NORSUS
Norwegian Institute for Sustainability Research

Basis for new EU reporting on food waste

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REPORT NO.
OR.49.21

YEAR
2021

ISBN NO.	ISSN NO.	REPORT TYPE	CONFIDENTIALITY
978-82-7520-881-9	2703-8610	Oppdragsrapport	Åpen

NORSUS

PROJECT TITLE

Basis for new EU reporting on food waste

PROJECT NUMBER

3317

COMMISSIONED BY

The Norwegian Environment Agency

REFERENCE

Marianne Reime

QUALITY ASSURANCE

Ole Jørgen Hanssen

NUMBER OF PAGES

65

KEY WORDS

Food waste, EU-reporting, Statistics

Summary

This report has been commissioned by the Norwegian Environment Agency and written by the Norwegian institute for sustainability research (NORSUS) and SINTEF Ocean.

The purpose of the report and associated deliverables is to provide a basis for Norway's reporting duties to the EU on food waste throughout the food supply chain (2019/1597/EC).

The food supply chain comprises the following stages:

- Primary production
- Processing and manufacturing
- Retail and other distribution of food
- Restaurants and food services
- Households

The EU states that "**food waste** is any **food** that has become waste under these conditions:

1. it has entered the food supply chain,
2. it then has been removed or discarded from the food supply chain or at the final consumption stage,
3. it is finally destined to be processed as waste." (2019/2000/EC, p. 7, original emphasis)

Data on food waste must be reported annually but in-depth measurements of food waste are only required at least once every four years. The first mandatory reporting year is for the reference year 2020 (Table I). Empty fields indicate that data is missing.

Table I. Results from the in-depth measurement of food waste for the reference year 2020.

Stage of the supply chain	Total food waste	Of which, edible waste	Food drained as or with wastewater
Primary production	164 219	79 273	
Processing and manufacturing	29 088	26 020	31 300
Retail and other distribution of food	61 281	51 860	2 238
Restaurants and food services	97 547		
Households	419 893	216 106	
Total	772 028	373 259	33 538

The EU specifies that data for in-depth measurements must be collected using the following methods:

- Direct measurement
- Mass balance
- Waste composition analysis
- Questionnaires and interviews
- Coefficients and production statistics
- Counting/scanning
- Diaries

For annual food waste measurements, data from in-depth measurement can be adjusted with, for example, production statistics or socio-economic indicators (see chapter 3).

Table II outlines the data used to calculate food waste in the respective stages of the food supply chain and alternative data sources considered.

Table II. Data used to calculate food waste and alternative data sources considered.

Stage	Data source used for food waste statistics	Alternative data source considered
Primary production	Norwegian Agriculture Agency/ SINTEF Ocean	SSB (table 10514) was identified as possible alternative, but SSB advised against using it
Processing and manufacturing	Data from NORSUS and SINTEF Ocean gathered in connection with the Industry agreement on reduction of food waste	SSB (table 08604) was identified as possible alternative, but the data was too old for this reporting. This may be an option for the next in-depth reporting (in 2024) if SSB has updated the table by then.
Retail and other distribution of food	Data from NORSUS gathered in connection with the Industry agreement on reduction of food waste	SSB (table 07355) was identified as an alternative, but data from the Industry agreement on reduction of food waste is of better quality for this purpose.
Restaurants and food service sector	Data from SSB (table 07355) combined with waste composition analysis from household waste (proxy data) conducted by NORSUS in connection with Industry agreement on reduction of food waste	Data from NORSUS gathered in connection with the Industry agreement on reduction of food waste was identified as alternative, but the data from SSB is of better quality for this purpose.
Households	Waste composition analysis conducted by NORSUS in connection with Industry agreement on reduction of food waste combined with SSB data (table 13136)	No alternative data sources were identified.

Sammendrag på norsk

Denne rapporten er utarbeidet på oppdrag av Miljødirektoratet og skrevet av Norsk institutt for bærekraftsforskning (NORSUS) og SINTEF Ocean.

Formålet med rapporten og tilhørende leveranser er å gi direktoratet et grunnlag for Norges rapporteringsplikter til EU om matsvinn i hele matforsyningskjeden (2019/1597/EF).

Verdikjeden består av følgende ledd:

- Primærproduksjon
- Matindustri
- Detaljhandel og annen distribusjon av mat
- Restauranter og andre mattjenester
- Husholdninger

I henhold til EU er «matavfall» all mat som har blitt til avfall under disse forholdene:

1. maten har kommet inn i matforsyningskjeden,
2. maten blir deretter fjernet eller kastet fra matforsyningskjeden eller ved forbruksstadiet,
3. det anses som avfall (2019/2000/EF, s. 7,)

Hvert land skal rapportere data over total mengde matavfall årlig, men det kreves kun dybdemålinger av matavfallet en gang hvert fjerde år. Det første obligatoriske rapporteringsåret er for referanseåret 2020 (tabell III). Tomme felt indikerer at data mangler.

Tabell III. Resultater for 2020.

Verdikjedeledd	Total mengde matavfall	Hvorav nyttbar andel	Matavfall kastet som- eller i avløp
Primærproduksjon	164 219	79 273	
Matindustri	29 088	26 020	31 300
Detaljhandel og annen distribusjon av mat	61 281	51 860	2 238
Restauranter og andre mattjenester	97 547		
Husholdninger	419 893	216 106	
Sum	772 028	373 259	33 538

EU spesifiserer at data for dybdemålinger må samles inn ved bruk av følgende metoder:

- Direkte måling
- Massebalanse
- Plukkanalyser
- Spørreskjemaer og intervjuer
- Koeffisienter og produksjonsstatistikk
- Telling/skanning
- Matkastedagbok

For årlige matsvinnmålinger kan data fra dybdemåling justeres med basis i for eksempel produksjonsstatistikk eller samfunnsøkonomiske indikatorer (se kapittel 3).

Tabell IV skisserer dataene som er brukt for å beregne matavfallet for hvert av de respektive stadiene i matforsyningskjeden og alternative datakilder som er vurdert i prosjektet.

Tabell IV: Datagrunnlag og vurderinger av alternative datakilder.

Ledd	Datakilde brukt	Vurdering av alternativ
Primærproduksjon	Landbruksdirektoratet/ SINTEF Ocean	SSB (tabell 10514) er en mulig alternativ datakilde, men SSB anbefalte å ikke bruke den
Industri	Data fra NORSUS og SINTEF Ocean samlet inn i forb. med bransjeavtalen om redusert matsvinn	SSB (tabell08604) er en mulig alternativ datakilde, men datakilden var for gammel. Dette kan være en mulig datakilde ved neste hovedrapportering (2024-data) dersom SSBs planer om å oppdatere statistikken i 2022 gjennomføres.
Varehandel og annen distribusjon av mat	Data fra NORSUS samlet inn i forb. med bransjeavtalen om redusert matsvinn	SSB (tabell 07355) er en mulig alternativ datakilde, men dataene fra bransjeavtalen er av bedre kvalitet til dette formålet.
Serveringsvirksomheter og andre virksomheter som serverer mat	Data fra SSB (tabell07355) kombinert med plukkanalyser av husholdningsavfall (proxy data).	Data fra NORSUS samlet inn i forb. med bransjeavtalen om redusert matsvinn er et mulig alternativ, men dataene fra SSB er av bedre kvalitet til dette formålet.
Husholdninger	Plukkanalyser kombinert med data fra SSB (tabell 13136).	Det ble ikke identifisert noen alternative datakilder i prosjektet.

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Contents

1 Introduction and background

This report has been written by the Norwegian institute for sustainability research (NORSUS) and SINTEF Ocean for the Norwegian Environment Agency. The purpose of the report and associated deliverables is to form a basis for Norway's reporting duties to the EU on food waste (2019/1597/EC). The first mandatory reporting year is for the reference year 2020.

The food supply chain comprises the following stages:

- Primary production
- Processing and manufacturing
- Retail and other distribution of food
- Restaurants and food services
- Households

The basis for the reporting is Delegated Decision 2019/1597[1], which describes the methods to be used for measuring food waste, and Commission Implementing Decision (EU) 2019/2000[2], which outlines the reporting format to be submitted.

Data on food waste must be reported annually, but in-depth measurements of food waste are only required at least once every four years. Methods for in-depth reporting are outlined in **Annex III** of Commission Delegated Decision 2019/1597 and will be referred to as Annex III methods throughout. When Annex III methods are not used, the methods outlined in **Annex IV** (2019/1597/EC) may be used and will be referred to as Annex IV methods throughout. Annex IV methods can be summarised as "best available information" (2019/1597/EC). Section 3 of this report describes Annex III and IV methods in further detail.

1.1 Activities and deliverables

To meet the reporting duties for 2020 and following years, the Norwegian Environment Agency requested the following deliverables:

- Synthesise existing data and calculate food waste for each stage of the food chain using **Annex III** methods (in combination with Annex IV methods if needed) for the reference year 2020. The Norwegian Environment Agency must be able to use these data to report food waste for 2020.
- Suggest one or several methods for annual reporting of food waste using **Annex IV** methods.
    - It is important that the suggested methods are practical in nature to ease the administrative burden of reporting food waste for the Norwegian Environment Agency.
- Describe **data sources** and **methods** used to calculate food waste.
- Evaluate the quality of data and measurements to identify gaps or quality issues.

[1] Available here: EUR-Lex - 32019D1597 - EN - EUR-Lex (europa.eu)
[2] Available here: EUR-Lex - 32019D2000 - EN - EUR-Lex (europa.eu)

These are the deliverables for the project:

- In-depth food waste measurements for the reference year 2020
- A report in English, which must contain a summary in Norwegian, and a description of the methods used (Annex III and IV methods).
- Any excel files, datasets and reference lists produced in connection with the project.

1.2 External expert input

An external committee of experts on food waste was created to serve as an external expert control and validation in the project. These experts were:

- Johan Hultén, IVL – Swedish Environmental Research Institute, Sweden
- Elvira Molin, IVL – Swedish Environmental Research Institute, Sweden
- Mads Werge, PlanMiljø, Denmark

Other external input on data, definitions and methodology came from:

- Cristina Re from Eurostat
- Louise Sörme from Statistics Sweden
- Jørgen Drege from Biosirk
- Camilla Skjerpen and Mona Eide Onstad from Statistics Norway (SSB)
- Elin Røsnes from the Norwegian Agricultural Agency

1.3 Structure of this report

This report is structured in the following manner:

The definition of food waste according to the EU is outlined in Chapter 2. This includes voluntary measurements.

The methodology for measuring food waste is outlined in Chapter 3. This includes Annex III measurements (in-depth measurements) and Annex IV measurements (less detailed annual measurements).

Chapter 4 discusses some methodological questions that NORSUS and SINTEF Ocean discussed with external experts on food waste.

Chapter 5 describes the data sources that were evaluated and, in more detail, the data sources that were ultimately used to calculate food waste.

Chapter 6 is references used in this report.

The results from the food waste calculations and descriptions of the methodology used is in a separate section of this report called Reporting to Eurostat. This section is divided into two chapters, a results section and a methodology section. The methodology section follows the reporting format mandated by Eurostat. The reporting format is described Appendix 1. Note that the methodology section also includes a section for references. This refers references used in the methodology section only.

2 Defining food waste

2.1 EU definition of food waste

Food encompasses food throughout the entire food supply chain from primary production until consumption.

"**Food waste** is any **food** that has become waste under these conditions:

4. it has entered the food supply chain,
5. it then has been removed or discarded from the food supply chain or at the final consumption stage,
6. it is finally destined to be processed as waste." (2019/2000/EC, p. 7, original emphasis)

An important point of clarification on point 3 is that it does not matter how food waste is processed; the emphasis is on the fact that it is waste, not the actual destination of the food waste (e.g. it does not need to be processed as waste).

Food waste includes inedible parts that were not separated as by-products from the edible parts when the food was produced, e.g., bones attached to meat for human consumption, orange peels, seeds, etc. Food waste can therefore include items intended to be ingested and items not intended to be ingested (2019/1597/EC).

Final treatment or processing of food waste is not included in this reporting, e.g., waste recycling, energy recovery (including biogas) or disposal to landfill.

Food waste **does not** include (2019/1597/EC)[3]:

- Feed
- Live animals not placed on the market for human consumption.
- Plants prior to harvesting (also if they are not harvested for economic reasons).
- Losses at the stages of the food supply chain where certain products have not yet become food, e.g., illness to plants or animals prior to entering the food chain.
    - However, if an animal or part of it is wasted during any stage of the food production, processing, or distribution stage (e.g., "cold chain" is disrupted), then **it is** considered food waste.
- Products not fit for human consumption, including:
    - Animals treated with specific medicines that means they are not admitted for human consumption.
    - Imports of food with additives that are not admitted.
    - Food fraud.
    - Contaminated vegetal products.
- By-products from food production, processing, and manufacturing.
- Food waste residues collected within packaging.
- Food waste classified as street cleaning residues.

