

Reducing food waste

Obstacles experienced in legislation and regulations



WAGENINGEN UR

For quality of life

Reducing food waste

Obstacles experienced in legislation and regulations

Yuca Waarts

Mieke Eppink

Elsje Oosterkamp

Sabine Hiller

Addie van der Sluis

Toine Timmermans

LEI report 2011-059

October 2011

Project code 2273000023 (2010) and 2273000188 (2011)

LEI, part of Wageningen UR, The Hague

Food & Biobased Research, part of Wageningen UR, Wageningen

**Reducing food waste; Obstacles experienced in legislation
and regulations**

Waarts, Y., M.M. Eppink, E.B. Oosterkamp, S. Hiller, A.A. van der Sluis,
A.J.M. Timmermans

LEI report 2011-059

ISBN/EAN: 978-90-8615-538-5

Price €26.75 (including 6% VAT)

128 p., fig., tab., append.

BO-08-008.02-012, Preventing food waste.

This study was commissioned by the Ministry of Economic Affairs, Agriculture and Innovation; Theme: Food Chain Innovations; Domain Food, Animal and Consumer.

Cover photo: Shutterstock

Orders

070-3358330

publicatie.lei@wur.nl

© LEI, part of Stichting Dienst Landbouwkundig Onderzoek (DLO Foundation), 2011

Reproduction of contents, either whole or in part, is permitted with due reference to the source.

LEI is ISO 9001:2008 certified.

Contents

	Preface	7
	Summary	9
	S.1 Key findings	9
	S.2 Complementary findings	10
	S.3 Methodology	10
	Samenvatting	12
	S.1 Belangrijkste uitkomsten	12
	S.2 Overige uitkomsten	13
	S.3 Methode	13
1	Introduction	15
	1.1 Food waste and the food system	15
	1.2 Food waste as a policy focus	16
	1.3 Food waste: detailed description	17
	1.4 Objective of the research and the research questions	18
	1.5 How to interpret the report	19
2	Research approach and delineation	20
	2.1 Research approach	20
	2.2 Delineation	22
	2.3 Terminology	23
3	Perceived obstacles in legislation and regulations in preventing food waste	25
	3.1 Introduction	25
	3.2 European marketing standards	26
	3.3 Contamination in food	29
	3.4 Import control	35
	3.5 Phytosanitary policy	36
	3.6 Novel Foods	38
	3.7 Cooling and freezing meat	40
	3.8 Hygiene rules and product liability	43
	3.9 The provision of food information	49
	3.10 Norms and quotas in fisheries	56
	3.11 The use of animal by-products	59

4	Perceived non-legal obstacles	64
5	Conclusions and recommendations	70
	5.1 General findings	70
	5.2 Findings related to the legislation	70
	5.3 Policy recommendations	75
	Appendix 1	79
	Background information on legislation (I)	
	A1.1 Structure and hierarchy within the law in Europe	79
	A1.2 Contamination in foods	82
	A1.3 Novel Foods legislation	86
	A1.4 Hygiene rules including import checks, refrigeration and inspection of meat	88
	A1.5 Food information provision	89
	A1.6 Use of animal by-products	93
	A1.7 In conclusion: a few important points for attention	98
	Appendix 2	99
	Background information to legislation (II)	
	A2.1 European marketing standards	99
	A2.2 Phytosanitary policy	99
	A2.3 Norms and quotas in fisheries	100
	Appendix 3	103
	Non-legal obstacles encountered in preventing the creation of waste flows, per part of the chain	
	Appendix 4	117
	Non-legal obstacles experienced in the re-use of waste flows for human consumption or animal feed, per part of the chain	
	Appendix 5	127
	Companies and organisations involved in this research	

Preface

An objective of the Dutch Ministry of Economic Affairs, Agriculture and Innovation (EL&I) is that by 2015, food waste in the Dutch supply chains should be reduced by at least 20%. According to business, legislation and regulations encourage food waste. For this reason, the Dutch Ministry of EL&I asked LEI and Food & Biobased Research (both parts of Wageningen UR) to carry out a study into which obstacles in legislation and regulations are causing food waste. After all, understanding these obstacles will also provide tools for reducing food waste.

This study presents information from the perspective of chain actors and the obstacles as they experience them. By means of interviews and two workshops held in 2010, a broad survey was conducted in different sectors (horticulture, meat, arable, dairy, fisheries) and in different parts of the supply chain. Respondents were also asked to suggest solutions to reduce food waste. This report relates to food waste, which also includes the retention of waste flows for human consumption and animal feed.

This report provides an overview of the obstacles and solutions mentioned by chain actors. In part, the obstacles mentioned are a direct result of legislation and regulations or the means of enforcement; in part they relate to causes in a different sphere, but often connected with legislation and regulations. The classification into 'legal obstacles' and 'non-legal obstacles' has been evaluated by a legal expert and policy officials involved. A draft report has been presented to all involved parties. The advisory committee consisted of: Roland Thönissen (2010)/Jacintha Santen (2011), Mireille Boshuizen, Margreet Hofstede, Sandra van Winden, Tineke Martens and Liesbeth Kap on behalf of the Ministry of EL&I and Rob Theelen on behalf of the new Food and Consumer Product Safety Authority (nVWA). Dr H.J. Bremmers, Wageningen University and Dr L.W.D van Raamsdonk (RIKILT) gave advice in the area of legislation.

This report could not have come about without the efforts of a large number of people, from business and from the Dutch Ministry of Economic Affairs, Agriculture and Innovation, the Dutch Ministry of Health, Welfare and Sport and the new Food and Consumer Product Safety Authority (nVWA). We would like to thank everyone for their efforts, comments and advice.

A handwritten signature in black ink, appearing to read 'R.B.M. Huirne', written in a cursive style.

Prof Dr R.B.M. Huirne
Managing Director LEI

Summary

S.1 Key findings

Adaptations to legislation and regulations in two areas can significantly reduce food waste

1. The provision of food information regulation. Incorrect labels, expiration dates that are too short and differ too much for the same type of product, and a lack of clarity about what is permitted after the expiration date has passed - these all lead to food waste. Because of product liability, businesses remove food from the shelves when it is not necessary to do so. The government can stimulate chain parties to reach agreements about the expiration dates for non-perishable products and products with an extremely long shelf life. It can also research the possibility of abolishing the expiration date for non-perishable products if the production date is indicated. ([See Paragraph 3.9](#))
2. The two-hour guarantee (part of the hygiene codes which make up the EU Hygiene Package) results in waste in the catering industry. Extending that period through exemptions would directly result in less food being thrown away. ([See Paragraph 3.8](#))

Food waste needs to be a regular point of attention when adapting legislation. After legislation is adapted, it takes a while before businesses take advantage of new opportunities. The government can help businesses by looking for creative ways to make optimum use of new flows, including waste flows.

Overview of legislation and regulations mentioned in relation to food waste

- | | |
|--------------------------------|---------------------------------------|
| - European marketing standards | - Cooling and freezing meat |
| - Contamination in food | - Hygiene rules and product liability |
| - Import control | - The provision of food information |
| - Phytosanitary policy | - Norms and quotas in fisheries |
| - Novel food | - The use of animal by-products |

S.2 Complementary findings

There are also obstacles relating to legislation and regulations on contamination in food. Norms for contaminants that are too strict result in waste.

Contaminants and maximum residue limits (MRLs) are laid out in EU legislation. In addition, chain parties create stricter norms for themselves and others in order to avoid damage to their reputation. ([See Chapter 3](#))

In particular, there are long procedures for:

- import controls in terms of contamination in food ([See Paragraph 3.3](#))
- the admission of Novel Foods ([See Paragraph 3.6](#))

Adapting legislation in order to reduce food waste has a greater effect when social and economic interests are taken into account. ([See Chapter 4](#))

S.3 Methodology

The Dutch Ministry of Economic Affairs, Agriculture and Innovation (*Economische Zaken, Landbouw en Innovatie*, EL&I) wants to take inventory of the legislative obstacles which could be eliminated in order to reduce food waste and enable the reuse of waste flows. The following questions have been posed:

1. What legislation and which regulations promote food waste or prevent waste flows from being reused?
1. Where in the food chain do legislation and regulations result in food waste or less-than-optimum reuse of waste flows?
2. Which adaptations to legislation and regulations would result in less food waste and better reuse of waste flows? What would be the effects of liberalising or changing legislation and regulations? Would this, for instance, result in a change for the worse in other policy aspects? What are the risks in relation to issues such as food safety?
3. What do businesses and chains need (in addition to the removal of legislative obstacles) and what do they need to do to reduce food waste or increase the reuse of waste flows? What knowledge, insights, innovations, investments, etc. are needed?

The study was carried out in the period from March 2010 to November 2010. More than fifty chain parties, government bodies, and organisations for knowledge development and advice were interviewed or participated in

workshops. The chain parties include the various links in the food chain; and the horticultural, arable, meat, dairy, and fisheries sectors were all represented. The legislation mentioned was examined in depth by a legal expert.

Samenvatting

S.1 Belangrijkste uitkomsten

Aanpassing van wet- en regelgevingen op twee terreinen kan voedselverspilling aanzienlijk verminderen.

1. De wet op de *Voedselinformatieverschaffing*. Verkeerde etikettering, te korte en verschillende THT-termijnen voor één type product én onduidelijkheid over wat is toegestaan na het verlopen van de THT-datum leiden tot verspilling. Bedrijven nemen vanwege productaansprakelijkheid onnodig voedsel uit de schappen. De overheid kan ketenpartijen stimuleren om afspraken te maken over de THT-termijnen voor niet-bederfelijke producten en zeer lang houdbare producten. Ze kan ook de mogelijkheid onderzoeken de THT-datum af te schaffen voor niet-bederfelijke producten onder vermelding van de productiedatum.
2. De 2-uursborging (onderdeel van hygiëncodes die voortkomen uit het *Hygiënepakket*) leidt in de catering tot verspilling. Juist verlenging van die termijn door ontheffingen leidt direct tot minder weggegooid voedsel.

Voedselverspilling moet een vast aandachtspunt worden bij aanpassing van wetgeving. Na de aanpassing duurt het enige tijd voordat bedrijven nieuwe mogelijkheden toepassen. De overheid kan bedrijven helpen bij het zoeken naar creatieve oplossingen om nieuwe (rest)stromen optimaal te benutten.

Overzicht van wet- en regelgeving genoemd in relatie tot voedselverspilling	
- Europese handelsnormen	- Koelen en invriezen van vlees
- Verontreiniging in levensmiddelen	- Hygiënevoorschriften en productaansprakelijkheid
- Importcontrole	- Voedselinformatieverschaffing
- Fytosanitair beleid	- Normen en quota in de visserij
- Novel Foods	- Gebruik van dierlijke bijproducten

S.2 Overige uitkomsten

Er zijn ook barrières rond de wet- en regelgeving Verontreiniging in levensmiddelen. Te scherpe normering voor contaminanten veroorzaakt verspilling. Contaminanten en maximale residulimieten (MRL's) zijn in EU-wetgeving vastgelegd. Daarnaast leggen ketenpartijen zichzelf en anderen strengere normen op om imagoschade te voorkomen.

Er zijn vooral lange procedures bij:

- importcontroles in het kader van verontreiniging in levensmiddelen
- de toelating van Novel Foods.

Wettelijke aanpassingen voor de vermindering van voedselverspilling hebben meer effect wanneer rekening wordt gehouden met maatschappelijke en economische belangen.

S.3 Methode

Het ministerie van Economische Zaken, Landbouw en Innovatie (EL&I) wil inventariseren welke wettelijke belemmeringen kunnen worden geslecht om voedselverspilling te verminderen en om reststromen te hergebruiken. De volgende vragen zijn gesteld:

4. Welke wet- en regelgeving werkt voedselverliezen in de hand of voorkomt dat reststromen worden hergebruikt?
5. Waar in de voedselketen leidt wet- en regelgeving tot voedselverliezen of het niet (optimaal) hergebruiken van reststromen?
6. Welke aanpassingen van de wet- en regelgeving leiden tot minder voedselverliezen en meer (optimaal) hergebruik van reststromen? Welke effecten heeft een verruiming of verandering van wet- en regelgeving? Leidt dit bijvoorbeeld tot verslechtering van andere beleidsaspecten? Wat zijn de risico's in relatie tot bijvoorbeeld voedselveiligheid?
7. Wat is er voor en door bedrijven en ketens nog meer nodig (naast het wegnemen van wettelijke belemmeringen) om voedselverliezen te verminderen of hergebruik van reststromen te vergroten? Bijvoorbeeld welke kennis, inzichten, innovatie, investeringen enzovoort?

Het onderzoek is uitgevoerd in de periode van maart 2010 tot en met november 2010. Met meer dan 50 ketenpartijen, overheidsinstellingen en organisaties voor kennisontwikkeling en advies zijn er interviews of workshops

gehouden. De ketenpartijen zijn de verschillende schakels in de voedselketen en vertegenwoordigen de tuinbouw-, akkerbouw-, vlees- en zuivelsector en de visserij. De genoemde wetgeving is nader onderzocht door een wetgevingsexpert.

1 Introduction

1.1 Food waste and the food system

It is estimated that in the Netherlands, between 30% and 50% of all food produced is lost or thrown away.¹ In total, we in the Netherlands waste at least 9.5m tonnes of food per year, worth at least €4.4bn.² This wastage takes place in all parts of the supply chain and comprises losses in harvesting by farmers, losses during processing and transport of food, unsold products in supermarkets and in companies such as caterers and food thrown away by the consumer. For each separate batch of food lost, the amount of waste may be relatively small, but added together, the total quantity food wasted is large.

There are many owners of the food waste problem: chain actors, consumers and government. So if food waste is to be tackled, many actors will need to be taken into account within the total food system. For a company in the food production chain, the food system consists of factors within the company, the supplying parties and customers and their limiting conditions, the markets and the environment within which the company operates. There are two types of environmental factors:

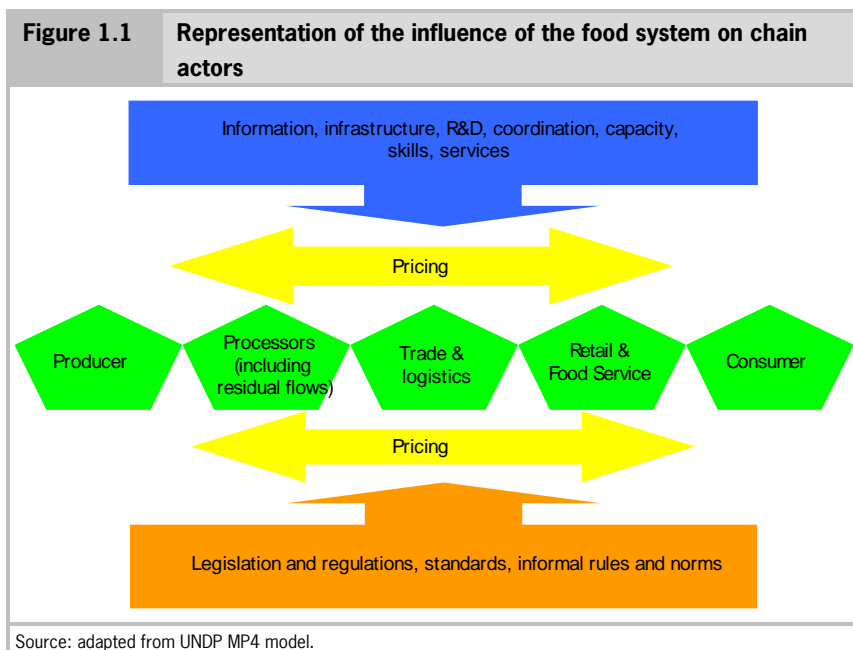
- The *supporting functions*, such as the available information, infrastructure and services, capacity and skills (for example of employees). These affect the choices, operational and chain processes and business objectives.
- The *rules and regulations* imposed by the authorities, but also the informal rules and agreements and standards which are agreed between companies or sectors.

Figure 1.1 depicts the food system centred around the chain actors in schematic form. Pricing is shown separately in the figure as, to an important extent, prices determine how companies act, because they are usually largely focused on cost reduction and/or value creation. Prices are not only determined by the interplay between suppliers and buyers, but also by laws and rules and the supporting functions which affect pricing. Laws and rules can thus influence

¹ Meeusen, M.J.G. and Hagelaar J.L.F., 2008. *Voedselverliezen: hoe denken stakeholders erover?* (Food losses: what do stakeholders think?) The Hague, LEI, 2008, Report 20081014; ISBN 97819018615122912.

² Ministry of Agriculture, Nature and Food Quality, 2010, *Factsheet voedselverspilling* (Factsheet on food waste), www.rijksoverheid.nl/onderwerpen/voeding/voedselverspilling.

the actions of chain actors via prices. As such, barriers which cause food waste can often not be regarded separately from the rest of the food system. This also means that legal barriers cannot be analysed in isolation either.



1.2 Food waste as a policy focus

The Dutch Ministry of Economic Affairs, Agriculture and Innovation wants to have reduced food waste in the Dutch supply chains by at least 20% by 2015. This ambition was formulated in the Policy Document on Sustainable Food (*Nota Duurzaam Voedsel*, 2009) and confirmed in the letter to the Lower House dated 10 December 2010.¹ A mid-term review is planned for 2012.

Over recent years, many initiatives to reduce wastage of food have been set up by businesses and consumers. The Dutch Ministry of Economic Affairs, Agriculture and Innovation has promoted and/or supported many of these initiatives in order to meet this ambition. By means of this study, the Ministry wants to

¹ Letter from the State Secretary for Economic Affairs, Agriculture and Innovation. *Voedingsbeleid* (Food Policy). TK 31 532, no. 43.

map out the barriers which could be eliminated in order to reduce food waste and enable the reuse of residual flows. The emphasis is on barriers relating to legislation and regulations, because prior to the study, businesses had indicated that in their view legislation and regulations were encouraging food waste. Although legal barriers are the line of approach here, they will be analysed in connection with other factors within the food system. Understanding of the barriers with regard to the prevention of food waste and the reuse of residual flows will provide tools for reducing food waste. The perspective in this study is that of the supply chain actors: it is about the obstacles as the chain actors experience them.

1.3 Food waste: detailed description

This research is based on the definition of food waste used by the Dutch Ministry of Economic Affairs, Agriculture and Innovation:

'Food waste exists if food which is intended for human consumption is not used for human consumption. As such, food waste relates to:

- the food which is actually not used by consumers and chain actors for human consumption ('food losses');
- and what is subsequently done with these residual and waste flows (the aim is to maximise utilisation value, preferably keeping the material suitable for human consumption or making it suitable for human consumption again);
- and preventing food from losing quality in the food chain, resulting in it no longer being used for human consumption by consumers or chain actors.'

For the second component, the Dutch Ministry of EL&I uses the so-called 'Moerman Ladder'¹ (by analogy with Lansink's waste ladder which is used in waste management). The extent of food waste increases as we move up this 'ladder':

1. Prevention (avoiding food waste);
2. Use for human food (for example food banks, Salvation Army);
3. Conversion to human food (processing and reprocessing)
4. Use in animal feed;
5. Raw materials for industry (biobased economy);

¹ Ministry of Agriculture, Nature and Food Quality, 2010, *Factsheet voedselverspilling* (Factsheet on food waste), www.rijksoverheid.nl/onderwerpen/voeding/voedselverspilling.

6. Processing to make fertiliser for cofermentation (+ energy generation);
7. Processing to make fertiliser through composting;
8. Use for sustainable energy (objective is energy generation);
9. Burning as waste (objective is destruction, with associated possibility of energy generation);
10. Dumping.

Moerman's Ladder shows the 'optimum utilisation' of residual flows based on an ethical norm, prompted by worldwide food security problems. The ladder begins where there are not yet any residual flows: the optimum use is food. Points two to ten relate to waste flows, food which has been removed from the regular chain. In this study, the emphasis is on the *retention of food for human consumption and for animal feed*. In terms of Moerman's Ladder, that means points one to four.

1.4 Objective of the research and the research questions

The objective of this research is to map out barriers which can be overcome and which, according to the chain actors, will then result in a reduction of food waste. A broad stock-taking exercise has been conducted into causes of waste in the food system, but the emphasis is placed on the perceived barriers with regard to legislation and regulations. The primary question is therefore:

Which barriers could be eliminated in order to reduce food waste?

This question has been elaborated in the following research questions:

1. What legislation and which regulations encourage food waste or prevent waste flows from being reused?
2. For which companies/parts of the food chain do legislation and regulations result in food waste or less-than-optimum reuse of waste flows?
3. Which amendments to legislation and regulations are possible which would result in less food waste and better reuse of waste flows? What effects may be expected from liberalisation/changes to legislation and regulations? Would it, for instance, result in a change for the worse in other policy areas? What are the risks in relation to issues such as food safety?
4. What else do businesses and supply chains need (in addition to the removal of legislative obstacles) to be able to reduce food waste/increase the reuse

of residual flows? What knowledge, insights, innovations, investments, etc. are needed?

The third question touches on the basic principle of food legislation: no unsafe food (art. 14 General Food Law) or animal feed (art. 15 General Food Law) may be brought onto the market. In fact, any contravention of food legislation which causes an unsafe situation for the user of that food can result in a waste flow, in by-products for processing or in a material which is unsafe and needs to be eliminated.

The answers to these research questions shed light on the legal or other perceived barriers in preventing food waste, and will make it possible for Dutch policymakers to prioritise actions to tackle food waste.

1.5 How to interpret the report

Chapter 2 sets out the research approach, a more precise delineation and the terminology used.

Chapter 3 contains the core of the results; the perceived barriers with regard to legislation and regulations. The following aspects will be discussed:

- the type of obstacle: the legislation and regulations mentioned. (See appendices 1 and 2 for background information on legislation.)
- by whom the obstacles are perceived
- which legal or other obstacles are at issue
- which legal or other modifications are suggested by chain actors, including an assessment of effects and risks (in case of a legal obstacle)
- other possible solutions mentioned.

Chapter 4 gives a brief overview of all the barriers which fall outside the legislation and were encountered in the research, including the 'non-legal' obstacles listed in chapter 3.

Chapter 5 rounds off with conclusions and recommendations.

2 Research approach and delineation

2.1 Research approach

A qualitative and broad approach was chosen, with surveys being conducted in different sectors (horticulture, meat, arable, dairy, fisheries) and in different parts of the supply chain. The broad approach was chosen in order to obtain the most complete possible picture of the legal or other obstacles perceived by companies with regard to the prevention of food waste; obstacles *perceived* because that is how they are experienced in practice according to the different chain actors.

Before embarking on the research, an advisory committee was formed consisting of policy officials from various fields within the Dutch Ministry of Economic Affairs, Agriculture and Innovation. The research approach was discussed with the advisory committee.

The research was carried out in phases:

1. A survey of what is already known about legislation causing food waste, by means of literature research and discussions with experts who have been involved in initiatives to reduce food waste in the past or who know a lot about food legislation.
2. Interviews with chain actors in order to establish which legal and non-legal obstacles they experience in practice with regard to the prevention of food waste. For these interviews, a qualitative questionnaire was drawn up, based on the research questions. The interviews were held with representatives of business, members of the *Platform Verduurzaming Voedsel*, umbrella organisations, commodities boards, members of the *Platform Agrologistiek* and government bodies such as the new Food and Consumer Product Safety Authority (nVWA) and the Dutch Ministry of Health, Welfare and Sport (VWS). At least one company was interviewed for each part in the chain: primary production, trade and logistics, processing industry, retail, out-of-home companies and waste and residual flow processors. In many cases, chain actors were unable to specify the amount of total food waste, let alone relate quantities to a specific legal obstacle or other obstacle. Information about the actual scale of food waste was either not available or the information was confidential.
3. Two stakeholder workshops for chain actors and government organisations. The first workshop, held in June 2010, was aimed at obtaining information

about legislation and regulations which cause food waste and impede sustainable business practices. A survey of non-legal obstacles was also carried out. There were 17 companies from the food chain present, including processors of residual flows. In addition, four representatives from nVWA, the Dutch Ministry of Infrastructure and the Environment and the Dutch Ministry of Economic Affairs, Agriculture and Innovation were present. In addition, there were three researchers from Wageningen UR.

