



FOUNDATION FOR EUROPEAN
PROGRESSIVE STUDIES
FONDATION EUROPÉENNE
D'ÉTUDES PROGRESSISTES



BRĒIVRAS UN SOLIDARITĀTES FONDS

(FOOD) WASTE NOT WANT NOT



V. ANDRIUKAITIS
C. BILLINGHAM
B. BORZAN
G. CIOCI
J. DEPOUILLON
H. HARTIKAINEN
K. JOENSUU
D. KAVASA
J. KRUIPIENĒ
E. MARKEY
H. MOORA
P. HERNÁNDEZ OLIVAN
E. PIIRISALU
M. RAUGEVIČIŪTĒ
J. SIMANOVSKA
P. WALLNER
J. WILDEMEERSCH

**WHY FOOD WASTE IS A BIG DEAL
AND HOW TO SCALE-UP
PREVENTIVE ACTION**

(FOOD) WASTE NOT WANT NOT

**WHY FOOD WASTE IS A BIG
DEAL AND HOW TO SCALE-UP
PREVENTIVE ACTION**

FOUNDATION FOR EUROPEAN
PROGRESSIVE STUDIES
FONDATION EUROPÉENNE
D'ÉTUDES PROGRESSISTES



BRĪVĪBAS UN SOLIDARITĀTES FONDS



Published by

FEPS
Foundation for European Progressive Studies
Rue Montoyer 40, 4th floor
B-1000 Brussels, Belgium
T: +32 2 234 69 00
Email: info@feps-europe.eu
Website: <http://www.fepe-europe.eu/en>
Twitter: @FEPS_Europe



BRĪVĪBAS UN SOLIDARĪTĀTES FONDS

BSF
Brīvības un solidaritātes fonds
Bruninieku iela 29/31, 204. telpa
Rīga, LV-1001, Latvija
T: +371 29199982
Email: info@bsf-latvija.lv
Website: <http://www.bsf-latvija.lv>



With the financial support of the European Parliament
The present paper does not represent the European Parliaments views but only of the respective author

Copyright © 2018 by Foundation for European Progressive Studies (FEPS) and Freedom and Solidarity Foundation (BSF)

The present paper does not represent the views of FEPS and BSF but only of the respective authors. The responsibility of FEPS and BSF is limited to approving its publication as worthy of consideration of the global progressive movement.

Edited by Jana Simanovska and Charlotte Billingham
Language editing by Thomas Schmit

Cover design: Inta Filjipova
Cover illustration: Shutterstock
Page layout: Inta Filjipova

ISBN: 978-9934-8647-3-5

(FOOD) WASTE NOT WANT NOT

WHY FOOD WASTE IS A BIG DEAL AND HOW TO SCALE-UP PREVENTIVE ACTION

TABLE OF CONTENTS

Introduction	7
<i>Ernst Stetter</i> , Foundation for European Progressive Studies <i>Ervins Labanovskis</i> , Freedom and Solidarity Foundation (BSF)	
Foreword	9
<i>Vytenis Andriukaitis</i> , European Commissioner for Health and Food Safety	
(Food) Waste Not Want Not	13
<i>Charlotte Billingham</i> , Foundation for European Progressive Studies	
1 Policy development in the EU with regard to food waste,	25
<i>Biljana Borzan</i> , Member of European Parliament, Group of the Progressive Alliance of Socialists and Democrats	
2 Current situation with food waste: amounts, comparison of countries, biggest sources and information gaps	37
<i>Hanna Hartikainen</i> , Natural Resources Institute Finland (Luke)	
3 Legislative and political framework as positive and negative drivers for reduction and recycling of food waste. Impact of national legislation	45
<i>Dace Kavasa</i> , Evolve Ltd Founder, Member of CSR Latvia Latvia	
4 POSITIVE EXAMPLES OF REDUCING FOOD WASTE	
4.1 Household food waste generation in Lithuania,	59
<i>Jolita Kruopienė</i> , <i>Monika Raugėvičiūtė</i> , APINI, Kaunas University of Technology Lithuania	

4.2 Food waste reduction in canteens of preschools and schools in Latvia, <i>Jana Šimanovska</i> , Vidzeme University of Applied Sciences, Latvia	69
4.3 Food waste in the Estonian food consumption-production chain <i>Harri Moora, Evelin Piirsalu</i> , Stockholm Environment Institute Tallinn Centre, Estonia	83
4.4 Prevention and reduction of food waste in european hospitals: lessons learned <i>Grazia Cioci</i> , Health Care Without Harm (HCWH) Europe and <i>Paola Hernández Oliván</i> , Mensa Cívica, Spain	99
4.5 Food waste reduction via awareness raising in Swedish society <i>Paul Wallner</i> , ResursRestaurangen, Sweden	109
4.6. Food Waste: Local Governments to the Rescue <i>Joris Depouillon, Jasmien Wildemeersch, Elke Markey</i> , FoodWIN, Belgium	127
4.7 Utilization of 2 nd class fruits and vegetables <i>Katri Joensuu</i> , Natural Resources Institute Finland (Luke)	143

(FOOD) WASTE NOT WANT NOT

Food waste, we don't want it but why is preventing it such a big deal?

Wastage can be found right along the food chain, from production to consumption, it strains our natural resources, land, water and energy use. It is wasteful financially yet moreover it constitutes to a huge part of global emissions. Therefore addressing this is important in preventing global warming and climate change too.

Our relationship with food queries our wider societal values as it regards our relationship on the social, economic and environmental levels. It concerns helping fight hunger, poverty and ecological degradation. The need to address these issues can be drawn up from basic progressive values.

If we want our societies to be fully sustainable in the way we produce, consume and redistribute a more holistic and multi-dimensional approach will be required, food waste provides a good foundation for addressing wider societal issues.

This publication is intended to illustrate the main issues to the reader as a complement to this fast-developing debate. It sets out clearly the significance and responsibility of action in preventing food waste, outlining the challenges and showcasing the opportunities and benefits that could be brought about. It looks at the policy developments and highlights good practices. The format is an collection of articles from different

contributors that look at the political, scientific, business case and educative aspects of food waste. It includes articles from Commissioner Andriukaitis for Health and food Safety and Bjlana Borzan MEP as well as other authors from across Europe with experience in this field.



Ernst Stetter
Secretary General
Foundation for European Progressive Studies



Ervins Labanovskis
Chairman of the Board
Freedom and Solidarity Foundation (BSF)

FOREWORD



BY VYTENIS ANDRIUKAITIS,
EUROPEAN COMMISSIONER FOR HEALTH
AND FOOD SAFETY

Food waste is fast becoming a sort of new European epidemic. Of course, no deaths or diseases can be directly imputed to it. Yet, with around 88 million tonnes of food wasted annually in the EU, this phenomenon has become so widespread and so worrisome that we, Social-democrats, must take the issue seriously and collectively think of ways to address this trend. I spent my childhood in a soviet gulag in Siberia where survival was challenging on a daily basis and wasting food was unimaginable. This is why I am particularly appalled that in the EU, 20% of the food we produce is currently lost and wasted. I am all the more shocked as I know that, at the same time, 55 million Europeans cannot afford a quality meal every second day. I find it intolerable.

Moreover, the associated costs to these 88 million tonnes of wasted food are estimated at 143 billion euros. Beyond this very telling – but slightly too narrow – economic perspective, the harm caused by food waste is also ethical and environmental. Preventing food waste therefore should meet concerns and objectives that are dear to all Social-democrats, such as: the protection of the environment we live in by removing unnecessary pressure on limited natural resources and tackling climate change - these will indeed have the greatest and the gravest consequences on those who are already the most affected by poverty and injustice.

Hence, fighting food waste constitutes one of these battles that we must place very high among our priorities. Otherwise,

repeating that at the core of our values the fight against inequalities and for social justice is just empty rhetoric. Combatting food waste – throughout the entire chain of farmers, producers, retailers and households – helps not only Europeans bring about more social justice, but also improves the environment and social structures in which we live in.

The European Union decided to take action towards meeting the UN Sustainable Development Goal 12.3 that calls for halving food waste by 2030 at retail and consumer levels and for reducing food losses all along the production and supply chains. Through the implementation of the Circular Economy Action Plan, published by the Commission in December 2015, we recognise the need to redesign the food supply chain, minimise waste and optimise food resources.

Indeed, an efficient farming model with an increased focus on the environment and climate, transitioning towards a more sustainable agricultural sector and the development of vibrant rural areas is needed to respond to societal demands in relation to food and resource efficiency, including food waste. To facilitate this, the Commission in June 2018 presented legislative proposals for a modernised and simplified CAP. Also, another proposal in April 2018 by the Commission on new legislation on unfair trading practices was made with the aim of improving farmers' and small and medium sized businesses' position in the food supply chain. Some of these measures, such as the prohibition of late payment for perishable food products, last minute cancellations, and forcing the supplier to pay for wasted products can help prevent food waste which can arise as a result of unfair trading practices.

In addition, the revised waste legislation package, adopted by the European Parliament and the Council on 30 May 2018, introduces new obligations for Member States to reduce food waste levels at each stage of that food supply chain, and monitor and report annually on food waste levels. It also provides the legal basis for adoption by the Commission by March 2019 for harmonised methodology to

be utilised for quantification and reporting on food waste levels across the EU.

Our fight against food waste covers a broad spectrum, and a broad range of stakeholders must be engaged in it. This is notably why since 2016, I was pleased to inaugurate the first meeting of a multi-stakeholder platform – the EU Platform on Food Loss and Food Waste which also involves international organisations (FAO, UN Environment, OECD), EU bodies, Member States and actors in the food chain to share and exchange ideas, knowledge and experience. Over the last year, two new sub-groups on 'action and implementation' and 'date marking' have been established, in addition to those dedicated to 'food waste measurement' and 'food donation'.

Facilitating food donation supports the fight against food poverty and the European Commission adopted guidelines on this in October 2017. They aim to clarify relevant provisions in EU legislation and help lift barriers to food redistribution within the current EU regulation framework. Specifically, it facilitates compliance of providers and recipients of surplus food with relevant requirements laid down in the EU regulatory framework (e.g. food safety, food hygiene, traceability, liability, VAT, etc.).

Finally, this February 2018 we published a report on date marking. It estimated that up to 10% of the 88 million tonnes of food waste generated annually in the EU are linked to date marking, particularly to different interpretations of the meaning of "best before" and "use by" dates on food labels. We will define a coordinated action plan to address date marking in relation to food waste prevention.

Too often, food is wasted around us. Therefore, I am glad that so much work has been done during my mandate as it was long past due. But this is not enough. Much more must be done to achieve the goal of halving food waste by 2030. While we all know that the issue of poverty goes well beyond food waste, it is unacceptable that food goes to the bin while somebody next

to us goes to bed hungry. Such inequality and unfair distribution of a basic human right – access to food – is not in line with the values of social democracy. This is the driver of my action. I count on us all: together to be actors of the fight against food waste.

(FOOD) WASTE NOT WANT NOT



CHARLOTTE BILLINGHAM,
FOUNDATION FOR EUROPEAN
PROGRESSIVE STUDIES

Introductory context

Around one third of food is wasted globally each year. If food waste were a country it would be the third largest emitter, following the US and China. Furthermore a recent report suggests that more emissions are being produced from the top meat and dairy companies than the three biggest oil and gas companies.¹

In addition food security causes conflict and inequalities, addressing the issue would save money and increase our collective well-being. Preventing food waste helps combat hunger and decreases strains on our natural resources, especially land, water and energy use. A documentary about food waste in 2017 claims that “food production is the biggest cause of deforestation, water extraction, biodiversity loss,” furthermore, **“one third of food produced is never eaten”**.²

In the EU it transforms into 88 million tonnes of food wasted every year. This “absurdity” is at the same time when 55 million people cannot afford a decent quality meal every second day.³ In economic terms this [food waste] is equivalent to an “annual bulk-trade value of USD 936 billion globally”.⁴ In the EU associated costs added up to EUR 143 billion in 2012, equivalent to the annual budget.⁵

Consequently the social costs of food waste are enormous and yet also much more difficult to calculate than the economic costs which are also immense. Food waste provides a good

illustration of how strong links are between financial, social and ecological concerns and interestingly how the solution for tackling this problem can be found by linking these together more.

The good news is that action is being taken to tackle this issue. Food waste is incorporated into the United Nation’s Sustainable Development Goals (SDGs) to which European Member States are committed:

Sustainable Development Goal 12.3

To “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”, by 2030.⁶

It is also part of the ‘circular economy’ package of the European Union, which seeks to prevent waste and increase re-use and recycling measures.

So “waste not want not” as the expression goes, is the title of this book and chapter. In other words, don’t waste what you might need.

This chapter will look at the main causes, political impulse, where action is coming from and the situation on measuring. The conclusion seeks to offer policy recommendations.

Main causes

Food waste occurs at different stages in the production process. In more developed countries such as in the EU, most food waste happens at the second stage of our food supply, so at the retail and consumption stages. Whereas in less-developed countries the majority of food waste tends to occur at the primary stage so, production, harvest, storage and transportation stages. This difference can be related to financial resources and knowledge, also good storage and packaging helps reduction.

‘Use by’ and ‘best before’ dates play an important role and yet are often misinterpreted, or interpreted differently; in a Eurobarometer survey, “less than half of respondents understand the meaning of “best before” labelling on food products” and “only four in ten respondents correctly understand the meaning of “use by” dates on food products”.⁷

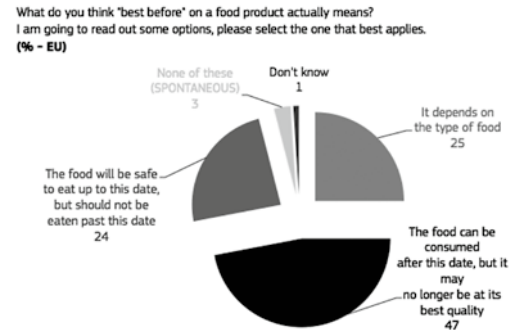


Figure 1

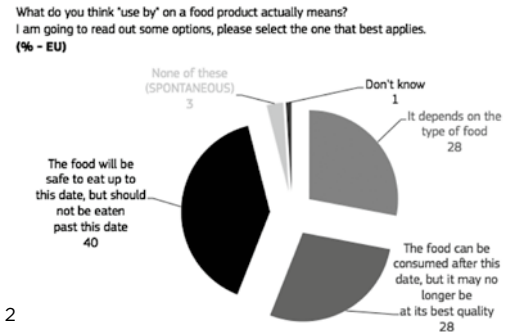


Figure 2

This can be due to misinterpretation by the consumer but it can also be the way it is managed and marketed by food operators and authorities. Food retail operators could do more to help define date marking and consumer labelling, but also avoid multipacks and misleading packaging. Despite more developed food outlets thought to be using more and better

storage facilities, waste at the retail stage can be due to outlets simply wasting what is not sold or consumers buying too much. Many fruits and vegetables are not sold or eaten for not being the right size or the right shape, either for aesthetic reasons or for packaging purposes. Long supply-chains also increase further risk of food waste.

So the causes of food waste differs greatly between countries and occurs at each stage of the food-chain; production, supply, storage, transport, retail and consumption.

Political impulse for reducing food waste - why do we care?

Food waste is harming the environment, it is wasting resources and money, degrading our landscapes and exacerbating climate change. Addressing these issues has huge benefits, socially, environmentally and economically.

It is estimated that households could be saving hundreds per year on food waste that could easily be avoided. Furthermore it is also down to the way we consume where the most impact can be made in the EU. Over half of food waste in 2012 came from households.⁸ Therefore we as consumers can make the most immediate impact, which will primarily save us a significant amount of money and also help protect the environment.

With concerns about protecting the environment and how our societies are managed being high on the political agenda, food waste is where a huge difference can be made. Addressing hunger, inequalities and helping protect the planet's limited natural resources has a strong progressive dimension. Setting international objectives and introducing new legislation are also factors that have helped contribute even further to the growing awareness about the issue.

Many initiatives set-up to help combat food waste also have

a strong, positive social innovation dimension. For example supermarkets donating food to charities that then give it to vulnerable people. Of course many would argue that the need for such charities should not be the norm and should not be the basis for long-term policies, which is true to a large extent, still it does go so far to addressing in some way the current ills of our economy and we must not be complacent about how many people in the EU depend on food subsidies. Nevertheless we must not forget that the main overall objective would be to reduce the amount of food at production stage and ensure equal redistribution.

With population size set to increase tremendously over the next few decades, ensuring everyone is fed adequately, that there is enough food and resources will become even more of a challenge, so the sooner we improve our food footprint, the better.

Measuring

Positively, food waste is something that can be measured and methodology exists. So if it can be measured it can be managed. Unfortunately though, there exists no clear definition of food waste and there are different ways of measuring it. Food waste measurements are only very recent so there is significant development in this area still to be made.

Under European legislation there is no food, or in fact waste, definition and on food waste there is even divergence between the European Commission and the European Parliament on this issue which demonstrates the complexity of the issue.

The European Commission is responsible for establishing a common and uniform methodology, the deadline foreseen is end March 2019. It already set up a food loss and waste accounting and reporting standard in 2016.⁹

The proposal by FUSIONS (Food Use for Social Innovation by

Optimising Waste Prevention Strategies) set up by the European Commission states:

“Food waste is any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed (including composted, crops ploughed in/not harvested, anaerobic digestion, bio-energy production, co-generation, incineration, disposal to sewer, landfill or discarded to sea)”.¹⁰

Whereas the European Parliament’s recommendation in May 2017¹¹ for the European Commission and Council was to use the following definition:

“Food waste means food intended for human consumption, either in edible or inedible status, removed from the production or supply chain to be discarded, including at primary production, processing, manufacturing, transportation, storage, retail and consumer levels, with the exception of primary production losses”.

There are also different approaches in science literature about whether to include inedible fractions of food and the type of measurement¹².

For measuring the Food and Agriculture Organization (FAO) distinguishes between food loss and food waste, yet their data is based on weight, this method does not always count for variations in water content per kilogram or calorific i.e. energy value.

The issue of avoidable and non-avoidable food waste also offers further variants in measuring methodology.

So the value of food stands to be determined however to show the high-end and low-end of valorisation, this illustration is useful:¹³:



Figure 3

Thus there are varying degrees of defining food waste and calculating the value. Consequently the common definition in the EU due in 2019 is much-awaited, and hopefully a common definition will exist soon at international level too.

Reactions to addressing food waste - Consumer safety and hygiene

Many initial reactions to food waste concern safety and hygiene. Food that is past its ‘best before’ date is questioned and in many cases existing legislation does not facilitate donations. The responsibility of waste collection more generally falls under local authorities, at the low-valorisation end; here positive change could be brought about by improving sorting and recycling. However at the high-valorisation end, the way food is produced, is a remit the European Union can address, where the biggest source of the problem lies. Similarly it is national legislation that determines in so far the legislation concerning food waste and the methodology to measure it, consequently resulting in variations between Member States.

Several EU countries; Denmark, Belgium, France and Italy in particular have already adopted legislation in recent years at national level that has had very positive effects. It is usually

only where legislation has been adapted to specifically address the challenge are real impacts seen clearly. Incidentally, the Commission's FUSIONS platform is gathering national cases of legislation together in order to share best practices.

Helping facilitate supermarkets to donate food that is still safe to consumer but that will not be sold is the main change in these countries. Thanks to such legal changes, charities, food banks, surplus supermarkets and products using 'second-class' fruit and vegetables are some of the initiatives that have been established to help combat food waste that would otherwise end up in landfill.

Looking ahead, packaging is likely to be one of the next developmental phases regarding food waste; whilst packaging can help lengthen the life-cycle of food, increasing plastic waste is of huge concern globally. Knowing that growth in food waste has increased alongside growth in plastic packaging, and developing countries, where plastic packaging is less prevalent have lower rates of household food waste. Therefore data suggests, that assessment studies tend to simplify food waste drivers and overstate the benefits of packaging.¹⁴ Smart packaging is also an area undergoing serious innovation; this is packaging that might have special indicators or release a substance into the food that helps keep it fresher for longer, or organic packaging. With plastic or other packaging the concern is also to check for additional risks of chemical migration onto food or environmental leakage, in that, working closely together with food safety authorities will be key in shaping this phase of prevention.

Conclusion

There is no doubt about it, preventing food waste is gaining more attention. No-one wants to waste food. Thanks to awareness campaigns but also changes in legislation has led to different initiatives are being set-up. There is also a growing consciousness that people not only realise it can save them money

but is also helping reduce the use of precious resources.

It is welcoming that food waste is being tackled at European level and international level and also at national and local level. Nevertheless much more can be done and in particular to address the way we produce and value our food.

Policy recommendations:

I. Establish a common definition and measurement methodology

The European common definition is well awaited yet an international common standard and common methodology on how to measure food waste is the first step in identifying how to prevent food waste.

II. Raise awareness about how food is produced and how to prevent waste – we need to address our relationship to food and the value it holds. Learning about how to better store food, changing the way we consume it, how to better use leftovers etc. is useful in preventing consumer food waste at retail and household level. Shorter supply-chains and packaging that does not increase food wastage could help this.

III. More robust legislation – establish new laws that allow products to be sold or donated easily, with little administrative burden whilst also adhering to food safety regulations.

IV. National legislation – the sustainable development goals and the European legislation now need to be transposed into national legislation. Of course each country needs to assess what is most suitable for its own adaptation needs, nonetheless a more coordinated approach would bring more wide-reaching benefits.

V. Awareness campaigns on 'best before' and 'use by' dates – by making people more informed about the difference between these two definitions would offer significant prevention.

VI. Encourage more action but also transparency – The introduction of more robust regulation would help ensure better measuring, recording and transparency of data at all stages along the food-chain, from production through to consumption. Action on food waste should be incentivised. This would be good for businesses that act to prevent food waste and also good for consumers and authorities to be able to use the data for analysis and thus help better manage and improve food waste.

VII. More concrete action from EU and national governments – the Commissioner for Health and Food Safety has done a significant amount to bring this issue onto the main political agenda but more concrete action in scaling-up the measures would have even higher results. If we are to work towards the 2030 target of reducing food waste by a half, concrete planning and roadmaps should be set up. Food waste as part of the circular economy package is not only something to think about at the end stage of consumption but at all stages of the food-chain. Furthermore local authorities can also commit to better sorting and recycling measures that would decrease food waste at the low-valorisation stage.

VIII. Coordinated action – Policies need to be revised to ensure that food waste is not just a side issue but that it is incorporated into all policy areas, bringing it into the more mainstream policy debates. From economic planning, to allow for investment, making best methods of production, storage and transport more widespread, using better technologies and introducing more robust regulation at the retail stage. Incentivising good practices and provide support for initiatives that help reduce food waste would be promising.

IX. Work together with food safety and hygiene authorities – in cases where national and local governments have worked together with food safety and hygiene authorities, improved regulation has been introduced to address food waste and thus allowing for new initiatives to be created.

Better legal clarification or provisions to encourage donations would be useful.

X. Establish methodology for best identifying where food waste is occurring and how to best measure it

At whatever stage in the food production and consumption chain if food waste is being measured, the source of the problem and the way it is measured needs to be identified first before collecting the data.

¹ Grain and the Institute for Agriculture and Trade Policy, *'Emissions impossible: How big meat and dairy are heating up the planet'*, 2018

² *Wasted! The Story of Food Waste*, Bourdain, A. 2017

³ Andriukaitis, V. 'Fighting the absurdity of food waste: A moral obligation' *FEPS Progressive Post Magazine*, 2017 March

⁴ Food and Agriculture Organization (FAO) 'Mitigation of food wastage: societal costs and benefits' 2014

⁵ FUSIONS, 'Estimates of European Food Waste Levels' 2016

⁶ <https://sustainabledevelopment.un.org/sdg12>

⁷ 'Food Waste and Date Marking' Flash Eurobarometer 425, 2015, September

⁸ 'Food Waste: the problem in the EU in numbers' *European Parliament News*, 2017, May

⁹ 'About the Food Loss and Waste Accounting and reporting standard', *Food Loss and Waste Protocol* <http://flwprotocol.org/wp-content/uploads/2018/02/About-The-FLW-Standard.pdf>

¹⁰ Food Waste Definition, FUSIONS, 2016, <http://www.eu-fusions.org/index.php/about-food-waste/280-food-waste-definition>

¹¹ European Parliament <http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P8-TA-2017-0207&language=EN>

¹² Caldeira, C. Corrado, S. Sala, S. (2017) 'Food Waste Accounting: Methodologies, challenges and opportunities' *European Commission Joint Research Centre Technical Report*

¹³ Janssen, T. and van de Hei, L. (2018) 'From Food Waste to Future Value' Rabobank Economic Report

¹⁴ Schweitzer, J-P and Janssens, C (2018) 'Unwrapped: How throwaway plastic is failing to solve Europe's food Waste Problem (and what we need to do instead)'. Institute for European Environmental Policy (IEEP), Brussels, A study by Zero Waste Europe and Friends of the Earth Europe for the Rethink Plastic Alliance

1 POLICY DEVELOPMENT IN THE EU WITH REGARD TO FOOD WASTE



BILJANA BORZAN, MEMBER OF EUROPEAN PARLIAMENT, GROUP OF THE PROGRESSIVE ALLIANCE OF SOCIALISTS AND DEMOCRATS
RAPPOREUR ON THE INITIATIVE ON RESOURCE EFFICIENCY: REDUCING FOOD WASTE, IMPROVING FOOD SAFETY

The EU, as one of the richest and most prosperous communities in the world, has a moral and political obligation to reduce huge quantities of food wasted every year.