[3] And accompanying guidance document available here (this report follows the definitions in the version from June 2021): https://ec.europa.eu/eurostat/documents/342366/351811/Guidance+on+food+waste+reporting/5581b0a2-b09e-adc0-4e0a-b20062dfe564

- Non-food materials that are mixed with food waste when collected.
- Medicinal products.
- Cosmetics.
- Tobacco and tobacco products.

2.1.1 Voluntary measurements

The following data can be collected as **voluntary** measurements of food waste:

- Edible food waste.
- Food drained with or as wastewater.
- Reuse: Food donation and other redistribution for human consumption. This is food that has been prevented from becoming waste by redistribution for human consumption.
- Food provided to feed businesses for transformation into feed, i.e., food no longer intended for human consumption that is being transformed into feed.
- Former food placed as feed on the market by operators registered simultaneously as food and feed businesses.[4]

[4] 'Former food means food, other than catering reflux, which were manufactured for human consumption in full compliance with the EU food law but which are no longer intended for human consumption for practical or logistical reasons (for instance surplus) or due to problems of manufacturing or packaging defects or other defects and which do not present any health risks when used as feed (see point 3 of Part A of the Annex to Regulation (EU) No 68/2013 (Catalogue of feed materials)); the food had been transformed into feed by the food business operator. Therefore, he also needs registration as feed business operator.

3 EU requirements to methodology

Methods for in-depth measurement of food waste are described in **Annex III** of 2019/1597/EC. Annex III methods must be used to report food waste at least once every four years. **Annex IV** of 2019/1597/EC describes the methods for annual reporting, which is in effect updating measurements made using Annex III methods with appropriate indicators.

For the reference year 2020, in-depth measurements must be provided for all stages of the food chain. Data may be used that has been collected under existing frameworks for the year 2017 or later. If measurements using Annex III methods are not sufficiently representative, data can be refined with estimates using Annex IV methods.

Food waste shall be measured in metric tonnes of fresh mass (see further clarification of the term "fresh mass in chapter 4).

Requirements to reporting food waste are outlined in Appendix 1.

3.1 Annex III methods

Table 1 outlines methods for in-depth measurement of food waste for each stage of the food chain (Annex III methods). Table 2 further defines the methods of measurement in Table 1.

Table 1. Annex III methods for the in-depth measurement of food waste (must be conducted least once every four years).

<table>
<tr><th>Stage of the supply chain</th><th colspan="5">Methods of measurement</th></tr>
<tr><td>Primary production</td><td rowspan="4">- Direct measurement</td><td rowspan="2">- Mass balance</td><td rowspan="2"></td><td colspan="2" rowspan="2">- Questionnaires and interviews
- Coefficients and production statistics
- Waste composition analysis</td></tr>
<tr><td>Processing and manufacturing</td></tr>
<tr><td>Retail and other distribution of food</td><td rowspan="3">- Waste composition analysis</td><td>- Counting/scanning</td><td></td></tr>
<tr><td>Restaurants and food services</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">- Diaries</td></tr>
<tr><td>Households</td><td></td></tr>
</table>

Source: Annex III of Delegated Decision 2019/1597.

Table 2. Further definitions of Annex III methods for the in-depth measurement of food waste (at least once every four years).

Access	Method of measurement	Definition
Direct access to food waste	Direct measurement (weighing or volumetric assessment)	Use of a measuring device to determine the mass of samples of food waste or fractions of total waste, directly or determined based on volume. It includes measurement of separately collected food waste.
	Counting/scanning	Assessment of the number of items that make up food waste and use of the result to determine the mass.
	Waste composition analysis	Physical separation of food waste from other fractions to determine the mass of the fractions sorted out.
	Diaries	Keeping a record or log of food waste information on a regular basis.
No direct access / direct measurement infeasible	Mass balance	Calculation of food waste based on the mass of inputs and outputs of food into and out of the measured system, and processing and consumption of food within the system.
	Coefficients	Use of previously established food waste coefficients or percentages representative for a food industry sub-sector or for an individual business operator. Coefficients or percentages can be established through sampling, data provided by food business operators or by other methods.

Source: Annex III of Delegated Decision 2019/1597/EC.

3.2 Annex IV methods

When the methods for in-depth measurements using Annex III methods are not used, the following methods or combination of methods should be used:

- Calculation of food waste based on the latest available data on the share of food waste in each stage of the food chain (established in accordance with Annex III measurements) and total waste generation in that stage. If data for the given year does not exist, data from the previous year may be used.
- Calculation of food waste based on socioeconomic data relevant for each stage of the food chain. The calculation should be based on the latest data on food waste generated and the change in one or several of the socio-economic indicators in Table 3.

Measurements must be based on a representative sample for each stage of the food supply chain, economic activities, or the population.

Table 3. Potential socioeconomic indicators to be used for calculation of food waste using Annex IV methods.

Stage of the supply chain	Indicators
Primary production	- Food production in agriculture, fishing, and hunting
Processing and manufacturing	- Production of processed food — based on PRODCOM data
Retail and other distribution of food	- Turnover of food products - Population
Restaurants and food services	- Turnover - Employment (FTE)
Households	- Population - Households disposable income

Source: Annex IV of Delegated Decision 2019/1597/EC.

4 Methodological questions

Chapter 2 describes how the EU defines food waste. Despite the extensive list, some questions remained as to which products should be included in the food waste measurements.

These questions were discussed extensively with the following:

- External expert committee in two expert meetings (28.10.21 and 23.11)
- Eurostat (email communication)
- Louise Sörme from Statistics Sweden (meeting 10.11.21 and email communication)
- Jørgen Drege from Biosirk (meeting 8.11.21)
- Elin Røsnes from the Norwegian Agricultural Agency (meeting 22.10.21 and email communication)
- The Environment Agency (meetings 28.10.21 and 25.11.21, email and telephone communication).

The questions and conclusions are outlined in the table below.

Table 4. Questions and conclusions on what should be included in the food waste definition.

Methodological question	Conclusion
Should specific parts of the animal (brains, spines, hooves, and intestines) that are removed after slaughter and utilized as energy for cement-production or sent to biogas-production) due to national food safety regulations that prohibit these fractions to enter the food value chain as food or feed, be considered food waste?	These will not be included. They do not enter the food chain. How they are disposed of or utilised is irrelevant.
Should fish and parts of fish (rest raw materials such as heads, blood intestines) that are thrown into the ocean directly from the vessels for whatever reasons be considered food waste?	The conclusion is that both fish and fish rest raw materials should be included in the definition of food waste even when discarded at sea because they enter the food chain and could feasibly be utilised. The results will however only include rest raw materials. Bycatch and other volumes of primary products are not included because the data are not available.
Does the unit of reporting referred to as “fresh mass” apply to all food’s original mass before processing, preparing and or cooking?	Eurostat has confirmed that this is the correct interpretation of the guidance document, but Sweden and Denmark have not taken this approach is their reporting. No fresh estimates have been conducted for the food waste measurements presented in this report.

5 Data sources in Norway

The objective of this project was to evaluate existing data sources that can be used to report food waste in Norway, not to collect new data.

There are several statistics, surveys and studies that has potential to be utilized as a basis for food waste reporting. In the project potential data sources was assessed. Table 5 provides an overview which data source was ultimately used to report food waste in each stage of the food supply chain (column 2), and which alternative data source was evaluated and the reason it was not used (column 3). For households, no alternative data source was identified.

Table 5. Summary of the available data and the data used in the reporting of food waste.

Stage	Data source used for food waste statistics	Alternative data source considered
Primary production	Norwegian Agriculture Agency / SINTEF Ocean	SSB (table 10514) was identified as possible alternative, but SSB advised against using it
Processing and manufacturing	Data from NORSUS and SINTEF Ocean gathered in connection with the Industry agreement on reduction of food waste	SSB (table 08604) was identified as possible alternative, but the data was too old for this reporting. This may be an option for the next in-depth reporting (in 2024) if SSB has updated the table by then.
Retail and other distribution of food	Data from NORSUS gathered in connection with the Industry agreement on reduction of food waste	SSB (table 07355) was identified as an alternative, but data from the Industry agreement on reduction of food waste is of better quality for this purpose.
Restaurants and food service sector	Data from SSB (table 07355) combined with waste composition analysis from household waste (proxy data) conducted by NORSUS in connection with Industry agreement on reduction of food waste	Data from NORSUS gathered in connection with the Industry agreement on reduction of food waste was identified as alternative, but the data from SSB is of better quality for this purpose.
Households	Waste composition analysis conducted by NORSUS in connection with Industry agreement on reduction of food waste combined with SSB data (table 13136)	No alternative data sources were identified.

5.1 Description of data used in food waste statistics

The following sections describe the data used in the respective stages of the food supply chain.

Table 6 summarizes the data used, including an estimate of the data coverage before scaling.

Table 6 Data used in for each step of the value chain

Stage of the food supply chain	NACE Section	Description	Data source	% covered before scaling (best estimate)
Primary production	A	Crop and animal production, hunting and related service activities	Milk - NAA	99,8 %
			Meat - NAA	100 %
			Eggs - NAA	100 %
			Grains - NAA	86 %
			Select vegetables, fruits and berries - NAA	N/A
	A	Fishing and aquaculture	SINTEF Ocean marine rest raw materials	N/A
Processing and manufacturing	C	Seafood products	SINTEF Ocean food waste statistics	9 %
	C	Manufacture of food and beverages	NORSUS food waste statistics	50 %
Retail and other distribution of food	G	Wholesale trade, except of motor vehicles and motorcycles	NORSUS food waste statistics	75 %
	G	Retail trade, except of motor vehicles and motorcycles	NORSUS food waste statistics	99 %
Restaurants and food services	I	Accommodation and food service activities	SSB - combined with WCA	23,5%-41,1%
	P	Education	SSB - combined with WCA	14 %
	Q	Human health and social work activites	SSB - combined with WCA	12 %
	N	Administrative and support service activities	SSB - combined with WCA	11,1%-39,2%
	O	Public administration and defence; compulsory social security	SSB - combined with WCA	36 %
	R	Arts, entertainment and recreation	SSB - combined with WCA	18,5%-35,6%
	S	Other service activities	SSB - combined with WCA	13,2-22,3%
Households		Waste generated by households	NORSUS food waste statistics	45 %

5.1.1 Primary production (except seafood)

The Norwegian Agriculture Agency (NAA) shared their reports (Røsnes, 2021a, 2021b) on food waste in primary production (except seafood) with NORSUS. These reports provided the data that were ultimately used to estimate food waste.

The data covers the following food products (Røsnes, 2021a, 2021b):

- Milk (cow's milk, goat's milk)
- Meat (cow, pig, sheep, goat, duck, chicken, turkey, reindeer)
- Egg
- Grain (wheat and rye)
- Select vegetables, fruits, and berries (apples, strawberry, raspberry, cucumber, tomatoes, winter cabbage, cauliflower, carrot, kohlrabi, onion, iceberg lettuce, potatoes)

Data comes from the Norwegian Agriculture Agency's database that is used to, among other things, calculate price subsidies for the agricultural sector (NO: Leveransedatabasen) and companies that receive milk, meat, egg, and grain from farmers (first-hand sales) are obligated to report to this database. A financial accountant verifies the data submitted to ensure price and fee subsidies are correct. Therefore, we can assume the data are accurate and reliable.

Data are submitted to Leveransedatabasen electronically every month. Method of measurement is direct measurement for milk, meat and egg, and mass balance for grain using additional data from grain buyers and food mills (see also Røsnes, 2020, 2021). Units are kg/litres and number of animals where relevant. Waste is included in this reporting as price subsidies are not provided to wasted products.

Data on waste of fruit, berries and vegetables come from a combination of production data from Statistics Norway (NO: Hagebruksundersøkelsen, and potet- og grovfôrundersøkelsen), and a survey conducted by the NAA of packers and processors to estimate food waste.

The NAA processes and analyses the data in order to measure progress in the reduction of food waste in the agricultural sector (Røsnes, 2021a, 2021b) as part of their obligations in the Industry agreement on reduction of food waste.

NORSUS received additional data on food waste where those were not included in the reports because the definition used in the Industry agreement differs form that used in the EU food waste reporting, but NORSUS did not do any other further processing of the data.

The data from NAA on food waste in primary production were chosen for the following reasons:

- Data covered all or nearly all production in Norway in the various food groups, meaning that no scaling or weighting was necessary. This means data are very representative.
- Data in Leversansedatabasen are verified by a financial accountant and can therefore be assumed to be highly accurate.
- The reports by NAA were very highly detailed, so the authors of this report were confident that the data was of high quality.

