

Food Waste in Norway: Report on Key Figures 2015-2019



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Summary

About the report

In June 2017, the Norwegian government and the entire food industry signed a sector agreement on food waste reduction. The purpose of the agreement is to halve food waste in Norway by 2030, in line with the UN Sustainable Development Goal 12.3; the target will be achieved by a 15% reduction in 2020 and a 30% reduction in 2025, where 2015 represents the baseline. The parties to the agreement are obliged to report on developments in amounts and composition of food waste. The figures and trends for the food industry are documented in this report.

Trends in food waste

From 2015 to 2019, food waste by retailers, wholesalers and producers (excluding the seafood industry) was reduced by 16 400 tons, which corresponds to a reduction of 4.2 kg per capita or 12% (Figure 1). This comes in addition to the reduction of 14% achieved by the industry from 2010 to 2015 in the ForMat Project. The fact that the food industry reduced food waste by 12% from 2015 to 2019 indicates that the industry is on track to reach the first interim target in the sector agreement of a 15% reduction by the year 2020.

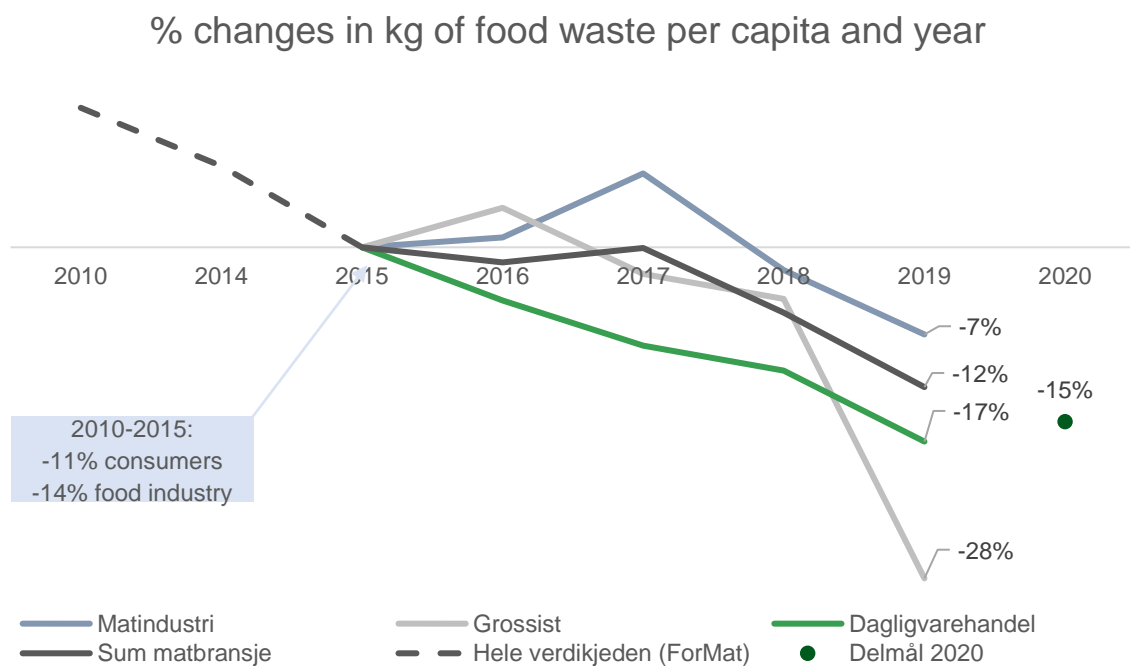


Figure 1 Percentage changes in kg of food waste per capita and year by stage in the value chain

Greenhouse gas emissions and financial losses associated with food waste in the industry were also reduced during the same period, both by 14%. This figure is somewhat higher than the reduction in the amount of food waste, since waste has been reduced for relatively environmentally unfriendly and expensive product groups.

At the production stage, the reduction is related to improved forecasting and cooperation across the value chain, as well as production planning and internal procedures. Further important measures at the production and wholesale stages have been the use of alternative sales channels and the donation of food that cannot be sold at normal prices. In addition to reducing food waste, the donation of surplus food also provides disadvantaged people with affordable food.

The decline in waste at the retail stage is largely linked to systematic price reductions for goods with a short shelf life. This has primarily been aimed at product groups with a relatively high cost and carbon footprint, which in turn has led to a reduction in the carbon footprint and financial loss from retail food waste of 26% and 20%, respectively. Retailers will continue to focus on price reductions in the future as this is assumed to have great potential in combination with improved ordering procedures and forecasting tools. It should be noted that trends in food waste are closely linked to trends in amounts of food produced, distributed and sold. At the production stage, for example, the amount of food produced has increased while the amount of food discarded has decreased. This reveals a problem related to the target figures in the sector agreement, since “kg per capita” is not a true measurement of resource efficiency for a number of parts of the value chain, with the exception of households.

Total amounts of food waste in 2019

Including all the actors in the value chain studied¹, we have calculated that at least 417 000 tons of edible food were discarded in Norway in 2019² (Figure 0-1). This corresponds to about 78 kg per capita per year, a financial loss of 20.7 billion NOK and 1.26 million CO₂ equivalents annually.

¹ Food waste has also been mapped for households (except for waste discarded via drains) (Syversen et al. 2018), and for hotels, restaurants, employee cafeterias, the public sector and convenience stores (Callewaert et al. 2020). Note that the figure for households is from 2016, and more recent trends at this stage of the value chain are unknown at present.

² The actors in the value chain included in the survey were food producers (except for the seafood industry, which SINTEF has presented in a separate report), wholesalers, retailers, hotels, restaurants, employee cafeterias, the public sector and convenience stores, in addition to households (except for food discarded via drains).

Note that although food waste in this year’s report may appear to have increased or decreased in some parts of the value chain compared to previous publications, these are not real changes. This year’s report cannot be directly compared with previous reports. This is partly because new sectors have been included (restaurants and the public sector) and methodology has improved somewhat, and partly because companies that report food waste data have increased more than fivefold since the end of the ForMat project. This is a very positive development that improves the data base further and enhances the quality of national food waste calculations; it is a direct effect of the declaration of affiliation and the sector agreement.

≈ 417 000 tons of food waste in Norway

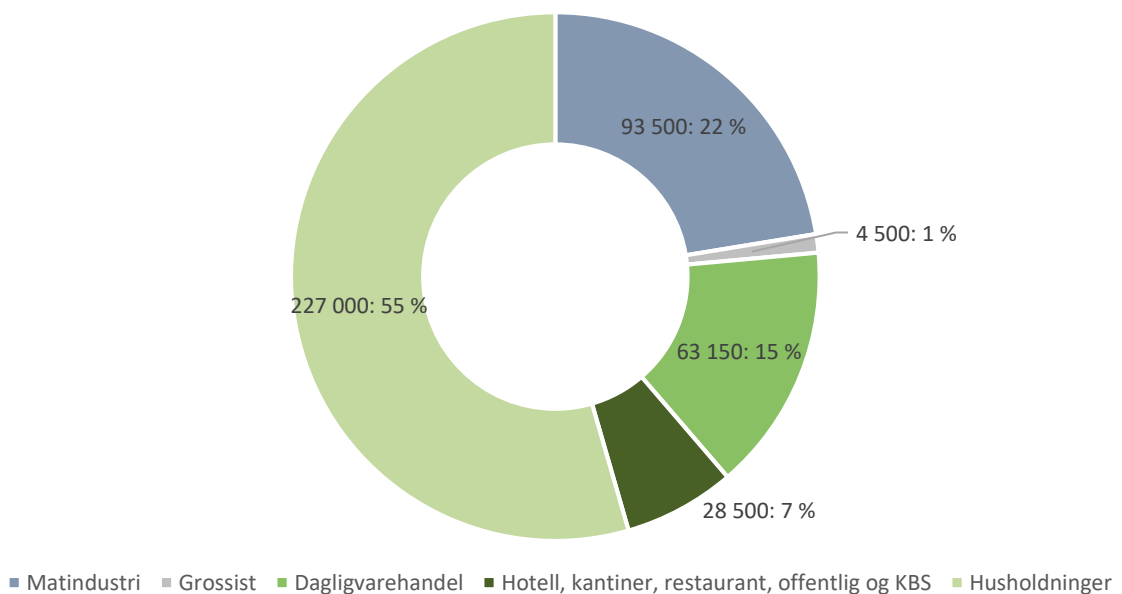


Figure 0-1 Estimated total amounts of food waste in Norway in 2019 by actor in the value chain

Households account for about half of food waste (55%³), followed by producers (22%), retailers (15%), hotels and catering (7%), and wholesalers (1%). Note that actual food waste levels from households and producers are higher, since liquid food discarded via

³ Based on calculations for 2016

drains is not included for households, unlike all the other parts of the value chain, and because the seafood industry has not been included in this report.

