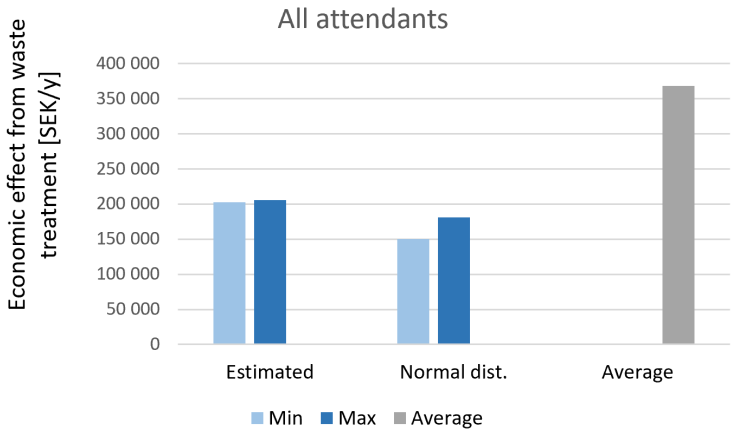

Figure 14: *Results from both sensitivity analyses. Minimum, maximum and average economic effects from food waste from all survey attendants.*

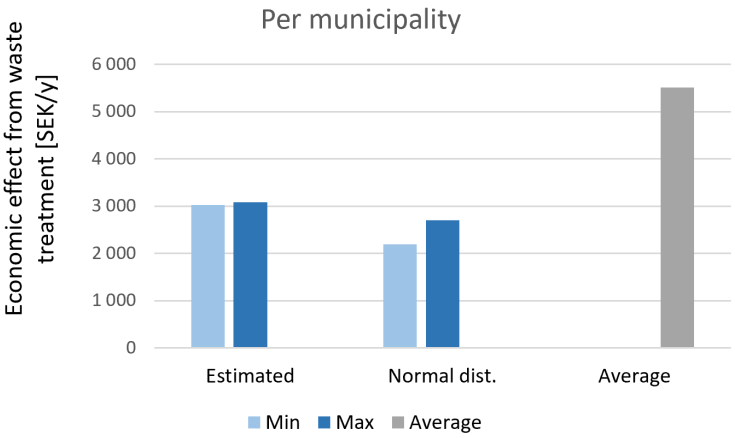

Figure 15: *Results from both sensitivity analyses. Minimum, maximum and average economic effects from food waste for the average municipality.*

Table 11: *Results from both sensitivity analyses on food waste quantities, social effects and resulting environmental and economic savings. Values as a total of all survey attendants, per municipality and Sweden as a whole.*

			Min. value	**Max. value**
Estimated	Attendants	Food waste [t/y]	270	660
		Emissions [t CO_2-eq./y]	40	100
		Social effects [million portions]	0.84	2
		Avoided costs [SEK/y]	203 000	206 000
	Municipality	Food waste [t/y]	7.5	13
		Emissions [t CO_2-eq./y]	1.1	2
		Social effects [no. portions]	23 400	41 000
		Avoided costs [SEK/y]	3 000	3 100
	Sweden	Food waste [t/y]	2 200	3 800
		Emissions [t CO_2-eq./y]	330	570
		Social effects [million portions]	6.8	11.8
		Avoided costs [million SEK/y]	0.88	0.9
Normal dist.	Attendants	Food waste [t/y]	350	1 600
		Emissions [t CO_2-eq./y]	50	90
		Social effects [million portions]	1.1	1.9
		Avoided costs [SEK/y]	150 000	181 000
	Municipality	Food waste [t/y]	10	19
		Emissions [t CO_2-eq./y]	1.5	3
		Social effects [no. portions]	32 000	60 000
		Avoided costs [SEK/y]	2 200	2 700
	Sweden	Food waste [t/y]	3 000	5 500
		Emissions [t CO_2-eq./y]	450	850
		Social effects [million portions]	9	17
		Avoided costs [million SEK/y]	0.65	0.79

6 Suggestion on redistribution solution

From performed research and calculations it can be concluded that redistribution the food waste generated from municipal canteens could contribute to a more sustainable food system, with respect to all three parameters of the concept of sustainability. Possible solutions identified are presented below. These are reviewed with regards to both stakeholder requirements and sustainability performance and with the aim of optimizing environmental, social and economic performance of the redistribution design.

Potential redistribution solutions identified are:

- Donation
  - to charity,
  - to farms as animal feed,
- Exchange of groceries and leftovers
  - to kitchens within the same or neighboring municipality,
  - to elderly/disabled in the municipality who receive cooked food,
- Selling lunch boxes
  - to staff members,
  - to parents/relatives,
  - to others

6.1 Reviewing environmental, social and economic aspects

Environmental aspects

Solely regarding environmental effects the best alternative would be not generating food waste at all, as in line with the EU waste hierarchy presented by Naturvårdsverket (2017). It must therefore be emphasized that highest priority should be that of minimizing food waste quantities. Second best would be utilizing food for its intended purpose of being consumed, also supported by the waste hierarchy and the article by Eriksson, Strid, and Hansson (2015). All suggestions given imply leftover food to be consumed, either by humans or by animals.

Regarding greenhouse gas emissions, transports of food redistributed for donation are included in both articles utilized in the calculations on environmental effects. In the article by Eriksson, Strid, and Hansson (ibid.) the authors assume that the donated food is transported 21 km by a diesel truck, and that donations are performed 300 days per year. The authors of the article by Eriksson and Spångberg (2017) instead assume shorter transports of 4 km by a medium-sized petrol car, performed five days per week. As both articles were used one might

say that thesis calculations are based on a distance somewhere between 4 and 21 km, that transport are performed with a large car or a small truck fueled with fossil fuels and that donations are performed approximately 220 days per year. How often redistribution is performed and the distance of transports likely affects the environmental performance of the redistribution suggestion.

Ranking the various options against each other, with regards to environmental performance, is very hard and must be done with great care. One might argue that selling the leftover food as lunch boxes or exchanging leftovers within the own or with neighboring municipality may fall within the distance span used in performed calculations. Regarding donations to charity or to farms as animal feed, resulting emissions depends on the location of the organization or the farm. From chapter 4.3.3 on charity organizations it was concluded that there are few active organizations performing food redistribution and that the organizations often are located in the areas of larger cities. With thesis data, no estimations on distances to potential farmers can be made. If there are no organizations or farmers in the close area of the canteen there might be a risk of the environmental savings of greenhouse gas emissions from donations are eaten up by the longer transports.

What the redistributed food replaces must also be taken into account in reviewing environmental effects. The article by Eriksson, Strid, and Hansson (2015) assumes groceries replaced bread and in the article by Eriksson and Spångberg (2017) it was assumed to substitute similar groceries by 30 %, junk food by 30 %, nothing by 30 % and that 10 % was wasted along the redistribution process. Similar assumptions if food from canteens were to be donated to charity, may therefore be justified as the assumptions made in the two articles are based on contacts with representatives from charity organizations. If the food were to be donated to farmers it may be assumed it would replace fodder. Solely based on thesis results, the environmental effect of this substitution cannot be further investigated in. The sensitivity analyses performed in the two articles studied illustrate that what the food replaces highly affects the outcome of the redistribution. If redistributed groceries were to replace identical groceries the articles imply significantly larger environmental benefits compared to that of the original case.

If allowing for redistribution via exchange of leftovers with another canteen, it could be argued that the two have similar menus. This is likely also the case if leftovers were to be redistributed to elderly or disabled receiving cooked food, as this food most probable is cooked in another canteen. Therefore it may be a reasonable assumption that the redistribution suggestion on exchange of leftovers would replace similar food and groceries.

In the case of selling overproduced food as lunch boxes, again the environmental consequences depends on what the leftover lunch box replaces, i.e what the

purchaser would have eaten if not buying the leftovers from the canteens. If the redistributed food consists of meat and imported greens and were to replace a vegan or vegetarian dish from local products, the environmental benefit is probably lower than if it were to replace similar ingredients. This based on the article previously referred to by Eriksson, Strid, and Hansson (2015) and findings in conducted literature study, chapter 2.3, where emissions related to various groceries are reviewed. Food cooked in canteens are built on recommendations from the Swedish National Food Agency on a varied diet. In private households it is likely that the food cooked also consists of a variety of dishes. Hence it is believed to be a safe assumption that sold leftovers would replace similar groceries.

It is above argued that larger environmental savings are to gain if redistributed food replaces similar groceries compared to if the food were to be donated to charity, based on what the donated food replaces. Solely regarding the environmental aspect of sustainability it might therefore be argued that selling canteen leftovers as lunch boxes or allowing for exchange of leftovers, within the own or with neighboring municipality, may results in larger savings of emissions than if donated.

Social aspects

Reviewing the social aspect of the suggestions given, only that of donations to charity targets people in need. Via redistribution to charity organizations offering meal servings the food may reach vulnerable people, why this option could be regarded as socially most beneficial. Moreover if this is done via a redistributor collaborating with socially responsible companies, even greater benefits might be achieved.

If leftovers were to be donated as animal feed this likely holds positive effects for the farmer as fodder expenses may be avoided. Selling the overproduced food as lunch boxes might also entail positive social effects for the buyers as they may save money and time. Similarly the case of exchanging the overproduced food may imply savings, economic as well as time wise. However it could be argued that the social benefits from redistributing food from canteens to charity are larger. Hence, aiming at optimizing the sustainability performance, donation may be regarded as the socially most sustainable alternative of the redistribution solutions given. Comparing the social effects from exchange or if the overproduced food were to be sold, no superior alternative can be selected.

Economic aspects

Based on calculations performed on findings from conducted interview, presented in chapter 5.3, the largest economic burden for the public canteens are that of grocery purchases. If these could be avoided calculations imply that large economic savings for the municipalities could be made. It is assumed, based on answers declared in section 4.2.2, that canteens already work actively in incorporate leftover groceries and food into new dishes, why this is not presented as a redistribution suggestion. From the suggestions given, it could be argued that the options likely resulting in greatest decreased costs for the municipalities are the two alternatives allowing for the exchange of groceries and overproduced food.

The alternative of selling the leftovers may imply economic benefits, both from revenues from sold lunch boxes and from avoided waste management costs. Calculations based on findings from the case study, presented in chapter 4.3.2, suggest that costs for avoided purchases are larger than that of avoided waste management costs. The magnitude of potential extra income from sold lunch boxes have not been investigated in. Estimations are hard to make and will not be speculated about, more than that this depends on the price charged for the lunch boxes. As the canteens are owned by the municipalities, selling the overproduced food is regulated by laws on competition and the municipal law. How this affects the various redistribution alternatives are discussed in the section below.

In the case of donating overproduced food from canteens the likely only economic benefit to gain is that of avoided waste management costs. Also if an intermediate redistributor were to be payed for, potential savings might be vanished by these extra expenses.

6.2 Stakeholder requirements

In chapter 2.1 several legal requirements are declared for, all which must be fulfilled by the municipal canteens regardless of how leftovers are managed. Most important are laws on safe handling, storing and distribution of food. Important for redistribution is the requirement of an unbroken cold chain.

The larger survey addressing municipal canteens allowed for several free text answers on attitudes towards handling leftovers with special regards to food redistribution, presented in chapter 4.2.3. Results highlighted both important issues but also possibilities related to the management of overproduced food. Most frequently stated hindrance for redistribution regarded legal aspects and the risking of food safety and human health. Concerns on not being able to ensure an unbroken cold chain if leftover food were to be redistributed and further, the risk of being held responsible if someone were to get sick from the redistributed food was frequently expressed. For the suggestions donation and exchange these are relevant aspects as they involve transports of food outside of the kitchens.

In the case of donations either the receiver or the canteen must transport the donated food, unless an intermediate redistributor is payed for. Donating leftovers from canteens, either to charity or to farmers, was frequently stated by the survey attendants as a possible solution. This however with the impediment of the canteens themselves not having resources to perform the transports. If the suggestion on donations is to pose an option, transports must therefore be managed by the receiver. Findings from the survey on charity organizations, section 4.3.3, do imply that this is the case of the current food redistribution. Thus it is believed that if canteen leftovers were to be donated to charity, the charity organizations would be willing to perform the transports and thereby undertake the responsibility of ensuring legal compliance. This may also be the case if the food is donated as animal feed, assuming the receiving farmers are willing to pick up food donations.

To allow the exchange of groceries and leftovers within the own or with the nearby municipality, either of the two kitchens must transport the food. As stated above, attendants of the larger survey expressed that the canteens did not have the resources to perform the redistribution themselves. Thus, if two canteens are to exchange food and groceries it might be troublesome how to solve the transports. It may be argued that the kitchens could take turn in who to have the responsibility of leaving and picking up donations. This however builds on the assumption that the canteens, despite previous statement, would have resources in terms of time, staff and equipment to perform the transports.

If the leftovers are to be utilized to substitute food that otherwise would have been cooked and delivered to elderly or disabled, either the canteens have to manage the transport themselves or the company normally deliver the food do

this. It might be a reasonable assumption that the ones who normally deliver the lunch boxes have the required equipment and would be willing to pick up prepared lunch boxes from the canteens and distribute them. A more far fetched alternative could perhaps be if the municipalities would be willing to support and enable for redistribution by financial support. If so, required equipment to ensure an unbroken cold chain and suitable means of transportation could be invested in. In that case both the donation and the exchange suggestion might be possible redistribution solutions.

To sell leftovers as lunch boxes is an option that does not require the canteens to transport food outside of the kitchen and hence concerns on keeping an unbroken cold chain could be avoided. It is believed that the canteens would only be responsible for safe handling and packaging of the food inside the kitchens. When the lunch boxes are sold the responsibility does no longer fall under the canteen. With the concerns on fulfilling legal requirements in mind, it could be argued that selling leftovers as lunch boxes may be a more suitable option than donation or exchange of food and groceries.

On the other hand, practical inconveniences on portioning, labeling and consequential added work of charging and accounting if food were to be sold were often stated by attendants as troublesome. According to the attendants of the larger survey, an extra 34 minutes per day was estimated to be required to prepare the lunch boxes. Except the charging and accounting, similar extra work would likely be required if the overproduced food were to substitute food cooked and delivered to elderly/disabled. Also, even if sold to a cost price, concerns were raised on not challenging laws on competition and the economic regulations of municipal activities. If this concern is legitimate or not is difficult to assess and may depend on several things. If selling leftover lunch boxes to parents/relatives becomes very popular and the canteens start making money on this, how does that interfere with regulations on competitions and the municipal law? And if sold to kitchen staff, is it regarded a privilege that should be taxed?

Potential consequences of selling overproduced food from the canteens will not be investigated in but it may entail extra work. It might therefore be argued that redistributing food without having to portion it, e.g donating or exchanging whole trays, may be more convenient for the canteens. With regards to practical requirements from the canteens, the two other alternatives of exchange with another canteen and donations might therefore be preferred over selling the leftovers.

A complementary survey, presented in chapter 4.3.3, investigated in charity organizations active in food redistribution. From survey results it was concluded that mainly charity organizations offering meal servings were suitable receivers of canteen leftovers as the other activities solely handled groceries. Survey attendants estimated that 55 % of the food served within their activities constituted

of donated food and groceries. This might be interpreted as the organizations being able to handle larger donations, something that was further confirmed by all survey attendants but one. Attendants expressed that they had the capacity of managing larger donations with regards to safe storing spaces. Additionally, it was concluded that there was a demand for more food in terms of the numbers served.

Concerns expressed by the charity organizations was again that of legal requirements of an unbroken cold chain but also the cleaning of donated trays. Despite this the attendants were positive to a collaboration with municipal canteens. As previously stated, in current redistribution collaborations the charity organizations are the part responsible for transports. From conducted research and survey on charity organizations it was also concluded that the number of potential donors, i.e. canteens, largely exceeds the number of potential receivers. Hence the food waste quantities generated by the public canteens, calculated in chapter 4.2.1, cannot be managed by charity organizations alone.

6.3 Suggested solution

Redistributing overproduced food from public canteens could be done in more than one way. The suggestions given were donation, exchange of food and groceries and the selling of lunch boxes. Above, the alternatives were discussed based on sustainability performance and with regards to stakeholder requirements. As it is believed that food waste cannot be avoided and that much is already done both in working preventively and in reusing leftovers, redistribution of food waste is considered the most sustainable and appropriate solution. How the redistribution solution should be designed however is a large task to undertake. It must be stressed that one solution cannot fit all and that circumstances and prerequisites for each individual kitchen should optimally be taken into consideration.

The aim was to present a solution suitable for the canteens that would optimize the environmental, social and economic effects. Based on thesis results one optimal solution cannot be presented. However, some conclusions from the performed research and the discussion above may be drawn.

Donating leftovers from the canteens to charity organizations would likely result in the largest social benefits as this redistribution solution reaches vulnerable and exposed people. In the article by Eriksson, Strid, and Hansson (2015) representatives from charity organizations declared that approximately 30 % of the ones served would not eat if not offered food by the charity organizations. Reviewing the environmental effects it is argued that the benefits are smaller, based on assumptions on what the donated food replaces.

If donation is to pose a redistribution alternative, canteen prerequisites declared

by attendants of the larger survey were that transports should be performed by the receivers. With this solution, it would fall under the receivers responsibility to ensure an unbroken cold chain. It is further believed that with this alternative, it would be appropriate if food were to be donated in the very end of the week to allow for reuse of food and groceries within the own canteen first.

Also to avoid the responsibility of transports and keeping an unbroken cold chain, leftovers could substitute food that otherwise would have been cooked and delivered to elderly or disabled in the municipality. It is believed, based on the assumption that donations replace similar groceries, that this alternative would result in larger environmental benefits than the alternative of donations. As this redistribution solution imply that the municipality could avoid expenses for grocery purchases, this alternative may also results in positive economic effects.

The alternative of exchanging leftover food and groceries with another canteen, within the own or with nearby municipalities, might also result in economic savings from avoided purchases. As it is believed that similar groceries are replaced the environmental benefits are believed to be larger than if food were to be donated. However, this redistribution suggestion builds on a collaboration between two canteens. From the larger survey it was frequently stated that the canteens themselves did not have required resources to perform the transports. Hence, how the transport and consequential legal compliance are to be managed is troublesome.

By selling leftovers, either to staff members, parents/relatives or others, potential issues on transports and following legal compliance are avoided. It is also argued that the environmental benefits from this is larger as it is believed that the leftovers replaces similar food. However this redistribution alternative most likely requires extra time for portioning, charging and accounting. Concerns on how this may interfere with the municipal law and laws on competition were expressed by several canteens attending the larger survey.

7 Discussion

Results from the literature study, research conducted and calculations performed are in this chapter reviewed. Assumptions made, approximations and other sources of errors are further discussed. Facilitating for the reader the discussion is arranged on the basis of the three research questions and topics used throughout the thesis. Additionally a chapter reflecting on future potentials and related survey answers is presented.

7.1 Food loss and food waste quantities from public canteens

The cornerstone constituting the base of this thesis is food waste. Hence highly relevant is how the term is defined. Throughout this paper the definition used is that by FAO, as stated in section 2.2.1. However even this definition allows for interpretations and individual approaches. Coffee grounds, bones and capsicum seeds are not eatable, but should potato peel and intestines be classified as food waste? If a more liberal interpretation of the term food waste would have been applied, likely consequences for this thesis would have been larger quantities of food waste from performed surveys and subsequent calculations.

Besides quantities actually separated, 13 % of the total food loss ends up in the domestic waste according to Stare et al. (2013). If this is true estimated food loss quantities from the survey attendants would increase to 1 500 tonnes. For the average municipality corresponding increase would amount to 50 tonnes. However, food thrown in the domestic waste have not been included in this thesis and hence the magnitude of consequential environmental, social and economic effects will not be further investigated.

7.1.1 Survey prerequisites

Firstly, important prerequisites and constitutional assumptions and conditions for the survey and survey attendants must be highlighted. It should be commented that attendants of this larger survey have different professional backgrounds. Some are dietary managers working at the municipality whilst others are chefs working at municipal canteens. Likely the different professionals do not have identical knowledge on food waste, something that might affect the survey results. It could be argued that those actually working in the kitchens have more hands on knowledge and experience and thereby constituting a more reliable source. On the other hand if responding from a central position one may have access to more data and a more comprehensive picture with regards to the whole municipality, including variations from different canteens. Moreover one could say that a broader spectra of professionals attending the survey increases its credibility as the total collective experience and knowledge most likely is greater, why this variation may not be solely negative.

Data constituting the foundation of performed calculations are values on food loss and food waste quantities from public canteens. These are often measured over a period of one or two weeks when so called waste weeks are conducted. According to Nystedt (2018b) and several of the survey respondents, larger quantities are wasted during days with more popular food. Thus the food served during those specific waste weeks highly affect resulting numbers on generated food waste quantities. It should also be noted that as the kitchens are integrated parts of other objects, food waste quantities may vary depending on the persons served. As stated by Eriksson, Malefors, et al. (2016) in chapter 2.2.3, food waste from kindergartens are lower than that from care homes and schools, something that was not investigated in this thesis. The same article further implies that kitchens solely serving food generate larger quantities of food waste compared to kitchen both cooking and serving, which is consistent with results from conducted survey.

A large source of error is what and how food loss is measured, which survey attendants were asked to declare for. It appeared that variations occurred both with regards to what was weighted but also the technique used. Some kitchens solely measured plate scrape off whilst others also included waste from both preparation and serving trays, things that highly affect resulting quantities. Mainly two different approaches seemed to be used when weighing the food loss; drained or wet weights. If drained, values on food loss will be lower than corresponding wet weight. As not all values estimated by the survey attendants include food loss from all hotspots it is likely that the actual food loss, and consequentially also the food waste, is greater than that calculated.

Moreover as survey answers were analyzed it appeared that respondents sometimes interpreted questions differently. In addition to that the undersigned had to, with great endeavour of objectivity, make interpretations of several answers. However avoiding misreadings and consequential altering of results is hard and the risk of misinterpretations can be presumed to increase with a growing number of survey respondents. Hence it is likely that answers and values have been affected and modified with the consequence of altered end results. But as numbers and responses were handled with great care, not including data in calculations if uncertainties arose rather than misinterpreting it, values are still considered as useful approximations.

7.1.2 Survey results

Key questions of the survey regarded values and estimations on food loss and food waste. In several questions attendants were asked to estimate the food loss and the share constituting of food waste. The various types of kitchens estimated that per person and year food loss quantities varied from 3.5 to 8.6 kg. Compared to numbers by Stare et al. (2013), implying a total of 18.2 kg per person and year, survey results are very low. This could likely be derived from answers from several survey attendants stating that solely plate scrape off was

included in measured quantities. It should also be highlighted that the article by Stare et al. is from 2013 and that food waste related issues have gained large focus lately. Hence realization of food waste reducing measures have been possible with the likely consequence of decreased quantities.

It should be further stressed that one person does not equal one portion as one may eat more than one portion, why numbers on food waste from Pettersson, Breitholtz, and Olsson (2017) and Eriksson, Malefors, et al. (2016) are not compared to thesis results.

Results obtained from the larger survey implies that on a national scale, the annual food waste from public canteens amounts to 5 500 tonnes. National statistics from Naturvårdsverket (2018) imply that canteens, both private and public, generate 73 000 tonnes food loss every year. According to Stare et al. (2013) 52 % of the food loss from canteens are food waste. If this is applied to the national statistics food waste quantities would amount to 38 000 tonnes. One reason to the low values from the conducted survey is, as just stated, that the national statistics includes both private and public canteens. The low number may also be explained by how survey attendants measured food loss; that not all hotspots were included in the measurements and that some measured the dry weight while others measured the wet weight.

According to Stare et al. (ibid.) 52 % of the food loss generated from municipal canteens constitute of food waste. This is very close to approximations made by the survey attendants. Calculating one average for all attendants, with no regards to the type of kitchen or if answering for a whole municipality or not, the result implicates a corresponding value of 51 %. Strengthened by support from the literature, results imply that food waste constitutes half of the food loss from public canteens.

The majority of the food loss arise from serving trays and plate scrape off, according to the survey attendants. Results further imply that attendants believe that these two stations are the hotspots with of the largest share of food waste. Both in conducted interview with Nystedt (2018b), from the article by Eriksson, Malefors, et al. (2016) and from Måltid Göteborg (2016) through Göteborgsmodellen, this is confirmed. Hence it can be concluded that these are the hotspots on where largest focus should be in working preventively from generating food waste.

Moreover attendants were asked if they believed preparing overproduced food for redistribution would be more time consuming than regular food loss management. If positive they were further asked to estimate how many extra minute they thought this work would require. It seemed, based on the free text answers of several respondents, that the 34 minutes extra time approximated was an estimation based on the assumption that the food were to be portioned and sold

as lunch boxes. If the question would have been formulated differently, answers may have differed. Also the majority of the attendants, 53 by number, did not believe that redistribution would be more time consuming.

To estimate food waste variations and resulting environmental, social and economic consequences attendants were asked to what extent food loss quantities varied. In this sensitivity analysis previously estimated averages fell outside estimated interval for two of the four categories. The reason to this is most probably the noticeably lower number of attendant responding to this question compared to that of estimated average, especially for attendants answering from a central position. As the average values on food loss quantities fell outside of the interval, consequential calculations on the sustainability parameters also faulted. Hence results from this sensitivity analysis was discarded and another approach, utilizing normal distribution, was applied. This may be considered more representative and correct as the method is a known mathematical approach used to estimate reality from a limited set of data, much like the case of the survey results of this thesis.

Based on the normal distribution of quantities estimated by the survey attendants, intervals on food loss quantities were calculated for each of the four categories. With a confidence interval set to 95 %, all previous estimated averages fell inside calculated intervals. This was also true for the following calculations on all sustainability parameters but the economical effects, which strengthens results from the complementary sensitivity analysis. Also, normal distribution is a mathematical model often used to approximate reality from a given set of data similar to this case. As the sensitivity analysis estimated by the survey attendants had large faults this approach may be considered more representative. It should still be emphasized that for two of the categories the number of in-data are very low and it may therefore not be all accurate to assume a normal distribution based on these. Despite potential sources of errors, utilizing normal distribution gives an indication of how much food waste quantities may vary.

Regardless possible errors it should be stresses that the number of attendants largely exceeded expectations and that no earlier, comparable studies with this many respondents could be found. Despite improvement potentials of the survey results are regarded as credible, strengthened by the numerous participants.

7.2 Environmental, social and economic effects

7.2.1 Prerequisites for complementing surveys, case study and calculations

Environmental effects from food waste was calculated in the form of greenhouse gas emissions from waste treatment. I should be emphasized that values used throughout calculations are from two articles solely. As stated in chapter 2.6 the reason to this is that these were the only articles found investigating Swedish waste treatment alternatives and conditions. Certainly a larger number of articles would have been desirable but due to given circumstances raw data used are considered as representative and the most applicable to thesis calculations in relation to other, foreign articles reviewed.

Regarding the same articles it should be pointed out that different assumptions are made which may affect end results. In the article by Eriksson, Strid, and Hansson (2015) all groceries but bananas are assumed to be produced in Sweden. For the article by Eriksson and Spångberg (2017) however none of the fruit and vegetables studied was assumed to originate from Sweden. Additionally presumptions differ in terms of what donated food replaced as all donated food in the article by Eriksson, Strid, and Hansson (2015) was assumed to replace bread whilst in the article by Eriksson and Spångberg (2017), food replaced constituted to 30 % of similar fruit and vegetables, 30 % junk food, 30 % nothing and that 10 % was wasted along the donation process. It might therefore be argued that numbers are not comparable and that it is not suitable calculating averages using value from both articles. Nevertheless values are within the same order of magnitude and averages using both articles were calculated for category of greens only. Also assumption made on what the food replaces are based on contacts with representatives from charity organizations, a bearing to reality which strengthens obtained results.

It may also be argued that it is not suitable to utilize values on emissions for the various treatment methods of bananas for that of potatoes/pasta. In chapter 5.1 this was justified by the fact that water and energy contents of potatoes/pasta were the most similar to that of bananas. However, this comparison only reviews the eatable part of the banana. In the various waste treatment alternatives, the whole banana is treated. Values used for calculations on emissions related to the various treatment alternatives for potatoes and pasta might therefore not be representative.

From conducted literature study, chapter 2.3, it is confirmed that emissions related to various groceries differ and that this is also true for various treatment alternatives. It can therefore be concluded that what we eat, and even more what we waste, affect our carbon footprint. Based on numbers after Röös (2014) mainly plant based menus from locally produced groceries would result in lower emissions than those predominantly consisting of meats and imported

vegetables. According to several of the attendants of the more extensive survey, canteens are often steered by regulations regarding solely serving Swedish meat or buying a certain percentage ecological products. This is positive in terms of giving incentives to the kitchens to work more resourceful and sustainable.

Similar to the larger survey on food loss and food waste from municipal canteens, the complementing survey on food loss management was answered by persons with different professional backgrounds. The reason to this is that some of the responding municipalities did not know how food loss from public canteens were treated, why the local waste management company was contacted. However it is believed that this does not affect end results.

In section 5.1 calculations on greenhouse gas emissions resulting food loss treatment were calculated. Per municipality it was estimated that waste treatment of annual food waste quantities amounting to 19 tonnes, caused emissions of 2.6 tonnes CO_2-eq.. However it should be pointed out that in calculations it is presumed that 77 % of the food is treated by anaerobic digestion, 21 % by incineration and 1 % by composting, regardless how food loss from the individual municipality is actually treated. This may be applicable when calculating emissions from a larger number of municipalities but not for individual municipality. Preferably emissions for the average municipality should have been calculated per waste treatment alternative and from average food waste quantities.