Estimates suggest that 88 million tonnes of food are wasted in the EU each year. The production and disposal of EU food waste leads to the emission of 170 million tonnes of CO₂ and consumes 261 million tonnes of other resources.

In 2016, the European Parliament commissioned a report on resource efficiency under the title “Reducing food waste, improving food safety”. The Socialist and Democrats Group considered this report to be a priority and were given the lead role in drafting the document. Consequently, I was appointed as rapporteur.

Concurrently, the responsibility in the European Commission for the issue of food waste was in the hands of the Commissioner for Health and Safety Vytenis Andriukaitis, also a member of the Progressive political family. This resulted in a great amount of synergy during the work on the document and, in the end, resulted in a useful document that was welcomed in both institutions.

The work was concluded in May 2017 and, under the leadership of Socialists and Democrats, the European Parliament endorsed proposals that aim at halving the annual amount of food wasted in the EU by 2030.

In parallel with the report, the Parliament was working on the overhaul of the waste directives under the leadership of another S&D member, Simona Bonafe. The new laws were passed in 2018 and saw the introduction of a specific food waste hierarchy and incentives for food donation. Furthermore, the groundwork was laid for a unified methodology for measuring food waste at EU level.

On the global level, there are differences in when and where food waste and food losses occur. In industrialised countries, most wastage is concentrated at the final stages, namely distribution and consumption. Whereas in developing countries it is concentrated at the early stages, owing to the lack of advanced agricultural practices, efficient transport systems and infrastructure and secure storage facilities.

According to estimates of the FUSIONS project, the sectors contributing the most to food waste in the EU are households with 53% and processing with 19%. The food service sector contributes with 12%, primary production with 10%, and whole-sale-retail with 5%.

The complexity of the problem calls for a coordinated policy response on the EU and Member States level that takes into account policies regarding waste, food safety and information, but also aspects of economic, research and innovation, environment, agriculture, education and social policy.

Food wastage happens along the entire food supply chain and all actors have a responsibility to take measures to prevent and reduce the problem. Hence, this report is envisaged as an encompassing document that addresses the problem along the entire supply and consumption chain and explores political and practical means and ways to reduce it. At the same time, maintaining and improving food safety must be a priority.

The problem of resource efficiency and food waste is high on the political agenda of the EU and all its institutions. The Platform on Food Losses and Food Waste has recently been established by the Commission and the work on drafting the

EU Guidelines on food donation is progressing. When finalized, they should be a valuable tool in increasing the volumes of food donation in Member States, but many questions related to food waste are likely to remain outside of the scope of the Guidelines.

The Action Plan on Circular Economy is progressing and should lay the groundwork for coordinated European action. We need common definitions, hierarchy and methodologies if the EU is to tackle the problem systematically. The lack of a common, consistent definition of “food waste” and a common methodology for measuring food waste at Union level makes it difficult to compare different datasets and to measure progress in reducing food waste.

The European Parliament should have a coherent position regarding these issues. Therefore, where possible, this report will be aligned with the relevant decisions made within the ongoing important work on the legislative Waste package.

With that being said, the problem of food waste and food loss is more complex than just the waste dimension. Questions such as labelling, liability, education, sharing of best practices, and discards require further attention and highlight the need for a coordinated policy response across policy areas.

According to the FUSIONS report, currently there are 52 EU acts that have a certain impact, positive or negative, on food waste: 29 regulations, 10 directives, 3 decisions, 10 communications and 1 resolution. EU policy areas that they cover are: agriculture, fisheries, taxation, consumer protection, environment, finances, economy, public health, industrial policy and internal market.

In the context of aiming to reduce food waste, the European Commission should look at relevant legislation to see if it is fit for purpose and identify if there are gaps, overlaps or areas in need of clarification or further action.

Concerning the current regulatory framework and considering

the misinterpretations of the current EU law at national levels, it should be clearly explained in the EU guidelines for food donation what is under the responsibility of the EU and what is under the responsibility of the Member States in order to allow effective changes.

Moreover, there is a clear need to improve citizens' understanding of food, food safety, and food waste, and its causes. According to a Eurobarometer survey done in 2015, 47% of Europeans understand the meaning of "best before" labelling and 40% are aware of the meaning of "use by".

At the same time, nearly six in ten Europeans state that they always check "use by" and "best before" labels when shopping and preparing meals, with very few indicating that they never do. These two findings confirm that the meaning of date marking found on food products is poorly understood and that this confusion adds to food waste rates.

Consumer education is a critical area where a concerted effort is needed to reduce food waste. According to Eurobarometer, consumers recognise that they themselves have a role to play in preventing food waste. Over three quarters of Europeans think that the individual consumer is one of the actors involved in the prevention of food waste.

Moreover, in existing legislation there are further issues which may have a negative impact on levels of food waste. For example, Directive 2006/112/EC of 28 November 2006 on the common system of value added tax (VAT Directive) provides that food donations are taxable and that tax exemptions on food donations are not allowed. To go around this, the Commission recommends that, for tax purposes, the value of donated food close to the best before date or not fit for sale should be set "fairly low, even close to zero". Some Member States came up with legal ways to abandon donation taxation but some, especially among the newer ones, have not. Croatia is a good example as the Social Democratic government abolished the VAT on food donations in

2015. But that is an exception and therefore it is appropriate to call on the Commission to propose a change of the VAT Directive in order to explicitly authorise tax exemptions on food donations.

Economic and other incentives at Member State level can be a strong signal to stakeholders to increase efforts in reducing food waste. Corporate tax incentives have demonstrated their effectiveness in encouraging food donations to food banks in countries like France and Spain.

The questions about the liability of donors that arise from the General Food Law and Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products are an example of legal uncertainty. In principle, food donated in good faith and conforming to all the food safety and other laws should not land the donors into legal trouble.

A form of Good Samaritan legislation at EU level, while respecting the principle of subsidiarity, could lead to greater volumes of donated food. Such laws were passed in Italy by the progressive government and have greatly contributed to food donation. The Commission should explore the possibility and effects of introducing such legislation on reducing food waste and food safety. With regard to this, it must be clear, though, that food safety is a priority and that food waste reduction measures must not compromise current standards of food safety.

To reduce food waste, improve food safety as well as enhance the overall sustainability of food production, research and development have a highly important role to play in all sectors of the food supply and consumption chain. The development of innovative and environmentally friendly solutions should be encouraged and supported in areas including management of co- and by-products of food production, food storage, digital technologies, and packaging.

What is clear is that the European Union, Member States, farmers, processors, packaging producers, transporters, retailers, food services, consumers and all the other stakeholders have a responsibility to act.

Experience has shown that spontaneous initiatives taken by stakeholders, be they voluntary or professional, to publicise and bring about an anti-waste culture have generally been successful wherever they have been carried out. The Commission and the Member States should promote successful practices of food waste reduction and resource conservation methods already used by stakeholders.

However, effective action to reduce food waste requires a comprehensive rethink of how we produce, market and consume food at each step in the food supply and consumption chain. This requires a common understanding of the issues at stake and close co-operation between all relevant stakeholders.

There is food waste at every stage of the supply and consumption chain. That means there is not a single, “silver bullet” regulation that the EU can enforce that would solve the problem. We need a coordinated policy response at EU and Member State level that takes into account policies regarding waste, food safety and information, but also aspects of economic, research and innovation, environment, agriculture, education, and social policy.

As Parliament’s rapporteur, my intention was to produce an encompassing document that will address the problem of food waste along the entire supply and consumption chain and explore political and practical means and ways to reduce it.

Maintaining and improving food safety was my red line in the drafting process.

The report got the unanimous support of the committee on environment, public health and food safety, which does not hap-

pen that often. The Parliament’s plenary vote in May 2017, also passed with overwhelming support. This shows that there is a lot of political will to tackle the issue of food waste.

All the political groups in the Parliament were very constructive during the drafting and the votes, which demonstrates that there is a lot of political will to tackle the issue of food waste and that this is relevant to the public.

The report is extensive and it includes an opinion from the Parliament’s agriculture committee.

These are some of the key points:

- In the report the Parliament stresses the urgent need to reduce the amount of food waste, and to improve resource efficiency in the Union at every step of the food chain
- **Education** is crucial in reducing food waste. The report calls on the Commission, Member States, regional and local authorities and stakeholders to set up information and communication campaigns, to promote the understanding of consumers and all the operators along the food chain of food waste prevention
- **Sharing of best practices** is one of the simpler ways of reducing food waste in Europe. We call on the Commission and the Member States to exchange, promote and support successful food waste reduction practices and resource conservation methods that are already being employed by stakeholders
- The Parliament notes that some Member States have successfully used **legal solutions** to reduce food waste and increase donation. Italy is a very good example with the Gadda law. The Socialist government in France passed a law that obliges large food business operators to have co-operation deals with food banks. Spain has fiscal incentives for donors in place. Non-legal action like the national voluntary guidelines for food donations in Finland are also highlighted as examples of best practices.
- A change in the **VAT Directive** that would explicitly autho-

rise tax exemptions on food donations is necessary. Until then, the report calls on the Member States to follow the Commission's recommendations and to set a VAT rate that is close to zero if a food donation is made close to the recommended expiry date, or if the food is unsellable.

- Member States are called upon to establish voluntary donation agreements as well as creating economic and fiscal incentives for **donating food** along with other means of limiting food waste.

- **Misunderstanding of 'use by' and 'best before' dates** on food is recognized as a factor in food waste generation. We called on the Commission to assess whether current EU legislation and its implementation in Member States is fit for purpose.

- **Agriculture** is a sector that has a huge potential in reducing food waste. The mismatch in supply and demand in primary production is a key generator in the creation of food waste. The report stresses the importance of bringing together farmers in cooperatives or professional associations in order to reduce food losses by strengthening their knowledge of markets, allowing more efficient programming and economies of scale, and improving their capacity to market their production.

Digitalisation of the sector is also part of the solution, as it allows better access to data and demand forecasts, enabling farmers to tailor their production to demand, better coordinate with the other sectors of the food supply chain, and minimise wastage.

- **Marketing standards** for fruits and vegetables are a factor in food waste generation. Some losses and waste in primary production are the result of retailer standards on product specifications, cancelled orders due to changes in consumer demand, and overproduction as a result of requirements to meet seasonal demands.

A lot of perfectly good agricultural products are not sold because of their "imperfect" shape or colour. This practice

originates mostly from consumer expectation or marketing practices which means that it can be changed by education and public campaigns. There are successful initiatives in the wholesale and retail sector which offer "imperfect" fruit or vegetables at lower prices. While these initiatives are for the industry to put into practice, the Member States and the EU can do their part by public awareness campaigns.

The report also calls on the Commission and the Member States to boost the development of markets for food unsold due to aesthetic reasons and other marketing standards, and to undertake research on the relation between marketing standards and food waste. The S&D had to overcome a lot of opposition by the EPP to include this in the resolution, but in the end we were successful.

- The report considers that **unfair commercial practices** in the supply chain can create food waste, and calls on the Commission and Member States to examine this, and to create a policy framework to combat such practices. Resolving the problem of unfair trading practices would improve the position of farmers and, by lowering overproduction and the accumulation of surpluses, could also to reduce both food wastage along the entire chain and losses generated on family farms

- Experience has shown that spontaneous initiatives taken by stakeholders, be they voluntary or professional, to publicise and bring about an anti-waste culture have generally been successful wherever they have been carried out. The Commission and the Member States should promote successful practices of food waste reduction and resource conservation methods already used by stakeholders.

- In regards to **retail**, the Parliament points out that the sector meets millions of consumers every day, and is in a unique position to boost knowledge and raise awareness about food waste and facilitate informed choices. We welcome the initiative taken by some large retail operators to

promote schemes for making changes to the sales prices of products for consumption in line with expiry dates, with a view to boosting consumer awareness and encouraging the purchase of products which are close to their expiry dates. On the other hand, marketing practices such as ‘buy one, get one free’ increase the risk that consumers buy more than they can use, which often leads to waste.

– The positive contribution of **food packaging materials** to the prevention of food loss and food waste is noted. Packaging can both reduce food waste and improve food safety. Among other things, it protects food from external factors and increases the shelf life of packed food. This is an important sector where innovation can give a tremendous boost to reducing food waste. Simple solutions such as re-sealable packages already limit food losses and waste.

Technological developments, such as smart tags that give warning on temperature changes or biosensors that detect pathogens, could have a big impact on food safety. Research and development in the packaging sector is already funded by some Member States and for good reasons. The packaging of the future should help the consumer to pick, preserve and use food more safely while having less environmental impact.

The Parliament encourages the Commission and the Member States to support the development and deployment of active and intelligent food contact materials and other innovative solutions that contribute positively to resource efficiency and the circular economy

– Research consistently shows that foods most wasted by EU households essentially consist of fruit and vegetables, bakery items, meat and fish, dairy products, and dried food such as pasta and condiments. The majority of these items are not packed so reducing their wastage requires a different approach. One of the ways to deal with this is to allow and facilitate donation from all parts of the supply chain

starting from the farmers.

– To reduce food waste, improve food safety as well as enhance the overall sustainability of food production, **research and development** have a highly important role to play in all sectors of the food supply and consumption chain. The development of innovative and environmentally friendly solutions should be encouraged and supported in areas including management of co- and by-products of food production, food storage, digital technologies, and packaging.

– When talking about measures that simultaneously reduce food waste and increase food safety, we call on the Commission to work with the Member States and stakeholders on recommendations on refrigeration temperatures. **Harmonized temperature levels** throughout the supply chain would improve product conservation and reduce food waste for products that are transported and sold across borders

– Developments in the **digital sector**, especially in the so called sharing economy, offer many opportunities for preventing the generation of food waste, in particular the creation of online ‘food rescue’ platforms, which enable the catering sector to offer unsold dishes at reduced prices. Initiatives such as these have yielded significant results in the Member States in which they have been developed. Another area where digital solutions have huge potential is matching supply and demand across the food supply chain.

– The report considers the potential that **EU funds and programmes** such as Fund for European Aid to the Most Deprived, European Innovation Partnership, European Maritime and Fisheries Fund, and the European Agricultural Fund for Rural Development have in preventing and reducing food waste, and is of the view that they are underutilized by Member States.

Member States should harness the full potential of the Eu-

European Fisheries Fund (EFF) and the European Maritime and Fisheries Fund (EMFF) in order to reduce food waste from fish discards and improve survival rates of aquaculture-grown organisms.

The same goes for the European Agriculture Fund for Rural Development (EAFRD) that facilitates measures that reduce food waste in primary production and the processing sector.

– Finally, the report asks for **common EU definitions** of food waste and food losses and a common methodology to measure them. The EU has signed the UN Sustainable Development Goals to reduce food waste by 50% by 2030, but at the moment we have only estimates that we waste around 88 million tons of food a year. No exact measurement exists because there is not a single EU methodology to measure food waste. How will the EU know if we have reached the 50% target if we do not know the starting point?

The scope of the problem of food waste is vast and it is clear is that the European Union, Member States, farmers, processors, packaging producers, transporters, retailers, food services, consumers and all the other stakeholders have a responsibility to act. Otherwise, the efforts will be partial and the results insufficient.

Effective action to reduce food waste requires a comprehensive rethink of how we produce, market and consume food at each step in the food supply and consumption chain. This requires a common understanding of the issues at stake and close co-operation between all relevant stakeholders.

To conclude, I must say that, as a Social Democrat, I was privileged to have worked on the report on combatting food waste. To reduce the problem we need more solidarity, sustainability, equality and internationalism and these are exactly the values we, as a political family, stand for.

2 CURRENT SITUATION WITH FOOD WASTE: AMOUNTS, BIGGEST SOURCES AND INFORMATION GAPS



HANNA HARTIKAINEN, NATURAL RESOURCES INSTITUTE FINLAND (LUKE)

Food waste - a big deal?

Food waste raises discussion around the globe and there is a common understanding that we need to find ways to prevent and reduce food waste. One reason for this is that there is a continuing pressure to produce more food because of population growth. So, instead of increasing the land area to feed the people, there is a pressure to use the land more efficiently. It is estimated that we currently waste one third of the food along the food chain¹, hence the potential to improve the efficiency of food production by finding different ways to reduce food waste is massive. There is also need to reduce our impact on the environment, and Godfray et al.² argue that resource efficiency and food waste minimization are essential means to reduce environmental impact while improving food security. Moreover, the global earning potential of food waste reduction is estimated at over 200 billion euros³.

The importance to reduce food waste is also reflecting policy making. For instance, the United Nations (UN)⁴ has set a target to halve food waste levels at the retail and consumer levels by 2030. Another UN target is to reduce food losses along production and supply chains, including losses in agriculture. The target is also supported by the European Commission, since

the Commission has launched a waste reduction action plan that covers the whole food supply chain⁵. The European Commission aims to reduce food waste at consumer level and retail 30 percent by 2025 and 50 percent by 2030. Furthermore, several countries, like Finland, have studied their food waste levels and set their own action plans to reduce food waste.

Biggest food waste sources

It is suggested that in low income countries, most food loss is in the upstream sections of the food chain, especially in agriculture, and that there is only a little food waste downstream at consumer level¹. In high income countries it is the other way around: most of the food is lost at consumer level (Figure 2_1). The study by Stenmarck et al. (2016)⁶ gathered food waste studies from around Europe and concluded that on average 53 percent of food waste is from households. For instance, in Finland it is estimated that over one third of Finnish food waste is directly wasted by consumers: food waste from households, and plate leftovers in the hospitality sector totals around 36-38 % of the Finnish food waste⁷. Besides, if we also consider consumer related reasons to food waste, it could be argued that consumers cause directly and indirectly over 50 percent of the food waste in Finland. Most of the buffet waste in the hospitality sector occurs because it is difficult to predict consumer behavior, for example how many consumers will show up each day⁸.

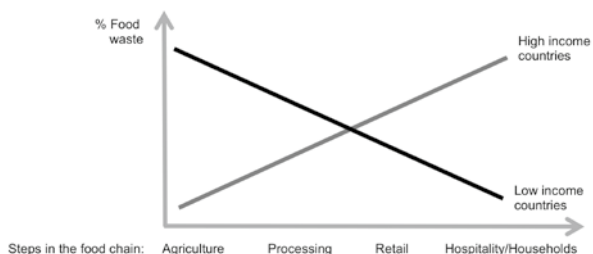


Figure 2_1. Food waste percentages (%) in different steps of the food chain in high - and low-income countries

Meanwhile, in low income countries the biggest reasons for food waste are suboptimal practices in agriculture and logistics. In fact, McKinsey (2012)³ estimates that the biggest earning potential in food waste reduction in low-income countries is to find solutions for poor storage facilities and insufficient distribution infrastructure. Furthermore, consumer related food waste in low-income countries is rarer and it is seldom a voluntary act to waste food¹.

Altogether, the greatest potential for reducing food waste in high income countries is at the consumer level, and UN has set the 50 percent food waste reduction target only for the downstream stages. Food waste reduction potential in the low-income countries lies in improved agriculture practices. It is essential to consider all stages of the food chain, because neglecting upstream stages, can negatively impact the overall aim of reducing the total food waste of the food chain. By focusing only on upstream, important information could be left out of the picture. For instance, setting strict quality standards in retail could help to reduce food waste in retail, but meanwhile could increase the amount of produce wasted in agriculture⁹.

Data gaps and uncertainties

It is impossible to develop strategies for preventing food waste if there is a lack of knowledge on where, why, and how much food is removed from the food chain. During the last decade there have been several studies on food waste¹⁰. However, for example, Stenmarck et al. (2016)⁶ pointed out that there are data gaps in food waste data.

For instance, in a Finnish study from 2011 food waste was measured at 72 places in the hospitality sector^{7,8}. It should be noted that there are only a few studies with such high number of places taking part in food waste weighing^{6,10}. Nevertheless, the Finnish study was not sufficient to provide comparative data to measure the direction of how much food is wasted each year. For instance, in some of the 72 places the measurements were based only on one-day-samples. Moreover, while there

are over one thousand workplace canteens in Finland, there were only 5 workplace canteens in the data sample – and all from the same area and company. This indicates a common problem with food waste studies – many waste studies are not representative (or the representativeness of the sample is not properly discussed) and hence it is not possible to estimate the direction of the food waste levels.

Besides the lack of data another major challenge is that there is no commonly accepted definition for food waste. For instance, according to FAO food waste refers to “discarding or alternative (non-food) use of food that is safe and nutritious for human consumption”. Meanwhile, the Definitional Framework for Food Waste¹¹ defines food waste as “any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed”. The biggest difference between the two definitions is that according to the FUSIONS definition some non-food uses, such as feed, are not called waste, whereas FAO label all non-food uses as food waste/loss. Moreover, there is another manual to give guidance to measure food waste: the Food Loss and Waste Accounting and Reporting Standard¹². According to the manual the scope of the study determines what is included in food waste and what is not. In other words, FLW standard does not define food waste.

Since there is no agreement on terms and definitions for food waste and because of data gaps, it is difficult to compare different studies or set efficient policy measures to reduce food waste. As a result European Commission has formed a subgroup to provide further insight to food waste (what to measure) and consequently support the target to half food waste at consumer and retail level and reduce the overall food waste in the food chain¹³.

Case-Finland

The first Finnish study on food waste in the Finnish food chain started in 2009 and by 2018 several studies on food waste in the Finnish food chain have been finalized (^{7,14,15,16}). The studies used the same agreed food waste definition, which is similar to the FAO definition: *where only edible parts of food are included to the food waste definition (excluding inedible parts like peels and bones) and all non-food uses are counted as food waste*. But, there is one difference to the FAO definition: in agriculture the line is drawn between what could still be used as food, hence, damaged and spoiled food is not counted as food waste in agriculture¹⁵. In latter stages (after agriculture) also damaged and spoiled produce is counted as food waste because the damages could be avoided with more careful planning. Meanwhile, in agriculture the damages especially weather damages are often very difficult or impossible to avoid¹⁵.

Altogether, it is estimated that around 15 percent of food consumed in Finland is wasted which totals around 450 million kilos of food waste per year, hence around 80 kilos of food waste per Finnish citizen ^{7,13,14,15}. One third of this food waste or around 25 kilos is from households^{19,15} (Figure 2_2).

Furthermore, when food waste is compared to the total food flows per each step it was found that around 2 percent of food flow is lost in agriculture, 3 percent in industry, 2 percent in retail, 20 percent in hospitality sector, and 6 percent in households (Figure 2_3). Therefore, in Finland the biggest potential to reduce food waste within one sector is in the hospitality sector. Yet, the hospitality sector is only one part of the picture, and we should not neglect other sectors but find ways to reduce waste in each step.

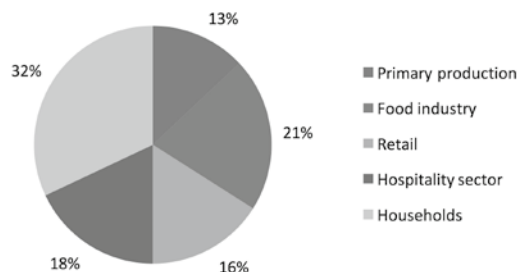


Figure 2_2. Food waste in the Finnish food chain: Food waste division between different steps of the food chain.