At the household stage, leftovers from meals and baked goods predominate in the food waste figures, while wholesalers waste most fresh fruit and vegetables. At the retail stage, fresh baked goods and fresh fruit and vegetables are the most important groups, while food waste is more evenly distributed between product groups in the production stage, but here beverages, meat and fruit and vegetables are among the largest groups.

Consumer Surveys

The food industry also has a key responsibility for reducing food waste that occurs in the homes of consumers; for this reason, NORSUS (previously called Ostfold Research) conducts annual consumer surveys on behalf of Matvett to learn more about the factors affecting food waste habits in Norwegian households.

The 2020 consumer survey shows relatively small changes from previous years in the number of product groups discarded. The proportion of respondents who reported having thrown away pan leftovers from the fridge and fresh vegetables in the past week increased in 2019, while for fresh fruit, pan leftovers directly from meals and fresh baked goods, the figures were slightly down on last year. The average for the remaining groups has remained stable at around 11% since 2015. The main reason for food waste is that food is left in the fridge or cupboards, which indicates a continued challenge in knowing what food there is in the house before buying new food.

The consumer surveys show that available time is a more important reason than income to reduce food waste in households. We also see that the under 40s throw away the most food, while people over 65 discard by far the least. Generally, a high proportion state that they know how to store food. However, more information is needed on what kinds of food can be eaten if part of the food is mouldy or damaged, especially among younger respondents.

Consumers stated that the measures that had reduced waste in their household were extra information on date labels, increased shelf life, good opening and closing mechanisms on packaging and information about a product's shelf life and storage after it has been opened. These are also high-priority measures for both producers and retailers.

Future prospects

Although the food industry as a whole is well placed to reach the first interim target in the sector agreement (-15% by 2020), the report also shows that the industry must work in an intensive and goal-oriented manner to meet the targets in the agreement, as these intensify from a 15% reduction in 2020 to a 30% reduction in 2025 and a 50% reduction in 2030.

In order to reach the interim targets in the sector agreement, food waste efforts must focus on the large-volume product groups across the value chain, namely fruit and vegetables and bread/baked goods, since the key figure in the agreement is kg of food waste per capita. The causes of food waste in the industry as a whole reveal a need for increased collaboration and information sharing between companies and across the value chain in order to improve product flow and forecasting accuracy. This work is already well underway and will be a future focus area as it is expected to significantly reduce food waste in the entire value chain.

Other areas to focus on in the future are changes in quality requirements, involving e.g. shape, design and colour, particularly of fresh products, and improved opportunities for alternative utilisation of items with reduced quality or shelf life. In addition, the food industry must work actively to increase consumer acceptance of foods that are currently considered to be unsaleable.

The analysis also shows that trends in the amount of food waste in one part of the value chain are often closely linked to measures or changes in other parts of the chain. For example, waste of fresh meat by producers has increased, which is primarily due to production challenges related to the emergence of chain- or profile-specific products that make it difficult to maintain regular production of all products. This shows the need for increased collaboration across the value chain, which has been a strong focus area in the food industry in recent years.

There is little to suggest that consumer food waste is on the decrease. This indicates that the food industry, in collaboration with the government, has important work ahead to reduce food waste by consumers, in addition to reducing their own food waste. This responsibility cannot merely be left to consumers themselves.

The food industry should continue to focus on measures such as correct date labelling including additional information, better packaging (such as improved opening/closing mechanisms) to increase shelf life and information on storage and uses of its products. A further important point is to determine how the industry can facilitate easier planning of purchases coupled with better consumer knowledge of the contents of their fridges and

food cupboards. In addition, the industry should develop measures to alleviate consumers' time pressure, which leads to significant food waste. In cooperation with the government, the food industry must also continue to provide financing for food banks to ensure that surplus food is redistributed to disadvantaged people in society.

The government should focus on enhancing knowledge of food waste in schools and kindergartens, since children and young people appear to have poor knowledge about food. A greater focus on the quality of raw materials, on using different senses and on how to keep and store food in food and health classes at lower levels and in food science education at higher levels can help to reduce food discard by future generations. This and other measures aimed at changing attitudes and behaviour will probably be the most important government actions to achieve the goal of halving food waste by the year 2030.

In addition, the government should ensure the continuation of food waste efforts in the public sector, which were started in the research project "KuttMatsvinn2020". This project, which has now been completed, established methodology and national statistics for food waste in nursing homes, kindergartens and after-school programmes. This work should be further developed and included in the annual survey of food waste. Finally, the government must also ensure stable and adequate funding for food banks.

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1 Introduction

1.1 Food Waste Efforts in Norway

Work on mapping food waste in Norway started with the ForMat project (2010-2015), a collaborative effort that covered large parts of the value chain of the Norwegian food and beverage sector. The aim of the project was a 25% reduction in food waste in Norway by the end of 2015, compared with 2010.

The final project report showed that food waste in the production, wholesale, retail and consumer stages of the value chain was reduced by 12%, measured in kg per capita, from 2010 to 2015. Greenhouse gas emissions associated with food waste fell by 3%, while costs associated with food waste increased by 1.5% (financial losses related to discarded food).

The ForMat project also developed a common methodological basis for measuring food waste in the four stages of the value chain. This methodology, together with the results of the survey, forms the basis for future mapping of food waste throughout the value chain by the parties involved in the sector agreement on food waste, and has been summarised in the final report (<https://www.matvett.no/uploads/documents/ForMat-rapport-2016.-Sluttrapport.pdf>).

The present report provides information on quantities, environmental impacts and costs associated with food waste by producers, retailers and wholesalers, as well as consumer studies on causes and attitudes related to household food waste. This is the fourth report in the series and it includes a section on the catering sector based on the three-year research project "KuttMatsvinn2020 Forskning".

Note that this year's report includes an updated basis for data and methodology, which means that previous reports are dated and cannot be compared with this year's report.

This report presents updated calculations for the entire period 2015-2019. For trends from 2010 to 2015, the final report of the ForMat project is still applicable (Stensgård & Hanssen 2016).

1.2 Sector Agreement on Food Waste

Norway has committed itself to fulfilling the UN Sustainable Development Goals, and one of these goals (12.3) is to halve food waste by retailers and consumers, measured in kg per capita, and reduce waste in production and the supply chain by 2030.

In June 2017, the Norwegian government and the entire food industry signed a sector agreement on reducing food waste. The purpose of the agreement is to halve food waste in Norway by 2030, in line with the UN Sustainable Development Goal 12.3. The sector agreement states that the halving of food waste is to be achieved through a 15% reduction in 2020 and a 30% reduction in 2025, and that all sectors must cut their food waste by half, unlike the UN Sustainable Development Goals, which only include retailers and consumers in this target. The year 2015 represents the baseline in the sector agreement. The parties to the agreement from the food industry are also committed to quantifying the extent and composition of their food waste and reporting on this annually.

As a supplement to the sector agreement, 103 companies in the seafood industry and among food producers, retailers and caterers have signed a declaration of affiliation whereby they agree to the goals of the agreement and commit themselves to mapping and reporting their food waste and working to implement anti-waste measures internally and in networks with others.

As a result of this declaration and the sector agreement, the number of companies sharing waste data has increased more than fivefold since the end of the ForMat project. The following link provides further information on the companies involved: <https://www.matvett.no/bransje/aktuelt/bedriftene-slutter-opp-om-bransjeavtalen>

This report presents an overall view of total food waste, trends for the food waste surveyed in Norway and detailed results and trends for food producers, retailers and wholesalers, as well as preliminary key figures for the hotel and catering sector (including hotels, restaurants, employee cafeterias, the public sector and convenience stores). The report also includes the latest results from consumer surveys of Norwegians' attitudes and behaviour related to food waste.

The report serves as a status report to the sector agreement on food waste reduction on behalf of the owners of Matvett.

2 Methodology and Data Basis

This section summarises the key aspects of the methodology and data basis for this report and explains the differences between this year's food waste report and previous reports.