The economic consequences of the food waste was calculated based on data obtained from the municipality of Kristiandstad. The results give an example of what waste management costs can be in a municipality but are far from generalizable. There are great variations in local fees and waste taxes which affects the municipal expenses related to waste management and treatment. Also, these costs likely vary with the various treatment alternatives. In Kristianstad food loss is treated by anaerobic digestion. How treatment costs varies from incineration and composting is also affecting the costs, but will not be further investigated. In the case study the monetary consequences were calculated per person and year. A perhaps more suitable approach would be to calculated costs per kilo waste instead. The reason to why this might be a better unit is that a larger food waste per person in the former approach results in lower costs per person. Again it should be emphasized that data on waste management costs are based on one single municipality. Applying this to a national level inherits great uncertainties and obtained values should be used with great care.

Further invoices from 18 public canteens in Kristianstad were reviewed in the case study. As undersigned is not very experienced in reading canteen invoices and had to make interpretations and considerations of what to include and not, the risk of misreading is imminent. It should also be highlighted that waste management and treatment costs from the municipality of Kristianstad accounts for treating food loss by anaerobic digestion. For approximately one fifth of the mu-

nicipalities attending the complementing survey, incineration or composting is utilized as waste treatment. This affects resulting costs calculated but probably only to a minor extents as the remaining majority do utilize anaerobic digestion.

Also related to costs calculations are assumptions made regarding subscribing all food loss containers to the canteens. This may not be accurate as school activities might use food loss containers for classes in home economics as well. Althought it is most probable that the absolute majority of these, and definitely all food loss disintegrators, are utilized by the canteens. This potential source of error is thus regarded to have only a minor impact on end results. Another assumption made is based on the interview with representatives from Partille. According to Nystedt (2018b) one container á 660 L is within their kitchen utilized for residual waste, something that was assumed to be true for all kitchens investigated in the economic analysis. This may not be applicable to all kitchens but it is highly likely that at least one container, although maybe smaller than 600 L, is used within each canteen.

On the topic of social sustainability it should be highlighted that there are other social aspects of food waste more than the number of portions available, as calculated in this thesis. It could be the work environment for the canteen staff or equity in terms of who that may benefit from the redistributed food. Due to time restraints, these aspects were not reviewed and will hence not be further discussed.

7.2.2 Results from complementing surveys, case study and calculations

Of the municipalities attending the complementing survey on food loss treatment, 77 % declared that food loss from the public canteens were separated and treated by anaerobic digestion. As expected this in line with and even identical to corresponding national statistics, 77 % published by Avfall Sverige (2018c).

For the average Swedish municipality, emissions from management and treatment of the generated food waste quantities was estimated to 0.002 % of the total annual greenhouse gas emissions. Partly, this is likely a consequence of the low food waste quantities on which calculations are based on. The low emissions may also be explained by the values on emissions per grocery and treatment alternative used. As stated by the authors large uncertainties lies in assumptions made regarding what the donated food replaces. If the donated food replaces nothing, i.e. if no food was donated the ones benefiting from it would not eat at all, emissions from this option was negative due to transports. On the other hand, if donated food replaced similar groceries the environmental savings were significantly higher. This difference was especially large for resource-intensive groceries such as beef (Eriksson, Strid, and Hansson 2015; Eriksson and Spångberg 2017). It can be concluded that it is hard to tell the environmental effects

from redistribution of food as it depends on what is substitutes, which likely varies amongst the receivers. However, as long as the donated groceries replaces other groceries there are environmental benefits to gain.

As stated, emissions resulting from food waste was by calculations estimated to 2.6 tonnes CO_2-eq. per year for the average municipality. With food waste quantities calculated to an average of 19 tonnes, this implies emissions of 0.14 kg CO_2-eq. per kg food waste. Comparing this to 1.6 kg CO_2-eq. suggested by Måltid Göteborg (2016) in Göteborgsmodellen, implies that values obtained from thesis calculations on resulting emissions are rather low. Again this could likely be explained by the inconsistency amongst the survey attendants on what was included in measured quantities and how this was measured. It may also be a consequence of the previously declared assumptions made in the articles that constitutes the base of the calculations on the environmental effects, and how these affect values on emissions related to the various treatment alternatives of the groceries.

Social effects from redistribution was measured by the number of portions available from the overproduced food. Results from the performed calculations imply that many people could be fed by the food currently wasted. From the survey on charity organizations, as described in section 4.3.3, however it was illustrated that there are not enough potential receivers of this food. Although all but one organization declared that they were able to handle larger donations, and that there was a need for this, quantities from the public canteens highly exceeds what likely could be managed by the charity organizations alone. From calculations the organizations serve on average 152 persons per week, compared to the 17 million portions available from food waste generated by the public canteens in Sweden. As the food waste cannot be managed by the charity organizations alone, there is a need for new redistribution channels.

Calculations on environmental, social and economic variations were also performed based on the two sensitivity analyses. Identical algorithms and methodologies to those used when calculating corresponding values for average food waste quantities, were used. In above discussion it is argued that the complementing sensitivity analysis which assumes a normal distribution of the food waste quantities, is more reliable than that estimated by survey attendants. This is further strengthened by the fact that previously estimated averages for both quantities and waste management costs fell outside estimated intervals for the sensitivity analysis estimated by the survey attendants.

Considering thesis results it can be concluded that values on environmental and economic consequences are low. Hence, they should be viewed as rough estimations and must be used with great care. However it should be emphasized that emissions and expenses originate from one meal only. Although the absolute majority of the food loss generated arises from private households, canteens are

the largest public food loss producer on the consumer side of the food chain as illustrated in section 2.2.3. If not redistributing leftovers the largest economic potential lies in avoiding grocery purchases.

7.2.3 Future

For future, several respondents attending the more extensive survey asked for better support and clearer guidelines from authorities on if and how canteens are allowed to handle and redistribute food waste. This would probably ease for those willing to make a change but who are unsure of existing laws and regulations, thereby not taking action rather than taking the wrong action. With fortified support and unequivocal guidance larger quantities of food waste could be saved.

From the complementing survey on how food loss was managed by the municipalities, several attendants currently utilizing incineration stated that anaerobic digestion is to be introduced as waste treatment. This is also supported by Avfall Sverige (2018c) declaring that the number of municipalities treating food loss by anaerobic digestion increases. As more food loss is converted into biogas and biofertilizers greater environmental yields can be attained, even though the environmentally best option would be not causing food waste at all or using it for its intended purpose of feeding people.

With a growing interest for climate change and issues related to food waste one could hope that the increasing awareness will result in decreased food waste quantities. Certainly the problem must be fought by its roots and the primary focus should be that of working preventively from food waste to arise and reusing leftover food and groceries within the kitchens. Alongside this redistributing or even selling remaining food waste could pose an option. Further the growing number of subscribers of food rescuing apps, described in chapter 2.7.3, indicates an increased demand for saving leftovers.

7.3 Redistribution

One of the research questions of this thesis aimed at investigate in and present a suggestion on how the overproduced food from canteens could be redistributed, with optimized sustainability performance. Solely based on conducted literature study, interview, case study, surveys and calculations this could not be done.

In chapter 6 various redistribution alternatives were reviewed with regards to stakeholder requirements and environmental, social and economic effects. An important issue related to redistribution, presented already in chapter 4.2.3, was that the majority of the attendants frequently expressed concerns on legal requirements. The risk of interfering with laws on both food hygiene and competition, and the regulations on how municipal economic activities should be

performed, were key issues frequently expressed to hinder redistribution. It is therefore believed that current legislation does not facilitate for redistribution of overproduced food from the canteens.

Attendants of the larger survey also expressed the need for clearer guidelines and better support from higher instances on how leftovers can be managed in terms of what the canteens are and what they are not allowed to do with the food. The fear of being held responsible if someone were to get sick from the redistributed food was often stated as problematic. To ease for the canteens willing to redistribute the overproduced food a measure that might be effective could be that of the disclaim of responsibility.

Based on discussions from chapter 6 the undersigned believes that of the redistribution alternatives considered, donation to charity would pose the most sustainable and suitable option for the canteens. This as issues on interfering with laws on competition and the municipal law are avoided. If the transports are managed by the receivers canteens would not have to be concerned on fulfilling requirements on an unbroken cold chain. This is believed to be a reasonable assumption, based on results from chapter 4.3.3 and the survey on charity organizations. Moreover, practical inconveniences expressed by attendants of the larger survey on portioning, packaging and eventual charging and accountancy, are avoided with this redistribution alternative.

Regarding the sustainability performance, it is believed that this suggestion would entail the greatest social benefits. On the environmental and economic outcomes the consequences may be more difficult to assess. A reasonable assumption is that economic benefits from donations are avoided waste management costs. Although the donated food might not replace similar groceries, which likely would result in larger benefits, there are still positive environmental effects in terms of avoided emissions from replaced food. Problematic with this suggestion however is that there are not enough potential receivers. The number of donors, i.e canteens, highly exceeds the number of charity organizations offering meal servings. The quantities available from the canteens also likely exceeds the demand and hence, the food waste from public canteens cannot be managed by charity organizations alone.

8 Conclusion

The aim of this thesis was to investigate food loss from Swedish canteens and the share constituting of food waste. Research questions which have formed the base of this work regarded food loss and food waste quantities, the possibility of redistributing the food waste and the environmental, social and economic effects from this. To answer these questions a literature study, one interview, three surveys and a case study were conducted. Calculations on all three sustainability parameters were performed, based values obtained from thesis research.

Results imply that approximately 5 500 tonnes of eatable food from public canteens in Sweden is wasted every year. The food waste mainly arise from plate scrape off and from the trays of food that have been up for service outside of the kitchen. If food waste quantities would have been saved and redistributed, emissions amounting to 800 tonnes of CO_2-eq. could have been avoided. Calculations imply that food waste related emissions totals to 0.002 % of annual greenhouse gas emissions for the average municipality.

It can be concluded that the environmental consequences of the food waste only constitutes a minor fraction of the total emissions caused by the municipalities. The reason this may likely be explained by the fact that most food loss is currently treated by anaerobic digestion, a treatment method with relatively good environmental performance. The low emissions might also be explained by assumptions made on what the redistributed food would replace. Raw data used in calculations builds on the assumptions that redistributed food is donated to charity, and that the donated groceries substitute either bread or a combination of fruit, vegetables and junk food. Results of the larger survey addressing public canteens imply that the food waste consists of a mix of carbohydrate rich groceries, meats and greens. If these were to replace similar groceries, findings from the literature study indicate that larger environmental savings could be achieved compared to the case of donation to charity.

The potential economic savings from redistribution of the overproduced food was for the average municipality calculated to 5 500 SEK per year. Hence, redistribution of food waste may not be performed solely for the monetary yield. Regarding economic aspects of food waste, it could be concluded that the largest savings are to be made from avoiding grocery purchases. However it is believed that a complete match of purchases, cooking and consumption is hard to achieve. If not able to reuse leftover groceries and food within the own canteen, redistribution is believed to pose a good option.

The number of portions available from food waste quantities was on a national level estimated to 17 million portions. Instead of converting the food into biogas and biofertilizers, it could have been utilized for its intended purpose of being consumed. Although environmental and economic savings are small, it

is argued that it would have been more sustainable to donate the leftovers to charity organizations offering food to people in need.

Very important to emphasize is that redistribution must never legitimize overproduction of food. It should also be stressed that primary focus should be that of minimizing the food waste generated by working preventively. Furthermore it can be argued for greater involvement of e.g. principals and teachers. With better information the food related behavior of the ones served could be affected, which in the long term may result in reduced food waste.

Several attendants of the larger survey stated that there is a need for better assistance and clearer guidelines on what actions municipal canteens are allowed to take regarding the food waste issue. Investigating how authorities and municipalities from a central position can support canteens could pose a topic for future work. It is further believed that both specific pick analyses and studies on food waste, not solely from canteens, are needed and requested for.

With greater actions from a larger number of actors, greater common achievements and synergies can be realized. We have to change our behavior to keep this only planet Earth environmentally sustainable for our succeeding generations. Minimizing food waste would improve food system sustainability and is one of several keys to a more sustainable society and a more sustainable world.

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9 Appendix

All interviews, surveys and e-mail correspondence throughout this thesis have been conducted in Swedish. Also some of the calculations are commented in Swedish. Due to time restraints, no translations have been made.

9.1 Transcribed interview with municipality of Partille

Maria Mattsson - Kostchef
Pia Nystedt - Köksmästare. Tillagningskök för gymnasium och äldreboende

Allmänna frågor:
Hur många barn går på skolan?
387 elever

Hur många portioner serverar ni per dag?
306 elever/dag

Hur många jobbar i köket?
5 personer varje dag

Jämfört med andra skolor i kommunen, är det en liten/stor skola?
Medelstor skola i Partille

Frågor rörande matsvinnet:
Hur mycket matavfall slängs varje dag/vecka?
Mäter endast tallrikssvinn samt svinnvecka.

Hur mäter ni matavfallet?
Bänkvåg som mäter tallrikssvinnet

På vilka olika stationer uppstår matsvinnet?
Grönsaksrummet i köket (från ansning), i disken (bläck från servering + tallrik), tallrikssvinn

Hur mycket avfall uppstår på de olika stationerna? (ev. mest/minst eller %-uell uppskattning)
Grönsaksrummet - minst, Disken (serveringsbleck) - mest, Tallrik - näst mest

Uppskattningsvis, hur mycket av det som går i matavfallet är direkt ätbar mat? (%-uell uppskattning)
Tallrikssvinnet 100 %, Totalt någon procent - 2 kanske?

Vilken typ av livsmedel är det som främst hamnar i matavfallet?

Från tillredningen främst sallad och råkost. 95% svenskt kött (??)

Är det främst tillagad mat eller råa råvaror som slängs?
Tillagad

Vad gör ni av den mat som blir över idag, både tillagad och rå?
Råvaror fryses in eller sparas till nästa dag. Tillagad mat kyls ner och serveras senare alt. fryses ner. Den mat som blir över serveras antingen på gymnasieskolan eller på äldreboendet.

Frågor rörande redistribution:
Vad ser ni för möjligheter kring någon form av samarbete där den mat ni tillagat tas om hand och redistribueras?
Hade det varit enklare kunde säljas men all mat måste ha innehållsförteckning om det skulle säljas - administrativa hinder och livsmedelslagen

Vad ser ni för svårigheter kring att på något sätt ta hand och och ev. sälja eller skänka mat och livsmedel som varit i era kök?
Problem: kommunal verksamhet då det KOSTAR

Vad har ni för förvaringsmöjligheter i köket för t.ex tråg med tillagad mat som inte ätits upp?
Absolut

Tror ni att det skulle innebära ett merjobb för er att ta hand om den mat som är ätbar och skulle kunna tas omhand, jämfört med det som krävs för avfallshantering av samma mat? I så fall, hur mycket extra tid?
Nej, det vore roligare och man hade sett en vinning.

Om ni skulle kunna tänka er ett samarbete där er mat på något vis redistribueras, hur skulle ett sådant kunna utformas för att det skulle funka så bra och så smidigt som möjligt för er?
Någon som hämtar dagen efter (kylas ner korrekt. Grönsaker som inte kan säljas levereras till skolan där de får ett andra liv.

Är det något ni tänker på kan vara bra ifall jag vet, något jag kan tänka på eller något jag kanske bör ha med som fråga, inför det att jag formulerar enkäten?
Nej.

9.2 Calculations on residual waste from municipality of Partille

Skolans restavfall: 20 m^3 som töms varannan till var tredje vecka. dvs:

$$\frac{52}{2.5} \cdot 20 = 416 \text{ m}^3 \text{ restavfall/år}$$

Från köket genereras 660 L restavfall/v = 34.32 m^3 restavfall/år.

$$\frac{34.32}{(416+34.32)} = 0.076 = 7.6 \text{ \%}$$

9.3 The full, larger survey

Figure 16: *The larger survey. Introductory part.*

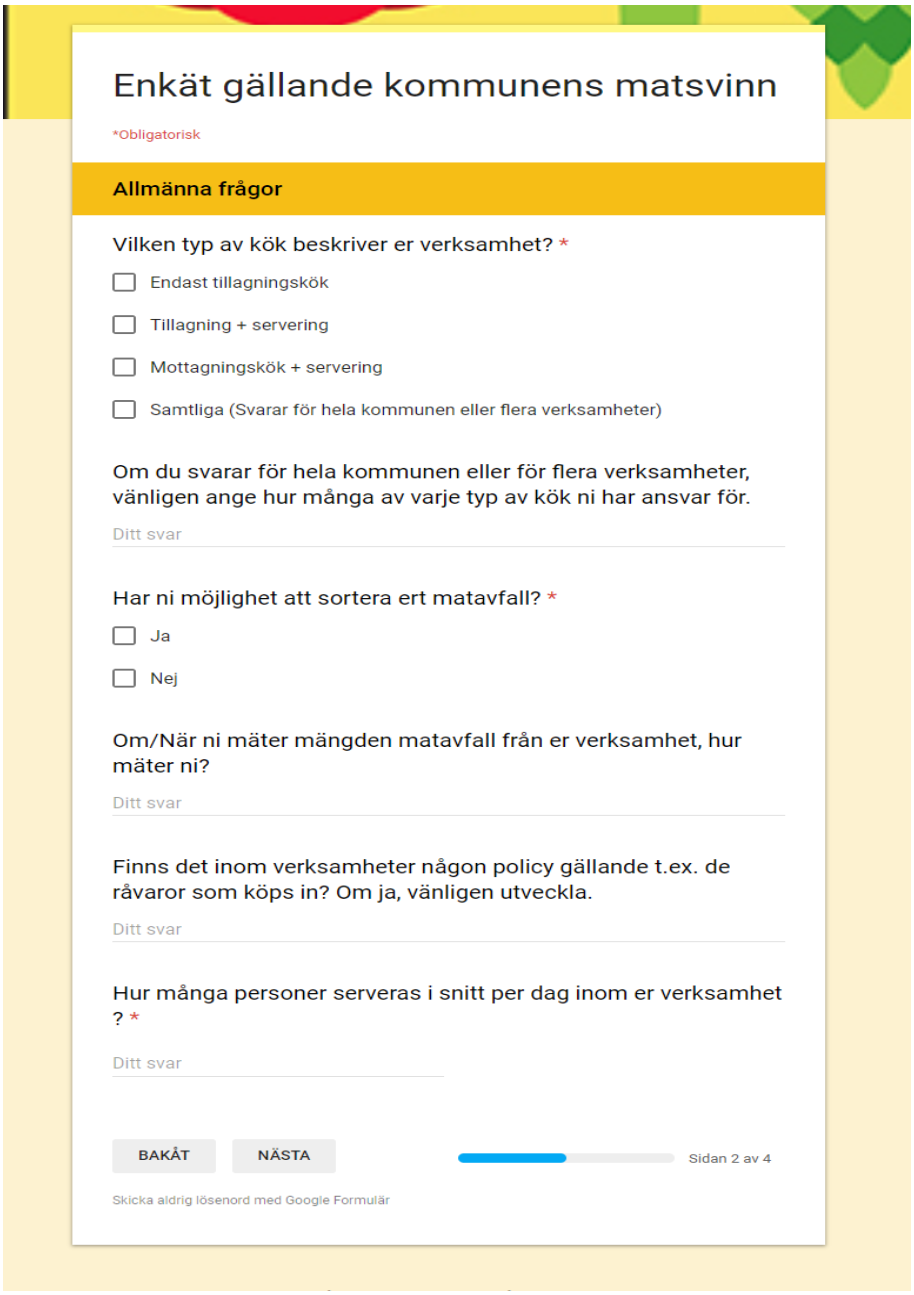


Figure 17: *The larger survey. Part 1.*

Enkät gällande kommunens matsvinn

*Obligatorisk

Frågor gällande verksamhetens matavfall och matsvinn

Följande frågor handlar om matavfall och matsvinn inom er verksamhet. Med matavfall avses i denna enkät både sådant som är ätbart och sådant som inte går att äta, t.ex ben, skal och kärnor. Matsvinn syftar till sådant som skulle kunna tillagas och ätas om det hanterats annorlunda. Det kan till exempel handla om råvaror som slängs för att det blivit skrumpna/stötta pga bristande förvaringsmiljö. Även serveringsbleck som ej blivit helt tömda, men där maten ändå slängs, och tallriksavskrap (som ej består av ben/skal) räknas som matsvinn.

Serveringsrester i följande frågor avser sådant som stått framme för servering i serveringsbleck men där det finns mer än en portion kvar i. Det matavfall/matsvinn som efterfrågas i disken avser sådant som uppstår ute i diskrummet p.g.a att bleck eller förpackningar inte tömts ordentligt.

Hur mycket matavfall uppstår inom er verksamhet i snitt? Vänligen ange enhet i svaret, t.ex kg/dag eller kg/månad. *

Ditt svar

Hur mycket matavfall uppstår inom er verksamhet då det slängs ovanligt mycket? Vänligen ange i samma enhet som frågan ovan.

Ditt svar

Figure 18: *The larger survey. Part 2.*

Hur mycket matavfall uppstår inom er verksamhet då det slängs ovanligt lite? Vänligen ange i samma enhet som frågan ovan.

Ditt svar

På vilka stationer uppstår matavfallet? Kryssa i samtliga alternativ där matavfall uppkommer inom er verksamhet. *

- ◯ Ute i köket vid preparation och tillagning
- ◯ Tallriksavskrap
- ◯ Serveringsrester
- ◯ I disken
- ◯ Övrigt:

Procentuellt, hur mycket av matavfallet uppstår på de olika stationerna (Köket/Tallriksavskrap/Serveringsrester/I disken/ Övrigt)?

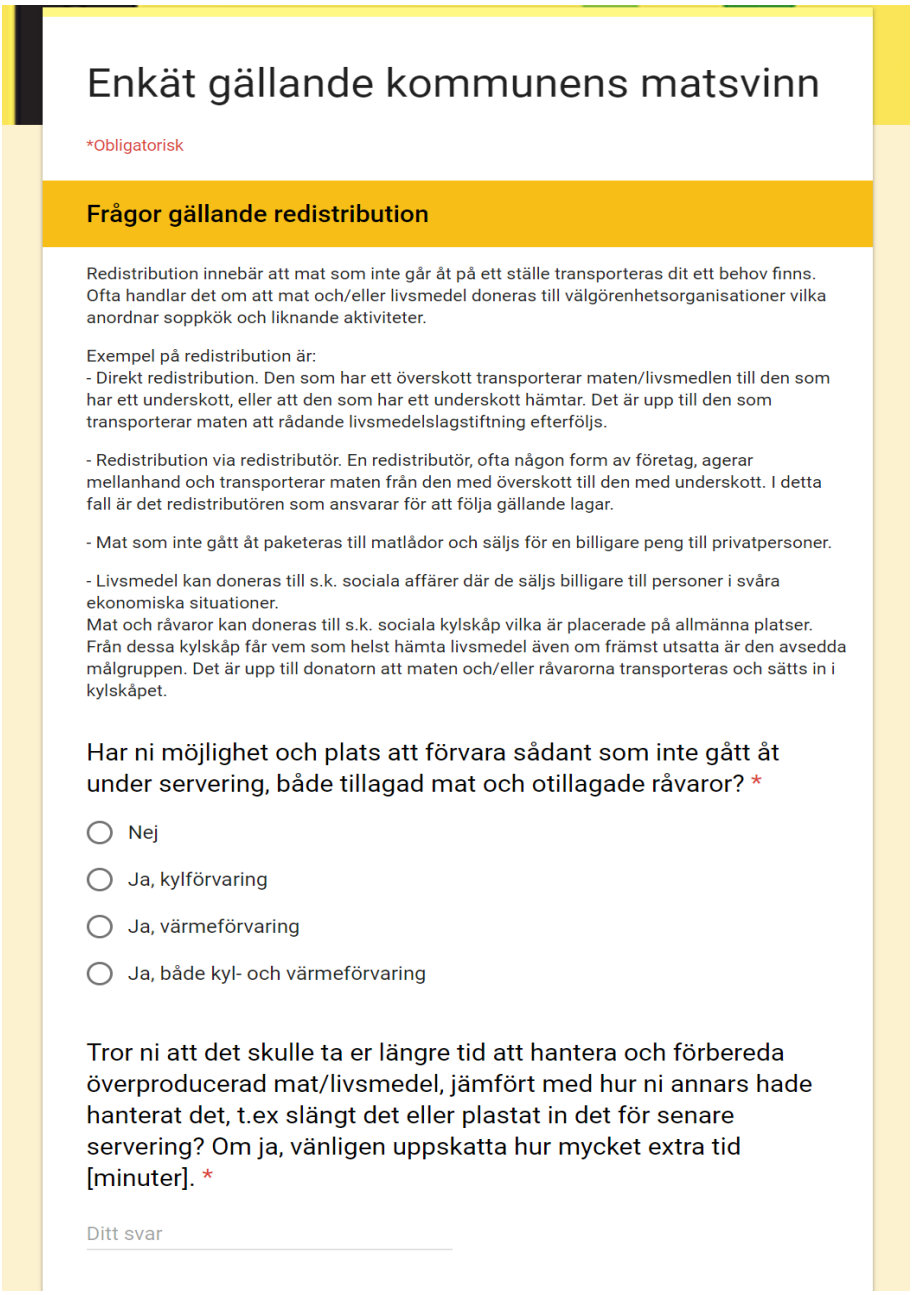
Ditt svar

Procentuellt, hur mycket av det totala matavfallet uppskattar ni är matsvinn, d.v.s onödigt matavfall? *

Ditt svar

Figure 19: *The larger survey. Continuation part 2.*

Figure 20: *The larger survey. Continuation part 2.*



Enkät gällande kommunens matsvinn

*Obligatorisk

Frågor gällande redistribution

Redistribution innebär att mat som inte går åt på ett ställe transporteras dit ett behov finns. Ofta handlar det om att mat och/eller livsmedel doneras till välgörenhetsorganisationer vilka anordnar soppkök och liknande aktiviteter.

Exempel på redistribution är:
- Direkt redistribution. Den som har ett överskott transporterar maten/livsmedlen till den som har ett underskott, eller att den som har ett underskott hämtar. Det är upp till den som transporterar maten att rådande livsmedelslagstiftning efterföljs.

- Redistribution via redistributör. En redistributör, ofta någon form av företag, agerar mellanhand och transporterar maten från den med överskott till den med underskott. I detta fall är det redistributören som ansvarar för att följa gällande lagar.

- Mat som inte gått åt paketeras till matlådor och säljs för en billigare peng till privatpersoner.

- Livsmedel kan doneras till s.k. sociala affärer där de säljs billigare till personer i svåra ekonomiska situationer.
Mat och råvaror kan doneras till s.k. sociala kylskåp vilka är placerade på allmänna platser. Från dessa kylskåp får vem som helst hämta livsmedel även om främst utsatta är den avsedda målgruppen. Det är upp till donatorn att maten och/eller råvarorna transporteras och sätts in i kylskåpet.