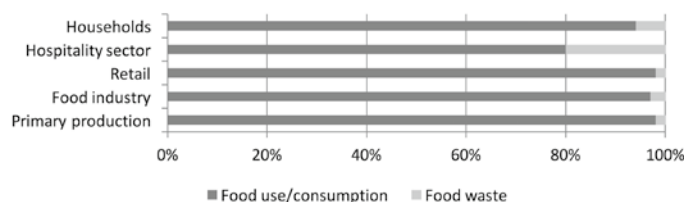


Figure 2_3. Food waste in the Finnish food chain: Food waste shares compared to total food flow in each step.

The studies on food waste in Finland have so far led to better understanding of the magnitude of food waste and of the biggest sources of food waste. However, similar to most of the existing food waste studies, the Finnish studies are based on limited samples from certain areas/places and years. To be able to manage and systematically reduce food waste, there is need for more detailed and systematic data collection on food waste, and need for food waste data collection to be repeated at certain intervals (e.g. every year/every second year). Additionally, efficient food waste reductions require collaboration along the food chain. Currently there are ongoing discussions between researchers, Finnish ministries and industry on ways to start systematic, repeatable food waste measurements and

active collaboration along the food chain to reduce food waste in Finland. The overall atmosphere is positive and there is willingness to move in that direction.

Conclusion

Food waste is a big deal: according to one estimate, roughly one third of food is wasted globally. It is also estimated that the earning potential to reduce food waste is over 200 billion euros. Food waste is an unnecessary environmental burden because the resources to produce food that end up as waste are used for nothing.

Main limitation to managing and reducing food waste levels is that there is no common agreement on what is food waste and hence what we should measure and reduce, and that there is very little detailed data on food waste available. In Finland, there have been several projects on food waste measurements. Nevertheless, similar to most countries, the existing measurements are not sufficient to manage food waste levels and give indication how much food waste has increased/decreased during time. At the global level there is great need for more consistent, systematic and detailed data about food waste in the food chain so that we can manage and develop effective strategies to reduce the total food waste in the food chain.

¹ Gustavsson J., Cederberg C., Sonesson U., van Otterdijk R., Meybeck A., 2011. Global Food Losses and Food Waste. Rome: Food and Agriculture Organisation of the United Nations. <http://www.fao.org/docrep/014/mb060e/mb060e00.pdf>

² Godfray, H.C.J., Beddington, J.R., Crute, I.R., Haddad, L., Lawrence, D., Muir, J.F., Pretty, J., Robinson, S., Thomas, S.M., Toulmin, C., 2010. Food security: The challenge of feeding 9 billion people. *Science*, 327(5967), 812-818.

³ McKinsey 2012. Mobilizing for a resource revolution, McKinsey global institute sustainability & resource productivity practice, McKinsey Quarterly, Richard Dobbs, Jeremy Oppenheim, Fraser Thompson, January 2012 http://bio.albertainnovates.ca/media/44743/mckinsey-mobilizing_for_a_resource_revolution.pdf

⁴ UN, 2016. Goal 12: Ensure sustainable consumption and production patterns. <http://www.un.org/sustainabledevelopment/sustainable-consumption-production/>

⁵ European Commission, 2016. EU Platform on Food Losses and Food Waste Terms of Reference (ToR), European Commission Directorate-General for Health and Food Safety, 26 April 2016. https://ec.europa.eu/food/sites/food/files/safety/docs/fw_eu-actions_flw-platform_tor.pdf

⁶ Stenmarck, Å., Jensen, C., Quedsted, T., Moates, G., 2016. Estimates of European Food Waste Levels. Stockholm, Sweden. www.eu-fusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf

⁷ Katajajuuri, J.-M., Silvennoinen, K., Hartikainen, H., Heikkilä, L., Reinikainen, A., 2014. Food waste in the Finnish food chain. *Journal of Cleaner Production* 73: 322–329 (15 June 2014).

⁸ Heikkilä, L., Reinikainen, A., Katajajuuri, J.-M., Silvennoinen, K., Hartikainen, H., 2016. Elements affecting food waste in the food service sector, *Waste Management* 56

⁹ Bond, M., Meacham, T., Bhunnoo, R., Benton, T.G., 2013. Food Waste Within Global Food Systems. A Global Food Security Report. (online) Available at: <http://www.foodsecurity.ac.uk/assets/pdfs/food-waste-report.pdf>

¹⁰ Møller, H., Hanssen, O.J., Gustavsson, J., Östergren, K., Stenmarck, Å., Dekhtyar, P., 2014. Report on review of (food) waste reporting methodology and practice. FUSIONS report. <http://www.eu-fusions.org/index.php/download?download=7:report-on-review-of-food-waste-reporting-methodology-and-practice>

¹¹ Östergren, K. et al, 2014. FUSIONS project Definitional Framework for Food Waste, Full Report, 3 July 2014. Retrieved from: <http://www.eu-FUSIONS-project.org/index.php/publications>

¹² WRI, 2016. Food Loss and Waste Accounting and Reporting Standard 2016 (FLW Standard) Version 1. Hanson, C., Lipinski, B., Robertson, K., Dias, D., Gavilan, I., Grévarath, P., Ritter, S., Fonseca, J., Van Otterdijk, R., Timmermans, T., Lomax, J., O'Connor, C., Dawe, A., Swannell, R., Berger, V., Reddy, M., Somogyi, D., Tran, B., Leach, B., Quedsted, T., http://www.wri.org/sites/default/files/FLW_Standard_final_2016.pdf

¹³ European Commission, 2017. Mandate of sub-group established under the EU Platform on Food Losses and Food Waste to support EU activities on measurements of food waste. Directorate - general for health and food safety, Food and feed safety, innovation, Food information and composition, food waste, 31 March 2017 https://ec.europa.eu/food/sites/food/files/safety/docs/fw_eu-actions_subgroup-mandate_fw-measure.pdf

¹⁴ Hartikainen, H., Mogensen, L., Svanes, E., Franke, U. 2018. Food waste quantification in primary production – the Nordic countries as a case study. *Waste Management* 71

¹⁵ Hartikainen, H., Kuisma, M., Pinolehto, M., Rääkkönen, R., Kahiluoto, H., 2014. Food waste in primary production and food processing. *Foodspill 2 -Final project report*. (In Finnish) MTT Report 170, 61 p. <http://www.mtt.fi/mttraportti/pdf/mttraportti170.pdf>

¹⁶ Silvennoinen, K., Katajajuuri, J.-M., Hartikainen, H., Heikkilä, L., Reinikainen, A., 2014. Food waste volume and composition in Finnish households, *British Food Journal* 116, 6, 1058–1068

3 DRIVERS FOR REDUCTION AND RECYCLING OF FOOD WASTE: HOW LAWS AND POLICIES IMPACT BUSINESS INTERACTIONS



DACE KAVASA, EVOLVE LTD FOUNDER,
MEMBER OF CSR LATVIA

There are a number of initiatives that have looked at on the concepts, drivers, instruments and potential innovative actions regarding food waste in the EU. This article section therefore will focus on only one aspect of the food waste reduction system – business to business relations (B2B), looking at how the laws and policies influence business relations and what role state, business and the consumer play in driving business food waste initiatives. It will look at the state duty to ensure having a basic framework for business and individual actions, in business voluntary vs legally binding activities, and consumer as the rights holder of the right to health, and sustainable living.

The context

For the purposes of this discussion, the definition of food waste will be *“any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed (including composted, crops ploughed in/not harvested, anaerobic digestion, bioenergy production, co-generation, incineration, disposal to sewer, landfill or discarded at sea”*¹

To better understand the review of the drivers to the business interactions, the context, including the principles of the circular economy approach, the role of Sustainable Development Goals², and Human rights principles in business are explained. Businesses do not operate in a vacuum, but in a context of local, national, regional and global interactions. The value chains are interconnected and impacted by developments in the sustainability field – whether business responsibility discussions, voluntary vs mandatory compliance narrative, or global goals and rights agreements made by the governments.

With regard to food waste issue, these global goals and principles of circular economy, human rights and sustainable development include systems thinking – the **interconnected nature of food security and safety questions with other economic, social and environmental development** issues. Furthermore, looking at it from a rights based perspective – the purpose of any of our actions should contribute to the protection and respect of rights³. The system of protection includes varying duties of the states and businesses. That way the policy and legislative functions of the state and the responsibilities of the businesses to act in protecting rights are interlinked:

- (a) *States' existing obligations to respect, protect and fulfil human rights and fundamental freedoms;*
- (b) *The role of business enterprises as specialized organs of society performing specialized functions, required to **comply** with all applicable laws and to **respect** human rights;*
- (c) *The need for rights and obligations to be matched to appropriate and effective remedies when breached.*

Therefore, in talking about the food waste we have to recognize that it is an issue that derives from the right to food and health perspective, and rights to adequate and sustainable living (protection of the individual and, therefore, the responsibility of the state and business to act), the environmental impact with regard to waste re-use and utilization, emissions, overproduction, and social issues like unsustainable consumption, food security and safety, and sustainable living.

To illustrate the complexity of the legal and policy measures, this article will only explore **product safety vs food waste**. This issue affects the producers, consumers and is subject to government regulation for the purpose of protection of public health and the environment.

Policy directions

To understand the drivers of food security issues, it is essential to understand the ultimate goals to be achieved. What is the purpose of such government regulations and who is **affected** by it?

For the purpose of looking at B2B and B2C relations the most relevant drivers explored are:

- 1) food waste **related to the inherent characteristics** of food products and the ways through which they are produced and consumed (e.g. perishability of food and limited predictability of supply and demand);
- 2) food waste related to other priorities targeted by private and public stakeholders (the possibility of generating food waste may be a minor concern with respect to other priorities of private and public stakeholders: like cost reduction, sales increase, **product safety, quality standards**, etc.)⁵

The duty of the **state to protect individual rights** impacts core policy directions and are defined in the WHY part of the policy documents.

- Inherent characteristics of the food will impact its longevity and for the safety and health of the individuals there will be certain conditions of the B2B and B2C transactions in place.
- Defining minimum product safety and quality standards, including labelling

Sustainable business and circular economy principles, furthermore, require a business impact assessment: impact on

individual rights (related to minimum standards for health protection, for example) and, in a wider sense, impact on well-being through economic, social and environmental impact assessment. This implies following the minimum standards set by policy and law, while strategically developing the B2B and B2C approach that considers sustainable supply chain principles, and respects individual (consumer) rights for safety and product quality standards. The primary goals of policies related to informing consumers on product safety will relate to labelling and product information, while within the supply chain, the specific health and safety rules on production, distribution, storing and retail conditions.

Law as instrument

Assessing the legal instruments from the perspective of the two value chain points (production and retail), there are overlapping perspectives requiring answers:

- Whether the regulation encourages cooperation in waste management, or
- Whether it creates unnecessary restrictions, leading to unhappy producers and retailers, where consumers are protected but may be affected by having access to a limited offer.

Law is an instrument that facilitates achieving public interest goals – public health, environment protection. The regulatory framework creates the base for the compliance systems organized by the businesses and other stakeholder (see Voluntary norms). The legislation therefore covers 3 main areas:

- Waste management – government /public authority responsibility often outsourced to business for execution (e.g. waste collection) and not a subject of this article;
- Business regulation – questions of how regulation with regard to food production/retail effects business interactions, and consequently consumers;

- Consumer protection – questions of how consumer protection regulation interlinks with business regulation and therefore effects food waste.

The specific principles of the laws are further discussed in section³.

Voluntary norms

Regulation is a state responsibility and creates the basis for voluntary mechanisms of compliance and sustainability for businesses. Businesses report on food waste because of legal requirements and within the value chain of food production, indicators that form voluntary reporting frameworks include *waste measurement indicators*.

Global Reporting Initiative (further GRI) in its *Food Processing Sector Supplement*⁶ addresses waste management taking the starting point in “*Most waste minimization strategies emphasize prioritizing options for recovery, reuse, or recycling over other disposal options, wherever possible*”. The GRI indicator therefore is: *EN22 Total weight of waste by type and disposal method* measuring compilation – hazardous waste, and non-hazardous waste (herein also the food/organic waste, but excluding wastewater). And, the actual measurement criteria includes reporting “*the total amount of waste in tonnes by type [...]for each of the following disposal methods: Composting; Reuse; Recycling; Recovery; Incineration (or use as fuel); Landfill. Deep well injection; On-site storage; and Other (to be specified by the reporting organization).*” Thus, food waste is measured by actual weight, but also various disposal methods are taken into account in assessing business compliance and impact.

Furthermore, GRI guidelines, or the new standards, include Consumer interest indicators, that cover the same areas as the regulation by the state. For example, Indicator G4-PR2 is directly linked to the specific regulation in place “*total number of incidents of non-compliance with regulations and voluntary*

codes concerning the health and safety impacts of products and services during their life cycle, by type of outcomes” 7

Thus, a voluntary system of reporting offers a common data set to be used in waste management/measurement. It is usually linked to a regulatory framework in force and the way it can support the drive for food waste reduction, is through accounting for it, reporting and being transparent, and offering the comparative data for the businesses to see how things can be done better.

Voluntary frameworks offer businesses clear references to the regulatory minimum levels, indicators for measuring type of waste and its disposal method, and as in case of GRI, a specific Food processing sector indicator base and comparative data.

The second area of interest – retail waste – also comes under similar guidelines and the new GRI standard offering the same principle of waste measurement as described above.

The other side of the voluntary norms is business activities beyond compliance. While there is plenty of data on compliance/reporting mechanisms, the new non-financial reporting tendencies indicate a move towards more advanced requirements to businesses: not only following the regulatory framework and therefore complying with the minimum standards, but setting goals that are linked to the global circular economy principles, SDGs, human rights, and socio-economic impact.

Production and retail: joint effort?

The legal and voluntary frameworks on *food safety versus food waste* affecting producers, retailers and consumers and address the various levels of responsibility and activity as shown in the table on food waste drivers:

105 drivers for the current causes of food waste generation were identified by this study⁸. *FUSION Drivers study

Table 3_1. Grouping of identified drivers of current food waste causes, Drivers of current food waste generation, threats of future increase and opportunities for reduction, Edt. M.Canali, FUSIONS report, 2014

Context categories		Grouping of identified drivers of current food waste causes	
Technological	Drivers inherent to characteristics of food, and of its production and consumption, where technologies have become limiting	Drivers related to collateral effects of modern technologies	Drivers related to suboptimal use of, and mistakes in the use of food processing technology and chain management
Institutional (business management)	Drivers not easily addressable by management solutions	Drivers addressable at macro level	Drivers addressable within the business units
Institutional (legislation and policy)	Agricultural policy and quality standards	Food safety, consumer health, and animal welfare policies	Waste policy, tax, and other legislation
Social	Drivers related to social dynamics which are not readily changeable	Drivers related to individual behaviours which are not readily changeable	Drivers related to individual behaviours modifiable through information and increased awareness

From the rights-based approach perspective business and the government have key role to play in addressing food safety and food waste challenges. Consumers are the final link in food value chains, which are increasingly international, and their wellbeing and expectations are inbuilt into either legislation that protects their health and interests, or in business voluntary strategies that take into account consumer behaviour and interests to offer added value and that way generate more revenue and profits.

Consumer behaviour

Consumer behaviour drivers are quality expectations, food safety labelling, price, and location etc. For the purpose of food waste in the producer/purchaser B2B relations, we look at food safety issues.

Food quality and safety are interlinked but distinctive terms⁹. The purpose of food safety standards is to secure objective measures of the quality of food and the impact on production and retail choices and costs, and determine impact of consumer behaviour in creation of food waste.

Food Quality includes positive and negative attributes that influence a product's value to the consumer. Positive attributes that demonstrate good quality may be the origin, colour, flavour, texture and processing method of the food, while negative attributes may be visible spoilage, contamination with filth, discolouration, or bad odours or tastes.

Food safety refers to limiting the presence of those hazards whether chronic or acute, that may make food injurious to the health of the consumer. Food safety is about producing, handling, storing and preparing food in such a way as to prevent infection and contamination in the food production chain, and to help ensure that food quality and wholesomeness are maintained to promote good health.

Food quality and food safety: http://www.searo.who.int/entity/world_health_day/2015/whd-what-you-should-know/en/#quality

Governments set the general food safety regulations. EU food safety principles are set in the General Food Law¹⁰, with regulations and standards in place for safety requirements, traceability, operators (producer, retailer, transport operators etc.) responsibility, withdrawal requirements and import/export conditions. Food information to consumers includes regulations on various types of labelling information¹¹ (allergens, GMOs, freezing and de-frosting dates, nutritional value, added water/protein etc.). While

this information impacts consumer behaviour and responds to safety needs (e.g. allergens), the main food waste driver is the date marking of *best before and use by*.¹²

The 2014 TNS Report¹³ concludes that “empirical evidence shows that a misunderstanding of the ‘best before’ date as related to food safety contributes to consumers throwing away outdated food when compared with the other attitudinal and sociodemographic factors taken into account in the analysis.” The knowledge tests revealed a widespread misinterpretation of expiry dates by consumers, which can be assumed to increase avoidable food waste:

- A majority (54%) of European household shoppers were not able to identify the correct interpretation of ‘best before’ as a quality related date;
- The most common misunderstanding (37%) confused the ‘best before’ date with the safety related ‘use by’ date’.

More significant impact than the waste created by incorrectly interpreted expiry date comes from socio-economic factors and consumer behaviour, which are harder to impact. However, information availability and clarity is a manageable task for governments in setting labelling regulations that allow for clear information for consumers, and for producers and retailers in making packaging decisions, placement of products, and improving logistics management.

The retailer's buying power vs. producer

Business operators take into account consumer behaviour and, therefore, influence food waste reduction through their operations, contracts, and stakeholder relations. By choosing whether to use “use by” or “best before” dates, contract requirements towards suppliers with regard to shelf life and return of unsold produce are altered. There are examples of national governments adopting regulations prohibiting return of produce to the supplier (in Latvia), or, as in France, requiring unsold produce to go to food banks.

There, the first aspect of food marking relates to the retailers own brands and food packaged on site. In the EU Market study findings, the authors conclude that avoidable food waste linked to date marking is likely to be reduced where:

- a date mark is present, its meaning is clear and it is legible;
- consumers have understanding of the difference between “use by” – as an indicator of safety- and “best before”- as an indicator of quality, which other studies show consumers do not have;
- “use by” dates are used only where there is a safety-based rationale for doing so, the product life stated on the packaging is consistent with the findings of safety and quality tests, and is not shortened unnecessarily by other considerations, such as product marketing;
- storage and open life guidance are consistent with the findings of safety and quality tests;
- there is a level of consistency in storage of food at retail and guidance for consumers regarding the temperatures at which products should be stored in the home.¹⁴

All of the conditions apply to the retailers who have their own brands, and the conditions related to storage, marketing, and consumer guidance for retailers who sell produce of others only. Consistent with the sustainability reporting indicators, the management practices adopted by the retailer can impact food waste. Another study “the Relationship between supermarkets and suppliers: what are the implications for consumers?”¹⁵ Discussed in detail the buyers power and impact on the market and food producers. It extensively describes buyer power abuse practices, like listing fees, slotting fees, discount payments, retrospective payments, return of unsold goods to supplier that cannot be resold, below cost selling, promotions of own brands etc.

Competition and other agencies act within the scope of their power in cases of abuse of buyer power, while new regulations are devised by governments that are relevant for food waste reduction – to limit product return to the supplier and, as in France – to mandate unsold produce be given to food banks.

From a sustainable business perspective, retailers should adopt policies that limit waste. It means better data use on consumer behaviour, internal logistics processes, communication and other business operations in order to calculate the required produce and sell by dates. When, in 2016, Latvia introduced the Unfair Retail Trade Practices Prohibition Law¹⁶ that as part of the listed unfair practices included prohibition “6.8) of taking back the unsold food products, except goods of poor quality and new goods unknown to consumers, the initiator of the supply or increase in the amount of which is the supplier;” there was public outcry of mostly smaller retailers that this measure was introduced under pressure of larger suppliers. Two years on, there have not been further discussions on the validity of this requirements and the market practices have adapted to the requirements. There have been no studies carried out in Latvia on the impact of this regulation.

Similarly, the EU Commission in 2017 tried to introduce measures championed by France that would require Member States to set up a system for redistributing unsold food to charitable organisations¹⁷.

This is an example of how regulatory drivers, in this case of unfair market practice regulation, can impact improvement of management practices and reduction of food waste. When voluntary sustainability measures do not work, enforceable government regulation may improve the food waste reduction rates, but also impact for better the management practices of the businesses.

Finally, as the supplier or producer of the food products, businesses have the impact over food waste reduction in a number of ways:

- During the production phase follow the best practices to limit waste in use of technology ;
- Diversify management practices to ensure the various grade products have retail channels;
- Choosing the “use by” or “best before” markings with clear information to the consumer;

- the product life stated on the packaging is consistent with the findings of safety and quality tests, and is not shortened unnecessarily by other considerations, such as product marketing;
- storage and open life guidance are consistent with the findings of safety and quality tests.

Conclusions

There is an interplay between consumer behaviour, the retailer, and producer in reducing food waste. Reduction of food waste requires that governments adopt clear policies and normative regulations setting the framework for individual market actor’s actions in planning for effective food production, retail and consumption. The key drivers for food reduction by producers, retailers and consumers relate to food safety information, but also on perceived quality which is a behaviour that can be changed. Many of the drivers that can improve food waste reduction relate to governments taking responsibility for normative regulation and thus impacting behavioural change, and businesses improving their management practices in better managing supply that corresponds to consumer demand.

Producer	Retailer = byer power	Consumer
<ul style="list-style-type: none"> • Overproduction • Quality standards • Returned goods • Safety standards 	<ul style="list-style-type: none"> • Purchasing and logistics • Quality standards • Safety standards 	<ul style="list-style-type: none"> • Quality standards • Safety standards • Expectations and behaviour

Therefore it is not a disagreement over voluntary practices that are driving the change. The sustainability reporting frameworks are often developed based on existing regulation and specific industry conditions. Only businesses that build sustainably (including reduction of food waste as social and environmental concern) go beyond voluntary measures, whilst **the introduction** of regulations in eliminating unfair market practices – e.g. food return – or introducing new community based practices

as donations to food banks, demonstrate that businesses can improve their management practices to follow the regulation.

¹ D3.5 Guidelines for a European common policy framework on food waste prevention, 2016, pp. 24, available at <https://www.eu-fusions.org/phoca-download/Publications/D3.5%20recommendations%20and%20guidelines%20food%20waste%20policy%20FINAL.pdf>

² United Nations Sustainable Development Goals include goals related to food security (G2) and protection of health (G3) including protection from hazardous substances, available at <http://www.un.org/sustainabledevelopment/health/>

³ United Nations Guiding principles on business and human rights (UNGPs), available at http://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf

⁴ UNGPs, pp. 6, available at http://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf

⁵ The FUSIONS report explores 4 lawyers of food waste drivers. Details on specific indicators and the exosting adn future drivers can be explored in the report “Drivers of current food waste generation, threats of future increase and opportunities for reduction”, Edt. M.Canali, FUSIONS report, 2014

⁶ Food Processing Sector Supplement, indicator protocols, available at <https://www.globalreporting.org/resourcelibrary/G3-English-Food-Processing-Sector-Supplement.pdf>

⁷ G4 Sustainable Reporting Guidelines: Implementation Manual, GRI, pp.224<https://www.globalreporting.org/resourcelibrary/GRIG4-Part2-Implementation-Manual.pdf>

⁸ Drivers of current food waste generation, threats of future increase and opportunities for reduction, Edt. Massimo Canali, 2014, as part of FUSIONS study.

⁹ World Health Organization SEA World health day 2015 information sheet: available at http://www.searo.who.int/entity/world_health_day/2015/whd-what-you-should-know/en/#quality

¹⁰ General Food Law Safety requirements, summary and updates on regulation, guidelines and fitness check. It includes Traceability Factsheet, Leaflet on Key Obligations of Business Operators, https://ec.europa.eu/food/safety/general_food_law/general_requirements_en

¹¹ https://ec.europa.eu/food/safety/labelling_nutrition/labelling_legislation_en

¹² Information on Date marking and food waste in the EU is collected here https://ec.europa.eu/food/safety/food_waste/eu_actions/date_marking_en

¹³ TNS Consortium, Study on Impact of Food Information on Consumers' Decision Making, 2014, for the EU framework contract No EAHC/2011/CP/01, pp. 22; available at https://ec.europa.eu/food/sites/food/files/safety/docs/labelling_legislation_study_food-info-vs-cons-decision_2014.pdf

¹⁴ Market study on date making and other information provided on food labels and food waste prevention; EC, 2018, available at <https://publications.europa.eu/en/publication-detail/-/publication/e7be006f-0d55-11e8-966a-01aa75ed71a1/language-en>

¹⁵ 2012, Catherine Nicholson (Consumers International), Bob Young (Europe Economics), The relationship between supermarkets and suppliers: What are the implications for consumers?