5.1.2 Fish (primary production) and seafood (processing and manufacturing)

SINTEF Ocean and Kontali Analyse map the volumes for residual raw materials in fishing (primary production) and the seafood industry (processing and manufacturing) every year.

The annual mapping report of marine rest raw materials from the Norwegian seafood sector (Myhre et al., 2021) is based on both first-hand communication with the industry, but also public national statistics, retrieved from the following sources:

- Norwegian Seafood Council[5]
- Statistics Norway[6]
- Norwegian Directorate of Fisheries[7]
- Various regional Norwegian sales organizations for fish[8]

[5] https://seafood.no/
[6] https://www.ssb.no/statbank/table/08799/
[7] https://www.fiskeridir.no/Tall-og-analyse/Statistikkbanken
[8] https://www.rafisklaget.no/ / https://www.surofi.no/ / https://www.sildelaget.no/en

Only volumes from white fish vessels are included in the food waste measurements. The data covers the following fractions (Myhre et al., 2021):

- Liver
- Roe
- Heads
- Viscera
- Backs/cut-offs
- Milt/skins/other bones

The volumes of self-dead fish in aquaculture have not entered the food value chain and are therefore not in line with the EU definition of food waste so these volumes are not included in the reported food waste measurements. All volumes from the pelagic fleet are utilized for food or feed purposes (Myhre et al., 2021).

SINTEF Ocean and Kontali Analyse have also mapped edible food waste in the seafood industry for 2018, 2019 and 2020 (Carvajal et al., 2021). From this the volumes of inedible waste calculated using national coefficients for seafood to find total food waste. Data in the study are retrieved both from the industry themselves, as well as public data similar to primary production. Ten seafood industry actors reported data in 2020, covering the following sectors:

- White fish
- Pelagic fisheries
- Salmonids (aquaculture)
- Fish food producers

In total, the reported data represented about 9-10 % of the total landings/production of seafood in Norway in 2020.

5.1.3 Processing and manufacturing (except seafood) and Retail and other distribution of food

The Norwegian authorities and the food industry signed a negotiated voluntary agreement in 2017 on reducing food waste.[9] The goal of the Industry agreement on the reduction of food waste is to halve food waste in Norway by 2030 with 2015 as the baseline year, measured in kg/per capita.

Five government ministries and 12 industry organisations have signed the industry agreement, and all companies are invited to sign the voluntary agreement, thereby agreeing to voluntarily take measures to reduce food waste in their own organisations and enable consumers to waste less food. Part of their commitment is to map, measure, and report food waste every year.

The agreement has 106 signatories (at the time of writing) from the food processing and manufacturing stage, retail stage and the food service stage.[10] Progress on reducing food waste is analysed regularly by NORSUS on behalf of Matvett (A. Stensgård et al., 2021; A. E. Stensgård et al., 2018b, 2018a, 2019, 2020). Data for the reference year 2020 are from Stensgård et al. (2021).

[9] https://www.matvett.no/bransje/aktuelt/bransjeavtale-om-matsvinn
[10] https://www.matvett.no/bransje/aktuelt/bedriftene-slutter-opp-om-bransjeavtalen

The Industry agreement on reduction of food waste provides the data foundation for food waste measurements for the following food supply chain stages:

- Processing and manufacturing
- Retail and other distribution of food

The data follow the definition of food waste ("matsvinn") in the Industry agreement, not the EU definition, and therefore have to be converted into the EU definition of food waste. This is described in the following section.

The definition used in the industry agreement is the following:

> "Food waste includes edible parts of food produced for humans that is thrown away or taken out of the food chain and used for other purposes than human consumption, from the time when animals and plants are slaughtered or harvested."[11]

There are a few important differences between the EU definition and the definition used in the industry agreement (see also Table 7):

- In the industry agreement, products that are taken out of the human food chain for feed is considered food waste. The EU definition does not consider this food waste as the products stay within the food system.
- In the industry agreement, inedible waste is not included in the food waste definition. The EU includes all inedible parts unless they are removed as by-products or never enter the food supply chain (parts of cops that are not harvested and left on the field).
- In the industry agreement, food drained as or with wastewater is included. In the EU, it is voluntary.

Table 7. Food waste in the EU and in the Industry agreement on the reduction of food waste.

Product	**Food waste in the EU?**	**Industry agreement definition of food waste**
By-products	No	Sometimes – when it was intended to become food
Inedible parts	Yes (unless removed during production as by-products)	No
Food waste residues collected within packaging	No	Yes – ideally, but not counted yet.
Food no longer destined for human consumption that is being transformed into feed	No. Only reported as voluntary measurement.	Yes
Feed	No.	Yes, if it was intended to become food.
Food waste drained with or as wastewater	No. Only reported as voluntary measurement	Yes

Sources: Stensgård et al. (2021) **and (2019/1597/EC)[12]:**

[11] In Norwegian here: https://www.regjeringen.no/contentassets/1c911e254aa0470692bc311789a8f1cd/matsvinnavtale.pdf

[12] With accompanying guidance document available here (this report follows the definitions in the version from June 2021): https://ec.europa.eu/eurostat/documents/342366/351811/Guidance+on+food+waste+reporting/5581b0a2-b09e-adc0-4e0a-b20062dfe564

For the food industry (except seafood), NORSUS gathers data on tons food waste per product group according to EUs definition is alongside data on tons food waste per product group according to the industry agreement and tons produced per product group, each year for all companies. Due to this, there was no need for calculating/estimating between the different definitions. However, since these datasets have not been utilized before, quality assurance was conducted using data from norskeutslipp.no, from Biosirk, as well as reported data on food waste sent to feed, donations, biogas, compost, and incineration. In addition, email communication with large food processing and manufacturing companies in Norway was done to quality check the reported food waste data.

After the food waste data according to EU definition was quality checked, national food waste statistics were calculated using the same method as in Stensgård et al. (2021): Total amount of food waste is calculated by multiplying % food waste of tonnes produced for the reporting companies with SSB table 10455 "Sold production of goods in the manufacturing industry, by 8-digit Prodcom code 2008 – 2020" (Statistics Norway, 2021b), including confidential data that is not published publicly by Statistics Norway.

For the retailers and wholesalers, NORSUS collects data on total weight and economic value of food discarded (including feed and food drained as or with wastewater) per product group and total turnover per product group. Edible share of food waste is estimated using matvaretabellen.no for the industry agreement, thus the primary data reported to NORSUS includes inedible parts of food discarded. The companies also report tons food sent to feed, so this was subtracted from the total amounts of food waste, to accommodate the EU-definition. Food discarded as- or with wastewaters was also subtracted. This was only beverages returned to breweries, based on information from retailers, wholesalers and food industry companies on how liquid food waste is treated at the different supply-stages, and what liquid product- groups have physical return-policies. National food waste statistics was calculated using the same method as in Stensgård et al. (2021): Total amount of food waste is calculated by scaling up to the national level based on the companies' market share in 2020.

5.1.4 Restaurants and food services

Data from Statistics Norway (table 07355) waste from service industries, by section (SIC2007) and material (tonnes) (Statistics Norway, 2021a) was used in combination with waste composition analysis from Norwegian households[13] to determine food waste in the service sector. The data constitute a part of the Waste Account for Norway (Statistics Norway, 2021c), which is the data source for reporting waste statistics to EU/OECD (Municipal waste) and to Eurostat pursuant to Regulation on waste statistics (EC 2150/2002).

The data from Statistics Norway used include the following sub-sections of the Restaurants and food services stage

- I – Accommodation and food service activities
- N - Administrative and support service activities
- O - Public administration and defence
- P - Education
- Q - Human health and social work activities
- R - Arts, entertainment, and recreation
- S - Other service activities

[13] Documented in Stensgård et al. (2021).

The waste composition analysis of collected household waste was conducted in 2019, 2020 and 2021 and documented by NORSUS on behalf of Matvett in connection with an assignment commissioned by the Ministry of Climate and Environment in the spring 2021, for reporting under the Industry agreement on reduction of food waste (Stensgård et al., 2021). These data were used as proxy data in this instance to establish the fraction of food waste in the service sector.

5.1.5 Households

For households, data on household waste from Statistics Norway (table 13136) (Statistics Norway, 2021d) were used in combination with waste composition analysis documented by NORSUS on behalf of Matvett in connection with the Industry agreement on reduction of food waste (Stensgård et al., 2021). The purpose of using the waste composition analysis was to establish the fraction of food waste in collected household waste.

6 References

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Reporting to Eurostat

Results

Unit of measurement is tonnes. A blank cell indicates data not available. A real zero is reported by 0.

Primary production

Table 8. Table 1 reporting for primary production, divided into agriculture and seafood.

TABLE 1: Data on food waste amounts Unit: tonnes of fresh mass												
Stage of the food supply chain	Total food waste	Standard footnote	Confidentiality footnote	Explanatory footnote	Of which: edible food waste	Standard footnote	Confidentiality footnote	Explanatory footnote	Food drained as or with wastewaters	Standard footnote	Confidentiality footnote	Explanatory footnote
Agriculture	41 819				41 073							
Seafood	122 400				38 200							
Primary production	**164 219**				**79 273**							

Table 9 intentionally left blank.

Table 9. Table 2 reporting for primary production, divided into agriculture and seafood.

TABLE 2: Data on management of food surplus related to food waste prevention Unit: tonnes of fresh mass												
Stage of the food supply chain	Reuse: food donation and other redistribution for human consumption	Standard footnote	Confidentiality footnote	Explanatory footnote	Food provided to feed business operators for transformation into feed	Standard footnote	Confidentiality footnote	Explanatory footnote	Former food placed as feed on the market by operators registered simultaneously as food and feed business	Standard footnote	Confidentiality footnote	Explanatory footnote
Agriculture												
Seafood												
Primary production												

Processing and manufacturing

Table 10. Table 1 reporting for processing and manufacturing, divided into agriculture and seafood.

TABLE 1: Data on food waste amounts Unit: tonnes of fresh mass												
Stage of the food supply chain	Total food waste	Standard footnote	Confidentiality footnote	Explanatory footnote	Of which: edible food waste	Standard footnote	Confidentiality footnote	Explanatory footnote	Food drained as or with wastewaters	Standard footnote	Confidentiality footnote	Explanatory footnote
All foods except seafood	28 868				25 800							
Seafood	220				220				31 300			
Processing and manufacturing	**29 088**				**26 020**				**31 300**			

Table 11. Table 2 reporting for processing and manufacturing, divided into agriculture and seafood.

TABLE 2: Data on management of food surplus related to food waste prevention Unit: tonnes of fresh mass												
Stage of the food supply chain	Reuse: food donation and other redistribution for human consumption	Standard footnote	Confidentiality footnote	Explanatory footnote	Food provided to feed business operators for transformation into feed	Standard footnote	Confidentiality footnote	Explanatory footnote	Former food placed as feed on the market by operators registered simultaneously as food and feed business	Standard footnote	Confidentiality footnote	Explanatory footnote
All foods except seafood	2 292											
Seafood					16 230							
Processing and manufacturing	**2 292**				**16 230**							

Retail and other distribution of food

Table 12. Table 1 reporting for retail and other distribution of food

TABLE 1: Data on food waste amounts Unit: tonnes of fresh mass												
Stage of the food supply chain	Total food waste	Standard footnote	Confidentiality footnote	Explanatory footnote	Of which: edible food waste	Standard footnote	Confidentiality footnote	Explanatory footnote	Food drained as or with wastewaters	Standard footnote	Confidentiality footnote	Explanatory footnote
Retail and other distribution of food	**61 281**				**51 860**				**2 238**			

Table 13. Table 2 reporting for retail and other distribution of food

TABLE 2: Data on management of food surplus related to food waste prevention Unit: tonnes of fresh mass												
Stage of the food supply chain	Reuse: food donation and other redistribution for human consumption	Standard footnote	Confidentiality footnote	Explanatory footnote	Food provided to feed business operators for transformation into feed	Standard footnote	Confidentiality footnote	Explanatory footnote	Former food placed as feed on the market by operators registered simultaneously as food and feed business	Standard footnote	Confidentiality footnote	Explanatory footnote
Retail and other distribution of food	**2 965**				**3 191**				**14 154**			

Restaurants and food services

Table 14. Table 1 reporting for restaurants and food services.

TABLE 1: Data on food waste amounts Unit: tonnes of fresh mass												
Stage of the food supply chain	Total food waste	Standard footnote	Confidentiality footnote	Explanatory footnote	Of which: edible food waste	Standard footnote	Confidentiality footnote	Explanatory footnote	Food drained as or with wastewaters	Standard footnote	Confidentiality footnote	Explanatory footnote
Restaurants and food services	**97 547**											

Table 15 intentionally left blank.

Table 15. Table 2 reporting for retail and other distribution of food.