Har ni möjlighet och plats att förvara sådant som inte gått åt under servering, både tillagad mat och otillagade råvaror? *

- ◯ Nej
- ◯ Ja, kylförvaring
- ◯ Ja, värmeförvaring
- ◯ Ja, både kyl- och värmeförvaring

Tror ni att det skulle ta er längre tid att hantera och förbereda överproducerad mat/livsmedel, jämfört med hur ni annars hade hanterat det, t.ex slängt det eller plastat in det för senare servering? Om ja, vänligen uppskatta hur mycket extra tid [minuter]. *

Ditt svar

Figure 21: *The larger survey. Part 3.*

Figure 22: *The larger survey. Continuation part 3.*

9.4 Survey answers

9.4.1 Complete survey answers

Answers from attendants answering from a central position

Tidstämpel	E-postadress	Vilken verksamhet svarar du för? Ex. Namn på skola	Vilken typ av kök beskriver er verksamhet?	Om du svarar för hela kommunen eller för flera verksamheter, vänligen ange hur många av varje typ av kök ni har ansvar för.	Har ni möjlighet att sortera ert matavfall?	Om/När ni mäter mängden matavfall från er verksamhet, hur mäter ni?
2018-10-29 11.07.07			Samtliga (Svarar för hela kommunen eller flera verksamheter)	5 tillagningskök + 7 mottagningskök	Ja	Via skolmat Sverige 2 ggr per år i 2 veckors perioder.
2018-10-29 11.10.37			Tillagning + servering, Mottagningskök + servering	5 tillagningskök och 14 mottagningskök	Nej	Tallrikssvinn och börjat mäta serveringssvinn på förskolorna som är mottagningskök
2018-10-29 11.41.39			Tillagning + servering, Samtliga (Svarar för hela kommunen eller flera verksamheter)	1 tillagningskök 5 mottagningskök	Nej	Produktionssvinn tallrikssvinn
2018-10-29 12.15.29			Samtliga (Svarar för hela kommunen eller flera verksamheter)	Lagar mat till förskola till äldreomsorg	Nej	Vi har inte börjat mäta matsvinn ännu
2018-10-29 12.59.46			Samtliga (Svarar för hela kommunen eller flera verksamheter)	19 kök	Ja	Vi väger med hjälp av digitala vågar
2018-10-29 13.43.50			Samtliga (Svarar för hela kommunen eller flera verksamheter)	13 mottagning, 1 servering, 37 tillagningskök	Ja	Kg vikt som slängs från elever och servering, blött
2018-10-29 16.36.40			Samtliga (Svarar för hela kommunen eller flera verksamheter)	68 tillagningskök och 51 mottagningskök varav en del är serveringskök	Ja	Vi mäter tallrikssvinn och kökssvinn, ej flytande livsmedel
2018-10-30 08.10.29			Samtliga (Svarar för hela kommunen eller flera verksamheter)	25 tillagning, 25 mottagning	Ja, Nej	
2018-10-30 08.17.33			Samtliga (Svarar för hela kommunen eller flera verksamheter)	6 tillagning 9 servering	Ja	2 gånger per år, tallriksvinn och produktionssvinn
2018-10-30 09.16.46			Samtliga (Svarar för hela kommunen eller flera verksamheter)	10 tillagningskök, 14 mottagningskök	Nej	
2018-10-30 09.26.42			Samtliga (Svarar för hela kommunen eller flera verksamheter)	1 centralkök för skola och äldreomsorg, intern servering + utskick, 3 mottagningskök grundskola, 4 tillagningskök för förskola och grundskola, 9 tillagningskök för förskola, 1 mottagningskök för äldreomsorg	Ja	Tallrikssvinn och serveringssvinn
2018-10-30 14.35.09			Samtliga (Svarar för hela kommunen eller flera verksamheter)	19 tillagningskök och 20 mottagningskök	Ja	Mäter serveringssvinn och tallrikssvinn under två veckor per år. En vecka per termin.
2018-10-30 18.52.33			Samtliga (Svarar för hela kommunen eller flera verksamheter)	6 tillagning och 2 mottagning	Ja	2 ggr/år i de två största köken, mäter köksvinnet ej debiterad åtbar portion
2018-10-31 07.33.45			Samtliga (Svarar för hela kommunen eller flera verksamheter)	4 mottagningskök 1 tillagnng + servering	Ja	Tallrikssvinn
2018-10-31 10.12.56			Mottagningskök + servering	7 tillagningskök och 10 mottagnings	Ja	Vi mäter tallrikssvinn på skolorna

Figure 23: *Answers from attendants answering from a central position. Survey questions 1 - 5, part 1.*

2018-10-31 11.20.02			Samtliga (Svarar för hela kommunen eller flera verksamheter)	Tillagningskök 21 st mottagningskök 5	Ja	Serveringssvinn och tallrikssvinn
2018-11-01 07.42.55			Endast tillagningskök, Tillagning + servering		Ja	vi väger både i serveringen och väger tallriksvinnet seperat
2018-11-05 09.56.46			Samtliga (Svarar för hela kommunen eller flera verksamheter)	1+12 ett produktionskök	Nej	Kg
2018-11-05 10.13.06			Tillagning + servering, Mottagningskök + servering		Ja	Mäter lunchsvinnet i alla våra serveringar och kök några veckor varje termin
2018-11-05 10.13.20			Samtliga (Svarar för hela kommunen eller flera verksamheter)	T= 53 M= 25 S= 27	Ja	Tallrik, tillverkning och serveringssvinn. Vi mäter också antal tallrikar och därför redovisar vi mängd svinn dividerat med antal ätande för att få ut svinn per ätande lunch.
2018-11-05 10.14.12			Samtliga (Svarar för hela kommunen eller flera verksamheter)	24	Ja	Vi väger matsvinnet under två perioder á 2 veckor vardera
2018-11-05 13.25.28			Samtliga (Svarar för hela kommunen eller flera verksamheter)	9 tillagningskök, 11 mottagningskök	Ja	Vi mäter tallrikssvinnet i skolrestaurangerna
2018-11-05 13.49.57			Samtliga (Svarar för hela kommunen eller flera verksamheter)	36 tillagning, 24 mottagning	Ja	väger
2018-11-05 15.00.38			Tillagning + servering, Mottagningskök + servering	6 tmottagnings+servering, 20 tillagningservering	Nej	Väger
2018-11-05 15.02.28			Samtliga (Svarar för hela kommunen eller flera verksamheter)	18 tillagningskök och 11 mottagningskök	Nej	Väger säcken varje dag
2018-11-06 09.27.30			Samtliga (Svarar för hela kommunen eller flera verksamheter)	9 tillagningskök, 6 mottagningskök	Ja	Komposten från matsalarna
2018-11-06 10.42.38			Samtliga (Svarar för hela kommunen eller flera verksamheter)	39 tillagning + servering 15 mottagning + servering	Ja	Vi väger allt matavfall i olika fraktioner. ALLT matavfall från en HEL-dags servering (frukost - lunch - mellis - kvällsmat)
2018-11-06 11.15.46			Samtliga (Svarar för hela kommunen eller flera verksamheter)	3 tillagningskök, 8 mottagningskök	Nej	svinn fr matsal och kök
2018-11-06 12.47.16			Mottagningskök + servering	Mottagningskök + servering 21st	Nej	Vi mäter både Kökssvinn & tallrikssvinn, 1 vecka i i månaden
2018-11-06 14.02.19			Samtliga (Svarar för hela kommunen eller flera verksamheter)	4 tillagningskök, 2servering	Nej	vi har hinkar på ca 7L
2018-11-06 15.14.03			Samtliga (Svarar för hela kommunen eller flera verksamheter)	1 tillagningskök 22 mottagningskök 3 serveringskök	Ja	Sysavs matsvinns fil

Figure 24: *Answers from attendants answering from a central position. Survey questions 1 - 5, part 2.*

2018-11-06 15.30.28	Tillagning + servering, Mottagningskök + servering	13	Ja	vi väger
2018-11-12 10.04.26	Samtliga (Svarar för hela kommunen eller flera verksamheter)		Ja	Vi mäter 2 ggr/år, tallrikssvin och tillagningssvinn
2018-11-12 10.10.31	Samtliga (Svarar för hela kommunen eller flera verksamheter)	1 tillagning 25 mottagning	Ja	väger kg
2018-11-12 10.10.47	Samtliga (Svarar för hela kommunen eller flera verksamheter)	10 skolor 2 äldreomsorg 12 fk	Nej	Kg
2018-11-12 10.16.52	Endast tillagningskök, Mottagningskök + servering		Ja	vägning
2018-11-12 12.20.08	Samtliga (Svarar för hela kommunen eller flera verksamheter)	35 tillagning och 31 mottagning	Ja	Väger i förhållande till produktion
2018-11-12 13.27.42	Samtliga (Svarar för hela kommunen eller flera verksamheter)	Tre tillagningskök + servering samt 23 mottagningskök+ servering	Ja	Vi mäter två gånger per år, fyra veckors period varje gång. Väger/mäter tillagat, matsvinn från elever, matsvinn från servering/kök
2018-11-12 13.56.36	Samtliga (Svarar för hela kommunen eller flera verksamheter)	11 tillagning och 5 mottagning	Ja	Väger serverad mat och produktions- och tallrikssvinn
2018-11-12 16.16.00	Samtliga (Svarar för hela kommunen eller flera verksamheter)	1 centralkök 1litet tillagningskök 15 mottagningskök	Nej	Tillverkningssvinn, serveringssvinn och tallrikssvinn
2018-11-13 14.48.30	Samtliga (Svarar för hela kommunen eller flera verksamheter)	9 tillagningskök och 5 mottagningskök	Ja	- Väger tallrikssvinnet från hinkar där gästerna kastar mat de ej ätit upp. - Arbetar recepturen för att säkerställa att portionerna är i den storlek som vi behöver och därigenom minimerar överproduktion. - Väger eventuellt serveringssvinn från serveringsvagnar.
2018-11-13 17.25.45	Samtliga (Svarar för hela kommunen eller flera verksamheter)	tillagningskök 13, mottagningskök 50	Ja	i kg, kökssvinn, serveringssvinn, tallrikssvinn
2018-11-18 23.28.02	Samtliga (Svarar för hela kommunen eller flera verksamheter)	Ett centralkök, ett tillagnigskök, 13 mottagningskök	Ja	Mäter serveringssvinn och Tallrikssvinn två gånger per år under en vecka vid varje tillfälle.
2018-11-19 09.08.54	Samtliga (Svarar för hela kommunen eller flera verksamheter)		Nej	

Figure 25: *Answers from attendants answering from a central position. Survey questions 1 - 5, part 3.*

2018-11-19 09.15.45	Endast tillagningskök, Samtliga (Svarar för hela kommunen eller flera verksamheter)		Ja	
2018-11-19 09.42.24	Samtliga (Svarar för hela kommunen eller flera verksamheter)		Nej	Tallriksvinn och buffesvinn
2018-11-19 13.43.13	Mottagningskök + servering	21 skolor	Ja	Väger tallrikssvin och serveringssvinn
2018-11-21 12.12.09	Samtliga (Svarar för hela kommunen eller flera verksamheter)	8 tillagningskök, 4 mottagningskök, 2 serveringskök	Ja	Kökspersonalen väger tallrikssvinn och serveringskök 1ggr/v.
2018-11-23 16.10.22	Endast tillagningskök, Tillagning + servering, Mottagningskök + servering	9 tillagning+ serv, 3 mottagning+serv	Ja	Mäts ej regelbundet
2018-11-05 16.57.31	Samtliga (Svarar för hela kommunen eller flera verksamheter)	7	Ja	Väger tallrikssvinn
2018-11-05 10.46.33	Endast tillagningskök		Ja	Tallrik och serveringssvinn

Figure 26: *Answers from attendants answering from a central position. Survey questions 1 - 5, part 4.*

Finns det inom verksamheter någon policy gällande t.ex. de råvaror som köps in? Om ja, vänligen utveckla.	Hur många personer serveras i snitt per dag inom er verksamhet ?	Hur mycket matavfall uppstår inom er verksamhet i snitt? Vänligen ange enhet i svaret, t.ex kg/dag eller kg/månad.	Hur mycket matavfall uppstår inom er verksamhet då det slängs ovanligt mycket? Vänligen ange i samma enhet som frågan ovan.	Hur mycket matavfall uppstår inom er verksamhet då det slängs ovanligt lite? Vänligen ange i samma enhet som frågan ovan.	På vilka stationer uppstår matavfallet? Kryssa i samtliga alternativ där matavfall uppkommer inom er verksamhet.
Vi är en hållbar kommun och ställer höga krav i våra upphandlingar.	ca 4500	ca 1460 kg/vecka	1500 kg/vecka		Serveringsrester
Ja kostpolicy, 20 % ekologiska livsmedel	2000	Vet inte totalantal kg. Mäter mest tallrikssvinn	Som ovan		Tallriksavskrap
Livsmedelsavtal	1600	1700 kg per månad	1700	?	I disken
	750	har inte haft någon mätning	se ovan	se ovan	oftast är det mat som inte går åt, att får slänga det som inte går åt vi har ingen avsvalning
Självfallet är det så, upphandlingens avdelningen i uppdrag av politiker följer policyn.	Ca 2400	Ca 7kg/dag			I disken
Artikelstyrning med mål att öka ekologiskt och öka andel svenskt	9300	20,3 gr tallriksvinn/port, 26,10g serveringssvinn/portion	Kan inte svar på i daxläget	Kan inte svara på i daxläget	tallrikssvinn och servering, det enda som vi mäter
60 % EKO till 2019, idag har vi 59 %. Ingen GMO, endast MSC märkt fisk och en del andra krav	Vi serverar c:a 23000 pers	6500 kg/månad vilket motsvarar ungefär 10 % av inköpt mängd mat.	Högsta månaden var mars med 9900 kg	7800 kg förutom juni, juli och augusti som ju är lägre på grund av sommarlovet.	Går inte att välja flera...
Det finns kostpolicy	7500	vet ej	vet ej	vet ej	alla
Det gör det, vi har en måltidspolicy samt politiskt beslutat att vi skall jobba för nummer 1 närodlat nummer 2 svenska produkter nummer 3 EKO	ca 2000	58 kg/dag	ca 70 kg/dag	45 kg/dag	Serveringsrester
Öka andelen ekologiskt och närproducerat	4800	Oklart	Oklart	Oklart	alla alternativ, tillåts bara välja ett
Vi ska arbeta utifrån SMART-konceptet.	c.a 2500	175 kg/dag eller c.a 0,057kg per person	132 kg/dag eller 0,06kg per person	93 kg/ dag eller 0,05 kg per person	Det går inte att kryssa i fler alt. + vi har bara vägt tallriks- o serv.svinn
Ja, vi har ett måltidspolitiskt program	8500	52 g per port (serveringssvinn & tallrikssvin)	150 g per port i mottagningskök	10 g per port i tillagningskök	Samtliga alternativ (går ej att välja)
upphandlingspolicy	1700	Vi mäter inte matavfallet bara matsviinnet vid enstaka tilfällen varje år.	Vi mäter inte matavfallet bara matsviinnet vid enstaka tilfällen varje år	kan inte svara på det vi mäter vi enstaka tilfällen	x
Nej	800	serveringen här ca 8-9 kg/dag	12-15 kg/dag	3-4 kg/dag	Tallriksavskrap
Ja vi har strikta avtal ihop med 7 andra kommuner, tex enbart svenskt kött, ekologiska mejeriprodukter, ägg och potatis från Öland mm	ca 2700 totalt på 17 kök.	vet ej i dagsläget	vet ej.	vet ej.	på alla ställen blir det lite avfall.
Närproducerade och ekologiska/krav	3800	Vi har inte mätt den totala vikten	Har inget svar	Har inget svar	samtliga stationer
ja, det ska vara 41 ekologiskt /krav, närproducerat, svensk	800	10-15kg, men då har vi räknat med matsvinn som har stått framme olika specialkoster och sallader som är kvar i	15kg, vi försöker ha så lite mat som möjligt framme i serveringen just för att minska matsvinnet	5kg,	Det uppstår både i serveringen, men mest på tallriksskrapet

Figure 27: *Answers from attendants answering from a central position. Survey questions 6 - 11, part 1.*

Ja en kostpolicy och riktlinjer från politikerna	1300	10-15kg/dag	10-15kg/dag	10-15kg/dag	Kombination av överproduktion samt tallriksavskrap/serveringsrester
Vi har ett mål på 45 % ekologiskt utifrån inköpsvärde och har som policy att mejerivaror, ägg, potatis, morötter alltid ska vara ekologiskt. I upphandlingen jobbar vi med att ställa krav på leverantörer enligt svensk lagstiftning och många produktgrupper är av svenskt ursprung som t.ex. färskt kött, mejeri, ägg och potatis. Färska grönsaker och frukt köps in enligt säsong.	6000	260 kg/dag	370 kg/dag	220 kg/dag	Det går inte att kryssa i mer än ett alternativ så därför skriver jag istället. Svinn uppstår överallt så klart men vi mäter enbart tallriksavskarp och serveringsrester.
	22300	Totalt svinn: Förskola 70 g per ätande. Grundskola 71 g per ätande. Gymnasiet 85 g per ätande. Äldreomsorg 185 g per ätande			Samtliga ovan.
Ja. Vi har politiska mål gällande andelen ekologiskt, närproducerat. Sen har vi krav på djurbehandling.	4500	vi har mätt tallrikssvin och serveringssvinn och det uppgår till ca 84g /port	Vet ej	Vi ligger mellan 10 - 30% svinn beroende på vilken verksamhet köket representerar	Avfall uppstår på alla stationer
Vi har politiskt beslut på att endast köpa svenskt kött och svenska köttråvaror samt att 50% av våra inköp ska vara hållbara (ekologiskt, KRAV, MSC, rättvisemärkt eller lokalproducerade)	ca 2700	genomsnittet hitills i år är 12 gram per portion	Svinnet kan var upp till 30 gram per portion främst skolor där vi har högstadie eller gymnasieelever	Ca 5 gram/portion skolor med låg- och mellanstadieelever	Tallriksavskrap
finns en riktlinje för Norrköpings kommuns kostverksamhet	24000	har inga aktuella siffror	har inga aktuella siffror	har inga aktuella siffror	tallriksavskrap, serveringsrester
Ja, vissa livsmedel ska var100% eko och vissa eko och/eller rättvisemärkta	ca 4500	35 g/dag och portion	När det serveras barn/elevers favoritmat		Tallriksvinn och kökssvinn
Förstår inte frågan, Enligt avtal? Eko?	ca 2600 portioner (ej personer) varje dag	Ca 30 gram serveringssvinn per elev och dag. Ca 20 gram tallrikssvin per elev och dag.	Vet inte	Vet inte	Går ju bara att välja 1 alternativ? Vi mäter Serveringssvinn och tallrikssvinn
ingen policy men önskan om närproducerat	2200	20g/elev och dag	vet ej	Vet ej	Alla, men det går inte att kryssa i
Svensk köttråvara, svensk kyckling, MSC märkt fisk, vitt ris får serveras max 2ggr per termin, frukt och grönt efter säsong, fair trade märkt kaffe/ the och eko bananer (mängden bananer är begränsad)	ca 9000 personer	drygt 12000kg/mån			i alla led men främst servering och tallrikskrap
livsmedelspolicy	ca 2500 portioner	ca 7% både kökssvinn och serveringssvinn	ca 15%	ca 3 %	I disken
	2500	ca 50kg	ca 80kg	ca 35kg	Vi har mottagningskök och beställer maten 3 veckor innan serveringsdag och det innebär att vi har ett kökssvinn som är stort.
Närodlat, närproducerat	500+190	5kg max 10 kg	10 kg	5 kg	Tallriksavskrap

Figure 28: *Answers from attendants answering from a central position. Survey questions 6 - 11, part 2.*

	4750	215kg/dag			Serveringssvinn samt tallriksvinn
ja	ca 7000 portioner	ca 10 kg per köket enitt	ca 25 kg per dag i snitt	ca 2 kg i snitt	tallrikavskrap
nej	5500	ca 15%	vet ej	vet ej	Serveringsrester
Ja. Minska andelen animaliska. 35 % ekologisk	3000	2017. 20 ton	Vet ej	vet ej	Samtliga aletnativ
Efter avtal	4000	15 kg			Tallriksavskrap
enligt ramavtal	300	25 kg/ vecka	40 kg/vecka	10 kg	Serveringsrester
Måltids- och livsmedelspolicy	11000	Har inte uppgifterna i det formatet	Se ovan	se ovan	Det går inte att kryssa i mer än ett alt, avfall uppstår på alla stationerna
Nej	ca 5000	2653 kg per månad	Kan ej svara på när det gäller en hel månad	Kan ej svara på när det gäller en hel månad	De tre första, gick inte att bocka i tre alternativ
25 % ekologiskt	4400	200 kg/dag	220 kg/dag	180 kg/dag	Serveringsrester
30 % ska vara ekolologiska	1500	55 kg/dag	96kg/dag	22 kg/dag	köket och servering gick inte att kryssa i
Policy begreppet får ej användas om det inte är politiskt antaget så om det är det som efterfrågas så nej. Det som finns är ett beslut att arbeta med matsvinn och med en ekologisk procent. Vidare har vi inom kostenheten även egna satta mål och där arbetar vi med livsmedel både ur miljö, klimat och säsongsanpassning.	Någonstans mellan 2400-2700 stycken.	Kan tyvärr inte svara med aktuella siffror då arbetet med detta i dagsläget främst görs på receptur basis och vi inte vägt på över 2 år.	Se svar i föregående fråga. Dock sker det största tallrikssvinnet i skolorna främst när det serveras favoriträtter som det slängs mest. Ögonen vill mer än magen orkar i ombination md för lite tid att kunna sitta i lugn och ro under måltiden.	När nya rätter introduceras slängs det minst utifrån ett tallriksperspektiv eftersom barnen ej tar lika mycket på tallriken vid dessa tillfällen.	Det går inte att kryssa i mer än en. För oss gäller att de tre första.
EKO 60%	5000	2017 när vi mätte under två veckor: ca 1000 kg/veckan	inget svar	3,5 g/gäst i tallrikskvinn på en skola	köket, servering, tallrik
Ja, måltidspolitiskt program med krav på rättvisemärkta råvaror, ekologiska råvaror, svenskt kött & kyckling samt närproducerade och lokalproducerade råvaror. Även krav på säsongsbaserade grönsaker och minskat koldioxidavtryck.	2000	70 g per dag	110 g per portion (uppskattar)	40 g per dag (uppskattar)	Serveringsrester
Fokus på svenska produkter, ekologiskt 20%	9500	Vi mäter inte alla kök.			Tallriksavskrap
Nationella och kommunala krav	25000	Vet ej	Vet ej		Serveringsrester
Vi ska köpa Närproducerat och ekologiskt i första hand sedan svenskt	3000	39 g/port och dag			Samtliga din din enkät är väldigt dåligt utformad så det går bara att fylla i ett alternativ

Figure 29: *Answers from attendants answering from a central position. Survey questions 6 - 11, part 3.*

Vi ska köpa Närproducerat och ekologiskt i första hand sedan svenskt	3000	39 g/port och dag			Samtliga din din enkät är väldigt dåligt utformad så det går bara att fylla i ett alternativ
Nej	5500	ca 120 kg per dag serveringssvinn	150 kg per serveringssvinn	60 kg serveringssvinn	Serveringsrester
Inköpsansvisning samt en måltidspolicy.	2700	34 kg/dag	Har ej mätt på det viset	Har ej mätt på det viset	Samtliga ovanstående alternativ
Inköp enl avtal upphandlade varor	1900	ej mätt	tallrikssvinn över 25g/p	0-5 g/p	Serveringsrester
En viss mängd ekologiskt, närproducerat, MSC, svenskt kött	1500	mellanstadieskolor = 2 kg/dag (ca. 500 elever), förskolor = 4,5 kg/dag (ca. 220 barn), högstadie/gymnasieskolan = 10.5 kg/dag (ca. 400 elever)	Låg/mellanstadie = 4 kg, Förskolan = 10 kg, Högstadiet/gymnasiet = 17 kg	Låg/mellanstadie = 1 kg, Förskolan = 1 kg, Hög/gymnasiet = 5 kg	Alla stationer
Nej, men reglerat i upphandling ex svensk lagstiftning på djurhållning osv.	1500	56gram / portion (snitt, då alla enheter inte är med utan detta är en siffra ifrån de enheter som mäter)	?	?	Matsvinn sker i många led, det som vi jobbar aktivt och mäter är tallrik samt servering. Men det kan vara lagerhållning, tillagning, beställning osv.

Figure 30: *Answers from attendants answering from a central position. Survey questions 6 - 11, part 4.*

Procentuellt, hur mycket av matavfallet uppstår på de olika stationerna (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)?	Procentuellt, hur mycket av det totala matavfallet uppskattar ni är matsvinn, d.v.s onödigt matavfall?	Procentuellt, hur mycket av matavfallet från varje station uppskattar ni är matsvinn? Vänligen ange specifikt för varje station (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)	Vilken typ av livsmedel är det främst som slängs på de olika stationerna (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)?	Är det främst tillagad mat eller råa livsmedel, t.ex grönsaker, som slängs?	Vad görs av sådant som inte gått åt under dagen, både i form av tillagad mat och otillagade livsmedel?
Vårt sammanlagda svinn just nu är ca 8,3%	6%	Tallrik 6,83% Servering 8,08% totalt 7,45%	Kolhydrater i serveringen.	Tillagade	Tillagade varmhållda livsmedel blir svinn. Det som inte varmhållits återanvänds
Vet inte	Vet inte	Vet inte	Tallrikssvinn	Tillagad	Beror på om det varit ute bland ätande. Om det inte varit ute så kyls det ner och serveras igen.
?	?	se totalt svar	Produktionssvinn tallrikssvinn	Tillagad	De som går att tillvarataga återanvänds resten kasseras som varit uppvärmt
övrigt75-85 %	se ovan	köket 2% tallriksavskrap3 servering 5% disk 5%	mat som inte gått åt	tillagad mat	till största delen slängs den tillagade maten livsmedlen tas omhand
Köket 2% Tallrikavskrap 90% Servering 7% Disken 1%	Ca 93%	Köket 1% Tallrikavskrap 89% Servering 3%	Kök: grönsaker och frukt Tallrikavskrap: ris, pasta, bulgur, bröd och potatis Servering: grytor, ris, bulgur, såser och gratänger Disken: rester från vasken	Tillagad mat	Vissa tillagade maträtter kyls ner och serveras dagen därpå Vissa otillagade livsmedel tas hand om till nästa dag
44% tallrikssvinn och 56% serveringssvinn	uppskattningsvis 13%	5,8% Tallrikssvin och 7,2% servering	Svårt att svara på	Tillagad mat men även från salladsbuffen som räknas som serveringssvinn	Tillagad mat som inte varit ute servering, kyls ned och tas tillvara. Mat som varit ute i servering slängs enligt miljö och hälsa.
Av de 10 % svinn vi har så är 7 % tallriksavskrap och 3 % kökssvinn	10%	Allt är väl svinn som vi ser det	Rätt blandat, svårt att säga men en del potatis blir det	Tillagad mat	Återvinns till biogas
	60	40	skal mm	tillagad	andra rätter
köket 10% tallrik 35% servering 50% disken 5%	50%	köket 5% tallrik 25% servering 40% disken 2%	vet ej	50/50	Om det är inom lagen för miljö och hälsa kyls det ner och kan användas nästa dag. Sallader som inte varit ute används nästa dag.
tallriksavskrap står för ca 1/3 och köks/serveringssvinn 2/3	80	Beror på om det är mottagnings eller tillagningskök	Blandat	Tillagad mat	Tillagningskök har nedkylningsmöjligeter, mottagninsköken slänger
39%= tallrikssvinn 61%=Serveringssvinn	Vet ej	Vet ej	Vet ej	Vet ej	Om möjligt kyls varm mat ned och används vid senare servering.
Kökssvinn har vi tyvärr inte mätt. I våra tillagningskök är ungefär hälften serveringssvinn och hälften tallrikskrap. I Mottagningsköken är ungefär 75 % serveringssvinn & 25 % tallrikskrap	Gissar på 90 % men har inte gjort någon mätning	Gissar även här på 90 %	Köket: skal och rens. Tallrik & servering: potatis/ris/pasta	Tillagad mat	Används i nya maträtter
Vi mäter inte matavfallet bara matsvinnet vid enstaka tillfällen varje år	Vi mäter inte matavfallet bara matsvinnet vid enstaka tillfällen varje år	Vi mäter inte matavfallet bara matsvinnet vid enstaka tillfällen varje år	Vi mäter inte matavfallet bara matsvinnet vid enstaka tillfällen varje år	Vi mäter inte matavfallet bara matsvinnet vid enstaka tillfällen varje år	Kyl alt frysförvarar.