¹⁶ Unfair Retail Trade Practices Prohibition Law, No 2015/1071, <https://likumi.lv/ta/id/274415-negodigas-mazumtirdzniecibas-prakses-aizlieguma-likums>

¹⁷ The product life stated on the packaging is consistent with the findings of safety and quality tests, and is not shortened unnecessarily by other considerations, such as product marketing;

-storage and open life guidance are consistent with the findings of safety and quality tests; <https://euobserver.com/social/139116>

4.1 HOUSEHOLD FOOD WASTE GENERATION IN LITHUANIA



JOLITA KRUOPIENĖ, APINI, KAUNAS
UNIVERSITY OF TECHNOLOGY, LITHUANIA



MONIKA RAUGEVIČIŪTĖ, APINI, KAUNAS
UNIVERSITY OF TECHNOLOGY, LITHUANIA

Introduction

The management of municipal waste (MW) in Lithuania has experienced substantial development since 1990s. The transposition of EU directives into Lithuanian legislation required fast changes and matching what older member states have achieved during a few more decades of development¹. The changes that happened were an intensive process, starting with closing the old numerous dumpsites and building new sanitary landfills. Mechanical-biological treatment and incineration were the next steps in development. Changes in MW treatment are shown in Figure 4.1_1. Although Lithuania is still below the EU average from the point of view of waste hierarchy, the difference is decreasing.

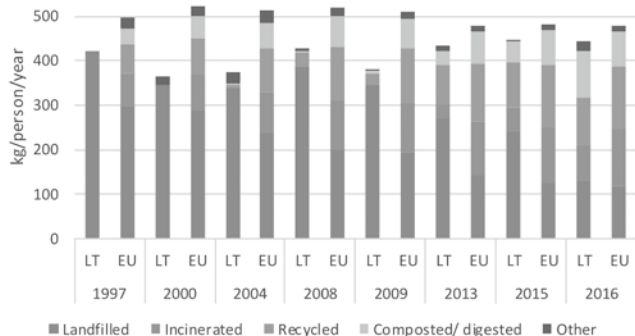


Figure. 4.1_1. Generation and treatment of municipal waste (based on data from Eurostat).

The fact that MW generation rate in Lithuania is also approaching EU average is much less pleasant (see Figure 4.1_1). The generation of municipal waste appears to be linked to the economic well-being of people: in many instances, it is higher in case of higher GDP². As demonstrated by the example of Lithuania, the economic crisis in 2008 and the sharp fall in GDP in Lithuania correlates with a significant decline of municipal waste in 2009.

Biodegradable waste accounts for a substantial share, some 40-50%, of the increasing municipal waste stream, and food waste from households is a component (State Waste Management Plan, 2014)³. The questions arise:

- how much of this biodegradable waste is food waste from households?
- what are the reasons behind food waste generation? and
- what is the potential to reduce food waste?

Materials and methods of Lithuanian study

Data about household food waste was collected using survey and food waste diary methods. The methodology relied on FUSIONS⁴ recommendations and on studies made in Sweden, Finland and UK^{5, 6, 7, 8, 9}. The food waste diary creates quality and quantity measures as this method is not costly and directly addresses the source of food waste generation⁷ allowing household members to evaluate food waste quantities, types, and reasons for wasting the food.

The study was a sample of Lithuanian households in different geographic areas (large cities, suburbs of the large cities, small cities or towns, rural areas) and was done by volunteers who agreed to record their daily data on food waste. 105 households (272 individuals) participated in the study in March 2015¹⁰. The food waste diary period was one week (7 days). Respondents were asked to select an ordinary week (without any celebrations, holidays or etc.) and to behave as usual as possible with regard to their eating and food wasting habits. Participants weighed discarded food daily and filled their diary noting a total discarded food weight, avoidable food weight and category, and reasons for its disposal.

According to definitions used in the diary, *unavoidable* food waste was described as waste arising from food or drink preparation that is not, and has not been, edible under normal circumstances (e.g. meat bones, egg shells, fruit peels, tea bags)⁹. *Avoidable* food waste was all wasted food and raw materials that could have been consumed if it had been stored, handled or prepared differently⁴. Respondents had to classify the avoidable food waste into the 12 categories, and to identify the reasons for discarding avoidable food waste (there was a list of 8 proposed possible reasons). Liquid food waste disposed through the drain was not included in the study.

In addition to the diary, a background survey was made with all participants of the study. The survey consisted of 8 demographic questions in order to clarify socio-demographical data

(household size, participant's age, income, residence place and type of housing) and of 2 behaviour questions concerning food waste treatment (home composting and pet feeding).

Results and discussion

During the one-week study period, the amount of food waste ranged from 0.16 kg to 5.29 kg per person (1.15 kg in average). When extrapolated to cover the food waste over a whole year, this resulted in 59.8 kg per person per year, or 132 kg per average household per year.

The amount of avoidable food waste per person ranged from 0 kg to 2.21 kg, corresponding to 18 kg (30.1% of the total food waste) per person per year on average.

Table 4.1_1. Comparison of generated household food waste amounts.

Country	Total food waste, kg per person per year	Share of avoidable food waste in total food waste, %
Lithuania (our data)	59.8	30.1
Lithuania (European Commission) ¹¹	33	
Estonia ¹²	52.8	
Sweden ¹³	89	34
Finland ⁴	65.0	35
Denmark ¹⁴	83.2	56.4
Norway ¹⁵	80.2	57.7
EU-28 ¹⁶	92.0 - total	
EU-28	76.6 (not including liquid going to sewer)	

If compared to the EU-28 average and to neighbouring countries in Northern Europe, households in Lithuania, likewise

in Estonia, generate smaller food waste amounts and also a smaller proportion of it is avoidable food waste. Table 4.1_1 presents a summary of data.

The lower food waste generation rate might seem a good achievement compared to other countries. However, the probable reason for the observed differences in food waste generation rate is the difference in living standards. This is confirmed by analysing the impact of income. The authors observed that the amounts of discarded food waste were twice as big for those with the highest income (>700 euro per month per person) compared to those with the lowest income (≤100 euro per month per person): 76.9 kg and 31.6 kg per person per year, respectively¹⁰. Therefore, it is reasonable to think that food waste from households will increase as welfare increases, unless awareness campaigns to change behaviour, and various other possible measures are implemented.

The Lithuanian analysis of socio-demographic factors potentially affecting generation of food waste revealed a certain impact of household size on food waste generation rate and on the share of avoidable food waste. Food waste generation rate per person was lower in bigger households (see Figure 4.1_2). It seems to be slightly more difficult to manage eating issues in single households. About 35 % of their food waste was avoidable, whereas the average for all households was 30.1%.

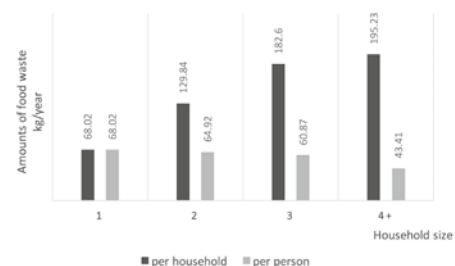


Figure 4.1_2. Food waste generation (kg) in relation to household size, expressed as the number of people in the household.

The total amount of unnecessary wastage in the country, i.e. avoidable household food waste, was 54 000 tonnes per year. Among the types of avoidable food waste fruits and vegetables dominate (27 %) followed by cereal and bakery products (15%), and home-made meals (13%) (see Figure 4.1_3.).

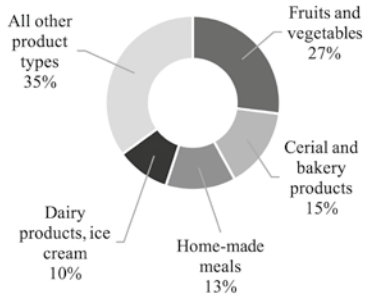


Figure 4.1_3. Dominating types of avoidable food waste.

The major reasons for food waste were: food has gone bad (rotten, sour, mouldy, etc.) because of buying too much or forgetting it in the fridge/ cabinet (29%) and not using leftovers in time (17%). Figure Figure 4.1_3. shows the major reasons for wasting food.

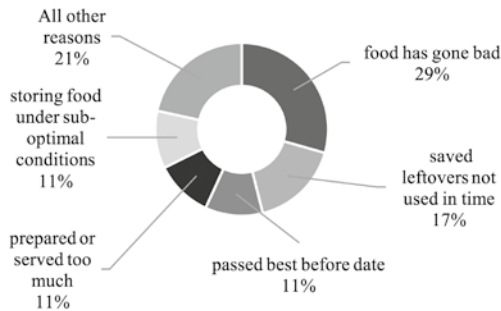
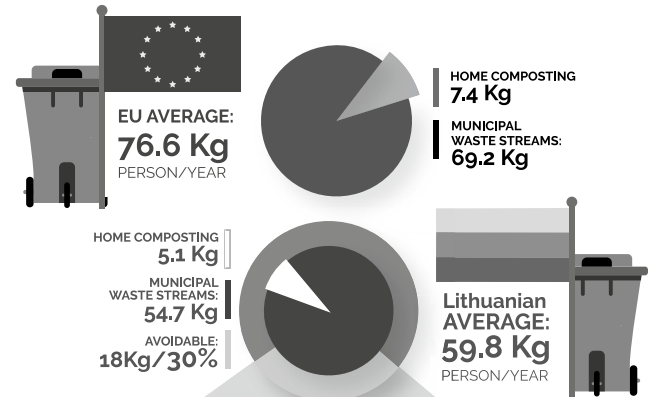


Figure 4.1_4. Major reasons for wasting food.

HOUSEHOLD FOOD WASTE



TYPES OF AVOIDABLE WASTE



MAJOR REASONS OF WASTING FOOD

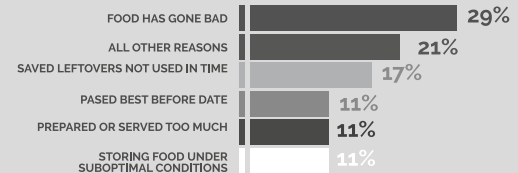


Table 4.1_2 survey data analysing the main reasons for throwing away different types of food. For fruits and vegetable, cereal and bakery products the primary reason was food has gone bad because of buying too much or forgetting it in the fridge/ cabinet. Homemade meals in turn had to be discarded most often because the leftovers were not used in time. For dairy products and ice cream, missing the best-before date appeared to be the most important reason to discard it.

Table 4.1_2. Main reasons for the most commonly discarded avoidable food to become a waste.

Types of avoidable food waste	Reasons of throwing food away					
	prepared or served too much	not used the saved leftovers in time	passed best before date	were unsatisfied with the taste or freshness of the purchased food	food has gone bad because of buying too much or forgetting it in the fridge/ cabinet	stored food in sub-optimal conditions
Fruits and vegetables					51%	16%
Cereal and bakery products	17%	22%			29%	
Home-made meals	18%	43%			22%	
Dairy products, ice cream		9%	47%	9%	31%	

Conclusions

In Lithuania, one person generates on average 59.8 kg of household food waste per year, a lower rate than European average. However, a relationship between income and food waste generation rate suggests that this value might increase as the welfare of people increases.

A share of avoidable food waste, which is 30.1% (18 kg per person per year), points to the highest prevention potential in improved purchasing practices and timely use of fresh of leftover food. For the whole country, unnecessary wastage comprises around 54 000 tonnes per year. Fruit and vegetable dominate avoidable food waste (27%), followed by cereal and bakery products (15%) and home-made meals (13%). Food has gone bad (rotten, sour, mouldy, etc.) because of buying too much or having forgotten in the fridge/ cabinet (29%) and not using the saved leftovers in time (17%) were the most common reasons for wasting.

¹ Filho WL, Brandli L, Moora H, Kruopiene J, Stenmarck A (2016) Benchmarking approaches and methods in the field of urban waste management. *Journal of Cleaner Production* 112, 4377-4386.

² Filho WL, Kruopiene J, Moora H, Stenmarck A (2015) Towards sustainable waste management in the Baltic Sea region countries: the contribution of universities. *Progress in Industrial Ecology - An International Journal* 9(1), 96-108.

³ Valstybinis atliekų tvarkymo 2014-2020 metų planas (State Waste Management Plan) (2014)

⁴ Food Use for Social Innovation by Optimising Waste Prevention Strategies, a project funded by FP7: www.eu-fusions.org

⁵ Katajajuuri JM, Silvennoinen K, Hartikainen H, Heikkilä L, Reinikainen A (2014) Food waste in the Finnish food chain. *Journal of Cleaner Production* 73, 322-329.

⁶ Koivupuro HK, Hartikainen H, Silvennoinen K, Katajajuuri JM, Heikintalo N, Reinikainen A, Jalkanen L (2012) Influence of socio-demographical, behavioural and attitudinal factors on the amount of avoidable food waste generated in Finnish households. *International Journal of Consumer Studies* 36, 183-191.

⁷ Moller H, Hanssen OJ, Svanes E, et. al. (2014) Standard approach on quantitative techniques to be used to estimate food waste levels.

⁸ Williams H, Wikström F, Otterbring T, Löfgren M, Gustafsson A (2012) Reasons for household food waste with special attention to packaging. *Journal of Cleaner Production* 24, 141-148.

⁹ WRAP (2009) Household Food and Drink Waste in the UK.

¹⁰ Raugevičiūtė M. Separate food waste collection from households in Lithuania: feasibility, perspectives and environmental impact. M.Sc. thesis. Kaunas University of Technology, 2015, pp.68.

¹¹ European Commission (2010) Preparatory Study on Food Waste Across EU 27, October.

¹² Moora H, Urbel-Piirsalu E, Viilvere T (2015) Toidujäätmete teke Eesti kaubandus- ja toiduainetööstusettevõtetes, Stockholm Environment Institute.

¹³ Schott B, Schott S, Vukicevic S, Bohn I, Andersson T (2013) Potentials for food waste minimization and effects on potential biogas production through anaerobic digestion. *Waste Management and Research* 31, 811-819.

¹⁴ Edjabou ME, Petersen C, Scheutz C, Astrup TF (2016) Food waste from Danish households: Generation and composition. *Waste Management* 52, 256-268.

¹⁵ Hanssen OJ, Syversen F, Stø E (2016) Edible food waste from Norwegian households - Detailed food waste composition analysis among households in two different regions in Norway. *Resources, Conservation and Recycling* 109, 146-154.

¹⁶ Stenmarck Å, Jensen C, Quedsted T, Moates G (2016) Estimates of European food waste levels. FUSIONS EU project. IVL-report C186.

4.2 FOOD WASTE REDUCTION IN CANTEENS OF PRESCHOOLS AND SCHOOLS IN LATVIA



JANA SIMANOVSKA, VIDZEME UNIVERSITY OF APPLIED SCIENCES, LATVIA

Opportunity for schools and preschools to establish responsible attitudes towards food and reducing food waste

Schools and preschools are designed to educate children, but education about food and eating is not necessarily seen as a part of it. Children spend much of their time in schools and preschools and receive a substantial part of their daily meals there and thus also generate food waste. In 2016 there were 213,000 students at comprehensive schools, 92,000 in preschools, and 30,000 students in vocational schools in Latvia and all schools and preschools have a school canteen. There are no countrywide measurements of food waste in schools, but self-monitoring in some schools show, that as much as 50-20 kg of food per child annually is wasted. This counts only leftovers from canteens and excludes kitchen waste. At the same time, there are schools where food waste generated almost 10 kg per student per year, showing that there is room for improvement. Approximately 1 kg of school food is worth of 2 Euros, according to calculations from a Latvian primary school "Annele". Wasting of food waste therefore means wasting of financial resources that can be in turn used for healthier food and result in more satisfied children.

The Latvian Eco-school programme¹ has participated in the European project “Eat Responsibly”² for several years. The Eco-school programme is an international, action-oriented environmental, voluntary education programme for schools. Association “Environmental Education Fund” runs this programme in Latvia. Participation in the project “Eat Responsibly” enabled schools and preschools access a joint European methodology and target various aspects of food. The schools participating in the project chose their own priorities for further in-depth work based on their own environmental assessments.

During the “Eat Responsibly” project several Latvian schools focused on reducing food waste and achieved good results: food waste generation was halved from canteens over one year and at the same time met with the requirements for catering and waste management. This experience was studied by the author of this chapter in co-operation with Eco-school programme and pre-school “Annele”:

- Ropazu district pre-school “Annele” food waste from catering (e.g. leftovers from meals) fell to 1/3 of what it was at the beginning of the year.
- Smiltene Secondary School, in cooperation with caterers, reduced the amount of food waste by half.
- Malpils District Secondary School managed to find a solution to reduce the main source of food waste from the kitchen – leftover soup - reducing the amount of soup thrown away from 6 to 3 litres.
- A pre-school in Jelgava at the beginning of the school year they generated 220 g of food waste per day per child, and at the end of the school year it was only 95 g.

As a result of this assessment the guidelines for Latvian schools, preschools and municipalities were developed in order to reduce food waste³. This was done with financial support from the Latvian Environmental Protection Fund. The main learning points and conclusions are described in this chapter. This experience is supplemented with impressions of the author from

discussions with public bodies responsible for procurement during five training sessions in various Latvian regions last year and screening of existing tenders for catering services.

Systematic approach – a key to success

The Eco-schools in their daily work and during the “Eat Responsibly” project follow a management cycle approach (plan-do-check-act), implementing seven steps⁴:

1. Forming an eco-committee consisting of volunteer or elected teachers, school staff (in the case of the food project also the cooks and kitchen staff of course), pupils and parents who form the engine for improvements – the project management team.
2. Carrying out the environmental review, in the case of the food project, evaluating different aspects in schools and preschools related to food e.g. quantifying food waste generated using the common methodology of the project.
3. Building an action plan to address the problems identified by the environmental review, including concrete actions, responsibilities, timeline, and measurements.
4. Monitoring and evaluating results, also in-between, and revising the action plan if necessary.
5. Integrating the food issue in the school curriculum.
6. Informing and involving students from the school, their parents, community as much as possible by actions, reports in newspapers as much as possible.
7. Producing an eco-code, to set and remind themselves of the main objectives of the action plan.

Steps 2, 3 and 4 belong to typical good governance cycles, applied in many organisations looking for continuous improvement. For example, the ISO standard 14001 for environmental management that is often used by for environmentally conscious enterprises includes the same steps – planning (including assessment of existing situation), implementing, reviewing achievements and adjusting the plan.

Looking at the actions implemented by the schools to reduce food waste one can split them in two types:

- 1) Providing children with **structure** and **opportunities** needed to reduce food waste e.g. changing the organisation of catering and menus.
- 2) **Motivating** children to eat more responsibly and reduce the amount of food waste by education and involvement, see picture below.

Table 4.2_1

Motivation

- Giving pupils ownership on the actions: involvement of pupils in assessment of the problem (food waste amounts and sources) and elaboration of action plan to improve incl. waste weighing, evaluation of menus, elaboration of action plan.
- Adult attitude as a positive model - teachers are eating together with kids and reminding them about responsible attitudes towards food.
- Education (information about food global and local consequences of the food waste, environmental impacts of food production and waste management).
- Building children's relationship with food (preparation of food in classes, planting of school vegetable gardens, visits to farms and food producers supplying schools).

Structure

- Regular food waste and menu assessments and actions for improvements. For example, excluding sweetened drinks during lunch.
- Children may choose size and composition of the portion.
- Leftover food is properly stored and kids can eat it later that day.
- Food waste is sorted separately from other waste streams.
- Leftover food is given to private persons for their pets.

Lessons from food waste minimisation projects

After evaluating reports from the participating schools and discussing their experience, the following important aspects can be identified.

The key point to start reduction of food waste is a detailed environmental review to carry out a detailed assessment of the waste generation. Some schools were measuring food waste generated at least for two weeks during every working day, involving children and integrating that into the school curriculum as practical mathematics. It is important, that waste measurements at the beginning of the project follow the same methodology throughout. Often schools at the beginning were not aware of the amount of food wasted thus for some schools it was a first highlight for a need to act. Such measurements also gave a strong message to cooks and caterers about the urgent need for changes.

Parallel to food waste measurements a scrupulous menu assessment was carried out in order to understand which types of foods are less preferred by children, and what to change to avoid leftovers and at the same time comply with legislation regarding nutrient norms and healthy food. Children were involved in this action depending on their skills e.g. even preschoolers were asked to draw emoji (smiley or unhappy face) about their daily experience with food. Results varied a lot among schools i.e. each school had to perform its own assessment, and each school could choose their approach.

After measurement of the food waste, many schools recognised a need to change the canteen system e.g. from ready-made portions to giving children the possibility to choose the size and composition of the portion. Such changes, however, required different involvement of kitchen staff and teachers, asking them to guard "self-distribution" and to motivate smaller children to choose unknown dishes "at least a spoon to try". However, it is important to remember that under no circum-

stances should a child be emotionally pressured to eat food, but the child can be encouraged to behave responsibly when choosing his/her own portion.

Such new involvement of teachers and staff sometimes caused an opposition to the changes of the respective persons. Support from school leadership and good change management approaches were important in such cases. In some schools inspectors from the Food and Veterinary service argued against the option that children may select their own portion saying that it might contravene strict legal norms guaranteeing a certain amount of nutrients for each child. Nevertheless, when the project team asked the official opinion of the National Food and Veterinary Service, they confirmed that allowing students to select their own food and portion size is acceptable if the average nutrient norms for the individual child are achieved. Some schools were cautious to offer to children “self-selection” being afraid of parent’s reactions since they are often paying for the meals and might expect guaranteed portions.

Some schools started to store leftover food from lunch and offered that to children in the afternoon. However, such practice caused discussions with Food and Veterinary Food Service and Ministry of Health since in Latvia there are very strong norms allowing schools to store food only for one day, and it is not allowed to use it next day for eating or preparing other meals.

Even more legal constraints are related to the use of leftover food for charity. Even if food waste is sorted separately, the same as for the other types of waste, it can be given only to the municipal waste management company for proper treatment. However, there is no restriction to donate the leftover (not wasted yet) meat products to owners of pets.

During the food project, teachers found many ways for how to address the food issue via the curriculum and created various interesting food projects, both – practical and theoretical. For example: studying the life cycle of food products, visiting farms supplying schools or preschools with products, creating

recipe books for leftovers, measuring food waste in schools and homes, jointly preparing meals, growing food products and tasting at the school garden. With such practical experience, even products, which were hardly eaten before (e.g. salads or pumpkin), were much better appreciated. Although this is a soft measure, teachers were convinced that it is a very effective approach.

In the preschools and primary schools, a good way to motivate children is to use some kind of play. In the “Eating Responsible” project the main characters were a hamster, a mouse or a mole – in a form of a toy-pet that helped children to find out about food issues and urged them to act responsibly. These toys participated with kids in their actions, visited homes etc.; children addressed them in their artworks related to food issues.

Assessing their experience in the food waste reduction project, Vizma Muzika, teacher, and environmental coordinator of the preschool “Annele” emphasised the following issues:

- It is necessary to teach the child to put on a plate only as much as they can eat. We tell, “If you put too little, you can ask for more!” However, if the portion is assembled by the children themselves, it takes a lot of time, and on top of that, the favourite food can run out too quickly with the danger that some kids are left without. Therefore we also practice that teacher distributes the portions but kids are encouraged to tell the teacher if it’s enough or if they want a bit more.
- Teachers interest and participation is important, for example, in educating children about the importance of food for their health and development, by being an example and taking initiative in organizing the catering process, for example, by allowing children who stay in the school longer to eat leftover dishes from their lunch.
- In order to achieve good results one should co-operate with parents and caterers, educating and involving them in the process of changes.
- In the food waste reduction process, the involvement of

canteen personnel, as well as the involvement and support of the management, plays a crucial role.

Liaison through the green public procurement for catering services

Cooperation between schools and caterers is also one of the keys to reduction of food waste, since re-organisation of the catering (e.g., changes of menu, self-selection of portion) requires the involvement and motivation of the caterer. It is easier for those schools that still have their own kitchens and chefs, but in Latvia very often school catering is outsourced to private companies via public procurement. For some schools an outsourced caterer seemed, at first, to be a big obstacle, however starting negotiations and co-operation lead to good results in the reduction of food waste.