4. During the second workshop in September 2010, the most important research results up to that point were presented. In addition, specific legislation which causes food waste and waste flows according to the interviewees was examined in more detail. Discussions were also held about which legislation and regulations cause the most waste and what the effect of amending the legislation and regulations might be on waste and risks for other policy aspects (including food safety). In total, 16 food chain companies attended this workshop, including processors of residual flows. In addition, four representatives from nVWA, the Dutch Ministry of Infrastructure and the Environment and the Dutch Ministry of Economic Affairs, Agriculture and Innovation were present, along with four Wageningen UR researchers.
5. This workshop, too, failed to provide an unambiguous picture of the quantity of food wasted as a result of legislation. However, an impression was formed (based on the legislation frequently cited in the interviews) of which legislation represents the greatest barrier to preventing food waste and the optimum utilisation of waste and residual flows. The chain actors also indicated what they regarded as risks for food safety when amending legislation.
6. After concluding the interviews and the workshops, the results were analysed and divided into legal obstacles and non-legal obstacles. In many cases, it proved difficult for companies to name legislation and regulations related to the obstacles; for this reason, the researchers themselves often linked the obstacles mentioned by the companies to the relevant legislation and regulations. They did the same with the distinction between legal and non-legal obstacles. Legal texts associated with the most frequently cited legal obstacles were evaluated in more detail by a legal expert. This was done in order to be able to establish which legal texts affect food waste in which ways, and whether the legislation in question could be amended. The results of this work are set out in appendices 1 and 2. This step was not foreseen in the research plan. Ultimately, some of the obstacles mentioned proved unrelated to legislation and regulations but were, for example, standards over and above legal requirements (for example hygiene codes),

or chain actors' own interpretation, procedures and enforcement. Moreover, the persons interviewed were not always properly informed about the current legislation and regulations.

7. This report represents the answer to the research questions. Where possible, quantities of food waste derived from the literature and interviews have been included in this report.

In total, we spoke to more than 50 people during the research. Appendix 5 gives an overview of the parties involved.

2.2 Delineation

- The research was focused on the Dutch food supply chains from the primary producer to the consumer (the behaviour of the consumer falls outside the scope of this study).
- A distinction has been made between wastage of food and wastage of residual flows (by failing to make optimum use of residual flows). For the chain actors, this distinction in the research proved useful, because they did not necessarily consider optimum use of residual flows when considering food waste.
- In the reuse of residual flows, the particular focus was on reuse for human consumption, animal feed and cofermentation. In order to make an estimate of optimum use, Moerman's ladder was used.
- Background information on legislation may be found in appendix 1 and has been updated to June 2011. Appendix 2 describes the situation up to October 2010.
- Enforcement also falls under legislation and regulations. To assess the impact on food waste, it is important to know how laws are enforced. With regard to enforcement/monitoring, differences can arise between member states, for example due to differing monitoring frequencies, internal policy of monitoring bodies, a policy of toleration and the level of detail of measurement and tolerance limits in inspections. Differences in enforcement of legislation within the Netherlands and in countries in the EU are cited by chain actors and are therefore reflected in this report. Those differences have not been investigated in more detail in this study.
- The emphasis within this study is on surveying legal obstacles, but because they often cannot be regarded in isolation from other obstacles, we also describe the latter in this report.

- The terms used above are explained further in the following paragraph: this serves to further delineate the study.

2.3 Terminology

In paragraph 1.2, 'food waste' is described and Moerman's Ladder introduced. In this report, we use the term 'food losses' specifically to refer to food waste which is not prevented (the first rung on the ladder) and the non-optimal utilisation of waste and residual flows for the other rungs of the ladder.

The terms 'obstacles' and 'barriers' are used interchangeably. We use these to refer to the same thing. Obstacles to the prevention of food waste related to legislation and regulations can also be viewed as *causes* of food waste.

2.3.1 Waste flows and secondary flows

Waste- and residual flows are organic residual products/by-products from food production generated by a company which for various reasons are lost. They may also be high-value secondary flows generated during production processes. Residual products may no longer be fit for human consumption, but they are suitable for alternative processing. In this report, the terms 'residual flows' and 'waste flows' are used. In the interviews, most companies used the term 'secondary flows'. This is because the term residual flows has a negative connotation for some companies, which does not tally with practice, because these flows can be of great value to them. For this reason, they prefer to speak of secondary flows.

2.3.2 Legislation or legislation and regulations

In order to promote the readability of the text, the term 'legislation' is used here for the whole of the laws and rules adopted by the Netherlands.

2.3.3 Distinction between legal and non-legal obstacles

When mapping out the legal obstacles, many of the obstacles cited proved not to relate to the rules or enforcement of the legislation itself, but to old legislation or interpretation of the legislation by respondents, or 'incorrect' price incentives/costs. All of these obstacles fall outside of the legal obstacles and we call them non-legal obstacles. Some of these non-legal obstacles are more strongly

related to the law and its implementation than others, but in the report we do not make any further distinction between them. Chapter 3 lists non-legal as well as legal obstacles if they were raised by the interviewed persons or workshop participants when naming the legislation.

2.3.4 Chain actors

By chain actors we mean the companies and platform organisations. The chain actors interviewed are named in appendix 5.

3 Perceived obstacles in legislation and regulations in preventing food waste

3.1 Introduction

The obstacles mentioned in this chapter emerged during the interviews with chain actors or during the workshops. The perceived legal obstacles have been grouped by the researchers according to the specific legislation and regulations and are discussed in that way in various paragraphs below. The legislation and regulations involved relate to:

- European marketing standards
- Contamination of food
- Import control
- The entry and control of organisms harmful to plants (phytosanitary policy)
- Novel Foods
- Refrigeration and inspection of meat
- Hygiene requirements
- The provision of food information
- Norms and quotas in fisheries

Information about the relevant legislation and regulations may be found in appendices 1.2 - 1.5 and appendix 2.

This chapter also describes the perceived barriers in legislation and regulations with regard to the optimum reuse of residual flows. Moerman's Ladder (see chapter 1) is the guideline for determining whether residual flows are optimally used. Some barriers relating to the law on animal by-products were also mentioned. These barriers are described in paragraph 3.11. We have limited ourselves here to obstacles to reuse residual flows as food and animal feed, because the emphasis in this study is on preventing food waste, defined as retaining food for human consumption or for animal feed. Information about the relevant legislation and regulations for this subject may be found in appendix 1.6.

The legal texts associated with the perceived legal obstacles of the respondents were mapped out and evaluated by an expert. The information on the legislation and regulations, as well as on the scope for amending this legislation, is

presented alongside the research results from the interviews and workshops. The other results reflect the perspective of the interviewed chain actors.

The main text consists of obstacles as they were cited by the companies: where researchers insert a comment, the text is shown in *italics*.

3.2 European marketing standards

Table 3.1	Obstacles perceived by companies as causing food waste
<i>Obstacles related to which legislation and regulations?</i>	<ul style="list-style-type: none"> - European marketing standards: there are marketing standards for grains, sugar, meat, fruit and vegetables, eggs, milk and dairy products. European regulations describe general and specific marketing standards for different types of food products. The general marketing standards lay down generic minimum quality requirements. Some products have specific marketing standards, with rules for: quality (minimum requirements, classification into classes), grading (size), tolerance, packaging and appellation. The two regulations which apply to European marketing standards are binding in all their components and are directly applicable in every EU member state. In 2009, the number of specific EU marketing standards for fruit and vegetables was reduced from 36 to 10, with the expectation being that the sale of fresh fruit and vegetables with deviant shapes, colours or sizes, etc. to consumers would increase. More information about these regulations is shown in appendix 2.1.
<i>Perceived/cited by whom? Where in the chain?</i>	<ul style="list-style-type: none"> - Wastage (particularly of fruit and vegetables) mainly occurs in the primary sector and among trading parties. The marketing standards were cited by: a commodities board, a trading company, retailers and legal experts.
<i>Perceived legal obstacles</i>	<ul style="list-style-type: none"> - The ten legal European marketing standards that still exist (with regard to fruit and vegetables) cause loss of value in the food chain. Products which deviate from the marketing standard many not be traded as fresh products within the chain. An example has been elaborated below.

Table 3.1

**Obstacles perceived by companies as causing food waste
(continued)**

<p><i>Perceived legal obstacles</i></p>	<p>Because there are many specific rules, the result is that many products fail to meet the standards and therefore cannot be optimally utilised. However, they do not always need to be thrown away, because deviant sizes may still be processed (for example fruit, vegetables, eggs).</p> <ul style="list-style-type: none"> - <i>Evaluation of the legal texts shows that deviation from the specific marketing standards is permitted if a modified label is added for retail bearing a text such as 'product intended for processing'.</i>
<p><i>Perceived non-legal obstacles</i></p>	<ul style="list-style-type: none"> - To date, abolishing 26 marketing standards has had too little effect. Partly this is because retail and other parties have continued to use the standards as private quality requirements. It is also partly because the (new) supply chains are not yet geared up for the new possibilities. - Examples of the private standards which companies believe cause food waste are described below this table.
<p><i>Proposed amendments with assessment of effects and risks</i></p>	<ul style="list-style-type: none"> - Companies did not specifically indicate which amendments to the legislation they wanted, except that they would like to see the existing marketing standards being relaxed too. As regards the European marketing standards for fruit and vegetables, this relaxation of the legislation proved insufficient, because the old marketing standards were still being used as private standards. No implications for food safety are anticipated from amending the marketing standards. At the same time, it must be said that amending the legislation alone is not sufficient to take advantage of the opportunities, certainly not within two years.
<p><i>Other possible solutions to the perceived experienced</i></p>	<ul style="list-style-type: none"> - Companies can themselves reduce food waste by imposing less stringent requirements (private standards) on, for example, the shape of fruit and vegetables and by adjusting their logistical processes accordingly. - Companies can do more to establish where fresh fruit and vegetables with deviant shapes, colours or sizes can be processed.

Source: Interviews with chain actors, information from two workshops and analyses by the researchers.
Italics: Comment by the researchers.

3.2.1 Notes to perceived obstacles with regard to European marketing standards

During the interviews, a number of obstacles were mentioned with regard to European marketing standards. Some examples are shown below.

An example of a legal obstacle with regard to European marketing standards:

- *The marketing standards for the sale of fresh poultry meat:* poultry meat may not first be frozen and then be sold as fresh in a thawed state. Retail organisations only want to sell BBQ skewers as fresh (consumer demand) but there is a large variation in sales. If the BBQ skewers were allowed to be frozen first before being sold as fresh once thawed, less food would be wasted.

Examples of private standards which are stricter than the EU marketing standards for fruit and vegetables:

- *Marketing standard as quality class:* a fruit and vegetable trading company noted that the old European marketing standards are being used by a retailer as private quality classes. Fruit and vegetables which do not meet particular requirements are either thrown away or are processed.
- *Private standards with regard to quality and relating to the existing efficient design of processes:* a fruit grower indicated that he uses as many 'A class' products as possible (high quality), in order to avoid losses in his operation. In his view, processing deviant forms or remainders is not efficient, because the machines are not set up for them. For this reason, he does not buy products with deviant shapes.
- *Private standards with regard to the efficient design of logistic processes:* although 'crooked cucumbers' may be sold following the change to the law in 2009, they are not yet offered for sale in the regular supermarkets, although you do sometimes find them at the market and in Turkish grocery shops. The reason is that the logistic processes have been perfected and that storage and distribution are based on having the largest possible number of cucumbers in a box. In the logistic process, this is much more efficient than for example packing cucumbers with different sizes and shapes. In this case, the less stringent legal norms are therefore not being utilised, because stricter private standards are applied in the trade than the legislation prescribes.

3.2.2 Scope for amending the legislation and/or its implementation in the Netherlands

The two regulations which apply for the European marketing standards are binding in all their components and are directly applicable in every EU member state. This means that the Dutch government has no scope to unilaterally amend this legislation. In the short term, it makes more sense to further develop solutions for alternative sales and processing of products which are now permitted to be used for food or feed.

3.3 Contamination in food

Table 3.2 Obstacles perceived by companies as causing food waste	
<i>Obstacles related to which legislation and regulations?</i>	- Contamination in food: there are various regulations and guidelines concerned with ensuring food safety for animals and humans. A distinction may be drawn between legislation on contamination which occurs during production, microbiological contamination and pesticides and medicines. For all these types of contamination, Maximum Residue Levels (MRLs) have been set at European level by means of regulations. More information about legislation relating to contamination in foods is shown in appendix 1.2.
<i>Perceived/cited by whom? Where in the chain?</i>	- From eight interviews and both workshops it emerged that food is primarily wasted due to contamination in the trade and the fruit and vegetables sector: this is caused among other things by excess MRLs (pesticides), the presence of contaminants and the prohibition on decontamination. This was noted by a representative, a dealer and growers in the fruit and vegetables sector, and by legal experts.
<i>Perceived legal obstacles</i>	- The companies were fairly critical about the underlying principles of the legislation, including the scientific basis for setting MRL values and the measurement methods used for verification.

Table 3.2**Obstacles perceived by companies as causing food waste
(continued)**

<i>Perceived legal obstacles</i>	<ul style="list-style-type: none"> - Businesses cited the following legal obstacles which lead to food waste: <ul style="list-style-type: none"> - In fruit and vegetables, above all MRLs for pesticides: - Application of different standards for MRLs outside Europe; MRL values are getting lower and lower, leading to more food waste; the lack of MRLs for particular substances or their application to particular products, resulting in a low lower limit being assumed; long acceptance procedures for those substances; in some cases, exceeding an MRL means the product is still regarded as safe to eat but is not allowed to be marketed (the public health standard has not been not exceeded). - Zero tolerance for particular substances and ever-improving measurement methods cause further waste. Zero tolerance applies to veterinary contaminants such as hormones and antibiotics. - Prohibition on the use of decontamination or mixing - even though this could prevent waste. - Examples of these legal obstacles which companies believe cause food waste are elaborated below the table.
<i>Proposed amendments with assessment of effects and risks</i>	<ul style="list-style-type: none"> - The amendments which the chain actors would like to see are: <ul style="list-style-type: none"> - The raising of some MRLs. More research could be targeted at establishing MRLs which actually reflect food safety for humans. This could also level the playing field for producers in countries outside Europe, who find it harder to meet low norms. - Instead of destroying products, fines could be imposed for failing to meet the MRL requirements, as long as food safety requirements are met.

Table 3.2	Obstacles perceived by companies as causing food waste (continued)
<p><i>Proposed amendments with assessment of effects and risks</i></p>	<ul style="list-style-type: none"> - Also allowing the use of a crop protection agent which is permitted for one product (e.g. apples) for other similar products (e.g. pears), so that similar products containing residues of this crop protection product are not rejected on that basis. - Changing the zero tolerance for some substances, because better measurement methods are making it increasingly easy to demonstrate that there is a residue on the product. Whether sampling methods and refined measurement methods do indeed lead to waste could be investigated further. - Permit decontamination though allowing mixing more often. According to respondents, this could for example be incorporated into the HACCP, and would yield few problems if properly incorporated within the registration and standardisation procedures. - An assessment of effects and risks: <ul style="list-style-type: none"> - Where MRLs could be increased, companies believe this would lead to much less food being rejected or destroyed. Research would need to investigate how the risks in the field of food safety could be limited. - The question is whether amending the MRLs would lead to less stringent standards adopted in practice by e.g. fruit growers, traders and supermarkets. As a result of the 'naming and shaming' of retailers by NGOs and TV shows in connection with contamination on fruit and vegetables, retailers often set stricter requirements than are required by the legislation, namely a percentage of the MRL. When amending the legislation, fruit growers and supermarkets (for example) will still adhere to stricter standards, albeit perhaps to a lesser extent. Incidentally, the government regulator also play a role here: it provides data which is gathered on the basis of risk analyses and cannot be extrapolated to generate an overall picture.

Table 3.2	Obstacles perceived by companies as causing food waste (continued)
<i>Other possible solutions to the perceived obstacles</i>	<ul style="list-style-type: none"> - If a product does not meet the legal requirements for a relevant risk, it can be destroyed. However, if a physical treatment (other than mixing) can ensure that it does meet the legal requirements, the product may be returned to the regular supply chain after the treatment. The producer/owner or the product takes this decision. For example, if aflatoxin is found in nuts, the owner can perform a physical treatment to ensure that it can nevertheless be returned to the supply chain, or press oil from the nuts (in that case, only the 'lath' is destroyed). - Ensuring that products due to be imported meet EU legislation prevents them from being rejected. - Not enforcing stricter standards between parties than is legally necessary. As regards 'naming and shaming' in connection with MRLs on fruit and vegetables, a dialogue between government, supermarkets, producers and civil-society organisations might help to reduce the negative publicity.
Source: Interviews with chain actors, information from two workshops and analyses by the researchers.	

3.3.1 Notes to perceived legal obstacles with regard to contamination of food

The companies we spoke to cited a number of legislative obstacles relating to contamination of food which encourage food waste. The examples given are shown presented below:

Ever lower MRLs - exceeding the standard and enforcement of different standards outside Europe:

- Ever lower MRLs are being introduced for pesticides, which according to companies is leading to increased losses in storage and reduction of the time a product is permitted to remain on the shelves.
- The MRLs are specific to a product: for example, if one pesticide is permitted for apples and it occurs on pears, the pears are rejected and destroyed.

- In Europe, different MRL standards apply for substances than outside Europe, as a result of which products entering Europe may be destroyed if they fail to meet the European standards.
- For substances for which no MRL has been set in Europe, for example because they are specifically used to combat tropical plant diseases, a low limit applies.
- If products are imported from third countries, measurements need to be carried out to demonstrate that they comply with the MRL standards. If such measurements have not been performed, importation cannot take place. The product is then destroyed or sent back to the country of origin.

The acceptance procedure for new pesticides is very time-consuming:

- Pesticides which are not required in the EU are unlikely to be accepted because that would not be in the EU's interest.
- The public health standard is established using animal testing in accordance with scientific procedures. If a product has been shown to be safe on rats, the standard is set based on the assumption that people are 100 times more sensitive than rats. Companies consider this to be a rather wide safety margin. According to one respondent, the procedure could be speeded up by testing on intact human liver cells, rather than testing on rats.

MRLs and food safety:

- *According to a legal expert, it is indeed the case that some MRL norms are stricter than necessary for food safety. It is therefore possible that food containing levels of contaminants above the MRL is still safe to consume yet is nevertheless rejected and destroyed. In that case, the norms for MRLs are based on what is technically the minimum possible (feasibility norm) if there are risks for public health. Rejecting consignments which do not comply with the feasibility norm but do meet the public health norm therefore actually means rejecting food which is perfectly suitable for consumption - which causes food waste.*

Zero tolerance:

- With regard to some food products, not a single 'part per billion' of a substance may be present in the product to be consumed. If that substance is found, the product is destroyed. In view of the fact that measurement methods are improving all the time, detecting more than '0' of a non-permitted substance in food is becoming increasingly easy, which means that ever more food can be rejected and destroyed. For example: if slightly

more than '0' of Sudan Red or the antibiotic chloramphenicol is found in a ship's cargo, the whole shipment will be destroyed.

Mixing with the aim of decontamination is not permitted in many cases:

- Mixing products with the goal of reducing the level of a substance to a permitted level is prohibited. Decontamination is not permitted if it disguises unhygienic practices.

3.3.2 Scope for amending the legislation and/or its implementation in the Netherlands

To a significant degree, the EU regulations relating to contamination of food directly work through into the national legal systems. This means it is not possible for the Netherlands to unilaterally amend the legally established MRLs. The same applies for decontamination.

3.4 Import control

Table 3.3	Obstacles perceived by companies as causing food waste
<i>Obstacles related to which legislation and regulations?</i>	There are various European regulations which apply to 'more extensive official controls on the import of particular animal feeds and foods of non-animal origin'. Regulation (EC) no. 882/2004 relates to the performance of official controls for the General Food Law (GFL). More information about this legislation is given in appendix 1.4.
<i>Perceived/cited by whom? Where in the chain?</i>	The trade (the fruit and vegetables sector) and the legal experts interviewed cited import checks as a legal obstacle which causes food waste. It is not just the trade which sometimes has trouble with import controls; so do supermarkets with short supply chains which trade directly with exporters in, for example, developing countries.
<i>Perceived legal obstacles</i>	<ul style="list-style-type: none"> - Companies noted that it can take a very long time to obtain permission to import products listed in the appendix to regulation 669/2009. The time taken can be as much as three days. For fresh products, this means that retailers and consumers get products which will not stay fresh as long as expected. - In addition, the number of import inspection locations in the Netherlands is small, which means products spend more time on the road and consignments have to be opened more often. This also cause waste. - Respondents also observed that import controls are carried out more strictly in the Netherlands than in other European countries, and that this contributes to food waste.
<i>Perceived related obstacles</i>	The respondents did not cite any non-legal obstacles related to legislation on import controls.
<i>Proposed amendments with assessment of effects and risks</i>	Companies claim that amending the <i>implementation</i> of this legislation would be sufficient to reduce the waste it causes. So a possibility would be to ensure that checks were carried out more quickly and that more inspection points were established for imports. These amendments need not yield any risk in terms of food safety.
<i>Other solutions</i>	None cited.
Source: Interviews with chain actors, information from two workshops and analyses by the researchers.	

3.4.1 Scope for amending the legislation and/or its implementation in the Netherlands

This European regulation is binding in all its components and is directly applicable in every member state. This means that the Dutch government has no scope to unilaterally amend this legislation. In the areas mentioned (speed of procedures), the Netherlands is able to make amendments.

3.5 Phytosanitary policy

Table 3.4	Obstacles perceived by companies as causing food waste
<i>Obstacles related to which legislation and regulations?</i>	European directive relating to the taking of protective measures against the introduction and spread within the Community of organisms harmful to plants and plant-products. Phytosanitary policy is focused on harmful invasive organisms. Invasive organisms are those which do not naturally occur in the Netherlands but find their way there due to human action. More information about this European guideline and its translation to Dutch policy is contained in appendix 2.2.
<i>Perceived/cited by whom? Where in the chain?</i>	Primarily by producers and companies within the chain and logistics.
<i>Perceived legal obstacles</i>	<ul style="list-style-type: none"> - If a batch of potatoes, fruit or vegetables is contaminated with a disease or infestation, it will be destroyed or sent back in its entirety; the new Food and Consumer Product Safety Authority decides what happens: <ul style="list-style-type: none"> - Products grown in the Netherlands are destroyed. For example, a batch of potatoes contaminated with ring rot. - Imported products are destroyed or sent back to the country of origin. Sending food back also often means food is wasted due to the perishability of the products.¹ - It appears that other European countries enforce different standards. One company reported that a consignment of fruit which had been rejected in the Netherlands nevertheless found its way onto the Belgian market.

¹ One respondent claimed that a rejected declared can also be transported to a country outside the EU instead of to the country of origin, but this could not be verified by the sources on legislation or the nVWA website.

Table 3.4	Obstacles perceived by companies as causing food waste (continued)
<i>Related obstacles perceived</i>	None cited.
<i>Proposed amendments with assessment of effects and risks</i>	A proposal by companies is not to destroy the entire batch in case of contamination but only the contaminated part, while declaring the non-contaminated part suitable for consumption (if necessary after processing). The question is whether this is possible in terms of food safety. Such an amendment to the legislation would again require investigation as to the risks regarding the introduction or spread of harmful organisms in/into the Netherlands.
<i>Other solutions</i>	<i>Ensuring that products for import comply with the legislation.</i>
Source: Interviews with chain actors, information from two workshops and analyses by the researchers. <i>Italics: Comment by the researchers.</i>	

3.5.1 Scope for amending the legislation and/or its implementation in the Netherlands

The European regulation on preventing the introduction or spread of harmful organisms is directed at the member states. This means that member states need to take the necessary measures in public and administrative law to assure the results prescribed in the guideline. This also means that the Netherlands itself provides the detail of this guideline, and that there is scope for national amendment, provided the results prescribed in the regulation are assured. For instance, the Netherlands has opted for a more stringent regime to tackle quarantine diseases such as brown rot and ring rot than the EU pesticide guidelines prescribe, due to the great importance of exports to the Netherlands.¹

¹ Bremmer, J. and R. Slobbe, *Naar Fytopia; Heroverweging van het fytosanitair beleid met behulp van een bestuurskundig kader* (Towards Phytopia; Re-evaluation of phytosanitary policy with the help of an administrative framework). Report 2011-020. LEI, part of Wageningen UR, The Hague, 2011.