Figure 31: *Answers from attendants answering from a central position. Survey questions 12 - 17, part 1.*

?	?	?	potatis och grönsaker	tillagad	extrarätt nån annan dag
vet ej.	vet ej.	vet ej.	vet ej.	vet ej.	tillagad mat som inte varit ute på avdelning eller i line tar vi tillvara på och fryser in eller serverar som rester dagens efter.
Har inget svar	Har inget svar	Har inget svar	Har inget svar	Har inget svar	Har vi nedkylningsskåp så kan man ta till vara, icke tillagade använder vi igen
15	8	köket 2%, servering 3%, 10% tallriksskrap	det är inget specifikt, försöker vid planeringen av matsedel ha maträtter som elever tycker om tex. stekt fisk, fiskgratäng är inte så populära det har vi inte så ofta! Soppa har vi inte heller så ofta, eleverna kommer inte till matsalen utan går och köper annan mat!	tillagad mat och det är tallrikssvinnet som är mest, vi har buffeservering och de plockar kanske mycket på sig och orkar inte äta upp sen, matkön i matsalen är ofta lång, då vill eleverna inte ställa sig i kön 2 gånger man tar	tillagad mat blir en extra maträtt en annan gång, otillagade livsmedel fryser vi in eller hittar på en extra maträtt
Har ingen uppgift på det	50%	Ingen uppgift	Ingen uppgift	Tillagad	Kasseras
40 % tallriksavskrap 60 % serveringsrester	100%	Inget svar	Väldigt lite köksavskrap, morotsskal och blast från grönsaker bara. Tallriksavskarp är främst kolhydraterna. Serveringsrester är blandat.	Tillagad mat	Det som går att ta tillvara görs om till annat. Överbliven sallad används i grytor, såser och bröbak. Överblivna maträtter fryses in till en annan dag eller görs om till en ny maträtt.
Kan ej svara	Kan ej svara	Kan ej svara	Kan ej svara	Tillagad mat	Det som kan återanvändas sparas. Det andra kastas
Kan inte svara då allt inte är mätt. Men av serveringssvinn och tallrikssvinn är det 50/50 ungefär	?	kök 0%, Tallrik 99%, Serv 99%, disk 100%,	Vet ej	antingen tillagad eller sådant som inte kan användas. Skal osv.	Serverar vid annat tillfälle.
	5%	5%	Kan vara olika	Olika men det vi ser är att svinnet är högre när det är populära maträtter	Kyls ner och serveras som en alternativrätt, görs om till andra maträtter
har inga aktuella siffror	kan ej svara	kan ej svara	serveringsrester	tillagad mat	kyls ned och sparas, gör nya rätter
kökssvinn 3,15%, tallrikssvinn 20%	15%	kökssvinn 95%, tallrikssvinn 80%	Favoritmat som hamburgare+ bröd, köttbullar	tillagad	tas tillvara och serveras dagen efter eller fryses in
Se tidigare svar	Vet inte	Vet inte	Mycket potatisskal		Om maten har behandlats säkert så sparas det.
Vet ej	Vet ej	Vet ej	Vet ej	kompost från matsalarna	Kyls ner och serveras vid ett annat tillfälle
	ca 70%	köket 15% tallrikskrap 50% servering 25% disk/övrigt 10%	kolhydrater, grönsaker	något mer råa livsmedel som grönsaker, frukt, smörgåsar	serveras som extra rätt vid senare tillfälle, byggs om till ny rätt, används i brödbak
10%, 75%, 5%, 10%	ca 7%	10%, 75%, 5%, 10%	pasta potatis favorit protein	tillagad	om man kan inom tiden för avsvalning så serveras det en annan dag
Mottagningskök: 60%, Tallrik: 30%, Disk: 10%	25%	?	Kan ej säga det.	Tillagad mat	Vi slänger mat eftersom de kommer kyld till oss och vi värmt det.
10%, 60% , 20% , 10%	3kg	0%, 60%, 10%, 10%	rens vi grönsakerna, all mat som serveras, serverings rester är mat som varit framme i serveringen, disken säser odyl,	både och	Det som inte varit framme i serveringen snabbkyls ,sparas å serveras en annan gång.
60% serveringssvinn 40% tallrikssvinn	75%	60% serveringssvinn 40% tallrikssvinn	Alla de komponenter som serveras samt papper, skal, bestick tex	Tillagad mat	Tillagad mat som varit i serveringen kasseras

Figure 32: *Answers from attendants answering from a central position. Survey questions 12 - 17, part 2.*

kanske 5 %	25 kg	allt från både stationer som vi mäter är matsvinn	det är både sallad och dagens	tillagad mat	om vi kan sparar vi annars ibland måste vi slänga
totalt 15%	totalt 15%	totalt 15%	vet ej	vet ej	serveras som alternativ
Vet ej	5%	Sallad 3,2 ton, huvudkomponent 7,5 ton. köksavfall 9,2 ton	Förädlad mat	Tillagad	Sparas
	vet ej	vet ej	tallriksavskrap	tillagad mat	serveras annan dag ,visst slängs
	20	10	potatis, ris	både och	kyls ner, och sparas
Har inte uppgifterna i det formatet	Se ovan	Se ovan	Se ovan	Se ovan	Omarbetas eller serveras vid senare tillfälle om möjligt.
Mäter endast totalsvinn	ca 12 %	Kan ej svara på denna	Köket/servering	Tillagad mat	Det vi inte kan ta hand om går till biogas
Tallriksavskrap: 42 %, Serveringsrester: 58 %	85%	Vet ej	Blandat	Tillagad mat	Det som går att spara sparas.
35% tallrik 46 % köket och 19 % servering (Köket är det som skickas från centralköket och serveringssvinn är det som bereds förutom huvudkomponenten.	Snittet totalt för senaste mätningen var 13 % och vårt mål är att komma under 10 %	Kan inte svara	Sås och potatis från köket. God mat från tallrikarna då tar eleverna mer än de orkar äta upp. Grönsaker och potatis	Tillagad mat	Sallader och gratänger t.ex.
Ungefärligt och ej dags aktuella siffror: kök ca. 8%, Tallrikssvinn ca. 72% serveringssvinn ca. 20%	Allt på tallriken dvs 67 % + 10 totalt från servering & kök =~77%	Tallrikssvinnet 100%, Kök ca. 3 %, Serveringssvinn ca.15%	Den sista "slatten" på alla stationerna.	tillagad	Tas tillvara på och lagas till nästkommande dagar/värms som extra alternativ om det är tillagad mat.
50 % serveringsvinn, 25 % kökssvinn, 25 % tallrikssvinn	vet ej	se fråga ovan	mest salladsbuffe, potatis, ris, pasta	tillagade	sparas om det går
75 % serveringssvin 25 % tallriksvinn (övrigt vet jag inte)	90 % (gissar)	Tallriksskrap (95 %) Serveringssvinn (98 %)	Pasta, potatis, ris	Tillagad mat	Sängs, Serveras till mellanmål eller en ny rätt dagen efter
Vi mäter inte	Vi mäter inte	Vi mäter inte	Vi mäter inte		Används i kommande dags produktion.
	Vet ej	Vet ej	Vet ej	Både ock	Spara och tars tillvara på
	80%	Köket 50% Tallrik 50%	vet ej		På de ställen vi kan kyler vi ner mat annars kastas tillagad mat, otillagade livsmedel används alltid
Tallriksvinn 40 % och serveringssvinn 60%	50%	Tallriksvinn 40 % och serveringssvinn 60%	Tallriksvinn, potatis ris Servering, potatis, ris råkost	Främst tillagad mat	Det som inte varit ute i serveringslinjen kyls ner och återanvänds i annat format.
Har inget svar	Har inget svar	Har inget svar	Det beror helt på vilken maträtt som serveras.	Tillagad mat	Det används vid ett annat tillfälle om det inte har varit ute i servering. Mat ute i servering kastas.
ej mätt	oklart	oklart	favoriträtterna	tillagad	nerkylt serveras att rätt
Vi har bara jobbat med tallriksvinn	Av tallriksvinn skulle jag uppskatta 95 %	Kan inte svara på den fråga	Mest skulle jag nog tycka grönsaker	Grönsaker	Det som inte varit ute i servering sparar vi till nästa dag eller fryser in.
	-	-	ca 50/50 tallrik / servering	blandat	Tillagad mat i servering erbjuds till matlådeförsäljning bland pedagoger, personal för en mindre summa just för att minska mängden matsvinn. tillagad mat som ej lämnat köket kyls ned för att serveras en annan dag.

Figure 33: *Answers from attendants answering from a central position. Survey questions 12 - 17, part 3.*

Arbetar ni på något sätt med att informera de ni serverar om matsvinn och dess effekter?	Har ni möjlighet och plats att förvara sådant som inte gått åt under servering, både tillagad mat och otillagade råvaror?	Tror ni att det skulle ta er längre tid att hantera och förbereda överproducerad mat/livsmedel, jämfört med hur ni annars hade hanterat det, t.ex slängt det eller plastat in det för senare servering? Om ja, vänligen uppskatta hur mycket extra tid [minuter].	Vad ser ni för möjligheter kring någon form av redistribution av mat och livsmedel som blir över från er verksamhet?	Vad ser ni för svårigheter kring någon form av redistribution av mat och livsmedel som blir över från er verksamhet?	Om ett samarbete skulle inledas med någon typ av redistribution av mat och livsmedel från er verksamhet, hur skulle ett sådant samarbete vara utformat för att det skulle fungera så enkelt och smidigt som möjligt för er?
Ja, vi visar alltid resultatet av senaste svinnmätning via informatinsplancher i våra matsalar. Även på matråd och föredrag med både pedagoger och äldreomsorgspersonal.	Ja, kylförvaring	Ja. Gissningsvis 1 h/ dag.	vi har talat om detta men har svårt med logistiken.	Att maten redan varmhållits länge innan.	Kanske matlådor til en billigare kostnad
Ja redovisar mätningar från tallriksvinn	Ja, både kyl- och värmeförvaring	Inte om det blir en rutin	Måste organiseras på ett bra sätt	Ev krångel och konkurrens till befintliga restauranger i byn om vi börjar sälja billiga matlådor.	Behöver tid för att organisera det, vi är i uppbyggnadsfas av en kostverksamhet som inte haft någon ledning och struktur så jag är fullt upptagen med att klara av vardagen.
På gånga att informera ut till rektorer etc	Nej	?	Inte i dagsläget	Ett sätt som gör det möjligt	?
inte just nu men vi är i uppstart att börja jobba	Nej	troligen inte	nytt tankesätt måste till	måste investeras i utrustning som politiker ansågs vara överflödig när vi byggde kök	vet inte
Alltid, både i förskola och skolmatsalar. Effekterna blir när förskolebarnen blir äldre och börjar skolan så kan de hantera det bättre. Det är en process som kräver både TID och LÄRNADE.	Ja, både kyl- och värmeförvaring	Nej	Kommunen borde ta sitt ansvar och hitta en klokare lösning en biogas!	Lagar och regler	Det är svårt att säga, men det skulle krävas mer tid för anställda och förbereda redistribution.
Vissa enheter informerar om hur mycket som slängts och alla enheter kan få tillgång till informationen	Ja, både kyl- och värmeförvaring	kan inte svara	Nej	All verksamhet har behovet av mat samtidigt och vi har ingen egen transport	Vet ej
Ja, på många olika sätt beroende på ålder.	Ja, kylförvaring	Vet ej	Tveksamt då den mat som slängs i våra verksamheter i princip inte är ätbar för människor.	Se ovan	Jag tor inte på idén just kopplat till den typen av verksamhet vi sysslar med.
ja, info i matsalar mm	Ja, både kyl- och värmeförvaring	förstår inte frågan	kan gå men jobbar hellre för att ha så lite svinn att det inte behövs	att det blir en överproduktion	vet ej
informerar genom möten och länkar via WWF och andra org.	Ja, kylförvaring	ja , 30 min	Vissa av våra kök skulle kunna lösa det på sikt	Vi är en politiskt styrd org så det får tas den vägen, inga problem men kan ta tid. Och vem skall man erbjuda maten?	Att det är ett tydlig kund och väl förankrat politiskt så vi inte konkurrerar mot privata verksamheter.
Ja	Nej	Nej	Vi tittar på det	Maten står på varmhållning för länge i mottagningsköken	Vi kyler ner, någon kommer och hämtar maten i bleck som de sedan återlämnar
Här kan vi bli bättre. Info till skolledning för vidare info till elever vid några tillfällen. Lite info även i matsalar. I senaste mätningen som vi gör på likartat sätt i hela länet och som jag relaterat till här har vi inte med kökssvinn och beredningssvinn. I tidigare mätningar har vi sett att kökssvinnet varit den största boven och där vi arbetat med den egna personalen.	Ja, kylförvaring	Ja, självklart! Kan ej uppskatta. Möjligheten är också olika för olika kök.	Ev matlådor som kan säljas internt till personal.	Tid! Det är pressat ändå i köken idag. Utrustning på vissa kök för säker hantering, t ex nedkylningsmöjlighet, förvaring, organisation för försäljning.	I första hand ska vi försöka minska överproduktion och ta tillvara inom egna enheten. ev överskott skulle kunna säljas sim matlåda på vissa enheter.

Figure 34: *Answers from attendants answering from a central position. Survey questions 18 - 23, part 1.*

Ja vi har haft olika informationskampanjer, matsvinnstävlingar	Ja, både kyl- och värmeförvaring	Ja, 30 min	Vi har idag ett kök som säljer matlådor. I Tillagningsköken får vi väldigt lite mat över. I mottagningsköken blir det mer mat över och där finns en större vinst att återbruka maten.	Utmaningen blir att behålla kvalitén på maten som varmhålts en längre tid. Vi saknar också nedkylningsskåp i våra mottagningskök. I tillagningsköken är det väldigt lite mat som behöver slängas.	Att maten hämtas och kyls direkt efter måltiden i våra mottagningskök så att Varmhållningen inte blir för lång.
nej	Ja, kylförvaring	vi hanterar genom att kyl och frysförvara det som inte säljs under dagen.	sälja rabatterat alt skänka	logistik, hygien vs ansvarsbiten, orättvisa gentemot de som köper till ord pris, konkurens gentemot privatta aktörer	ansvarsfrihet och smidig avhämtning
inte ännu	Ja, både kyl- och värmeförvaring	nej	Ingen aning	?	?
Ja, på skolorna arbetar vi effektivt med detta, har olika måtperioder och pratar då om det.	Ja, kylförvaring	vet ej, tillagad mat återanvänder vi.	Hade varit bra om möjliget till det funnits	Skulle inte vara problem om någon hämtade upp maten. Problemet är att vi har så många ställen isf.	Maten blir hämtad på plats ca två gånger per vecka.
Nej	Ja, kylförvaring	Nej	Ingen möjlighet	Hanteringen	Vet ej
Ja, vi har tagit upp det på matrådet och gjort en beräkning och jämnfört i IPads hur mycker Ipads skolan hade kunnat köpa in för de pengarna	Ja, både kyl- och värmeförvaring	Nej, vi tänker alltid ett steg längre vad vi kan använda det till under veckan , ig bytter matsedel till kommande vecka för att använda sådant som har blivit över, köttfärssås kan både bli chili con carne, lasagne, köttfärsfrestelse, gulaschsoppa!!	Det är svårt , behövs ju både transport (miljö)och garanterat hygienregler så att allt följs upp så att det är en säker hantering av livsmedlet	hygienkraven vi måste följa hela vägen	Det får hämtas i kylbilar om det är kallt eller värmeskåp om det ska skickas varmt
Ja	Ja, kylförvaring	Ja 20min	Finns möjlighet	Livsmedelslagstiftningen, varmhållningstiden säkra livsmedel	Hämtas varmt på plats direkt efter lunch
Vi brukar ha en vecka per termin med info. Har jobbat med svinntävlingar också.	Ja, kylförvaring	Ja men jag kan inte uppskatta tiden då vi inte undersökt det än	Är mycket intressant möjlighet	Säker hantering, märkningslagen, distributionen.	Att någon kommer och hämtar maten hos oss. Vi ser ingen möjlighet att själva transportera maten någon annanstans.
Vi samtalar med både kökspersonal och matgäster och pedagoger om vikten av att minska matsvinnet	Ja, kylförvaring	Kan ej svara			Kan ej svara
Ja	Ja, både kyl- och värmeförvaring	?	Sälja matlådor.	lagkrav	Sälja matlådor till ex lärare på det som inte blivit uppätet. De plockar själva från buffén.
Vi vill få till ett bra samarbete med rektorer och lärare, om vi ska nå målet att minska matsvinnet så bör initiativet komma från rektor och att man arbetar åt samma håll, ett alternativ kan vara lunch på schema	Ja, både kyl- och värmeförvaring	Nej	Vi skickar avfall till biogasanläggning men det finns mer att göra i utvecklingen inom området tex hjälporganisationer	Livsmedelslagen	Bra samarbete, enkel kommunikation, enkla lösningar med transporter
på en del skolor, inget centralt utformat material	Ja, kylförvaring	nej	intressant tanke	hitta rätt kanaler	vet ej
ja	Ja, både kyl- och värmeförvaring	ja, 20 min.			Att någon kommer och hämtar resterna
Vi har haft sophinksfri vecka, samt någon svinntävling.	Ja, kylförvaring	Ja			Vet inte
Nej	Ja, kylförvaring	Nej	vet ej	vet ej	vet ej

Figure 35: *Answers from attendants answering from a central position. Survey questions 18 - 23, part 2.*

bla genom att prata med dem, affischer, bordsryttare, klassbesök, genom hem och konsumentkunskap lektioner	Nej	JA omöjligt att svara på idagsläget	att vi kan bli bättre på att "byta" överproduktion inom och mellan våra egna verksamheter. Men fokus SKA ligga på att hitta metoder och arbetssätt som gör att vi lagar lagom mängd mat till rätt antal personer vid varje tillfälle. Redistribution är en endast en NÖDlösning om/utifall det blir något över.	Ser en STOR risk att det blir underförstått legitimt att producera förmycket... ngn annan får det ju ändå...	Tror då i första hand på ett internt system mellan köken och inte ut mot föräldrar/ eller personal baserat på kommentaren i tidigare ställd fråga
ja, vi informerar elever löpande	Ja, både kyl- och värmeförvaring	vi kan inte servera om allt	används inom enheten	lagen kring nedsvalning	inte intressant
Vi ger regelbundet information till våra matgäster om mängd de slänger och hur mycket som minskad svinn mm.	Nej	Vi tillagar inte			Det skulle fungera om vi var ett tillagningskök
nej	Ja, kylförvaring	nej	vi behöver inte det	ingen svårighet	vet ej
Genom tex matråd	Ja, kylförvaring	Det tar mer tid att kyla ner oanvänd mat tex	Möjligheter finns att sälja sallad och lunch som blir över, möjligt projekt framöver.	Livsmedelssäkerhet, kvalité, förvaring, tekniska hinder tex betalning	Samarbete blir svårt, skulle driva nåt internt.
ja	Nej	vet inte, det beror på kökets möjligheter	kan inte inte svara på den frågan just nu	hantering	skulle man kunna titta på möjligheter
ja	Ja, kylförvaring	vet ej	vet ej	vet ej	vet ej
ja	Ja, kylförvaring	nej	Minska svinnet	Personalkunskap	Vet ej
ja	Ja, både kyl- och värmeförvaring	nej	ingen	att förvara	nej
ja	Ja, både kyl- och värmeförvaring	nej			mailkontakt, och upphämtning
ja	Ja, kylförvaring	oklart	goda	nedkylningsbden	Endast inter redistribution är intressant för oss.
Ja	Ja, kylförvaring	?	?	?	?
Ja	Ja, både kyl- och värmeförvaring	Ja. Tidsåtgången beror på hur mycket, hur det skulle förpackas och förvaras och hur utleveransen skulle skötas.	Inte någon stor möjlighet. Det vi kan ta vara på görs redan idag.	Det största problemet är att klara hygienen då det som blir kvar har stått på varmhållning. Skulle det förpackas i ex portionsförpackningar blir det svårt att få plats i köken.	Vet ej.
Ja genom information till lärare och elever	Ja, kylförvaring	Nej	Sälja övertöliva matportioner efter att restaurangen stängt	Livsmedelslagen	Vet ej
Genom matråd med rektor, pedagog och barn berättas vi om vårt arbete.	Ja, både kyl- och värmeförvaring	Går inte att svara på det beror på utrymmen som variera mellan köken och hur väl de som arbetar i köket känner till vad som kommer att gå åt ner på maträttsnivå.	Det skulle vara önskvärt i större utsträckning. Vi har ett större kök som redan säljer för inköps och hanteringspris.	De olika kökens förutsättningar för hanteringen som medföljer. (Telefonsamtal om det finns mat kvar, mail, bokföring av det packning osv.).	Kan tyvärr inte ge svar på detta i dagsläget.
Ja, en film tex	Ja, både kyl- och värmeförvaring	initialt, men inte sen	kan vara möjligt	få kontinuitet	vet ej
Ja, vi har haft matsvinnstävlingar	Nej	30 min	Stora möjligheter finns då vi i mottagningsköken får över väldigt mycket mat. I förskolorna varmhålls inte maten så länge så mycket skulle gå att använda.	Distribution av maten	Någon kom och hämtade maten dagligen.
	Ja, både kyl- och värmeförvaring	Nej	Vi använder vårt kökssvinn i kommande produktion.		Vi ser i dagsläget inget behov.

Figure 36: *Answers from attendants answering from a central position. Survey questions 18 - 23, part 3.*

Ja	Ja, både kyl- och värmeförvaring	Bej	Vi säljer det i dah		Vi sköter det shälva
Matråd	Ja, både kyl- och värmeförvaring	ja 20min			att det hämtas
Matråd på alla skolor 2 ggr/termin. Informationsmaterial ute i alla matsalar.	Ja, kylförvaring	Ja, all hantering tar tid. Ca 15-20 minuter idag	Stora möjligheter. Vi tar tillvara det mesta förutom det som varit ute i serveringslinjen.	Nedkylningsmöjlighet	Har inget svar på detta idag
Ja	Ja, kylförvaring	ja	vet ej	Lagar och regler	vet ej
på G	Ja, kylförvaring	ja ev visst merarbete	-	-	-
Vi har tryckt upp olika "slogans" som vi satt upp vid disken som vi byter ut vid jämna mellanrum	Ja, kylförvaring	Beror ju helt på hur det skulle "serveras" men ca. 30 min	Möjlighet finns, vet dock inte behovet då vi är en liten kommun	Vi jobbar ju varje dag med att inte få något svinn, så i den bästa av världar finns ju inte mycket att hämta i vårt kök. Man får också tänka på att inte överproducera så det SKA bli mat över. En annan svårighet kan jag tycka är hur maten hanteras efter den lämnat köket. Om den inte hanteras rätt och någon skulle bli sjuk, vem bär då skyldighet för det?	Vi är endast ett telefonsamtal bort. På min arbetsplats (produktionskök) finns personal till klockan 16.00, så någon får komma och hämta
Yes, tanken är att samtliga dalakommuner kommer ha en "portal" där allmänhet kan ta del av mängden matsvinn. Samt material i matsal.	Ja, kylförvaring	?	Detta sker idag internt samt mat över i servering säljs i mattådor (i den mån det finns mat över) till pedagoger och personal.	-	Inte aktuellt med någon extern, skulle ev vara någon förening som hjälper de mer behövande i samhället. Isf skulle vi ställa upp och arbeta fram fungerande rutiner.

Figure 37: *Answers from attendants answering from a central position. Survey questions 18 - 23, part 4.*

Answers from attendants answering for kitchens both cooking and serving.

Tidstämpel	E-postadress	Vilken verksamhet svarar du för? Ex. Namn på skola	Vilken typ av kök beskriver er verksamhet?	Om du svarar för hela kommunen eller för flera verksamheter, vänligen ange hur många av varje typ av kök ni har ansvar för.	Har ni möjlighet att sortera ert matavfall?	Om/När ni mäter mängden matavfall från er verksamhet, hur mäter ni?
2018-10-29 11.21.32			Tillagning + servering		Ja	mäter ej
2018-10-29 12.07.33			Tillagning + servering	1	Nej	Avrunnen vikt
2018-10-29 13.49.02			Tillagning + servering		Nej	väger
2018-10-29 14.09.51			Tillagning + servering		Ja	I vikt dagligen fördelat på Tallriksvinn, serveringssvinn och beredningssvinn
2018-10-29 14.30.46			Tillagning + servering		Ja	Vi väger svinnet från vår seniorrestarung
2018-10-29 14.33.56			Tillagning + servering		Ja	Vi väger
2018-10-29 14.48.59			Tillagning + servering		Ja, Nej	Med våg
2018-10-30 06.56.18			Tillagning + servering		Ja	Väger
2018-10-30 07.26.19			Tillagning + servering		Ja	vi mäter inte indirekt men ser på kärlet om det är mkt el lite
2018-10-30 07.51.18			Tillagning + servering		Ja	Är alltid pyttelite i en liten kantin. Knappt något att väga
2018-10-30 08.12.25			Tillagning + servering		Ja	vi mäter det som är över i serveringen och allt som är över i en mängd
2018-10-30 08.16.19			Tillagning + servering		Ja	En stor våg inne i köket
2018-10-30 10.49.46			Tillagning + servering		Ja	Tallriksavskrap, karott avskrap
2018-10-30 11.03.02			Tillagning + servering		Nej	Vi väger
2018-10-30 11.32.53			Tillagning + servering		Ja	Vi väger och kollar hur många som ätit och räknar ut i gram per person
2018-10-30 12.33.16			Tillagning + servering		Ja	på våg
2018-10-30 14.30.24			Tillagning + servering		Ja	Våg
2018-10-30 14.51.52			Tillagning + servering		Ja	allt från kantinerna som har vart ute på värmevagnen och allt som slängs från tallrikarna
2018-10-30 15.25.58			Tillagning + servering		Ja	väger
2018-10-31 08.15.27			Tillagning + servering		Ja	Tallrikssvinn och karottsvinn i kg
2018-10-31 10.49.10			Tillagning + servering		Ja	väger på våg
2018-10-31 12.11.04			Tillagning + servering		Ja	Vi mäter 3 gånger i veckan. barnens klassvis och

Figure 38: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 1 - 5, part 1.*

2018-10-31 14.57.29	Tillagning + servering		Ja	vi väger matavfallet
2018-11-01 09.01.04	Tillagning + servering		Nej	Vi mäter elevernas avfall och sedan mäter vi svinnet från matsalen där varje komponent för sig.
2018-11-01 13.00.03	Tillagning + servering	Bara mitt kök	Ja	med hjälp av en våg
2018-11-01 14.31.01	Tillagning + servering	ansvarar endast för vårt kök på förskolan	Ja	kilo alt liter då det rör sig om soppa eller sås
2018-11-05 10.17.42	Tillagning + servering		Ja	vi väger under några veckor men det dagliga arbetet med matsvinn görs genom att använda datakostprogrammet som hjälper oss att beräkna tillagad mängd mat vi reflekterar och skriver ner hur mycket gick i dag för att ha som underlag nästa gång maträtten dyker upp.
2018-11-05 11.01.51	Tillagning + servering		Ja	vi väger avfallet några gånger per år på en vanlig hushållsvåg
2018-11-05 14.08.29	Tillagning + servering		Nej	I kilo
2018-11-06 10.24.47	Tillagning + servering	1	Ja	Väger
2018-11-06 10.39.52	Tillagning + servering		Ja	Tallrikssvinn än så länge
2018-11-06 11.27.19	Tillagning + servering		Ja	Tallrikssvinn dagligen, stora mätningar(både serverings- och tallrikssvinnet) -2 gånger per år i 2 veckors perioder
2018-11-06 11.49.43	Tillagning + servering		Ja	Väger vikt på organisk avfall i påse - kg
2018-11-06 14.08.01	Tillagning + servering		Nej	Väger matsalssvinn och kökssvinn varje dag.
2018-11-07 15.18.43	Tillagning + servering		Nej	väger
2018-11-09 09.08.02	Tillagning + servering		Nej	Vi mätertallrikssvinn och kantinsvinn, mätning sker på våg i KG
2018-11-12 13.31.59	Tillagning + servering		Ja	Väger
2018-11-12 14.45.46	Tillagning + servering		Ja	väger
2018-11-12 15.55.12	Tillagning + servering		Ja	var produkt för sig
2018-11-12 22.04.44	Tillagning + servering		Ja	

Figure 39: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 1 - 5, part 2.*

2018-11-13 16.27.49	Tillagning + servering		Ja	Mäter vissa dagar när det är så kallad populär mat. Pratar ex med elever dessa dagar om att de kan ta på mat flera gånger istället för att lägga på för mycket och sedan kasta maten
2018-11-15 11.44.18	Tillagning + servering	Äldreomsorgskök 1 st, skolkök 5 st, Förskolekök 4 st	Ja	Tallrikssvinn
2018-11-15 13.52.08	Tillagning + servering		Ja	matsvinn från köket o från barnens mattallrik
2018-11-16 15.24.59	Tillagning + servering	tre skolor, fyra dagis	Ja	väger
2018-11-19 10.11.05	Tillagning + servering	Ett äldrekök	Ja	
2018-11-19 13.11.49	Tillagning + servering		Ja	Vi har svinnvecka en gång i månaden. Vi mäter då serveringssvinnet(=mat som är kvar i skålar, kantiner) samt kökssvinnet (=lagad mat som sparats men sedan slängs). Vi väger upp mängden sedan sammanställs den och vi räknar ut kostaden för maten vi slängt. Vi använder siffror för varje komponent från vårt kostdataprogram för att få så exakt summa som möjligt.
2018-11-19 14.53.27	Tillagning + servering		Ja	använder litermått
2018-11-19 15.35.23	Tillagning + servering	1	Ja	Vi mäter tallriks svinn. väger varje dag på våg.
2018-11-20 10.22.26	Tillagning + servering		Ja	vikt.
2018-11-20 14.40.26	Tillagning + servering		Nej	Olika mätningar Ibland tallrikssvinn, produktionssvinn.
2018-11-28 16.03.22	Tillagning + servering		Nej	I kilo
2018-10-30 07.22.39	Endast tillagningskök	endast Kevingeskolan	Ja	Vi väger vad barnen slänger varje dag. Matavfalls hämtningen väger allt matavfall som de hämtar.
2018-11-28 11.34.18	Endast tillagningskök		Ja	Det som eleverna slänger från sin tallrik
2018-11-05 14.10.29	Endast tillagningskök		Ja	Tallrikssvinn och matsvinn på onsdagar

Figure 40: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 1 - 5, part 3.*

Finns det inom verksamheter någon policy gällande t.ex. de råvaror som köps in? Om ja, vänligen utveckla.	Hur många personer serveras i snitt per dag inom er verksamhet ?	Hur mycket matavfall uppstår inom er verksamhet i snitt? Vänligen ange enhet i svaret, t.ex kg/dag eller kg/månad.	Hur mycket matavfall uppstår inom er verksamhet då det slängs ovanligt mycket? Vänligen ange i samma enhet som frågan ovan.	Hur mycket matavfall uppstår inom er verksamhet då det slängs ovanligt lite? Vänligen ange i samma enhet som frågan ovan.	På vilka stationer uppstår matavfallet? Kryssa i samtliga alternativ där matavfall uppkommer inom er verksamhet.
Det ska vara minst 50% krav och ekologiskt. nu ligger vi på 79%	ca 30	ca 3kg i veckan	Ca 3 kg i veckan	ca o-1 kg	Tallriksavskrap
Ja, kommunen har mål gällande ekologisk procent. De i upphandlinggruppen tar in fler närproducerade livsmedel.	500 (dock så serverar vi lunch, efterrätt och middag varje dag året runt)	ca 15 kg per dag	ca 25 kg per dag	ca 5 kg per dag	Ute i köket vid preparation och tillagning
avtal	500	16kg/dag	37.6kg	2.3kg	Tallriksavskrap
Vi har en kostpolicy som styr vårt inköp, procent ska vara eko, krav, närproducerat, fairtrade osv	1000	60 kg/dagen	80 kg/dagen	40 kg/dagen	Alla ovan, det gick inte all fylla i alla alternativ
viss mängd ekologiskt, köper svenskt eller närproducerat, handlar efter säsong	90	4 kg/dag	10 kg/dag	1kg /dag	om datum gått ut och produkten inte går at tillaga eller använda
Ekologisk eller Kravmärkt	230 elever +85 vuxna	1,8kg/dag	2,8 kg/dag	0 kg	Tallriksavskrap
vi har anbud genom kommunen.	330	ca 13 kg/dag	ca 20 kg	ca 7 kg	Det gick inte att kryssa i flera men det uppstår på både tallrikssvinn, och rester i matsalen som slängs.
Ja! Vi har ett anbud att följa	550-600	25-30kg/dag	35-40Kg/dag	5-10kg/dag	Tallriksavskrap
Vi har en livsmedelspolicy där råvaran (så oarbetad som möjligt) ska köpas o tillagas på effektivaste sätt. Stor vikt läggs på lokal/närproducerad råvara	350	väldigt olika beroende på vilken råvara som används. men vi är bra på att använda så mkt som möjligt på råvaran. som tec blad och stock på rotfrukter. (stor del av rotfrukter är dessutom frysta, vilket inte ger ngt svinn alls) men uppskattningsvis 5kg/dag	ca 10 kg/dag	ca 3 kg/dag	eftersom det INTE går att klicka i samtliga alternativ.. så för våran del alla utom disken
	100	Kanske typ 1kg per vecka	Är de mat som jag är osäker på att de gillar portionerar jag väldigt lite per barn	Har varit flera luncher då ingenting slängs	I disken
ekologiska varor o MSC märkta, närproducerat ska handlas så gott det går	300	1kg/dag	1,5kg/dag	0,5kg/dag	+ tallriksavskarap,serveringsrester(gick inte kryssa i)
Vi följer upphandling och ska försöka komma upp i 43% ekologiska varor	30 frukost 300 lunch 160 mellanmål	v 40-v43 hade vi slängt 233.35 kg mat:(	jag tycker att över 6 kg är mycket. Brukar ligga runt 4 kg	1-2 kg	Kan bara trycka på en men från tallrikar och i serveringen