2.1 Definition

The definition of food waste in the sector agreement formed the basis for the food waste survey and is similar to the definition used in the ForMat project:

“Food waste is defined as all useful parts of food produced for humans which are either discarded or removed from the food chain for other purposes than human food, from the time of slaughter or harvesting.”

This definition thus includes only the wastage of edible parts of food (not inedible parts such as bones, pits, shells, etc.). Although animal feed is considered as food waste, the parties should make optimal use of food waste, and using it to feed animals is therefore preferable to e.g. incineration.

2.2 Data Collection

The basis for the survey of food waste in the food industry is the reporting of data on sales and waste by product group and cause by a selection of companies in the different stages of the value chain. See Appendix 1 for the product groups and the items included in each group. The companies involved are primarily companies in the ForMat project and those that have signed the declaration of affiliation.

Table 2-1 shows the numbers of companies and municipalities (public sector) that provided food waste data in 2019 and their share of the sector they represent. For municipalities, their share is calculated on the basis of the number of nursing home places, kindergarten places or pupils in after-school programmes they represent.

Table 2-1 Numbers of companies/municipalities providing food waste data for 2019 and their share of the sector

Part of value chain	Number of municipalities or companies providing food waste data for 2019	Percentage of the sector in Norway
Producers	47 companies	46%
Wholesalers	5 companies	65%
Retailers	5 retail chains	100%
Hotels	44 hotels	47%
Employee cafeterias	598 cafeterias	36%
Restaurants	59 restaurants	2%
Convenience stores	3 chains	50%
Nursing homes	6 municipalities	7.6%
Kindergartens	3 municipalities	0.7%
After-school programmes	2 municipalities	3%

This table shows that data representativity varies considerably between the various actors in the value chain; retailers, wholesalers, convenience stores, hotels and producers are relatively well represented, while representativity is poor for the public sector and restaurants. This means that the results for restaurants and municipalities are very unreliable.

The data have been scaled up to national figures based on the market share of the companies reporting, and have been adjusted for the edible portion according to data from the food composition table at matportalen.no.

To supplement the statistics, results for households (for the year 2016) and the catering industry are also shown, based on results from the report “Nasjonal beregning av mengde matsvinn på forbrukerleddet” (Calculations of Consumer Food Waste at the National Level) (Syversen et al. 2018) and the research project KuttMatsvinn2020 (Callewaert et al. 2020).

2.2.1 The Production Stage

The basis for the survey of food waste by producers is the reporting of data on waste and amounts of food produced (in tons) by product group by a selection of companies. The companies have also reported on data quality, how food waste is used (animal feed, biogas or incineration), measures implemented, and how much food waste they have reduced by selling food at low prices, donating food, etc.

The 47 companies represent a broad selection of production facilities and cover about 46% of the total sales of Norwegian food producers (with the exception of the fishing industry). The sample is considered to be representative of several product groups in economic terms.

Note that the fishing industry is not included in this report, as food waste from the seafood sector is being studied in a separate project run by the research organisation SINTEF on behalf of the Norwegian Seafood Federation (Carvajal et al. 2020). (link: <https://www.sintef.no/publikasjoner/publikasjon/?pubid=1820857>)

Of the 47 companies that have provided data, two have stated that they have not reported total food waste figures, since they have not established good methods for measuring/recording parts of food waste (such as food falling onto the floor during production). The missing data applies to beverages and frozen vegetables/fruit/berries. The companies are working to establish statistics for the missing food waste, and hopefully these will be in place for next year's reporting.

The Norwegian Directorate of Agriculture's work on food waste at the primary stage of production has clarified the distinction between the primary stage and the production stage proper. This new and clearer definition of these links in the value chain has meant that amounts of food waste by producers have been revised for a few product groups. This applies to meat products and fruit/vegetables.

The signing of the sector agreement in June 2017 and the declaration of affiliation, which is signed on an ongoing basis, have led to an increase in the number of producers providing food waste data, from 15 companies in 2016 to 24 in 2017, 31 in 2018 and 47 in 2019. Although some of the new companies have been able to provide historical data, the increase in the sample means that the data basis is not directly comparable between years. This discrepancy is further reinforced by the fact that some of the companies that have shared data since 2010 have improved their data basis by introducing new and better measurement procedures and including a larger share of their business in the reporting. This means that the old time series for these companies can no longer be compared to the surveys in more recent years.

To ensure a comparable and maximally representative time series, for all new companies entering the data base after 2015, their production and waste volumes in their first reporting year are used for the previous years without waste data. This means that if Company A started reporting its food waste in 2017, it will be given the same waste percentage in 2015 and 2016 as it had in 2017. In this way, there will be no changes in waste for companies before they can provide real figures, and they thus have fewer years to achieve a 50% reduction in their food waste. The same applies to companies that do not have comparable data because they have changed their data base or methodology.

This means that the time series will each year be corrected backwards in time, and the annual food waste reports will therefore not be comparable. The most recent report will thus always contain the best food waste data.

For food producers, the annual production volumes of each product group are from Statistics Norway's Table 10455 "Solgt produksjon av varer for store foretak i industri, etter 8-sifret Prodcomkode" (Sold Production of Goods for Large Industrial Companies, by 8-digit Prodcom Code), and include confidential data as a basis for scaling up. Note that the production statistics from Statistics Norway in terms of amounts of waste are of varying quality; therefore, to correct for missing data and sources of error, the costs for each product group and year (NOK per kg) were calculated. These were then combined with production statistics expressed as sales value in order to calculate annual production. When calculating tonnage of food waste from Norwegian producers, the percentage of waste for the various product groups was multiplied with the production volume from Statistics Norway.

In the case of product groups that are not represented by any of the companies in the sample, tons of food waste are calculated by multiplying the weighted average of the percentage of food waste for all product groups in a particular year (in total) by the total quantity produced in these groups. In this report, these product groups are referred to as "others".

2.2.2 The Wholesale and Retail Stages

The basis for the survey of food waste by wholesalers and retailers is the reporting of data on waste and sales (in NOK) by product group and cause by a selection of companies in these two stages of the value chain. The reason why the data basis for these two stages is in economic terms is that the recording of waste is part of the financial management system of wholesalers and retailers.

The alternative to financial food waste data is data from refuse collectors, i.e. the weight of food waste occurring in stores. Such data are very unreliable as packaging or other types of waste can end up in the sorted waste, and large volumes of bread and baked goods are not removed by refuse collectors. Further, some parts of the country have inadequate solutions for food waste management. Therefore, amounts of food waste removed by refuse collectors do not always correspond to the actual amount of food thrown away. In addition, refuse collectors cannot distinguish which foods have been discarded, so the data they provide will give little insight into the composition of the food waste and the reasons why it occurs. Due to the degree of detail and the quality of the financial data on food waste, these are used rather than quantities of waste from refuse collectors.

At the same time, methods of recording data are constantly evolving, and one of the retail chains now also reports food waste in kilograms. To achieve this, it has linked the weight of the products to the system of recording waste in financial terms, so that the kilograms of food discarded are recorded in detail. This provides a more accurate calculation of the quantity of food waste and is a positive trend. A long-term goal is for all chains to report quantities of food waste, so that these can also be included in the reporting.

The companies included have been scaled up to the national level on the basis of their market share for each year during the period, based on A C Nielsen's annual retail statistics (Nielsen 2020).

2.2.3 Hotels and Catering and the Public Sector

KuttMatsvinn 2020 was implemented as two parallel projects: one sectoral project initiated by NorgesGruppen and ASKO and one research project funded by the Research Council of Norway.

The research project KuttMatsvinn2020 has identified food waste occurring in hotels, restaurants, convenience stores, employee cafeterias and the public sector. This work commenced in 2017 and was completed in 2020, but restaurants and the public sector were not included until 2018. Because of the relatively short time-span of this work, the results for these sectors are somewhat unreliable, partly due to the small sample (few companies have reported data), gaps in the data (data that were not recorded) and varying data quality (different data recording methods and understandings of definitions).

For restaurants, hotels, employee cafeterias and the public sector, data are reported in grams of food waste per meal. Data from convenience stores is reported in economic terms. Various data collection methods have been used as this is a complex sector with large variations in financial systems and ways of recording food waste.