3.6 Novel Foods

Table 3.5	Obstacles perceived by companies as causing food waste
<i>Obstacles related to which legislation and regulations?</i>	<ul style="list-style-type: none"> - The European Novel Foods regulation relates to new foods and new food ingredients which were not on the market before May 1997. They may only be marketed by the applicant if the European approval procedure has been completed, on the basis of scientific data and a risk analysis with particular regard to public health. If the food is sufficiently identical to the food which is already on the market ('<i>substantially equivalent</i>'), a simplified procedure may be followed. In practice, requests are always handled by the European regulator. More information about EU regulation relating to Novel Foods can be found in appendix 1.3.
<i>Perceived/cited by whom? Where in the chain?</i>	<ul style="list-style-type: none"> - Novel Foods legislation was not often cited as a cause of food waste by the interviewees. When they did refer to it, it was in connection with companies who wanted to market new products (e.g. an innovative proteins). Genetically modified organisms (GMOs) were cited as having the potential to prevent food waste. (According to the chain actors, in many cases the obstacles to marketing GMOs lie in the emotional sphere.) Experts pointed out that not every new product or new production process is admitted onto the European market.
<i>Perceived legal obstacles</i>	<ul style="list-style-type: none"> - Due to the long acceptance procedure for new products and processes, it may be the case that an optimum use of a foodstuff is not yet possible (e.g. extracts from residual flows for the food industry). - In some cases, products may already be consumed outside Europe, but are not (or not yet) permitted. (For example, the baobab fruit, which meant that for a long time the local population was unable to make optimum use of this fruit, GMOs, etc.).

Table 3.5	Obstacles perceived by companies as causing food waste (continued)
<i>Perceived legal obstacles</i>	<ul style="list-style-type: none"> - According to a number of the interviewees, GMO material could prevent food waste. However, GMOs are only admitted to the EU following approval. If they are accepted, the European market is still closed due to emotional obstacles, according to chain actors. GMOs are now used in Europe as animal feed, following a long acceptance procedure.¹ - Only the applicant is granted a licence, according to the legal texts, and the acceptance therefore does not apply to similar products from other producers.
<i>Related obstacles perceived</i>	<ul style="list-style-type: none"> - According to the chain actors, in many cases the main obstacle to marketing GMOs lies in the emotional sphere. Retailers do not put products containing GMOs on their shelves, even if the GMOs are permitted.
<i>Proposed amendments with assessment of effects and risks</i>	<ul style="list-style-type: none"> - <i>From the interviews we understand that above all else it is the long and costly procedures which form a barrier to bringing a new product onto the market. The individuals interviewed would like to see those procedures shortened and simplified. According to companies, this change would directly result in less waste and a more optimum use of food and residual flows (for example for animal feed, or extracts from residual flows for the food industry). But a relaxation of the legislation could have a negative impact on public health. This risk can be reduced by conducting research and good risk analyses before making legislative changes.</i>
<i>Other solutions</i>	<ul style="list-style-type: none"> - None cited by the respondents.
<p>Source: Interviews with chain actors, information from two workshops and analyses by the researchers. <i>Italics: Comment by the researchers.</i></p>	

3.6.1 Scope for amending the legislation and/or its implementation in the Netherlands

The European regulation and associated procedures are binding in all their components and are directly applicable in every EU member state. This means that the Dutch government has no scope to amend the legislation unilaterally.

¹ Especially for GMOs, the approval procedure is combined with an assessment of the environmental impact (art. 10 of Directive 90/220/EEC).

National acceptance procedures do exist, but the powers which the member states have to object in practice means that European admission takes place by means of 'pre-market approval'. For GMOs, such 'pre-market approval' is always required.

3.7 Cooling and freezing meat

Table 3.6	Obstacles perceived by companies as causing food waste
<i>Obstacles related to which legislation and regulations?</i>	Legal requirements for the refrigeration and inspection of meat are laid down in Regulation (EC) no. 853/2004. More information about this legislation is given in appendix 1.4.
<i>Perceived/cited by whom? Where in the chain?</i>	Meat producers and dealers claimed that legislation related to temperature, inspection and refrigeration of meat encourages food waste.
<i>Perceived legal obstacles</i>	<p>- Checks on deep frozen meat products involve measuring the internal temperature of the meat rather than the external temperature. The internal temperature may be no higher than -18°C. Companies feel bogged down by the existing legislation: it specifies that when checking meat, they have to measure the 'core' temperature, whereas it is the external temperature which is crucial to food safety. However, the companies asserted that the legislation also permitted measurement of the external temperature. They claimed that the measurement of internal temperatures during checks meant that meat was being unnecessarily rejected if this temperature was not low enough.</p> <p><i>At various points, the legislation states that the 'internal' temperature may be no higher than -18°C.¹ For other maximum temperatures cited, the legislation also specifies that a particular temperature must be achieved 'throughout the meat.'² It therefore appears that some respondents were not sufficiently aware of the legislation and others take a critical attitude towards the legislation.</i></p>

¹ Regulation 853/2004.

² Sometimes it is stated that the temperature may not be above 7°C *anywhere in the meat*. For example in Chapter III art. 1a and art. 2cii, Chapter V art. 2.b, and Chapter VI, art. 1a.

Table 3.6	Obstacles perceived by companies as causing food waste (continued)
<i>Perceived legal obstacles</i>	<ul style="list-style-type: none"> - Meat is not permitted to cool down to the maximum temperature during transportation; it must already have cooled down before being transported.¹ According to the companies, this causes extra storage time for the meat, which costs extra energy. - According to respondents, Dutch requirements for the checks on the temperature of meat are stricter than those abroad (higher permitted maximum temperature). Respondents stated that as a result, meat products arriving in the Netherlands are rejected, resulting in products having to be destroyed or losing their value.
<i>Non-legal obstacles perceived related to the legislation cited</i>	<ul style="list-style-type: none"> - <i>It appears that some companies believe that only the external temperature needs to be measured when meat is checked, when in fact it is the internal temperature which needs to be measured by law. This causes meat to be unnecessarily rejected and hence wasted.</i>
<i>Proposed amendments with assessment of effects and risks</i>	<p>Legal amendments cited and assessment of effects and risks:</p> <ul style="list-style-type: none"> - Being allowed to only measure the external temperature of the meat rather than the internal temperature during legal checks. Before the law could be changed on this point, the risks for food safety would need to be investigated, respondents say. If amended, the effect will be that less meat is rejected and destroyed. - A possible amendment which companies would like to see implemented is for meat to be allowed to be cooled during transportation, rather than in storage, if it could be guaranteed that the cold chain would not be interrupted. According to those interviewed, this would entail little risk for food safety, provided the cool chain was not interrupted. - Companies would like to see equally strict enforcement for imports of products in all countries, so that no food waste is caused by differences in enforcement.

¹ This provision is laid down in Chapter VII art. 3 of Regulation 853/2004.

Table 3.6	Obstacles perceived by companies as causing food waste (continued)
<i>Other possible solutions to the perceived experienced</i>	<ul style="list-style-type: none"> - Besides the proposed legislative amendments, companies would also need to improve the design of their processes in order to reduce food waste, but this would require investments. As a result, no immediate reduction in food waste would be achieved by a legislative change on cooling during transportation; the effect would only be seen over time. - Ensuring that importers/exporters know the local/national rules, so that they can respond to the differences in enforcement of the legislation by designing their processes differently. This will result in less meat having to be rejected and destroyed. - Making sure that companies are aware of the legislation on measuring meat temperature, so that meat is not rejected and destroyed unnecessarily.
<p>Source: Interviews with chain actors, information from two workshops and analyses by the researchers. <i>Italics: Comment by the researchers.</i></p>	

3.7.1 Scope for amending the legislation and/or its implementation in the Netherlands

This regulation is binding in all its components and is directly applicable in every member state. This means that the Dutch government cannot amend this legislation for the Netherlands. If what companies say is true, then the Netherlands impose slightly higher requirements when it comes to temperature rules. This could mean that different countries enforce the legislation differently, and that the enforcement of this legislation might be able to be modified in the Netherlands.

3.8 Hygiene rules and product liability

Table 3.7	Obstacles perceived by companies as causing food waste
<p><i>Obstacles related to which legislation and regulations?</i></p>	<ul style="list-style-type: none"> - <i>Hygiene rules</i> are laid down in the European Hygiene Package and comprise various regulations. The objective of the regulations is to prevent microbiological and/or chemical contamination. The basic regulations and standards are not only found in the Hygiene Package, but also in an extensive body of private law or public-private law agreements, rules and accepted policy on implementation. Large companies have food safety systems based on the HACCP. For smaller companies, the procedures are generally translated into hygiene codes by industry bodies; these may be implemented following approval by the Dutch Minister. The hygiene code itself, however, is not law. - <i>Product liability</i> is described in the Commodities Act, but it is dealt with more specifically in terms of food safety in this regulation. <p>More information about the legislation on hygiene rules is presented in appendix 1.4.</p>
<p><i>Perceived/cited by whom? Where in the chain?</i></p>	<ul style="list-style-type: none"> - <i>Hygiene rules:</i> During the workshops, the caterers and other similar companies and processors of animal products interviewed listed various obstacles with regard to the hygiene rules. Caterers and other similar companies in particular are faced with food waste due to this legislation. - <i>Product liability:</i> Caterers, a retailer, residual flow processors (Food Bank, Salvation Army) and experts pointed out that food is often wasted for reasons of product liability (image).

Table 3.7

Obstacles perceived by companies as causing food waste (continued)

<p><i>Perceived legal obstacles</i></p>	<ul style="list-style-type: none"> - During the workshop it was noted that hygiene rules usually prevent food from being wasted, but that due to very wide safety margins, the hygiene rules can also cause waste. The legal obstacles cited by the interviewees with respect to food waste are: <ul style="list-style-type: none"> - Very wide safety margins - Time limits on storing opened packaging and self-prepared products - Two-hour guarantee on unrefrigerated products - Throwing away products after supply (out-of-home) - Hygiene codes which are stricter than the legislation - Differences in evaluation by enforcers depending on sector, company size and code. In other words, are less stringent requirements possible? - Where residual flows for foods are reused, they must meet the HACCP or another approved quality system - <i>Product liability</i>- risk Examples of such legal obstacles which companies believe cause food waste are shown below the table.
<p><i>Perceived non-legal obstacles related to the cited legislation</i></p>	<ul style="list-style-type: none"> - The research required to obtain exemption from the two-hour guarantee is expensive; it is also problematic due to constantly changing recipes. - Besides the legal product liability, companies also do not want to run any risks in relation to their image. This is a barrier to the reuse of residual flows for food, but also for the setting of expiration dates by producers - <i>It seems that not all companies are up to date on the legislation:</i> <ul style="list-style-type: none"> - <i>the possibility of exemption from the two-hour guarantee and</i> - <i>the hygiene code are not legislation but relate to its implementation. Companies which adopt this code are subject to legal checks. They may choose to adopt a different quality system instead</i>

Table 3.7**Obstacles perceived by companies as causing food waste
(continued)**

*Proposed amendments
with assessment of effects
and risks*

Legal amendments cited and assessment of effects and risks:

- Amendment of the two-hour guarantee limit:
 - According to caterers interviewed, the two-hour guarantee could be extended. This ought to be centrally regulated with the nVWA and not by means of inspections per company. One caterer interviewed felt comfortable with an extension from two to three hours, and for a number of products extension up to four hours was considered possible. This would need to be investigated, however.
 - Exceptions could be made for products which are themselves stable, have a high preservative value (high fat/sugar content and low water activity (a_w)). This might not entail any risk for food safety but does need to be analysed.
- In microbiological terms, not all products should have to be thrown away after supply or after being stored for three days.
- Standardising enforcement and not enforcing stricter standards in one company than in another. To achieve this, nVWA inspectors need to coordinate their actions better.

According to the companies, less strict hygiene requirements could have an immediate impact on the number of products thrown away. Companies also indicated that an amendment to the legislation could present risks in terms of food safety. Hygiene is a complex process. The risks can be overcome through research. *Due to legal product liability and the risk of reputational damage, it may not be the case that amending the legislation will directly lead to a reduction in food waste.*

Table 3.7	Obstacles perceived by companies as causing food waste (continued)
<i>Other possible solutions to the obstacle perceived</i>	<ul style="list-style-type: none"> - Exemption from two-hour guarantee: industry organisations or a number of chain actors together could commission research in order to extend the two-hour guarantee for a number of products, instead of per company. This would make it affordable. - <i>If hygiene codes prove to contain requirements over and above legal requirements resulting in food waste, industry organisations could also modify those requirements. Since the requirements would be over and above those imposed by the legislation, modifying them need not represent a hazard.</i> - <i>The interviews revealed that companies were not all aware of the legislation with respect to the two-hour guarantee and hygiene codes. For this reason, the researchers believe that food waste can also be reduced by informing the companies about this scope within the legislation.</i>
<p>Source: Interviews with chain actors, information from two workshops and analyses by the researchers. <i>Italics: Comment by the researchers.</i></p>	

3.8.1 Notes to the perceived legal obstacles with respect to the hygiene rules

During the interviews, a rather large number of obstacles were named with regard to the hygiene rules. The legal obstacles cited are clarified below by means of examples:

Very wide safety margins

- During the first workshop it was noted that the hygiene rules contain very large safety margins (factor 100). The chain actors felt that food safety is sometimes taken too far. Is it necessary to make food as safe as it can be if it is already safe?

Time limits on storing opened packaging and self-prepared products

- Opened supplier packaging or self-prepared products may be stored for a maximum of three days (with the application of a so-called day sticker). After that, they must be thrown away.

Two-hour guarantee on unrefrigerated products offered for sale

- Products which normally need to be stored refrigerated, may be offered for sale for a maximum of two hours and must afterwards be thrown away, whether packaged or unpackaged.¹ Respondents believe this two-hour guarantee could be extended and currently causes unnecessary food waste. For example, single servings of butter which are not spreadable chilled need to be thrown away because they have been supplied for use unrefrigerated even though they are stable products.
- A caterer and legal experts explained that an exemption can be requested for an extension of up to 24 hours' unrefrigerated storage. A prerequisite is that research has established that such action is responsible in terms of food safety. If the composition of a product changes, this research has to be carried out again. For a caterer this is problematic, for example because the composition of a salad can change every day. Moreover, it is expensive to implement for individual companies. An example of an exemption from the two-hour guarantee is sausage displayed on the counter of a butcher's shop. *Not all the respondents appeared to be aware of this possibility of legal exemption.*

Throwing away products after supply (out-of-home)

- There is a lot of food waste in the out-of-home sector, because products once supplied must be thrown away if they have not been sold or eaten. This also applies to closed containers of self-prepared salad, crudité's, etc.

Hygiene codes - stricter than the legislation

- Respondents indicated that the hygiene codes are sometimes stricter than the legislation they are based on.² When adopting a hygiene code as HACCP/quality system, companies are monitored for their compliance with it and are thus measured according to requirements that go beyond the legislation. *From the interviews it emerged that not all the chain actors are aware that instead of complying with the hygiene codes, they are also permitted to adopt their own HACCP quality system.*

¹ Products stored and supplied chilled (under 7°C), may be supplied for longer than 2 hours.

² No comparison between the hygiene codes and the legislation has been carried out within this research.

Differences in evaluation by enforcers, depending on sector, company size and code. In other words, are less stringent requirements possible?

- Companies say there are differences in the ways enforcement authorities carry out inspections: a distinction is made between sectors; between different sizes of companies; between the different codes. If some companies are subject to less stringent requirements (in the form of exemptions), then the risk is apparently acceptable. This results in unnecessary wastage of food at other companies. One example given was that at the market, a fishmonger has to meet different - less stringent - requirements than a fishmonger with his/her own shop, whereas according to the companies the conditions at the market are less optimal.
- According to the respondents, the interpretation of the codes by nVWA varies, which means that different criteria are measured for different actors in the chain.

Where residual flows for foods are reused, they must meet the HACCP or another approved quality system

- Residual flows of food may only be reused for human consumption if HACCP or another approved quality system is met (and for animal feeds, GMP). For example, the product must still be of good quality, the cold chain must not have been broken, and so on.

Product liability - risk

Retailers/producers but also caterers are responsible for the product up until delivery. Companies therefore run the risk of being held accountable if something goes wrong.

- Few of the companies interviewed give away food which is left over, is past its expiration date or needs to be thrown away, whether to its own staff, the Food Bank or the Salvation Army. Nor would the interviewed caterers and retailers be likely to relabel products which had passed their sell-by dates (assuming they even knew this was permitted). Reasons given were the legislation on product liability, but also possible damage to their image.
- Producers prefer to show a more conservative expiration date on the packaging than the actual date until which the product can be kept. As a result, the interviewed caterers and legal experts say food is wasted unnecessarily.

3.8.2 Scope for amending the legislation and/or its implementation in the Netherlands

In view of the fact that these are European regulations, the rules apply in full for all EU countries. As a result, the margins for setting different limits for microbiological contamination or contaminants at national level are small. This is less true of traditionally produced food. But the prohibition on bringing unsafe food onto the market also applies to traditionally produced food. Adapting to differences in production conditions and methods is possible nationally, regionally or by sector. There is also significant freedom in putting the HACCP system into practice. In view of the differences in operating conditions, traditions and culture in the European food industry and also within the Dutch food chain, there are differences between companies in the application of the hygiene rules; for example in the translation to hygiene codes, but also in the manner in which checks are carried out. However, this does not relate to the legislation but to its implementation.

3.9 The provision of food information

Table 3.8	Obstacles perceived by companies as causing food waste
<p><i>Obstacles related to which legislation and regulations?</i></p>	<p>- Wrongly labelled food can mislead consumers and can moreover be harmful, for example if information about allergies is not shown on the packaging or the label. In order to prevent this, regulations have been created. The labelling directive currently in force, which has to a significant been translated literally into the Dutch Royal decree concerning food labelling, draws a distinction between the expiration date (best-before date) and the ultimate consumption date (use-by date). Exceeding the expiration date does not necessarily mean that a product may no longer be sold. Under certain conditions, the seller may independently extend the best-before date although this does not apply to all products. Taking such action does shift the responsibility to the seller.¹</p>

¹ nVWA, Expiration dates on foods for companies, information sheet 6/15 July 2009.

Table 3.8	Obstacles perceived by companies as causing food waste (continued)
<i>Obstacles related to which legislation and regulations?</i>	The food information provision directive are in transition from the existing labelling directive to a European Regulation in the area of food information provision which will probably come into force as European law in 2012. More information about this legislation is shown in appendix 1.5.
<i>Perceived/cited by whom? Where in the chain?</i>	<ul style="list-style-type: none"> - It was pointed out by a wholesaler, a retailer, caterers, residual flow processors for human consumption, experts and during the workshops that incorrect labelling and the compulsory expiration dates often lead to food waste. The best-before date in particular was often cited as a legal obstacle which causes food waste; product liability appears to play a role here.
<i>Legal obstacles perceived</i>	<ul style="list-style-type: none"> - In some cases, incorrect information on the label (incorrect labelling) may not be modified: - Products must be stored, sold and distributed in a recognisable way, but new labelling is expensive - Companies are being given different deadlines for complying with the new legislation on labelling - Expiration (best before) date: - Compulsory expiration date (best before date), even for products which remain stable for a very long time. - Product liability when setting the new best before date. <p>Examples of legal obstacles perceived by companies to cause food waste are shown below the table.</p>
<i>Perceived non-legal obstacles experienced</i>	<ul style="list-style-type: none"> - It is very expensive to repack or relabel products if they are wrongly labelled or not labelled. - Expiration date (best before date): - Unfamiliarity with the possibility of amending the best before date - Best before dates set too conservatively by producers - Interpretation of the best before date - Risk of damage to reputation when setting the new best before date <p>Examples are elaborated below the table.</p>

Table 3.8	Obstacles perceived by companies as causing food waste (continued)
<p><i>Proposed amendments with assessment of effects and risks</i></p>	<p>Incorrect information provision on the label (incorrect labelling):</p> <ul style="list-style-type: none"> - Depending on what has gone wrong with the labelling, a decision must be made as to whether the product may still be used or not. If food is safe, the producer should be allowed to amend the label. <p>Expiration date (best before date):</p> <ul style="list-style-type: none"> - According to some companies, the best before date should be retained, because it stands for quality. According to other companies, some non-perishable products should not have to carry best before dates (for example salt and spices). Analyses - including risk analyses - are required to determine whether a best before date is really necessary for some products, and to determine the true shelf life for the new best before date. If the best before were scrapped for long-life products, the chain actors believe, much less waste would occur, for example because companies, supermarkets and consumers are less likely to throw away products without best before dates. Those affected should be informed about any such change to the legislation. If best-before dates are scrapped for certain products, the respondents believe a use-by date will nevertheless be required on the packaging, and visual checks will need to be performed to establish whether the product is still good. - Compulsory or optional extension of the expiration dates on products, certainly long-life products. The question is whether manufacturers will voluntarily set longer expiration terms, since they do not want to run the risk of anything being wrong with their products. If the expiration dates were extended, products could be offered for sale for longer and consumers would have longer to consume the product.

Table 3.8	Obstacles perceived by companies as causing food waste (continued)
<i>Proposed amendments with assessment of effects and risks</i>	<p>There is also a small increased risk with regard to food safety; however, in view of the perceived margins currently used in setting expiration deadlines, this would not be a real risk according to the respondents. Companies note that the legislation could stipulate that packaging should show only the date after which the product is no longer safe to consume (i.e. only the use-by date/ultimate date of consumption). Extending the expiration date on products will result in reduced waste.</p> <p>Another option is to only state the production date on the product.</p>
<i>Other possible solutions to the obstacle perceived</i>	<p>Another possibility relating to the provision of food information:</p> <ul style="list-style-type: none"> - Aside from amending the legislation, chain actors recommended initiating a debate between government, consumers and business about what information should be shown on labels. According to the respondents, limits on the quantity of information on the label are needed. They consider pragmatic decision-making on this point to be important. <p>Other possible solutions with regard to food waste related to the best before date:</p> <ul style="list-style-type: none"> - Informing companies about the legal possibilities with regard to amending the best before date, in order to encourage them to start placing new best before dates on products if the original dates have passed and the products still meet the conditions for sale.

Table 3.8	Obstacles perceived by companies to cause food waste (continued)
<p><i>Other possible solutions to the obstacle perceived</i></p>	<ul style="list-style-type: none"> - Product liability/reputational damage - analyse safety margins: Producers seem to allow wide margins when setting best before dates because consumers may not observe due care when handling food and companies do want to guarantee the quality of their products. For this reason, the companies say it would be useful to establish in which cases and for which products a longer expiration term would represent a risk to food safety. - A seller can ask the supplier to supply products with longer expiration terms, which will probably result in less waste. - Informing consumers about the best before date and its interpretation, because many consumers do not interpret the best before date correctly and waste a lot of food as a result. - In addition, innovations can help in adjusting the best before date to match the true shelf life of a product, for example by means of an 'indicator' (RFID, <i>Radio Frequency Identification</i>) on the packaging, which measures storage conditions over time and so can reflect the actual shelf life.
<p>Source: Interviews with chain actors, information from two workshops and analyses by the researchers.</p>	

3.9.1 Notes to perceived obstacles with respect to food information provision

There are various ways in which this legislation causes food waste according to the chain actors interviewed. The legal obstacles are explained below with the help of examples:

- *Incorrect information provision on the label:* first of all, the respondents report that waste is caused by incorrect information provision on the label. If the information on the label is not correct, the product may not be sold, and it is taken off the market and destroyed or processed (where possible). According to the parties interviewed, in some cases the label may not be altered even though the food is safe for consumption. In some instances, a company may repack the product if it observes particular conditions; this is very expensive, though, which is why this option is rarely chosen. Examples

of information which needs to be correct: nutritional claims, ingredients, presence of allergenic substances in the product and so on.