TABLE 2: Data on management of food surplus related to food waste prevention Unit: tonnes of fresh mass												
Stage of the food supply chain	Reuse: food donation and other redistribution for human consumption	Standard footnote	Confidentiality footnote	Explanatory footnote	Food provided to feed business operators for transformation into feed	Standard footnote	Confidentiality footnote	Explanatory footnote	Former food placed as feed on the market by operators registered simultaneously as food and feed business	Standard footnote	Confidentiality footnote	Explanatory footnote
Restaurants and food services												

Households

Table 16. Table 1 reporting for households.

TABLE 1: Data on food waste amounts Unit: tonnes of fresh mass												
Stage of the food supply chain	Total food waste	Standard footnote	Confidentiality footnote	Explanatory footnote	Of which: edible food waste	Standard footnote	Confidentiality footnote	Explanatory footnote	Food drained as or with wastewaters	Standard footnote	Confidentiality footnote	Explanatory footnote
Households	**419 893**				**216 106**							

Table 17 intentionally left blank.

Table 17. Table 2 reporting for households

TABLE 2: Data on management of food surplus related to food waste prevention Unit: tonnes of fresh mass											
Stage of the food supply chain	Reuse: food donation and other redistribution for human consumption	Standard footnote	Confidentiality footnote	Explanatory footnote	Food provided to feed business operators for transformation into feed	Standard footnote	Confidentiality footnote	Explanatory footnote	Former food placed as feed on the market by operators registered simultaneously as food and feed business	Standard footnote	Confidentiality footnote	Explanatory footnote
Households												

Methodology (Quality Report)

Annex III methods (in-depth reporting)

Table 18. Table 4.1 reporting for the entire food value chain.

4. Information concerning measurement using the methodology set out in Annex III			
4.1. General description of the sources of data for measuring food waste in the framework of the methodology set out in Annex III to Delegated Decision (EU) 2019/1597			
Please indicate the sources of data on food waste amounts for each stage of the food supply chain (mark with a cross all the relevant cells).			
Stage of the food supply chain	On the basis of the data collected for the purposes of Regulation 2150/2002/EC of the European Parliament and of the Council*	On the basis of a dedicated study (examples: scientific study, consultancy report)	Other sources or combination of different sources (please specify in point 4.2) (examples: administrative reporting, voluntary commitments of the industrial sector)
Primary production		x	x
Processing and manufacturing	x		x
Retail and other distribution of food			x
Restaurants and food services	x		x
Households	x		x

Table 19. Table 4.2 reporting for the entire food value chain.

4.2. Detailed description of the methods for measuring food waste within the framework of the methodology set out in Annex III to Delegated Decision (EU) 2019/1597					
For each stage of the food supply chain, please describe the methods for measuring food waste amounts, by reference to Annex III to Delegated Decision (EU) 2019/1597.					
Stage of the food supply chain	Short description of the methods used (including methods used to measure amounts of food waste in mixed waste, where relevant)	Entities providing data on food waste	In case of sampling and/or scaling…	Description of the main issues affecting the accuracy of the data, including errors	Description of the data validation process, including possible sources of uncertainty and their likely impact on the results reported
Primary production	This data covers primary production of **milk.** The Norwegian Agricultural Agency receives data on all first-hand sales of milk for price subsidy and fee purposes (NO: Leveransedatabasen, data not publicly accessible). Dairy producers report monthly the milk collected from dairy farmers via direct measurement. Method of measurement is direct. Unit of measurement is litres. Data is submitted electronically. All reported data is for the year 2020. Data covers 99.8% of production so results assumed to be representative and accurate. Data are processed and analysed by the Norwegian Agricultural Agency: Røsnes, E. (2021a). Utvikling av matsvinnstatistikk i korn- og grøntsektoren: Tilleggsrapport til rapporten Utvikling av matsvinnstatistikk i jordbrukssektoren. Røsnes, E. (2021b). Matsvinn i jordbrukssektoren: Kartlegging for 2020.	Food business operators (Dairy producers)	**Sample:** Data covers 99.8% of milk production. Local sales are not included (0.2%). No scaling or weighting.	**Measurement errors:** One of the two major dairy producers in Norway does not report milk that is wasted due to being mixed with milk that was later determined to not be fit for human consumption during collection. It was assumed that both dairy companies had the same fraction of this type of waste. Mixing of "good" and "bad" milk is the main cause of food waste in milk production but total milk waste was only 0.14% of total production in 2020, so this assumption does not considerably affect results.	- Data collection is part of administrative reporting and data is validated by financial accountant. - Assumptions do not considerably affect results.
	This data covers primary production of **meat.** The Norwegian Agricultural Agency receives data on all first-hand sales for price subsidy and fee purposes (NO: Leveransedatabasen, data not publicly accessible). Waste is part of this data collection. Data covers all production so results assumed to be representative and accurate. Method of measurement is direct measurement. Unit of measurement is kg. Data are submitted electronically. All reported data is for the year 2020. Parts of the animal not fit for human consumption are not included in the data, e.g., skin, hair, heads, hooves, guts, as these never enter the food chain according to Norwegian regulations. Data are processed and analysed by the Norwegian Agricultural Agency (Røsnes, 2021a, 2021b).	Food business operators (Slaughterhouses)	**Sample:** 100% of production. No scaling or weighting.		- Data collection is part of administrative reporting and data is validated by financial accountant.

Stage	Short description of the methods used (including methods used to measure amounts of food waste in mixed waste, where relevant)	Entities providing data on food waste	In case of sampling and/or scaling…	Description of the main issues affecting accuracy…	Description of the data validation process…
Primary production	This data covers primary production of **eggs.** The Norwegian Agricultural Agency (NAA) receives data on all first-hand sales for subsidy-purposes (NO: Leveransedatabasen, data not publicly accessible). Additional data on waste are gathered from egg packers by NAA. Unit of measurement is kg. All reported data is for the year 2020. Data covers all production, so results assumed to be representative and accurate. Inedible parts account for approximately 12% of the egg (eggshell) and have been added to the data from the NAA, which excludes it in their food waste reporting. Eggs that have been trampled or have blood stains are excluded from the food value chain. Data are processed and analysed by the Norwegian Agricultural Agency (Røsnes, 2021a, 2021b).	Food business operators (Egg farmers and egg packers)	**Sample:** 100% of production. No scaling or weighting.		- Data collection is part of administrative reporting and data is validated by a financial accountant.
	This data covers primary production of **grains.** Data only includes wheat and rye, accounting for 86% of total grain production. The Norwegian Agricultural Agency used data that grain buyers and food mills are required to report to conduct material flow analysis. Method of measurement is direct measurement and unit of measurement is kg. To estimate waste, a material flow analysis was conducted using inputs and outputs of grains to grain reception and out of food mills. A five-year average is used to account for storage over years, which can cause large fluctuations in inputs and outputs in material flow analysis. Data cover 86% of grain production and have not been scaled to 100% of production. No estimate on fresh mass/water content conducted. Data are processed and analysed by the Norwegian Agricultural Agency (Røsnes, 2021a, 2021b).	Food business operators (grain buyers and food mills).	**Sample:** Data only includes wheat and rye, accounting for 86% of total grain production. No scaling or weighting.	Data only includes wheat and rye, so all grains are not covered. No scaling has been conducted to account for this. There are uncertainties regarding material flow analysis; may be some overlap with processing and manufacturing stage (risk of double counting).	- Data collection is part of administrative reporting and data is validated by a financial accountant. - Data only includes wheat and rye, accounting for 86% of total grain production. No scaling was conducted.

Stage	Short description of the methods used (including methods used to measure amounts of food waste in mixed waste, where relevant)	Entities providing data on food waste	In case of sampling and/or scaling…	Description of the main issues affecting accuracy…	Description of the data validation process…
Primary production	This data covers primary production of **fruit, berries, and vegetables.** The Norwegian Agricultural Agency used production data from Statistics Norway (NO: Hagebruksundersøkelsen, 98% response rate; potet- og grovfôrundersøkelsen, sent to 25% of potato farmers) and conducted a survey of packers and processors to estimate food waste (response rate 75% and 72% respectively). Method of measurement is direct measurement. Unit of measurement is kg. All data is for the reference year 2020. No estimate of fresh mass/water content conducted. Data were processed and analysed by NAA, report pending. Data covers 12 largest product groups, estimated to account for 85-90% of total production of fruit, berries, and vegetables. NAA scaled data in two ways to account for products not included in production survey and non-responses. Data are processed and analysed by the Norwegian Agricultural Agency (Røsnes, 2021a, 2021b).	Food business operators (farmers, packers, and processors)	**Sample:** 12 largest product groups, estimated to account for 85-90% of total production of fruit, berries, and vegetables. **Scaling:** Conducted by NAA in two ways: 1. To account for products not included in production survey, 2. To scale up waste volumes missed by non-response in the NAA survey.	**Measurement errors:** The Norwegian Agricultural Agency assumes measurement errors in production statistics and in data reported in their own survey. Data on carrots were deemed of such poor quality that they were excluded. Data on food waste in potatoes is also likely an overestimate. **Non-response:** Non-response errors in survey of packers and processors. Accounted for in scaling.	- Many uncertainties in production data and food waste data. This is the first time estimates on food waste of fruit, berries and vegetables have been conducted so no data to validate against. - Data on some food groups was deemed of poor or insufficient quality. Checks have taken place in Norwegian Agricultural Agency.
	This data covers primary production of **fisheries** (catching) sector (NACE 03). Degree of utilization and landing statistics are used to calculate volumes of rest raw material discarded at sea. Certain fractions are defined as edible in Norway, such as roe and liver, while heads, backs and cut-offs are defined as inedible parts. Blood is not calculated in the data source because it appears spread in the fish making it hard to classify exact volumes. About 40 % of the marine rest raw material/food waste from the white fish sector was not utilized in 2020, whether for food purposes (direct/indirect), nor feed purposes. The majority of this was discarded in production of primary products at sea. Data were retrieved through the annual national report on marine rest raw material: Myhre, M., Richardsen, R., Nystøyl, R., Strandheim, G. (2021). Analyse av marint restråstoff, 2020. SINTEF rapport 2021:00633. SINTEF Ocean og Kontali Analyse AS.	Data are a combination of public statistics and first-hand information food business operators.	**Sample:** All vessels landing volumes of seafood in Norway, as well as the industry buying the volumes, are obligated to report data on this to the respective sales organizations. Therefore, the calculations are based on complete data for the seafood industry.	**Sampling errors:** There might be incidents where the reported volumes are lower/higher than the actual, especially first-hand information, but also landings (public statistics). However, this is assumed to be rare.	Data is calculated from well-known public sources and first-hand information. SINTEF Ocean and Kontali Analyse validate the data on the basis of comparison of the two data sources, but also on previous results and experience working with such data for almost 10 years.

Stage	Short description of the methods used (including methods used to measure amounts of food waste in mixed waste, where relevant)	Entities providing data on food waste	In case of sampling and/or scaling…	Description of the main issues affecting accuracy…	Description of the data validation process…
Processing and manufacturing	This data covers food processing and manufacturing of food (NACE 10) and beverages (NACE 11) **except seafood**. Food business operators report tons of food waste per product group and tons food sold per product group. All reported data is for the year 2020. The following methods of measurement are used: - direct measurement or weighing - estimate based on volume or counting - scanning - best estimate based on experience - or a combination of all. 55% of all respondents reported using volume/counting estimates, and 36% used direct measurement. Data is collected via survey. National food waste levels are calculated by first calculating the coefficient "% food waste" per product group by dividing reported tons food waste per product group by reported tons sold per product group. Coefficient_%food_waste_product_group1 = (Total_food_waste_reported_product_group1/ Total_food_produced_reported_product_group1) Coefficient_%food_waste_product_groupN = (Total_food_waste_reported_product_groupN/ Total_food_produced_reported_product_groupN) The coefficient %food_waste is then multiplied with tons food produced per product group from national production statistics. Total_Food_Waste_product_group1 = (Coefficient_%food_waste_product_group1* Total_food_produced_National_product_group1) Total_Food_Waste_product_groupN = (Coefficient_%food_waste_product_groupN* Total_food_produced_National_product_groupN) Food waste for product groups with no reported food waste data are calculated using weighted average %-food waste for all other product groups. Finally, the food waste for all product groups are summarised. No fresh mass estimates have been conducted due to lack of data on conversion. Data was processed and analysed by NORSUS: Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.	Food business operators	**Sample**: 41 entities reported data for 2020, representing approx. 50% of total turnover in food processing and manufacturing, excluding seafood, in 2020. **Scaling:** % food waste of tons sold product per food product group is multiplied with production data (volume) for 231 product groups (ProdCom codes) from Statistics Norway (SSB table 10455) for NACE codes 10 og 11. In order to account for potential errors in ProdCom data, data on production value (price/kg) is used to estimate total production volume in each product group.	**Sampling errors:** Risk of self-selection. Food waste monitoring scheme is voluntary so entities that are unable to monitor food waste or know they have a lot of food waste may be dissuaded from participating in the scheme. It may also be a matter of capacity. Sample consists of the largest companies in the sector. **Measurement errors:** 3 of 41 entities reported incomplete data on egg, dairy, and grain-products. These 3 are working to improve data collection. One entity has also not been able to separate waste from agriculture from their own waste, which leads to double counting.	- Reporting is voluntary, so biased selection in sample. - Estimated food waste may be an underestimate (as described left). - Uncertainty connected to ProdCom statistics used to create coefficient and scale up (as described left). - Quality assurance has been made for reported data using supplementary data from norskeutslipp.no, Biosirk, and email-correspondence with large companies