Figure 41: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 6 - 11, part 1.*

Vi följer upphandling och ska försöka komma upp i 43% ekologiska varor	30 frukost 300 lunch 160 mellanmål	v 40-v43 hade vi slängt 233.35 kg mat:(	jag tycker att över 6 kg är mycket. Brukar ligga runt 4 kg	1-2 kg	Kan bara trycka på en men från tallrikar och i serveringen
	130	76kg/månad			Tallriksavskrap
Gärna ekologiskt, dock beroende på pris	750	10kg/dag	20kg/dag	5kg/dag	I disken
Vet inte	380	Ca 7 kg	ca 12kg	ca 4kg	Tallriksavskrap
inte mer en att att man ska försöka köpa anbudsvaror o eko i vis mån	900	35kg/dag ungefär beroende på mat	40 kg /dag	15 kg / dag	Serveringsrester
Svenska, närodlade, ekologiska ej socker	250	Vet ej, har inte vägt	Vet ej, har inte vägt	Vet ej, har inte vägt	Tallriksavskrap och serveringsrester, matprepp
nja helt äggfritt, och svenskt , ekologiskt så mycket de går	50 frukost 450 lunch 170 mellanmål	ca 320 kg/ månad ca 15kg/dag /450 =34g / tallrik	18 - 20 kg / dag	8 - 10 kg /dag	Serveringsrester
ja	550	5 kg/dag	12 kg/dag	4 kg/ dag	lite av varje
Vi handlar de anbudsvaror som erbjuds och och försöker att handla så högt procentantal ekologiska varor som möjligt (30%)	Cirka 200 personer	Tallrikssvinn ca 17 g / dag och barn, karottsvinn ca 3 kg/dag	40 g/ barn och dag, 5 kg karottsvinn / dag	10g / barn och dag, 1kg karottsvinn	Tallriksavskrap
vi håller oss till anbudsvaror och säsong	100	4-6 kg/dag	4-6 kg	2-3kg	I disken
Ja, 25% ekologiskt och grönsaker efter säsong	630st	8 kg dag	15 kg dag	6 kg dag	Tallriksavskrap
avtalsvaror	ca 750	10-14 kg/dag	14 kg	8 kg	Tallriksavskrap
vi portions beräknar utifrån hur mycket barn och personal som äter	120 barn 20 personal	3 kg/dag	om det förekommer maginfluensa på förskolan får det inte komma tillbaka något alls	0 kg	Alla dessa
Avtalsprodukter och i ekologiskt/närproducerat i den mån det är möjligt	500	Vårt totatala svinn ligger på i snitt 120kg/ månad	ca 160kg /mån	70-80kg/mån	Tallriksavfall serveringsrester samt ev om något blivit gammalt
Jag får bara handla på speciella platser som kommunen har bestämt och bara råvaror som ligger inom avtal	ca 185 pers	ca fyra kg per dag	Barn äter inte vilken mat som helst det blir mycket matrest när de gillar inte maten	Favorit mat betyder lite avfall	Serveringsrester
absolut, vi har tydliga riktlinjer med bas i från livsmedelsverket samt håller oss till de upphandlade varor så gott det går	vi har 206 inskrivna barn på förskolan samt ca 42 ätande pedagoger	Ca 10-15 kg/dag frukost, lunch, mellanmål, rester, sallads och matberedningssvinn, samt fruktrester	som absolut mest har vi legat på 23 kg/dag då vid enstaka tillfällen, då de förekommit mycket prepp i köket	de lägsta vi haft har legat på 6,16 kg /dag nu räknat på fulltalig förskola ej på lov eller liknande	Vill bocka i alla utom disken, går inte

Figure 42: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 6 - 11, part 2.*

absolut, vi har tydliga riktlinjer med bas i från livsmedelsverket samt håller oss till de upphandlade varor så gott det går	vi har 206 inskrivna barn på förskolan samt ca 42 ätande pedagoger	Ca 10-15 kg/dag frukost, lunch, mellanmål, rester, sallads och matberedningssvinn, samt fruktrester	som absolut mest har vi legat på 23 kg/dag då vid enstaka tillfällen, då de förekommit mycket prepp i köket	de lägsta vi haft har legat på 6,16 kg /dag nu räknat på fulltalig förskola ej på lov eller liknande	Vill bocka i alla utom disken, går inte
svenskt så långt det går men alltid inom upphandlingsavtalet ekologiska produkter vi är nu uppe i ca 30%	ca 900 portioner	per dag mellan 3-15 kg beroende på maträtt	vi kastar en del ris då vi inte vill spara det och värma upp svårt att beräkna då eleverna kommer så olika vi försöker att ha varmt vatten på plattan för att snabbt kunna göra lite mer ris vid behov 18 kg är tre bleck ris.	3 kg	Serveringsrester
ramavtal	60	ingen aning faktiskt			Tallriksavskrap
Anbud	750	20 kg/dag	50 kg/dag	10 kg/dag	Serveringsrester
Enl avtal	totalt 650 på stället 260	5,2 kg/dag	8,5 kg/dag	2 kg/dag	Tallriksavskrap
Upphandlat	350	Tallrikssvinn mellan 6-11kg/dag	11kg eller mer, och då är det oftast mat eleverna älskar	5kg eller mindre, dagar då färre elever äter, ex. fiskdagar som inte är så uppskattat såvida det inte är panerad fisk.	Tallriksavskrap
Upphandling av livsmedel bygger på kommunens kostpolicy och Lunds kommuns program för ekologiskt hållbar utveckling LundaEKO II. https://www.lund.se/bygga-bo--miljo/klimat-miljo-och-hallbarhet/miljoprogram---lundaeko-ii/	ca 18 000	16% av total mängd tillagad mat. Detta motsvarar ca 600kg/dag	ca 25%, dvs ca 900kg/dag	ca 8%, dvs 300kg/dag	Det är både serverings och tallrikssvinnet
Enligt kommunens anbud.	150 portioner/ middag, 70 portioner/ kvällsmat	5 kg/dag	7 kg/dag	4 kg/dag	Alla ovanstående stationer
Svenskt kött i största möjliga mån samt min.20% ekologiskt	175 p	Ca 1,5 kg/dag	3,5-4 kg	0,3 kg	Tallriksavskrap, serveringsrester(gick bara att kryssa för ett aternativ)
ja 100 % svenskt kött och kyckling	90	ca3kg per dag	3000gr	500 gr	Tallriksavskrap
Nej	600	13,5 kg/dag	20-30 kg/dag	2-3 kg/dag	Tallriksavskrap
	65	2 kg	5 kg	1 kg	Serveringsrester
krav, närproduserat	750	genomsnitt 8-9kg per dag	13-15 kg	3-4kg	Serveringsrester
svenskt kött, så mycket ekologiskt som möjligt	24 serveras, 100 tillagas	1-3 kg om dagen	x	x	alla stationer blir det matavfall på

Figure 43: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 6 - 11, part 3.*

	250	10kg/dag			Det går bara att kryssa i ett allt , konstigt.
40 % ekologiskt	450	6,5 kg per dag	14 kg	3 kg	Tallriksavskrap
Måltidspolicy	1 500 st	vet ej	vet ej	vet ej	Tallriksavskrap
krav o rättvisemärkt bananer o kakao	130	3 kg per dag	5 kg	0,5 kg	Tallriksavskrap
35% krav	850	20kg per vecka			I disken
Enligt svenska djurskyddsregler EKO 25%	150	4 kg?	8 kg?		I disken
Ja, köpa anbudsvaror samt ett visst eko% mål.	1250	115 kg/vecka	200 kg/vecka	99 kg/vecka	Överproduktion
jag köper så mycket ekologisk och kravmärkt som budgeten tillåter och efter tillgång/säsong	ca: 70 personer	det kan bli 1kg upp till 3 kg beroende på skal och blast från grönsaker till matrester.	När det hämtas en omgång till, är det ganska så precis den mängd som äts upp. Blir det över i köket kyls det ner och används en annan gång, om det är möjligt.	Det kan bli 3 -5 portioner över om min planering har fungerat	Serveringsrester
Ja! vi har mål om hur mycket ekologisk inköp vi gör. köper svenskt kött.	550 st	16 kg/dag tallriks svinn	22 kg/dag tallriks svinn.	8 kg/dag tallriks svinn	Tallriksavskrap
krav, eko, bra miljöval mm4	1500 st	20 kg/dag	40 kg/dag	3 kg/dag	tallriksavskrap, serveringsrester,
ja vi följer de vi handlar från de leverantörer vi har upphandlat av.	650	ca. 20 kg/dag	35 kg/dag	ca.10kg/dag	Tallriksavskrap
Ja vi har upphandlingen som sköter det.	2000	ca 40gram/portion och dag	90 kg 45 gram/ portion/dag	40kg 20gram/portion/dag	Vi måter kökssvinn,tallrikssvinn och serveringsvinn
Vi är Krav certifierade, så vi måste handla ekologist till 25%. Sedan måste man sortera allt avfall.	450	Barnen slänger ca: 6 -7 kg om dagen.Under 2017 blev totala mängden matafall 30 kg om dagen.	Det få bli en gissning ca: 50kg.	Vi hade tävling mellan klasserna i våras. Då var det 4 årskurser som inte slänge något mat alls.	Serveringsrester
Nej	300	20kg/dag	dagar då det är "god mat" slängs det mer mat. Chicken nuggets och klyftpotatis tex 24 kg	10 kg, potatisbullar och blodpudding	Tallriksavskrap
Ja, säsong 25% ,ekologiskt, upphandlat avtal via winst	300	tallriksvinn och serveringssvinn ca:2-3 kg mäts på onsdagar	3,5 kg	1,2 kg	Serveringsrester

Figure 44: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 6 - 11, part 4.*

Procentuellt, hur mycket av matavfallet uppstår på de olika stationerna (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)?	Procentuellt, hur mycket av det totala matavfallet uppskattar ni är matsvinn, d.v.s onödigt matavfall?	Procentuellt, hur mycket av matavfallet från varje station uppskattar ni är matsvinn? Vänligen ange specifikt för varje station (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)	Vilken typ av livsmedel är det främst som slängs på de olika stationerna (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)?	Är det främst tillagad mat eller råa livsmedel, t.ex grönsaker, som slängs?	Vad görs av sådant som inte gått åt under dagen, både i form av tillagad mat och otillagade livsmedel?
ca 3 kg/veckan	inget	ca 3kg/vecka	Tallriksavskrap		Det som går tar vi hand om och använder till tex pytt , makaronipudding och dylikt. resten går till biogas
60/0/40/0/0	75%	75%/0/75%/0/0	Matrester	Tillagad	Om det hinns så kyl vi ned det och värmer upp som extrarätt annars slängs det.
17%/ på en vecka	1.5%	kök0% tallrik5% servering5% disk0%	servetter tallrikskrap,	tillagad mat	mat som ej varit ute vid servering ,kyls ned och sparas
Köket 15%, Tallriksavskrap 55%, Servering 20%, Disk 10%	70%	Köket 5%, Tallriksavskrap 100%, Serveringsrester 100%, Disk 0%.	Köket är beredning som skal av rotfrukter osv. Tallriksavskrap är kött, fågel och kolhydrater. Servering är blandat och disk är blandat	Tillagad mat till 95%	I den mån vi kan och får så tar vi hand om det och serverar eller tillagar den igen.
Tallriksavskrap ca 250 ge /dag, serveringen 2-4 kg/dag köket 1kg/dag	20%	40%,2%,50%,8%	Sås	Främst tillagad	Används vid senare tillfällen som restmaträtt eller om arbetad till en annan maträtt. tex kött som blir över används till tex pyttipanna, bondomelett mm
Tallriksavskrap 85 %	Elever när de tar för mycket på sin tallrik	Tallriksavskrap 85 % serveringsrester 15%	Potatis	Kokt potatis	Vi tillagar omgångar så vi kan ta vara på livsmedel som inte har varit ute matsal eller servering
köket: 15/50/20/15	90	5 kök/75 tallrik/15 matsalrest/5 disk	skalrester och gammal mjölk i kök/matrester, potatis,ris,pasta,grönsaker, tallriksvinn/ servering är det sallad och specialkost som slängs mest. i disk rester i kantiner.	tillagad mat	Det som inte gått ut i servering kyls och sparas och serveras en annan dag
Tallriksavskrap 75% Serveringsreste25% Köket25%	50%	Kök 15% Tallriksavskrap 65% Serveringsrester Serveringsrester/disk 20%	Kök: skal Tallriksavskrap: Mat/matrester Serveringsrester/disk: mat som inte går att återanvändas	Tillagad mat	Kyls ner och återanvänds vid senare tillfälle, läggs i frys
köket 20, tallrikavskrap 40, serveringsrester 40	50	svårt att säga. det är svårt att beräkna för ett barn hur mkt man äter, där av deras svinn. matsvinnet som blir i serveringen blir ofrånkomlig då man måste ha mat tills sista gäst.	det gästen inte orkar äta upp + skrutt/skal från frukt	tillagad mat	tas rätt på och serveras vid annat tillfälle
Är knappt mätbart	samma	1	Inget specifikt	inget specifikt	Nedkylning på det som går att frysa, resten går till några lokala höns
köket 75% tallrikavsk.10% servering 15%	70%	köket 70%, talrikavsk 1%,serveringsrester 10%	Köket; skal från grönsaker, tallrik: matrester som kunden ej ätit, servering: ex tillagad mat som ej serverats	råa livsmedel	vi tillagar så när åtgången som möjligt till serveringen o det som inte går åt slängs pga varmhållning. Otillagad slänga i organiskt

Figure 45: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 12 - 17, part 1.*

Vi mäter inte det som är ifrån köket när vi producerar ej heller det som spolas av tallriken i disken. Det andra har du siffra på ovan.	Inte mycket. Kan vara någon bit kantstött frukt.	köket 10% tallrik 30% servering 35% i disken 20% övrigt 5%	kantstött frukt / rester som de inte orkar tyckte om/ det som varit ute ska slängas om det inte vill bli köpt/ det som lämnas kvar på tallriken/ tappade rester på golvet	tillagad	Det som inte har varit uti i linjen utan lock kyls ner och fryses in eller serveras senare i veckan Vill någon köpa med sig så kan de göra detta med. Försöker ta hem kyld mat som kan frysas så att man slipper att laga till det och frysa in maten .
	100	tallrik 70 serveringsrester 10 disken 20	mat	ja	kylsner fryses ner värms upp på lovdagar
	5	5	Matrester	Lagad	Tallagad kyld mat används under veckan
	vet ej för vi mäter bara tallrikssvinn	vet ej	tallrikskrap	tillagad	Om det inte bryter mot 2 timmar varmhållning och inte varit ute i serveringsdisken, så fryser vi antingen in eller värmer dagen efter.
köket 10,tallriksavskrap30,serveringsrester 40,disken 20	50%	köket 10 tallrik 40 serveringsrester 20 men det beror på vad det är	köket det e olika svårt att säga,tallrik ris o potatis	tillagad mat	serveras näst kommande dag eller fryses in
vet ej	50%	Tallriksavskap 100% Servering 100% matprepp 0%	Tallrik mat servering mat matprepp skal, kärnor osv.	Grönsaker	sparas / slängs beror på vad det är
köket 10% tallrik 20 % servering 60 % disken 10%	70%	köket 5 % tallrik 20% servering 65% disken 10%	kokt potatis och alla typ av gryträtter och vegetarisk mat	tillagad mat till 90 %	den maten som har vart i värmeskåp och håller tempratur kyls ner och körs ut dagen efter
10%,70%,10%, 10%	70%	0	0	0	0
70 % tallriksskrap, 20% serveringsrester, 5 % diskrest	Upplever inte att det finns procent som kan anses som onödigt. Då elevernas lunchintag kan ses som ojämt dag från dag kan vi ej påverka tillagningsmängden mer än vi redan i dag gör.	10% vardera	tallriksskrapet är till 90% avfall sådant som servetter, potatisskal eller annat som anses som oätligt det 10 återstående procenten handlar oftast om potatis eller för stor portion. På frågan serveringsrester skulle jag säga potatis, ris eller soppa.	tillagad mat	Mat / grönsaker som ej tagits ut i servering kyls ner och återanvänds i samma eller annat måltidsformat.
Vet ej	20%	Vet ej	olika	tillagad mat	slängs
Köket 25% Tallriksavskrap 75%	50%	Köket 15% Tallriksavskrap 50%	Populära rätter	Tillagad mat	Kyler ner sådant som går och försöker servera det som extra rätt, gör soppor på grönsakerna
tallrik 60% servering 20% övrigt 20%	60%	tallrik 60% servering 40%	dom populäraste maträtterna	tillagad mat	tillagad kastas Det som inte varit framme kyls och återanvänds
1 kg kök av rens vid tillredning av sallader. ½ kg tallrisskrap, ½ serveringsrester1 kg övrigt	45%	45% matsvinn pga för stora portioner.30 % rens vid tillredning av mat & sallader.25 % övrigt ex special koster	Grönsaker och mindre populär mat	både och	Om det ej har lämnat köket fryses matrester ner och användes någon annan gång
50 till 60% av vårt avfall kommer från tallriksavskrap	5%	5% köket/55% tallriksvinn/40% serveringsvinn	Svårt att av göra det beror på maträtt.	ja främst tillagad	Kan vi kyler vi ner det och serverar det som rest oftast till lagar vi allt och kyler ner det.
20%	kanske för mycket sallad någång	Köket 5% , tallrik 8% , servering 10% , övrigt 3%	Vegetarisk mat är inte populär i skolan	Lagad mat slängs mest	Sparar, fryser, använder till sallad buffe

Figure 46: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 12 - 17, part 2.*

köket 35% tallriksavskrap 60% serveringsrester 5%	ca 5% eller lägre, då vi alltid kyler ner och fyller på små mängder	%	köket sallads beredningsrester i form av skal från rotfrukter, frukt mm tallriksskrapet allt frå		kyls ner och fryses in alt serveras som extra någon dag senare, otillredda grönsaker från tex salladsbordet tillagas i någon form typ soppa, bröd eller rostas och serveras igen
köket 5% tallrik svinn 20% serveringsrester 5%disken 1%	20%	köket 5%tallrikssvinn 17% serveringsrester 5%	köket rester som blivit kvar i grytor, potatisskal från eleverna och vid god mat slängs det mer för de tar åt sig så mycket av rädsla för att maten ska ta slut , disken är minimerat då vi skrapar ur kantiner och bleck.	inga råa rester tillagad mat som varit i serveringen	tillagad mat blir en ny maträtt eller serveras som rest dagen efter. vi fryser in köttfärssås eller gör en gratäng på den.
	20	15	tallriksskrap	allt	återanvänds eller fryses
2%, 30%, 60%, 7%, 1%	60%	2% 30% 60% 7% 1%	Ofta potatis och proteinet	Tillagat	All värmd mat slängs
tallriksavskrap 90% serveringsrester 10%	95%	tallrik 85% servering 15%	Överlag vegetariskt och när det är populär mat då man tar åt sig för mycket och inte orkar äta upp.	Tillagad mat	Gör om maten till nya rätter
Tallriksavskrap ca 4kg/dag ex. kycklingwrap, 50kg lagad mat(inget svinn efter servering)	Har inte kommit så långt än, vi är på gång att väga allt.	Har inget svar i dagsläget	Har ej ett specifikt svar	Tallrikssvinn får jag säga då.	Vi använder som tillåtet efter konstens alla regler sånt som ej gått åt till nästa dags lunch.
tallrikssvinn 8%, serveringssvinn 9%	ca 20%	Kök 10%/Tallrik 80%/ Servering 50%/	I matsalen slängs mest av kolhydratdelen dvs potatis, ris, pasta	tillagad mat	Köket tar hand om överbliven mat som inte var ute i serveringen. T.ex kyla ner, frysa, återvinna i en annan maträtt en annan dag.
Köket 40% , Avskrap 20%, Servering 40%	40%	Köket 0 %, Tallrik 10 %, Servering 25%	Köket- Grönsaksrens, Tallrik- Potatis och grönsak, Servering-Den mat som är kvar när serveringen stängs.	Tillagad mat	Fryses in om det inte har stått på varmhållning
Tallriksavskrap = 75-80%, serveringrester = 20-25%	90%	Tallriksavskrap = 75-80%, serveringrester = 20-25%	Fisk	Tillagad mat	Kyls ner, fryses in för att serveras vid senare tillfälle, eller som en andra rätt nästa dag.
10%	5%	5%	potatis	tillagad	fryses
Tallrikskrap= 70 % Serveringsrester 30 %	80%	Tallrik 90 %, Köket 80%	ris, potatis, pasta, sallad	Tillagad	Det som går serveras dagen efter.
	20%	Köket 10% Tallriksskrap 10% Serveringsrester 20%	Grönsaker Potatis	tillagad mat	Slängs/ Kyls ned
köket 2kg, tallrikavsk, 6kg, serv, 5kg, disk 2kg	all mat som slängs 100%	köket 2% Tallriksav 7% servering 3%	köket dåliga grönsaker, tallrikav kyckling, fiskgratäng och vegetarisk. servering fiskgratäng		Kyls ner.
x	x	x	äggskal, grönsaker=kök, tallriksavskrap=disken, tillagad överbliven mat=serveringsrester	råa livsmedel	x
	Omöjligt att svara på.	Kan inte svara på denna fråga	En konstig fråga		Tas givetvis hand om, om det är möjligt.
Det mesta är tallriksavskrap. kök och disk	50%	Mest på tallriks avskrap sedan serveringsrester	Tallriksavskrap	Både delarna	Serveras som rest nästa dag

Figure 47: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 12 - 17, part 3.*

vet ej	vet ej	vet ej	vet ej	tillagad mat	sparas och används inom kort till annat
30% köket/35% tallrik/20%serveringen 10% disken	25%	25% köket/30%tallrik/20% serveringen/10% disken	skalrester/grönsaker/rester utav lunchen/sås	grönsaker	vi försöker ta tillvara det som går och inte lägga upp för mycket till sista omgången
köket 10% Tallriksavskrap 80% disken 10%	80%	kök 0% tallriksavskrap 90% disken 10%	potatis	tillagad	Kyls ned ock används igen
	?	?	?		Kyler ner och återanvänder. Tillagar kyler och återanvänder
vet ej	90%	vet ej	vet ej	Tillagad mat	Fryses in eller kastas
vet ej exakt.	Kan bara bara svara för köket. ca 10 - 20%	vet ej exakt	köket avfall från grönt och annat samt det som blir över.	tillagad mat.	tillagad mat kylls ned om det är tillräkerlig mängd.Tar bara fram så mycket som jag har planerat.
mäter bara tallriks svinn!	80%	Mäter bara tallriks svinn.	Mycket blandat som skrapas av från tallriken.	Tillagad.	Åter används .
tallriksavskrap 80 %, 20 % serverinsrester	75%	70%, tallrikavskrap, 25 % serveringsrester	potatis-tallriksavskrap, servering veggrytor	tillagad	tillagad tars omhand och används/ny rätt, otillagad används i andra rätter.
kök 10 Tallrik 70 servering 10 disken 10	90	som ovan	Panerad fisk	tillagad	kyls ner och värms på för följande dag/ fryses ner för en annan dag.
Kökssvinn 5% serveringsvinn25% tallriksvinn 70%	25%	Kössvinn 5% serveringssvinn 25% tallrikssvinn 70%	potatis pasta ris och mjukt bröd	potatis pasta ris	Vi har stor servering så vi kokar steker eftersom som tex om vi har fisk lägger vi alltid 320 portioner frusen fisk i bleck som endast har salt och peppar. Så eftersom vi behöver kan vi panera eller slå dagens sås på och grädda eftersom.
Kök 10% , tallriks.. 30%, serv..40%, disken 20%	ca 30%	Kök 5%, tallrik..30%, serv..70%, disk 15%. Denna procent är vad jag upplever som onödigt slängdmat.	kök= råvaror, rens skrap. Tall..matrester, serv.. mat som inte vart tagen men som varit ute i serveringen, ej fräsht att servera i gen. disken skrap från tallrikar = matrester.	Mest tillagad mat.	Det blir till ny mat nästa dag.
vet inte den är svår ihop med den som kommer en ner	80%	oj, största delen är tallriksskrap 20% ,60%, 20%, 15%, 5%	Köket utgångna produkter Tallrikskrapet dagens lunch, blandat av allt Serveringsrester det som är kvar i bleck och kantiner och inte kan användas igen	tillagade	tillagade livsmedel förvaras på rätt sätt igen, oftast tillbaka in i frysen. tillagd mat kyls och värms oftast dagen efter
	10%	VET EJ	OLIKA	TILLLAGAD MAT	KRUTONGER , SOPPA, RÖROR, ROSTAR, KOKAR , BRÖD,MM

Figure 48: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 12 - 17, part 4.*

Arbetar ni på något sätt med att informera de ni serverar om matsvinn och dess effekter?	Har ni möjlighet och plats att förvara sådant som inte gått åt under servering, både tillagad mat och otillagade råvaror?	Tror ni att det skulle ta er längre tid att hantera och förbereda överproducerad mat/livsmedel, jämfört med hur ni annars hade hanterat det, t.ex slängt det eller plastat in det för senare servering? Om ja, vänligen uppskatta hur mycket extra tid [minuter].	Vad ser ni för möjligheter kring någon form av redistribution av mat och livsmedel som blir över från er verksamhet?	Vad ser ni för svårigheter kring någon form av redistribution av mat och livsmedel som blir över från er verksamhet?	Om ett samarbete skulle inledas med någon typ av redistribution av mat och livsmedel från er verksamhet, hur skulle ett sådant samarbete vara utformat för att det skulle fungera så enkelt och smidigt som möjligt för er?
Inte direkt då medeláldern är 92 år	Ja, kylförvaring	nej			behövs inte i nuläget
Nej	Ja, kylförvaring	Nej	Vi serverar överbliven mat i matsalen.	Inga	Vi kyler ned och någon kommer och hämtar.
JA	Ja, både kyl- och värmeförvaring	30 min	nej. vi serverar nedkyld mat då det är husets erbjudande	inget	hämta när det är nedkylt
Japp, i skrift, video och arbetsgrupper som eleverna måste genomgå.	Ja, både kyl- och värmeförvaring	Ja, en timme kanske	Får inte så det har inte varit en tanke vi tänkt.	Eftersom vi står som ansvarig för maten fram tills det konsumerats och inte har kontroll på om den äts nu eller om några dagar/veckor så blir det svårt att klara dagens krav på att ingen ska bli sjuk av maten…	Nån "köper" maten av oss och tar därmed över "ägandet" och ansvaret.
nej	Ja, både kyl- och värmeförvaring	nej den tiden är inräknad i dagens arbets uppgifter	vi säljer ibland portioner av maträtter som blivit över vid serveringen till personal efter stängningstid.	inga	Vet ej
Ja och lärarna i de lägre klasserna pratar om det när eleverna äter i matsalen	Ja, både kyl- och värmeförvaring	20 minuter	vet ej	Tidsaspekt	vet ej
Nej tyvärr, önskar dock att måltidsservice tog fram ett material som vi alla kök kunde använda för att upplysa våra gäster om att minska matsvinnet.	Ja, både kyl- och värmeförvaring	Ja om det ska portioneras. ca 30 min dag	Att man kunde tjäna lite pengar på mat som inte äts upp av eleverna, typ sälja matlådor till föräldrar/personal för billig peng.	Ser inte någon svårighet i det.	Vet ej.
Ja vi jobbar hela tiden med information om hur mycket som slängs och vilken påverkan det har på bl a vår miljö	Ja, både kyl- och värmeförvaring	Nej!	Vi säljer överbliven mat	Ingen stor efterfrågan att köpa mat i vår verksamhet! Ingen som kan ta emot mat i vår kommun	Att vi packar mat och att den blir hämtad
försöker alltid inspirera barnen till att hellre backa än att ta för mkt.	Ja, både kyl- och värmeförvaring	omöjlig fråga att svara på men gissningsvis 15 min	Åsele är en kommun med under 3000 personer. (4544km2 till yta) så det vi gör idag är att ge maten till människor som har djur av olika slag. Vidare är samarbetet gott mellan köken och många gånger körs livsmedel/färdiglagad mat i mellan dit det behövs.	svar som ovan	svar som ovan
Dagligen	Ja, kylförvaring	nej	Det görs redan	inget	vet ej
Nej	Ja, kylförvaring	Nej	Skulle kunna funka då vi servar pensionärer..	Vi får mindre kunder som äter i vår servering	Vet ej
Vi har en omtagsvagn så att man kan ta en liten portion först och tycker man om maten så går man till omtaget och tar mer mat. Man slipper att ta för mycket mat som riskerar att slängas pga att man inte orkar stå i långa köer.	Ja, kylförvaring	30 min	Vi har redan en kontakt med Nattcafét i Halmstad som hämtar mat främst soffan på fredagarna.	Finns inga svårigheter	Har redan kontakt.
ja	Ja, både kyl- och värmeförvaring	nej			nej