- *Products must be stored, sold and distributed in a recognisable way:* the legislation prescribes that products must be stored, sold and distributed in a recognisable way. If a manufacturer removes the label (in order to maintain its image) before giving it away to the Food Bank or the Salvation Army, for example, a new label must be placed on it before use or distribution for human consumption. This can be very costly and troublesome.
- *Companies are being given different deadlines to comply with the new legislation on labelling:* companies pointed out that different benchmarks are being used for compliance with the new labelling regulation. Small companies have been given five years to adapt their processes to this new regulation, large firms only three years.
- *Expiration date - best before date:* the legislation with regard to the expiration date on pre-packed foods causes food waste, particularly with regard to the best before date.

Specific examples given by the companies are:

- *Compulsory best before date, even for products which remain stable for very a long time:* best before dates have to be placed on products which remain stable for a very long time (for example dry products such as salt, sugar, dried spices, dried beans, rice, but also vinegar). For these products, best before dates are actually superfluous in food safety terms, and as a result food is wasted unnecessarily: sellers and consumers who see that such a product has passed its best before date will often throw it away. In many cases, consumers do not know that such products are usually still safe to consume. And companies appear not to know that these products, under certain conditions, can be given new best before dates.
- *Product liability when setting the new best before date:* according to some respondents, producers set best before dates too conservatively, in order to limit their risk in terms of product liability. (Potential reputational damage plays a role here.) For the same reason, sellers decide not to re-label products which have passed their best before dates.

Perceived non-legal obstacles with regard to the best before date are as follows:

- *Altering best before date - unfamiliarity*
- If the best before date has passed, food may not be sold or given away to the consumer or the Food Bank, even if it is good and safe food, such as chocolate sprinkles which have passed their expiration date. The best before date on the packaging must first be altered.
- In practice, sellers hardly ever alter best before dates. Many also believe this is not legally permitted. The legislation states that sellers of pre-packaged unrefrigerated foods are permitted to alter the best before date independently if the product still 'possesses its normal properties' and under certain conditions. However, they do then become responsible for the product. Drawbacks of such responsibility are product liability and the risk of reputational damage.
- *Best before dates set too conservatively*
Producers may set the best before date themselves. According to some respondents, producers set conservative best before dates for products and do not provide any guarantee after opening in order to limit their own risk (in connection with product liability).
- *Interpretation of the best before date*
Companies indicate that many consumers will throw products away if they have passed the best before date, even though the best before date does not indicate when a product is no longer safe to consume. They therefore believe it is important that consumers should be informed about what the best before date means.

3.9.2 Scope for amending the legislation in the Netherlands

The regulations must be applied uniformly in Europe, aside for a few exceptions, because they are based on a European Regulation. For this reason, the Netherlands cannot unilaterally amend this legislation.

3.10 Norms and quotas in fisheries

Table 3.9	Obstacles perceived by companies as causing food waste
<i>Obstacles related to which legislation and regulations?</i>	<ul style="list-style-type: none"> - Legislation related to norms and quotas in fisheries: Each year, the EU sets the quantity of fish which may be caught for each species of fish in the form of a quota. The minimum landing sizes for some fish species are laid down in regulations. These regulations have been drawn up with the objective of protecting the young fish. After the catch and the sorting, discards are thrown overboard. According to the commodity board, commercial varieties are discarded if (1) the organism is smaller than the minimum landing size and (2) the quota for the species in question has been reached. The survival chances of discards depend on several factors, such as the fishing gear used, the environmental conditions, the species and the duration of the trawl. It is therefore difficult to generalise about the survival chances of discards. Work is currently underway on the revision of the Common Fisheries Policy (CFP). For more information about current legislation in this area, see appendix 2.3.
<i>Perceived/cited by whom? Where in the chain?</i>	<ul style="list-style-type: none"> - During the first workshop, an expert stated that the norms and the quota system in the fisheries sector can cause food waste. The Commodity Board for Fish and Fish Products confirmed this in an interview.
<i>Perceived legal obstacles</i>	<ul style="list-style-type: none"> - Current obstacles relate above all to the prevention of discards: <ul style="list-style-type: none"> - When setting quotas, no account is taken of the proportion of the target species within the total catch in mixed fisheries. - It is currently still difficult to fish so selectively on a commercial basis as to avoid any undersized discards. - The legislation limits the use of a number of alternative and selective fisheries methods, such as pulse fishery.

Table 3.9	Obstacles perceived by companies as causing food waste (continued)
<i>Statutory obstacles experienced</i>	<ul style="list-style-type: none"> - Rules inhibit research into pulse trawling, which is attractive to the sector, because it is still prohibited. - Currently, the discards cannot be used, because they are not allowed to be landed <p>An explanation of these legal obstacles is given below the table.</p>
<i>Related obstacles</i>	None cited.
<i>Proposed amendments with assessment of effects and risks</i>	<ul style="list-style-type: none"> - Amendment of the quota system, taking mixed fisheries (catch composition) into account, will immediately lead to reduction in waste because there will be fewer discards. - A relaxation of the restrictions on fishing with pulse gear. In pulse fishing, the fish are driven from the sea floor by means of electrical pulses. In addition, greater flexibility in the legislation and regulations on scientific quotas and exemptions for research into more selective alternative fisheries methods is desired. - In terms of food waste, amending the regulations on landing discards will result in an improvement in the utilisation of the unwanted incidental catch.
<i>Other possible solutions to the perceived obstacle</i>	- <i>None cited.</i>
Source: Interviews with chain actors, information from two workshops and analyses by the researchers.	

3.10.1 Notes to perceived obstacles with respect to norms and quotas in fisheries

The following remarks were mentioned by respondents as legal obstacles with regard to food waste in the current CFP:

- When setting quotas, insufficient account is taken of the fact that Dutch fishermen are generally engaged in mixed fisheries (several target species caught using one fishing method). Fish for which the quota has been reached continue to be caught when fishing for other varieties, but have to be returned to the water. Account ought to be taken of the proportion of the target varieties in the catch. *The Dutch Ministry of Economic Affairs, Agriculture and Innovation comments that the quota is operated in a co-management arrangement, in other words together with the government. The producer organisations have an important role to play in optimising*

management and trading in order to reduce over-quota discards. The Ministry believes this role should be enhanced in the new CFP.

- In some cases, the legislation also limits the use of alternative fishing methods which might be able to reduce discards. This applies to pulse fishing, for example. The pulse technique is currently still prohibited under European legislation; it may only be used after an exemption has been obtained. Provisional results show that the number of discards is significantly reduced through the use of this technique and that prices are better, for example because the quality of the fish caught is improved.¹ In 2011, the number of exemptions for pulse fishing increased to 42 ships, but there is a waiting list.² Moreover, exemptions bring uncertainty: they can be revoked. Investment costs for pulse trawling are high and investments are made more difficult by the uncertainty regarding the duration of the exemption.
- It is not possible to utilise undesired incidental catch. Fish discards may not be landed but must be thrown overboard, which not all fish survive. If the quota has been exceeded or the fish are undersized, commercial fish varieties have to be thrown back into the sea. In the current proposals for amending the CFP, all catches of particular target varieties would have to be landed. The aim is to use as much fish as possible for human consumption. Undersized fish can only be used in fishmeal for animal feed, pet food and aquaculture, for example. What counts as appropriately sized and undersized has yet to be established.

Utilisation of landed undersized fish for fishmeal takes the place of nutrient utilisation by life in the sea from discards. These effects need to be weighed against each other in terms of waste. In the context of food waste, reducing the number of discards and making maximum use of the discards landed appear to be strategies which offer solutions.

The Dutch cabinet's position is based on the principle of fisheries which produce food without waste. This means that throwing unwanted incidental catch overboard must stop.

¹ Increase in quality of fish caught using pulse gear (Ton IJlstra, Ministry of Economic Affairs, Agriculture and Innovation) and better prices (Pieter Louwe van Slooten, Fisherman UK 153). See film clip: www.groenkennisnet.nl/Pages/pulskor.aspx

² The number (42) and the waiting list have been confirmed by the Ministry of Economic Affairs, Agriculture and Innovation.

3.10.2 Scope for amending the legislation in the Netherlands.

The EU regulations which regulate quota and norms are binding in all their components and are directly applicable in every member state. This means that the Dutch government cannot unilaterally amend this legislation in the Dutch translation of this legislation. A change to the CFP is currently being prepared; it is expected that the elaboration of the policy will be finalised at the end of 2012.

3.11 The use of animal by-products

Table 3.10	Obstacles perceived by companies that prevent optimum reuse of residual flows
<i>Obstacles related to which legislation and regulations?</i>	The use of animal residual flows can be hazardous to the health of animals and humans. The use of animal by-products is therefore limited by various European regulations. More information about these regulations is given in appendix 1.6.
<i>Perceived/cited by whom? Where in the chain?</i>	The legislation was cited by a processor, a wholesaler, a retailer, caterers, a cofermenter, by experts and during the workshops. For the animal sector, the legislation on the use of animal by-products is seen not so much as an obstacle to preventing food waste but above all as an obstacle to further useful high-value application.
<i>Perceived legal obstacles</i>	<p>Respondents pointed out that if an animal product is present in the residual flow, the entire residual flow falls under the animal by-product legislation and into one of the three categories described in the law. Which substances lead to which categories, and with them their permitted applications, is laid down by law. Obstacles to using these flows as animal feed lie in:</p> <ul style="list-style-type: none"> - The prohibition on the use of animal tissue proteins in animal feed for productive livestock. - The fact that animal residual products must be traceable. - The prohibition on swill (kitchen waste) as feed for food-producing animals in Europe.

Table 3.10	Obstacles perceived by companies that prevent optimum reuse of residual flows (continued)
<i>Perceived legal obstacles</i>	<p>Valuable material is therefore burned, composted or converted into biogas.</p> <p>Respondents also noted that they had experienced differences between different inspection departments as regards the implementation of the legislation in the Netherlands. They claimed that inspections are carried out more rigorously at some companies than at others.</p>
<i>Perceived non-legal obstacles related to the cited legislation</i>	<p>According to the respondents, the residual flows are aggregated by chain actors, resulting in a devaluation of the residual flows because there are limits on what as Category 3 materials may be used for. As a result, for example, residual flows which would have been suitable as animal feed (or even suitable for human consumption) are fermented.</p> <ul style="list-style-type: none"> - Return flows from supermarkets are not separated and are therefore designated as Category 3 material. - Separation of residual flows is expensive. - Energy subsidies stand in the way of more optimal use as animal feed (see explanation below this table).
<i>Proposed amendments with assessment of effects and risks</i>	<ul style="list-style-type: none"> - Relaxation on the use of animal proteins for feed for different animal species, or for reuse as fertiliser. - Not designating residual flows of processed foods of animal origin as Category 3 material. - Banning unfair competition related to imports of meat and fish from third countries which do not meet the EU requirements or exports of animal by-products to third countries. - In addition, it would be helpful if enforcers in the Netherlands were to attempt to iron out differences in interpretation.

Table 3.10	Obstacles perceived by companies that prevent optimum reuse of residual flows (continued)
<i>Proposed amendments with assessment of effects and risks</i>	<p>Assessment of effects and risks:</p> <ul style="list-style-type: none"> - The amendments in the new Regulations EC 1069/2009 and EU 142/2011 came into force on 4 March 2011. These regulations partly meet the wishes of business, because they permit wider use of animal by-products. According to companies, the change barely entails any risks. Since 4 March 2011 it has also been possible to move material between different categories, as long as this has been approved by the EU. This enables a higher utilisation value for proteins. A consequence of the changes is that fewer residual flows will become available for alternative use (for example, flows which are currently used as fertiliser in cofermentation plants). This will alter transport movements, and less destruction capacity may be required. - In the companies' view, a potential relaxation of the requirements for exports of animal by-products would also not entail any risks.
<i>Other possible solutions to the perceived obstacles</i>	<ul style="list-style-type: none"> - Chain actors could keep residual flows of processed foods of animal origin separate (and possibly bundled) from foods of vegetable origin. If separated, the part which is of vegetable origin would not fall under Category 3. - Companies should together have/create the capacity to better separate and bundle residual flows. The great majority of the companies in the food industry are small to medium-sized. For each company individually, permanently disposing of only one residual flow is often more cost-efficient than having it processed to produce animal feed.
Source: Interviews with chain actors, information from two workshops and analyses by the researchers.	

Regarding reuse as animal feed, one of the respondents observed that adding potato, fruit and vegetable residual flows to feed has become problematic for farmers because they do not know exactly or cannot demonstrate what is in the residual flow, which is essential in connection with their minerals records.

3.11.1 Notes to perceived obstacles with regard to the use of animal by-products

Prohibition of the use of animal tissue proteins in animal feed for productive livestock

- Companies claimed that while it was not possible to use animal proteins in animal feed for ruminants, for pigs and fish these animal proteins could be used. However, this is currently not permitted. The appendix to the TSE-roadmap¹(see also appendix 1.6) does list a limited number of exceptions.

The animal residual products must be traceable

- Until now, tracing different animal proteins has been difficult, because the test methods are not yet reliable. Currently, certification is used, but respondents note that inspectors do not appear to fully trust such certification. It would be a good thing, they say, if the 'total ban' (see appendix 1.6) were lifted, and if test methods were developed and approved by inspection bodies in order to identify animal proteins; otherwise, amending the rules might have little effect.

Swill may not be used in Europe as feed for food-producing animals

- Organic waste from catering, food processors and sometimes also from meat producers can be used all over the world as animal feed but this is not permitted in Europe. Outside Europe, such 'waste' (known as 'swill'), is primarily used as pig feed and to a lesser extent as poultry feed. Chain actors do not consider it fair that meat and fish potentially fed with swill are permitted to be imported from those countries.
- The respondents state that residual flows for example from kitchens which have little chance of contamination with animal proteins may not be used for animal feed. This applies to bread, for example. An exception is packaged bread, which may under certain conditions be used for animal feed. It does however first need to be removed from its packaging, which is costly.

Return flows from supermarkets are not separated and are designated as Category 3 material

- The return flows from supermarkets are declared unfit by the supermarkets themselves. Because plant-based and animal products are combined together, this flow is designated as Category 3 material and subsequently not used for animal feed. These are flows of products which were suitable

¹ Regulation (EC) no. 999/2001.

for human consumption and sometimes still would be, if the return flow were handled differently. Many such residual flows could also be valuable for use in animal feed. In any case, separating residual flows could be an option.

Energy subsidies stand in the way of more optimal use as animal feed

- A number of the residual flow processors indicated that they meet GMP+ and that the Animal Feed Hygiene Regulation is no obstacle to using their residual flow for animal feed because they ensure that their residual flows are separated (plant-based and animal products). However, it was found that many respondents coferment their residual flows, because this process is simple and cheap. According to the respondents, the price of having residual flows cofermented is low due to energy subsidies.

Experts (EL&I, nVWA) comment that the hygiene requirements of the Animal Feed Hygiene Regulation are also such that some companies which have residual flows cannot be suppliers of raw materials to the animal feed sector. It is also not known whether all residual flows which are currently cofermented would also have been suitable as animal feed.

4 Perceived non-legal obstacles

Besides legislation, there are also many other obstacles that make preventing food waste difficult. The most important non-legal obstacles which emerged in this study are listed below. First we cite the obstacles to preventing food waste, and under 'pricing and financial incentives' we discuss the retention of residual flows for human consumption or animal feed. Finally, a number of respondents cited practical problems in the processing of residual flows of 'written-off' food-stuffs.

In appendix 3, legal obstacles to the prevention of food waste are described for each part in the supply chain. Appendix 4 gives an overview of the non-legal obstacles to optimally utilise residual flows, again for each part in the chain. In the appendices, potential solutions for tackling those obstacles are presented.

Awareness, knowledge and mentality of consumers and staff

According to the chain actors, consumers are insufficiently aware of the food waste they cause and of the consequences which food waste has for the environment, for example. The knowledge levels of staff are also inadequate for tackling food waste (for example staff often lack professional diplomas with regard to knowledge of the product, storage, planning, etc.). Many staff do not know that a product that has passed its best before date may still be sold (or may be given away to the Food Bank or the Salvation Army) if particular conditions are met.

Overproduction, difference between supply and demand

Difference between supply and demand can arise due to overproduction, for example. Overproduction of fruit, vegetables and potatoes can arise when, for example, no agreements have been made about the quantities to be produced or due to seasonal influences (for example a peak in supply in the harvest season). The result is that too much fruit, vegetables and potatoes are then supplied to the Dutch market. In order to prevent the price from falling too far, fruit, vegetables and potatoes are then sometimes destroyed. However, this supply peak is reasonably predictable; you can gear your actions to it (also in the supermarket, for example). This already happens with cauliflower, for example (the longer the product takes to grow, the more predictable it is). If processors have greater flexibility, they can respond to scarcity in the market. However, they often plan their work in advance (contract cultivation), which leaves them little room

for manoeuvre. Sometimes a discrepancy between supply and demand arises because trade parties do not communicate with each other properly. If there is good coordination in the chain as to when a delivery is to take place (import, trade), losses can be avoided reasonably effectively. Bringing together supply and demand information also helps.

Contracts in the chain

With the use of private labels, products which are produced in excess quantities may not be sold to other parties. For this reason, such overproduction is often thrown away. In addition, caterers are often contractually bound to a particular range and duration of supply, which leads to food waste because the range does not match the wishes of the customer or because the entire range must be offered until closing time, which means that a large amount is left over.

Private standards

Besides legal standards/norms, food waste is also caused by adherence to private standards. Examples of private standards which cause food waste are:

- Best before date requirement of customers (companies). Especially for fresh products, customers often demand a particular expiration term. If the best before date is too short, the product will not be bought.
- Adherence to lower Maximum Residue Levels (MRLs) than is legally required. For example, there is a supermarket which uses 50% of the legal MRLs as a standard. The company does this for two reasons: measurement results can deviate by 50%, which means there is a chance of excessive levels being found in checks. The 'naming and shaming' of supermarkets in connection with 'toxins on fruit and vegetables' by civil-society organisations also has a knock-on effect in the chain, prompting supermarkets to sometimes adopt tougher standards than legally required. As a result, fewer pesticides are used on fruit and vegetables, resulting in more putrefaction and waste.
- Quality standards. Statutory marketing standards have been scrapped for many products; for example, it is now permitted to sell 'crooked cucumbers' as a fresh product. However, we do not yet see them on the shelves because the private standards have not been adapted.

Errors and disruptions during production

Due to disruptions and production errors, recipes deviate, labelling is wrong or packaging is not uniform in its contents. Such packaging and its contents is rejected and often destroyed. Sometimes such residual flows are given away, for

example to the Salvation Army, or they are used for the production of animal feed.

It affects the image of a company if food is supplied wrongly. For this reason, companies take precautions, for example by ensuring that they can supply a standard product quality, or by setting relatively short expiration dates.

Interruption of the cool chain/incorrect storage temperature

Storing products at too high a temperature and interruption of the cool chain lead to more losses. This can occur because inspectors order the cool chain to be broken or because knowledge about storage is lacking.

Cleaning losses

When switching from one product charge to another, the production line is cleaned, as a result of which food is lost. Much of this goes into animal feed (although this varies from one chain to another); the remainder goes into the sewers. The order size, which influences the scale of the product charge, and the hygienic design of the equipment, affect the volume of these cleaning losses. Not all producers have hygienically designed equipment, which leads to more cleaning losses.

In addition, in order to guarantee food safety, the first batches of a product after changing the product in a production process are destroyed in order to prevent contamination with the previous product.

By making the charges as big as possible and using hygienic equipment, losses/food waste can be reduced.

Cutting losses and filling losses

The cutting-to-size of among other things cheese slices and the filling of packaging lead to food waste. It is open to question whether cutting food to size actually leads to value loss (leftover cheese can be used to make grated cheese, for example).

Logistical limitations

The logistical process is usually perfected so that, for example, products which have an inconvenient shape are sorted and used for a different purpose. For example: packing a fixed number of straight cucumbers in a box is more efficient than packing crooked cucumbers. As a result, crooked cucumbers (and other non-uniform vegetables and fruit) are often assigned a lower value or not sold at all.

Image

If food is wrongly delivered (for example in spoiled condition or in too small quantities, etc.) this affects the image of the party who supplied the food. For this reason, companies take precautionary measures. The measures cited were:

- placing a relatively early expiration date on the products (the true shelf life is often longer),
- taking precautionary measures to deliver a standard product quality to the processors,
- adopting safety margins for ordered lunches (caterers),
- ordering extra quantities in order not to have to say 'sorry, sold out' (retail),
- offering sufficiently large portion sizes (restaurants).

Pricing and financial incentives lead to food waste and residual flows

If reducing food waste yields a company nothing financially, it will not happen. So for a company it is important to investigate whether reducing food waste is worthwhile. For example, due to low prices for potatoes, fruit and vegetables, the products are sometimes marketed at a lower value than they are actually suitable for. Such low prices can arise through oversupply, for example.

The costs of processing determine how the residual flow is disposed of. If a residual flow yields no income, it will not be reused. There also may be high costs associated with separating residual flows.

- It can be expensive to process products which are still good but have defects (such as apples with bruises) into alternative foods.
- There may be high costs associated with processing a residual product into animal feed: only large batches may be economically attractive. For example, pig feed may cost no more than 25 euro cents per kilogram of dry matter. For collecting many small residual flow consignments, transport costs are high. You need to be able to fill a truck. Residual flows from an individual horticulturalist with five hectares of land, for example, or a city baker are not sufficiently voluminous. Optimum utilisation of residual flows also requires continuity.
- Separating flows to enable residual flows to be used differently is often expensive, because it costs a lot of time (training staff, taking measures, designing processes accordingly, and so on). Investments need to be made to comply with the conditions of the quality system (for implementation of HACCP, GMP (Good Manufacturing Practices) and tracking & tracing, for example). Those costs are often not earned back from the proceeds of improved utilisation of residual flows. For this reason, for example a

supermarket chain will choose to designate all return flows as Category 3 material (declare it unfit), also in connection with risks for food safety.

- Subsidies, for example for cofermentation, also result in less than optimum utilisation of residual flows, because they make the costs of cofermentation 'unnaturally' low. In this situation, businesses will more likely opt for cofermentation than for a more expensive but more optimal utilisation. If the legal barriers and subsidies which encourage non-sustainable behaviour are gone, and there is fair competition, then initiatives aimed at optimum use of residual flows will emerge. These days, cofermentation has a good image, as a result of which consumers and businesses do not realise that better options for utilising residual flows exist.
- If waste disposal is cheap, companies will not look for other ways of reusing their residual flows. In other words, the costs of waste processing are not yet sufficiently hitting businesses in their bottom lines. This is partly due to waste incinerators having overcapacity because the quantity of waste has fallen in recent years. As a result, they are competing with re-users on price and often have lower rates for waste processing than recycling companies. This means they also burn waste which could be reused. This has the effect of making recycling difficult and hampering the sustainable use of residual flows. In some cases, caterers do not have to pay for the disposal of the waste they produce because the waste is owned by the customer. Alternatively, the costs of disposal are so low that they do not represent a financial incentive to reduce waste.

Packing, logistics and storage for the processing of residual flows for human consumption

There is a technical challenge with regard to the unpacking of packaged residual flows for processing. For example, returned pre-packaged products are attractive for residual flow processing. But unpacking takes a lot of time and effort and is therefore very expensive.