Stage	Short description of the methods used (including methods used to measure amounts of food waste in mixed waste, where relevant)	Entities providing data…	In case of sampling and/or scaling…	Description of the main issues affecting the accuracy of the data, including errors…	Description of the data validation process…
Processing and manufacturing	The data covers seafood processing. Calculations are based on definition of "food waste" agreed upon by industry, only looking at the edible parts that are not utilized. Non-edible parts are not calculated in the original data, but are calculated specifically for this reporting, based on non-utilized edible parts, using official national coefficients. The industry reports tons of "food waste" and seafood production per production level. Species included are cod, haddock and saithe (white fish), herring and mackerel (pelagic) and salmon and trout (aquaculture). All reported data is for the year 2020. The following methods of measurement are used: - counting/scanning - estimate based on volume or counting - best estimate based on experience - or a combination of all. National seafood "food waste" levels are calculated by multiplying % "food waste" of tons produced product per seafood production level (the % is calculated by dividing reported tons "food waste" per product level by reported tons produced per production level) with national production data for each step in the production estimated from export and domestic statistics per product level. Data were processed and analysed by SINTEF Ocean and Kontali Analyse: Myhre, M., Richardsen, R., Nystøyl, R., Strandheim, G. (2020). Analyse av marint restråstoff, 2020. SINTEF rapport 2021:00633. SINTEF Ocean og Kontali Analyse AS.	Food business operators.	**Sample:** 10 seafood industry actors reported data for 2020, representing about 9 % of national volumes of production (aquaculture) and landings (fisheries). **Scaling:** % food waste of tons produced product per seafood product group is multiplied with landing/production data (volume) for the primary production level, based on regional sales organizations (Norges Råfisklag, Sildesalgslaget, SUROFI) and national statistics (Fiskeridirektoratet). Food waste from the secondary production level is scaled based on data from the Norwegian Seafood Council (export/wholesale).	**Sampling errors:** Risk of self-selection. Reporting edible parts is voluntary so actors that are unable to report or know they have a lot of non-utilized edible parts may be dissuaded from participating. It may also be a matter of capacity. Not reporting the inedible parts as well can make the data less reliable. However, using official coefficients to calculate the inedible part is considered a valid methodology to achieve full food waste data. Certain sectors and belonging actors have less internal registration (counting/scanning) of food waste than others. **Measurement errors:** With total food waste levels being calculated based on food waste shares from each production level, there will be some volumes counted twice. However, this is perceived as a more precise way to do calculations compared to calculating one % for the entire production (all production levels) and not consider the respective shares of food waste individually for each production level (weighing). A certain share of the products/units are not calculated in fresh mass, such as "klipp"-fish and stock fish. However, this is not assumed to be of significance for the results. **Coverage errors:** With only 9 % of the total national volumes of production (aquaculture) and landings (fisheries), scaled up calculations for national and sector data is less reliable. However, several of the largest seafood companies are represented with one or two production facilities which makes the limited data more reliable and representative.	- Reporting is voluntary so biased selection in sample - Estimates by the industry may be incorrect - Low number of participants creates an uncertainty in scaled up calculations

Stage of the food supply chain	Short description of the methods used (including methods used to measure amounts of food waste in mixed waste, where relevant)	Entities providing data on food waste	In case of sampling and/or scaling…	Description of the main issues affecting the accuracy of the data, including errors…	Description of the data validation process…
Retail and other distribution of food	**For wholesale,** food waste is monitored by individual businesses through voluntary scheme. Data is recorded in economic value by product group. Some businesses also record waste in volumes. All use scanning as a method of measurement. Data are collected by email (excel sheet) or survey. All wholesalers measure waste as part of financial management, therefore some do not distinguish between food that is donated and food that is wasted. Therefore, food waste data from wholesalers is likely to be overestimated. National food waste levels are calculated by first sorting the economic value of food waste into product groups per reporting unit. After this the amount of food waste is calculated using kilogram prices per product group from retailers (see below). Finally total food waste is calculated by scaling up to national statistics using the reporting units marked share. Data was processed and analysed by NORSUS: Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.	Food business operators	**Sample:** 7 entities reported data for 2020, of which 4 are direct importers and 3 are large wholesalers with large selection of goods. These 7 entities represent approx. 65-85% of revenue for wholesalers, depending on the product group and market (HORECA, retail etc.). **Scaling:** To get waste in tonnage, the total value of food waste for 26 product group is calculated. Kilogram prices (NOK/kg) from retail were used to convert value into volume (tonnes) of food waste. To scale up, data are adjusted by market share of each of the wholesalers.	**Sampling errors:** Risk of self-selection. Food waste monitoring scheme is voluntary so entities that are unable to monitor food waste or know they have a lot of food waste may be dissuaded from participating in the scheme. It may also be a matter of capacity. **Measurement errors:** Data on food waste are recorded in value. Process of turning value into volume is uncertain since kilogram prices from retail is used. Errors connected to difficulty differentiating between food waste and food donations in measurement approach.	- Reporting is voluntary, so biased selection in sample. – Uncertainties connected with scaling and calculation from value to volume. - Difficulty differentiating between food donations and food waste in recording data

Stage	Short description of the methods used (including methods used to measure amounts of food waste in mixed waste, where relevant)	Entities providing data on food waste	In case of sampling and/or scaling…	Description of the main issues affecting the accuracy of the data	Description of the data validation process…
Retail and other distribution of food	**For retail**, food waste is monitored by individual businesses through voluntary scheme. Data is recorded in economic value per product group. Some of the retailers also report in volume. Method of measurement is scanning. Data are collected via email (excel sheet). Retailers measure waste as part of financial management, therefore some individual retailers struggle to distinguish between food that is donated and food that is wasted. Therefore, food waste data is likely to be overestimated for a few entities. National food waste levels are calculated by first sorting the volumes and economic values of food waste into product groups, sorted per reporting unit. Next, kilogram prices per product group are calculated by dividing economic value of food waste to kg food waste per product group from retailers that provide both economic and mass-data: Kg_Price_product group1 = (Value_food_waste_product_group1/ Kg_food_waste _product_group1) …Kg_Price_product groupN = (Value_food_waste_product_groupN/ Kg_food_waste _product_groupN) After this, the economic value of food waste per product group for reporting units with no mass data are divided by kilogram prices to calculate kg food waste per product group: Kg_food_waste _product_group1 = (Value_food_waste_product_group1/ Kg_price_waste _product_group1) …Kg_food_waste _product_groupN = (Value_food_waste_product_groupN/ Kg_price_waste _product_groupN) Finally total food waste is calculated by summarizing kg food waste per reporting unit and scaling up to national statistics using the reporting units marked share. Data was processed and analysed by NORSUS: Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.	Food business operators	**Sample**: 5 retail chains participate in the voluntary scheme to measure food waste. They represent 99% of revenue in 2020. **Scaling**: Total food waste is calculated by scaling up to national statistics using the reporting units marked share.	**Sampling errors:** Risk of self-selection. Food waste monitoring scheme is voluntary so entities that are unable to monitor food waste or know they have a lot of food waste may be dissuaded from participating in the scheme. It may also be a matter of capacity. **Measurement errors**: Uncertainty connected to scaling due measurements being a combination of value and volume. Errors connected to difficulty differentiating between food waste and food donations in measurement approach.	- Reporting is voluntary, so biased selection in sample. - Difficulty differentiating between food donations and food waste in recording data

Stage	Short description of the methods used (including methods used to measure amounts of food waste in mixed waste, where relevant)	Entities providing data on food waste	In case of sampling and/or scaling.	Description of the main issues affecting the accuracy of the data	Description of the data validation process
Restaurants and food services	For Restaurants and food services, national statistics from Statistics Norway (SSB) (table 07355: Waste from service industries, by section (SIC2007) and material (tonnes) 2008 – 2020)) are combined with waste composition analysis (WCA) of collected household waste conducted by NORSUS. The statistics constitute a part of the Waste Account for Norway, which is the data source for reporting waste statistics to EU/OECD (Municipal waste) and to Eurostat pursuant to Regulation on waste statistics (EC 2150/2002). From these statistics, the following data are used: tons "wetorganic waste" and "mixed waste" in 2020 for the following NACE-sections: I (Accommodation and food service activities), P (Education) Q, (Human health and social work activites), N (Administrative and support service activities), O (Public administration and defence; compulsory social security), R (Arts, entertainment and recreation) and S (Other service activities). The NACE sections are then divided into two categories: NACE sections with household-like waste (I, P and Q), and NACE sections NOT with household-like waste (N, O, R and S). For NACE sections with household-like waste (I, P and Q), total food waste is estimated by multiplying tons wetorganic waste with share of food waste in wetorganic waste from WCA from households, then adding tons mixed waste multiplied with share of food waste in mixed waste from WCA from households. For NACE sections with NOT household-like waste (N, O, R and S), total food waste is estimated by multiplying tons wetorganic waste with share of food waste in wetorganic waste from WCA from households (mixed waste is excluded due to the assumption that there's little food waste here). Statistics Norway, 2021. Table 07355: Waste from service industries, by section (SIC2007) and material (tonnes) 2008 – 2020. Available here: https://www.ssb.no/en/statbank/table/07355 WCA data from Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.	Statistics from SSB: The statistics are compiled on data from customer registers gathered from waste collectors. The Central Register of Establishments and Enterprises of Norway has also been applied. The identity of the establishments is controlled using the business register. For WCA, municipalities and waste operators that have conducted waste composition analyses of household waste in specific time-period. Additional analyses conducted by consultancy in collaboration with waste operator.	From SSB: The sample consists of Service Industry establishments with a customer relationship to waste collectors, who can be identified using the Central Register of Establishments and Enterprises of Statistics Norway. Only establishments with employee figures are used in the inflation of the sample. The ratio between variable x summed over respectively the population and sample are used to inflate the waste to cover the whole population. The population is stratified by crossing employee groups and industry. This is done to account for the fact that waste per employee vary both by size and industry. The WCA is a compilation of 12 different analysis of collected household waste performed in the years 2019, 2020 and 2021 across a wide range of municipalities in Norway, housing 46% of the population. The analyses are of residual waste and wetorganic waste for municipalities with- and without separate collection of wetorganic waste. Since the WCAs are a snapshot of the yearly waste generated – the representativity of the WCAs for total generated household waste is below 1%.	Waste composition analysis from households used as proxy for estimating food waste in wet-organic waste and mixed waste, due to lack of waste composition analysis for Restaurants and food services. This results in high uncertainty. WCA also represents less than 1% of annual household waste. Due to lack of data, the food waste has not been calculated into fresh mass.	-WCA from households are used as proxy for Restaurants and food services. -WCA is just a snapshot and represent less than 1 % of yearly generated waste from households. - The food waste is not in calculated back to its original fresh mass, meaning that cooked meat, pasta etc. are not adjusted back to the weight before preparation.