Figure 49: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 18 - 23, part 1.*

Ja	Ja, både kyl- och värmeförvaring	Vi "överproducerar" inte	Vi tar hand om och använder "överbliven" mat., till våra elever		Vi tar hand om och använder "överbliven" mat., till våra elever. Således finns idag inget sådant behov
Ja men inte just nu, vi har visualiserat med bollar i en glasburk om de klara målet på litet kast. när burken är full blir det belöning.	Ja, kylförvaring	Ja, ca 15 minuter	Vi har tidigare sålt matlådor men det får vi inte göra längre	Att alla i köket inte tycker lika om det	Att någon hämtade överbliven mat dagen efter när vi kylt ner det
ja att ta inte mer än du äter upp	Nej	svårt att säga beroende på mat?	som det ser ut nu får vi inte hålla på med sådant	samma svar som ovan	vet ej
Nej, dom är för små	Ja, både kyl- och värmeförvaring	nej	vi återanvänder		vet ej
ja lärarna informerar eleverna och lärarna är med barnen när de tar mat	Ja, både kyl- och värmeförvaring	nej	om jag har tolkat frågan rätt så vi har alla ett ansvar att ta hand om alla mat som blir över och alla har ansvar att också göra de , och tex ge till de som inte har mat på bordet, eller sälja vidare de i portions förpackningar mm, de slängs sjuka mycket mat i onödan men först och främst måste vi lära barn att våga smaka och förstå vikten av att äta från hela kostcirkeln för att man ska må bra och kunna prestera bra i skolan, för de fungerar inte idag. vi kommer aldrig få ner svinnet om inte barnens föräldende för mat och hur allt detta fungerar och vad maten kommer ifrån och vad som händer om vi fortsätter kasta mat i framtiden	förvaring och utkörning men allt går att lösa	att vi varje dag packiterar om maten varm eller kall eller kyler ner den och sen att någon kommer och hämtar maten för att sen sälja eller ge till de som behöver
0	Ja, både kyl- och värmeförvaring	0	0	0	0
JA, genom mätningar och klass information. Försöker även att sätta oss ner och konversera med de elever som återkommande slänger för mycket mat. Genom att ta åt oss av kritik från elever och pedagoger ang maten, genom att själva ta reda på hur många elever/ pedagoger som är närvarande / frånvarande den dagen.	Ja, kylförvaring	nej	Att kreativt kunna skapa nya rätter av matsvinnet är en rolig del av vårt arbete. Att vara matsmart och kunna minimera matavfallet ligger i tiden och känns som en aktuell fråga både i köken och i övriga delar av skolan. Genom att ta vara på så mycket som möjligt får vi möjlighet att sänka våra kostnader på livsmedel och även sänka transportutsläpp av de bilar som levererar våra livsmedel.	Ett problem i detta är våra begränsade möjligheter att kunna förvara livsmedlen. För lite frys och kyl möjligheter.i den utsträckning vi tar tillvara i dag klarar vårt kök detta , men i större utsträckning skulle det inte vara hållbart.	Vårt matsvinn är inte så stort men om vi skulle tagit alla kök i måltidsservice skulle tanken kunna växa. Alternativ som kommer till mig är foodbanks eller lämna över matlådor till närliggande soppkök.
försöker påverka att de äter upp den mat de tar till sig	Ja, kylförvaring	vet ej	om det är godkänt att göra det så har vi möjlighet	förvaring och köpare?	vet ej

Figure 50: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 18 - 23, part 2.*

Ja, har gått runt i klasserna, tävling med anslag på hur mycket som slängs	Ja, kylförvaring	30 min	Nej det får man inte som regelverket ser ut idag	Plats och logistik	Ett samtal efter lunch och att det hämtas dagligen
ja	Ja, både kyl- och värmeförvaring	vet ej	vet ej	vet ej	vet ej
ja	Ja, kylförvaring	nej	i sammarbete med förskole personalen skulle matsvinnet bli mindre	tidsbrist att inte kunna vara med när barnen tar sin mat	ja
Ja, vi brukar visualisera det eleverna i form av vattendunkar	Ja, kylförvaring	nej	Jag skulle gärna göra mattådor att sälja till lärare av den mat vi har värmt för mycket och stått framme i serveringen för den andra kan vi kyla ner och servera som rest.	Att bara sälja mattådor till personalen ser jag inga större problem något annat har jag inte funderat över	Inget vi funderat över
Ja	Ja, både kyl- och värmeförvaring	ca 20 min	Har aldrig hänt	Jag har svårt att köra över till andre verksamheter plus det här kräver extra tid	Bra planering och kontakt med övriga verksamheter i kommunen,
absolut, vi arbetar med svinnmonster där barnen redan till mellanmålet kan se om de slängt förmycket, detta gör vi under perioder under hela året, dock inte alltid som vi önskar, då det tar lite tid	Ja, både kyl- och värmeförvaring	nej	vi har inte så mycket över som vi inte tar hand om själva, men skulle vi ha det så tror jag inte det skulle godkännas uppifrån, då allt krångel med miljö och hälsa ställer till det. har själv tidigare som köksmästare lämnat mycker överblivet från tex buffer till frälsningaarmen, det va uppskattat	att vi inte har mat till det	att det hämtades upp
ja tidigare så hade vi gjort en sammanställning på anslagstavlan för eleverna under svinnmätning på ett enkelt sätt genom att sätta upp om de slängde 20% från tallriken vad motsvara det i hårt bröd, potatis eller köttbullar ger en bra bild över att våra elever inte kastar så mycket mat.	Ja, kylförvaring	ja det kan ta en halvtimme till en timme	nej inte möjligt vid en kommunal verksamhet	samma svar som ovan	mattådor
varje dag men barnen är väldigt små så inte så lätt	Ja, kylförvaring	10min	alla möjligheter	inga	vet ej
Ja	Nej	Ja svårt att uppskatta	Små	Matsäkerhet	Samma utformning som vi har kring de kylda matlådorna
ja	Ja, kylförvaring	nej	gör det idag	i stort sett inget	her ej funderat på det
Hela tiden, att ej ta för mycket, involverar skolan, förmedlar på elevrådsmöten osv.	Ja, både kyl- och värmeförvaring	Det är nog olika, har ej svar.	Hade varit jättebra.	Mestadels hur det ska packas och levereras.	Att någon hämtar

Figure 51: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 18 - 23, part 3.*

Ja, mäter tallrikssvinnet dagligen och skriver resultat på tavlan. Utmanar elever att uppnå bättre resultat och även samordnar tävlingar, belönar.	Ja, både kyl- och värmeförvaring	Det blir extra tid för hantering, planering och det krävs extra utrymme i kylar och frysar.	Maten som riskerar säkerheten eller inte uppfyller kvalitetskraven pga lång varmhållning, ska inte återanvändas av annan aktör utan lämnas som avfall till biogasproduktion.	Redistribution ställer stora krav på egen verksamhet. Det handlar om matsäkerhet, hygien, logistik, kvalité, näringsvärde på den varmhållna maten. Det är bättre att fokusera på att hitta åtgärder att minska matsvinnet än att distribuera den vidare. Det ansvaret vi alla har är att se till att använda våra resurser på bästa sätt och motverka överproduktion dvs motverka att matsvinnet uppstår. Bästa skolmaten är den uppätna maten både ur ett närings-, pedagogiskt-, matglädje- och ekonomiskt perspektiv. Minimalt skolmatssvinn möjliggör att kommunens ekonomiska resurser kan användas till t ex fler lärartimmar, mer undervisningsmaterial eller högre matkvalitet.	Den maten som är över betalas av skola(rektor). Skolan måste vara involverat i processen. Vem tar ansvaret och kostnaden. Ska den säljas vidare? Då får man tänka på konflikt med konkurrens- och upphandlingsregler. Logistiken är viktig! Vem och på vilket sätt skulle den maten transporteras för att säkerställa kylkedja och bibehålla matens kvalité och näringsvärde.
Nej.	Ja, kylförvaring	Nej			Vet ej.
Är ibland ute och pratar med elever när de lägger upp mat särskilt de yngre.	Ja, kylförvaring	Nej	Inget alternativ i vår verksamhet.	Får inte konkurera med de offentliga aktörerna.	Upphämtning av portionsförpackad kall mat.
ja	Ja, kylförvaring	nej	vi slänger väldigt lite	ingen	vet ej
Ja	Ja, både kyl- och värmeförvaring	Nej	Möjligheten att sälja överbliven mat finns.	Konkurresen med privata företag	Försäljning av kalla matlådor av någon annan kommunal verksamhet som säljer tex cafe eller dylikt. Problemet är att offentlig verksamhet inte får begränsa konkurrensen.
Nej	Ja, kylförvaring	Ja vet ej	Vet ej	Vet ej	Vet ej
	Ja, kylförvaring	nej	dåligt blir bara mera transporter	risken finns att det blir en massa engångs och kantinsvinn	Det får vara en leverans varje dag.
nej	Ja, både kyl- och värmeförvaring	nej	x	x	x
	Ja, kylförvaring	Nej			Vet ej
Pratar om det i matsalen extra mycket när det är populär mat och skriver upp på matsedeln på trottoarprataren hur mycket som slängs dag för dag	Ja, kylförvaring	30 minuter	Just nu har vi ingen möjlighet att göra det men det skulle vara intressant att få prova	Att transportera det från köket till den plats det ska samlas upp på	Att någon kommer och hämtar upp det
Olika teman ibland i matsalarna	Ja, kylförvaring	nej	vet ej	vet ej	vet ej
ja dagligen talar vi med barnen	Nej	tid att potionera	biogas i våran kommun	förvaring	kommunfråga
ja	Ja, kylförvaring	nej	ingen		vet ej
Nej	Ja, både kyl- och värmeförvaring	Beror ju på hur mycket som blivit över			?
nej	Ja, kylförvaring	vet ej	Motverkar onödigt svinn	Tid och kunskap för rutiner för att maten ska vara söker	vet ej

Figure 52: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 18 - 23, part 4.*

Jag portioner ut det som jag anser är en normal portion, sen får de komma hämta så mycket det vill ha, en andra omgång	Ja, kylförvaring	vet ej			vet ej
Vi för medlar det på matråd .	Ja, kylförvaring	Nej!	Ett bra förslag! Men kan vara svår att genom föra.	Det finns väldigt hårda regler när det gäller mat, mat transporter, ansvar.	Måste hämtas varje dag. kommer inte bli några stora volymer så svårt att få någon vinning i det!
ibland i kampanjer om svinn.	Ja, kylförvaring	ja 15-30 min per dag.	vi säljer överbliven mat, men skulle kunna ibland utöka med redistribution om tid skulle kunna avsättas för det.	logistiken , kontunitet.	1-2 ggr/veckan hämtas livsmedel ,mat på bestämda tider i kärl som den som hämta tar hand om ,diskade mm
Har försökt utan respons, behöver att de börjar använda svinnet i lärandet.	Ja, både kyl- och värmeförvaring	Nej	Bra	inget	Sälja matportioner.
Vi har skylt material i våra matsalar.	Ja, kylförvaring	Vi ska kyla det tar 20-90 minuter beroende på vad det är sedan ska vi värma det kommande dag så ca 1 timme.	Goda möjligheter vi jobbar hårt på det hela tiden	Goda möjligheter att kunna fördela om.	Förstår inte frågan
Vi pratar med barnen lite. I marsalen har vi en tavla som vi skriver upp varje dag så att alla som vill kan kolla hur mycket som har slängts.	Ja, kylförvaring	Ska det paketeras i portioner kommer det att ta tid ca: 30 min-60 min	Vi har inte möjlighet att köra maten någon stans(har inte bil), så då måste mottageren komma och hämta hos oss.	Tidsåtgången sim blir när man måste paketera det.	Att vi skulle kunna leverera i kantinerna som maten skulle ha serverats ur hos oss.
mycket lite	Ja, kylförvaring	Nej	säljas som lunchlådor	Märkningen på dom matlådor som vi skulle kunna sälja	vet inte
JA, DET MÄTS OCH FÖLJS	Ja, både kyl- och värmeförvaring	INGEN ANING , VI JOBBAR HELATIDEN MED ATT TA TILLVARA PÅ ALLT ÖVERBLIVET	NEJ EJ AKTUELLT	BLIR INGET ÖVER PÅ DET SÄTTET	EJ AKTUELLT

Figure 53: *Answers from attendants answering for kitchens both cooking and serving. Survey questions 18 - 23, part 5.*

Answers from attendants answering for kitchens solely serving.

Tidstämpel	E-postadress	Vilken verksamhet svarar du för? Ex. Namn på skola	Vilken typ av kök beskriver er verksamhet?	Om du svarar för hela kommunen eller för flera verksamheter, vänligen ange hur många av varje typ av kök ni har ansvar för.	Har ni möjlighet att sortera ert matavfall?	Om/När ni mäter mängden matavfall från er verksamhet, hur mäter ni?
2018-10-29 13.36.18			Mottagningskök + servering		Ja	Väger i kg
2018-10-30 07.38.10			Mottagningskök + servering		Ja	Väger på våg.
2018-10-30 10.47.20			Mottagningskök + servering		Ja	Vi mäter ej på förskolan
2018-10-31 09.42.14			Mottagningskök + servering		Ja	Två ggr/år, vecka 17 och 43
2018-11-05 13.17.58			Mottagningskök + servering		Ja	Väger tallrikssvinn och buffe/karottsvinn
2018-11-05 14.25.38			Mottagningskök + servering		Ja	i kg
2018-11-06 09.17.29			Mottagningskök + servering		Nej	
2018-11-09 14.14.41			Mottagningskök + servering		Ja	Vi sorterar och väger matavfall från elever
2018-11-12 11.19.44			Mottagningskök + servering		Ja	vi väger
2018-11-12 14.45.12			Mottagningskök + servering		Ja	Med våg
2018-11-15 08.54.53			Mottagningskök + servering		Ja	Vi väger det barnen resp. köket slänger

Figure 54: *Answers from attendants answering for kitchens solely serving. Survey questions 1 - 5.*

Finns det inom verksamheter någon policy gällande t.ex. de råvaror som köps in? Om ja, vänligen utveckla.	Hur många personer serveras i snitt per dag inom er verksamhet ?	Hur mycket matavfall uppstår inom er verksamhet i snitt? Vänligen ange enhet i svaret, t.ex kg/dag eller kg/månad.	Hur mycket matavfall uppstår inom er verksamhet då det slängs ovanligt mycket? Vänligen ange i samma enhet som frågan ovan.	Hur mycket matavfall uppstår inom er verksamhet då det slängs ovanligt lite? Vänligen ange i samma enhet som frågan ovan.	På vilka stationer uppstår matavfallet? Kryssa i samtliga alternativ där matavfall uppkommer inom er verksamhet.
Ja vi ska köpa ekologiskt, närproducerat och billigt	350	ca 8 kg	36 kg	4 kg	Det går bara kryssa et alternativ, men Tallriksskrap och serveringsrester
	300	22kg/dag	35kg/dag	9kg/dag	Tallriksavskrap
Råvarorna skall vara säsongs anpassade, 25% ekologiska	70	ca 3-5kg dag	ca 8kg	ca 3kg dag	alla kategorierna. det gick ej att kryssa i mer än 1 alternativ
Vi följer det upphandlade anbudet	175	13 kg/dag	16 kg/dag	8 kg/dag	Serveringsrester
Säsongsanpassade grönsaker. Handlar allt efter avtal	500	Kommer väga första gången på denna enhet v 47, så kan inte svara på denna fråga ännu. Nystartad skola	Kommer väga första gången på denna enhet v 47, så kan inte svara på denna fråga ännu. Nystartad skola	Kommer väga första gången på denna enhet v 47, så kan inte svara på denna fråga ännu. Nystartad skola	Tallriksavskrap
ja vi får inte överskrida budgeten sen är jag noga med att köpa en liten mängd så det går åt	165	1kg/dag	1 kg /dag	0	Serveringsrester
	38	Vet ej.	Vet ej	Vet ej	Serveringsrester
Nej	400	Ca 10-12 kg/dag	14-16 kg/dag	ca 4-5 kg	Tallriksavskrap
ja 35 procent ekologiskt helst närodlat	ca 100 st	ca 4 kg	ca 6 kg	ca 2kg	Serveringsrester
Vi handlar det som är upphandlat.	350-370	ca10-13kg/dag	ca 10-13kg/dag	ca 5kg	Tallriksavskrap
Kaffe, mjölk och kaffe ska vara ekologiskt. Kött helst svenskt	200	6kg	4kg	1kg	Uppstår på alla enheter med det gick bara att fylla i ett alt.

Figure 55: *Answers from attendants answering for kitchens solely serving. Survey questions 6 - 11.*

Procentuellt, hur mycket av matavfallet uppstår på de olika stationerna (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)?	Procentuellt, hur mycket av det totala matavfallet uppskattar ni är matsvinn, d.v.s onödigt matavfall?	Procentuellt, hur mycket av matavfallet från varje station uppskattar ni är matsvinn? Vänligen ange specifikt för varje station (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)	Vilken typ av livsmedel är det främst som slängs på de olika stationerna (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)?	Är det främst tillagad mat eller råa livsmedel, t.ex grönsaker, som slängs?	Vad görs av sådant som inte gått åt under dagen, både i form av tillagad mat och otillagade livsmedel?
	70%	Köket? Tallriksskrap 50% Serveringsrester 90% Disken 0%	Tallriksskrap: Eleverna ser inte att de ättit utan de tror de orkar lika mycket andra gången de hämtar Serveringsrester: Vi får för mycket eftersom vi inte vill stå utan eller ringa taxi och vänta 30 min om maten tar slut. Och då vi inte kan kyla ner så får vi skicka tillbaka och kompostera.	Tillagad mat	Tillagad mat
70% tallriksavskrap 30% serveringsrester	80%	70% tallriksavskrap 10% serveringsrester	Dagens lunch	Tillagad	Slängs om det stått på varmhållning
15%, 25%, 30% , 15%, 15%	30%	Köket 15%, tallrik 25%,servering 30%, disk 25%, övrigt 5%	skal, mat,sallad, sallad överbliven mat, kompostpåse med mat, dålig frukt grönsaker osv	grönsaker	grönsaker serveras dagen efter om de ej stått framme på borden, gröt bakas bröd på, resten slängs
	20%	22	vet ej	vet ej	slängs
70% tallrik, 25% serveringsrester 5% disken	Vet ej	Vet ej	Tillagad mat	tillagad mat	Sparar och återvinner i tex salladsbuffe. Det som är uppvärmt och inte kan återbrukas slänger vi
ungefär lika delar ca 1/2 kg var	1/2 kg /dag	2%	all mat	både och	använder på något vis
Vet ej	Vet ej	Vet ej	Blandat	Tillagad mat	Kastas
Vi mäter enbart tallriksavfall	100%	tallriksavskrap 100%	Alla	Lagad mat	Kyls ner och används i andra rätter eller serveras som extra dagen efter
80 procent	40 procent	köket20 procent serverigsrester50 procent serveringsrester 30 procent	huvudrätt och sallad	tillagad mat	slängs om de varit i serveringsdisk
tallrik 4-10kg/dag///serveringsrester 4-12kg/dag	2-5procent	tallrik 2procent/////servering 2procent	matrester	blandat	tar hand om allt som går
	Allt är onödigt matavfall	Tallrik 20%, servering 60% övrigt 10%	Grönsaker, ris, pasta	Tillagad	Endel sparas om det går att kyla ner och inte varit uppvärmt innan

Figure 56: *Answers from attendants answering for kitchens solely serving. Survey questions 12 - 17.*

Arbetar ni på något sätt med att informera de ni serverar om matsvinn och dess effekter?	Har ni möjlighet och plats att förvara sådant som inte gått åt under servering, både tillagad mat och otillagade råvaror?	Tror ni att det skulle ta er längre tid att hantera och förbereda överproducerad mat/livsmedel, jämfört med hur ni annars hade hanterat det, t.ex slängt det eller plastat in det för senare servering? Om ja, vänligen uppskatta hur mycket extra tid [minuter].	Vad ser ni för möjligheter kring någon form av redistribution av mat och livsmedel som blir över från er verksamhet?	Vad ser ni för svårigheter kring någon form av redistribution av mat och livsmedel som blir över från er verksamhet?	Om ett samarbete skulle inledas med någon typ av redistribution av mat och livsmedel från er verksamhet, hur skulle ett sådant samarbete vara utformat för att det skulle fungera så enkelt och smidigt som möjligt för er?
Vi försöker lära barnen att smaka första gången de tar (våra skolgjorda rätter smakar inte alltid som de hemgjorda eller de från max) och sedan hämta mer. Allt för att de ska va vana att göra det när vi har eget kök om 1-2 månader då vi kan ta hand om rester som är orörda.	Nej	Mottagningskök! och tillfälligt. När vi får eget kök igen så brukar vi kyla och frysa i bleck så det är bara att tina och sätta in i ugn för att värma när det behövs.	Inte i dagsläget. Och när vi lagar maten själv och har ett fungerande kök har vi inte haft så mycket rester utan vi har återanvänt dem själva inom verksamheten.	Svårt att få dem att köra ut till skolan för att hämta då hjälpverksamheten finns ca 2 mil bort?	De få hämta mat hos oss och lämna nya bleck som ersättning.
Nej, inte ännu.	Nej	30			Inte aktuellt, maten har stått framme för länge
inte från köket. men pedagogerna pratar med barnen om sortering, mat osv	Ja, kylförvaring	ca 2 tim	då vi är ett mottagningskök så får vi kyld mat som sedan värms.Vi värmer bara mängden som behövs och resten av denna maten frys in om det är mindre barnantal och används en annan dag istället eller serveras som en rest.	svårt att kyla ner uppvärmd mat tillräckligt snabbt	att någon kom och hämtade maten efter lunch om det blev något över.
affisher	Nej	vet ej			vet ej
Ja	Ja, kylförvaring	30	Skulle vara positivt	Att innehållsförteckning finns på det vi kan redistribuera	Att någon kan komma och hämta varje dag så vi inte har möjlighet att förvara.
jo det har blivit mycket bättre på 2 år som jag jobbat och skrivit upp och pratat med barnen	Ja, både kyl- och värmeförvaring	15min	lite olika beror på vad	livsmedelverket	komma efter lunch och ta vara på maten
Nej	Nej	Nej	Inga		Vet ej
vi visar föregående veckas sammanlagda kg på en tavla vid serveringen	Nej	nej	Vi har väckt frågan i kommunen	Nerkylningen och en säker hantering fram till kund	paketering, förvaring och marknadsföra samt pengarhantering
ja	Ja, kylförvaring	nej	det skulle gå	inget	det kyls ner och någon hämtar samma dag
pedagogerna har troligtvis informerat eleverna	Nej	nej	nej		vet ej
Ja	Ja, kylförvaring	40 min	Redistribution till social verksamhet	Utrymme och transport	Bättre värme och/eller kylförvaring och att någon hämtar maten

Figure 57: *Answers from attendants answering for kitchens solely serving. Survey questions 18 - 23.*

Answers from attendants answering for kitchens solely cooking.

Tidstämpel	E-postadress	Vilken verksamhet svarar du för? Ex. Namn på skola	Vilken typ av kök beskriver er verksamhet?	Om du svarar för hela kommunen eller för flera verksamheter, vänligen ange hur många av varje typ av kök ni har ansvar för.	Har ni möjlighet att sortera ert matavfall?	Om/När ni mäter mängden matavfall från er verksamhet, hur mäter ni?
2018-10-29 13.34.10			Endast tillagningskök		Ja	Avfallet vägs
2018-11-07 08.13.03			Endast tillagningskök		Ja	Vi väger allt vi har kvar efter servering. Hos oss är det inklusive efterätter och kvällsmat
2018-11-12 10.38.09			Endast tillagningskök		Ja	På våg
2018-11-12 15.01.07			Endast tillagningskök	0	Nej	Kg

Figure 58: *Answers from attendants answering for kitchens solely cooking. Survey questions 1 - 5.*

Finns det inom verksamheter någon policy gällande t.ex. de råvaror som köps in? Om ja, vänligen utveckla.	Hur många personer serveras i snitt per dag inom er verksamhet ?	Hur mycket matavfall uppstår inom er verksamhet i snitt? Vänligen ange enhet i svaret, t.ex kg/dag eller kg/månad.	Hur mycket matavfall uppstår inom er verksamhet då det slängs ovanligt mycket? Vänligen ange i samma enhet som frågan ovan.	Hur mycket matavfall uppstår inom er verksamhet då det slängs ovanligt lite? Vänligen ange i samma enhet som frågan ovan.	På vilka stationer uppstår matavfallet? Kryssa i samtliga alternativ där matavfall uppkommer inom er verksamhet.
	ca 1000 st	ca 2 kg/dag	4 kg/dag	0,4kg/dag	Serveringsrester
Ja Vi följer de anbud kommunen har och i dom ingår en policy som leverantörerna ska följa.	190	1,5 kg / dag	3 kg/ dag	0,5 kg / dag	I disken
Ja, vi följer politikens mål för ekologiska och när/härproducerade livsmedel.	120	20kg/vecka	30kg/ vecka	10kg/vecka	Både från tallriksvinn och serveringsrester
	2300	ca 5 % per dag	10 % per dag	2% per dag	Ute i köket vid preparation och tillagning

Figure 59: *Answers from attendants answering for kitchens solely cooking. Survey questions 6 - 11.*

Procentuellt, hur mycket av matavfallet uppstår på de olika stationerna (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)?	Procentuellt, hur mycket av det totala matavfallet uppskattar ni är matsvinn, d.v.s onödigt matavfall?	Procentuellt, hur mycket av matavfallet från varje station uppskattar ni är matsvinn? Vänligen ange specifikt för varje station (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)	Vilken typ av livsmedel är det främst som slängs på de olika stationerna (Köket/Tallriksavskrap/Serveringsrester/I disken/Övrigt)?	Är det främst tillagad mat eller råa livsmedel, t.ex grönsaker, som slängs?	Vad görs av sådant som inte gått åt under dagen, både i form av tillagad mat och otillagade livsmedel?
Köket 20%, Serveringsrester 30%, Disken 30%, Övrigt 20%	30%	Köket 20%, Serveringsrester 50%, Disken 20%, Övrigt 20%	Köket: skivspill av stekar, Serveringsrester: potatis, grönsaker, grytor, soppor, Disken: grönsaksrester		inget blir över då köket enbart jobbar med kyld mat och vägs upp till varje avdelning, den mat som slutbereds är räknad och vägd.
Vet ej vi har aldrig mätt matavfall från disken	1,5 kg / dag	Köket 1,5 kg/ dag	Vi slänger bara det som är över när vi packat maten till våra matdistributioner. Tex. potatis, grönsaker, varmrätten + sås.	Det är mest tillagad mat + grönsaksrester från när vi gör salladen	Får vi tillagad mat över som inte varit på varmhållning spar vi den till kvällsmat för vi har en kväll i veckan då vi har Husets Meny.
70/30% av ovanstående	70%	Köket 5% Tallriksavskrap 43% Serveringsrester 27% Disken 12% Övrigt 13%	Köket: Svinn från putsning av kött, slabb (spill på bänkar). Tallriksavskrap: Främst livsmedel som inte är populära, ex ris, pasta. Även Oönskade mängder mat. Serveringsrester: Överproduktion, alltså det som är över i kantinerna. Disken: Rester från redskap som använda i köket och inte sköljts av innan. Övrigt: Rester efter salladsberedning, svinn av "dåliga" livsmedel. Utgångna datum/bristande kvalitet.	Främst lagad mat	Det som lämnar köket måste kasseras då det ej längre befinner sig i "skyddad" miljö. Tillagad mat som aldrig lämnar köket kyls ner/fryses för att kunna användas vid andra tillfällen. Helt beroende på vad som kan sparas eller inte. O tillagade livsmedel sparas och förvaras på samma sätt och används vi senare tillfälle.
	4%	4%	Rester	tillagad	Slängs

Figure 60: *Answers from attendants answering for kitchens solely cooking. Survey questions 12 - 17.*

Arbetar ni på något sätt med att informera de ni serverar om matsvinn och dess effekter?	Har ni möjlighet och plats att förvara sådant som inte gått åt under servering, både tillagad mat och otillagade råvaror?	Tror ni att det skulle ta er längre tid att hantera och förbereda överproducerad mat/livsmedel, jämfört med hur ni annars hade hanterat det, t.ex slängt det eller plastat in det för senare servering? Om ja, vänligen uppskatta hur mycket extra tid [minuter].	Vad ser ni för möjligheter kring någon form av redistribution av mat och livsmedel som blir över från er verksamhet?	Vad ser ni för svårigheter kring någon form av redistribution av mat och livsmedel som blir över från er verksamhet?	Om ett samarbete skulle inledas med någon typ av redistribution av mat och livsmedel från er verksamhet, hur skulle ett sådant samarbete vara utformat för att det skulle fungera så enkelt och smidigt som möjligt för er?
	Nej	Nej			Vet faktisk inte då vårt kök är ett kylmatskök
Ja Jag informerar kontinuerligt till dom kunder vi skickar mat till att dom ska tänka på mängderna dom beställer så det inte ska behöva bli något svinn.	Ja, både kyl- och värmeförvaring	Nej	Vi har ju inte det problemet pga. att vi sparar det till kvällsmat.	Ingen	Jag tror inte det är möjligt .
Ja, genom matråd med personal/boende.	Ja, både kyl- och värmeförvaring	Nej	Det finns i viss mån. "Resten" kan säljas genom swish till personal.	Då vi har ganska få portioner har vi ganska lätt att beräkna noga och har oftast ingen mat som sparas.	Som det gör nu.
Vi har matsvinns mätningar på skolor	Ja, kylförvaring	sparar inget			Sälja matlådor