Residual flows are also sometimes rejected because there is insufficient space to store the products, or because the expiration date will be reached before the products can be processed. The Food Bank is therefore working towards more streamlined supply. Agreements are already being made with distribution centres which mean they can report their supply at regular points during the week. As yet, there is no properly organised logistical system in which supply and demand are clear and can be matched to each other. Sometimes producers can only indicate how much they expect to be able to supply on an annual basis (between 1 and 5%) but do not know when and exactly how

much because the waste is often from failed batches or batches with expiration dates which are too short. The Salvation Army experiences the same in processing the flows. For example, what do you do if one week you get more kale than you can process and you do not get any potatoes and smoked sausage to go with it?

5 Conclusions and recommendations

5.1 General findings

According to the chain actors, the biggest barriers to preventing food waste relate to the following legislation and regulations:

- Contamination of food,
- Hygiene package/requirements,
- Food information provision
- European marketing standards/private standards
- Norms and quotas in fisheries
- Animal by-products.

With regard to the following legislation it was noted above all that there are long procedures for:

- import controls relating to contamination of food
- the admission of Novel Foods

In the area of legislation and implementation of the law there are gains to be made from limiting food waste. In addition, causes of food waste were also found which could not directly or indirectly be related to the legislation.

We discuss the most important obstacles below. A conclusion has been formulated and several suggestions for follow-up steps are made. The final paragraph is a translation to government policy.

5.2 Findings related to the legislation

Contamination of food and import controls

Different points were raised by companies in the fruit and vegetable sector which are causes of waste. They cited excessively low MRLs for a number of pesticides, with the lowest permitted values being below the public health standard. They regard food which is rejected and destroyed because of such low MRLs as food waste. For some substances, zero tolerance applies and consignments in which those substances are found must be rejected and are often destroyed. Thanks to new technologies, the presence of certain undesirable

substances can be measured with great precision, resulting in a lot of food being rejected. The exact quantities involved are not known.

In the area of implementation of legislation and regulations, chain actors request that controls on imports of fresh products be speeded up and more inspection points established.

In addition, there are also non-legal causes. Chain actors indicated that the standards which private parties impose on each other are often stricter than the statutory norms. These norms are a percentage of the MRL. In practice, MRLs are sometimes set at the lower limit of the detection method, which is not required by law. An expert even described the imposition of stricter requirements than legally prescribed as the trend. Customers set these more rigorous requirements in order to prevent damage to their reputations and growers adopt stricter requirements as a precaution because they do not want to run any risk of exceeding the MRLs, as this can lead to public condemnation. However, these more stringent requirements can in turn lead to bigger losses in the primary process or during storage.

It may be concluded that the perceived obstacles cannot solely be resolved by amending the legislation and regulations or implementation procedures, but that an approach is also called for in which government, chain actors from the fruit and vegetables sectors and NGOs together address the effects and desirability of standards set at more rigorous levels than required by the law, because they can lead to food waste.

- *The speed of the procedures for import control and the number of inspection points could be investigated further in relation to food waste.*
- *Government, supermarkets, food producers and civil-society organisations should enter into a dialogue to discuss the standards over and above statutory requirements and their effects on food waste throughout the chain. Agreements could be made about the use of 'naming and shaming' in connection with excessive levels of MRLs on fruit and vegetables. If no agreement can be reached and the trend of ever-downward levels of acceptable contamination beyond the statutory standards continues inexorably, the advice to chain actors must be that they should prepare for the more stringent requirements to avoid more food having to be taken off the market due to rejection or spoilage.*
- *An inventory could be made of the MRLs based on the feasibility norm, the level of which seems to lie below the standard for food safety and which leads to food waste in practice. In doing so, the extent of food waste could be estimated. Further investigation could establish whether and to what ex-*

tent the improved technical measurement methods are leading to destruction of food with regard to contaminants subject to 'zero tolerance'. The question is whether this policy is essential from a food safety perspective or whether it is causing waste. This inventory needs to be weighed against the trend of private parties imposing zero tolerance on each other.

Hygiene package/hygiene requirements

Catering companies in particular cited the two-hour guarantee in the hygiene rules as a source of food waste, because food has to be thrown away after being presented for two hours. However, HACCP (required by the Hygiene Package) offers more flexibility than businesses are aware. Exemptions to the two-hour guarantee are possible - and for some sectors they already exist, but the legal possibility for exemption is problematic in practice.

- *Exemptions which apply to one sector could be permitted by the legislator/enforcer for comparable situations in other sectors.*
- *Industry bodies (or national bodies) could pursue the legal possibilities for exemption from, for example, the two-hour guarantee; for individual small companies, this is too burdensome. Additionally, companies or industry bodies could scrutinise their hygiene codes further for norms over and above statutory norms which cause food waste.*

Food information provision

Expiration terms and dealing with the best before date is often cited by companies in catering and similar companies and in the retail world as a source of waste. Excessively short deadlines for non-perishable and extremely long-life products lead to food waste. Products whose best before dates have passed or nearly passed are part of the large return flow of former foods which is estimated to total 2 million tonnes per year.¹ The companies indicate that there is a lot of confusion about what is and what is not legally permitted after the best before date has passed. Nevertheless, the respondents did feel that the best before date should be retained in some form, because it guarantees quality and food safety. The confusion - combined with product liability for the retail companies - leads to food products being taken off the shelves unnecessarily. But mi-

¹ Vermeij and Bosma, *Notitie voor Helpdeskvraag Flowchart Dierlijke bijproducten* (Memo for Helpdesk Request Flowchart Animal By-Products). Knowledge question BO-08-001-032. Livestock Research, part of Wageningen UR, 2009.

crobiologically stable products or frozen products, for example, do not represent a risk after the best before date has passed.¹

Retail and wholesale companies also indicated that incorrect *labelling* leads to a lot of food waste. If the information on the label is not correct (or is presumed to be incorrect), the product may not be sold and is taken off the market, despite the fact that it is safe for consumption.

In short, the barriers identified lie in the knowledge of this legislation, which is rather complex and fragmented, and in the knowledge of the scope which the legislation offers. Nor has there been a clear translation to the responsible use of best before dates and use-by dates.

- *Together with companies and industry bodies, the legislator could investigate whether and how information about legislation and regulation on food information provision could be better communicated towards the companies. Unfamiliarity with legislation is often a cause of waste; good information for small companies in particular is highly desirable.*
- *Consider scrapping compulsory best before dates for non-perishable products (which would then instead carry the production date) and/or introducing a compulsory long expiration term for long-life products.*
- *Chain actors can also make clear agreements themselves about the use of best before and use-by dates for different products. The basic principle would then be the prevention of food waste, alongside food safety. Clarity will stimulate companies and strengthen the faith of consumers that companies are handling food products in a sustainable and safe manner.*
- *The advice to the Dutch Minister of Economic Affairs, Agriculture and Innovation and the Dutch Minister of Health, Welfare and Sport about former foods² also contains starting points for preventing best before dates being exceeded.*

European marketing standards/private standards

In 2009, the 36 European marketing standards for fresh products were cut back to standards for ten products. Despite this amendment to the legislation and regulations, some chain actors in the fruit and vegetables trade are still adhering to the original marketing standards in the form of a private classification

¹ nVWA, 22 March 2011: Advice from the director of BuRO to the Minister of Economic Affairs, Agriculture and Innovation and the Minister of Health, Welfare and Sport about former foods.

² nVWA, 22 March 2011: Advice from the director of BuRO to the Minister of Economic Affairs, Agriculture and Innovation and the Minister of Health, Welfare and Sport about former foods.

system. They use this classification because for example the logistical systems are geared to them or because customers have continued to use the system. It is also possible that the quality requirements based on the original standards are in fact leading to less waste being created at the buyer company.

The conclusion is that the effects of adhering to private classification on food waste are not straightforward. It is also found that some time is needed to take advantage of new opportunities following a legal relaxation.

- *Companies can inspire each other in the marketing and optimum utilisation (according to Moerman's Ladder) of products with deviant forms or visual quality. The government could encourage this.*
- *The effects of private norms on food waste could be examined further. This demands a chain approach, because waste effects extend over several parts of the chain.*

Norms and quotas in fisheries

First and foremost, the companies from the Dutch fisheries sector want to prevent discards, but in the current legislation there are rules which prevent this. According to the companies, this legislation does not properly reflect the characteristics of Dutch fisheries; there are obstacles to conducting research into selective fisheries methods and applying pulse trawling, among other things. Work is currently underway at EU level on the revision of the Common Fisheries Policy. A proposal by the European Commission relates to compulsory landing of all catches of particular target varieties. Undersized fish would then be able to be used but only for non-human applications. There are therefore limits on the potential effect of this proposal for reducing food waste.

In short, this could mean that in order to reduce food waste, incidental catches would need to be prevented in the first place.

- *In amending the Common Fisheries Policy, food waste ought also to be a consideration.*
- *With a view to a possible imminent change to the legislation, companies could explore optimum utilisation and marketing of the high-value residual flows if undersized fish has to be landed. This can be achieved by increasing knowledge of the market and technical possibilities.*

Animal by-products

Besides meat-processing companies, food wholesalers, retailers, and companies such as caterers are faced with legislation when food products are taken off the shelves.

The regulations with regard to animal by-products were prompted by the serious risks to animal and public health from the use of residual flows of animal origin (BSE, TSE). Food remains which contain animal proteins from a variety of sources are designated as Category 3 material; this is a major barrier to optimum reuse of such flows. These flows currently have limited application possibilities for use as animal feed. Appendix IV of Regulation EC 999/2001 is currently being revised. More possibilities will arise for the use of residual flows for animal feed, but the crux remains that different flows need to remain separated in order to enable an optimum utilisation according to Moerman's Ladder. This applies to the entire chain up to and including retail and companies such as caterers. Separation is not performed if it requires too much time or money, if the flows are too small, or if the financial incentive of subsidy for energy generation from cofermentation is too great. For example, retailers already do realise a flow of 70,000 tonnes of day-old bread which goes back to the supplier for reuse as a separate return flow.

According to the Food Banks¹ and the Salvation Army, there is also still room for improvement in the logistics for the reuse of foods from the shelves of wholesalers or retailers for human consumption. In short, such improvements in logistics and the utilisation of the scope - within the framework of the new legislation - for optimum utilisation according to Moerman's Ladder, represent tasks for the chain actors.

- *Government and chain actors are looking for solutions to reuse foods in higher-value ways. Between sectors too, options for keeping residual flows separate and bundling them could be investigated.*

5.3 Policy recommendations

In this paragraph, we identify possibilities for decreasing food waste by means of making policy. A division has been made in the elaboration below. The first group of actions comprises opportunities which appear concrete and achievable in the short term and relate to important flows of waste. Potentially, these ac-

¹ By keeping the cool chain intact, the logistics for fresh products have since already been improved.

tions can therefore make a big contribution to achieving the target objectives of the Dutch Ministry of Economic Affairs, Agriculture and Innovation, namely a reduction in food waste of 20% in 2015. The second group relates to subjects which are certainly important but require a longer-term approach. But first we begin with a number of general remarks and conclusions about the policy process which can be drawn from the study.

Policy process

For much of the legislation and regulations, also those encountered in this study, guaranteeing food safety is the most important objective. The legislation originated with a view to preventing diseases or out of concern for the environment. Reducing food waste is relatively new as a policy approach and prompts questions as regards existing legislation. This leads to tensions with food safety, animal health, environment and possible other policy aspects. It is natural and essential that the sector and government should continue to strive for safe food. However, it is also necessary to more explicitly include the aspect of 'preventing food waste' in the thinking behind policy-making and the preparation of legislation, given the importance of striving for increased sustainability in the food chain and securing global food security for the longer term.

- *The recommendation is to include food waste in the thinking behind legislation and regulation, also at the EU level (for example in the amendments to the fisheries policy).*

The research has shown that legal amendments to decrease food waste are more effective if relevant aspects from the total food system and social and economic interests and incentives are taken into account. More specifically, account needs to be taken of:

- a. other domestic policy (more specifically, subsidies which help to determine the direction of residual flows)
- b. policy abroad
- c. the market context of companies in the chain
- d. the existing design of business processes.

- *When amending legislation, it is necessary to anticipate consequences for food waste.*

The research has revealed that businesses attach value to increased interaction with the authorities (at national and European level) about existing and proposed

legislation and regulations. Businesses want to be given more responsibility in the process around legislation and regulations and the enforcement and control mechanisms. In their view, the achievement of determined objectives should be the guiding principle.

- *Consult with chain actors about targeted legislation and allow companies to contribute ideas on the detail.*

Starting points for policy in the short term

- *Provide information to and/or train small and medium-sized businesses so that legislation about labelling, best before dates and use-by dates and the hygiene package are correctly interpreted and the opportunities for reducing food waste are taken.*
- *Initiate action to achieve clear agreements around best before dates, in particular for non-perishable products and products with extremely long shelf lives. Within this context, investigate the scrapping of the best before date for non-perishables, to be replaced on the packaging by the production date.*
- *Investigate whether existing exemptions to the two-hour rule which apply to one sector can be translated to comparable situations in other sectors.*
- *Improve the speed of procedures for import control, and the number of inspection points in relation to food waste.*
- *Facilitate the search for creative solutions for the prevention of food waste and for optimum use of residual flows. Moerman's Ladder gives an indication based on ethical considerations which does not always tally with the market context and business processes of companies. If the existing economic valuation of potential residual flows is taken as the reference point, the expectation is that it will be hard for the reuse of such flows to get off the ground. For this reason, there is a need to look beyond chains and sectors for creative solutions to:*
 - *prevent residual flows by designing processes differently or increasing the storage term of products. For example: preventing best before dates from being exceeded in catering and similar companies or in retail.*
 - *promote the sales of products with deviant shapes or visual quality in fruit and vegetables chains.*

- *develop a system and logistics to retain 'written-off' foods for human consumption.*
- *retain overproduction in the fresh fruit and vegetables chains for human consumption.*
- *retain residual flows of potatoes, fruit and vegetables for animal feed.*
- *further separate kitchen waste in catering and similar companies and waste from supermarkets for high-value utilisation.*
- *utilise new opportunities for residual flows (created by the amendment of the legislation on animal by-products and of legislation on discards).*

Starting points for policy in the longer term

- *Discuss with supermarkets, food producers and civil-society organisations the norms over and above statutory norms for contaminants in foods and their effects on food waste throughout the chain. If the trend of ever-downward accepted levels of contamination over and above legal levels continues inexorably, the advice to chain actors must be that they should prepare for the more stringent requirements to avoid more food having to be taken off the market due to rejection or spoilage.*
- *Stimulate technical innovations which can contribute to reduced food waste: Technological solutions can contribute to the reduction of waste, for example better packaging or innovative indicators on the packaging which adjust the best before term to reflect storage conditions.*
- *Develop a new guide for the valuation of raw materials. In the current food system, valuable products (in terms of energy and quality of the raw material) are still too easily designated as waste, whereas according to Moerman's Ladder they could be used more optimally.*

Appendix 1

Background information on legislation (I)

By Dr H.J. (Harry) Bremmers, Wageningen University, L&G Group

A1.1 Structure and hierarchy within the law in Europe

Introduction

Food legislation is complex. This is a consequence of the fact that regulation takes place at different administrative levels and is partly outside the authority of national governments and parliaments. This appendix sketches a concise summary of the hierarchy of regulations and the place of food legislation within it.

Information about the structure of legislation in Europe

In daily usage, 'the law' tends to mean 'the whole of the laws'. It is divided into public law and private law. Public law regulates the relationship between government and citizens; private law relates to the relationships between citizens (such as the establishment of a contract). Much food law is by its nature public law, given the importance for human and animal health and the environment. Another part of food law is privately regulated, for example in the case of food and chain quality systems such as Integrated Chain Management.

Legislation is one source of the law. Besides that, treaties, common law and judicial decisions are regarded as sources of the law. In the European context, treaties, regulations and directives are important sources of law. In a global context, treaties and agreements can likewise bind the European Union or individual countries to particular standards. Standards restrict behaviour. For example, the Lisbon Treaty¹ has considerable consequences for the Netherlands' system of laws, in particular through the Treaty of the EU² and the Treaty on the Functioning of the European Union (TFEU).³ Article 3, paragraph 3 of the TFEU obliges the Union among other things to achieve an internal market. The Union

¹ For a more extensive account, see: K-D. Borhardt: The ABC of the European Union Law, EU Publications Office.

² TEU; 2008/C115/13.

³ TFEU; 2008/C115/47.

is assigned competencies¹ to this end; these are exercised through the application of the subsidiarity² and proportionality principles.³

The Treaty on the Functioning of the European Union (TFEU) regulates the functioning of the Union and its competencies. It determines that the Union has a shared authority with the member states in fields including the internal market (free movement of goods, services, people and capital), agriculture and fisheries, environment and consumer protection (art. 4 TFEU). Consumer protection is complementary to, but sometimes also at odds with, the free working of the market. After all, unrestricted marketing of and competing with products, new or otherwise, can come at a cost to the consumer and also the environment (for instance genetic modification).

Information about the hierarchy within European law

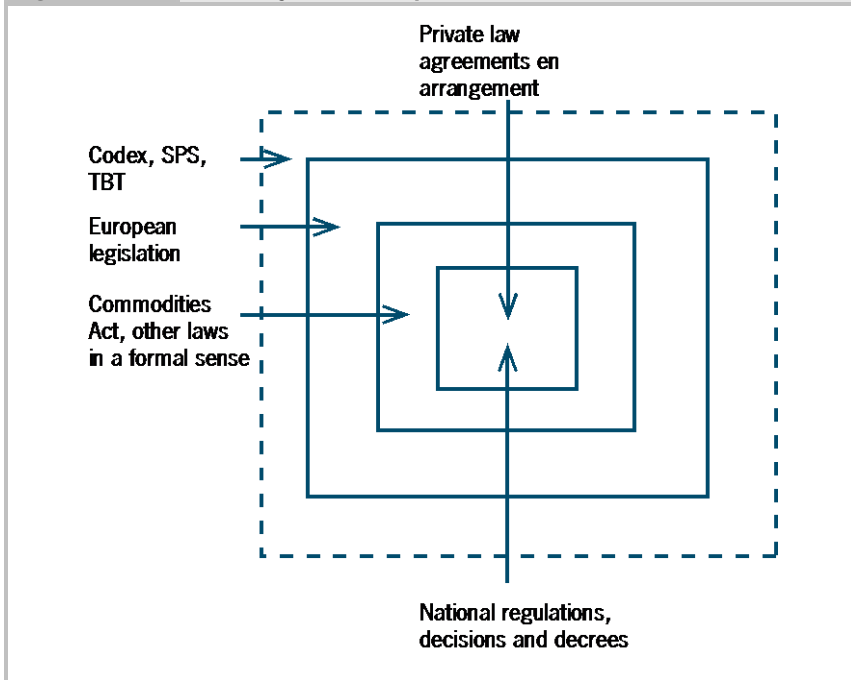
Figure A1.1 represents the hierarchy of legislation in the EU. Regulations issued by the Council and the European Parliament translate directly to the national system of laws. This leaves a small role for the national legislator, which is limited to monitoring and sanctions for contraventions of the provision. The second important form of European regulation is the directive. In this case, the task of the individual countries is to implement European directives into national legislation by establishing rules at the national level. If a country fails to do so or is late in doing so, an appeal can be made to the contents of the directive.

¹ The Union exclusively has competencies given to it by the member states (art. 5 TEU).

² The subsidiarity principle determines that the Union only acts in those areas which cannot be sufficiently effectively taken care of by the member states.

³ This means that the actions of the Union go no further than necessary to achieve the objectives set.

Figure A1.1 Hierarchy within European law



If the European directive allows room for the rules to be specified at the national level or for additional measures to be taken, national rules will begin to differ between the different countries, which can impair the working of the internal market. For this reason, the European legislator is making increasing use of regulations, which consolidate various directives and ensure legal harmonisation and integration within the European Union.

Implementation of European legislation can take place at national level by means of a law in a formal sense. This is a decision by the government and the States General. In addition, there are other rules by which citizens are bound: Orders in Council (issued by the government), ministerial decrees and ordinances at municipal or local level.

Example: hierarchy within European law

An important law in a formal sense in connection with food waste is the Commodities Act. This act relates to movable property including food, including substances used for chewing other than tobacco, and beverages as well as immovable property to be designated by order in council. The terms food and

beverages are condensed into the term 'food' referring to foodstuffs in general. The description of this term is to be found in article 2 of Regulation (EC) no. 178/2002, the General Food Law Regulation, which also forms the basis of our national food legislation. The General Food Law Regulation forms the basis of specific regulations (directives, regulations, decisions) of the European Union, which in turn are followed up by implementing regulations. At European level, the latter task is allocated to the Commission in particular.

At the national level, laws in a formal sense (such as the Commodities Act) are implemented by means of orders and/or regulations which supplement, specify and or implement the prescriptions of the Commodities Act. These are established by the Government/Minister, if a legal basis exists. A good example is the Dutch Food Labelling (Commodities Act) Decree. For example, Article 4, paragraph 1 of the Dutch Commodities Act states that: 'by order in council, the preparation, production, trade or processing or consumption of wares which do not meet the requirements laid down by the order with regard to their composition or execution or with regard to their quantity or properties may be prohibited for purposes specified in the prohibition'.

The Dutch Food Labelling (Commodities Act) Decree cited above has as its legal foundation articles 1, paragraphs 4 and 5, 8 (a) and (c), 14 and 22 of the Commodities Act (*Bulletin of Acts and Decrees* 1988, 360), and the requirement to implement European Directives, of which the most important in this connection is the European Labelling Directive (EC) 2000/13 of 2000. If he has legal authority to do so (by means of attribution and delegation), the responsible Minister can set more specific rules in a particular field or for particular circumstances.

In some cases, bodies which have been created on the basis of the Public Law, Industrial Regulatory Body set rules (under joint authority or independently) which apply to the production of a product (commodity board, e.g. the Commodity Board for Fish and Fish Products) or a sector (industry board). The boards are very important to the effective operation of sectors or supply chains (such as the poultry chain) in the Netherlands.

A1.2 Contamination in foods

Delineation of contaminants

Various Regulations and Directives apply to the safeguarding of animal and human food safety. A distinction may be made between legislation for contaminations which occur during production, microbiological contaminations and

pesticides. For many contaminants, maximum values have been set at European level by means of Regulations.

The basis for the European legislation relating to contaminants (contamination in foods) is Regulation (EEC) No. 315/93 of the Council of 1993, which established community procedures regarding contamination in foods. This regulation makes it possible to assign maximum tolerances for particular substances which can occur in food. The most important requirement for setting maximum tolerances is that the level of contamination must be as low as can reasonably be achieved (ALARA). These tolerances must be laid down in the form of a non-exhaustive EU list with among other things (article 2 of the Regulation):

- Maximum limits for the same contamination in different foods,
- Maximum limits for analytical detection,
- A reference to the methods to be used for sampling and analysis.

Limits are contained in the Annex to the implementing regulation of the Commission (EC), No. 1881/2006. In Europe, the Regulation has been chosen as the regulating instrument in order to promote market action (uniform regulation) and because contaminants can threaten public health.

How does this legislation cause food waste?

The important elements of this legislation are:¹

- Products which exceed maximum values of contaminants may not be brought onto the market as such:
- Article 2, paragraph 1: the endeavour must be to make the levels as low as reasonably achievable (ALARA principle);
- Member states may not prohibit, limit or obstruct the marketing of foods which comply with the specific provisions of the Regulation.
- The Commission can set maximum tolerances (art. 2, paragraph 3), but if the Commission does not do so, the national rules apply. The cited maximum values for contaminants are laid down by the Commission in Regulation (EC) No. 1881/2006, which took the place of Regulation 466/2001. This regulation prohibits among other things (art. 3):
 - Using foods as ingredients for other food if they exceed the maximum values, or to mix them in order to reduce the value;

¹ Based on the considerations to Regulation (EC) No. 1881/2006 of the Commission of 19 December 2006 (PB L 364 of 20.12.2006, p. 5).