Schools and preschools are limited in negotiations with caterers and school kitchens due to low resources allocated for school meals. Various caterers regularly complain about insufficient resources allocated for caterer contracts and hindering achieving a higher quality of catering. In Latvia three parties – state, municipalities and parents, finance catering in schools and preschools and it might differ among municipalities. In some municipalities lunches for preschools and primary schools are fully paid by the municipality and state. Therefore the increase of the school lunch price due to higher quality demands is a very complex issue and involves different considerations. It also may be politically unpopular with councils. However, there is a space for improvement even taking into account restricted resources – the achievements in the project “Eat Responsibly” were made without an increase in price of the food served in school.

Although catering is outsourced to private entities, it is possible to integrate the requirements for food waste reduction into the public tenders and also in the contracts via so called green

public procurement that is a powerful tool to embed environmental policy into daily life.

Green public procurement is a process of integrating environmental demands into procurement processes and is aimed at reducing the most important environmental impacts over the whole life cycle of the product or service. There are several parts in a procurement process where specific environmental requirements (green criteria) can be included:

- **Exclusion criteria** define the service provider to not be chosen.
- **Selection criteria** help to choose caterers with better experience, qualified staff and management systems able to reduce environmental impact.
- **Technical specification** characterises the service to be procured, here are usually main criteria defining more environmentally friendly products or services.
- **Award criteria** contain “wish-list” for higher standards, to be weighed against other important criteria such as price.
- **Contract performance clauses** specify in the agreement between service provider and contracting authority how the contract is implemented, including action to be taken in case(s) of non-compliance.

Currently European Green Public Procurement guidelines for food and catering services are under revision, and the new draft for the revised guidelines contains many recommendations with regard to food waste reduction (see table below). The Latvian National green public procurement guidelines correspond to the current European guidelines and they hardly address the food waste issue. The guidelines are recommendations only and public bodies may include additional criteria if they are well justified, e.g. the public bodies can include criteria addressing food waste prevention. However, if a municipality develops own green criteria, the bidders can appeal them more easily, therefore public bodies are not in favour of such approaches. Therefore European or national guidelines can therefore support implementation of the green public procurement.

Table. Food waste prevention related criteria included in the EU Green Public procurement criteria for Food procurement and Catering services

Table4.2_2

Type of criteria	Draft guidelines ⁵		Current guidelines (2008)
	Reducing leftovers from canteens (e.g. clients)	Reducing leftovers in kitchen	
Selection criteria	The tenderer has experience and competences, among others, in food waste reduction The tenderer can demonstrate policies (written procedures) aiming to prevent and reduce food waste		Company has a policy, instructions and strategies regarding environmental management (can be more specified regarding food waste)
Technical specification	Written procedures for: • Adjusting meal portions and accommodating the quantities depending on the customers or provide more than one size portion. • Allowing using leftovers by clients and staff. • Reduce diversity of menus at beginning and end of the day • Assessment of menus/long term analysis/ client feedback to adjust menus avoiding leftover food	Written procedures for: • Stock inventory and proper ordering system to avoid food surplus • Storage organisation promoting use of food products close to expiration date • Proper storage conditions, fast cooling • Avoid over-trimming of food • Strategies against overproduction (e.g. freezing)	

	<ul style="list-style-type: none"> • Education and awareness raising among clients • Redistribution of leftover food (agreements with charities, proper storage) 	<ul style="list-style-type: none"> • No food for representative purposes only (use pictures in the showcase) 	
Contract performance clause	Monitoring (including food waste generation), report on results and document actions to improve the situation. Staff training to (instruct updates with current staff to comply with new technical specifications)		The catering staff must be trained in waste minimisation, management and selective waste collection

Several recommendations, which are included in the new draft of EU GPP criteria for Food procurement and Catering services, are the same as those used by Latvian schools during the project “Eat Responsibly”: adjusting the size and composition of portions according to clients preferences or enabling **self – selection**, permission to use leftover food for later meals, education and awareness raising of pupils, giving over-left food for charity.

Screening current tenders for catering in school and pre-schools, food waste requirements are used rarely. As demonstrated during the project “Eat Responsibly” such criteria are possible to be implemented in current Latvian circumstances. When discussing current procurement practice with municipal procurers who are procuring catering for schools and pre-schools the author observed insufficient co-operation leading to insufficiently green procurements or such requirements, which are green on the paper but not implemented in the real life because of lack of control by the school receiving catering service.

SYSTEMATIC APPROACH FOR REDUCTION OF FOOD WASTE IN SCHOOLS AND PRESCHOOLS



PLAN

CREATE A TEAM,
Identify the project manager

ANALYZE CAUSES
Of waste generation including quantitative measurements and menu assessment / student satisfaction survey

INVOLVE
In the assessment of waste amounts (including weighing) and jointly plan the action



IMPLEMENT

MOTIVATE STUDENTS: EXPLAIN

Why wasting food is a problem

INVOLVE

In the assessment of waste amounts (including weighing) and jointly plan the action

DISCOVER

Together with children discover the food supply chain. Learn about farmers and producers (visit them), cook together, let pupils grow some food products in school garden

SHOW YOUR POSITIVE EXAMPLE

ENGAGE AND EDUCATE PARENTS

PROVIDE STUDENTS WITH OPPORTUNITIES TO REDUCE WASTE:

Let them choose portion size and composition

Discard "poor" and appetizing food and drinks so to not spoil the appetite

Assure waste sorting

Store leftover, but still edible food properly and offer it to children in the afternoon



EVALUATE

Together evaluate results, inform pupils, parents about the results!



IMPROVE

Rate your progress and continue!

Conclusions

Catering at schools and preschools in Latvia is a large source of food waste, and in some educational institutions it reaches 10-50 kg per child annually. Eco-schools involved in the international project "Eat responsibly" managed significantly to reduce amounts of food waste in canteens (even by 1/2-1/3 times) by changing catering systems and menus, educating and motivating children.

The approach of Eco-schools and their **7 step** programme following a good governance cycle is an excellent toolkit for tackling environmental problems including food waste.

The first step of reduction of food waste is the detailed assessment of food waste sources, menus, and feedback from children about the meals. This step is needed not only for development of a targeted action plan, tackling most important waste sources, but also for motivation of pupils, teachers and caterers to get involved and reduce food waste and fulfil own responsibilities.

Since actions reducing food waste in schools require the engagement of teachers and other staff it involves many organisational changes and support and interest from the school leadership is crucial to motivate personnel and overcome resistance. Good communication and timely involvement of parents are important to overcome implementation challenges.

As in many food waste areas, also with regard to school catering food waste reduction incentives may conflict with interpretation of food safety norms and as in Latvian case with nutrition requirements. Such different interpretations might inhibit school and others from doing the right actions to reduce food waste since schools are afraid of reprimands by controlling bodies.

The new draft of “EU GPP Criteria for Food procurement and Catering Services” compared to existing guidelines is significantly more detailed with regard to food waste. Several important criteria introduced here very well coincide with the actions chosen by schools and preschools during the project “Eat Responsibly” indicating, that both – Green public procurement and actions of schools – can be used as tools for food waste reduction and complement each other.

¹ *Latvian Eco-school programme*, <http://www.videsfonds.lv/lv/ekoskolas>

² Project “Eat Responsibly”, <https://www.eatresponsibly.eu/en/about-us/>

³ Guidelines for Latvian schools and municipalities “Reduce food waste in your school”, <http://ekodizains.org/projekti/samazini-partikas-atkritumus-sava-skola/>

⁴ The approach of Ecoschools (www.ecoschools.global/seven-steps/)

⁵ Revision of the EU GPP criteria for Food procurement and Catering services, Boyano, A., Espinosa, N., Rodriguez Quintero, R., Neto, B., Wolf, O., 2017, 3rd Technical Report, Joint Research Centre, European Commission, http://susproc.jrc.ec.europa.eu/Food_Catering/docs/170127_EU%20GPP%20Food%20catering%20criteria_TR2.0.pdf

4.3 FOOD WASTE IN THE ESTONIAN FOOD CONSUMPTION-PRODUCTION CHAIN



HARRI MOORA, STOCKHOLM ENVIRONMENT INSTITUTE TALLINN CENTRE, ESTONIA



EVELIN PIIRSALU, STOCKHOLM ENVIRONMENT INSTITUTE TALLINN CENTRE, ESTONIA

Introduction

Food waste is a major societal, economic, and environmental challenge¹. Significant amounts of food are discarded or lost even before being consumed by humans. Accurate estimates of the magnitude of this avoidable food waste and loss are lacking. Nevertheless, there is no doubt that the amount of food loss and food waste remain unacceptably high. Food waste and loss occur across the whole food consumption-production chain, from the initial production down to final household consumption².

Recently, there has been increasing international interest in reducing food waste. In order to tackle the problem, it is important first to study the total amount of food waste and loss at every level of the food supply chain and identify the main reasons and causes. In most studies, food waste has been explored by measuring food waste through the analysis of waste streams

or by using statistical data^{3,4,5}. This type of study usually does not allow for analysis of real food waste generation and the reasons behind the wasting of the food. In general, there are few studies focusing on the reasons why food is wasted⁶.

No food waste studies encompassing the entire food supply chain have been carried out in Estonia. Therefore the Stockholm Environment Institute Tallinn Centre undertook a series of food waste studies in 2014-2016^{7,8}. This paper presents a short summary of the results of those studies, funded by the Ministry of the Environment of the Republic of Estonia. The purpose of the research was to analyse the amount and composition of food waste and food loss (avoidable food waste) in various stages of the Estonian food production-consumption chain (households, catering institutions, food retail sector, and food processing industry). Besides examining the quantities and types of food waste and loss, the reasons behind generation of food waste were analysed. The research examined the influence of different socio-economic, demographic, technical, and behavioural factors influencing food waste. A more detailed description of the methodology used for each studied stage of the food chain is provided in relevant subchapters.

Food waste and food loss generated in households

Methodology

The study was conducted in 100 households. In each household the analysis lasted for two weeks during which the households kept a detailed kitchen diary about the weight and composition of the food waste they generated. Each household was given a kitchen scale, a kitchen diary, a guidebook to explain the process, and a structured questionnaire. The diary included information about the weight and type of food thrown away, the reasons for discarding the food, and the details about food waste handling (e.g. sorting habits). The questionnaire served also as a tool for collecting information about the household,

such as the general information (demographic data, income level, housing type, etc.), cooking, shopping habits, and what they do to avoid generating food waste, etc. The study included different types of typical households in Estonia with various income levels and living arrangements. A similar study was carried out recently in Finland⁹.

Results

The results of the study revealed that an average household generated 2,5 kg of food waste per week (ca 1 kg per person), in total 130 kg per year (54 kg per person). Food loss (avoidable food waste) accounts for approximately 36% of food waste generated in households. This amounts to 47 kg annually per average household (17 kg per person respectively). When extrapolated to the whole country, collectively, Estonian households generate approximately 71 000 tons of food waste per year of which 25 000 tons are food loss. Based on average food prices, the total food loss generated in Estonian households is estimated to amount to 63 million euros per year.

The largest share (35%) of the avoidable food waste was from cooked (ready-to-eat) food (Figure 4.3_1). Difficult to separate mixtures of foodstuff (e.g. soup, casserole, meat gravy with potatoes, etc.) accounted for almost one third of wasted cooked food. Also, soups and porridges accounted for quite a large share of cooked food (16-17%). Cooked fish was discarded the least (1%). This could be because fish is quite expensive and is consumed relatively less often than other food products in Estonia.

The rest of the food loss included fruits/berries and dairy products/eggs (both 16%), vegetables (12%), baked products (8%). Meat and fish products, despite being easily perishable, were not discarded very often (5%), and cereal/grain products (including pasta and rice) were discarded the least (1%).

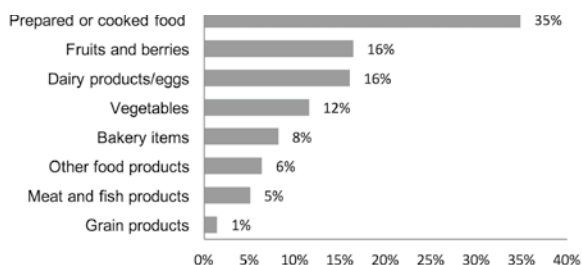


Figure 4.3_1. Proportions of avoidable food waste by food group

The main reason for discarding the food in Estonian households was because it had been spoiled or damaged in some way (44%). Other reasons for avoidable food loss included: having cooked more than needed (14%), food having passed the expiration date (12%), food having been left in the fridge for too long (12%), plate leftovers (12%), no longer wanting to eat the food (6%), and other reasons (5%) (see also Figure 4.3_2).

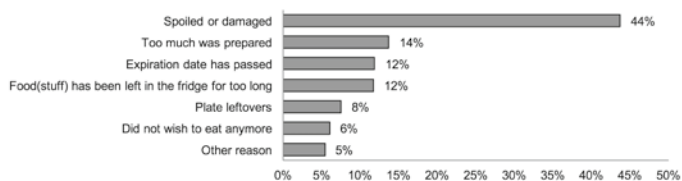


Figure 4.3_2. Proportions of reasons for throwing away food that could have been eaten

Food waste and food loss generated in catering institutions

Methodology

20 main types of catering institution participated in the study, including three restaurants, three bars/pubs, three cafés, four canteens/buffets, three schools, three kindergartens and a hospital. In each institution the generation of food waste and food

loss was measured over five consecutive days. Each day, the food waste was collected separately in four different phases (preparation, serving, consumption and storing of the food) to allow for better estimation of the causes of food loss. At the end of each day the containers from each phase were weighed. In addition, data about the number and average weight of served portions was collected/calculated.

Results

The results of the study show that food loss constituted on average 59% of the total food waste generated in catering institutions (see Table 4.3_1). Food loss was proportionally the largest in restaurants (87%) and the smallest in cafés (29%). Based on the results of the study it can be estimated that the catering institutions in Estonia annually generate approximately 13 000 tons of food waste of which 9 000 tons are food loss.

Table 4.3_1. Food waste and food loss generated in different catering institutions

Catering institutions	Food waste		Food loss		The share of food loss in total food waste
	Per day (kg)	Per year (t)	Per day (kg)	Per year (t)	
Catering companies					
Restaurant	35	12,8	30	11,1	87%
Pub/bar	14	5,2	9	3,3	63%
Café	7	2,4	3	0,7	29%
Buffet/canteen	17	6,2	10	3,7	60%
Average	18	6,7	13	4,7	71%
Educational institutions					
Kindergarten canteen	7,4	2,7	6	2,1	78%
School canteen	12,6	4,6	9	3,4	74%
Health care institutions					
Hospital	205	74,8	109	39,9	53%
Average	43	15,5	25	9,2	59%

For better comparison of the different types of catering institutions, the amount of food loss was calculated per portion, which shows the share of food loss per total amount of prepared food. On average, the food loss per portion was the highest in restaurants (25% per portion) and lowest in cafés and school canteens (6% per portion) (see Figure 4.3_3).

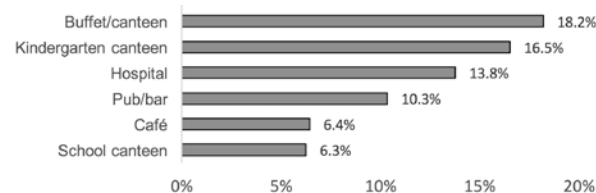


Figure 4.3_3. The generation of avoidable food waste per portion (%)

The results of the analysis of the causes of the food loss clearly brought out the specific nature of different catering institutions (Figure 4.3_4). Plate leftovers were more than half of the total food loss in most of the catering institutions. In the hospital the plate leftovers accounted for the largest share of total food loss (88%). The least was left on the plates in the canteens/buffets where people usually have lunch and tend to finish their meals. In canteens and buffets however, the largest share of food loss occurred at the serving phase due to the excessive amount of food prepared (46%). This can be explained by the fact that the food is prepared without knowing the exact number of clients (portions). In canteens/buffets, cafés and pubs/bars there was some food lost also during the preparation phase (13-23%). The least food is lost due to spoilage of food in all types of catering institutions.

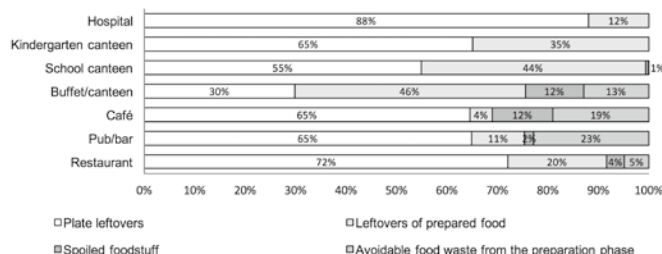


Figure 4.3_4. The causes of food loss at the different catering institutions

Food waste in food retail sector

Methodology

The study of food waste generated in the food retail sector consisted of analysing general results (survey) and in-depth interviews and measurements carried out on-site for more detailed results. A questionnaire was sent to all 600 food stores of the main grocery chains. 27 stores responded to the survey. Another 11 grocery stores of different sizes (in 4 small, 3 medium-size and 4 large stores) across Estonia (both in major cities and in rural areas) were selected for a detailed analysis. The aim of the detailed analysis was to gain accurate data through in-depth interviews, weighing of unsold food, and via on-site observation in the stores. The survey and interviews included questions about the main reasons for food waste generation and the main actions the stores have taken to prevent, reduce, and manage food waste. The amount of food waste was estimated based on unsold goods/food in nine food product categories (fruits, vegetables, meat products, fish products, bakery products, dairy products, prepared foods, cereal products, and other food stuff). Background information was collected from national statistics, the Estonian Waste Reporting system, literature and the results of previous studies.

Results

According to the data from the Estonian Waste Reporting system, the food retail sector generated approximately 5 290 tons of food waste in 2013. Detailed analysis demonstrated that on average 12 000 tons of food remains unsold per year, and that it is worth approximately 22 million euros. Table 4.3_2 shows the amount of unsold food in large, medium-sized and small stores in different time periods.

Table 4.3_2. Unsold food items in the grocery stores

Size of the store	Weight of unsold food			
	Average per store			Total in stores
	kg/day	kg/month	kg/year	t/year
Large store >1000 m ²	128,8	3 833,1	45 997	5 658
Medium-size store 400-1000 m ²	29	881,5	10 577	5 553
Small store <400 m ²	4,8	143,2	1 719	741
Total in all stores (tons/year)				11 952

The results of the detailed analysis show that the proportions of food products discarded in various types of stores similar (see Figure 4.3_5). About half (47%) of the unsold food products were fruit and vegetables (23% of the fruit and 22% of the vegetables). The meat products accounted for 16% and bakery products 13% of the total amount of unsold food. Both ready-to-eat food and dairy products made up 10% of the total amount of unsold food. However, dairy products remained unsold relatively more often in small grocery stores and ready-to-eat products relatively more often in the large and medium-sized stores. Fish, cereal products and other products are least likely to remain unsold (1-2%).

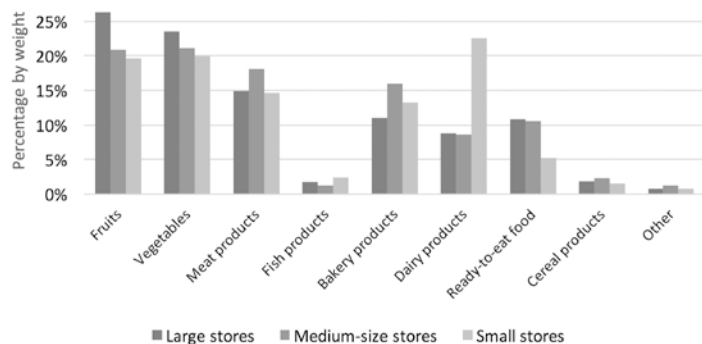


Figure 4.3_5. Proportion of different types of food products in the total amount of unsold food (percentage by weight)

Food remains unsold in the retail sector mainly because of difficulties in planning and forecasting the sale of products, and predicting customer demand. This is also connected to consumer behaviour and preferences. Consumers in Estonia are rather price sensitive, therefore campaigns and price fluctuations in other stores influence the sales. Quality requirements, especially those of the visual quality of food products are another reason why products are not sold (especially in the case of fruit and vegetables).

The study results revealed that many larger stores donate food to the Estonian Food Bank in order to avoid having food waste. At the same time, small stores in rural areas often have problems with donating food due to lack of human resources, storage space or transport. Finally, current legislation does not facilitate food donation.

Food waste in the food processing industry

Methodology

The study covered different food (processing) industries including meat, fish, fruit and vegetable, cereal processing, dairy, baking, and beverage industries. The amount of food waste

generated in the industries was estimated based on data from the Estonian Waste Reporting system. In addition, 35 companies (five from each food processing sectors mentioned above) were interviewed to investigate the type of food waste generated, the reasons for generating food waste, and learn about what they do to avoid, reduce, and manage food waste. Food donation practices in the food processing industry were also analysed.

Results

The study revealed that most of the residues from food processing are considered and managed as by-product, rather than waste. Different food processing industries create different kinds of by-products. For example, the meat industry generates mainly uneatable animal by-products (ABPs) such as skin, bones, cartilage, whereas the main by-product from dairy industry is whey, in fish processing it is fish skin and bones, in breweries brewery grains, etc. These by-products are not treated or recorded as waste but are usually used as fodder, sent for further processing to produce animal feed or as products to be used in other parts of the food industry. Therefore, it is not possible to estimate the precise amount of food waste generated in the food industry.

The data about the amount of generated by-products received from the companies during the interviews cannot be extrapolated to the whole industry as the processing techniques may vary considerably in different companies. Therefore, in the study only the amount of food waste collected and further treated by waste companies and recorded in the Estonian Waste Reporting system was regarded as waste. According to this, an estimated 3 393 tons of food waste were collected in food processing companies (Table 4.3_2).

Table 4.3_2. Generation food waste in food industry

Food industry sub-sector	Generation of food waste t/year	Proportion %
Meat processing industry	2 681	79%
Fish processing industry	70	2%
Dairy industry	80	2%
Cereal industry	200	6%
Fruit and vegetable processing	28	1%
Baking industry	57	2%
Other food processing	277	8%
Total	3 393	100%

Only a few companies said that no food waste is generated in their production processes, mainly because they use pre-processed raw material. Others (51% of the respondents) claimed that specific features of the production processes are the main reason why food waste is generated. Other reasons that were expressed include technical reasons (including problems in planning and organisation of production) and issues with staff competence (such as incorrect work procedures, non-compliance with instructions, etc.) (see also Figure 4.3_6.).

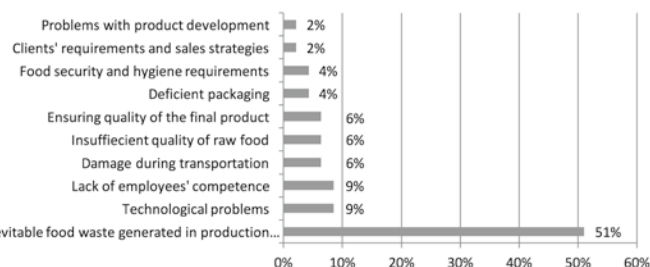


Figure 4.3_6. The causes of food waste generation in the food industry

All industries claimed that they are striving to reduce food waste, as this is directly connected to resource efficiency and costs. In most companies, training and motivating the staff was considered a key measure for reducing food waste. As technical reasons were one of the main reasons for generating food waste, most companies look for technical solutions to avoid and reduce food waste.

The food processing companies in general were aware that they could donate food to the Estonian Food Bank, but it was still not a common practice. Half of the respondents had not even considered the option. Many food processing companies felt that they have no products to donate to the Food Bank, others doubted that the donated food would be used for the intended purposes. This included concerns that the donated food might end up in the black market, which has occurred.

Conclusion

The results of the food waste studies in Estonia show that households are the main producers of food waste and loss generating about 70 000 tonnes (76%) of food waste per year. The catering sector generates approximately 13 000 tonnes (14%), the food retail sector 6 235 tonnes (7%), and the food processing sector only 3 393 tonnes (4%) of food waste.

Compared to other similar studies in European countries (e.g. the United Kingdom, Sweden, Germany), the food waste generation figures in Estonia appear to be rather low (2-3 times lower). This can be explained by the differences in economic development and consumption patterns (Estonia still has a relatively low income and consumption level) and cultural differences. However, there is a high potential for the reduction of food waste, especially by households, but also by the catering and retail sectors.