Stage	Short description of the methods used (including methods used to measure amounts of food waste in mixed waste, where relevant)	Entities providing data on food waste	In case of sampling and/or scaling …	Description of the main issues …	Description of the data validation process…
Households	For households, national statistics from Statistics Norway (SSB) are combined (table 13136: Household waste, by material, treatment and downstream system (M) 2015 – 2020) with waste composition analysis (WCA) of collected household waste processed and analysed by NORSUS. The Statistics are included in Norway's Reporting of Waste statistics to Eurostat and OECD, and are collected by authority in the Pollution Control Act Section §49 and adapted to statistics after Statistics Act Section §3-2. From these statistics, the following data are used: tons "food and other wetorganic waste" and "residual waste" in 2020 for all 358 municipalities. The municipalities are then divided into two categories: municipalities with source-separation of wet-organic waste and municipalities without source-separation of wetorganic waste. For municipalities with source-separation of wetorganic waste, total food waste is estimated by multiplying tons wetorganic waste with share of food waste in wetorganic waste from WCA, then adding tons residual waste multiplied with share of food waste in residual waste from WCA. For municipalities without source-separation of wetorganic waste, total food waste is estimated by multiplying tons residual waste with share of food waste in residual waste from WCA. Statistics Norway, 2021. Table 13136: Household waste, by material, treatment and downstream system (M) 2015 – 2020. Available here: https://www.ssb.no/en/statbank/table/13136 WCA data from Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.	Household waste statistics compiled by Statistics Norway. For WCA, municipalities and waste operators that have conducted waste composition analyses of household waste in specific time-period. Additional analyses conducted by consultancy in collaboration with waste operator.	The waste composition analyses (WCA) are a compilation of 12 different analysis of collected household waste preformed in the years 2019, 2020 and 2021 across a wide range of municipalities in Norway, housing 46 % of the population. The analyses are of residual waste and wetorganic waste for municipalities with- and without separate collection of wetorganic waste. Since the WCAs are a snapshot of the yearly waste generated – the representativity of the WCAs for total generated household waste is below 1%	**Coverage errors:** Waste composition analysis represents less than 1% of annual household waste -Due to lack of data, the food waste has not been calculated into fresh mass.	-WCA is just a snapshot and represent less than 1 % of yearly generated waste from households. - The food waste is not calculated back to its original fresh mass, meaning that cooked meat, pasta etc. are not adjusted back to the weight before preparation.

Annex IV methods (annual reporting)

The Annex IV methods is also documented in the Excel sheet “Annex IV-reporting food waste in Norway”

Table 20. Table 5 reporting for primary production

5. Information concerning measurement using the methodology set out in Annex IV to Delegated Decision (EU) 2019/1597									
Please provide information for each stage of the food supply chain, for which calculations have been made in the reporting year									
Stage of the food supply chain	Data on food waste amounts used as a basis for the calculations			Socio-economic data used for the calculations					Description of the methods used for the calculations
	Value [t]		Year	Type of data	Value*		Year*	Source*	
Primary production	*Type*	*Tons*	*2020*	Production data	*Type*	*Tons*	*2020*	*The Norwegian National Data Catalog*	Annex IV numbers are calculated using total production in tons for the 5 different commodities from the Norwegian National Data Catalog for the applicable reporting year and estimated total amounts of food waste for the 5 commodities and 2020. Food waste/ton produced is calculated for the 5 commodities. Food waste/ton produced is then multiplied to total ton produced for the applicable reporting year. $Ton\_FW_{Milk, Meat, Eggs, Grain, Select F\&V\&B}$ = $((ton\_FW\_2020_{Milk} / Ton\_Produced\_2020_{Milk}) \times Ton\_Produced\_yearX_{Milk}) +$ $(ton\_FW\_2020_{Meat} / Ton\_Produced\_2020_{Meat}) \times Ton\_Produced\_yearX_{Meat}) +$ $(ton\_FW\_2020_{Eggs} / Ton\_Produced\_2020_{Eggs}) \times Ton\_Produced\_yearX_{Eggs}) +$ $(ton\_FW\_2020_{Grain} / Ton\_Produced\_2020_{Grain}) \times Ton\_Produced\_yearX_{Grain}) +$ $(ton\_FW\_2020_{Select F\&V\&B} / Ton\_Produced\_2020_{Select F\&V\&B}) \times Ton\_Produced\_yearX_{Select F\&V\&B}) +$
	Milk	2 061			Milk	*1 520 899*			
	Meat	2 256			Meat	*352 169*			
	Eggs	629			Eggs	*65 993*			
	Grain	10 146			Grain	*159 325*			
	Select vegetables, fruits, and berries	14 581			Select vegetables, fruits, and berries	*610 749*			

	Seafood: *122 400*	*2020*	Production data	*Type*	*Tons landed and available rest raw material*			*2020*	***Seafood****: Option 1: Option 1:* Myhre, M., Richardsen, R., Nystøyl, R., Strandheim, G. (2021) Analyse marint restråstoff. *Option 2: https://www.fiskeridir.no/Yrkesfiske/Tall-og-analyse/Fangst-og-kvoter/Fangst/Fangst-fordelt-paa-art*	**Seafood:** Option 1: By combining reported landings of raw material with reported landings of rest raw materials from public statistics (sales organizations), one can calculate, with official coefficients, volume rest raw material/food waste discarded at sea. Roe and liver is defined as edible parts, while heads, viscera, backs and more are defined as inedible parts. Option 2: Use annual landing statistics from the Norwegian Directorate of Fisheries for cod fishes, and multiply with a calculated available RRM coefficient developed from the annual RRM report (0,44) which gives the available RRM. This number is then multiplied with the weighted average coefficient for non-utilized RRM (0,42166, including edible parts such as liver and roe) based on the last three years of data from the same report, to get tonnes food waste.
				Landings of cod fish (t)	*2018*	*2019*	*2020*		
					718 241	*668 415*	*654 431*		
				Share of rest raw material coefficient	*0,435*	*0,435*	*0,435*		
				Available rest raw material cod fish (t)	*312 435*	*290 761*	*284 677*		
				FW coefficient	*0,4215*	*0,4137*	*0,4299*		

Table 21. Table 5 reporting for processing and manufacturing

5. Information concerning measurement using the methodology set out in Annex IV to Delegated Decision (EU) 2019/1597							
Please provide information for each stage of the food supply chain, for which calculations have been made in the reporting year							
Stage	Data on food waste amounts used as a basis for the calculations		Socio-economic data used for the calculations			Source*	Description of the methods used for the calculations
	Value [t]	Year	Type of data	Value*	Year*		

<table>
<tr><td rowspan="5">Processing and manufacturing</td><td>Seafood: 218</td><td>Seafood: 2020</td><td>Production data</td><td colspan="4">10.2 Processing and preserving of fish, crustaceans and molluscs: 69 240,4 Mill NOK</td><td>Seafood: 2020</td><td>Seafood: https://www.ssb.no/statbank/table/12817/</td><td>Using table 12817 at SSB, calculating a weighted average food waste coefficient based on total food waste in tonnes divided on the annual turnover per last three years for the preparation and conservation of fish, shellfish and molluscs. The three different coefficients for each year are then weighted to establish a coefficient (0,0032373) which can be multiplied with annual turnover in coming years to find total food waste.</td></tr>
<tr><td rowspan="4">28 868</td><td rowspan="4">2020</td><td rowspan="9">Production statistics in economic value</td><td></td><td>2018</td><td>2019</td><td>2020</td><td rowspan="4">2020, 209 and 2018</td><td rowspan="9">SSB table 12817: “Preliminary figures for number of enterprises, employed persons and turnover, by industry (SIC2007) 2016 - 2020”. Turn over (mill NOK), “Industry, 3-digit level”, 10.1, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 11.0</td><td rowspan="9">Annex IV numbers are calculated using SSBs table 12817 for the applicable reporting year and estimated total amounts of food waste for the years 2018, 2019 and 2020: Average food waste/Mill NOK turnover is calculated for the three years (2018, 2019 and 2020). Average food waste/mill NOK turnover is then multiplied to total turnover for the applicable reporting year.

Average_ton_FW/Mill_NOK $_{2018, 2019, 2020}$ = ((ton_FW$_{2018}$ / Mill_NOK_turnover$_{2018}$)+ (ton_FW$_{2019}$ / Mill_NOK_turnover$_{2019}$)+ (ton_FW$_{2020}$ / Mill_NOK_turnover$_{2020}$))/3</td></tr>
<tr><td>10.1 Processing and preserving of meat and production of meat products</td><td>49 365</td><td>45 519</td><td>49 171</td></tr>
<tr><td>10.3 Processing and preserving of fruit and vegetables</td><td>5 029</td><td>5 246</td><td>5 715</td></tr>
<tr><td>10.4 Manufacture of vegetable and animal oils and fats</td><td>19 341</td><td>4 259</td><td>5 311</td></tr>
<tr><td>10.5 Manufacture of dairy products</td><td>25 090</td><td>25 159</td><td>26 372</td></tr>
<tr><td>26 600</td><td>2019</td><td>10.6 Manufacture of grain mill products, starches and starch products</td><td>3 326</td><td>3 438</td><td>3 594</td></tr>
<tr><td rowspan="2">23 846</td><td rowspan="2">2018</td><td>10.7 Manufacture of bakery and farinaceous products</td><td>10 670</td><td>11 540</td><td>11 472</td></tr>
<tr><td>10.8 Manufacture of other food products</td><td>13 998</td><td>19 067</td><td>20 742</td></tr>
<tr><td>11.0 Manufacture of beverages</td><td>23 431</td><td>23 485</td><td>25 430</td></tr>
</table>

										$Total\_ton\_FW_{YearX}$ = $Average\_ton\_FW/Mill\_NOK_{2018, 2019, 2020}$ x $SUM(MillNOK\_turnover\_NACE_{10.1, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 11.0})$

Table 22. Table 5 reporting for retail and other distribution of food

5. Information concerning measurement using the methodology set out in Annex IV to Delegated Decision (EU) 2019/1597								
Please provide information for each stage of the food supply chain, for which calculations have been made in the reporting year								
Stage	Data on food waste amounts used as a basis for the calculations		Socio-economic data used for the calculations				Source*	Description of the methods used for the calculations
	Value [t]	Year	Type of data (e.g. population, food production)*	Value*		Year*		
Retail and other distribution of food	*61 281*	*2020*	Turnover in the sector	*Section*	*Mill NOK*	*2020*	*SSB table 07313: "Turnover statistics except wholesaale on a fee or contract basis, by industry (SIC2007) (NOK million) 2008 – 2020". Industry 3-digit level: 46.3, 47.1, and 47.2.*	Annex IV numbers are calculated using SSBs table 07313 for the applicable reporting year combined with the food waste estimates from 2020. Food waste/Mill NOK turnover is calculated for 2020. Food waste/mill NOK turnover is then multiplied to total turnover for the applicable reporting year. $Total\_ton\_FW\_YearX_{46.3,\ 47.1,\ 47.2}$ = (Ton_FW2020/Mill_NOK_2020) x $SUM(Mill\_NOK\_turnover_{46.3,\ 47.1,\ 47.2})$
				46.3 Wholesale of food, beverages and tobacco	*417 311*			
				47.1 Retail sale in non-specialised stores	*234 570*			
				47.2 Retail sale of food, beverages and tobacco in specialised stores	*27 738*			

Table 23. Table 5 reporting for restaurants and food services

5. Information concerning measurement using the methodology set out in Annex IV to Delegated Decision (EU) 2019/1597									
Please provide information for each stage of the food supply chain, for which calculations have been made in the reporting year									
Stage	Data on food waste amounts used as a basis for the calculations		Socio-economic data used for the calculations					Source*	Description of the methods used for the calculations
	Value [t]	Year	Type of data (e.g. population, food production)*	Value*			Year*		
Restaurants and food services	*97 547*	*2020*	*Waste statistics and share of food waste in collected waste based on WCA*	*Section*	*Wetorganic waste*	*Mixed waste*	*2020*	*SSB table 07355: Waste from service industries, by section (SIC2007) and material (tonnes) 2008 - 2020"": tons "wetorganic waste" and "mixed waste" in 2020 for the following NACE-sections: I, P, Q, N, O, R, and S.*	Annex IV numbers are calculated using SSBs table 07355 for the applicable reporting year combined with waste composition analysis (WCA) from 2020. The NACE sections are divided into two categories: NACE sections with household-like waste (I, P and Q), and NACE sections NOT with household-like waste (N, O, R and S). For NACE sections with household-like waste (I, P and Q), total food waste is estimated by multiplying tons wetorganic waste with share of food waste in wetorganic waste from WCA from households, then adding tons mixed waste multiplied with share of food waste in mixed waste from WCA from households. For NACE sections with NOT household-like waste (N, O, R and S), total food waste is estimated by multiplying tons wetorganic waste with share of food waste in wetorganic waste from WCA from households (mixed waste is excluded due to the assumption that there's little food waste here). Total_FW_YearX_NACE $_{I\ P,Q}$ = (ton_WO_YearX $_{I,\ P\ Q}$*90%)+(ton_MW_YearX $_{I,P,\ Q}$*29%) Total_FW_YearX_NACE $_{N,\ O,\ R,\ S}$ = (ton_WO_YearX $_{N,\ O,\ R,\ S,}$ *90%) Total_FW_YearX = Total_FW_YearX_NACE $_{I\ P,Q}$ + Total_FW_YearX_NACE $_{N,\ O,\ R,\ S}$
				I	*10014*	*58172*			
				N	*1578*				
				O	*1885*				
				P	*2882*	*24770*			
				Q	*16569*	*148106*			
				R	*667*				
				S	*170*				
			WCA from Norwegian households	*Share of food waste (%)*	*90 %*	*29 %*	*2020*	*Stensgård et al. 2021*	

Table 24. Table 5 reporting for households

5. Information concerning measurement using the methodology set out in Annex IV to Delegated Decision (EU) 2019/1597								
Please provide information for each stage of the food supply chain, for which calculations have been made in the reporting year								
Stage	Data on food waste amounts used as a basis for the calculations		Socio-economic data used for the calculations				Source*	Description of the methods used for the calculations
	Value [t]	Year	Type of data (e.g. population, food production)*	Value*		Year*		
Households	*419 893*	*2020*	*Waste statistics*	*Residual waste, collection system*	*732 198*	*2020*	*SSB Table 13136: "Household waste, by material, treatment and downstream system (M) 2015 - 2020". Region "The whole country", Material: "Residual waste" and "Food and other wetorganic waste", Downstream system: "Collection system"*	Annex IV numbers are calculated by multiplying tonnes "Resudual waste" and "Food and other wetorganic waste" from collection systems in 2020 (SSB table 13136) for the applicable reporting year with corresponsing fractions from WCA in 2020. Total_FW_YearX = (ton_WO_YearX x 90%) + (ton_MW_YearX x 29%)
				Wetorganic waste, Collection system	*209 949*			
			WCA from Norwegian households	*Share of food waste (%) in Wetorganic waste*	*90 %*	*2020*	*Stensgård et al. 2021*	
				Share of food waste (%) in Residual waste	*29 %*			

Methods for voluntary reporting

Table 25. Table 6 reporting for the entire food value chain.