Over 2300 participants were involved in the KuttMatsvinn2020 sectoral project, where the main focus areas were the measurement of food waste, employee competence development and the implementation of anti-waste measures. NorgesGruppen and ASKO initiated the sectoral project, which was managed by Matvett. Further information about the project can be found here: <http://www.matvett.no/bransje/kutt-matsvinn-2020>

The methodology and detailed results for the catering industry and the public sector are described in more detail in the final report of the research project (Møller et al. 2020)

2.3 Consumer Surveys

Every year, Matvett collaborates with NORSUS on surveys to determine the types of food consumers have discarded, reasons for discarding food, and their behaviour and attitudes related to planning, purchasing, meals, packaging, date stamps, etc. The studies use the Norstat web panels (electronic questionnaires), and a sample of 1000 respondents representative of Norwegian consumers. Studies have been conducted annually from 2010 to 2015 and from 2017 to 2020. Since the survey is conducted in June, consumer studies for the current year are reported, unlike the food industry part of the report which uses figures for the previous year, as the data must be collected the year before. In addition to the responses to the questionnaire itself, data are collected on age, gender, place of residence, education, social status, number of persons in the household and household income, to enable the responses to be considered in relation to various socio-demographic factors.

The questions asked in this year's survey are quite similar to those in 2019, but the questionnaire has been expanded to include questions about how the Covid-19 pandemic that affected Norway and the world in 2020 has influenced consumer food waste habits and other behaviour related to buying food, etc.

2.4 Carbon Footprint

The carbon footprint of food waste is calculated using life cycle analysis (LCA) methodology in accordance with the ISO standard 14040/44.

It is important to point out that the prevention of food waste can have a positive effect on many other environmental indicators apart from the carbon footprint (e.g. acidification, eutrophication and emissions of particulates) and on resource use (e.g. the use of land, water and fossil energy).

The calculation of the carbon footprint includes all greenhouse gases associated with the production, transport and packaging of food. Emissions associated with waste management of packaging and food waste are not included.

Greenhouse gas emissions are estimated on the basis of the amount and composition of food waste from the various stages of the value chain in Norway, and calculated by multiplying tonnages of food waste for the relevant product groups and stages by the emission factors for each product group.

2.5 Financial Loss

Financial loss associated with food waste has been calculated for the individual stages and in total for the value chain. Financial loss only includes the market value of the food discarded, not costs associated with food preparation or waste management.

For wholesalers and retailers, the calculation of financial loss is relatively simple, since waste is recorded in economic terms. Calculations in these stages were therefore made by totalling the economic value of the waste and then scaling up using the same methodology as for the calculation of tonnage (wholesalers' market share in the retail sector and retailers' market share in the retail chains).

Since data from producers, catering, the public sector and households are measured in tons, financial loss related to food waste is calculated in terms of key figures (NOK per kg) for each product group, which are then multiplied by tons of food waste calculated for the relevant part of the value chain. The key figures (NOK per kg) are net prices from retailers. This means that calculations of financial loss for these parts of the value chain are not entirely reliable.

All values have been converted to 2015 NOK values to ensure comparability between years.

3 Results of the Survey

3.1 Overall Trends

This section gives a brief summary of overall trends in amounts of food waste and associated economic loss and greenhouse gas emissions for producers, wholesalers and retailers from 2015 to 2019. For a more detailed description of developments from 2010 to 2015, see the final report of the ForMat project (Stensgård & Hanssen, 2016).

Figure 3-1 shows the percentage change in kg of food waste per capita from 2015 to 2019 in total and for each of the three stages of the value chain, compared with the first interim target of the sector agreement (a 15% reduction by 2020), together with changes from 2010 to 2015 as documented in the final report of the ForMat project. The percentage change is shown relative to the base year in the sector agreement (2015), which is set at 0%.

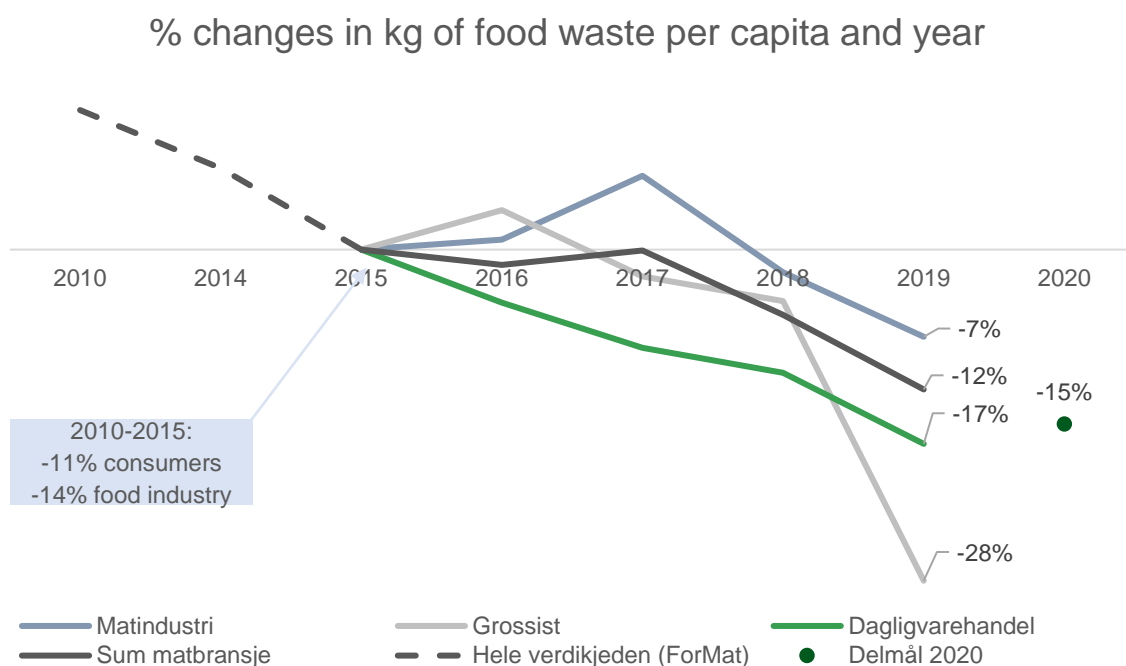


Figure 3-1 Percentage changes in kg of food waste per capita and year by stage in the value chain

The final report from the ForMat project showed that food waste in the industry as a whole was reduced by 14% from 2010 to 2015, measured in kg per capita (the broken line). Since the end of the ForMat project, food waste in the industry has been reduced by a further 12% (black line from 2015 to 2018). Note that the data for 2010-2015 are not directly comparable with the data sets for 2015-2019, due to changes in the sample and improved data.

The figure suggests that the food industry as a whole is well on its way to reaching the first interim target in the sector agreement of a 15% reduction by 2020 (indicated by a dark green dot). The retail and wholesale

sectors have already reached this goal (a 17% and 28% reduction respectively). Food producers are furthest away from the goal with a 7% reduction.

3.2 Tons of Food Waste by Stage in the Value Chain

This section gives a brief summary of the total amount of food waste for all parts of the food value chain included in the survey.

Figure 3-2 shows estimates of food waste in Norway by actor in the value chain. The figures for households are from the report “Nasjonal beregning av mengde matsvinn på forbrukerleddet” (Calculations of Consumer Food Waste at the National Level) and apply to 2016, while those for the catering sector are based on preliminary results from the research project KuttMatsvinn2020 and only include hotels, employee cafeterias, restaurants, the public sector and convenience stores.

≈ 417 000 tons of food waste in Norway

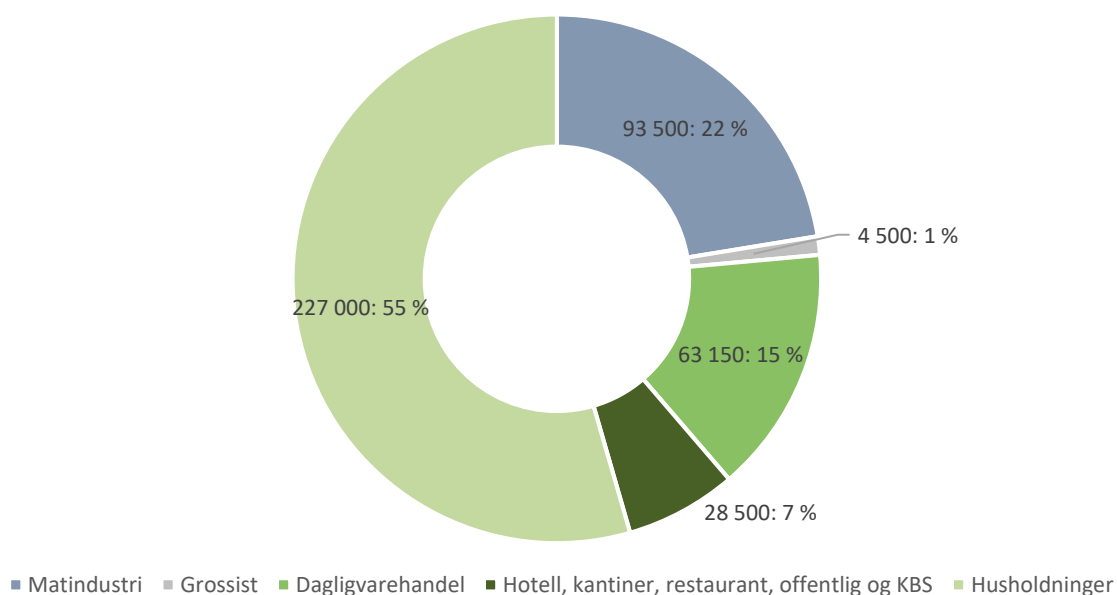


Figure 3-2 Estimated total amounts of food waste in Norway by actor in the value chain

The figure shows that the total amount of food waste in Norway is estimated at around 417 000 tons annually, corresponding to 78 kg per capita per year (this excludes food waste in the fishing industry, primary production and food discarded via household drains). Food waste represents an economic loss of NOK 20.7 billion and 1.26 million CO2 equivalents per year.