There is a need for food supply chain actors to develop a higher awareness of the environmental, economic and social impacts of food waste. It is important to disseminate the knowledge of the main reasons for food waste and loss generation. From the

household perspective, awareness of food waste related issues (e.g. how to preserve food and avoid food loss) and especially understanding the economic impact, could act as a strong incentive in triggering behavioural changes that help to prevent and reduce food waste. Better cooperation is required between the food chain actors and other partners (e.g. the Food Bank) with government interventions and support.

As such, the results of the food waste studies provide a very good basis for further development of food waste prevention and reduction strategies and measures not only in Estonia, but also in other countries that have a similar economic situation and consumption patterns.

¹ FAO (2011). The state of the world's land and water resources for food and agriculture. Managing systems at risk. Rome, Food and Agriculture Organisation of the United Nations.

² Parfitt, J., Barthel, M., Macnaughton, S. (2010). Food waste within food supply chains: quantification and potential for change to 2050. *Philosoph. Trans. R. Soc. B: Biol. Sci.*, 365 (1554), pp. 3065-3081

³ Schneider, F., Obersteiner, G. (2007) Food waste in residual waste of households - regional and social-economic differences. In: Proceedings of the Eleventh International Waste Management and Landfill Symposium, CISA, Sardinia, Italy.

⁴ Household food and drink waste in United Kingdom 2012, <http://www.wrap.org.uk/sites/files/wrap/hhfdw-2012-main.pdf>

⁵ Edjabou, M., E., Petersen, C., Scheutz, C., Astrup, F. (2016). Food waste from Danish households: Generation and composition. *Journal of Waste Management*. 52 (2016), pp. 256-268.

⁶ Gjerris, M., Gaiani, S. (2013). Household food waste in Nordic countries: Estimations and ethical implications. *Nordic Journal of Applied Ethics*, 7 (1), pp. 6-23

⁷ Moora, H., Piirsalu, E., Õunapuu, K. (2015a) Food waste and food loss in Estonian households and catering institutions. SEI Tallinn Project Report publication 2015-8. p. 29 https://www.sei-international.org/mediamanager/documents/Publications/SEI-2015-Report-_SEI_Tallinn.pdf

⁸ Moora, H., Piirsalu, E., Viilvere, T (2015b) Food waste in Estonian retail and food industry sectors. SEI Tallinn Project Report publication 2015. (in Estonian) http://www.envir.ee/sites/default/files/toidujatmed_ii.pdf

⁹ Katajajuuri, J-M., Silvennoinen, K., Hartikainen, H., Heikkilä, L., Reinikainen, Anu. (2014). Food waste in the Finnish food chain. *Journal of Cleaner Production*, 74 (2014), pp. 322-329

4.4 PREVENTION AND REDUCTION OF FOOD WASTE IN EUROPEAN HOSPITALS: LESSONS LEARNED



GRAZIA CIOCI, HEALTH CARE
WITHOUT HARM (HCWH) EUROPE



PAOLA HERNÁNDEZ OLIVAN, MENSA CÍVICA,
SPAIN

Introduction

It is estimated that approximately 100 million tonnes of food are wasted annually in the EU across all stages of the food chain from production to consumption. 14% of this food waste is attributed to food services alone.¹ In hospitals and other healthcare facilities, plate waste is higher than other food service sectors and it can be as high as 65% of food served.²

Food waste is an expensive problem, with an estimated global cost of €630 billion,³ but food waste does not only have an impact on the economy, it also has an impact on society and the environment, as it contributes to land and soil degradation, water pollution, and resource depletion.⁴ Furthermore, in addition to the carbon footprint related to the food production, food waste has a high climate impact linked to its final disposal in landfills, where methane and carbon dioxide (greenhouse gases) are produced as part of natural decomposition processes.

The high food waste rates of hospitals and other healthcare

facilities occur because of inefficient food ordering and delivery systems, inadequate portion sizes, unappetising meals and poor food quality.⁵ All these factors can lead to malnutrition-related complications and undermine prompt patient recovery^{5,6,7}. This creates even more economic challenges for the healthcare system. As food and nutrition play an important role in patient recovery and wellbeing, they deserve to be considered as an integral part of patient care rather than simply an operating cost.

By focusing on greening their food procurement and preventing and reducing food waste, the healthcare sector can change the old model of doing things – purchase, prepare, consume and dispose – for the benefit of society, the environment and the economy. Hospitals and healthcare systems in Europe are already starting to implement strategies for preventing and reducing food waste at their facilities and are investing the savings from food waste reduction into healthier and more sustainable meals for patients and employees alike.⁸ Hospitals have the opportunity to lead by example in their own sector and for other sectors when it comes to helping communities better understand the food they consume, and the importance of consuming fresh, local and sustainable produce as well as preventing and reducing food waste.

Case Studies and Lessons Learned

Health Care Without Harm Europe⁹ developed a survey and carried out semi-structured interviews with catering, facility and procurement managers of several European hospitals. The aim of the study was to identify the causes of food waste in healthcare, to assess the challenges and opportunities of preventing and reducing food waste, and to showcase best practices from

«The biggest challenge is to make everybody understand that food should be an important part of the patient recovery path.»

Dr. Amerio, Hospital
Cardinal Massaia Asti (Italy)

which other facilities can be inspired and learn. The final sample of respondents comprised more than 25 European hospitals from nine European countries (Austria, Belgium, Denmark, France, Italy Spain, Sweden, Switzerland and United Kingdom), two national initiatives on food waste reduction from Ireland and the Netherlands, and two regional programmes from Denmark and Sweden. From the survey and interviews a number of challenges and opportunities were identified and lessons were drawn from these best practices across the European healthcare sector. The purpose of the individual interviews was to investigate how hospitals and healthcare systems develop strategies that reduce food waste while still meeting nutrition goals. The analysis of these individual interviews generated five main lessons learned.

Healthy and Sustainable Food Procurement

Increasing the amount of fresh, seasonal, local and, in many cases, organic food products purchased and served in hospitals is a priority for some European hospitals to promote wellness in patients, staff, and visitors, and, at the same time, meet higher environmental standards and addressing ethical trading considerations. The provision of these products requires more time in identifying suppliers that can provide the right quality and quantity of products needed to increase their patients' consumption of fresh, seasonal, local, and organic ingredients. One of the disadvantages of fresh and organic products that was cited by some hospitals is the extra preparation time (and resources) needed to eliminate, for example, the presence of insects and soil in lettuces or leafy vegetables. Another drawback is the extra cost, which nevertheless is seen as an investment by some hospitals. This increased spending on better food can be understood as a means of reducing costs elsewhere, for example in shortened stays, reduced risk of complications, and reduced mortality rates. Some hospitals have reduced their food waste with the aim of investing the additional savings in procuring healthy and sustainable food, relying on short-supply chains and emphasise freshness, quality, traceability, and choice, as a way to embed sustainability objectives into public food systems.

The Nottingham University Hospitals NHS Trust (NUH) with 1.94 million meals served per year, is the fourth largest hospital in the United Kingdom with 11000 staff members. The focus of the hospital's sustainable food programme is to provide fresh and locally-produced food which is cooked in an on-site central kitchen. For example, 95% of the meat served comes from a local processor sourcing from farmers in the East Midlands. This switch to local suppliers has saved food miles and contributed to the socio-economic growth of the region. The biggest challenge has been to find local suppliers able to provide the right amount of produce for the different meals and to convince the hospital's administration and partners that locally sourced food was the right choice. The programme has incurred only a 2% increase in the budget, which was overcome by reducing food waste, and the relative cost associated with it. As the main problem in plated food waste is knowing the number of patients present at each mealtime, patients were allowed to order meals directly from the bedside just two hours before mealtime. This technology has contributed to considerably decreasing food waste.

"If the meal is fresh and stimulates the appetite, then the patient will eat more and thereby recover more effectively. If the hospital sends the signal that it is prioritizing food and patients' meals, it will be seen as being on the side of the patients' recovery"

Ms Sisse Horup Larsen,
Head Dietician at Gentofte

The Centre Hospitalier du Bois de L'Abbaye in Belgium with four hospital sites in Belgium has had for many years the priority to serve fresh, local and seasonal produce exclusively from Belgian farmers.

Every day, patients can choose meals from a lunch and dinner menu that changes every week.

The Genthofte Hospital in Denmark, serving about 328,000 meals annually, focuses on handmade meals prepared on-site,

including marmalades, bread, and cakes. In addition, the hospital procures 81% of its organic food exclusively from Denmark. Because meals are made directly from raw ingredients the hospital is expecting to reduce spending by 100,000 Euro per year within the next few years.

In addition, food leftovers from the wards and the kitchen are placed in a tank for temporary storage and the bulk is later converted into gas in a bioreactor.

Food Ordering System

Results from the survey and interviews show that the food service logistics, such as meals ordering and delivery, are main factors that influence prevention and reduction of food waste in hospitals. In most cases ordering systems are not flexible and the meal is often ordered between 12 and 24 hours in advance of when the meal is served.

One effective ordering method is the so-called "à la carte" system, whereby patients can choose from a menu and can order only a few hours before the meal is served. In this way, patients are more likely to know what they would like to eat at meal time. For example, the Rotherham NHS Foundation Trust (UK), situated in the North of England, serving 508,000 meals annually, has an electronic meal ordering system that provides patients with tablets to order their meals from the bed-side only two hours before mealtime. In addition, patients can order food outside meal service times via an "à la carte" cook and chill menu. They also have a one-week menu cycle, which is changed twice a year and a seasonal one-week menu cycle with daily "chef's specials".

The Vastra Gotaland Region in Sweden has started a pilot project at Kungälv Hospital with the goal of reducing the number of meals ordered by 25%. They will do it by allowing patients to order their desired dishes the same day and by introducing ward hostesses in each ward to gather patients preferences.

The meal ordering process is complex and plays an essential

role in controlling food waste and in guaranteeing that patients have high-quality food that meets they will eat and enjoy.¹⁰

Meals presentation and portions size

The way meals are presented to patients and the size of the portions can reduce food waste. As highlighted in various studies, patients are often overwhelmed, discouraged and their appetite is reduced when presented with large portions. On the contrary, meals can improve patients' appetite and desire to eat when they are presented in an attractive way.

“When meals are presented attractively, it can help the patient’s appetite and desire to eat”

Palle Erbs, Chef at Hvidovre Hospital, Denmark

Hvidovre Hospital in Denmark pays particular attention to the aesthetics of the dishes. The Gentofte Hospital in Copenhagen serves food in ceramic containers, which makes dishes more attractive and reduces packaging. In addition, dishes are smaller to reduce portion sizes.

Changing the portion size of dishes has been regarded as an easy measure to reduce food waste.

At the Gentofte Hospital decreasing portion sizes, improving the presentation of meals and preparing fresh food on-site every day allowed the hospital to decrease food waste as much as possible with a potential saving of 800 tonnes of food waste annually (saving approximately 108,000 Euro).

Communication and coordination

Appropriate communication and coordination, between kitchen staff, healthcare professionals and patients, is defined as a precondition for patient satisfaction and therefore for reducing food waste and costs. Improving communication and coordination between wards and the kitchen to match patients' preferences and meals request as well as assisting patients to make informed decisions about their menu choices are measures that contribute to preventing and reducing food waste.¹¹

The Vall d'Hebron University Hospital in Barcelona, Spain, offers approximately 450 menus across the year, including vegetarian menus and individual dietary choices for both staff and patients. The Dietetics Department adjusts patients' diets to accommodate allergies, patient preferences, and to prevent food waste. The department also carries out satisfaction surveys and monitors patients' intake in different wards.

Communication improvement has been linked to high-tech solutions like tablets available to patients for ordering their meals. It can also help in establishing protected meal times during which patients can eat their meals without being disturbed and with the help of a nurse or a friend if they need assistance while eating.¹²

In many hospitals, food “hosts” serve food to patients and make the link between the kitchen staff and patients. In the Hospital Coplex of the Lillebaelt Region, in Denmark, serving around 912,500 meals per year, food hosts move from one ward to another, keeping track of which food is left uneaten and collecting patients' assessment of their meals. This information allows the kitchen staff to adjust the amount of food sent to each ward the next day and remove meals from the menu if needed.

The involvement of patients in meal design has been identified as a key component in limiting dissatisfaction and decreasing food waste. It is also important to involve of dieticians and nutritionists to ensure that the necessary nutrients are present in each meal. The Lozano Bleza University Hospital in Zaragoza, Spain, has created a menu that covers all dietary and nutritional requirements by involving the Dietetics and Nutrition Unit in the development of menus for different dietary needs.

Measure and monitor food waste

All of the above factors will not be effective if hospitals do not measure and monitor food waste in kitchens and plate waste from wards, based on visual estimates and also more standardised measuring systems (e.g. direct weighing). Reporting the results to employees and patients about the amount of

food wasted in the facility further raises awareness about food waste.

In Ireland the Irish Environment Protection Agency (EPA) in collaboration with the Clean Technology Centre has set up a programme called Green Healthcare Programme (GCHP) involving 40 hospitals. The GCHP has set up a system to measure food waste in hospitals by food weight and purchase cost (€2/kg), with both a centrally plated system and a bulk food system.

The Netherlands Wageningen University and Research has developed and applied a practical method for measuring food waste, which has been implemented in more than 15 Dutch hospitals. The method is not only about measuring discarded food, but also gives detailed insight into food wastage by examining factors such as the quantity of food wasted during different steps in the production process, which products are thrown away the most, and what improvements are possible in terms of reducing food waste.

Conclusion

Research describes reducing food waste as an emerging problem that hospitals have to tackle. Data on the level of food waste in the healthcare sector are lacking. The findings of the interviews and survey carried out by HCWH Europe have shed some light on the strategies that hospitals and healthcare systems are implementing. The majority of these strategies have proven successful, and should be mainstreamed in the healthcare sector and transposed into other sectors.

Providing good quality, nutritious and appetizing food is an indispensable part of patient treatments, health and wellbeing. Food should be considered as the best medicine of all.

¹ Bio Intelligence Service (2010). Preparatory Study On Food Waste Across EU 27. European Commission Technical Report - 2010 – 054.

² Williams P. and Walton K. (2011). Plate waste in hospitals and strategies for change. *European e-Journal of Clinical Nutrition and Metabolism*, 6(6), pp.235–241.

³ Thyberg K. L. and Tonjes D. J., (2016). Drivers of food waste and their implications for sustainable policy development. *Resources, Conservation and Recycling*, 106, pp.110–123

⁴ Papargyropoulou et al. (2014). The food waste hierarchy as a framework for the management of food surplus and food waste. *Journal of Cleaner Production*, 76, pp.106–115.

⁵ Barton et al. (2000). High food wastage and low nutritional intakes in hospital patients. *Clinical Nutrition Journal*, 19(6), pp.445–9.

⁶ Jones L. (2014). The Hospital Food Standards Panel's report on standards for food and drink in NHS hospitals. Department of Health.

⁷ Navarro et al. (2015). Improved meal presentation increases food intake and decreases readmission rate in hospitalized patients. *Clinical Nutrition Journal*, 35(5), pp.1153–1158.

⁸ HCWH Europe (2016). Food Waste in European Healthcare Settings.

⁹ Health Care Without Harm (HCWH) Europe is the European arm of a global not for profit NGO whose mission is to transform healthcare worldwide so that it reduces its environmental footprint, becomes a community anchor for sustainability, and a leader in the global movement for environmental health and justice. HCWH's vision is that healthcare mobilises its ethical, economic, and political influence to create an ecologically sustainable, equitable and healthy world.

¹⁰ Ofei, K. T. (2015). Food waste in hospital: minimizing without compromising patient food intake using the DIMS. Aalborg University: http://vbn.aau.dk/files/223354456/Kwabena_Titi_Ofei_E_pdf.pdf

¹¹ Position of the American Dietetic Association: Food and Nutrition Professionals Can Implement Practices to Conserve Natural Resources and Support Ecological Sustainability. (2007). *Journal of the American Dietetic Association*, 107(6), 1033–1043. <http://doi.org/10.1016/j.jada.2007.04.018>

¹² NHSE Hospitality. (2005). Managing food waste in the NHS: <http://www.hospitalcaterers.org/documents/foodwst.pdf>

4.5 FOOD WASTE REDUCTION VIA AWARENESS RAISING IN SWEDISH SOCIETY



PAUL WALLNER, RESURSRESTAURANGEN,
SWEDEN

ResursRestaurangen is a non-profit association founded in May 2015 as an answer to the colossal amounts of edible food discarded daily. In Gothenburg alone (Sweden's second largest city), up to 1 200 tonnes/year, with a net worth of 35 million Swedish kronas of food is wasted in the municipality's different activities. Thus, the food waste issue is both an environmental problem, and expense for taxpayers.

ResursRestaurangen started off as a review of the flows of food from "farm to fork" to identify the points where food is wasted. A team member talked to producers (farmers, bakeries etc.), wholesalers, supermarkets and restaurants and interviewed them about their challenges in reducing food waste. We learned that food waste occurs at all stages and among almost all actors in the food chain. We teamed up with some of the actors we had previously reviewed such as bakeries, wholesalers and some supermarkets. Together we formed food waste partnerships and started to redistribute food that would otherwise have been turned into compost, biogas, or gone to landfill.

As a result we formed the non-profit association (Swedish: "Ideell förening") ResursRestaurangen and wrote statutes, goals, and a credo:

"ResursRestaurangen will work to decrease food waste and raise awareness of how the present system of food production influences the ecosystems in and around Gothenburg and its surroundings. ResursRestaurangen will foster member knowledge about food production and food consumption."



Photo 4.5_1
Photo: Hilda Wenander



Photo 4.5_2
Photo: Remina Kisimov

One of the associations' main pillars became to reduce the carbon footprint for all activities. This resulted in developing cargo bike based food waste logistics. To reuse old materials, a working group produced bike trailers that with cargo bikes can each carry approximately 150 kilograms of food.

Requests started to come in without any marketing actions except for word-of-mouth. Our first clients were deep green organizations, and cultural and educational actors that are aware of food waste issues and that share some of ResursRestaurangen views on these topics.

Since May 2015, ResursRestaurangen has:

- Organized events where waste food has been turned into delicious meals and products
- Informed and shared knowledge on how the organizations and citizens of Gothenburg can decrease how much food is wasted
- Started a community restaurant (Folkkök/Volxküche) with local association Majornas Samverkansförening in the "Majorna" district
- Been awarded the "Varsågoda"-funding from Business Region Gothenburg for social innovations
- Been one of the finalists in the Brewhouse Awards competition for original ideas and innovations

Teaming up with the "Swedish Union of Tenants", today we have a pool of battery-powered cargo bikes. Today almost all transport is done with cargo bikes, lowering emissions and contributing to a better city environment and a less used road network.

In late 2016, we formed a partnership with the local organisation Majornas Samverkansförening (MSF) in the "Majorna" district (known for its vibrant cultural life, second hand shops, bars and vegetarian restaurants). ResursRestaurangen and MSF restarted a community restaurant project that had been in hibernation for lack of volunteers. We started up the project by adding waste food, our pool of chefs, and food waste logistics as cornerstones of the project. The cooperation also led

to ResursRestaurangen renting a space in the building where MSF resides.

One of the main pillars of ResursRestaurangens goals is sharing knowledge. Since the beginning, our members have organized activities together with the adult educational association “Studieförbundet”. We jointly offer public workshops and lectures, sharing knowledge through fanzines, flyers and social media and sharing and receiving knowledge from new members, our members striving to promote the issues connected to food waste through popular adult education.

We believe that creating behavioural change challenging individuals to work with wasted food, has in our experience a higher rate of converting “consumers of change” to “producers of change”. Therefore, all our activities involve contact or a workshop with waste food. Today ResursRestaurangen mainly offers:

- Catering
- Lectures and workshops (fermenting waste food, urban foraging)
- Food waste logistics (cargo bike delivery of wasted food)
- Products based on wasted food (sauerkraut, kimchi etc.)

Since June 2015, ResursRestaurangen, its members and staff (an average of 5 part-time- employees) have saved approximately 5,62 tonnes of food that would otherwise have been discarded. This is a yearly average of 2,24 tonnes.

Our motives/ drivers to start ResursRestaurangen

Our members, bringing experience from farming, restaurant business, supermarkets and food saving activities such as dumpster-diving, the “food not bombs”-movement etc., and realised that we needed a new form of organization to counter the symptoms of the system failures we had detected in different parts of the food chain. One idea that brought the founding members together was the idea of food waste in the Swedish context – a society often



Photo 4.5_3
Photo: Laima Bagdonaite



Photo 4.5_4
Photo: Laima Bagdonaite



Photo 4.5_5
Photo: Laima Bagdonaite

boasting (and praised) for its progressive and innovative thinking. Adding a network of transportation, cooling/warming and digital information attached to food, food waste sounded like a contradiction. The Swedish system of handling food had failed and stills fails today to avoid waste in the spectrum from producer to consumer, and in both the public and private sector. This reality worked as a motivator for some of the members.

Another factor that attracted members was the community. People have a really good time together planning, fetching, cooking and serving wasted food. Showing and communicating to others that a change is possible gives all members a feeling of joy and the satisfaction of making a difference.

Environmental arguments such as respecting the food and its value and making a clear statement against the stupidity of discarding food also attracted members.

Some of the members had previous experiences and know-how of turning wasted food into meals, for example the Gothenburg-based dumpster diving catering service “Kungliga Containerakademien” has this knowledge. Others had embarked on different roads to a more resilient and local food production. Putting skills and experience together, ResursRestaurangen started off in an ad-hoc manner as soon as it received its first catering request. (See point 1 and 4)



Photo 4.5_6
Photo: Paul Wallner



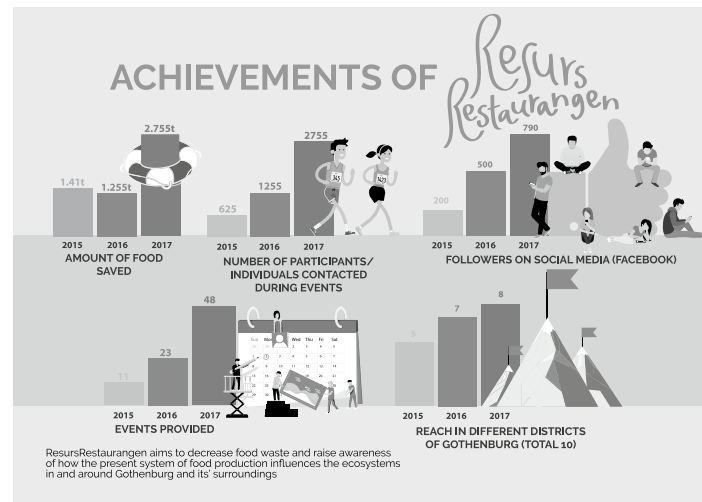
Photo 4.5_7
Photo: Paul Wallner



Photo 4.5_8
Photo: Froda Blomster

Our achievements and how we measure them

Here are some numbers indicating the achievements of ResursRestaurangen:



Since 2016 ResursRestaurangens has been a partner of the permanent exhibition "Urbanum" at the Museum of Gothenburg (Attracting 213 000 visitors each year) and a partner in Folkök on a weekly basis since November 2016.

According to the Swedish environmental protection agency, 1,3 million tonnes of food is wasted in Sweden each year. Households account for the majority (55 %) of the waste - 717 000 tonnes. This averages to 74 kilograms/person/year. In Gothenburg, with its 570 000 inhabitants, consequently, households account for a total of 42 180 tonnes of wasted food every year. ResursRestaurangens annual contribution of 2,24 tonnes of saved food points out that we are still facing a challenge in influencing the end consumer's behaviour and consumption patterns.

What were the obstacles and how did we overcome them?

Most members had little or no experience in founding a non-profit organisation. Hence administration, forming statutes, and reporting to authorities were tasks that consumed time in the first years. The members overcame this by searching for information (library, internet) and receiving feedback from similar non-profit organisations. We also grew a network with state and municipality financed organisations and projects that offered support for associations and enterprises.

Likewise, forming a board was also a challenge. Not only because of working in a new framework, but also because the association needed specific knowledge in food handling, law, administration and business, to mention a few. There were no previous cases (to the members knowledge) of creating and running an association with similar activities.

Until recently, the organisation did not have a long-term strategy for volunteer engagement. There has been a flow of volunteers coming from the Folkkök project, social media and other events we organised or joined in Gothenburg. This way, ResursRestaurangen attracted a pool of muscles and brains for development and operational activities. But this pool has not always corresponded to the needs of the organisation. Members and volunteers achieved a lot, but sometimes the achievement has not been beneficial to the organisation's long-term goals or the potential of the members has not been used.