6. Voluntary reporting			
Please provide information for each set of voluntarily reported data.			
Name of dataset (referred to in points (a) to (e) of Article 3 of Delegated Decision (EU) 2019/1597)	**Stage of the food supply chain**	**Short description of the data collection method**	**Source - link to the reference document (if applicable)**
a. Edible waste	Primary production (agriculture)	Same as main reporting. Data from database by Norwegian Agricultural Agency (NO: Leveransedatabasen). Farmers, slaughterhouses, and others involved in primary production are mandated to report food waste to this database for subsidy purposes. Unit of measurement is direct. In case of grain, mass balance was conducted by Norwegian Agricultural Agency.	Røsnes, E. (2020). Utvikling av matsvinnstatistikk i korn- og grøntsektoren: Tilleggsrapport til rapporten Utvikling av matsvinnstatistikk i jordbrukssektoren. Røsnes, E. (2021). Matsvinn i jordbrukssektoren: Kartlegging for 2020.
a. Edible waste	Primary production (seafood)	Data on landings of seafood, retrieved from public sources are combined with official coefficients to calculate the potential missing volumes of rest raw material brought to shore.	Myhre, M., Richardsen, R., Nystøyl, R., Strandheim, G. (2021). Analyse av marint restråstoff, 2020. SINTEF rapport 2021:00633. SINTEF Ocean og Kontali Analyse AS.
a. Edible waste	Processing and manufacturing (all except seafood)	Same as main reporting Food business operators report tons of food waste per product group and tons food sold per product group. All reported data is for the year 2020. The following methods of measurement are used: - direct measurement or weighing - estimate based on volume or counting - scanning - best estimate based on experience - or a combination of all. See main reporting for more details.	Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.
c. Reuse, e.g., food donation	Processing and manufacturing (all except seafood)	Same as main reporting.	Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for

		Food business operators report tons of food waste per product group and tons food sold per product group. All reported data is for the year 2020. The following methods of measurement are used: - direct measurement or weighing - estimate based on volume or counting - scanning - best estimate based on experience - or a combination of all.	matbransjen, offentlig sektor og husholdningsleddet.
a. Edible waste	Processing and manufacturing (seafood)	Data reporting by the industry, edible food waste calculated and scaled up using national production/landing, export and wholesale data	Carvajal, A., Myhre, M., Mehta, S., Remme, J., Nystøyl, R., Strandheim, G. (2021). Matsvinn i sjømatindustrien 2020.
b. Food drained as or with wastewaters	Processing and manufacturing (seafood)	Volumes slaughtered salmon and trout, multiplied with a blood-coefficient developed in cooperation with the industry	Myhre, M., Richardsen, R., Nystøyl, R., Strandheim, G. (2021). Analyse av marint restråstoff, 2020. SINTEF rapport 2021:00633. SINTEF Ocean og Kontali Analyse AS
d. Food provided to feed operators	Processing and manufacturing (seafood)	All volumes from the industry, except fish food producers, is estimated to utilize former food volumes degraded to not acceptable levels for human consumption, into acid silage processing for input in feed products as protein concentrate	
a. Edible waste	Retail and other distribution	Same as main reporting. Food waste is monitored by individual businesses through voluntary scheme to reduce food waste. Data is recorded in economic value by product group, sometimes also in volume. Some businesses also record waste in volumes. All use scanning as a method of measurement.	Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.
b. Food drained as or with wastewaters	Retail and other distribution	Same as main reporting. Food waste is monitored by individual businesses through voluntary scheme to reduce food waste. Data is recorded in economic value by product group, sometimes also in volume. Some businesses also record waste in volumes. All use scanning as a method of measurement.	Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.
c. Reuse, e.g., food donation	Retail and other distribution	Same as main reporting. Food waste is monitored by individual businesses through voluntary scheme to reduce food waste. Data is recorded in economic value by product group, sometimes also in volume. Some businesses also	Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.

		record waste in volumes. All use scanning as a method of measurement.	
d. Food provided to feed operators	Retail and other distribution	Same as main reporting. Food waste is monitored by individual businesses through voluntary scheme to reduce food waste. Data is recorded in economic value by product group, sometimes also in volume. Some businesses also record waste in volumes. All use scanning as a method of measurement.	Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.
e. Former foodstuffs	Retail and other distribution	Same as main reporting. Food waste is monitored by individual businesses through voluntary scheme to reduce food waste. Data is recorded in economic value by product group, sometimes also in volume. Some businesses also record waste in volumes. All use scanning as a method of measurement.	Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.
a. Edible waste	Households	Same as main reporting. combined (table 13136: Household waste, by material, treatment and downstream system (M) 2015 – 2020) with waste composition analysis (WCA) of collected household waste.	https://www.ssb.no/en/natur-og-miljo/avfall/statistikk/avfall-fra-hushalda#om-statistikken.

Methodological changes and problems

Table 26 intentionally left blank.

Table 26. Table 7 reporting for the entire food value chain.

7. Methodological changes and problems notifications		
7.1. Description of methodological changes (if applicable)		
Please describe significant methodological changes in the calculation method for the reporting year, if any (please include in particular retrospective revisions, their nature and whether break-flags are required for specific reporting years). Please describe separately for each stage of the food supply chain and provide the precise location of the respective cell(s) (table name, stage of the food supply chain, column heading).		
Add rows as appropriate.		
7.2. Explanation of tonnage difference (if applicable)		
Please explain the causes of the tonnage difference (which stages of the food supply chain, sectors or estimates have caused the difference, and what the underlying cause is) where the variation is greater than 20 % compared to the data submitted for the previous reporting year.		
Stage of the food supply chain	Variation (%)	Main reason for the difference
Add rows as appropriate.		
7.3. Notification of problems (if any)		
In case, you have experienced problems with the attribution of food waste to a given stage of the food supply chain please provide a description of the problems. For every specific problem, please provide the precise location of the respective cell(s) (table name, stage of the food supply chain, column heading).		

Confidentiality

Table 27 intentionally left blank.

Table 27. Table 8 reporting for the entire food value chain.

8. Confidentiality
Please provide a justification to withhold the publication of specific parts of this report, if necessary. For every specific case, please provide the precise location of the respective cell(s) (table name, stage of food supply chain, column heading)

References

Table 28. Table 9 reporting for the entire food value chain.

9. Main national websites, reference documents and publications	
Please provide links to main national websites, reference documents and publications used in the collection of data on food waste amounts.	
Stage of the food supply chain	**References**
Primary production	**Agriculture** Røsnes, E. (2021a). *Utvikling av matsvinnstatistikk i korn- og grøntsektoren: Tilleggsrapport til rapporten Utvikling av matsvinnstatistikk i jordbrukssektoren.* Røsnes, E. (2021b). *Matsvinn i jordbrukssektoren: Kartlegging for 2020.*
Primary production	**Seafood** Myhre, M., Richardsen, R., Nystøyl, R., Strandheim, G. (2021). Analyse av marint restråstoff, 2020. SINTEF rapport 2021:00633. SINTEF Ocean og Kontali Analyse AS.
Processing and manufacturing	**Everything except seafood** Statistics Norway, 2021. "Table 10455: Sold production of goods in the manufacturing industry, by 8-digit Prodcom code 2008–2020." https://www.ssb.no/statbank/table/10455 Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.
Processing and manufacturing	**Seafood** Carvajal, A., Myhre, M., Mehta, S., Remme, J., Nystøyl, R., Strandheim, G. (2021). Matsvinn i sjømatindustrien 2020. Regional sales organizations (fisheries) statistics: Norwegian Fishermen's Sales Organization for Pelagic Fish, available here https://www.sildelaget.no/en Norwegian Fishermen's Sales Organization, available here https://www.rafisklaget.no/ Norwegian Directorate of Fisheries, available here https://www.fiskeridir.no/English

	Norwegian Seafood Council, data not publicly available
Retail and other distribution of food	Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.
Restaurants and food services sector	Statistics Norway, 2021. Table 07355: Waste from service industries, by section (SIC2007) and material (tonnes) 2008 – 2020. Available here: https://www.ssb.no/en/statbank/table/07355 Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.
Household	Statistics Norway, 2021. Table 13136: Household waste, by material, treatment and downstream system (M) 2015 – 2020. Available here: https://www.ssb.no/en/statbank/table/13136 Stensgård, A., Prestrud, K., Callewaert, P., & Booto, G. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet.

7 Appendix 1: Reporting food waste

Eurostat has developed an Excel questionnaire for reporting data on food waste, which also includes a Quality Report. The sheet has seven tabs in total. The tabs called Table 1 and Table 2 are for reporting food waste and voluntary measurements of waste, and the Quality Report tab, which is for describing the methods used to calculate food waste, notes on confidentiality, and references.

The others are Cover, Basic instructions, Footnotes list, and Validation Rules, and will not be discussed further.

7.1 Table 1

Table 1 of the reporting questionnaire (see Figure 1) is where data on food waste for each stage of the food chain should be reported.

In Figure 1, the white column is for total food waste (mandatory), the light blue columns are for voluntary reporting of edible food waste and food drained as or with wastewaters. The light orange columns are for footnotes.

Figure 1. Table 1 of the reporting questionnaire: Data on food waste amounts.

TABLE 1: Data on food waste amounts Unit: tonnes of fresh mass												
Country:												
Reference year:	**2019**											
Stage of the food supply chain	Total food waste according to Article 1 of *2019/1597**											
	Total food waste**	Standard footnote	Confidentiality footnote	Explanatory footnote	Of which: edible food waste***	Standard footnote	Confidentiality footnote	Explanatory footnote	Food drained as or with wastewaters	Standard footnote	Confidentiality footnote	Explanatory footnote
Primary production												
Processing and manufacturing												
Retail and other distribution of food												
Restaurants and food services												
Households												
Total												

Cell shading:

White: Data provision is mandatory.
Light blue (cyan): Data provision is voluntary.
Light orange: footnotes (only to be filled-in when relevant)
Light grey: The calculation of data is automatic and cannot be edited.

The reporting unit is **tonnes of fresh mass**. If data is not available, leave the field blank. In case of real zero (no waste), use 0.

Total food waste (white column): Must include edible and inedible parts and exclude food drained as or with wastewater. The reporting unit is tonnes of fresh mass; therefore, food waste must include in the number an estimate of the water content when it was in the status of food fresh mass.[14]

Of which, edible food waste (first light blue column): Contains waste belonging to edible parts of food. In practice, this is the amount of food waste after the exclusion of inedible parts from edible parts of food.

Data on food drained as or with wastewater: Data on food that has been discarded through the sink.

There are two "standard" footnotes (column D): **E for estimate** or **D for definition differs**.

E is used if Annex IV methods are used to estimate food waste.

D is used if the amounts reported include or exclude other codes or categories that are not included in the scope of the reporting. In this case, an **Explanatory footnote** must be entered in the appropriate cell of the table. The footnote must be a number and their associated notes written in the tab Footnotes list of the Excel sheet. In this report, footnotes will be written under the table in question. A detailed explanation must accompany the Explanatory footnote in Section 7 of the Quality Report in the excel sheet. In this report, this explanation will appear in the Quality Report section.

The **confidentiality footnote** is for reporting of confidential data and can only be used when there are less than 3 statistical units and data are not publicly available anywhere else. If confidentiality is claimed, this must also be reported in section 8 of the Quality Report.