Households account for more than half of food waste (55%), followed by producers (22%), retailers (15%), hotels, employee cafeterias, restaurants, the public sector and convenience stores (estimated at 7%) and the wholesale sector (1%). Note that the figures for hotels, employee cafeterias, restaurants, the public sector and convenience stores are only a general estimate.

The observant reader will notice that estimated amounts of food waste are higher or lower in this year's report than in previous reports for some of the actors in the value chain. For example, last year's report showed that the total amount of food waste for the parts of the value chain studied amounted to 390 000 tons, which was 27 000 tons less than this year. However, this difference is not due to a real increase in food waste, but partly because restaurants and the public sector have been included and partly because of an improved data base (see the methodology section for further details).

Figure 3-3 shows changes in tons of food waste for the three stages of the value chain with comparable time series back to 2015. The percentages above the bars indicate the total tonnage of food waste for the three stages combined and the percentage change from 2015.

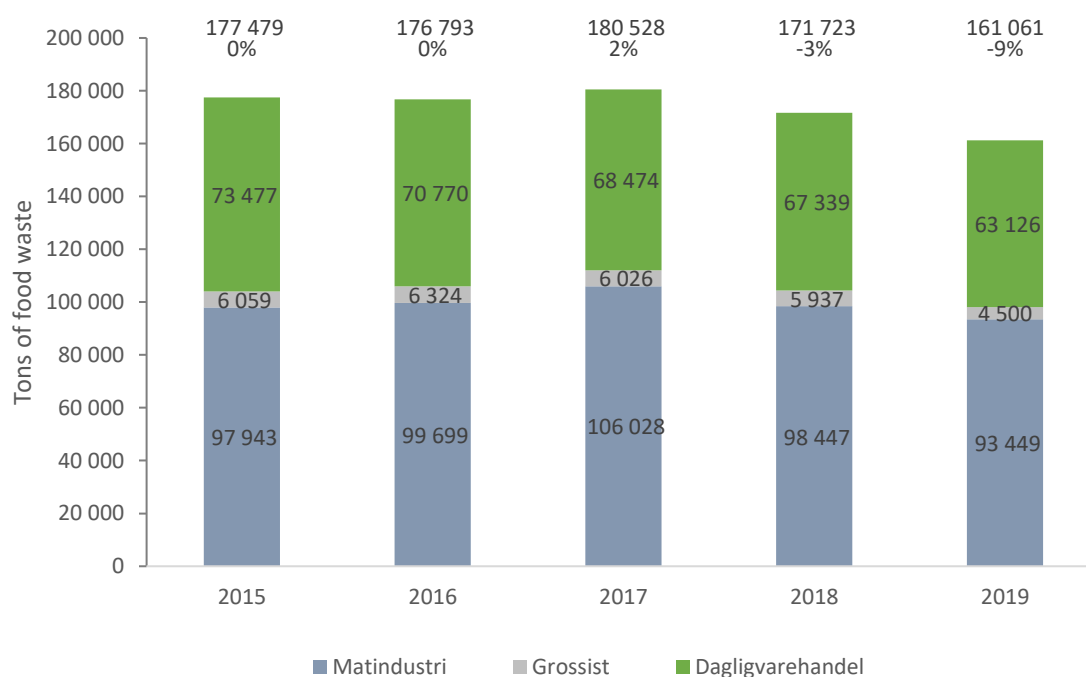


Figure 3-3 Changes in tons of food waste by stage in the value chain 2015-2019

The figure shows that the total amount of food waste in the three stages was reduced by 9% in tons from 2015 to 2019. The reduction is thus somewhat lower measured in tons than in kg per capita, due to an increase in the population from 2015 to 2019. Note that trends in food waste in tons are closely linked to trends in the amounts of food produced, distributed and sold. At the production stage, for example, the quantity of food produced has increased while food waste has decreased. This is not visible in the bar graph above.

For the different stages of the value chain, the changes in tons of food waste from 2015 to 2019 were as follows (note that these are percentage changes in tons, not in kilograms per capita):

- Producers - 5%
- Wholesalers - 26%
- Retailers - 14%

3.2.1 Financial Loss Linked to Food Waste

Figure 3-4 shows historical changes in financial loss associated with food waste in the three stages of the value chain. The percentages above the bars indicate the total financial loss (in billion NOK) for the three stages combined and the percentage change from 2015 for the year in question.

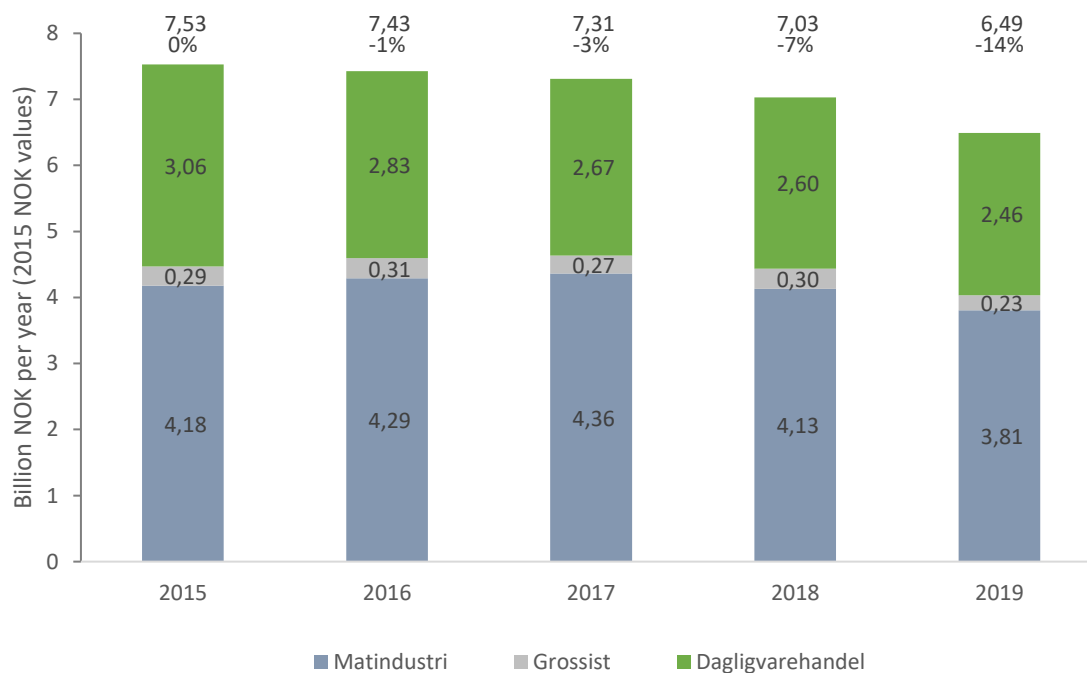


Figure 3-4 Financial loss (in billion NOK) linked to food waste by stage of the value chain from 2015 to 2019

The figure shows that financial losses associated with food waste in the three stages of the food value chain were reduced from NOK 7.53 billion in 2015 to NOK 6.49 billion in 2019. This is a reduction of NOK 1.4 billion or 14%.