A new board was elected in May 2017 and since then a member of the board has been appointed coordinator of member value creation and a strategy on using member/volunteer assets has been drafted. One of the challenges is to find a suitable strategy for how to recruit appropriate volunteers and find corresponding tasks that go well with the temporary nature of volunteering.

In Sweden, the legislation surrounding food safety and hygiene when handling food is a lot more dispositive and ad-hoc in comparison with, for example, British standards. Since ResursRestaurangen has handled food in unconventional manners (using wasted food, cargo bike transportation) it has been a challenge for the organisation to design our food handling according to standards. The authorities have not been in a position to give support and feedback, and if they do work with us, it is based on the engagement of individual officials. With help from other colleagues in the restaurant business, and food safety courses offered by the city, we have managed to gain the knowledge to tailor the food handling system according to the organisation's needs.

Working in a deep green environment and being a non-profit association, ResursRestaurangen has had to work a lot with communication of our business model and pricing. Many potential clients have had the preconception that saved food means that it is also free food. As the saying goes, there are no free lunches. Saving food and the world has a price. But it seems that still many of the people ResursRestaurangen comes in contact with have a hard time with this equation. Our organisation is in no way aiming for high profits and revenues, but we want to work sustainably, not only in the societal and environmental realm, but also economically. We are convinced that every organisation needs all three sustainability elements in order to offer employees and members a healthy and secure arena for engagement. Money (i.e. salaries) is still one of the strongest incentives for people who want to engage on a long term. At the present, one of our members is developing the model for communication and pricing.

In the first two years, ResursRestaurangen was a jack-of-all-trades. As long as the activities were linked to food waste, the organisation engaged. Learning along the road, we have come to realize that in the beginning stages, it is beneficial to focus on the few things we do the best, and avoid doing other activities or recruiting/engaging an external actor who can handle this better than our organisation. ResursRestaurangen is trans-

forming our business and narrowing down the core activities that serve our goals. We expect this to benefit the organisation in freeing time, becoming more tangible as an organisation and attracting the right members and clients.



Photo 4.5_9
Photo: Paul Wallner



Photo 4.5_10
Photo: Paul Wallner



Photo 4.5_11
Photo: Paul Wallner

The legal implications of ResursRestaurangen model

During 2015-2017 food waste has really become a part of the agenda of media, politics and business in Sweden: supermarkets are discounting products about to expire, quantitative research has been conducted on the amounts of wasted food, and lately a politician argued to legislate against discarding food. From our organization's perspective, during the years of ResursRestaurangen, many consumers have started to realize the magnitude of the problem and some of have even started to take action. As stated above, supermarkets have started working reactively but still have a lot to do before becoming waste free businesses.

ResursRestaurangens' target group is mainly households from the middle class. Detecting behavioural change is hard to do in such a short time perspective. ResursRestaurangen has met with the mayor Ann-Sofie Hermansson of the Gothenburg municipality and discussed the issue with her and how our tool facilitates behavioural change and food waste reduction.



Photo 4.5_12

Photo: Paul Wallner

But, in ResursRestaurangens first three years, the focus has mainly been on reaching out to organizations, companies and households to plant ideas on how organizations and individuals can make a concrete change for the better for the food.

ResursRestaurangen - recommendations for food-waste startups

As a not-for-profit organization, ResursRestaurangen has learned quite a few lessons on good practice when organizing. To avoid our mistakes, we recommend that others:

- Define the vision first, and then state goals that align with the vision and define the strategies and activities you need to meet the goals. Review the goals, strategies and activities regularly and make sure they are in line with the vision.
- Identify and engage the key skills you need to fulfil the goals.

- Start off using the simplest and easiest model for fulfilling the goals. Evaluate. If this works, go on scaling up your model.

- Write guidelines, a core documents or statutes that will guide the organisation toward the vision, no matter the circumstances. Make sure that this document is available, easy to understand and helps members and board to work for the organisation's vision. Write a distinct job description for the board and active members.

- Make sure to have a board that is familiar with and has knowledge of some of the following topics: taxes/book-keeping, human relations, restaurant business, and law.

- Do not underestimate the power of incentives, such as organising a brunch, a kick off/kick out or other group activities for active members.

- Do an inventory of organisations, associations, clubs, and NGOs in your vicinity: Find common denominators and try to see how you can help each other to realise your goals. If you have tasks that someone else can handle better, and for a reasonable cost -outsource.

- Have active communication with authorities in the fields of health and law. Form cooperation with authorities and build a relation upon mutual trust and transparency.

- Find ways for measuring the positive impact you create. If there is no measure available - invent one!



Photo 4.5_13
Photo: Remina Kisimov



Photo 4.5_14
Photo: Remina Kisimov



Photo 4.5_15
Photo: Remina Kisimov



Photo 4.5_16
Photo: Remina Kisimov



Photo 4.5_17
Photo: Remina Kisimov



Photo 4.5_18
Photo: Remina Kisimov

4.6 FOOD WASTE: LOCAL GOVERNMENTS TO THE RESCUE



JORIS DEPOUILLON,
FOODWIN, BELGIUM



JASMIËN WILDEMEERSCH,
FOODWIN, BELGIUM



ELKE MARKEY,
FOODWIN, BELGIUM

This chapter outlines the framework FoodWIN has created to guide local governments in helping to reduce food waste. Illustrating this framework with specific examples, it gives a vision of how local governments can act as a catalyst to reducing food waste in Europe.

Introduction: What is FoodWIN?

We are a team of food waste experts, leading a network of food waste changemakers such as entrepreneurs, social innovators and grassroots organisations. The network comprises around 150 food waste changemakers from across Europe who

we support with learning activities, opportunities for collaboration and societal visibility.

By collaborating with the changemakers from our network, we offer support and innovative solutions to local governments to reduce food waste. We have successfully implemented actions in the cities of Bruges, Ghent, Amsterdam, and within the regions of Limburg (NL), Brussels, Vlaams-Brabant and the Grand Duchy of Luxembourg.

We have extensive knowledge on best practices used in other cities and methods developed by the actors within our network. With this practical experience, we created a framework that offers tools to help cities reduce food waste.

Why Food Waste?

The average EU citizen annually wastes 173 kg of food, each year **equating to an estimated**¹:

- **88 million tons of waste** in the EU,
- costing 143 billion euro,
- emitting 170 million tons of carbon dioxide through production & disposal.

One third of the food raised or prepared does not make it from farm to fork. Producing food that will never be eaten wastes a host of resources (seeds, water, energy, fertilizer, labour, land, financial capital) and emits greenhouse gases throughout the production cycle.

Therefore, food waste is a cross-cutting issue: tackling food waste would help us to meet SDGs concerning climate change, jobs and zero hunger, as well as the EU's climate targets. This proves that there are many opportunities to benefit from by reducing food waste.

Reducing food waste **reduces costs**. A 2012 initiative in London reduced food waste by 15% in 6 months, and for every £1 the local government invested, waste management services saved £8 and households saved £84. Companies also gain positive

return on investments against food loss and waste. In a separate study, for every \$1 invested, companies saved at least \$14.

Reducing food waste **is key to making your city or region carbon neutral**. Cutting out all avoidable food waste would reduce greenhouse gases by an estimated 12% across Europe. **Recent research**² shows that it is the 3rd most impactful solution to climate change is reducing food waste.

Recovering and redistributing food surplus is one of the most cost-effective ways to **feed people in need**. It decreases costs for social organizations and helps to combat food poverty and food inequality.

Why cities?

Local governments (municipalities, cities, regions) have the potential to stimulate innovation and entrepreneurship around food waste. London is a good example of where an ecosystem of changemakers and entrepreneurs working on food waste has developed, helping and pushing each other forward. It brings together different actors working on logistics, connecting those with surplus to those who need it, and making use of that surplus. This kind of thriving system could develop in many cities or regions, where changemakers and the local governments work together to tackle food waste.

At FoodWIN we believe that local governments can and should take the role of catalyser in reducing food waste. Local governments are probably best-placed to reduce food waste as they are responsible for waste management and are the authorities that are closest to businesses, consumers and civil society. We've learned that once local governments know how much food waste occurs in their territories, they cannot help but take action. With a concrete view of the situation, local governments are in an ideal position to co-create a strategy with local stakeholders of the food chain, companies and civil society, and thus develop an increasingly powerful dynamic of

collaboration and action between these actors.

Together, this coalition of actors can define what actions can yield the highest impact results and who is best placed to implement them. Local governments and stakeholders can therefore choose to (1) raise awareness, (2) prevent food waste, (3) redistribute and reuse food surplus and (4) stimulate entrepreneurship and innovation.

Though this chapter outlines a framework for local governments to use to reduce food waste, national and regional governments can take the same approach, as Spain, Germany, Hungary and the Netherlands are demonstrating in the Refresh project.³

The outline of the framework is the following:

Step 1: The food waste diagnosis

- Conduct an analysis

Step 2: Build a strategy with stakeholders

- Build a coalition
- Co-create a strategy

Step 3: Take action

- Raise Awareness
- Prevent food waste
- Recovery and redistribution
- Social innovation and entrepreneurship

Step 1: The food waste diagnosis

Conduct an analysis

Through an in-depth analysis of food waste in its territory, local governments get a clear idea of how serious the problem (and opportunity) is and what actions earn priority. Where? By whom? How much food goes to waste? How much money could be saved? Who works on food waste reduction? What are the “quick-wins” to reduce food waste fast, save costs and reduce greenhouse gas emissions? Such a clear overview automatically urges action, as numbers are usually much higher than expected.

Step 2: Building a strategy with stakeholders

Co-create an action plan tailored to the city or region together with key local stakeholders.

Phase 1: building a coalition

Food waste is a problem and opportunity that involves stakeholders from across the supply chain and local government. Therefore, building a coalition with these stakeholders is a key step. The coalition should include businesses, farmers, NGOs/non-profits, start-ups and representatives from the administration itself (both from the economy/welfare and the environment/waste management departments). The size of the platform can vary depending on the region. Generally it is between 10-50 participants. The size depends on whether one wants to involve mostly ambitious frontrunners or ensure a widely accepted strategy.

Phase 2: co-creating a strategy

Based on the analysis, this coalition can co-create a strategy. Such a strategy includes (1) a clear target to reduce food waste over 1 year, 5 years and 10 years, (2) the focus areas or sectors where the coalition wants to reduce food waste and (3) specific measures for the following 1-3 years.

The creation of this strategy is a co-creative process that builds on the analysis. The participatory nature of this process is important to ensure the collaboration of the various actors to implement the actions taken up in the strategy. Actions to reduce food waste can roughly be categorized into 4 types (cf. infra). Once the strategy has been established, it's useful to have quarterly meetings between the members of the coalition to share updates, stimulate collaboration, remove barriers, and create new solutions.

Step 3: Take action!

By raising awareness!

Awareness raising to households is crucial as 42% of food waste in Europe⁴ comes from households. It is vital to ensure citizens are informed about food waste and the many poten-

tial solutions to it. Workshops, competitions, festivals and advertising campaigns... are all possible attention grabbers. The awareness we want to stick in people's minds involves the scale and impact of food waste in the living area at stake, the most important reasons for household food waste and practical tips to avoid it.

Feeding the 5000' is such a community awareness raising event, where 5000 meals are served in a delicious communal feast. The feast is made entirely out of food that would otherwise have been wasted. This event has been held in many cities including Paris, Athens, Milan and Brighton.

FoodWIN's **Food Waste Awards**⁵ put solutions to food waste in the spotlight, while creating a professional community around the issue of food waste and drawing media attention and public awareness.

Zero Food Waste Citizens is another campaign where local governments guide 100 families towards a zero food waste lifestyle, providing regular training and education sessions. This is to build a movement of Zero Food Waste families.

By preventing food waste

Preventing food waste refers to the highest levels of the food waste pyramid where the aim is to avoid generating food waste in the first place. Preventing food waste from occurring can generate huge cost savings for organizations and households. What is more, the return on investment is impressive. According to a recent **study**⁶, each euro invested in actions to reduce food waste yields 8 euro return (for local governments), 92 euro (for households) and 14 euro (for companies).

Measuring how much food is wasted within an organization is an essential step in diagnosing where and why food waste occurs. On the basis of this, measures can be taken. Examples of ways to do this include better planning to avoid overproduction and better storage to make food last longer.

Rest-O-Pack Brussels⁷ for example, is a new brand of doggy bags to raise awareness about food waste in restaurants, and change consumption habits by encouraging people to bring their leftovers home.

Roubaix school canteens have implemented many actions to manage their foodstuffs efficiently and prevent food waste from occurring in their kitchens. This resulted in major cost savings.

By recovering & Redistributing food surplus

Once the food is produced and would go to waste, let's make the most out of it! This involves intercepting the surplus before it is disposed of, either to distribute to people or to make and sell products.

A first step is to connect potential donors of food surplus with potential recipient organizations. This can be done by organizing a roundtable event and providing a communication platform (e.g. **La Bourse Aux Dons**⁸) to provide automatic match-making. Another key action is implementing logistic solutions to connect food surplus, through charities, to people in need. Many of these charities lack the logistical means (and manpower) to recover surplus food from donors. Such logistical solutions can organize logistics efficiently by recovering food from several donors while respecting the cold chain, storing it (if necessary) and delivering the demanded quantities by recipient organizations.

This step reduces the food going to landfill, where it would contribute to greenhouse gas emissions. It also addresses food inequality and food poverty as redistributing food can help reduce the number of people going hungry.

Bourse Aux Dons/ Schenkingsbeurs⁹ for example, is a national Belgian platform designed to facilitate food donations between professional actors in the food sector and recipients like social organizations or new food entrepreneurs in the Circular Economy.

Another platform is **SavingFood¹⁰**, an online network community of various stakeholders. In Belgium, the Saving Food app will be used for the gleaning network, coordinating volunteers, farmers, and food redistribution charities to salvage the tonnes of fruit and vegetables that go to waste on farms.

Through social innovation & entrepreneurship

Local governments can also play a role by giving support to entrepreneurs and start-ups who prevent food waste or use food surplus.

Stimulating social innovation can help to raise awareness among citizens and challenge social norms around food waste by creating a dynamic group of changemakers working to create positive change. Furthermore, being regarded as a hotbed of green, progressive innovation can only improve a city's or region's reputation.

Local governments can organize competitions for business ideas to reduce food waste or coaching workshops for change-makers and start-ups on the theme. Providing long-term support and/or funding to follow-up on these social innovation projects can then create sustainable impacts.

Some food for thought: Real world examples from local governments that took on the challenge of tackling food waste strategically.

Step 1: The Food Waste Diagnosis

São Brás de Alportel & Loulé Food Waste Diagnoses

What happened?

An analysis was conducted of the current situation in two towns in the south of Portugal (Loulé and São Brás de Alportel), to estimate the amount of food waste generated and recommend measures to reduce waste. This was an EU project in which a

local consultant (Foodways Consulting) was contracted to do the analysis. In some cases they couldn't access data so they did an in depth best-practice analysis.

What were the results?

The Food Waste Diagnosis gave an insight into food waste specifically in these two towns, in order to assess how best to combat it at the local level. Foodways Consulting found that 2.06 kilograms of food in the whole supply chain are produced for one inhabitant of the towns every day, while they consume from this only 1.02 kilograms per day. This results in a food waste rate of 50.4%, the equivalent of 378.9 kilograms of food waste per inhabitant, per year .

Now what?

The report offered a diagnosis of the main reasons for losses and food waste in the municipalities, as well as quantification of the waste volume. Furthermore, the report offered advice on how to proceed after the diagnosis, identifying and recommending actions to reduce food waste.

Step 2: The Food Waste Strategy

Food Lab Bruges

What is the strategy?



In 2015, the City of Brugge and FoodWIN set up a steering group "Food Lab Brugge" with local stakeholders. This platform is based around sustainable food (focusing on food waste, as well as urban agriculture and farm to fork food). Using a situation analysis, the Food Lab devised a strategy. The Food Lab meets quarterly and is the one-stop-shop in Brugge around food waste and sustainable food.

What does the Food Lab do?

Since 2015 the Food Lab has co-organized several actions to deliver this strategy and reduce food waste: Feeding the 5000 "(H)eerlijk Brugge", creating a sustainable food manual which Bruges uses for the catering at all its events, a project to re-

duce fish waste in the harbour and a co-creation process to reduce food waste in hospitals.

Step 3: Time for action By raising awareness

Disco Soup London 2017

What happened?



Civil society and entrepreneurs joined forces to organize a food waste feast. A Disco Soup is an event where participants cook and eat a meal together from food that would have otherwise gone to waste, with music and a dynamic, fun atmosphere. On April 29, 2017, participants gathered to chop vegetables and bop to the beat of live music, in solidarity with the People's Climate Marches happening across the world. It was a day full to the brim with activities, workshops, talks, eating and drinking, celebrating the delicious solutions to food waste and raising awareness on other climate change issues.

Participants ate a free feast, all from food that would have otherwise been wasted, dance, drink Toast Ale (beer made from Surplus bread) and a variety of food waste inspired cocktails and boogie the night away.

Participants ate a free feast, all from food that would have otherwise been wasted, dance, drink Toast Ale (beer made from Surplus bread) and a variety of food waste inspired cocktails and boogie the night away.

Disco + Soup = ?

A disco soup is an event where participants cook and eat a meal together made out of food that would have otherwise gone to waste, with music and a dynamic, fun atmosphere.

Feedback organised this event and got partners involved to add various events to the day. This involved workshops and talks from various social enterprises and from some of the most exciting pioneers in food, technology, activism and sustainability.

This is a tried and tested method of raising awareness and is very effective and bringing together local actors and engaging

the public in a fun and dynamic way. This event raised public awareness and education, as well as created media attention around the issue.

By preventing food waste

Reducing food waste at health care institutions in Bruges

The City of Brugge supports 4 healthcare institutions (2 hospitals, an elderly home and a public caterer delivering to healthcare organizations) over one year in an effort to reduce food waste and save costs. The process supports these institutions to measure food waste, learn about best-practices, develop their own set of measures to reduce food waste, test those measures on a small scale, and upscale them in their entire organization.

Why?

According to Wageningen University, hospitals in the Netherlands waste on average 40% of their food. Reducing food waste can save between 50.000-150.000 euro per year per hospital.

Who is involved?

Employees of the hospitals from the catering or facility services, nurses, experts from across Europe.

What are the goals?

The goal of the project is, in one year, to reduce food waste and costs by 20% in these organizations.

By recovering and redistributing food

Extraordinary Almere



What is it?

A partnership of profit and non-profit organisations that work to reduce food waste and use food surplus. They offer healthy food to low-income people. They distribute food

surplus through distribution points to deliver it to those in need.

Why?

Their aim is to link two policy priorities: sustainability within the city and reducing poverty. By connecting food surplus to those in need, food poverty is addressed in a sustainable way, simultaneously reducing the climate impact of avoidable food waste.

Who is involved?

Extraordinary Almere works with neighbourhood teams, hospitals, Rabobank (funding), Floriade 2022, welfare organizations, supermarkets, hospitality, farmers, police, media and press, politicians etc.

What are the outcomes?

The number of food operations fluctuates around a rate of 3-4 operations from supermarkets, 2 days per week. They will launch a monthly cooking class with surplus food in all distribution points. These classes will use professional kitchens and refrigeration equipment. The aim is to educate not only about food surplus, but also about healthy eating on a budget.

By stimulating social innovation and entrepreneurship

Food waste challenge Leuven



FoodWIN hosted a startup process over several months to encourage entrepreneurship where students and young professionals were challenged to build their own social enterprise to reduce food waste in one day. The event involved innovation and coaching processes to support the entrepreneurs. Participants visited places where food waste occurs: a farm, a bakery, people's homes. They did gleaning, a bread recovery, a cooking workshop, and organised a Disco Soup. Afterwards, they were inspired by successful entrepreneurs to develop and implement their own ideas.



WHY REDUCE FOOD WASTE?

- Reducing food waste reduces costs
- Reducing food waste can reduce greenhouse gases by 12%
- 1 euro invested saves 8 euro for waste management services, 14 euros to companies, 84 euros to households
- Feed people in need

WHERE TO START?

- ANALYSE
- MAKE A STRATEGY WITH STAKEHOLDERS
- TAKE ACTION

WHAT TO DO CONCRETELY?

- RAISE AWARENESS
- PREVENT FOOD WASTE
- REDISTRIBUTE AND REUSE FOOD SURPLUS
- STIMULATE ENTREPRENEURSHIP AND INNOVATION

Why a food waste challenge?

This innovation process creates sustainable and self-sufficient means of tackling food waste. We supported people to set up businesses that use food surplus or help existing businesses use food surplus.

Two new businesses reducing food waste were launched from the initiative, creating jobs and systematically reducing food waste: Shak'Eat and WOW Food. It also created PR for the city and for the entrepreneurs, who increased their visibility and their professional network, meeting potential partners/donors.

Who was involved?

FoodWIN provided the participants with expertise on food waste and social entrepreneurship. The coaching and master-class processes brought together innovative coaches, current entrepreneurs, panel speakers and expert jury members; combining various expertise and experience in working with food waste.

References

<http://www.drawdown.org/solutions/food/reduced-food-waste>

¹ Estimates of European food waste levels, Stenmarck Å. et al, project FUSIONS, available: <https://www.eu-fusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf>

² Project Drawdown, Reduced Food waste, <http://www.drawdown.org/solutions/food/reduced-food-waste>

³ Refresh project National Platforms, <https://eu-refresh.org/national-platforms>

⁴ Preparatory study on food waste across EU 27, 2010, http://ec.europa.eu/environment/archives/eusssd/pdf/bio_foodwaste_report.pdf

⁵ Food waste awards, <http://foodwasteawards.be>
https://ec.europa.eu/food/sites/food/files/safety/docs/fw_lib_business-case_en.pdf this link is not working; is this: The business case for reducing food loss and waste,

⁶ A report on behalf of Champions 12.3, https://champions123.org/wp-content/uploads/2017/03/report_-business-case-for-reducing-food-loss-and-waste.pdf

⁷ Rest-O-Pack project by Bruxelles Environment, <http://www.foodwin.org/portfolio/rest-o-pack/>

⁸ La plateforme de gestion des dons alimentaires, <https://www.bourseaux-dons.be>

⁹ Food Fair platform - Bourse aux dons / Schenkingsbeurs, <https://eu-refresh.org/food-fair-platform-bourse-aux-dons-schenkingsbeurs>

¹⁰ SavingFood, <https://foodwin.org/portfolio/saving-food-2-0/>

¹¹ Simões ALP, Combate ao desperdício alimentar como contributo para o Desenvolvimento Local Sustentável, Dissertação, Escola Superior de Educação, https://comum.rcaap.pt/bitstream/10400.26/18328/1/ANA_POETA_SIMOES.pdf

4.7 UTILIZATION OF 2ND CLASS FRUITS AND VEGETABLES



KATRI JOENSUU, NATURAL RESOURCES
INSTITUTE FINLAND (LUKE)

Introduction

Losses and waste of fruit and vegetable vary globally from 35 to 55 % of total production¹. Up to 20 % of total production is lost in the production (growing) stage while waste at the consumption stage can be significant. A large part of loss in the agricultural stage occurs because of quality standards related to the size, shape and appearance^{2,3,4}. In Europe, these kinds of standards were originally set by EU legislation.

For example, the EU has set general marketing standards for fresh fruits and vegetables (Regulation EC 1221/2008)⁵. The purpose of the marketing standards and requirements for fresh fruits and vegetables is to facilitate trade, particularly in the international, but also in the national market. The requirements help to ensure that buyers are offered high quality products. All products must be of good quality:

- intact
- sound (for example, not rotten, severely bruised or severely damaged)
- clean
- fresh in appearance
- practically free from pests
- practically free from flesh damage caused by pests
- free of abnormal external moisture
- free of foreign smell or taste
- sufficiently developed/ripe, but not overdeveloped/over-ripe

In addition, further cosmetic specifications are used in quality classification:

- Extra - superior quality: uniform in size, shape, color and appearance and free from defects with the exception of very slight superficial defects
- Class I - good quality: slight skin defects as well as slight defects in shape and colouring are allowed
- Class II - reasonably good quality: depending on the product skin defects as well as slight bruising and defects in shape and colouring are allowed.