- Sorting¹ or handling foods in order to reduce contamination, mixing them or using them in the production of food for direct human consumption.

The appendix to the Regulation lists hundreds of foods and the maximum concentrations of contaminants, such as nitrates, mycotoxins, metals, dioxins, PCBs, etc. Art. 5, paragraph 1 of Regulation 315/93 stipulates that member states may not prohibit, restrict or obstruct the marketing of foods which comply with the Regulation on the grounds of the contamination observed. This means that in principle, stricter regulations at national level must not lead to trade restrictions.

A 'zero tolerance' policy is applied to some contaminants. An example is the prevention of packaging material in animal feed. Besides the practical/technical problem that it is almost impossible to prevent residues of packaging ending up in aggregated bread and kitchen and garden waste, there is a measurement problem. Measuring instruments are becoming ever more accurate and as a result, the detection of undesired substances continues to improve. As a result, zero-tolerance effectively means that products are being excluded from the market.²

In the Dutch Commodities Act on contaminants in food products, the Dutch Minister imposed additional requirements for particular PCBs (in, among other things, eels and elvers, milk and products prepared using milk, eggs and egg products, nitrate-ion (for endive and red beetroot) and the nitrate content of spinach which is not exported (the permitted nitrate values are higher than permitted according to the appendix (section 1, point 1.1) to the European Regulation (EC) No. 1881/2006.

Likewise, in the ministerial order, specific rules set out in Regulation (EEC) 737/90 regarding maximum values for caesium 134/137 are declared applicable to the Netherlands (following the accident at the Chernobyl nuclear power station), along with maximum values for benzo(a)pyrene in nutritional supplements and spices and spice mixtures. It should be noted that the text of Regulation (EC) 1881/2006 has otherwise been adopted literally within the legislation of the Netherlands.³

Besides contamination by inert substances, foods can present microbiological risks, for example due to the presence of bacteria and parasites. The Commission has included criteria for the product (food safety criteria), criteria for

¹ With the exception of some products, such as nuts and dried fruit

² For a more extensive account, see B. van der Meulen: *Reconciling food law to competitiveness*, page 59 and further. Wageningen Academic Publishers, 2009.

³ www.cokz.nl/nl-NL/Regelgeving/Warenwet.aspx.

process hygiene and rules for testing methods in Regulation 2073/2005, appendix I, chapters 1, 2 and 3. The operators of food companies are primarily responsible for preventing the risks through the design of their operations (HACCP, 852/2004).

The measures which can be taken if tests show that the food safety criteria have been exceeded are as follows (art. 7, paragraph 2 of Regulation 2073/2005):

- If the product is already on the market, it is recalled or taken off the market;
- If the product has not yet reached retailers, it may be treated so that the danger is eliminated;
- The operator of a food company may use a batch for other purposes (following permission from the competent authority).¹

Residues from pesticides are regulated by Council Directive 91/414 (admission of pesticides to the European market) and Regulation 396/2005 (which formulates the standards and, together with its appendices, forms a document running to 1545 pages). The Regulation prohibits the use of some pesticides, such as DDT. The Directive gives the member states the freedom to permit or prohibit some substances which are listed in appendix I. Maximum values are stated in Regulation 396/2005, while this Regulation also sets a maximum residue level of 0.01 mg/kg, along with specific levels in appendix II, temporary levels in appendix III and permitted substances without health risks in appendix IV.²

Maximum values and procedures with regard to residues of medicines in the production of meat in products of animal origin are regulated by Regulation (EEC) No. 2377/90 of the Council of 26 June 1990, which contains a European procedure for setting maximum values for residues of medicines for veterinary use in foods of animal origin.

¹ Particular rules apply to mechanically separated meat (see art. 7, paragraph 3).

² See B. van der Meulen and M. van der Velde, *European Food Law*, Wageningen Academic Publishers, 2009, p. 324 ff

A1.3 Novel Foods legislation

What are Novel Foods?

Novel Foods are those foods which had not yet been brought onto the EU market before May 1997. Regulation (EC) no. 258/97 of the European Parliament and the Council relating to new foods and new food ingredients applies. Specific conditions for the use of GMO material in human or animal food are included in Regulation (EC) 1829/2003 and fall under the Novel Foods Regulation. Foods and animal feeds which consist of genetically modified organisms or are produced using them are subjected to a safety assessment before being admitted to the market.

In accordance with Regulation no. 258/97, new foods and new food ingredients are subject to a European approvals procedure. They may only be marketed when it is certain that the new foods do not pose any risk to health, are not misleading, or do not differ to such an extent from existing products which they are designed to replace that consuming them may be harmful.

The approval procedures are national or international, in particular if GMO (genetically modified organism) food or ingredients are at risk of entering the environment¹, and have been simplified or expanded and made applicable to products which were not previously² on the market and which fall into one of the following categories (art. 1):³

- Food and ingredients with a new or deliberately altered molecular structure;
- Food and ingredients which contain/are derived from micro-organisms, moulds or algae;
- Food and food ingredients which are derived from plant or animal material, unless derived from traditional methods with a history of safe application.

The admission of a *novel food* to the market, in contrast to an additive, is exclusively issued to *the requester*. Every subsequent request is assessed separately, which leads to considerable administrative burdens. However, if a food is considered identical to a significant degree ('*substantially equivalent*') to a food which is already on the market, a simplified procedure may be followed and notification is sufficient.⁴ However, in practice the procedure is practically

¹ See consideration 5 to Regulation (EC) No 258/97 (Novel Foods).

² In this context, 'now' refers to and from the date on which the Novel Foods Regulation came into force (27 May 1997).

³ Additives do not fall under this Regulation (but under Regulation 1333/2008 relating to additives).

⁴ See for example http://ec.europa.eu/food/food/biotechnology/novelfood/index_en.htm.

always handled by the European regulator (competition considerations mean member states have an interest in keeping new products 'outside the gate').

The procedures for innovations in the United States are significantly simpler due to the use of the GRAS principle (this stands for: '*generally recognised as safe*');¹ once it has been established that a product is safe, its acceptance onto the market also applies to other, comparable products. Moreover, an important difference with American legislation is that products which contain GMO material do not have to be labelled as such. In the EU, they do.

Effect on residual flows and on product innovation

Important legislation for new food is the Novel Foods Regulation (258/97). Specific conditions for the use of GMO material in human or animal food are set out in Regulation (EC) 1829/2003.

In principle, the *novel foods* procedure guarantees that the regulation is applied uniformly. While national procedures do exist, the powers that the member states have to object means in practice that European acceptance takes place by means of 'pre-market approval'.

The system of regulation imposes a greater administrative burden than the system in force in the United States because every request is assessed and permits are issued to the requester separately. The system is extremely rigid. 'New' products which may have been used as food outside Europe for centuries are excluded from the European market (sent back/destroyed and so on), as long as they have not been approved. All this also acts as a significant brake on product innovation (e.g. new products from residual flows), which is a possible instrument for reducing food waste.

¹ 'GRAS' is an acronym for the phrase Generally Recognized As Safe. Under sections 201(s) and 409 of the Federal Food, Drug, and Cosmetic Act (the Act), any substance that is intentionally added to food is a food additive, that is subject to premarket review and approval by FDA, unless the substance is generally recognised, among qualified experts, as having been adequately shown to be safe under the conditions of its intended use, or unless the use of the substance is otherwise excluded from the definition of a food additive'. The meaning of 'additives' in the United States differs somewhat from the EU 'additives'.

A1.4 Hygiene rules including import checks, refrigeration and inspection of meat

Which legislation applies?

Hygiene rules are laid down in the European Hygiene Package and comprise Regulation 852/2004 (food companies general), Regulations 882/2004 (official checks on foods), 853/2004 (specific hygiene prescriptions for foods of animal origin) and 854/2004 (official checks for products of animal origin intended for human consumption). The objective of the regulations is to prevent microbiological and/or chemical contamination. 'Hygiene' must be broadly interpreted: as the promotion of food safety. The basic regulations and standards are not only to be found in the Hygiene Package, but also in an extensive palette of private law and/or public-private law agreements, rules and accepted implementation policy.

Regulation 852/2004 prescribes that food companies must adhere to the principles of HACCP. The HACCP methodology is based on the Codex Alimentarius principles: risk analysis, establishment of *Critical Control Points* (CCPs), establishment of maximum limits, introduction of monitoring, determination of steps if maximum limits are exceeded, description of procedures and recording of data. Large companies in the Netherlands have food safety systems based on HACCP. For smaller Dutch companies, the procedures are generally translated into hygiene codes by industry bodies; these may be implemented following approval by the Minister. These hygiene codes are regularly evaluated in order to improve the codes if necessary. The hygiene code itself, however, is not law. All in all, then, there is notable freedom in implementing the HACCP system, the steps of which are not set out in detail in legislation. HACCP offers a general framework, the detail of which must be specified by the producer or retailer. Businesses are not always aware of the freedoms that exist.¹

In general, large-scale western producers are at an advantage in the application of hygiene prescriptions (lower administrative costs on balance due to benefits of scale and possibilities for standardisation) but also at a disadvantage due to the narrower margins for implementation.

For very small-scale producers, an exemption provision has been included in art. 1 paragraph 3 of Regulation (EC) 852/2004. Following an approval proce-

¹ Meulen, B. van der and H.J. Bremmers (2007). 'The overhaul of EU food law as perceived by industry'. In: *Competitiveness of the European Food Industry*. LEI, The Hague, Research Report, Nov 28th, 2006 (J.H.M. Wijnands, B.M.J. van der Meulen and K.J. Poppe eds.). Ch. 3, pp. 74-110. Published at: ec.europa.eu/enterprise/food/index_en.htm on behalf of DG Enterprise, Brussels.

ture, national governments can take measures to 'modify the rules laid down in appendix III' (in this connection, see articles 10(3) and 10(4) of Regulation (EC) 853/2004). Exemptions to the complete introduction of a HACCP system can be permitted in cases of traditional production methods, particular geographical restrictions or restrictions relating to the construction, design and equipment of facilities. Contrary to appendix II, national governments may permit exemptions to allow the use of raw milk for cheese production, which is more of an advantage for Eastern European countries than for those in Western Europe. It may be noted that the operator of the facility has primary responsibility for the hygiene of his company, registration, tracking & tracing, and the safety of his product in general.

Besides the public law hygiene rules, there is also a substantial system of private law and public-private law regulation. For example:

- Specific business forms such as joint ventures, with rules being imposed on companies with regard to presentation, operation and hygiene in the production and/or sale of foods. Such rules can be stricter than is essential on the basis of national (e.g. Dutch Commodities Act) and/or other international regulations (General Food Law, other Regulations and Directives).
- Specific contractual arrangements or conditions of supply, as is the case in application of the *GlobalGAP* system. This system prescribes standards which supplying companies must fulfil. Given the key position of retailers in the chain, such conditions can exceed the legal norms and as a result cause residual flows.
- Covenants in which public-private law agreements are made, for example with regard to design and removal of waste flows, such as packaging and the processing of plant-based and animal waste.
- Rules relating to implementation laid down by commodity boards which, independently or as delegated authorities, create additional regulations with which companies in a supply chain or sector must comply.

A1.5 Food information provision

Which legislation applies?

Food waste through labelling of foods will occur if the label gives incorrect, incomplete or misleading information. The food in question is taken from the market and either processed at a lower level or destroyed.

The regulations around food information provision are in a period of transition from the existing labelling directives to a European Regulation in the area of food information provision, which will probably come into force as European law in 2012. The European Directive currently in force has been implemented in the Netherlands by means of the Royal Decree Concerning Food Labelling (WEL) among other legislative instruments. This decree is supplemented by legislation from related Directives and Regulations. Acting in contravention of this Decree is prohibited. Art. 16 of Regulation 178/2002 (General Food Law Regulation) determines that the labelling and advertising of foods and the form in which they are offered for sale may not mislead the consumer.

Art. 16 v of the General Food Law (178/2002):

Without prejudice to more specific provisions of food law, the labelling, advertising and presentation of food or feed, including their shape, appearance or packaging, the packaging materials used, the manner in which they are arranged and the setting in which they are displayed, and the information which is made available about them through whatever medium, shall not mislead consumers.

Article 2, paragraph 1 of the Dutch Royal Decree Concerning Food Labelling:

The trading of food or drink is prohibited other than with observance of the prescriptions laid down in this decree with regard to their labelling and the use of references or representations.

Art. 7(1) of the new European Regulation on the provision of food information, which may come into force in 2012, explicitly provides that food information may not be misleading in terms of its composition and properties. It is prohibited to attribute to a product the property that it prevents, treats or cures a human illness. If such an impression is created, repackaging is a possibility, but in practice destruction or processing as animal feed will be the most cost-efficient alternative.

The new regulations integrate into a single European Regulation [currently still COM(2008)40] principally the existing prescriptions in the area of food labelling (Directive 2000/13/EC) and the nutrients regulations in Directive 90/496/EEC. Information on nutrients is currently still provided on a voluntary basis, unless a claim is made for the product or vitamins and/or minerals are added.

Moreover, the regulations are being modernised (for example: rules added for purchases via the internet). Monitoring of the application of regulations and sanctions for contraventions is in the hands of the national authorities. While the

existing regulations at national level permit substantial freedom in the implementation in legislation (in the Netherlands: the Commodities Act and derived from this the Royal Decree Concerning Food Labelling, along with various Decrees, Ministerial Decrees and Decisions of independent administrative bodies (commodities boards)), the new Regulation is directly effective on the system of regulation of individual countries, and is uniform across all member states (aside from minimal exceptions). Nevertheless, there will not be complete integration. There still remain more than 100 directives and ordinances (semi-horizontal, vertical) which all relate to food information provision (both '*business-to-business*' and '*business-to-consumer*'). Confusion about the applicable labelling rules results in the unnecessary removal of products from the food chain.¹

The proposal with regard to providing food information to consumers COM(2008)40 replaces and/or integrates parts of the general European labelling directive (2000/13/EG), the nutrients directive (90/496/EEC) and specific legislation.² If a product contains information on the packaging which is misleading to the consumer, it will have to be removed from sale and not or no longer used for human consumption. As has been shown, the chances of this are real because the regulations are complex and even after the current move towards integration, it will remain distributed across various locations. The integration of existing guidelines into a single European Regulation will also mean that companies will have to get used to the new situation and will therefore presumably make more mistakes. The administrative burdens in the short term will also increase.³

Expiration date - best before date and use-by date

Food waste can also originate if a product has to be removed from the shelves due to the passage of time. The currently applicable labelling guidelines, which to an important extent have been literally translated into the Dutch Royal Decree Concerning Food Labelling, draws a distinction between the 'best before date' (expiration date) and the 'use-by date' (ultimate consumption date). Exceeding the best before date does not automatically mean that a product has to be removed from the shelves, particularly not as long as the food retains its charac-

¹ Study currently at an advanced stage into the state of food information provision from a legal perspective by the author of appendix 1.

² Directives (87/250/EEC, Directive 94/54/EC, 99/10/EC, 2002/67/EC, 2004/77/EC), and Regulation (EC) No. 608/2004.

³ For a more extensive account, see H.J. Bremmers: *Administrative Burdens in the European Food Industry - with special attention to the dairy sector*. Research report LEI, 2008; ISBN/EAN 978-90-8615-267-4.

teristic properties. The primary responsibility for assuring food safety lies in general - and also in this case - with the operator and not with the government.

Products which can represent a hazard to health (i.e. which are highly perishable) are subject to an absolute time limit, which must be shown on the packaging in the form of a 'use-by date'. After the use-by date has passed, foods may no longer be sold.

Effect of legislation on food waste

In the long term, the proposal regarding food information provision COM(2008)40 will remove the confusion and uncertainty about the food information rules, which will prevent mistakes. Wrongly labelled foods must be removed from sale. In such cases, relabeling products is an option, but it is often an expensive solution or practically impossible in view of the limited expiration terms of products. It may be noted that the rules apply both to locally produced foods supplied to the customer (consumer/caterer/restaurant, etc.) and to imported products, based on the equivalence principle which applies in Europe. Border controls can result in products being sent back or eliminated (in other words dumped or incinerated) at the cost of the exporter or importer if they do not meet the European labelling rules.¹ However, incorrect labelling does not necessarily mean that the product in question may not be processed to make animal feed.² This is also the case if the product does not comply with European regulations regarding its composition and safety. For example, in Europe the use of hormones is prohibited in the production of beef, whereas it is permitted in the United States. Even though it did not prove possible to supply scientific proof in the terms of the WTO as to the unsafety of using some hormone products for the consumer, nevertheless the ban on hormone use (and likewise on the use of some products which make use of genetic modification) has remained in place.³ Such material may also not be processed into animal feed.

Elimination through dumping or incineration is the obvious course of action if it is no longer possible to establish the actual composition of a product, which may be the case for imports from less developed countries. In that case, re-packaging or processing as animal feed cannot take place, because the product represents a potential danger to humans or animals (application of the

¹ The creation of food waste by border controls has been charted both qualitatively and quantitatively by S. Schoss, WU, as part of her dissertation for the Law & Governance group.

² See consideration 34 to Regulation 1069/2009 relating to animal by-products not suitable for consumption.

³ Extensively discussed in H. Bremmers *et al.*: 'A legal-economic analysis of international diversity in Food safety Legislation: Content and Impact'. EFL, 1, 2011.

'*precautionary principle*', art. 7 General Food Law). As stated, the proposal clarifies the rules which apply uniformly within the European Union. This means that amendment of the existing regulations is currently not an issue.

The European General Food Law (art. 14) does not permit unsafe food to be brought onto the market. 'Unsafe food' can be the result of incorrect information provision (as is the case for processed allergenic foodstuffs, such as nuts, gluten, etc.). Processing incorrectly packaged foods outside the company of the operator to produce animal feed, for example, is not permissible if the actual content of the packaging cannot be determined.

A1.6 Use of animal by-products¹

Regulation

Transmissible Spongiform Encephalopathies (TSEs), of which the best known is *Bovine Spongiform Encephalopathy* (BSE), are hazardous to the health of animals and humans. These illnesses prompted Regulation (EC) No. 999/2001 of 22 May 2001. Article 7, paragraph 1 prohibits the use of proteins derived from mammals in the feed of ruminants. Article 7, paragraph 2 expands on this article, which is further regulated in Annex IV of the Regulation (see boxes on Annex IV).²

Regulation (EC) no. 1774/2002 determined how animal by-products, that are not intended for human consumption, must be processed, used and/or eliminated. This Regulation was succeeded in 2011 by Regulation (EC) no. 1069/2009 and Regulation (EU) no. 142/2011, partly because some countries were applying the rules too flexibly and in other cases the rules were regarded as rigid.

As a framework, it may be stated that there are three prohibitions on the processing of animal proteins:

- General prohibition on the consumption of animal proteins from mammals by ruminants ((EC) 999/2001 article 7, paragraph 1).
- *Species-to-species barr*: animals may not eat animal by-products from their own 'kind' ((EC) 1069/2009 article 11).
- Total ban, also known as Extended feed ban: all by-products from land animals may not be fed to productive livestock or to fish ((EC) 999/2001 Annex IV).

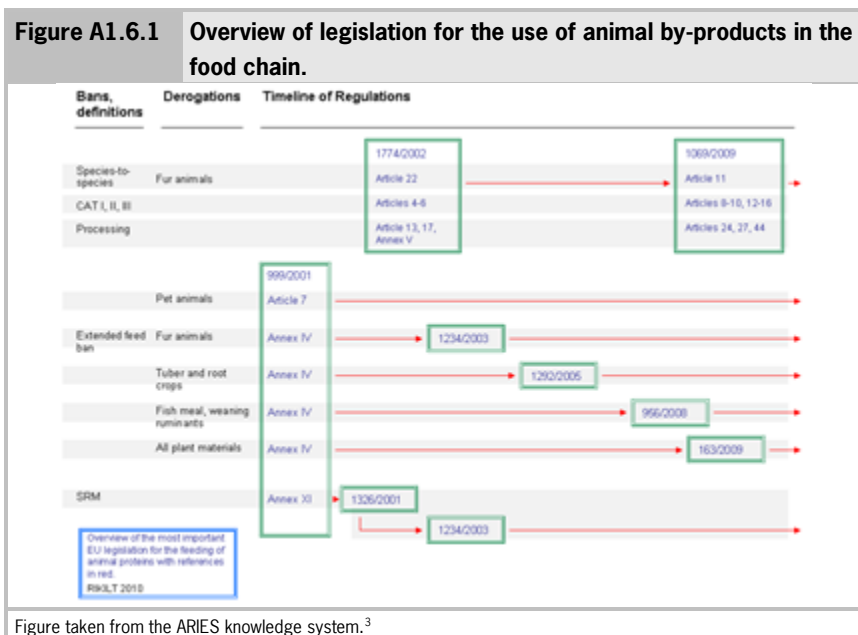
¹ This subparagraph has been commented on and in places amended by Dr. Leo van Raamsdonk, RIKILT, part of Wageningen UR. However, the final content falls under the responsibility of HB.

² Annex IV of Regulation (EG) 999/2001 may be relaxed in the near future; see the further text of this appendix 1.

The *total feed ban* therefore completely overshadows the *species-to-species ban*, and was also always intended as a temporary measure. The *species-to-species ban* can only be adopted if proper monitoring can be instituted and if cross-contamination above a particular level can be prevented. Alongside this, there are exemptions for fur animals and pets, for example, and for special products. Figure A1.6.1. gives an overview of the legislation in its historical context.

Fishmeal is not named in Annex IV as an extension to the prohibition imposed by (EC) 999/2001 article 7, paragraph 1, and as such is permitted, aside from several exceptions (feed for ruminants).

Modification of the total ban is currently under discussion,¹ partly because non-ruminants such as pigs and poultry have proved not to be carriers of the BSE-virus.²



¹ In the TSE Roadmap (http://ec.europa.eu/food/food/biosafety/tse_bse/docs/roadmap_2_en.pdf) of the Commission, possible relaxations of the TSE regulations are considered. Cannibalisation remains prohibited, but use of material from non-ruminants by other non-ruminants may be permitted within one to two years, provided adequate detection methods can be developed so that the source of the material can be established with certainty.

² Determined by the EFSA in 2007, EFSA Journal, 2007.

³ <http://aries.eti.uva.nl/>, L. van Raamsdonk, RIKILT.

Regulation (EC) 1069/2009 (replaces Regulation (EC) 1774/2002 on 3 March 2011) indicates how animal by-products need to be processed and/or definitively eliminated from the food chain. Use as feed for animals is permitted under some conditions, following a risk assessment. Exceptions to the prohibition in Annex IV of (EC) 999/2001 include the feeding to productive livestock of for example milk and dairy products, eggs and egg products, blood products and gelatine (appendix IV, paragraph II). In some cases, the exceptions are hedged in with stringent conditions (Regulation (EC) No. 999/2001 Annex IV, I a and b and Annex IV II d)).

Processing options

Animal by-products are defined in art. 3, paragraph 1 of Regulation (EC) 1069/2009 as: 'entire bodies or parts of animals, products of animal origin or other products obtained from animals that are not intended for human consumption, including oocytes, embryos and semen)¹).

Regulation (EC) 1069/2009 imposes restrictions on the use of kitchen waste and food remains. According to article 2, paragraph 2 (g), these fall under the Regulation if:

- it originates from international transport;
- it will be processed into animal feed or
- it will be processed to produce biogas or compost.

Regulation (EC) 1069/2009 relates to the processing, use and/or elimination and so on of animal by-products which are not intended for human consumption. Regulation 1069/2009 relates to animal by-products which are designated by law, or by the manufacturer (for example, designated as waste/losses during the production process for commercial reasons). Export rules are set out in Regulation (EU) 142/2011.¹

Regulation 1774/2002 (the predecessor to 1069/2009) made a distinction in articles 4, 5 and 6 between Category 1, 2 and 3 material; these correspond to articles 8, 9 and 10 of Regulation 1069/2009. With the coming into force of the Regulation of 2009 in March 2011, some small shifts of items will occur between the categories. Moreover, the new regulation is less restrictive, among other things because end points in the chain are formulated (see art. 4/5 of (EC) 1069/2009).