For the different stages of the value chain, the changes in financial loss related to food waste from 2015 to 2019 were as follows:

- Producers - 9%
- Wholesalers - 21%
- Retailers - 20%

For producers and retailers, financial loss associated with food waste showed a greater decline than the quantity of waste; this is because food waste decreased for relatively expensive items in these stages of the value chain.

3.2.2 Greenhouse Gas Emissions Linked to Food Waste

Figure 3-5 shows historical changes in tons of CO2 equivalents linked to the production, packaging and transport of food wasted in the three stages of the value chain. The percentages above the bars indicate the total greenhouse gas emissions linked to food waste in the three stages combined and the percentage change from 2015 for the year in question.

Note that the calculations only include emissions until the product reaches the retail outlet. This means that emissions related to transport from store to home, food preparation and waste management of food and packaging are not included.

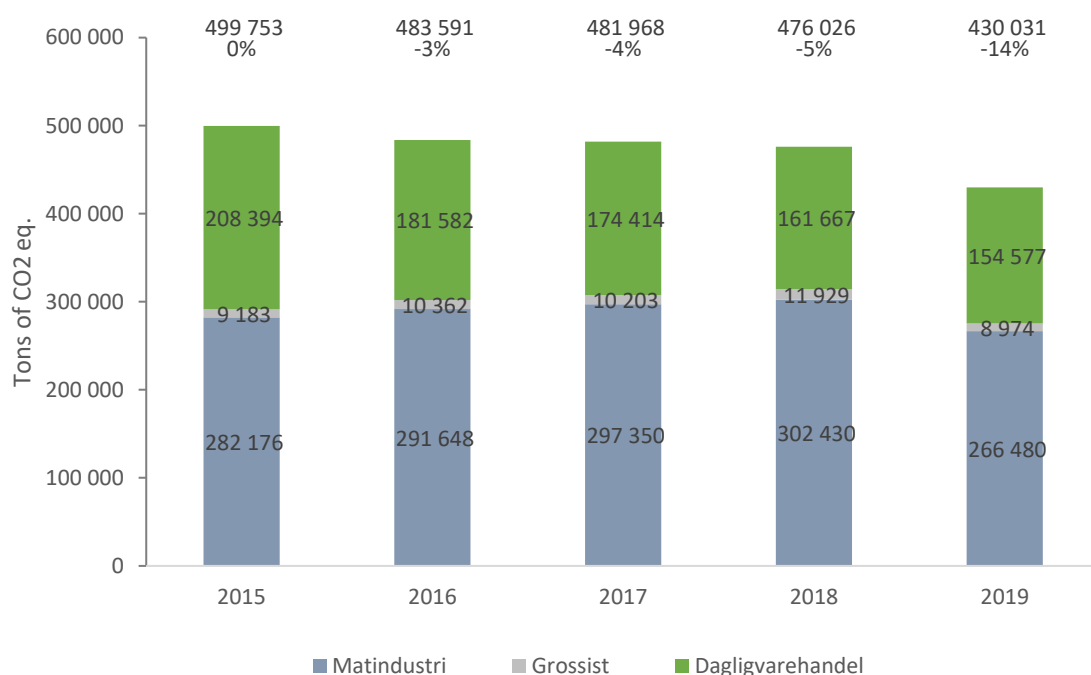


Figure 3-5 Tons of CO2 eq. linked to food waste by stage of the value chain from 2015 to 2019

The figure shows that the carbon footprint of food waste in the industry as a whole decreased from almost 500 000 to 430 000 tons of CO2 equivalents in 2019, which is a reduction of 70 000 tons, or 14%. Of the three stages of the value chain, retailers have reduced the carbon footprint of food waste the most. For the three stages, the changes in greenhouse gas emissions from 2015 to 2019 were as follows:

- Producers - 6%
- Wholesalers - 2%
- Retailers - 26%

At the production and retail stages, financial loss associated with food waste showed a greater decline than the quantity of waste; this is because food waste decreased for relatively environmentally unfriendly items in these stages of the value chain. We see the opposite trend for wholesalers; here food waste has mainly declined for fruit and vegetables, which is a relatively environmentally friendly product group.

4 Detailed Results

4.1 Producers

4.1.1 Trends by Product Group

This section presents trends in food waste by product group for producers from 2015 to 2019 in tons and percentages of amounts produced, and describes causes, anti-waste measures and use of resources.

Figure 4-1 shows the calculated composition of product groups involved in food waste by producers in 2015-2019.

Note that the product group “others” is a large group containing various smaller groups produced by Norwegian producers, but which are currently not included by the companies providing food waste data. Examples of this are wine and coffee. Tons of food waste for these products have been calculated by multiplying the weighted average of the percentage of total waste for all product groups in the relevant year by the total amount produced of the products in question. This group is decreasing in size as the number of companies reporting food waste data has increased significantly in recent years (from 13 companies in 2015 to 47 in 2019).

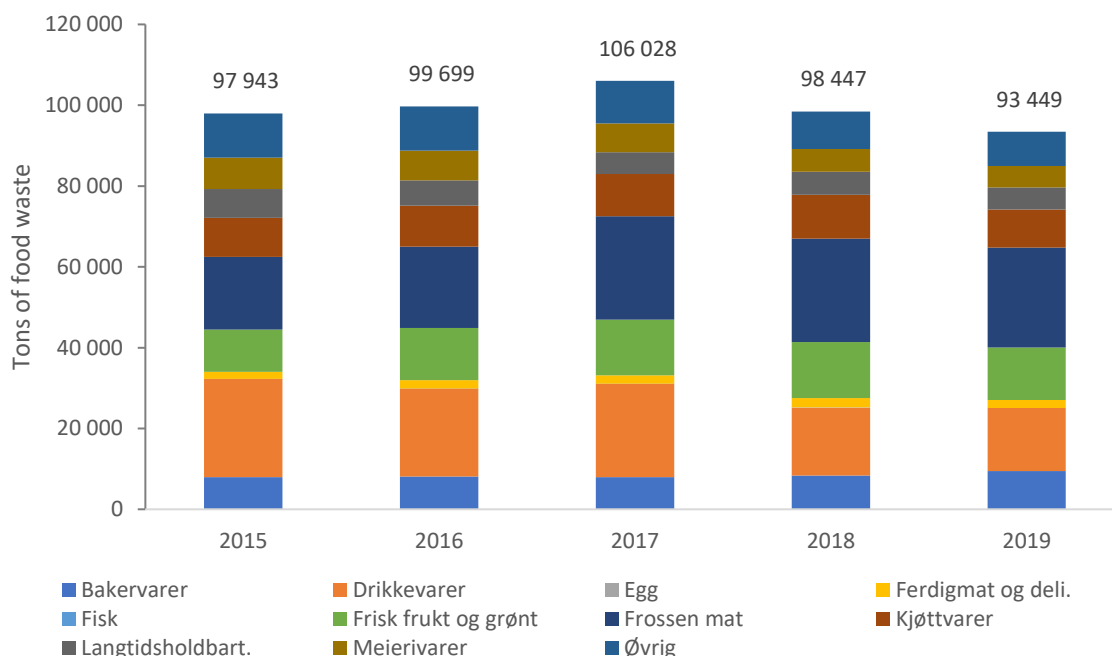


Figure 4-1 Changes in tons of food waste by producers 2015-2019

Note that calculations of amounts of food waste at the production stage are very unreliable, since there is considerable uncertainty about production volumes and percentages of food waste for some product groups, as mentioned above. This applies particularly to beverages and “others”.

The figure shows that food waste measured in tons has remained relatively stable at the production stage, with a small increase in 2017. Total food waste measured in tons has decreased by 5% or 4500 tons.