Figure 61: *Answers from attendants answering for kitchens solely cooking. Survey questions 18 - 23.*

9.4.2 Food loss per station

Calculation % food loss per hotspot		Kitchen	Plate	Servering	Dish/Other
					80
All types of kitchens		2	90	7	1
			44	56	
		3	7		
		10	35	50	5
		33	33	33	
			39	61	
			50	50	
			25	75	
			40	60	
			50	50	
			3,15	20	
		10	75	5	10
		60	30		10
		10	60	20	10
			40	60	
			42	58	
		46	35	19	
		8	72	20	
			25	75	
			40	60	
		20		30	50
			70	30	
		60		40	
		15	55	20	10
		25	6	75	
			85		
		15	50	20	15
		25	6	75	
			85		
		15	50	20	15
		25	75	25	
		20	40	40	
		75	10	15	
		10	30	40	20
		10	20	60	10
		10	70	10	10
		10	70	20	5
			60	20	20
		25	75		
			60	20	20
		39	15	15	30
			55		
		35	60	5	
		5	20	5	1
		2	30	60	8
			90	10	
			8	9	
		40	20	40	
			70	30	
		24	71	59	24
		30	35	20	10
			80	20	
		10	70	10	10
		5	70	25	
		10	30	40	20
			50	90	0
		10	30	40	20
			70	30	
		15	25	30	30
			100		
		20	50	30	
		10	10	10	10
			2	2	
			20	60	10
	Average:	21,6	46,4	34,6	16,8

Calculations % food waste per station		Kitchen	Plate	Servering	Dish/Other
			6,38	8,08	
All types of kitchens		2	3	5	5
		1	89	3	
			5,8	7,2	
		5	25	40	2
		2	10	3	
		0	99	99	100
		95	80		
		15	50	25	10
		10	75	5	10
		0	60	10	10
			40	60	
		3	100	15	
		25	25	50	
			95	98	
		50	50		
			40	60	
			95		
		20		50	20
		100			
		5	43	27	12
		60		40	
		15	55	20	10
		25	6	75	
			85		
		15	50	20	15
		25	6	75	
			85		
		15	50	20	15
		25	75	25	
		20	40	40	
		75	10	15	
		10	30	40	20
		10	20	60	10
		10	70	10	10
			70	20	5
		25	75		
			60	20	20
		39	15	15	30
			55		
		35	60	5	
		5	20	5	1
		2	30	60	8
			90	10	
			8	9	
		40	20	40	
			70	30	
		24	71	59	24
		30	35	20	10
			80	20	
		10	70	10	10
		5	70	25	
		10	30	40	20
			50	90	0
			70	10	
		15	25	30	30
			100		
		20	50	30	
			2	2	
			20	60	10
	Average:	22,5	49,5	31,7	16,0

Figure 62: *Share of total food loss per station and the share of food loss constituting of food waste per station. Survey answers for all attendants.*

9.5 Food loss per category

	A	B	C	D	E	F
1	**Total food loss quantities**			Numbers served [persons/day]		
2			1460	4500	**% food waste of total quantities**	6%
3			425	1600		80%
4			35	2400		93%
5			1625	23000		13%
6			290	2000		10%
7			875	2500		60%
8			42,5	800		50%
9			62,5	1300		80%
10			1300	6000		90%
11			11500	22300		8%
12			162	2700		50%
13			790	4500		100%
14			220	2200		5%
15			3000	9000		15%
16			1075	4750		70%
17			130	7000		7%
18			25	300		25%
19			663	5000		40%
20			1000	4400		75%
21			275	1500		19%
22			1000	5000		15%
23			700	2000		5%
24			585	3000		20%
25			170	2700		12%
26			85	1500		85%
27		**Sum:**	27495	[kg/week]		13%
28			1044810	[kg/y]		77%
29				(år=38v enl. http://data.riksdagen.se/dokument/H3021423)		90%
30						80%
31						50%
32	**Total amount food waste**	467727	[kg/y]	*C28 * F32*	**Avergage:**	45%
33	**Numbers served per week**	609750	[persons/week]	*Sum column D * 5 days per week*		
34	**Av. served per day:**	4878	[persons/day]	*Av. calculated from column D*		
35	**Av. food loss per person:**	8,6	[kg/y,person]	*(C27 / B33) * 5 days * 38 weeks*		
36	**Av. food waste per person**	3,8	[kg/y,person]	*B35 * F32*		

Figure 63: *Amounts of food loss, numbers served and the share of food loss constituting of food waste. Survey answers from attendants answering from a municipal position.*

	A	B	C	D	E	F
1	**Total food loss quantities**		Numbers served [persons/day]		**% food waste of total quantities**	
2		3	30			75%
3		75	500			1,50%
4		80	500			70%
5		300	1000			20%
6		20	90			90%
7		9	315			50%
8		65	330			50%
9		137,5	575			70%
10		25	350			100%
11		1	100			5%
12		5	300			50%
13		58	300			50%
14		19	130			70%
15		50	750			70%
16		175	900			20%
17		75	450			50%
18		25	550			60%
19		25	100			45%
20		40	630			5%
21		60	750			5%
22		15	140			20%
23		20	185			20%
24		50	248			60%
25		45	900			95%
26		100	750			20%
27		26	650			40%
28		3000	18000			90%
29		25	150			5%
30		7,5	175			80%
31		15	90			20%
32		67,5	600			100%
33		42,5	750			50%
34		10	124			25%
35		50	250			80%
36		32,5	450			90%
37		15	130			80%
38		20	850			75%
39		115	1250			90%
40		100	1500			25%
41		100	650			80%
42		400	2000			30%
43		100	300		**Average**	0,52
44		150	450			52%
45	**Sum:**	5754	[kg/week]			
46		218633	[kg/y]			
47						
48	**Total food waste quantity**	113667	[kg/y]	*B46 * F44*		
49	**Numbers served per week:**	196210	[persons/week]	*Sum column C times 5 days per week*		
50	**Av. served per day:**	913	[persons/day]	*Average calculated from column C*		
51	**Av. food loss per person:**	5,6	[kg/y,person]	*(B45 / B49) * 5 days * 38 weeks*		
52	**Av. food waste per person:**	2,9	[kg/y,person]	*B51 * F44*		

Figure 64: *Amounts of food loss, numbers served and the share of food loss constituting of food waste. Responds from attendants answering from kitchen both cooking and serving.*

	A	B	C	D	E	F
1	**Total food loss quantities**			Numbers served [persons/day]	**% food waste of total quantity**	
2			10	100		30
3			7,5	190		100
4			20	120		70
5						4
6						
7		**Sum:**	37,5	[kg/week]	**Average:**	0,51
8			1425	[kg/y]		51%
9						
10						
11						
12	**Total amount food loss**	727	[kg/y]	*C8 * F7*		
13	**Numbers served per week:**	2050	[persons/week]	*Sum column D * 5 days per week*		
14	**Av. served per day:**	137	[persons/day]	*Average calculated from column D*		
15	**Av. food loss per person:**	3,5	[kg/y,person]	*(C7 / B13) * 5 days * 38 weeks*		
16	**Av. food waste per person:**	1,8	[kg/y,person]	*B15 * F8*		

Figure 65: *Amounts of food loss, numbers served and the share of food loss constituting of food waste. Responds from attendants answering from kitchen solely cooking.*

	A	B	C	D	E	F	G
1							
2	**Total food loss quantities**			Numbers served [persons/day]		**% food waste of total quantity**	70
3			110	300			80
4			20	70			30
5			65	175			20
6			5	165			50
7			55	400			100
8			57,5	365			40
9		**Sum:**	312,5	[kg/week]			3,5
10			11875	[kg/y]			100
11						**Average:**	0,55
12							55%
13	**Total food waste quantity**		6511	[kg/y]	*C10 * G11*		
14	**Numbers served per week:**		7375	[persons/week]	*Sum of column D * 5 days per week*		
15	**Av. served per day:**		246	[persons/day]	*Average calculated from column D*		
16	**Av. food loss per person:**		8,1	[kg/y,person]	*(C9 / C14) * 5 days * 38 weeks*		
17	**Av. food waste per person:**		4,4	[kg/y,person]	*C16 * G11*		

Figure 66: *Amounts of food loss, numbers served and the share of food loss constituting of food waste. Responds from attendants answering from kitchen solely serving.*

9.6 Sensitivity analysis: Estimations from survey attendants

9.6.1 Food loss and food waste per category

	A	B	C	D	E	F	G	H	I
1	**Central**				**Solely serving**				
2									
3		Max [kg/w]	Min [kg/w]	Numbers served [personer/day]		Max [kg/w]	Min [kg/w]	Numbers served [personer/day]	
4									
5						175	45	300	
6		1500		4500		40	15	70	
7		2475	1950	23000		80	40	175	
8		350	225	2000		5	0	165	
9		660	475	2500		80	20	400	
10		75	15	800		65	25	365	
11		75	50	1300	**Sum food loss**	445	145	[kg/w]	
12		1850	1100	6000		16910	5510	[kg/y]	
13		125	10	7000					
14		40	10	300					
15		1100	900	4400	**Total numbers serve**	7375	[persons/w]	*Sum of column H muntiplied by 5 days per week*	
16		480	110	1500	**Waste percentage**	55%		*Previously calculated*	
17		1100	400	2000					
18		51,7	11,7	1500	**Av. max, food loss per person**		11,5	[kg/p,y]	*(F11 / F15) * 5 days * 38 weeks*
19	**Sum food loss**	9882	5257	[kg/w]	**Av. min, food loss per person**		3,7	[kg/p,y]	*(G11 / F15) * 5 days * 38 weeks*
20		375505	199755	[kg/y]					
21	**Average food waste**	13,0	7,5	[t/y]	**Av. max, food waste per person**		6,3	[kg/p,y]	*G18 * F16*
22	*Average from column B and C*				**Av. min, food waste per person**		2,0	[kg/p,y]	*G19 * F16*
23									
24	**Total numbers served, max**	284000	[persons/w]	*Sum D6 to D18*					
25	**Total numbers served, min**	261500	[persons/w]	Sum D7 to D18					
26	**Waste percentage**	45%		*Previously calculated*					
27									
28	**Av. max, food loss per person**	6,6	[kg/p,y]	*(B19 / B24) * 5 days * 38 weeks*					
29	**Av. min, food loss per person**	3,8	[kg/p,y]	*(C19 / B25) * 5 days * 38 weeks*					
30									
31	**Av. max, food waste per perso**	3,0	[kg/p,y]	*B28 * B26*					
32	**Av. min, food waste per person**	1,7	[kg/p,y]	*B29 * B26*					

Figure 67: *Calculations on minimum and maximum food loss and food waste amounts for attendants answering from a central position and kitchen solely serving.*

J	K	L	M
Cooking + Serving	Max [kg/w]	Min [kg/w]	Numbers served [personer/dav]
	3	0	30
	125	25	500
	188	11.5	500
	400	200	1000
	50	5	90
	14	0	315
	100	35	330
	200	25	575
	50	15	350
		0	100
	7.5	2.5	300
	100	25	750
	200	75	900
	100	40	450
	60	20	550
	30	10	100
	75	30	630
	70	40	750
		0	140
	40	17.5	500
	115	30.8	206
	75	15	248
	250	50	750
	42.5	10	650
	55	25	350
	4500	1500	18000
	35	20	150
	20	1.5	175
	15	2.5	90
	150	10	600
	75	15	750
	70	15	450
	25	2.5	130
	200	99	1250
	200	15	1500
	175	50	650
	450	200	2000
	250		450
	120	50	300
Sum food loss	8635	2688	[kg/w]
Total numbers served	187795	[persons/w]	*Sum column M*
Waste percentage	52%		*Previously calculated*
Av. max, food loss per person	8,7	[kg/p,y]	*(K44/K46) * 5 days * 38 weeks*
Av. min, food loss per person	2,7	[kg/p,y]	*(L44/K46) * 5 days * 38 weeks*
Av. max, food waste per person	4.5	[kg/p,y]	*L49 * K47*
Av. min, food waste per person	1.4	[kg/p,y]	*L50 * K47*

Figure 68: *Calculations on minimum and maximum food loss and food waste amounts for kitchens both cooking and serving.*

	O	P	Q	R	S
1	**Solely cooking**				
2					
3		Max [kg/w]	Min [kg/w]		Numbers served [personer/day]
4					
5		20	2		1000
6		15	2,5		190
7		30	10		120
8	**Average**	21,7	4,8		
9					
10	**Sum food loss**	65	14,5	[kg/w]	*Sum column P and Q respectively*
11		2,5	0,6	[tonnes/y]	
12					
13	**Total numbers served**	6550	[persons/w]	*Sum column S multiplied by 5 days per week*	
14	**Waste percentage**	51%		*Previously calculated*	
15					
16					
17	**Av. max, food loss per person**		1,9	[kg/p,y]	*(P10/P13) * 5 days * 38 weeks*
18	**Av. min, food loss per person**		0,4	[kg/p,y]	*(Q10/P13) * 5 days * 38 weeks*
19					
20	**Av. max, food waste per person**		1,0	[kg/p,y]	*Q17 * P14*
21	**Av. min, food waste per person**		0,2	[kg/p,y]	*Q18 * P14*

Figure 69: *Calculations on minimum and maximum food loss and food waste amounts for kitchens solely cooking.*

9.7 Calculations from sensitivity analysis: Values estimated by survey attendants

9.7.1 Interval: Food waste quantities

	A	B	C	D	E	F	G	H	
1									
2			**Central position**	**Cooking + Serving**	**Serving**	**Cooking**			
3									
4	**Numbers served [persons/week]**		609750	196210	7375	2050	*From previous calculations*		
5	**Numbers served [persons/year]**		23170500	7455980	280250	77900			
6	**Min av. food waste [kg/p,y]**		1,7	1,4	2,0	0,2	*From previous calculations*		
7	**Max av. food waste [kg/p,y]**		3,8	4,5	6,3	1,8	*From previous calculations*	**National level**	
8	**Min food waste quantity [t/y]**		209,6	55,5	3,0	0,09	*(Value row 6 * values from row 5) / (5 days * 38 weeks * 1000)*	60784	*C8 * 290*
9	**Max food waste quantity [t/y]**		463,4	178,2	9,3	0,7	*(value row 7 * values from row 5) / (5 days * 38 weeks * 1000)*	134389	*C9 * 290*
10									
11									
12						**Social effects**			
13		**Min. food waste**	268	[t/y]	*Sum row 8*	838088	[nr. portions]	*(C13 * 1000) / 0.32*	
14		**Max. food waste**	652	[t/y]	*Sum row 9*	2036434	[nr. portions]	*(C14 * 1000) / 0.32*	
15		**Av. food waste**	589	[t/y]					

Figure 70: *Maximum and minimum food waste quantities*

9.7.2 Interval: Emissions

A	B	C	D	E	F	G
MINIMUM						
		Food waste quantities	**potatoes/pasta (60 %)**	**Veg. (20 %)**	**Chicken/Beef (20 %)**	
		268,2	*Column C * 0,6*	*Column C * 0,2*	*Column C * 0,2*	
	An. Digestion (77,4 %)	207,59	124,55	41,52	41,52	*Values estimated by survey attendants*
	Incin. (21,4 %)	57,39	34,44	11,48	11,48	
	Composting (1,2 %)	3,22	1,93	0,64	0,64	[tonnes/year]
	Net saving/emissions	**Redist. - An. Digestion**	**Redist. - Composting**	**Redist. - Incin.**		
	Potatoes/Pasta (=Banana)	0,06	0,40	0,40		*Values after Eriksson, Strid and Hansson (2015) and Eriksson and Spångberg (2017)*
	Fruit & veg.	0,38	0,51	0,53		
	Chicken & beef	-0,14	0,37	0,18	[kg CO2/kg] = [tonnes CO2 /ton]	
	Env. Effects redistribution					
		potatoes/pasta	**Veg.**	**Chicken/Beef**		
	Redist. - An. Digestion	6,85	15,91	-5,60		*Waste volumes per grocery multiplied with related emissions from respective treatment alternative and grocery*
	Redist. - Incin.	13,60	6,10	2,03		
	Redist. - Composting	0,77	0,33	0,24	[tonnes CO2/year]	
	Sum Redist. - an. digestion	17,2		*Sum of all types of groceries per comparison*		
	Sum Redist. - Composting	21,7				
	Sum Redist. - Incin.	1,3	[tonnes CO2/year]			
	Sum, total:	40,2	[tonnes CO2/year]			

Figure 71: *Calculations on resulting greenhouse gas emissions from minimum food waste amounts from all survey attendants.*

K	L	M	N	O	P	Q
MAXIMUM						
		Food waste quantities	**potatoes/pasta (60 %)**	**Veg. (20 %)**	**Chicken/Beef (20 %)**	
		657,1	*Column M * 0,6*	*Column M * 0,2*	*Column M * 0,2*	
	An. Digestion (77,4 %)	508,6	305,2	101,7	101,7	*Values estimated by survey attendants*
	Incin. (21,4 %)	140,6	84,4	28,1	28,1	
	Composting (1,2 %)	7,9	4,7	1,6	1,6	[tonnes/year]
	Net saving/emissions	**Redist. - An. Digestion**	**Redist. - Composting**	**Redist. - Incin.**		
	Potatoes/Pasta (=Banana)	0,06	0,40	0,40		*Values after Eriksson, Strid and Hansson (2015) and Eriksson and Spångberg (2017)*
	Fruit & veg.	0,38	0,51	0,53		
	Chicken & beef	-0,14	0,37	0,18	[kg CO2/kg] = [tonnes CO2 /ton]	
	Env. Effects redistribution					
		potatoes/pasta	**Veg.**	**Chicken/Beef**		
	Redist. - An. Digestion	16,78	38,98	-13,73		*Waste volumes per grocery multiplied with related emissions from respective treatment*
	Redist. - Incin.	33,33	14,95	4,96		
	Redist. - Composting	1,88	0,80	0,59	[tonnes CO2/year]	
	Sum Redist. - an. digestion	42,0		*Sum of all types of groceries per comparison*		
	Sum Redist. - Incin.	53,2				
	Sum Redist. - Composting	3,3	[tonnes CO2/year]			
	Sum, total:	98,5	[tonnes CO2/year]			

Figure 72: *Calculations on resulting greenhouse gas emissions from maximum food waste amounts from all survey attendants.*

A	B	C	D	E	F	G
MINIMUM						
Per municipality		**Food waste amounts**	**potatoes/pasta (60 %)**	**Veg. (20 %)**	**Chicken/Beef (20 %)**	
		7,5	*Column C * 0,6*	*Column C * 0,2*	*Column C * 0,2*	
	An. Digestion (77,4 %)	5,81	3,48	1,16	1,16	*Values estimated by survey attendants*
	Incin. (21,4 %)	1,61	0,96	0,32	0,32	
	Composting (1,2 %)	0,09	0,05	0,02	0,02	[tonnes/year]
	Net saving/emissions	**Redist. - An. Digestion**	**Redist. - Composting**	**Redist. - Incin.**		
	Potatoes/Pasta (=Banana)	0,06	0,40	0,40		*Values after Eriksson, Strid and Hansson (2015) and Eriksson and Spångberg (2017)*
	Fruit & veg.	0,38	0,51	0,53		
	Chicken & beef	-0,14	0,37	0,18	[kg CO2/kg] = [tonnes CO2 /ton]	
	Env. Effects redistribution					
		potatoes/pasta	**Veg.**	**Chicken/Beef**		
	Redist. - An. Digestion	0,19	0,44	-0,16		*Waste volumes per grocery multiplied with related emissions from respective treatment alternative and grocery*
	Redist. - Incin.	0,38	0,17	0,06		
	Redist. - Composting	0,02	0,01	0,01	[tonnes CO2/year]	
	Sum Redist. - an. digestion	0,48				
	Sum Redist. - Composting	0,61				
	Sum Redist. - Incin.	0,04	[tonnes CO2/year]			
				Sweden		
	Sum, total:	1,12	[tonnes CO2/year]	326	[tonnes CO2/year]	

Figure 73: *Calculations on resulting greenhouse gas emissions from minimum food waste amounts per municipality.*

K	L	M	N	O	P	Q
MAXIMUM						
Per municipality		**Food waste amounts**	**potatoes/pasta (60 %)**	**Veg. (20 %)**	**Chicken/Beef (20 %)**	
		13	*Column M * 0,6*	*Column M * 0,2*	*Column M * 0,2*	
	An. Digestion (77,4 %)	10,06	6,04	2,01	2,01	*Values estimated by survey attendants*
	Incin. (21,4 %)	2,78	1,67	0,56	0,56	
	Composting (1,2 %)	0,16	0,09	0,03	0,03	[tonnes/year]
	Net saving/emissions	**Redist. - An. Digestion**	**Redist. - Composting**	**Redist. - Incin.**		
	Potatoes/Pasta (=Banana)	0,06	0,40	0,40		*Values after Eriksson, Strid and Hansson (2015) and Eriksson and Spångberg (2017)*
	Fruit & veg.	0,38	0,51	0,53		
	Chicken & beef	-0,14	0,37	0,18	[kg CO2/kg] = [tonnes CO2 /ton]	
	Env. Effects redistribution					
		potatoes/pasta	**Veg.**	**Chicken/Beef**		
	Redist. - An. Digestion	0,33	0,77	-0,27		*Waste volumes per grocery multiplied with related emissions from respective treatment alternative and grocery*
	Redist. - Incin.	0,66	0,30	0,10		
	Redist. - Composting	0,04	0,02	0,01	[tonnes CO2/year]	
	Sum Redist. - an. digestion	0,83				
	Sum Redist. - Incin.	1,05				
	Sum Redist. - Composting	0,06	[tonnes CO2/year]			
				Sweden		
	Sum, total:	1,95	[tonnes CO2/year]	565	[tonnes CO2/year]	

Figure 74: *Calculations on resulting greenhouse gas emissions from maximum food waste amounts per municipality.*

9.7.3 Interval: Waste management costs

	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	**Minimum**						**Maximum**						
2		**Min. food waste**	268 200	[kg/y]				**Max. food waste**	657 100	[kg/y]			
3		**Costs, food loss management**	2,02	[SEK/p,y]	*Calculated from case study*			**Costs, food loss management**	2,02	[SEK/p,y]	*Calculated from case study*		
4		**Average food waste**	2,68	[kg/p,y]	*Calculated from all categories*			**Average food waste**	6,45	[kg/p,y]	*Calculated from all categories*		
5		**Costs per weight**	0,76	[SEK/kg]	*I3 / I4*			**Costs per weight**	0,31	[SEK/kg]	*O3 / O4*		
6		**Av., annual costs all attendants**	202529	[SEK/y]	*I5 * I2*			**Av., annual costs all attendants**	205789	[SEK/y]	*O5 * O2*		
7													
8		**Numbers served per year**	61881100	[persons/y]	*Previously calculated*			**Numbers served per year**	61881100	[persons/y]	*Previously calculated*		
9		**Annual costs per person**	0,0033	[SEK/p]	*I6 / I8*			**Annual costs per person**	0,0033	[SEK/p]	*O6 / O8*		
10		**Av. Numbers served in municipalities**	4878	[p/day]	926820	[p/y]		**Av. Numbers served in municipalities**	4878	[p/day]	926820	[p/y]	
11		**Av. Savings in municipalities**	3033	[SEK/y]	*I9 * K10*			**Av. Savings in municipalities**	3082	[SEK/y]	*O9 * Q10*		
12		**Sweden**	879674	[SEK/y]	*I11 * 290*			**Sweden**	893837	[SEK/y]	*O11 * 290*		
13													
14													
15		**Applied to all municipalities in Sweden**											
16		Max.	1598838										
17		Min.	879674	[SEK/y]									
18													
19		**Sum attendants**	18026103	[SEK/y]									
20		**Sum per municipality**	561605	[SEK/y]									
21		**Sum Sweden**	162865518	[SEK/y]									

Figure 75: *Calculations on minimum and maximum waste management costs as estimated by survey attendants.*

9.8 Sensitivity analysis: Normal distribution

9.8.1 Matlab code

```
x = 0:0.1:20; % Create vector for norm dist
FLC = [12.3289 10.094 0.554 2.685 5.51 13.3 2.019 1.827 8.233 19.596 2.28 6.671 3.8 12.667 8.6 0.706
3.167 5.039 8.636 6.967 7.6 13.3 7.41 2.393 2.153];
FLCS = [3.8 5.7 6.08 11.4 8.44 1.086 7.485 9.087 2.714 0.38 0.633 7.347 5.554 2.533 7.389 6.333
1.727 9.5 2.413 3.04 4.071 4.108 7.661 1.9 5.067 1.52 6.33 6.33 1.629 6.33 4.275 2.153 3.0645 7.6
2.744 4.385 0.894 3.496 2.533 5.846 7.6 12.667 12.667];
FLSS = [13.933 10.857 14.114 1.152 5.225 5.986];
FLSC = [3.8 1.5 6.33];

pd_FLC = fitdist(FLC','Normal');
norm_conf_FLC = paramci(pd_FLC,'Alpha',.05); % confidence intervall 95 % gives lower and
upper values

[mu_FLC,sigma_FLC] = normfit(FLC);
norm_FLC = normpdf(x,mu_FLC,sigma_FLC);
norm_lower_FLC = normpdf(x,norm_conf_FLC(1,1),norm_conf_FLC(1,2));
norm_upper_FLC = normpdf(x,norm_conf_FLC(2,1),norm_conf_FLC(2,2));

pd_FLCS = fitdist(FLCS','Normal');
norm_conf_FLCS = paramci(pd_FLCS,'Alpha',.05); % confidence intervall 95 % gives lower and
upper values

[mu_FLCS,sigma_FLCS] = normfit(FLCS);
norm_FLCS = normpdf(x,mu_FLCS,sigma_FLCS);
norm_lower_FLCS = normpdf(x,norm_conf_FLCS(1,1),norm_conf_FLCS(1,2));
norm_upper_FLCS = normpdf(x,norm_conf_FLCS(2,1),norm_conf_FLCS(2,2));

pd_FLSS = fitdist(FLSS','Normal');
norm_conf_FLSS = paramci(pd_FLSS,'Alpha',.05); % confidence intervall 95 % gives lower and
upper values

[mu_FLSS,sigma_FLSS] = normfit(FLSS);
norm_FLSS = normpdf(x,mu_FLSS,sigma_FLSS);
```

```
norm_lower_FLSS = normpdf(x,norm_conf_FLSS(1,1),norm_conf_FLSS(1,2));
norm_upper_FLSS = normpdf(x,norm_conf_FLSS(2,1),norm_conf_FLSS(2,2));

pd_FLSC = fitdist(FLSC','Normal');
norm_conf_FLSC = paramci(pd_FLSC,'Alpha',.05); % confidence intervall 95 % gives lower and
upper values

[mu_FLSC,sigma_FLSC] = normfit(FLSC);
norm_FLSC = normpdf(x,mu_FLSC,sigma_FLSC);
norm_lower_FLSC = normpdf(x,norm_conf_FLSC(1,1),norm_conf_FLSC(1,2));
norm_upper_FLSC = normpdf(x,norm_conf_FLSC(2,1),norm_conf_FLSC(2,2));

figure(1);
hold on
grid on
plot(x,norm_FLC)
legend('Normal distribution, central')

figure(2);
hold on
grid on
plot(x,norm_FLCS)
legend('Normal distribution, cooking and serving')

figure(3);
hold on
grid on
plot(x,norm_FLSS)
legend('Normal distribution, solely serving')

figure(4);
hold on
grid on
plot(x,norm_FLSC)
legend('Normal distribution, solely cooking')
```

9.8.2 Vectors on food loss

H	I	J	K	L	M
Central	**Food loss [kg/w]**	**Numbers served [persons/day]**	**Numbers served [persons/w]**	**Food loss [kg/p,y]**	
	1460	4500	22500	12,33	*(Value column I / value column K) * 5 days * 38*
	425	1600	8000	10,09	
	35	2400	12000	0,55	
	1625	23000	115000	2,68	
	290	2000	10000	5,51	
	875	2500	12500	13,30	
	42,5	800	4000	2,02	
	62,5	1300	6500	1,83	
	1300	6000	30000	8,23	
	11500	22300	111500	19,60	
	162	2700	13500	2,28	
	790	4500	22500	6,67	
	220	2200	11000	3,80	
	3000	9000	45000	12,67	
	1075	4750	23750	8,60	
	130	7000	35000	0,71	
	25	300	1500	3,17	
	663	5000	25000	5,04	
	1000	4400	22000	8,64	
	275	1500	7500	6,97	
	1000	5000	25000	7,60	
	700	2000	10000	13,30	
	585	3000	15000	7,41	
	170	2700	13500	2,39	
	85	1500	7500	2,15	

Figure 76: *Calculations food loss per person and year based on answers from attendants answering from a central position.*