¹ It is not possible to provide all the details correctly and in full here given the limited space for text. This implementation regulation alone runs to more than 200 pages. For specific details, the reader is referred to the legislation cited.

Regulation (EC) no. 1069/2009 provides for a reclassification of by-products which were previously classified as Category 2 to Category 3. An important part of the Category 3 material may be used as feed for animals other than only fur animals or zoo animals. Art. 12 (e) and (f) stipulates that Category 1 and above may be used for fuel production or to manufacture particular products (such as cosmetics or medicines).

A restriction on the use or processing of Category 3 material in the old regulation was the fact that under article 17, processing companies recognised as Category 3 were exclusively permitted to process Category 3 material. This rule was relaxed in Regulation (EC) 1069/2009, provided cross-contamination could be ruled out. In accordance with the central principle of risk management in European law and in WTO regulations, the new Regulation has extended traceability in the supply chain (among other things through systematic record-keeping for the transportation of risk material).¹ The Regulation relating to the processing of by-products of animal origin provides that in case of contravention of the rules on residue levels, the products in question can be designated as Category 1 or also as Category 2 material. This widens the processing options at a higher processing level. The new Regulation differs from the existing one on the following points among others:²

- limiting of veterinary checks on risk-free, processed products;
- simplified rules for feeding animal by-products to protected animal species;
- improved delineation and control of the chain;
- relaxation of requirements for facilities which process different categories of by-products.

Category 1 material: some specific remarks

Category 1 material is the most risky. It includes material from animals suspected of having TSE, which have been culled, specified risk material, animal by-products which have undergone an illegal treatment or contain excessive residues and/or contaminants (such as hormones and cortisone products). Specified risk material (art. 3, paragraph 1(g) of Regulation (EC) No. 999/2001), is summed up in Annex V of that Regulation. It includes the skull, spine, brains and eyes of cattle or the skull, bone marrow and spleen of goats and sheep. Implementing Regulation (EC) 92/2005 has widened the possibilities for using cat. 1 material (in particular animal fat) for the production of biodiesel or biogas, with

¹ Based on the considerations and content of Regulation (EC) 1069/2009.

² <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10> downloaded on 10-11-2010; Proposal of the Commission COM 2008(345) p. 6-7.

the exception of high-risk material. Based on Regulation 1069/2009 currently in force, possibilities for processing depend on the nature of the material and run from incineration through co-incineration to processing specifically permitted (e.g. cosmetic) products. Processing to produce animal feed is not permitted. The same is true for Cat. 2 material. A mixture of Category 1 material with Category 2 and/or Category 3 falls into Category 1.

Category 2 material: some specific remarks

Regulation 1069/2009 sets limits on the use of specific animal waste flows (such as manure, contents of the gastrointestinal tract, dead animals not intended for human consumption, animal by-products other than Category 1 and Category 3 material, and so on). Contents of the gastrointestinal tract generally fall into Category 2 (except in the case of animals infected with BSE, for example), as do products of animal origin containing excessive residual values of permitted substances or other contaminants, or animal products which have been denied access to the EU following border checks or animal by-products which have been denied export clearance. As stated previously, in general, processing to produce animal feed is prohibited.

Category 3 material: specific remarks

These materials offer the most opportunities for use or processing. They also include products which have been taken off the market for commercial reasons. The latter may be processed to produce animal feed. Products with observed deficiencies in production (waste and losses) or in their packaging fall under Category 3, as does a significant proportion of kitchen waste and food residues (swill).¹ Processed animal proteins may not be used as animal feed for productive livestock, with the exception of fur animals, but can be cofermented and so used for the generation of biogas. After processing², they can be used as feed for other animals.³

¹ But not the kitchen waste and food residues of companies active in international transport: this is category 1 material and must be incinerated or dumped.

² Normally heating under pressure.

³ See for example <http://www.vwa.nl/onderwerpen/bijproducten-voeder/dossier/verwerking-dierlijke-bijproducten/categorie-3-materiaal>

A1.7 In conclusion: a few important points for attention

1. Contaminants. Although the setting of maximum levels for contaminants in foods and animal feed is preferable from the point of view of safety, in many cases the application of zero-tolerance is a significant cause of waste. Improved methods enable the smallest contaminants to be detected, leading to the product being taken off the market.
2. Novel Foods. Products which have been used outside the EU as food for centuries are excluded from the European market if they have not undergone 'pre-market approval'.
3. Hygiene. HACCP offers more flexibility than businesses are generally aware. Better information can limit residual flows.
4. Food information provision. Regulations are fragmented and will remain so. Businesses are not properly up to date with developments. Products may be wrongly processed at a lower level as a result of actual or supposed contraventions of labelling rules.
5. Animal by-products. The use of animal by-products in animal feed may be relaxed, particularly when it comes to the use of animal proteins from non-ruminants as an ingredient in animal feed for non-ruminants and fish. Better separation of kitchen and food waste and flows of former foods can lead to improved processing.

Appendix 2

Background information to legislation (II)

A2.1 European marketing standards

Which legislation applies?

Regulation (EC) No. 1234/2007 of the Council of 22 October 2007 relates to the establishment of common marketing standards for a number of agricultural products and to market regulation. This regulation describes general marketing standards for different types of products including grains, sugar, meat from various animal species, fruit and vegetables, eggs, milk and dairy products. These general marketing standards set generic minimum quality standards for these different types of products. However, for various products, specific marketing standards have been established, which lay down rules regarding quality (minimum requirements, classification into classes), grading (size), tolerances and packaging and appellation. Specific marketing standards for fruit and vegetables are described, for example, in Regulation (EC) no. 1580/2007 (amended in 2009 by means of Regulation (EC) No. 771/2009). Specific marketing standards exist for ten products in this category: for apples, pears, lettuce, curly endive and endive, tomatoes, sweet pepper, kiwi, peaches and nectarines, strawberries, table grapes and citrus fruits. The Dutch Fruit and Vegetable Quality Control Board (KCB) monitors compliance in the Netherlands with the marketing standards for fruit and vegetables by market participants at all stages of the chain except retail, where the checks are carried out by the nVWA (the Dutch Food and Consumer Product Safety Authority).¹

A2.2 Phytosanitary policy

Which legislation applies?

Council Directive 2000/29/EC of 8 May 2000 relates to protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community.

¹ Amendment to legislation on marketing standards for fruit & vegetables from 1 July 2009. Horticultural Commodity Board, 2009.

Phytosanitary policy focuses on keeping out and controlling invasive organisms which are harmful to plants and plant-based products. Invasive organisms are those which do not naturally occur in the Netherlands but find their way there due to human action. As such, phytosanitary policy distinguishes itself from crop protection policy, which is concerned with protecting plants in agriculture and horticulture and in nature against indigenous diseases and infestations.

Dutch phytosanitary policy is anchored in two international treaties; the IPPC (*International Plant Protection Convention*) and the WTO-SPS (*Sanitary and Phytosanitary Agreement*). These treaties are binding on the signatory countries, including the Netherlands and the EU. These international phytosanitary guidelines have been translated into European regulations and laid down in the Phytosanitary Directive. Appendices I and II of the Phytosanitary Directive (2000/29/EC) contain a list of approximately 300 quarantine organisms. Zero tolerance applies to these organisms – that is to say that these organisms may not be introduced or spread within the European Union. The Phytosanitary Directive 2000/29/EC obliges member states to take protective measures against the introduction and spread of these quarantine organisms.

The directives referred to above have been worked out in the Netherlands in the Plant Diseases Act, the Decision on the Suppression of Harmful Organisms (BBSO) and the Suppression of Harmful Organisms Regulation and the Regulation on the import, export and movement of plants. Due to the great importance to the country of exports of Dutch products, the Netherlands government enforces a more stringent regime to tackle quarantine diseases such as brown rot and ring rot than the EU pesticides directives prescribe. The nVWA coordinates the inspections (import and export checks and company visits).

A2.3 Norms and quotas in fisheries

*Which legislation is relevant to discards?*¹

In the fisheries sector, legislation and regulations play a role in the *discarding* of fish. *Discards* are organisms which under the legislation and regulations may not be landed and therefore must be dumped overboard after being caught. Commercial varieties are *discarded* if (1) the organism is smaller than the minimum landing size and (2) the quota for the species in question has been

¹ The information in this paragraph is taken almost entirely from a memo by the Commodity Board for Fish and Fish Products, which supplied information for this research (Code: 2010 268/33.2). We have supplemented the information with our own information and analyses.

reached. The survival chances of discards depend on several factors, such as the fishing gear used, the environmental conditions, the species and the duration of the trawl.¹

The following legislation causes food waste in fisheries:

- Regulations on minimum landing size: EC regulation - Technical measures for the conservation of fish stocks (No. 850/98 of the Council of 30 March 1998). Chapter III, Title III. Regulation prohibiting the landing of fish for which the quota has been reached: EC regulation - Technical measures for the conservation of fish stocks (No. 850/98 of the Council of 30 March 1998). Chapter 1, Article 10.
- Regulations on quota system: quotas are set each year by the EU. The quotas for 2010 were set in EC regulation - Distribution of TACs and Quotas 2010 (No. 23/2010 of the Council of 14 January 2010), supplemented by regulation no. 219/2010 of the Council of 15 March 2010.
- Regulations prohibiting electric fishing: EC regulation - technical measures for the conservation of fish stocks (No. 850/98 of the Council of 30 March 1998). Chapter III, Title V, article 31.1.
- Regulations providing 5% exemption for electric fishing: EC regulation - Distribution of TACs and Quotas 2009 (No. 43/2009 of the Council of 16 January 2009). Appendix III, article 3. Regulations on quota for scientific research: from 1 Jan 2011 article 33, sixth paragraph of regulation 1224/2009 (new control regulation).
- The European Fisheries Fund can also be used for investigating innovative techniques which contribute to reducing discards.

A change to the Common Fisheries Policy is currently being prepared. As a result, the applicable legislation will change from 2013. Studies are currently underway into the possibilities for implementing this policy, and into possible markets for the current *discards*, which would in future have to be landed. In 2011, a proposal for this new policy will be issued, after which stakeholders will be consulted about the new policy. Within the current frameworks, various measures have already been taken which have resulted in a reduction in discards compared to, for example, the 1980s – for example, the net configuration of the trawler. Alongside large-scale cuts, which significantly reduced the trawler fleet, a transition has also taken place to alternative fishery methods which produce fewer discards.

¹ Parliamentary question on discards in Dutch fisheries. Harriët van Overzee and Floor Quirjns, Wageningen IMARES, October 2007, Report number C101/07.

The Dutch Ministry of Economic Affairs, Agriculture and Innovation expects that the percentage of discards will not fall much further. The absolute numbers will increase, now that the restrictions on fishing have been relaxed due to the recovery of stocks.

Appendix 3

Non-legal obstacles encountered in preventing the creation of waste flows, per part of the chain

Alongside legal obstacles to the prevention of food waste, an inventory was also compiled of non-legal obstacles. This exercise was conducted on the basis of interviews with various chain actors. Because the non-legal obstacles cited often differed among the different chain actors, alongside an overview of the obstacles which apply in general to the entire chain, the information has also been represented per chain part:

- Primary sector
- Trade (sales channels), logistics and storage
- Processors/processing industry
- Wholesale
- Out-of-home sector
- Retailers and their distribution centres
- Consumers

Non-legal obstacles to preventing food waste (general)

Non-legal obstacles to preventing food waste which are not specific to a particular part in the chain but which operate at a higher level have been separately surveyed and represented in table A3.1. The fact that the entire Dutch Commodities Act is based on food safety, whereas food waste is not considered, is cited as a cause of food waste. In addition, it is noted that emotions on the part of the public, civil-society organisations and policymakers as regards the use of new processes/technologies make it harder to create legislation for their use (for example in the case of GMOs). Another cause which emerges in the entire chain are the private standards, along with the mentality and knowledge of people in relation to food waste as regards expiration dates and the opportunities which the legislation provides. Economic considerations are a barrier to preventing food waste for companies, even if reduced waste could generate money. A suggestion made by respondents is for the government to set an example in the area of preventing waste and optimum utilisation of waste flows.

Table A3.1 Food chains, general	
Non-legal obstacles to preventing food waste	
Cause	Notes, effect on food waste (including possible solutions)
The starting point of the Dutch Commodities Act is food safety; the Commodities Act has no criteria in relation to sustainability and food waste	The focus of the legislation is on food safety
Novel Foods and processes - Emotions	For example, GMOs and new techniques for extending expiration terms. Emotions hamper the process of legislating to permit new products and technologies.
Exemption procedures take a long time	Companies sometimes dare to take the responsibility, but decision-makers do not, because they cannot judge the risks.
Private standards - over and above the legislation - Expiration date requirement from customers - Lower MRLs than legally required - Delivery temperature - Quality standards - Power relations within the chain	The demand from retailers and consumers for products that look perfect can lead to the wasting of safe, healthy and good food which is perfectly suitable for human consumption. Waste can be caused by quality requirements set further along the chain. For example, due to particular quality standards, some potato, fruit & vegetables products cannot enter the chain at all.
Knowledge level and mentality of consumers	Not being aware of the scale of food waste and its consequences.
Knowledge level among entrepreneurs and their staff	Lack of professional diplomas relating to knowledge of the product, storage, planning, etc.
Expiration date - unfamiliarity with legal possibility	Many do not know that a product which has passed its best before date may still be sold. Such food may also be given to the Food Bank; conditions are laid down in a protocol. Additionally, innovations can be developed to make expiration dates more flexible, for example RFID (Radio-Frequency Identification Technology).
Lack of good hygiene	
Financial considerations; costs of activities to prevent waste	If reducing waste yields nothing financially, it will not happen. In other words, does it offer a financial return? Is it worth reducing waste if you only have small waste flows?
Source: Interviews with chain actors, 2010.	

Primary sector

The interviews with primary producers were mainly held with horticultural producers. No inventory was taken of non-legal obstacles in the primary animal sector. Overproduction of potatoes, fruit & vegetables was cited as the most important cause of food waste. Overproduction itself could be absorbed, but the influence of the seasons will remain. In addition, private standards are an important non-legal cause of food waste in the primary sector.

Table A3.2	
Primary sector	
Non-legal obstacles to preventing food waste	
Cause	Notes, effect on food waste (including possible solutions)
Overproduction of potatoes, fruit & vegetables - in some cases there are no agreements about quantities to be produced - seasonal influences	Overproduction of fruit, vegetables and potatoes can occur because no agreements have been made about the quantities to be produced or due to seasonal influences (for example a peak in supply in the harvest season). The effect is that too much fruit, vegetables and potatoes are then supplied to the Dutch market (there may be a market for the surplus abroad). In order to prevent the price from falling too far, fruit, vegetables and potatoes are sometimes destroyed. However, the supply peak is reasonably predictable; you can gear your actions to it. This already happens with cauliflower (the longer the product takes to grow, the more predictable it is). If processors are more flexible, they can respond to scarcity in the market. However, they often plan their work in advance (contract cultivation), which leaves them little room for manoeuvre.
Low prices	If prices are low, fruit, for example, is utilised at a lower value than it is actually suitable for. The question is whether apple sauce is not financially more valuable than fresh apples.
Private standards - demands from retailers for lower MRLs than legally required	There are supermarkets that use 50% of the legal MRLs as their standard because measurement results can be out by 50%. As a result, fewer crop protection agents are used and there are more losses caused by putrefaction. In addition, 'naming and shaming' of supermarkets by civil-society organisations has a knock-on effect in the chain. In order to prevent this, supermarkets sometimes adopt stricter standards than required by law.

Table A3.2	
Primary sector	
Non-legal obstacles to preventing food waste (continued)	
Cause	Notes, effect on food waste (including possible solutions)
Investment in research into pesticides for soft fruits	For growers of soft fruits, the legal requirement with respect to MRLs is problematic and as a result, more products are declared unfit. The soft fruit sector is small and as a result, the industry invests less in research into pesticides.
Source: Interviews with chain actors, 2010.	

Trade (sales channels), logistics and storage

The cited non-legal obstacles to preventing food waste within trade companies relate above all to products with short expiration terms and the short and cool chain which they require. In addition, there are customer-specific requirements (private standards) which mean that products are declared unfit as fresh produce, the old marketing standards are still being used as quality requirements, or stricter requirements with regard to pesticides are set by the customer.

Table A3.3	
Trade (sales channels), logistics and storage	
Non-legal obstacles to preventing food waste	
Barrier	Notes, effect on food waste (including possible solutions)
Interruption of the cool chain (potatoes, fruit & vegetables) - ordered by supervisors - due to lack of knowledge with regard to storage	If the cool chain is interrupted, there is a much greater chance of losses. Another cause of losses is storage at too high a temperature. This sometimes causes friction with supervisors, who pay too little attention to it. Knowledge of ideal storage conditions ought to be shared worldwide.
Oversupply: Stocks of potatoes, fruit & vegetables are stored too long	As a result, potatoes, fruit & vegetables are written off, leading to loss of value.
Trade companies do not communicate with each other properly (potatoes, fruit & vegetables)	If there is good coordination in the chain as to when a delivery is due to take place (import, trade), losses can be avoided reasonably effectively. Another solution is to bring together supply and demand information in order to smooth out peaks and troughs in relation to potatoes, fruit & vegetables.

Table A3.3 Trade (sales channels), logistics and storage	
Non-legal obstacles to preventing food waste (continued)	
Barrier	Notes, effect on food waste (including possible solutions)
Protectionism by countries in not permitting particular pesticides	Certain pesticides may not be used in all countries. This can be used as a form of protectionism by a country.
29 EU marketing standards for potatoes, fruit & vegetables were scrapped in 2009	<ul style="list-style-type: none"> - Supermarkets may now sell crooked cucumbers fresh; however, they are not yet on the shelves. Crooked cucumbers are not thrown away, they but go into a different sales channel (value reduction). - In the trade channel, norms are used to standardise quality. They say nothing about internal quality. Inspection/rejection based on the general marketing standards is pointless and increases costs. - Logistical limitations. The logistical process has been perfected; packing a fixed number of straight cucumbers in a box is more efficient than packing crooked cucumbers.
Private standards: <ul style="list-style-type: none"> - Pesticides, MRLs - Delivery temperatures 	The customer/supermarket can set more stringent requirements than required by law with respect to pesticides and delivery temperatures (in the EU; customer-specific).
Damage during transportation	
Source: Interviews with chain actors, 2010.	

Processors/processing industry

The most important non-legal obstacles to preventing food waste cited by the processing industry were cleaning losses, incidental production errors and poor coordination with the market (e.g. inaccurate assessment of sales volumes). Cleaning is required by law, but the quantity of food losses may be limited by adjusting the size of the product charges and by the design of the production line. Coordination with the market can be improved by better coordinating production planning and sales. In addition, the customer-specific requirements (private standards) with regard to minimum expiration terms are a cause of food waste.

Table A3.4

**Processors/processing industry
Non-legal obstacles to preventing food waste**

Cause	Notes, effect on food waste (including possible solutions)
Cleaning losses	<p>When changing between two product charges, the production line is cleaned, which leads to food being lost. Some goes into animal feed (depending on the chain), the rest goes into the sewers. The order size influences the scale of the product charge and the hygienic design of the equipment. Not all producers have hygienically designed equipment, which leads to more cleaning losses.</p> <p>In order to guarantee food safety, after changing a product in a production process, the first batches are destroyed in order to prevent contamination with the previous product.</p> <p>By making the charges as big as possible and using hygienic equipment, losses/food waste can be reduced. But big charges are in conflict with the wishes of consumers.</p>
Filling packagings	This causes waste, albeit relatively little.
Lack of good hygiene	
Errors and disruptions during production	This results in recipes differing, or incorrect labelling, and packagings are rejected.
Image: public health risks/food safety/quality	If food is not delivered as it should be (for example, in a rotten condition), that impacts on companies' reputations. For this reason, companies take precautionary measures - for example, by stating a short expiration date, or by supplying a standard product quality.
Sales	
Too much produced or not sold	Sometimes planning and production are not quite in sync. In addition, a safety margin is built into production and more is produced if special offers are running. If sales are lower than expected, the expiration date may be too short, which can lead to waste. The solution is improved coordination of planning and sales.
Private standards: expiration term requirement	Particularly for fresh products, customers often demand a particular expiration term. If a product's expiration date is too short, they do not want to buy it.

Table A3.4 Processors/processing industry Non-legal obstacles to preventing food waste (continued)	
Cause	Notes, effect on food waste (including possible solutions)
No market demand for the product	Part of a pig or cow will be processed into meat for Dutch human consumption. The remainder cannot be utilised at full value for the Dutch market because Dutch consumers are not used to eating everything. Other sales channels/parties are sought for the parts in question - for example, pigs' ears go to China. It is open to question whether this truly represents value loss.
Contracts in the chain	With the use of private labels, surplus products may not be sold to other parties. The overproduction is thrown away.

Source: Interviews with chain actors, 2010.

Wholesale

In wholesale, sales estimates are cited as the most important non-legal cause of food waste. Estimates could be improved by training buyers and focusing attention on conditions which can affect sales, such as the season and holidays.

Table A3.5 Wholesale (supplier to the out-of-home market)	
Non-legal obstacles to preventing food waste	
Cause	Notes, effect on food waste (including possible solutions)
Incorrect estimate by the buyer (internal)	Too much is ordered or the wrong product is wrong, resulting in losses. Possible solutions are training staff and using computer systems. Attention can be focused on things which are routine, but which change according to the season (e.g. pea soup) and in periods before and after holidays.
Private standards: Expiration date requirement from customers, leading wholesalers to also impose expiration date requirement on the producer.	Upon delivery, expiration dates are checked. This can result in losses. Criticism with respect to perception of expiration dates: setting an expiration date with such a large margin that the supplier has to start delivering the product differently - for example by packing it differently or supplying it frozen/canned instead of fresh. Knowledge about food can be increased through food education.
Interruption of the cool chain	If the electricity supply fails, the product may get too warm.
Recall: the producer has supplied something that is not right	If the consumer detects a discrepancy in taste and if the complaints system has logged multiple complaints for this product, it will be recalled.
Source: Interviews with chain actors, 2010.	

Out-of-home sector

The interviews with chain actors in the out-of-home sector revealed that the main non-legal obstacles to preventing food waste are incorrect estimates of sales and the financial stimulus to achieve the highest possible turnover. In addition, caterers are dealing with contracts, which means they have to provide food in a particular quantity and in a particular way, which leads to extra waste. Training staff with regard to ordering was cited as a possible way of reducing waste.

Table A3.6		Out-of-home sector	
		Non-legal obstacles to preventing food waste	
Cause		Notes, effect on food waste (including possible solutions)	
<i>Supply</i>			
Error in estimating on buyer side (buying process/stock management/menu choice/planning)		<ul style="list-style-type: none"> - Incorrect prediction of the amount bought, resulting in a product passing its expiration date. The weather has an influence on this: for example, customers might be more interested in water than the large quantities of soup stocked. - Certain long-life products can be taken back by the supplier (as an extra service). - Training staff and using computer systems. Stock systems can be optimised further. - Devoting attention to things which are routine, but which change according to the season and in periods before and after holidays. 	
Knowledge about expiration dates		Knowledge about expiration dates is limited, including what to do after opening a product. Providing information on the label can offer a solution for users.	
The product supplied is not good		Due to a production error, packaging error, etc.	
Packaging size too large		The packaging size is larger than the required quantity. By better matching portion sizes to need, less waste is generated.	
Facilities of caterer are sometimes not adequate to provide the optimum conditions; however, they are not always owned by the caterer		The caterer's own customer manages the material, equipment, location, etc. The cooling facilities are not always ideal or preventing food waste and, for example, salad tubs can be too large. A <i>chiller</i> can cool hot meals down quickly, so that they do not have to be thrown away (it was observed that it is not necessary for all locations to have <i>chillers</i>).	
Management of the cool chain		The storage temperature of products/product groups varies (e.g. dairy 4 °C).	
Lack of good hygiene			
Broken machines		This can occur several times per year, resulting in the product present at the time having to be thrown away.	