Fact Box 4-1 Summary of figures for producers in 2015 and 2019, and trends 2015-2019

At the production stage, product groups with the *most* waste as a percentage of production (in tons) were:

- 1) Frozen vegetables/fruit/berries (14.5%)
- 2) Prepared fruit/vegetables (11.0%)
- 3) Dry bread, etc. (8.6%)

Product groups with the *least* waste as a percentage of production (in tons) were:

- 1) Butter/margarine (0.2%)
- 2) Flour, cereals, grains, starch, baking ingredients, etc. (0.2%)
- 3) Eggs (0.3%)

Product group	% waste 2015	% waste 2019	Change in % waste 2015-2019
Frozen ready-made foods	5.1%	6.3%	25%
Frozen desserts	4.8%	5.4%	14%
Frozen vegetables/fruit/berries	18.4%	14.5%	-21%
Prepared fruit/vegetables	14.6%	11.0%	-25%
Fresh baked goods	2.9%	2.8%	-3%
Ready-to-eat meals and refrigerated toppings (not meat)	2.7%	2.2%	-20%
Sausages	0.7%	0.6%	-15%
Sliced meat and pâtés	1.5%	3.0%	104%
Prepared meat	1.2%	0.5%	-58%
Fresh meat (beef)	1.7%	1.5%	-15%
Fresh meat (pork)	3.5%	2.5%	-30%
Fresh meat (other)	0.3%	0.8%	153%
Poultry	3.0%	3.3%	11%
Eggs	0.3%	0.3%	-2%
Butter/margarine	0.2%	0.2%	24%
Cheese	0.7%	0.5%	-24%
Dressings, oils, ketchup	4.2%	3.4%	-19%
Food for main meals	5.7%	2.1%	-63%
Nuts/seeds/dried fruit	1.9%	2.2%	16%
Sweet and tinned spreads	4.8%	1.7%	-65%
Snacks	6.3%	5.7%	-10%
Dry bread, etc.	1.3%	8.6%	541%
Beverages	2.3%	1.7%	-28%
Dairy products (various)	1.1%	0.8%	-26%
Flour, cereals, grains, starch, baking ingredients, etc.	0.3%	0.2%	-25%
Sweets, cakes, biscuits, chocolate, etc.	3.2%	3.7%	15%

Figure 4-2 shows food waste as a percentage of annual production in tons from 2015 to 2019, and is a summary of the figures in the fact box and the years between 2015 and 2019. The percentages marked represent the waste for the various product groups in 2019 and the broken line shows the weighted average for waste in 2019.

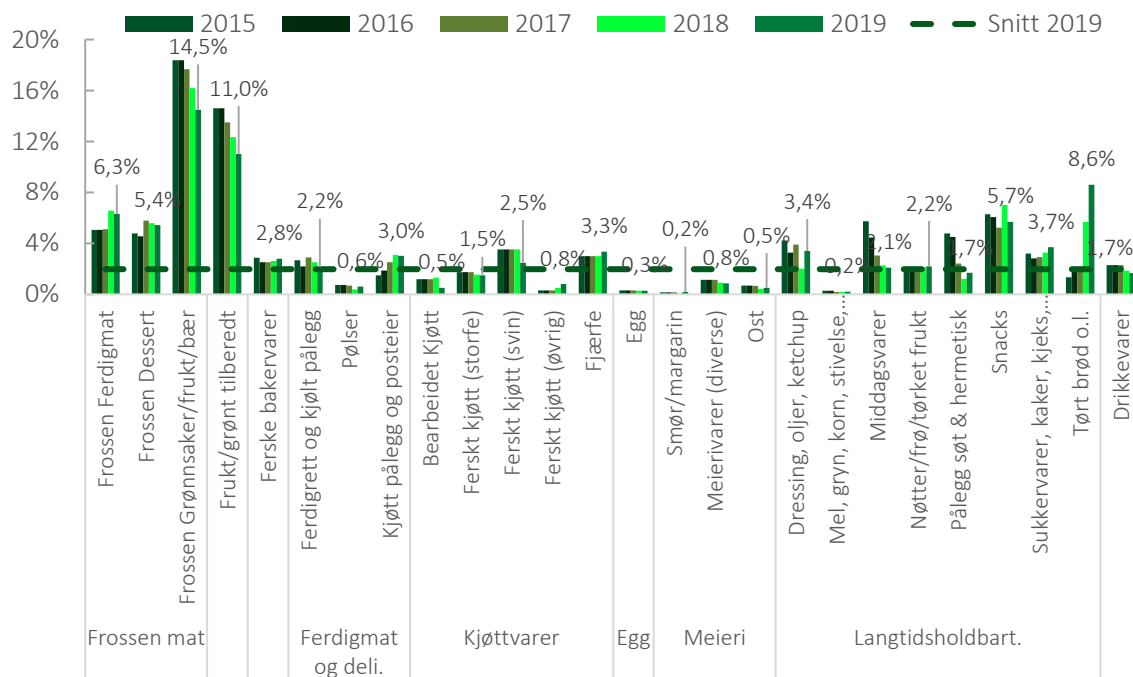


Figure 4-2 Trends in waste by producers 2015-2019 as a percentage of production

The figure shows that average food waste by producers for all product groups amounted to 2% in 2019 (broken line). In 2015 this figure was 2.3%, which shows that the proportion of food waste was reduced by about 14% in the period 2015 to 2019.

Seventeen product groups show reduced food waste over the period, while nine show increased food waste (Fact Box 4-1). Food waste increased the most for dry bread (+541%), followed by fresh meat (+153%) and sliced meat and pâtés. The increase in fresh meat is primarily due to production challenges related to the emergence of chain- or profile-specific products that make it difficult to maintain regular production of all products. The reason for the increase in waste of dry bread is unknown. As for sliced meat and pâtés, the increase is because several food waste categories have been moved from other product groups to this group. There was thus not a real increase in food waste in this group.

4.1.2 Causes

As part of this year's data collection, we asked companies which causes of food waste were most important in the various stages of the process.

The following causes were most frequently reported by companies (in order of priority) regarding raw material stock:

- Past storage date
- Poor raw material quality
- Breakage
- Discontinued product

Other causes of waste of raw material stock were technical faults, wrong storage temperature, accidents, reorganisation, damage, too large minimum orders, cleaning, and errors in orders and deliveries. In general, the causes were very homogeneous, i.e. the three most common causes (expired date, poor quality and breakages) accounted for almost 80% of the causes of food waste.

The following causes during processing were most frequently reported by companies (in order of priority):

- Production errors
- Production stops
- New production operations
- Accidents/items dropped on floor

Other causes during processing were scraps, quality defects and cleaning of equipment, etc. In general, the causes were of a technical nature or related to equipment.

The following causes during packing were most frequently reported by companies (in order of priority):

- Faulty production
- Damaged packaging
- Accidents/items dropped on floor
- Labelling errors

Other causes during packing were forecasting errors, faulty machinery, machine stops and breakages. Here too, the causes were generally technical or related to equipment.

Faults, disruptions and accidents during production are complex causes and may require an investment in new equipment/machinery, a focus on internal procedures and training or a combination of the two. These causes have the advantage that the company itself can make efforts to minimise this kind of food waste by implementing various measures. By contrast, raw material quality, expired storage of the finished product, forecasting errors and to some extent the quality of the finished product are causes that run across the value chain, thus requiring collaboration between the primary, production, wholesale and catering stages. Note that finished product quality may also be related to faulty production, poor packaging or similar, which indicates that this food waste could also be dealt with internally in some cases.

In many cases, the quality of raw material and finished product is linked to quality requirements later in the value chain, at the retail or the consumer stage. To reduce this food waste, quality requirements at the retail/catering stage could be eased. This could then lower the consumer's requirements, so long as it is

adequately communicated that the reason for the change in quality is to reduce food waste. For some raw materials, this might be difficult, if the company is having problems in finding a market with its existing products/sales channels. In such cases, producers should consider alternative utilisation of the raw material, e.g. through new processing or as a new product. It should also be noted that waste due to raw material quality may involve rotting food and other damage that prevent the use of the raw material in production. In such cases, it is important for food producers to work with the primary stage to identify possible measures to solve the problem.

4.1.3 Anti-Food Waste Measures Implemented

Food producers were also asked about the measures they have taken to reduce their own food waste and food waste in other stages of the value chain.

Figure 4-3 shows the percentage of companies that have implemented measures to reduce their own food waste or food waste in the other links in the value chain from 2017 to 2019.