N	O	P	Q	R	S
Cooking + Serving	**Food loss [kg/w]**	**Numbers served [persons/day]**	**Numbers served [persons/w]**	**Food loss [kg/p.y]**	
					*(Value column O / value column Q) * 5 days * 38 weeks*
	3	30	150	3,80	
	75	500	2500	5,70	
	80	500	2500	6,08	
	300	1000	5000	11,40	
	20	90	450	8,44	
	9	315	1575	1,09	
	65	330	1650	7,48	
	137,5	575	2875	9,09	
	25	350	1750	2,71	
	1	100	500	0,38	
	5	300	1500	0,63	
	58	300	1500	7,35	
	19	130	650	5,55	
	50	750	3750	2,53	
	175	900	4500	7,39	
	75	450	2250	6,33	
	25	550	2750	1,73	
	25	100	500	9,50	
	40	630	3150	2,41	
	60	750	3750	3,04	
	15	140	700	4,07	
	20	185	925	4,11	
	50	248	1240	7,66	
	45	900	4500	1,90	
	100	750	3750	5,07	
	26	650	3250	1,52	
	3000	18000	90000	6,33	
	25	150	750	6,33	
	7,5	175	875	1,63	
	15	90	450	6,33	
	67,5	600	3000	4,28	
	42,5	750	3750	2,15	
	10	124	620	3,06	
	50	250	1250	7,60	
	32,5	450	2250	2,74	
	15	130	650	4,38	
	20	850	4250	0,89	
	115	1250	6250	3,50	
	100	1500	7500	2,53	
	100	650	3250	5,85	
	400	2000	10000	7,60	
	100	300	1500	12,67	
	150	450	2250	12,67	

Figure 77: *Calculations food loss per person and year based on answers from attendants both cooking and serving.*

U	V	W	X	Y	Z
Solely serving	**Food loss [kg/w]**	**Numbers served [persons/day]**	**Numbers served [persons/w]**	**Food loss [kg/p,y]**	
	110	300	1500	13,93	*(Value column V / value column X) * 5 days * 38 weeks*
	20	70	350	10,86	
	65	175	875	14,11	
	5	165	825	1,15	
	55	400	2000	5,23	
	57,5	365	1825	5,99	
Solely cooking	**Food loss [kg/w]**	**Numbers served [persons/day]**	**Numbers served [persons/w]**	**Food loss [kg/p,y]**	
	10	100	500	3,80	*(Value column V / value column X) * 5 days * 38 weeks*
	7,5	190	950	1,50	
	20	120	600	6,33	

Figure 78: *Calculations food loss per person and year based on answers from attendants solely serving and attendants solely cooking.*

9.8.3 Returned values on min. and max. food loss

```
norm_conf_FLC =

4.7028 3.7806
8.7000 6.7357

» norm_conf_FLCS

norm_conf_FLCS =

4.4287 2.7947
5.6881 3.7056

» norm_conf_FLSS

norm_conf_FLSS =

5.3835 3.8600
11.7055 9.2445

» norm_conf_FLSC

norm_conf_FLSC =

1.2466 1.5921
6.5068 7.4429
```

9.9 Calculations from sensitivity analysis: Normal distribution

9.9.1 Interval: Food waste quantities

	B	C	D	E	F	G	H	I
1								
2			**Central position**	**Cooking + Serving**	**Serving**	**Cooking**		
3								
4	**Numbers served [persons/week]:**		609750	196210	7375	2050	*Sum of answers from survey attendants*	
5	**Numbers served [persons/year]:**		23170500	7455980	280250	77900		
6	**Min food loss [kg/p,y]:**		4,7	4,4	5,4	1,2	*Calculated using normal distribution of the averages previously estimated by survey attendants*	
7	**Max food loss [kg/p,y]:**		8,7	5,7	11,7	6,5		
8	**Av. percentage food waste**		45%	52%	55%	51%		
9	**Min food waste quantities [t/y]:**		257,9	89,8	4,4	0,3	*(Values row 5 * values row 6 * values row 8) / (5 days * 38 weeks * 1000)*	
10	**Max food waste quantities [t/y]:**		477,4	116,3	9,5	1,4	*(Values row 5 * values row 7 * values row 8) / (5 days * 38 weeks * 1000)*	
11								
12								
13								
14	**Min. food waste**	352	[t/y]	*Sum row 9*	**Social effects, all attendants**			
15	**Max. food waste**	605	[t/y]	*Sum row 10*	Min.	1101018	[nr. portions]	*D14 * 1000 / 0,32*
16	**Av. food waste**	589	[t/y]		Max.	1889262	[nr. portions]	*D15 * 1000 / 0,32*
17								
18	**Food waste, per municipality**				**Social effects, per municipality**			
19	Min.	10	[t/y]	*D9/25 answers*	32241	[st]	*C19 * 1000 / 0,32*	
20	Max.	19	[t/y]	*D10/25 answers*	59679	[st]	*C20* 1000 / 0,32*	
21								
22	**Food waste, Sweden**				**Social effects, Sweden**			
23	Min.	2992	[t/y]	*C19 * 290*	9349754	*F19 * 290*		
24	Max.	5538	[t/y]	*C20 * 290*	17306992	*F20 * 290*		

Figure 79: *Own calculations on minimum and maximum food loss and food waste quantities from all survey attendants, and resulting social effects.*

9.9.2 Interval: Emissions

A	B	C	D	E	F	G
MINIMUM						
Normal distribution		**Food waste quantities**	**potatoes/pasta (60 %)**	**Veg. (20 %)**	**Chicken/Beef (20 %)**	
All attendants		352,33	*Column C * 0,6*	*Column C * 0,2*	*Column C * 0,2*	
	An. Digestion (77,4%)	272,7	163,6	54,5	54,5	*Values from normal distribution based on survey answers*
	Incin. (21,4%)	75,4	45,2	15,1	15,1	
	Composting (1,2%)	4,2	2,5	0,8	0,8	[tonnes/year]
	Net saving/emissions	**Redist. - An. Digestion**	**Redist. - Composting**	**Redist. - Incin.**		
	Potatoes/Pasta (=Banana)	0,06	0,40	0,40	*Values after Eriksson, Strid and Hansson (2015) and Eriksson and Spångberg (2017)*	
	Fruit & veg.	0,38	0,51	0,53		
	Chicken & beef	-0,14	0,37	0,18	[kg CO2(kg] = [tonnes CO2/ton]	
	Env. Effects redistribution					
		potatoes/pasta	**Veg.**	**Chicken/Beef**		
	Redist. - An. Digestion	9,0	20,9	-7,4		*Waste volumes per grocery multiplied with related emissions from respective treatment alternative and grocery*
	Redist. - Incin.	17,9	8,0	2,7		
	Redist. - Composting	1,0	0,4	0,3	[tonnes CO2/year]	
	Sum Redist. - an. digestion	22,5				
	Sum Redist. - Incin.	28,5		*Sum of all types of groceries per comparison*		
	Sum Redist. - Composting	1,8	[tonnes CO2/year]			
	Sum, total:	52,8	[tonnes CO2/year]			

Figure 80: *Calculations on minimum greenhouse gas emissions as a result of maximum food waste quantities for all survey attendants, based on normal distribution.*

K	L	M	N	O	P	Q
MAXIMUM						
Normal distribution		Food waste amounts	potatoes/pasta (60 %)	Veg. (20 %)	Chicken/Beef (20 %)	
All attendants		604,56	*Column M * 0,6*	*Column M * 0,2*	*Column M * 0,2*	
	An. Digestion (77,4%)	467,9	280,8	93,6	93,6	*Values from normal distribution based on survey answers*
	Incin. (21,4%)	129,4	77,6	25,9	25,9	
	Composting (1,2%)	7,3	4,4	1,5	1,5	[tonnes/year]
	Net saving/emissions	Redist. - An. Digestion	Redist. - Composting	Redist. - Incin.		
	Potatoes/Pasta (=Banana)	0,06	0,40	0,40		*Values after Eriksson, Strid and Hansson (2015) and Eriksson and Spångberg (2017)*
	Fruit & veg.	0,38	0,51	0,53		
	Chicken & beef	-0,14	0,37	0,18	[kg CO2(kg) = [tonnes CO2/ton]	
	Env. Effects redistribution					
		potatoes/pasta	Veg.	Chicken/Beef		
	Redist. - An. Digestion	15,4	35,9	-12,6		*Waste volumes per grocery multiplied with related emissions from respective treatment alternative and grocery*
	Redist. - Incin.	30,7	13,8	4,6		
	Redist. - Composting	1,7	0,7	0,5	[tonnes CO2/year]	
	Sum Redist. - an. digestion	38,7				
	Sum Redist. - Incin.	49,0		*Sum of all types of groceries per*		
	Sum Redist. - Composting	3,0	[tonnes CO2/year]			
	Sum, total:	90,7	[tonnes CO2/year]			

Figure 81: *Calculations on maximum greenhouse gas emissions as a result of maximum food waste quantities for all survey attendants, based on normal distribution.*

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
MINIMUM									MAXIMUM						
Own obervations		Food waste amounts	potatoes/pasta (60 %)	Veg. (20 %)	Chicken/Beef (20 %)				Own obervations		Food waste amounts	potatoes/pasta (60 %)	Veg. (20 %)	Chicken/Beef (20 %)	
Per municipality		10,30	*Column C * 0,6*	*Column C * 0,2*	*Column C * 0,2*				Per municipality		19,10	*Column M * 0,6*	*Column M * 0,*	*Column M * 0,2*	
	An. Digestion (77,4%)	7,972	4,783	1,594	1,594	*Values from normal distribution based on survey answers*				An. Digestion (77,4%)	14,78	8,87	2,96	2,96	*Values from normal distribution based on survey answers*
	Incin. (21,4%)	2,204	1,323	0,441	0,441					Incin. (21,4%)	4,09	2,45	0,82	0,82	
	Composting (1,2%)	0,124	0,074	0,025	0,025	[tonnes/year]				Composting (1,2%)	0,23	0,14	0,05	0,05	[tonnes/year]
	Net saving/emissions	Redist. - An. Digestion	Redist. - Composting	Redist. - Incin.						Net saving/emissions	Redist. - An. Digestion	Redist. - Composting	Redist. - Incin.		
	Potatoes/Pasta (=Banana)	0,06	0,40	0,40	*Values after Eriksson, Strid and Hansson (2015) and Eriksson and Spångberg (2017)*					Potatoes/Pasta (=Banana)	0,06	0,40	0,40		*Values after Eriksson, Strid and Hansson (2015) and Eriksson and Spångberg (2017)*
	Fruit & veg.	0,38	0,51	0,53						Fruit & veg.	0,38	0,51	0,53		
	Chicken & beef	-0,14	0,37	0,18	[kg CO2(kg) = [tonnes CO2/ton]					Chicken & beef	-0,14	0,37	0,18		[kg CO2(kg) = [tonnes CO2/ton]
	Env. Effects redistribution									Env. Effects redistribution					
		potatoes/pasta	Veg.	Chicken/Beef							potatoes/pasta	Veg.	Chicken/Beef		
	Redist. - An. Digestion	0,263	0,611	-0,215	*Waste volumes per grocery multiplied with related emissions from respective treatment alternative and grocery*					Redist. - An. Digestion	0,49	1,13	-0,40		*Waste volumes per grocery multiplied with related emissions from respective treatment alternative and grocery*
	Redist. - Incin.	0,522	0,234	0,078						Redist. - Incin.	0,97	0,43	0,14		
	Redist. - Composting	0,030	0,013	0,009	[tonnes CO2/year]					Redist. - Composting	0,05	0,02	0,02		[tonnes CO2/year]
	Sum Redist. - An. digestion	0,66	*Sum of all types of groceries per comparison*							Sum Redist. - An. digestion	1,22	*Sum of all types of groceries per comparison*			
	Sum Redist. - Incin.	0,83								Sum Redist. - Incin.	1,55				
	Sum Redist. - Composting	0,05	[tonnes CO2/year]							Sum Redist. - Composting	0,10	[tonnes CO2/year]			
					Sweden									Sweden	
	Sum, total:	1,54	[tonnes CO2/year]		448					Sum, total:	2,86	[tonnes CO2/year]		831	

Figure 82: *Calculations on minimum and maximum greenhouse gas emissions as a result of varying food waste quantities from average municipality, based on normal distribution of averages estimated by survey attendants.*

9.9.3 Interval: Waste management costs

	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	Maximum						Minimum						
2	Normal distribution	Min. food waste	352330	[kg/y]			Normal distribution	Max. food waste	604560	[kg/y]			
3		Costs, food waste management	2,02	[SEK/p,y]	Calculated from case study			Costs, food waste management	2,02	[SEK/p,y]	Calculated from case study		
4		Average food waste	3,93	[kg/p,y]	Calculated from all categories			Average food waste	8,15	[kg/p,y]	Calculated from all categories		
5		Costs per weight	0,51	[SEK/kg]	M3 / M4			Costs per weight	0,25	[SEK/kg]	S3 / S4		
6		Av., annual costs all attendants	181096	[SEK/y]	M5 * M2			Av., annual costs all attendants	149842	[SEK/y]	S5 * S2		
7													
8		Numbers served per year	61881100	[persons/y]	Previously calculated from survey answers			Numbers served per year	61881100	[persons/y]	Previously calculated from survey answers		
9		Annual costs per person	0,0029	[SEK/p]	M6 / M8			Annual costs per person	0,0024	[SEK/p]	S6 / S8		
10		Av. Numbers served in municipalities	4878	[p/day]	926820	[p/y]		Av. Numbers served in municipalities	4878	[p/day]	926820	[p/y]	
11		Av. Savings in municipalities	2712	[SEK/y]	M9 * O10			Av. Savings in municipalities	2244	[SEK/y]	S9 * U10		
12													
13													
14													
15		Applied to all municipalities in Sweden											
16		Min.	650831		S11 * 290								
17		Max.	786582	[SEK/y]	M11 * 290								

Figure 83: *Calculations on minimum and maximum waste management costs for all survey attendants, based on normal distribution of averages estimated by survey attendants.*

9.10 Calculations on waste management costs

	A	B	C	D	E	F	G	H	I	J
1	Average									
2		Annual food waste	588 600	[kg/y]						
3		Costs, food waste management	2,02	[SEK/p,y]	Calculated from case study					
4		Average food waste	3,23	[kg/p,y]	Calculated from all categories					
5		Costs per weight	0,63	[SEK/kg]	C3 / C4					
6		Av., annual costs all attendants	368103	[SEK/y]	C5 * C2					
7										
8		Numbers served per year	61881100	[persons/y]	Previously calculated					
9		Annual costs per person	0,006	[SEK/p]	C6 / C8					
10		Av. Numbers served in municipalities	4878	[p/day]	926820	[p/y]	Previously calculated			
11		Av. Savings in municipalities	5513	[SEK/y]	C9 * E10					
12										
13										
14										
15		Portion size	0,32	[kg/port.]						
16		No. Portions from food waste	1839375	[port./y]	C2/C15					
17		Cost per portion	9,6	[SEK/port.]	According to Nystedt					
18		Costs, annual food waste all attendants	17658000	[SEK/y]	C17 * C16					
19		Av. Food waste per municipality	18536,4	[kg/y]	Previously calculated		Sum attendants	18026103	[SEK/y]	C6 + C18
20		No. Portions from municipal food waste	57926	[port./y]	C19 / C15		Sum per municipality	561605	[SEK/y]	C11 + C21
21		Cost for port. from municipal food waste	556092	[SEK/y]	C20 * C17		Sum Sweden	162865518	[SEK/y]	I20 * 290

Figure 84: *Calculations on food waste management costs as average estimated by survey attendants. In the bottom of the figure, calculations on additional staff salary are illustrated.*

9.11 Calculations on greenhouse gas emissions

A	B	C	D	E	F	G	H	I	J	K
Fruit and vegetables (articles from both 2015 and 2017)	Redistribution	An.digestion	Composting	Incineration		**Comparison**	Redistribution - An.digestion	Redistribution - Composting	Redistribution - Incin.	
tomatoe	0,56	0,08		-0,04		Av. fruit and veg.	0,38	0,51	0,53	
apple	0,5	0,09		-0,01		Av. bananas	0,06	0,40	0,40	
orange	0,57	0,12		-0,005		Chicken	0,09	0,39	0,04	
pepper	0,68	0,07		-0,03		Beef	-0,36	0,35	0,31	
iceberg lettuce	0,013	0,047	-0,043	-0,25		Bread	0,06	0,65	-0,06	
Average:	0,46	0,08	-0,04	-0,07	[kg CO2/kg]	Av. Chicken & beef	-0,14	0,37	0,18	[kg CO2/kg]
Bananas (2017+2015)							*Values from column B minus values from column C*	*Values from column B minus values from column D*	*Values from column B minus values from column E*	
banana, 2017	0,59	0,22		0,02						
banana, 2015	0,12	0,38	-0,043	-0,1			*Positive value indicate net savings from redistribution compared to alternative treatment method*			
Average:	0,355	0,3	-0,043	-0,04	[kg CO2/kg]		*Negative value indicate net emissions from redistribution compared to alternative treatment method*			
Other groceries (2015)							*Values after Eriksson, Strid and Hansson (2015) and Eriksson and Spångberg (2017)*			
chicken	0,35	0,26	-0,043	0,31						
beef	0,31	0,67	-0,043	-0,003						
Average:	0,33	0,47	-0,04	0,15	[kg CO2/kg]					
bread	0,61	0,55	-0,043	0,67	[kg CO2/kg]					

Figure 85: *Calculations on greenhouse gas emissions related to food loss treatment, part 1.*

	A	B	C	D	E	F	G	H	I	J	K	L
1		**Food waste amounts**	**potatoes/pasta (60 %)**	**Veg. (20 %)**	**Chicken/Beef (20 %)**							
2		588,6	*Column B * 0.6*	*Column B * 0.2*	*Column B * 0.2*							
3	**An. Digestion (77,4 %)**	455,6	273,3	91,1	91,1							
4	**Incin. (21,4 %)**	126,0	75,6	25,2	25,2							
5	**Composting (1,2 %)**	7,1	4,2	1,4	1,4		[tonnes/year]					
6												
7												
8		**Net saving/emissions**	**Redist. - An. Digestion**	**Redist. - Composting**	**Redist. - Incin.**							
9		Potatoes/Pasta (=Banana)	0,06	0,40	0,40		*Values after Eriksson, Strid and Hansson (2015) and Eriksson and Spångberg (2017)*					
10		Fruit & veg.	0,38	0,51	0,53							
11		Chicken & beef	-0,14	0,37	0,18		[kg CO2/kg] = [tonnes CO2/ton]					
12												
13												
14		**Env. Effects redistribution**										
15			**potatoes/pasta**	**Veg.**	**Chicken/Beef**							
16		**Redist. - An. Digestion**	15,03	34,92	-12,30		*Waste volumes per grocery multiplied with related emissions from respective treatment alternative and grocery, i.e. C4 * E9 for comparing redist. to incin. of potatoes/pasta*					
17		**Redist. - Incin.**	29,85	13,39	4,45							
18		**Redist. - Composting**	1,69	0,72	0,53		[tonnes CO2/year]					
19												
20												
21		**Sum Redist. - an. digestion**	37,6		*Sum of all types of groceries per comparison*							
22		**Sum Redist. - Incin.**	47,7				**Total numbers served**	3,1E+07	[persons/y]	*Sum of all survey respondents*		
23		**Sum Redist. - Composting**	2,9	[tonnes CO2/year]			**Av. emissions per person**	2,8E-06	[t CO2/p,y]	*C25 / H22*		
24							**Av. numbers served per municipality**	4,9E+03	[persons/y]	*From survey results*		
25		**Sum, total:**	88,3	[tonnes CO2/year]			**Av. emissions per municipality**	2,6E+00	[t CO2/m,y]	*H23 * H24 * 5 days * 38 weeks*		
26							**Sweden**	7,7E+02	[t CO2/y]	*H25 * 290 municipalities*		

Figure 86: *Calculations on greenhouse gas emissions related to food loss treatment, part 2.*

Emissions from food waste management and treatment as a share of total emissions from the average Swedish municipality

	A	B	C	D	E	F	G	H
1	**Rapportnamn:**	**Länsrapport, 2018-08-30**						
2	**Emissioner av Växthusgaser totalt som CO2-ekvivalenter**							
3	**Enhet: ton/år**							
4								
5					**2016**			
6	**Huvudsektor**	**Undersektor**	**Län**	**Kommun**	**Växthusgaser totalt**		**Av. Emissions per municipality**	
7	alla	alla	alla	alla	5,207E+07		1,796E+05	*N7 / 290*
8	alla	alla	Stockholms län	alla	4,886E+06			
9	alla	alla	Stockholms län	Upplands-Väsby	8,106E+04		**Percentage food waste**	
10	alla	alla	Stockholms län	Vallentuna	9,942E+04		1,4480E-03	*2.6 / Q7*
11	alla	alla	Stockholms län	Österåker	8.574E+04			

Figure 87: *Calculations on the share of greenhouse gas emissions resulting from food waste, for the average municipality*

9.12 Complementing survey on waste management costs

9.12.1 E-mail to municipalities

Hej!

Jag skulle vilja komma i kontakt med det företag som hanterar hämtning och behandling av matavfallet från de kommunala storköken. Har du uppgifter till någon?

Mvh, Lotta Jansson

9.12.2 E-mail to waste management businesses

Hej!

I XXX kommun utför jag en enkätundersökning gällande matsvinnet från de kommunala storköken. Utifrån enkätsvaren skriver jag min masteruppsats som bl.a handlar om miljönyttan med att kunna redistribuera matsvinn till t.ex välgörenhet. För att kunna avgöra miljönyttan måste jag veta vad den alternativa behandlingen är och det är därför jag kontaktar er.

Min fråga är vad som blir av det matavfall Ni samlar in från de kommunala storköken i XXX kommun. Om olika behandling av matavfallet tillämpas, ungefär hur ser uppdelningen ut procentuellt? (T.ex: Förbränning 20 %, rötning 70 %, kompostering 10 %)

Vänliga hälsningar, Lotta Jansson

9.12.3 Calculations on waste management costs from municipality of Kristianstad

Verksamhet	Hyra och tömning matavfallskärl	Hyra och tömning restavfallskärl	Tömning och behandling matavfallskvarn	Behandling Restavfall		Antal elever
Svalans förskola	1886	7152	0	143		85
Smedjegårdens förskola	943	7152	15600	72		110
Sjögårdens förskola	1886	7152	0	143		139
Norretullskolan	3752	16078	0	1222		210
Parkskolan	3407	7152	3640	544		267
Spängerskolan	1886	0	0	873		270
Milnerskolan	942	0	0	72		292
Villaskolan	3831	7152	0	544		294
Nosabyskolan	943	0	8320	72		395
Sånnaskolan	2045	7377	19240	561		442
Tollarpsskolan	682	0	21360	1623		446
Öllsjöskolan	1421	7152	9880	108		470
Fjälkingeskolan	2066	0	0	1185		485
Väskolan	1363	16210	11960	1232		511
Hammar skola	3053	7152	8840	160		560
Önnegården	2829	0	0	739		620
Fröknegårdens skola	12413	0	0	2555		720
Österängsgymnasiet	4150	0	8544	315		1028
Summa:	49 499	89 731	107 384	12 163	[SEK/år]	
Totalt, mat (B20 + D20)	156 883	[SEK/år]				
Totalt, rest (C20 + E20)	101 894	[SEK/år]				
Totalt	258 776	[SEK/år]				
Snitt antal serverade från kolumn G	408	[personer/dag]				
Snitt, kostnader mat per serverad	2,02	[SEK/person,år]	*B23 / (B27 * 5 dagar * 38 veckor)*			
Snitt, kostnader rest per serverad	1,31	[SEK/person,år]	*B24 / (B27 * 5 dagar * 38 veckor)*			
Snitt, totalt per serverad	3,34	[SEK/person,år]				
Snitt kostnader mat per verksamhet	8716	[SEK/år]				
Snitt kostnader rest per verksamhet	5661	[SEK/år]				
Snitt kostnader totalt per verksamhet	14376	[SEK/år]				
Andel mat av totala kostnader	0,61					
Andel rest av totala kostnader	0,39					

Figure 88: *Calculations on waste management costs from the municipality of Kristianstad.*

9.13 Charity organizations

9.13.1 Mail to charity organizations

Hej!

Jag läser mitt sista år på Lunds Tekniska Högskola och skriver just nu min masteruppsats om matsvinn från kommunala storkök och hur detta kan tas om hand på ett mer hållbart sätt, t.ex. genom redistribution till välgörenhet. En del i uppsatsen går ut på att undersöka vilka typer av aktiviteter det finns i dagsläget som erbjuder mat av olika slag till utsatta människor.
Därför skriver jag till Er nu med några frågor jag hoppas kunna få svar på:

- Vilka olika matserveringsaktiviteter erbjuder Ni?
- Tar Ni betalt för någon av dessa aktiviteter?
- Hur mycket av det Ni serverar utgörs av donerad mat/livsmedel?
- Hur många personer serverar Ni i snitt inom er/era matserveringsaktivitet/-er?
- Tror du att Ni skulle ha möjlighet att ta emot ännu mer mat/livsmedel än Ni gör idag?

Många vänliga hälsningar,
Lotta Jansson

9.13.2 Data from survey on charity organizations

Aktivitet	Organisation	Antal portioner		Avgift
Frukostservering	Göteborgs kyrkliga stadsmission			symbolisk summa
Lunchservering	Göteborgs kyrkliga stadsmission			symbolisk summa
Middagsservering	Göteborgs kyrkliga stadsmission			symbolisk summa
Café David: Frukost	Skåne stadsmission, Malmö			gratis
Café David: Lunch	Skåne stadsmission, Malmö	Frukost+Luch = 200 /dag	Antagande: 100 st/dag,aktivitet	symbolisk summa
Nattjour: Middag	Skåne stadsmission, Malmö	25 /dag		gratis
Crossroads: Frukost	Skåne stadsmission, Malmö	100 /dag		gratis
Unga forum: Frukost/Lunch/Middag	Skåne stadsmission, Malmö	200 /vecka		gratis
Matkasse	Skåne stadsmission, Malmö	175 - 200 hushåll/vecka = 4 000 - 5 000 kg mat/vecka		
Solidariskt kylskåp	Solidariskt kylskåp			gratis
Matbutik Matmissionen	Stockholm stadsmission	750 köp/vecka		minst - 30 % jämför med vanlig matbutik
Matbutik Matmissionen	Stockholm stadsmission	750 köp/vecka		minst - 30 % jämför med vanlig matbutik
Café David: Frukost	Skåne stadsmission, Kristiandstad	30 /dag		gratis
Café David: Lunch	Skåne stadsmission, Kristiandstad	4 /dag		symbolisk summa
Frukostservering	Skellefteå Stadsmission	20 /dag		symbolisk summa
Lunchservering	Skellefteå Stadsmission	20 /dag		symbolisk summa
Matförråd	Skellefteå Stadsmission			gratis
Matkasse	Skellefteå Stadsmission	8 hushåll/vecka		gratis
Middagsservering	Frälsningsamrén Örnsköldsvik	40 pers/ggr	2 ggr/vecka	gratis
Matkasse	Frälsningsamrén Örnsköldsvik	60 st/v	2 ggr/v	gratis
Matkasse	Uppsala Stadsmission			gratis
Crossroads: Lunchservering	Linköpings Stdsmission	19 /dag	mån-fre	gratis
Middagsservering	Linköpings Stdsmission	18 /dag	1 ggr/v	gratis
Café i gemensap: Frukostservering	Föreningen Ny Gemenskap	Frukost: mån-fre		gratis
Café i gemensap: Frukostservering	Föreningen Ny Gemenskap	Frukost: mån-fre		gratis
Café i gemensap: Frukostservering	Föreningen Ny Gemenskap	Frukost: mån-fre		gratis
Café i gemensap: Frukostservering	Föreningen Ny Gemenskap	Frukost: mån-fre		gratis
Café i gemensap: Frukostservering	Föreningen Ny Gemenskap	Frukost: mån-fre		gratis
Lunch i gemenskap	Föreningen Ny Gemenskap	Lunch: mån-fre	Vardagar, samtliga: 350 pers/dag	symbolisk summa
Lunch i gemenskap	Föreningen Ny Gemenskap	Lunch, gemensam servering: lördagar	Lördagar, tot: 225	gratis
Lunch i gemenskap	Föreningen Ny Gemenskap	Lunch, egen servering: lör + sön	Söndagar: 65	symbolisk summa
Soppmässa: Middagsservering	Uppsala Stadsmission			gratis
Frukostservering	Hemlösa.se i Stockholm			gratis
Ria: Frukostservering	Hela Människan Norrköping			gratis
Ria: Lunchservering	Hela Människan Norrköping			symbolisk summa
Matförråd	Hela Människan Norrköping			gratis ?

Figure 89: *Data from mail correspondence and web pages for charity organizations attending the complementing survey on social effects from food redistribution.*

D	E	F	G	H
Contact		**Share donated food**		**Could handle larger donations?**
Göteborgs kyrkliga stadsmission		35%		Yes
Skånes stadsmission, Malmö		50%		Yes
Skånes stadsmission, Kristianstad			"For breakfasts and lunches there is always some ingredients that have been donated"	Yes
Skellefteå stadsmission		75%		Yes
Frälsningsarmén, Örnsköldsvik		85%		No, due to insufficient storing spaces
Linköping stadsmission		27,5%		Yes
Ny gemenskap			"Relatively small share"	Yes
	Average:	55%		
Activity	**Numbers served**			
lunch	700			
dinner	175			
lunch	28			
lunch	140			
dinner	80			
lunch	95			
dinner	18			
lunch	112,5			
lunch	112,5			
lunch	65	[pers./w]		
Average:	153	[pers./w]		

Figure 90: *Data from mail correspondence with charity organizations attending the complementing survey on social effects from food redistribution. Numbers served, share of donated food and if able to manage larger donations.*