7.2 Table 2

Table 2 (Figure 2) is for voluntary reporting of reused food (food donation and other redistribution for human consumption), food provided to feed businesses for transformation into feed, and former food placed on the market as feed by operators that are registered both as food and feed businesses.

The reporting unit is **tonnes of fresh mass**. If data is not available, leave the field blank. In case of real zero (no waste), use 0.

As in Figure 1, light blue columns are for voluntary reporting of data and light orange columns are for footnotes.

The guidance on footnotes is the same as before.

[14] See page 16 of the guidance for suggested method, available here: https://ec.europa.eu/eurostat/documents/342366/351811/Guidance+on+food+waste+reporting/5581b0a2-b09e-adc0-4e0a-b20062dfe564

Figure 2. Table 2 of the reporting questionnaire: Data on food management of food surplus related to food waste prevention.

TABLE 2: Data on management of food surplus related to food waste prevention Unit: tonnes of fresh mass														
Country:														
Reference year:	**2019**													
Stage of the food supply chain	Reuse: food donation and other redistribution for human consumption	Standard footnote	Confidentiality footnote	Explanatory footnote	Food provided to feed business operators for transformation into feed*	Standard footnote	Confidentiality footnote	Explanatory footnote	Former food placed as feed on the market by operators registered simultaneously as food and feed business**	Standard footnote	Confidentiality footnote	Explanatory footnote		
Primary production														
Processing and manufacturing														
Retail and other distribution of food														
Restaurants and food services														
Households														
Total														

Cell shading:

Light blue (cyan): Data provision is voluntary.
Light orange: footnotes (only to be filled-in when relevant)
Light grey: The calculation of data is automatic and cannot be edited.

7.3 Quality Report

Measurements on food waste must be accompanied by a Quality Report. The objectives of the Quality Report are to (2019/2000/EC):

- evaluate the methods used for measuring food waste
- evaluate the quality of the data reported
- evaluate the quality of the data collection process
- give reasons for significant changes in reported data between reporting years

Sections 1 and 2 of the Quality Report describe the objectives of the Quality Report (above) and general information about the submission.

Section 3 (Figure 3) is for indicating if data was collected using Annex III or Annex IV methods. If Annex IV is used for any stage of the food chain, this must also be indicated in Table 1 with an **E (estimate) footnote** in column D (Standard footnote) for the applicable stage of the food chain to clarify that no in-depth measurement for that stage of the food chain took place that year.

For the reference year 2020, in-depth measurements must be provided for all stages of the food chain.

If measurements using Annex III methods are not sufficiently representative, data can be refined with estimates from the Annex IV methods.

Figure 3. Section 3 of the Quality Report: Indicate if data was collected using Annex III or Annex IV methods.

3. General information on data collection		Top
Please indicate the methodology used to measure the amount of food waste generated in the given reporting year, for each stage of the food supply chain (mark with a cross the relevant cells to indicate if the data is collected using the methodology set out in Annex III or in Annex IV to Delegated Decision (EU) 2019/1597).		
Stage of the food supply chain	**Data collected using the methodology set out in Annex III to Delegated Decision (EU) 2019/1597**	**Data collected using the methodology set out in Annex IV to Delegated Decision (EU) 2019/1597**
Primary production		
Processing and manufacturing		
Retail and other distribution of food		
Restaurants and food services		
Households		

7.3.1 Annex III methods (in-depth reporting)

Sections 4 and 5 of the Quality Report are devoted to the collection and compilation of mandatory data on using Annex III methods.

Figure 4. Section 4.1 of the Quality Report: Describe the types of data sources used to measure food waste using Annex III methods.

4. Information concerning measurement using the methodology set out in Annex III			Top
4.1. General description of the sources of data for measuring food waste in the framework of the methodology set out in Annex III to Delegated Decision (EU) 2019/1597			
Please indicate the sources of data on food waste amounts for each stage of the food supply chain (mark with a cross all the relevant cells).			
Stage of the food supply chain	**On the basis of the data collected for the purposes of Regulation 2150/2002/EC of the European Parliament and of the Council***	**On the basis of a dedicated study (examples: scientific study, consultancy report)**	**Other sources or combination of different sources (please specify in point 4.2) (examples: administrative reporting, voluntary commitments of the industrial sector)**
Primary production			
Processing and manufacturing			
Retail and other distribution of food			
Restaurants and food services			
Households			
** Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25 November 2002 on waste statistics (OJ L 332, 9.12.2002, p. 1).*			

Section 4.1 (see Figure 4) of the Quality Report is for listing the types of **data sources** used to measure food waste. There are three options here:

- based on data collected for EU waste statistics[15]
- data collected for a specific study
- other sources or a combination of sources.

All applicable options should be crossed for each stage of the food chain.

[15] Annex I and Annex II of Delegated Decision 2019/1597/EC provide guidance on identifying waste codes that fall under this definition (available here: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019D1597). Regulation 2150/2002/EC on waste statistics here: EUR-Lex - 32002R2150 - EN - EUR-Lex (europa.eu).

Section 4.2 of the Quality Report (see Figure 5) is for describing in detail the methods used to calculate food waste measurements.

Figure 5. Section 4.2 of the Quality Report: Detailed description of methods used to measure food waste using Annex III methodology.

4.2. Detailed description of the methods for measuring food waste within the framework of the methodology set out in Annex III to Delegated Decision (EU) 2019/1597					
For each stage of the food supply chain, please describe the methods for measuring food waste amounts, by reference to Annex III to Delegated Decision (EU) 2019/1597.					
Stage of the food supply chain	**Short description of the methods used (including methods used to measure amounts of food waste in mixed waste, where relevant)**	**Entities providing data on food waste [e.g. farmers, food companies (Food Business Operators), waste operators, municipalities, households]**	**In case of sampling and/or scaling please provide information about the size and selection of the sample and describe the methods of scaling**	**Description of the main issues affecting the accuracy of the data, including errors**	**Description of the data validation process, including possible sources of uncertainty and their likely impact on the results reported(examples: administrative reporting, voluntary commitments of the industrial sector)**
Primary production					
Processing and manufacturing					
Retail and other distribution of food					
Restaurants and food services					
Households					

Several methods of analysis may have been used for each subsector of a stage; insert new lines as necessary and describe each method separately.

Short description… (first column to be filled out): Write a summary of the methodology, providing titles and links to specific studies or reports if relevant. Include seasonal adjustments or impacts if relevant.

Entities… (second column): Specify the type of entities from which the information on food waste has been collected. Also include how these sources have been identified and selected, e.g., business register, data from associations, etc.

Sampling/scaling… (third column): In case of scaling and/or sampling, describe the approach. Include number of entities in sample and their share of the statistical population, and the sampling method, e.g., stratified sampling. Also include multiplication or weighting factor used to estimate totals.

Main issues… (fourth column): Describe main challenges and quality deterioration factors related to the method applied. Assess the overall accuracy and reliability of the measurements, describe in more detail the main quality issues including sampling errors, coverage errors, measurement errors, non-response errors, and processing errors. For definitions and descriptions, consult the ESS Handbook for Quality Reports.[16]

[16] Available here: KS-GQ-15-003-EN-N.pdf (europa.eu)

Data validation… (final column): Give an overview of the validation process undertaken to ensure high data quality. Include results of the validation regarding sources of uncertainty and their likely impact on food waste totals.

7.4 Annex IV methods (annual reporting)

Section 5 of the Quality Report is for recording information on Annex IV methods (see Figure 6) for any stages of the food chain where they have been used (indicated in Section 3 of the Quality Report).

Figure 6. Section 5 of the Quality Report: Information about measurements using Annex IV methods.

5. Information concerning measurement using the methodology set out in Annex IV to Delegated Decision (EU) 2019/1597 Top							
Please provide information for each stage of the food supply chain, for which calculations have been made in the reporting year							
Stage of the food supply chain	Data on food waste amounts used as a basis for the calculations		Socio-economic data used for the calculations				Description of the methods used for the calculations
	Value [t]	Year	Type of data (e.g. population, food production)*	Value*	Year*	Source*	
Primary production							
Processing and manufacturing							
Retail and other distribution of food							
Restaurants and food services							
Households							

Annex IV defines two types of methods:

a. Estimation using available data of food waste from Annex III methods from previous years that are adjusted with official production statistics
b. Estimation using available data of food waste from Annex III methods from previous years that are adjusted with socioeconomic indicators

Data on food waste amounts… (first and second column): With the above in mind, insert for each stage of the food chain the baseline value of food waste (Annex III) and the year the data are from, respectively. In practical terms, these will come from a previous year's Table 1 report (importantly, where the footnote E for Estimate has not been used, which indicates Annex IV methods were used). Add rows as needed if several data sources have been used.

Socio-economic data… (columns three to six): Describe the types of data used to calculate estimates of food waste, the values used, the year, and data source.

Description of methods… (final column): In-depth description of the methodology used to calculate food waste.

7.4.1 Voluntary reporting in tables 1 and 2

Section 6 of the Quality Report relates to the voluntary reporting in both Table 1 and 2 (see Figure 7).

Describe separately for each dataset:

- The name of the dataset, i.e.:
  - A. Edible food waste (table 1)
  - B. Food drained as or with wastewaters (table 1)
  - C. Reuse, e.g., food donation
  - D. Food no longer intended for human consumption
  - E. Former foodstuffs
- Stage of the food supply chain, including breakdowns in the chain, e.g., agriculture and seafood in primary production
- A concise description of the data collection method and compilation/estimation, specify the data sources, the entities providing the data, assess the overall accuracy of the data, and indicate main issues that may affect data accuracy
- A link to the data source if applicable

Figure 7. Section 6 of the Quality Report: Voluntary reporting in tables 1 and 2.

6. Voluntary reporting			Top
Please provide information for each set of voluntarily reported data.			
Name of dataset (referred to in points (a) to (e) of Article 3 of Delegated Decision (EU) 2019/1597)	**Stage of the food supply chain**	**Short description of the data collection method**	**Source - link to the reference document (if applicable)**
Add rows as appropriate.			

7.4.2 Methodological changes and problems

Section 7 of the Quality Report relates to methodological changes (see Figure 8).

In section 7.1, describe, separately for each stage of the food supply chain, any significant methodological changes in the calculation methods for the reference year, if any.

If the reported food waste varies by more than 20% from one reference year to the next, explain in section 7.2 which sectors caused the differences and what the underlying explanations are. Clarify if the measurements result from Annex III or Annex IV methods, and if methodological changes may have contributed to the change in food waste measurements. The focus is on the mandatory reporting, but voluntary reporting can also be commented on here. Specify which cells, tables, food supply chain stage, column heading the comments refer to.

Section 7.3 is to allow for a free-text description of methodological problems, if any.

Figure 8. Section 7 of the Quality Report: Methodological changes and problems notifications.

7. Methodological changes and problems notifications	Top
7.1. Description of methodological changes (if applicable)	
Please describe significant methodological changes in the calculation method for the reporting year, if any (please include in particular retrospective revisions, their nature and whether break-flags are required for specific reporting years). Please describe separately for each stage of the food supply chain and provide the precise location of the respective cell(s) (table name, stage of the food supply chain, column heading).	
Add rows as appropriate.	

7.2. Explanation of tonnage difference (if applicable)		
Please explain the causes of the tonnage difference (which stages of the food supply chain, sectors or estimates have caused the difference, and what the underlying cause is) where the variation is greater than 20 % compared to the data submitted for the previous reporting year.		
Stage of the food supply chain	**Variation (%)**	**Main reason for the difference**
Add rows as appropriate.		

7.3. Notification of problems (if any)
In case, you have experienced problems with the attribution of food waste to a given stage of the food supply chain please provide a description of the problems. For every specific problem, please provide the precise location of the respective cell(s) (table name, stage of the food supply chain, column heading).

7.4.3 Confidentiality

Section 8 of the Quality Report relates to confidential data (see Figure 9).

Eurostat only expects data from very small countries to be confidential (three or fewer statistical units). Tables 1 and 2 have two standard footnotes, one of which is C, confidential. Section 8 is to elaborate on this. Include stage and column where C has been indicated and explain the reasoning and argument for making the data confidential.

Figure 9. Section 8 of the Quality Report: Confidentiality.

8. Confidentiality	Top
Please provide a justification to withhold the publication of specific parts of this report, if necessary. For every specific case, please provide the precise location of the respective cell(s) (table name, stage of food supply chain, column heading)	

7.4.4 References

Section 9 of the Quality Report is for references (see Figure 10).

Provide links to main national websites, reference documents and publications used in the collection of data on food waste amounts. Add as many rows as necessary.

Figure 10. Section 9 of the Quality Report: References.

9. Main national websites, reference documents and publications	Top
Please provide links to main national websites, reference documents and publications used in the collection of data on food waste amounts.	
Stage of the food supply chain	**References**

Add rows as appropriate.

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