Initially the cosmetic specifications were applied to all fruits and vegetables, but from 2009 they only apply to ten product types: apples, citrus fruit, kiwifruit, lettuces, curled leaved and broad-leaved endives, peaches and nectarines, pears, strawberries, sweet peppers, table grapes, and tomatoes.

Although the cosmetic specifications are no longer used for other fruits and vegetables by EU legislation, they continue to be used by supply chain actors because they assume that consumers are not willing to buy fruits and vegetables with any cosmetic flaws⁶. In addition, farmers, producer organisations, and retail chains often set even stricter requirements on product cosmetic quality. Farmers, for example, may want to be profiled as high quality producers.

As a result the products that have differences in appearance are classified as 2nd class or sorted out and end up as waste, although their nutritional and hygiene quality at least as good as 1st class⁶. If the products are sold as 2nd class the price for the farmer is usually significantly lower than that of 1st class, and so it may not be profitable for the farmer to sell the product⁷. Also, selling cheaper 2nd class products alongside 1st class alternatives may cause unwanted competition and reduce sales of the 1st class product.⁶

Share of 2nd class fruits and vegetables in primary production

A Nordic food waste project⁸ found that on average 12 % of carrot yield was not sold for use as food because of differences in appearance (size, shape, small cosmetic faults) (figures 4.7_1 and 4.7_2). In the production of other vegetables, the share is not so large (table 4.7_1). However, it has been found that the amount of loss can vary greatly year to year and between farms, and that the occurrence is often strongly seasonal. For example, the side flow (a flow of food products that is meant for human consumption but is diverted to other uses or becomes waste⁹) from strawberries and iceberg lettuce that are discarded at harvest occurs in summer over a very limited time period, while the side flow from carrots and onions that are stored for long periods can occur at any time during autumn, winter, and early spring. In greenhouse cucumber and tomato production, the share of side flow is very small, and in practice it all consists of products with differences in size or shape (table 4.7_1, figures 4.7_3 and 4.7_4).

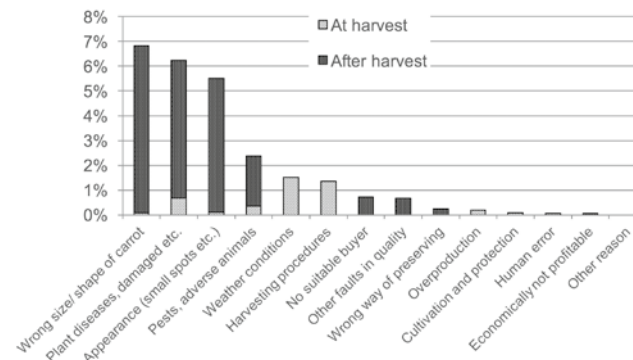


Figure 4.7_1. Reasons for side flow (part of the yield that is not sold for food use), in carrot production in Finland. In total, 26 % of carrot production was side flow.

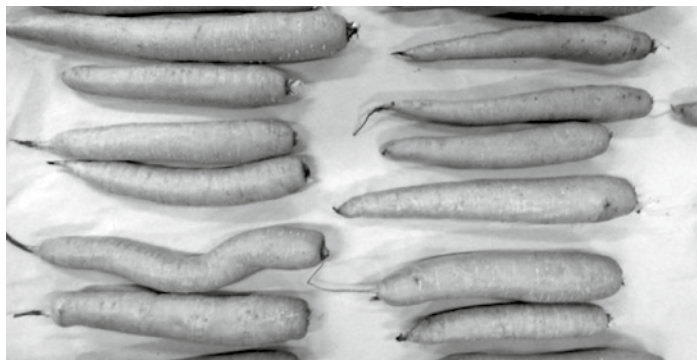


Figure 4.7_2. Carrots discarded from food use due to differences in shape. Picture taken by Paula Rannikko, Häme University of Applied Sciences.

Table 4.7_1. On-farm losses of vegetable products due to differences in appearance, share of total production^{9, 9, 10}.

Product	Share of products with wrong size, shape or cosmetic faults	Total share of side flow
Carrot	12 %	26 %
Onion	2 %	11 %
Iceberg Lettuce	3 %	17 %
Strawberry	1 %	14 %
Potato	9 %	16 %
Green pea	0,3 %	18 %
Greenhouse cucumber and tomato	1 %	1 %



Figure 4.7_3. Curved cucumbers sold as 2nd class product in a retail store. Picture taken by Katri Joensuu.

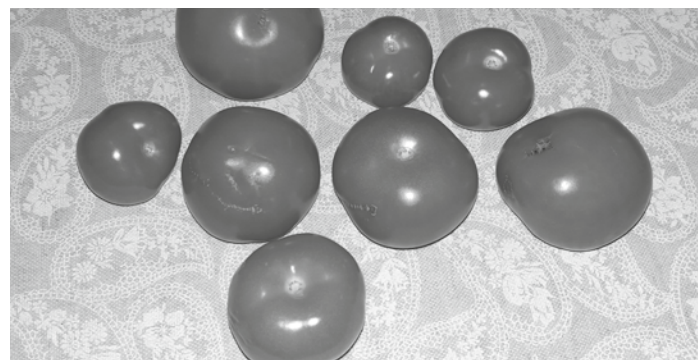


Figure 4.7_4. 2nd class tomatoes sold in a retail store. Picture taken by Katri Joensuu.

Marketing campaigns and other solutions to avoid waste of 2nd class fruits and vegetables

Selling 2nd class products as such

In the recent years there have been several initiatives related to the marketing of fruits and vegetables with cosmetic flaws directly to consumers without further processing (table 4.7_2). Most of these have been marketing campaigns conducted by retail chains. These kind of campaigns offer a positive means to inform the consumer about food waste and how it can be reduced in practice. In all the examples presented in table 4.7_2., the price of the products is also set significantly lower than that of similar 1st class products to attract consumers. Positive consumer feedback is highlighted in the campaign materials and web pages of e. g. Imperfect Produce and Inglorious Fruits and Vegetables (table 4.7_2).

Table 4.7_2. Examples of initiatives and marketing campaigns promoting the use of 2nd class fruits and vegetables (non-exhaustive list).

Country and region	Name	How it works	Starting year	Price related to 1st class product
USA, California	Imperfect Produce ¹¹	Products are sourced directly from farms and distributed to consumers in customized mixed boxes	2015	30 to 50 % lower
Canada	The Misfits (Save-on-Food) ¹²	Products are sold in retail stores	2016	up to 50 % lower
USA, Virginia	Practically Perfect ¹³	Products are sold in retail stores	2017	ca. 30 % lower

Country and region	Name	How it works	Starting year	Price related to 1st class product
France	Inglorious Fruits and vegetables (Inter-marché) ¹⁴	Products are sold in retail stores	2014	30 % lower
UK	Wonky veg box (Asda) ¹⁵	Products are sold in retail stores in mixed boxes	2016	31 % lower
UK	Perfectly Imperfect (Tesco) ¹⁶	Products are sold in retail stores	2016	up to 50 % lower
UK	Wonky veg (Morrisons) ¹⁷	Products are sold in retail stores	2015	31 % lower
Germany	Krumme Dinger (Aldi Süd) ¹⁸	Products are sold in retail stores	2017	lower
Germany	Keiner ist Perfekt (Edeka) ¹⁹	Products are sold in retail stores	2013	lower
Switzerland	Unique (Coop) ²⁰	Products are sold in retail stores	2013	up to 60 % lower
Austria	Wunderlinge (Billa) ²¹	Products are sold in retail stores	2013	lower
Finland	Curved cucumbers (S-group) ²²	Products are sold in retail stores	2014	30 to 50 % lower

However, although these kinds of campaigns help to reduce food waste at the farm stage, they may not be very good for the farmer. It should be noted that none of the campaigns show direct farmer feedback in their materials, indicating that the farmers are not so enthusiastic about the operations. Even

when the farmer manages to sell a bigger share of the yield, the prices paid for the 2nd class products may be lower than the costs of packing and distributing it to the market. In many cases, the producer prices of 1st class products can be very low compared to production costs. It is also possible that Also, the availability of the 2nd class products can be strongly seasonal and unpredictable. For these reasons, it can be difficult to extend the marketing campaigns to a more permanent practice.

Also, the campaigns have been criticized for not questioning the root causes of the wastage of 2nd class products, which are often the strict quality requirements of product appearance set by the supply chain actors, for example the retail chains themselves. Also, although the campaigns highlight that the nutritional, hygienic quality, and taste of the products are as good as those of 1st class equivalents, the prices are set remarkably lower, which in turn gives a contradictory message to the consumer. If the product is as good as the 1st class equivalent, why does the price need to be lower?

Further processing 2nd class products

Some examples can also be found of initiatives where 2nd class products are further processed to produce new kinds of food products. It should be noted that in the production of many crops, it is common practice to use the 2nd class produce in processing, e. g. apples to wine or cider production and malformed carrots to the production of “baby” carrots²³. However, there are companies whose whole business idea is based on the utilization of 2nd class products that would otherwise be wasted and they use this as the main selling argument of the products (table 4.7_3). It is remarkable that these companies provide detailed information about the farms where they source their raw materials from. This indicates that also the farmers are committed to the practice. Also, these companies produce more value-added products and do not attempt to attract consumers with reduced prices. This is in line with the arguments regarding high product quality.

Table 4.7_3. Companies processing 2nd class fruits and vegetables to new products

Country	Company	Product
Germany, Berlin	Dörrwerk ²⁴	Fruit paper snacks from fruits and berries from local farmers (+ exotic fruits from abroad)
The Netherlands	Kromkommer ²⁵	Vegetable soups from fruits and vegetables from local farmers

Avoiding retail waste

Some examples can also be found on initiatives targeting food waste of fruits and vegetables that end up as 2nd class in the distribution and marketing stages of the food chain. In Sweden, there has been a project on decreasing banana waste in retail stores²⁶. Here, consumer information was provided of the degrees of ripeness related to the colour of bananas, aiming to get consumers to select the riper ones that already have brown spots but have the best eating quality. Another example is a practice started by a retail store keeper in Finland. Here the fruits and vegetables that show signs of reaching the end of their self-life (but still are perfectly edible) are sorted out from the shelves and are packed in mixed boxes and provided to the customers with a very low price (viite). In this case the shop keeper is able to still make a little money with the products and also is able to avoid costs that would be caused by waste treatment.

Consumer acceptance of 2nd class fruits and vegetables

Retail chains often state that the consumers are not willing to buy 2nd class fruits and vegetables, but this idea has been questioned in recent years. Loebnitz et al.²⁷(2015), De Hooge et al.²⁸(2017) and Topolansky-Barbe et al.²⁹(2017) have studied

consumer acceptance of fruits and vegetables with cosmetic flaws. De Hooge et al.²⁸(2017) surveyed 4214 consumers in five European countries: Denmark, Germany, Norway, Sweden and the Netherlands. Loebnitz et al.²⁷ studied the opinions of 964 consumers in Denmark, and Topolansky-Barbe et al.²⁹ included 213 consumers in Germany. In all of the studies, the consumers were shown pictures of fruits and vegetables with cosmetic flaws and they were asked whether they would buy such a product. Loebnitz et al.²⁷ included two levels of cosmetic flaws: they showed the respondents pictures of moderately abnormal and extremely abnormal fruits and vegetables.

According to Loebnitz et al.²⁷, the shape of the fruits and vegetables (apples, lemons, carrots and eggplants were chosen for the study) affected the purchase intentions of consumers only if the products were extremely malformed. Moderate shape differences did not affect purchase intentions at all. However, the results of de Hooge et al.²⁸ and Topolansky-Barbe et al.²⁹ show that consumer acceptance varies strongly between the products, for example an apple with a spot would be selected by very few consumers, while more than three out of four would choose vegetables with deformations, such as a heart-shaped potato (table 4.7_4.).

In two of the studies (de Hooge et al.²⁸ and Topolansky-Barbe et al.²⁹), the respondents were also asked how big discount relative to the equivalent 1st class products they would require in order to be induced to select the 2nd class product. Both studies showed that reducing the prices of the 2nd class fruits and vegetables increased the consumers' willingness to buy them. However, also the amount of the required discount varies strongly between different products (table 4.7_5). In the study of Topolansky-Barbe et al.²⁹, most consumers answered that 10 to 20 % discount would be sufficient, when they were asked about their opinion of 2nd class products in general. In the study of de Hooge et al.²⁸ on the other hand, it was shown that an apple with a spot needs a much greater discount than a curved cucumber.

Based on these findings it seems that different kinds of cos-

metic flaws should not be seen as one single group. Although consumers do not like one type of cosmetic flaw, they may react very positively towards another type. All three studies found that awareness of food waste issues increases the acceptance of cosmetic flaws. De Hooge et al.²⁸ also found that younger customers are more willing to buy 2nd class fruits and vegetables.

Table 4.7_4. Likelihood of consumers to buy fruits and vegetables with cosmetic flaws.

Product	Likelihood to buy
Apple with a spot	3 % ²⁸
Curved cucumber	25 % ²⁸
Vegetables with deformations (carrot as an example)	54 % ²⁹
Vegetables with cosmetic flaws (carrot as an example)	10 % ²⁹
Vegetables with discoloration (carrot as an example)	33 % ²⁹
Vegetables with deformations (a heart shaped potato as an example)	76 % ²⁹

Table 4.7_5. Discounts needed for fruits and vegetables with cosmetic faults in order to be selected by consumers.

Product	Discount need
2nd class fruits and vegetables in general	10-20% ²⁹
Apple with a spot	67 % ²⁸
Curved cucumber	24 % ²⁸

Opportunities related to marketing 2nd class fruits and vegetables

It can be possible that consumers avoid buying 2nd class fruits and vegetables simply because they are not available in mainstream supply chains. De Hooge et al.²⁷ point out that consumers can become accustomed to cosmetic faults over time and select them more often if they see them frequently in retail stores. In the current mainstream supply chains, 2nd class products are seen as an abnormality⁶. However, for example organic products are marketed in such a way that their non-perfect shape is a sign of their authenticity and naturalness. Alternative marketing channels such as direct sales from farmers to consumers offer situations where the size, shape, and appearance of the products is not critical.

As was pointed out previously, awareness of food waste issues increases consumer acceptance of 2nd class fruits and vegetables^{27, 28, 29}). 2nd class products could therefore be marketed in a positive way as a means for the consumers to contribute to the reduction of food waste in the in the whole food chain⁶. Food waste reduction has indeed successfully been used as an argument in many of the marketing campaigns mentioned above (table 4.7_2.), and there seems to be no reason why it could not be used in longer term marketing of the products as well.

In addition, the exclusiveness of the 2nd class products could be emphasized in marketing. For example products with different size or shape than that of the 1st class alternatives could be branded as distinct products for special uses such as “small tomatoes” or “big carrots”.

Conclusions

Quality standards related to the size, shape and appearance are one of the biggest causes of food waste occurring in primary production of fruits and vegetables. Initially the standards were set by legislation, but food chain actors, including

farmers themselves, keep up quality standards that often are stricter than what legislation requires. Products with cosmetic flaws are classified as 2nd class and are often sorted out of the food chain. The exact volume of food waste caused by the cosmetic classification standards cannot be given because the share of 2nd class products varies between the different types of fruits and vegetables, as well as years and farms. Losses due to cosmetic quality have yet been analysed only in a few studies.

2nd class fruits and vegetables have already been sold in several marketing campaigns, but the sales have not yet become a permanent practice. The challenges related to the marketing of 2nd class products are related to the beliefs that the consumers are not willing to buy products that do not look perfect. The food chain actors often want to be profiled as high quality producers, and therefore only sell 1st class products. Also, the production of 2nd class fruits and vegetables is often strongly seasonal which limits their large scale marketing to consumers. The producers also suspect that selling cheaper 2nd class products alongside 1st class alternatives may reduce the sales of the 1st class products.

However, consumer studies suggest that the acceptance of 2nd class products can be increased by increasing their availability in retail stores and marketing them as a means for consumers to reduce food waste in the in the whole food chain. Also, it should be questioned whether 2nd class fruits and vegetables really need to be sold for a remarkably lower price.

¹ Gustavsson, J., Cederberg, C., Sonesson, U., van Otterdijk, R., & Meybeck, A. 2011. Global food losses and food waste: extent, causes and prevention. FAO, Rome. <http://www.fao.org/docrep/014/mb060e/mb060e00.pdf>

² Beretta, C., Stoessel, F., Baier, U., Hellweg, S., 2013. Quantifying food losses and the potential for reduction in Switzerland. *Waste Manag.* 33, 764-773. <https://doi.org/10.1016/j.wasman.2012.11.007>.

³ Buzby, J.C., Hyman, J., Stewart, H., Wells, H.F., 2011. The value of retail- and consumer-level fruit and vegetable losses in the United States. *J. Consum. Aff.* 45 (3), 492-515.

- ⁴ Gobel, C., Langen, N., Blumenthal, A., Teitscheid, P., Ritter, G., 2015. Cutting food waste through cooperation along the food supply chain. *Sustainability* 7, 1429-1445. <https://doi.org/10.3390/su7021429>.
- ⁵ EC 2008. Commission Regulation (EC) No 1221/2008 of 5 December 2008 amending Regulation (EC) No 1580/2007 laying down implementing rules of Council Regulations (EC) No 2200/96, (EC) No 2201/96 and (EC) No 1182/2007 in the fruit and vegetable sector as regards marketing standards. *Official Journal of the European Union* L336. <https://publications.europa.eu/en/publication-detail/-/publication/Od4cb359-dfef-462c-bfd0-8c18f2d-b87ae/language-en>
- ⁶ deHooge, I. E. van Dulm, E. & van Trijp, H. C. M. 2018. Cosmetic specifications in the food waste issue: Supply chain considerations and practices concerning suboptimal food products. *Journal of Cleaner Production*, 183, 698-709.
- ⁷ Mattsson, K. 2014. Vi slänger frukt och grönsaker i onödan- varför? Jordbruksverket, Rapport 5/2014. https://www.jordbruksverket.se/download/18_37e9ac46144f41921cd2a1e/1395998034568/Rapport_Vi+sl%C3%A4nger+frukt+och+gr%C3%B6nsaker+i+on%C3%B6dan_140328.pdf
- ⁸ Hartikainen, H., Svanes, E., Franke, U., Mogensen, L., Andersson, S., Bond, R., Burman, C., Einarsson, E., Eklöf, P., Joensuu, K., Olsson, M. E., Räikkönen, R., Sinkko, T., Stubhaug, E., Rosell, A., Sundin, S. 2017. Food losses and waste in primary production. Case studies on carrots, onions, peas, cereals and farmed fish. *Nordic Counsel of Ministers. TemaNord 2016:557* <https://norden.diva-portal.org/smash/get/diva2:1076202/FULLTEXT01.pdf>
- ⁹ Franke et al. 2016 Food losses and waste in primary production, Data collection in the Nordic countries <https://norden.divaportal.org/smash/get/diva2:945862/FULLTEXT02.pdf> TemaNord 2016: 529
- ¹⁰ Hartikainen, H., Kuisma, M., Pinolehto, M., Räikkönen, R., & Kahiluoto, H. 2014. Ruokahävikki alkutuotannossa ja elintarviketaloustuksessa. *Foodspill 2-hankkeen loppuraportti*. <http://jukuri.luke.fi/bitstream/handle/10024/485067/mttraportti170.pdf?sequence=1&isAllowed=y>
- ¹¹ <https://www.imperfectproduce.com/>
- ¹² <https://www.misfitsproduce.ca/>
- ¹³ <http://asdevelop.org/practically-perfect/>
- ¹⁴ <http://itm.marcelww.com/inglorious/>
- ¹⁵ <http://your.asda.com/news-and-blogs/asda-s-phenomenal-wonky-veg-coming-to-a-store-near-you>
- ¹⁶ <https://www.ourtesco.com/2016/04/14/our-perfectly-imperfect-range/>
- ¹⁷ <https://www.theguardian.com/business/2015/dec/18/morrisons-waste-initiative-wonky-vegetables>
- ¹⁸ <https://unternehmen.aldi-sued.de/de/presse/pressemitteilungen/verantwortung/2017/pressemitteilung-aldi-sued-krumme-dinger/>
- ¹⁹ <https://www.welt.de/newsticker/news1/article120720432/Edeka-verkaufstestweise-auch-krummes-Obst-und-Gemuese.html>
- ²⁰ <http://www.coop.ch/de/labels/unique.html>
- ²¹ https://www.billa.at/Sortiment/Obst_und_Gem_se/Obst_und_Gem_se/dd_bi_channelpage.aspx
- ²² <http://www.ptty.fi/kaupan-toiminta/ruokahavikin-vahentaminen/prisman-kayrat-kurkut-ja-toisenlaiset-tomaatit-maistuvat-suomalaisille>
- ²³ <http://karotia.fi/in-english/>
- ²⁴ <https://www.doerrwerk.de/>
- ²⁵ <https://www.kromkommer.com/english/>
- ²⁶ Strid, I., Eriksson, M., Lagerberg Fogelberg, C., Hernant, M. 2013. Minskat matsvinn från livsmedelsbutiker - sammanfattning av ett forskningsprojekt kring matsvinn. Sveriges lantbruksuniversitet (Swedish University of Agricultural sciences), Institutionen för energi och teknik. 12 pp. <http://handelsradet.se/wp-content/uploads/2014/11/2013-Minskat-matsvinn-fran-livsmedelsbutiker.pdf>
- ²⁷ de Hooge, I. E., Oostindjer, M., Aschemann-Witzel, J., Normann, A., Loose, S. M., & Almlí, V. L. 2017. This apple is too ugly for me!: Consumer preferences for suboptimal food products in the supermarket and at home. *Food Quality and Preference*, 56, 80-92.
- ²⁸ Loebnitz, N., Schuitema, G., Grunert, K., 2015. Who buys oddly shaped food and why? Impacts of food shape abnormality and organic labeling on purchase intentions. *Psychol. Market.* 32 (4), 408e421. <https://doi.org/10.1002/mar.20788>.
- ²⁹ Topolansky Barbe, F., Von Dewitz, P., & Gonzalez Triay, M. 2017. Understanding Consumer Behaviour to Develop Competitive Advantage: A Case Study Exploring the Attitudes of German Consumers towards Fruits with Cosmetic Flaws. *International Journal of Academic Research in Business and Social Sciences*, 554-580.



FOUNDATION FOR EUROPEAN
PROGRESSIVE STUDIES
FONDATION EUROPÉENNE
D'ÉTUDES PROGRESSISTES

FEPS is the only progressive think tank at European level. FEPS establishes an intellectual crossroad between social democracy and the European project, putting fresh thinking at the core of its action. As a platform for ideas and dialogue, FEPS works in close collaboration with social democratic organisations, and in particular national foundations and think tanks across Europe, to tackle the challenges that Europe faces today. Our main purpose is to nourish a fresh progressive dialogue through its research, which includes Next Left and Millennial Dialogue programmes. Activities are in person or online and available in different formats, notably FEPS Progressive Post magazine as well as further publications and events where you can find our material.



BRĪVĪBAS UN SOLIDARITĀTES FONDS

Freedom and Solidarity Foundation (BSF – Brīvības un solidaritātes fonds) has been established in 2007. BSF is primarily focused on organization of various educational events about important up-to-date issues. To achieve its goals, BSF holds discussions, conferences, seminars, lectures and other informative events, as well as publishes related articles on its website and elsewhere. BSF sees academic environment as the main and most fruitful contributor of serious proposals for public governance organizations in order to develop effective and better solutions to improve welfare of the state, to encourage social justice, as well as to form successful and modern society in Latvia.



Why food waste is a big deal and how to scale-up preventive action

Food waste, nobody wants it, so why is preventing it such a big deal?

It is wasteful financially yet moreover it constitutes to one third of global emissions. Therefore addressing this is important in preventing global warming and climate change too. Wastage can be found right along the food chain, from production to consumption, it strains our natural resources, land, water and energy.

To a large extent there is action being taken nevertheless there is huge potential and need for this to be scaled up even further if we are to address this seriously.

This publication is intended to illustrate the main issues to the reader as a complement to this fast-developing debate. It clearly sets out the significance and responsibility of action in preventing food waste, outlining the challenges and showcasing the opportunities and benefits that could be brought about. The format is a collection of articles from different contributors that look at the political, scientific, business case and educative aspects of food waste.

It includes articles from Commissioner Andriukaitis for Health and Food Safety and Bijlana Borzan MEP as well as other authors from across Europe with experience in this field.

- This book is edited by FEPS with the financial support of the European Parliament
- **ISBN number** 978-9934-8647-3-5