Table A3.6		Out-of-home sector
		Non-legal obstacles to preventing food waste (continued)
Cause	Notes, effect on food waste (including possible solutions)	
<i>Sales</i>		
Economic considerations: increased turnover and keeping consumer satisfied	Performance contracts are agreed which reserve a percentage of turnover for the caterer. So if a higher turnover is achieved, the caterer earns more. Caterers want/need to offer a broad and full range, so that they do not have to disappoint consumers and are able to optimise presentation. This does mean that the waste of prepared products (uncooled products, soup and bowls of salads) is higher. The consumer should be made aware of the fact that this results in a lot of food being lost. Salad tubs which are smaller or less full help to cut waste. Also, 'sorry, sold out' could be made acceptable.	
Supply-based contracts with the requesting party	The quantity that must be offered for sale to consumers is contractually specified (particularly the case for catering contracts with the government), as is the time until which products must be offered for sale (e.g. offer all products right up to closing time). Caterers can negotiate with the requesting party on this.	
Double safety margins for ordered lunches	The customer orders too much, so that enough lunches can be offered to consumers. The caterer prepares too much, so that he can offer enough lunches to the customer. A solution may be to offer less perishable products alongside sandwiches, such as fruit.	
Not finishing the plate	This leads to a lot of waste in hotels/restaurants/catering and in households. Better matching portion sizes to consumers' wishes.	

Table A3.6		Out-of-home sector
		Non-legal obstacles to preventing food waste (continued)
Cause	Notes, effect on food waste (including possible solutions)	
<i>Preventing waste flows</i>		
Cross-contamination	In many cases, remainders may not be processed in different products	
Preventing staff from stealing by deliberately buying the wrong quantities, so that food is left over which can be taken home.	The caterer does not give leftover food to staff; this is also connected with product liability.	
Insufficient financial stimulus	If food is wasted, it does not always impact on caterers in financial terms. In 40% of catering contracts, waste disposal is paid for. In these cases, the waste remains the property of the customer, not of the caterer. The image of the caterer also plays a role; this can be a stimulus. Charging for waste disposal by the kilo may also help.	
Source: Interviews with chain actors, 2010.		

Retailers and distribution centres

From the interviews with chain actors in the retail sector, as in the out-of-home sector, the main non-legal obstacle to preventing food waste which emerges are incorrect estimates of sales, alongside the financial stimulus to achieve the highest possible turnover. The expiration date and its interpretation is also a factor causing a lot of food in retail to be wasted. In order to tackle the latter obstacles, it is proposed that a system be applied which prevents expiration dates being exceeded, and to train staff to take a decision on this in good time (e.g. reducing prices on time).

Table A3.7

**Retailers and distribution centres
Non-legal obstacles to preventing food waste**

Cause	Notes, effect on food waste (including possible solutions)
<i>Supply</i>	
Incorrect estimates on buyer side lead to incorrect ordering	<ul style="list-style-type: none"> - The influence of the weather on consumer expenditures impacts on sales. If the trade in potatoes, fruit & vegetables stagnates, this leads to losses. - Training staff can reduce losses. - Further refining the ordering systems may also help: IT has an important role to play here (taking the human factor out of the equation). For example, handling ordering centrally and not individually per location.
Promotions/special offers	For example, buying a cheap consignment of butter and selling it on special offer. If not everything is sold, the remainder often goes to the Food Bank.
Expiration term too short for throughput from distribution centres	This does not directly cause losses; in these cases, the product often goes to the Food Banks or the Salvation Army.
Rejection due to production errors, packaging errors, incorrect labelling	For example if the label is wrong or if there is a slight discrepancy in terms of taste. This product can still go to the Food Banks or to the Salvation Army.
Interruption in the chain	Food waste caused by interruptions in the chain is marginal
<i>Sales</i>	
Economic considerations: Increased turnover and keeping consumer satisfied	Offering a wide and full range to the consumer, and fully-stocked shelves. That way, you do not have to disappoint customers and you do not miss out on turnover. However, the risk of waste is increased. The breadth of the range influences the throughput speed (e.g. offering seven apple varieties instead of two). A solution would be to make the consumer aware of the fact that this results in a lot of food wasted.

Table A3.7	
Retailers and distribution centres	
Non-legal obstacles to preventing food waste (continued)	
Cause	Notes, effect on food waste (including possible solutions)
Expiration date exceeded	Waste of products because they have passed their expiration dates. Systems can be put in place to prevent expiration dates being exceeded. A condition for them to work is that the systems are followed properly. Additionally, staff can be taught to take the right decisions on time. Increasing turnover speed is another solution.
Temperature control not optimal	As a result, products go off more quickly. Temperature control can be improved, with the help of staff training.
Consumer behaviour	Sometimes consumers take products off the shelves and place them back elsewhere in the shop. However, the resulting food waste is minimal.
<i>Using waste flow as food</i>	
Image: risks for public health and food safety	Incorrect delivery (e.g. rotten food) impacts on a company's image. As a result, precautionary measures are taken and the food does not go to the Food Bank. For example, in case of incorrect information on the label about allergenic ingredients.
No financial stimulus	Retailers and distribution centres do not feel the impact of food waste in their wallets. Charging for waste disposal per kilo might help.
Source: Interviews with chain actors, 2010.	

Consumers

Various chain actors cited non-legal obstacles to preventing food waste which relate to the consumer. For this reason, these obstacles are listed separately. The most important causes of waste by consumers raised by chain actors are lack of knowledge and awareness of food waste and the sense of value attached to food. With the help of campaigns about product expiration terms, respondents believe consumers can be made more aware of their contribution to food waste.

Table A3.8	
Consumers	
Non-legal obstacles to preventing food waste	
Cause	Notes, effect on food waste (including possible solutions)
Consumers are not/no longer used to eating particular products	They do not eat pigs' brains, etc., do not reuse leftovers (because they don't like the taste) and throw away products for which the expiration dates have passed (out of food safety/health fears).
Mentality/awareness/knowledge	There is little understanding of what the expiration date means. And there is a sense of affluence which means that people deal with food in a less conscious way. Solutions are informing consumers through government campaigns, for example. In this way, people can be made more aware of their wealth and the value of food. A task which retailers can take upon themselves is informing consumers and raising their awareness with regard to their behaviour at home. The question is, how do you influence that? Possible approaches are how you use your fridge or not buying more than you need.
In financial terms, food waste is not a problem	Consumers do not feel the impact of waste in their wallets or not enough to make them waste less. A solution would be to charge for waste disposal by the kilo.
Leaving food on the plate	This results in a lot of waste in hotels/restaurants/catering. By better matching portion sizes to consumer wishes, less waste would be generated.
Packaging size and emptying packagings	In some cases, consumers will leave a proportion of a product behind in the packaging because the portion size does not suit them. By better matching portion sizes to consumer wishes, less waste would be generated.
Source: Interviews with chain actors, 2010.	

Appendix 4

Non-legal obstacles experienced in the re-use of waste flows for human consumption or animal feed, per part of the chain

Alongside legal obstacles to the reuse of waste flows, an inventory was also compiled of non-legal obstacles. This exercise was conducted on the basis of interviews with various chain actors. Chain actors which create waste flows and companies which process waste flows were interviewed. The tables show the findings per part of the chain. Because the non-legal obstacles often differed for the different chain actors, alongside an overview of the obstacles which apply in general to the entire chain, the information has been represented per part of the chain:

- Primary sector
- Trade (sales channels), logistics and storage
- Processors/processing industry
- Out-of-home sector
- Retailers and their distribution centres
- Waste flow processors

Non-legal obstacles to reuse of waste flows (general)

The following general non-legal obstacles to the use of waste flows emerged from the interviews: eliminating public health risks; strict regulations and administration; economic considerations and subsidies which stand in the way of high value utilisation of food; and overcapacity among waste processors who compete with reusers of waste flows on price.

Table A4.1 Wastage of residual flows, general	
Non-legal obstacles to reuse of waste flows (general)	
Cause	Effect on food waste (including interpretation)
Eliminate risks with respect to public and animal health	As long as the exact causes of brain diseases (BSE) are not known, the preferred course of action is to eliminate all risks.
Stringent requirements with regard to implementation of controls and enforcement	The great diversity of incidental waste flows and the different possibilities for processing place high demands on the implementation of monitoring and enforcement.
Investments, administration and time required for the processing of animal by-products	In the eyes of a number of respondents, the legislation on the use of animal by-products goes too far.
Regulations stricter than in the past, which does not encourage reuse	When regulations were more flexible, all kinds of things were investigated, for example how to make sausage from material containing meat, and so on.
Mentality of people	People will have to change and be and act more aware to achieve a reduction in waste from residual flows.
Financial; pricing	The costs of processing determine how the waste flow is disposed of. Transporting it to the Food Bank, for example, costs money. If a waste flow yields no income, it will not be reused. For small flows in particular, the costs and effort needed for processing must not be too high. Disposing of waste is not expensive enough to make companies look for ways to reuse their waste flows. The costs of waste processing are not yet sufficiently hitting businesses in their bottom lines. A solution would be to charge for waste processing by the kilo.
Subsidies which distort the market	If the legal barriers are removed, along with subsidies which encourage non-sustainable behaviour, and there is fair competition, then sustainable initiatives will also emerge; market forces will do their job.
Overcapacity among waste incinerators, leading them to compete on price with reusers.	The reduction in the quantity of waste in recent years has led to a fight for waste flows between recycling companies and waste incinerators. Incinerators are faced with overcapacity and in their search for waste are cutting their rates to below those of the recycling companies. This means they also burn waste which could be reused. This has the effect of making recycling difficult and hampering the sustainable use of residual flows. A solution is to tax waste.

Source: Interviews with chain actors, 2010.

Primary sector

Farmers who grow potatoes, fruit & vegetables often sell 80% on a contract basis and save 20% in the hope of getting a good price. If the market is worse than hoped for, it is cheaper if for example the Food Bank collects the potatoes or onions (sometimes directly from the land) than to do something else with them. Potatoes, fruit & vegetables of class 3 quality are often composted. No non-legal obstacles to this way of reusing waste flows were cited.

A non-legal cause of waste which hampers reuse is the destruction of potatoes, fruit & vegetables in order to keep the price artificially high at times of overproduction.

Table A4.2	
Primary sector	
Non-legal obstacles to reuse of waste flows (general)	
Cause	Notes, effect on reuse of waste flows (including possible solutions)
Destroying potatoes, fruit & vegetables in order to keep their prices artificially high	If there is overproduction of potatoes, fruit & vegetables resulting in a fall in prices for these products, they are often destroyed in order to prevent the price from falling too far.

Source: Interviews with chain actors, 2010.

Trade (sales channels), logistics and storage

According to the interviewees, the waste flow of potatoes, fruit & vegetables primarily consists of rotten fruit and vegetables which are no longer suitable for human consumption. This waste flow is often cofermented. This does lead to a loss of value in the potatoes, fruit & vegetables sector. There are various companies which donate to Food Banks on an irregular basis – as a result of circumstances beyond their control. In the past, when overproduction was still withdrawn from the market (intervention), it cost money to donate it to the Food Bank, and by doing this, a trading company would be obstructing the regular trade.

Food is only destroyed if there is a food safety issue. In such cases, the importer can often first look into alternative sales channels, such as transporting to another country or use as animal feed. The trade sector did not report any non-legal obstacles to reuse of waste flows specifically related to the trade sector.

Processors/processing industry

Chain actors from the processing industry indicated that few waste flows are generated in the processing process. The main waste flow cited was cleaning losses, waste flows from unusable parts which are not suitable for consumption, followed by packaging errors, losses when filling packagings, losses through putrefaction or expiration dates being exceeded. An estimate by one chain party was that their waste flow amounts to 20,000 tonnes per year and primarily consists of cleaning losses, of which 50% goes into animal feed.

The processing industry listed a number of non-legal obstacles to reuse of waste flows. The obstacles related to lack of demand in the market, the absence of finance for improved value utilisation of the waste flow and the unwillingness to invest in separating waste flows because the investment would not pay for itself. In addition, companies are sometimes fearful for their image if they make their products available to Food Banks. Additionally, the Food Bank also imposes requirements with regard to the packaging.

Table A4.3 Processors/processing industry Non-legal obstacles to reuse of waste flows (general)	
Cause	Notes, effect on reuse of waste flows (including possible solutions)
Lack of market demand	In the Netherlands, part of a pig/cow will be processed into meat for human consumption, the rest cannot be utilised at full value on the Dutch market. Other sales channels/parties are sought for it. For example, pigs' ears go to China. It is open to question whether this actually represents financial value loss.
Financial - cost item	If processing a by-product/waste flow yields nothing financially, it will not happen. The waste does not affect processors' bottom lines. The choice of where waste flows go is related to the price. Processors want to dispose of the waste flow as cheaply as possible. Cooperatives, for example, want to give their suppliers the highest possible value.
Separating waste flows is expensive and a hassle (training staff, taking measures, gearing the workflow up for it, etc.)	For processing fruit to make juice, the waste flows must be separated and not dispatched centrally. The workflow needs to be geared up for it, measures need to be taken and staff trained. Those costs will not be recouped. The solution is to use separation technologies, creating added value for the individual raw materials.
Perishables - Food Bank	In some cases, the product may still be good to keep for one more day, but that time is too short to distribute it via the Food Bank. In any event, perishable products do not go to the Food Bank.
Company image - Food Bank	A company will not want its products to go to the Food Bank if they might be rotten. Strict rules are imposed by some chain actors for food that goes to the Food Bank because they are afraid the waste product might otherwise be wrongly supplied. For example obscuring the brand name, or making the product unrecognisable. Companies do not want to donate private labels to the Food Bank. Donating to the Food Bank ought in fact to have a positive effect on the image of the supplier.
Requirements relating to packaging - Food Bank	If the product is in the wrong packaging or crates, it must be repacked. For example, it all needs to be in the same bags.

Source: Interviews with chain actors, 2010.

Out-of-home sector

In the out-of-home market, the waste flows primarily consist of prepared products, the interviewees reported. Non-legal obstacles to the reuse of waste flows experienced by the out-of-home sector are: food safety risks (image); preventing staff from deliberately ordering too much, and the absence of a financial stimulus for reuse.

Table A4.4	
Out-of-home sector	
Non-legal obstacles to reuse of waste flows (general)	
Cause	Notes, effect on reuse of waste flows (including possible solutions)
Cross-contamination	In the out-of-home sector, remainders cannot be processed in different products
Preventing staff from stealing, deliberately buying incorrect quantities, etc.	Caterers do not give leftover food to staff; this is also connected with product liability. Leftovers go into the dustbin
Insufficient financial stimulus	Companies do not feel the impact of wasting food in their bottom lines. Transporting it to the Food Bank, for example, costs money. 40% of catering contracts also pay for the waste. The waste remains the property of the customer. The image of the caterer also plays a role; this can be a stimulus for the reuse of waste flows. Another solution is to charge for waste disposal by the kilo.
Image: public health risks/food safety	Incorrect delivery (e.g. rotten food) impacts on a company's image. For this reason, companies take precautionary measures and food does not go to the Food Bank, etc.

Source: Interviews with chain actors, 2010.

Retailers and distribution centres

According to the interviewees, waste flows in retail consist primarily of products whose expiration dates have passed. These are designated as Category 3 material and are cofermented. In distribution centres, such products are often those which have not yet passed their expiration dates but have remaining expiration terms which are too short for them to go to the shops. These may be taken to the Food Bank on a daily basis. Examples are certain flows of meat, fish, chicken - in other words products with short expiration dates - and long-life products on an incidental basis.

Non-legal obstacles to the reuse of waste flows named in the retail sector: image barriers in relation to food safety risks, the cost-effectiveness of co-fermenting which impedes higher value utilisation and the ease with which food is designated as Category 3 material, which means that flows do not have to be separated.

Table A4.5		Retailers and distribution centres	
		Non-legal obstacles to reuse of waste flows (general)	
Cause		Notes, effect on reuse of waste flows (including possible solutions)	
Image		Companies do not want to give food away to staff.	
Supermarkets designate all return flows as Category 3 material (rejected)		In connection with food safety risks, supermarkets opt for certainty that flows are truly separated for reasons of convenience, and profitability. The profitability of cofermentation has improved and cofermentation has a good image. Separating products which may be suitable for other purposes takes time and effort. The effect of this on reuse of waste flows: by designating it as Category 3 material, food which may have been suitable for human consumption is no longer permitted to enter the food/animal feed chain. A proportion is still permitted as animal feed, but this is very problematic in view of the legal conditions (animal by-products, animal feed regulation). Perhaps pasteurisation might help?	
Cost factor		Cofermentation is the most cost-effective option for processing waste flows. Food is sometimes also given away to the Food Bank.	
Image: Public health risks/food safety		Incorrect delivery (e.g. rotten food) impacts on a company's image. For this reason, companies take precautionary measures and food does not automatically go to the Food Bank, etc. For example, in case of incorrect information on the label about allergenic ingredients.	
Source: Interviews with chain parties, 2010.			

Waste flow processors

Obtaining waste flows is not a problem, although this is not true for all product categories. Most waste flows come from producers and distribution centres, sometimes also from farmers. For example, if too much has been produced in connection with special offers, if packagings are rejected, batches have gone wrong or products are too close to their expiration dates.

In order to be able to process waste flows, they need to be constant, continuous and of sufficient size. There is a logistical challenge in the collection of these waste flows and the waste flow processor needs to have sufficient storage capacity. Waste flow processors cite the following non-legal obstacles: some of the waste flows require greater processing time, involve a technical challenge (for example if they are packed or not separated), or the supplier of the waste flow imposes requirements. Subsidies for cofermentation are regarded as a barrier to higher value utilisation of waste flows than is currently the case.

Table A4.6 Waste flow processors	
Non-legal obstacles to reuse of waste flows (general)	
Cause	Notes, effect on reuse of waste flows (including possible solutions)
Human consumption	
Food Bank stricter with regard to supply moments and requirements relating to packaging.	The Food Bank wants to move towards more streamlined supply. For example, agreements are already being made with distribution centres which mean they can report their supply at regular times during the week. A properly set up logistical system could help. As yet, there is no properly organised logistical system in which supply and demand are transparent and can be matched to each other. In addition, requirements are imposed regarding packaging, for example that everything should be in the same bags.
Continuous waste flow required for waste flow processing	As a rule, alternative processing of waste flows demands continuity of supply and quality of waste flows.
Flows which are not constant make processing a very great challenge	In many cases, producers can indicate how much they expect to be able to supply to the Salvation Army on an annual basis (between 1 and 5%) but do not know when and exactly how much because the waste is often from failed batches or batches with expiration dates which are too short, rather than from deliberately planned over-production.

Table A4.6		Waste flow processors Non-legal obstacles to reuse of waste flows (general) (continued)
Cause	Notes, effect on reuse of waste flows (including possible solutions)	
Size of waste flows too small	The size of the waste flow is often too small to be efficiently processed into meals, or to be reused at all.	
Processing too time-consuming	It is often too time-consuming to process products which are still good but nevertheless unsalable into alternative products (for example bruised apples into fruit salad).	
Logistical process	If a large retail chain sees opportunities for delivering to the Food Bank, the supply to the Food Bank may increase significantly, which will be a logistical challenge. (Presumably with associated requirements for a longer expiration term, because they will then be able to deliver less often). This also applies to the collection of residual flows, and for processing them into meals and distributing them.	
Shortage of storage facilities at the waste flow processor	Waste flows are rejected because there is insufficient space to store the residual products, or because the expiration date is too soon to be able to process the products before that time. More possibilities ought to be investigated for storing waste products longer and processing them.	
Strict rules for the use of waste products in connection with the reputations of waste flow suppliers	Some companies are afraid that the waste products will be supplied wrongly. For this reason, some chain actors have strict rules - for example that the brand name must be concealed or that the product must be made unrecognisable. Donating residual flows to Food Banks ought in fact to have a positive effect on the image of the supplier.	
Investment in connection with meeting quality system requirements for food for waste flow processing	The implementation of HACCP, GMP (Good Manufacturing Practices) and tracking & tracing, for example, requires an investment.	
Costs and effort with regard to separation of the different waste flows	If you want to process waste flows into juice, for example, or animal feed.	
Technical challenge with regard to unpacking packaged residual flows for processing	Returned pre-packaged products are attractive in terms of residual flow processing, but unpacking is a technical challenge.	

Table A4.6		Waste flow processors
		Non-legal obstacles to reuse of waste flows (general)
		(continued)
Cause	Notes, effect on reuse of waste flows (including possible solutions)	
Confusion about the expiration date	How to deal with products which have passed their expiration dates?	
Animal feed		
High costs for feeding waste products to animals: only large consignments are worthwhile	Processing waste products to make animal feed is worthwhile, but the costs quickly add up. Pig feed may cost no more than 25 euro cents per kg of dry matter. For small consignments, the transport costs become far too high. You need to be able to fill a truck. That will not be the case for the waste from an individual horticulturalist with five hectares of land or a baker in town. You really need wholesale quantities.	
Costs and effort with regard to separation of the different waste flows	If you want to process waste flows into juice, for example, or animal feed.	
Cofermentation/Composting		
There are subsidies for cofermentation, and the requirements are less strict than for higher value utilisation of the material	The conditions for cofermentation of Category 3 materials are less strict than the conditions for other reuse of Category 3 materials.	
No possibility to compensate for the minerals lost in the mineral bookkeeping when disposing of biomass	The farmer will not want to get rid of plant residues if he cannot/may not compensate for the mineral outflow, because according to the mineral bookkeeping this would have the effect of exhausting the soil.	
The standpoint of the government is that composting potatoes, fruit & vegetables has no environmental advantages compared to incineration	As a result, municipalities are unhappy about collecting potato, fruit & vegetable waste separately at source.	
Biogas - Logistical costs	'Local for local' processing is preferable.	
General		
Too small quantity of residual flow	Often the quantities of waste are too small to be reused.	
Source: Interviews with chain actors, 2010.		

Appendix 5

Companies and organisations involved in this research

Table A5.1 Companies				
Type of organisation	Horticulture sector	Agrarian sector	Meat sector	Dairy sector
Primary producers	2			
Trade, logistics, storage (fresh)	2			
Processing	1	1	3	1
Wholesale (all foodstuffs)				2
Retail				1
Hotels/restaurants/catering				5
Reuse of food				2
Reuse of residual flows				6

Table A5.2**Other organisations**

Type of organisation	Company/organisation
Platform	CBL
	VENECA
	Koninklijke Horeca Nederland (hotel & restaurant association)
	FNLI
	Commodity Board for Margarine, Fats and Oils
	Horticulture Commodity Board
	Commodity Board for Fish and Fish Products
	Commodity Board for Arable Farming
	Commodity Board for Animal Feed
	COV
Government	new Food and Consumer Product Safety Authority (nVWA)
	Ministry of Health, Welfare and Sport (VWS)
	Ministry of Economic Affairs, Agriculture and Innovation (EL&I)
	Ministry of Infrastructure and the Environment (I&M)
Knowledge and advice	KnowHouse - innovation consultancy
	Foundation for the promotion of onion sales/Impuls Zeeland
	DeBoerenAdvies
	Global Harmonisation Initiative
	Wageningen University
	Wageningen UR (Food & Biobased Research, LEI)

The mission of Wageningen UR (University & Research centre) is 'To explore the potential of nature to improve the quality of life'. Within Wageningen UR, nine research institutes – both specialised and applied – have joined forces with Wageningen University and Van Hall Larenstein University of Applied Sciences to help answer the most important questions in the domain of healthy food and living environment.

More information: www.wur.nl