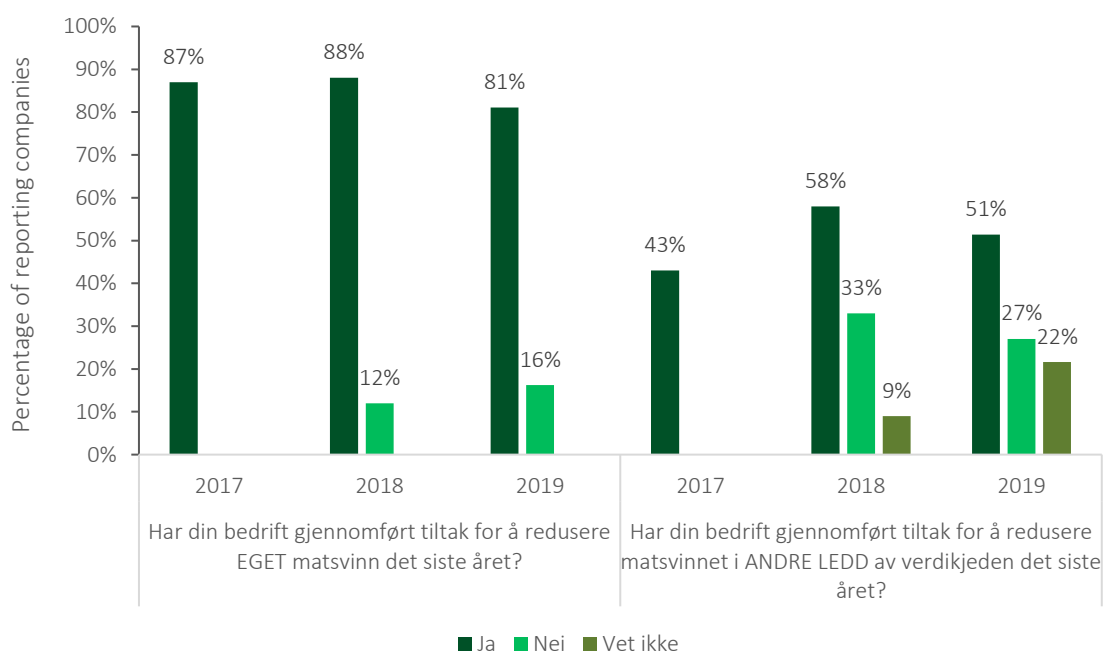


Figure 4-3 Percentages of companies having implemented measures to reduce their own food waste or food waste elsewhere in the value chain

The figure shows that a significant proportion of companies (81%) have implemented measures to reduce their own food waste, while 51% have implemented measures to reduce food waste in other parts of the value chain. In 2018, more companies (88%) reported having taken steps to reduce their own food waste, and as much as 58% replied that they had implemented measures to reduce food waste elsewhere in the value chain.

The reason why a smaller proportion of companies have implemented anti-food waste measures is that more companies have reported data this year. The sample of companies for 2019 therefore includes several companies that have just begun their anti-food waste efforts.

Companies were also asked which measures they had implemented. Figure 4-4 shows the percentages of the companies that reported having implemented various measures to reduce their own food waste in 2019 and 2018; the percentages shown are for 2019. It should be noted that the sample of companies differed between the two years, as the number of companies reporting increased from 31 in 2018 to 47 in 2019.

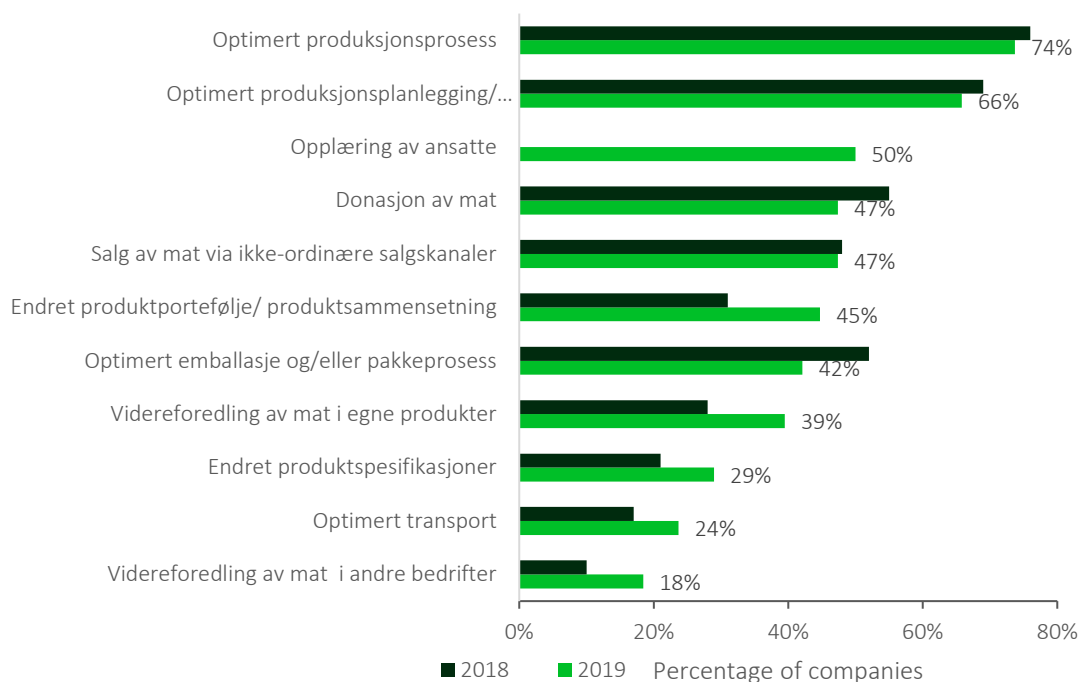


Figure 4-4 Percentages of companies reporting having implemented various measures to reduce their own food waste

The figure shows that optimisation of the production process (74%) and optimisation of planning/storage management systems (66%) were the two measures most frequently used by food producers to reduce their own food waste in 2019. These measures, in addition to staff training (50%), food donation (47%) and the sale of food via alternative sales channels (47%) appear to be useful in relation to food waste linked to several of the causes presented in Section 4.1.2, namely start/reorganisation of production, technical faults/disruptions during production, finished product past storage date and forecasting errors. In 2018, staff training measures were not included in the questionnaire, which explains the lack of data for that year.

Some companies also reported having implemented measures in 2019 that can be linked to the quality of raw material or finished product, including further processing of food in their own products (39%), changes in product specifications (29%) and further processing of food for new products in other companies (18%). A greater proportion of the companies implemented such measures in 2019 than in 2018.

Figure 4-5 shows the percentages of companies that reported having implemented various measures to reduce food waste elsewhere in the value chain in 2019 and 2018; the percentages shown are for 2019. It should be noted that the sample of companies differed between the two years, as the number of companies reporting increased from 31 in 2018 to 47 in 2019.

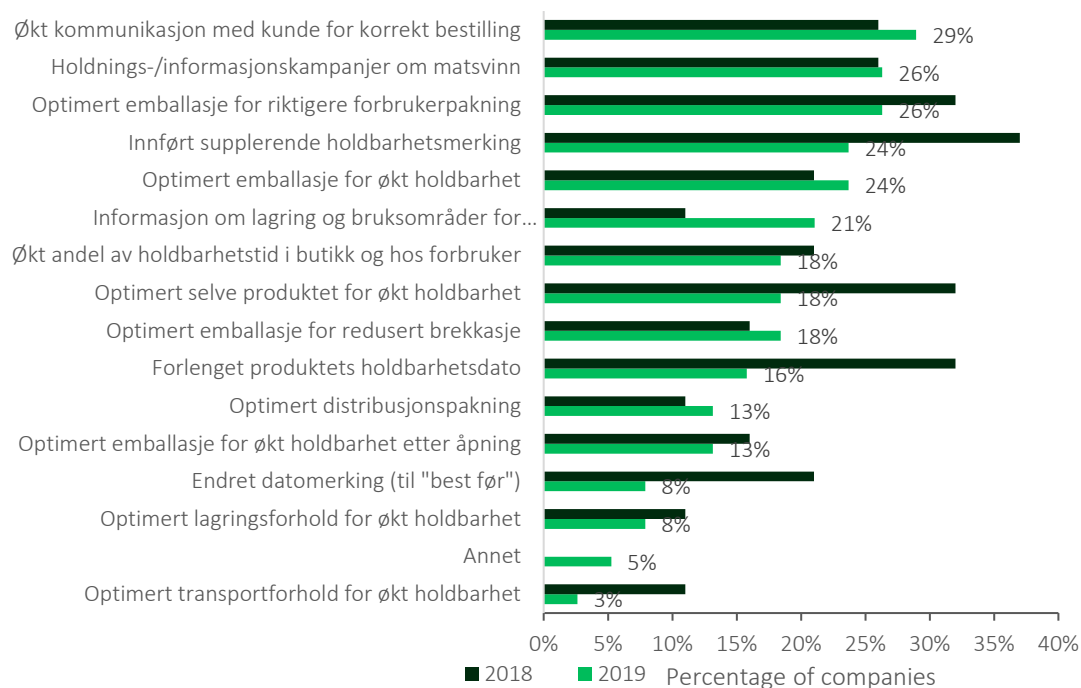


Figure 4-5 Percentages of companies reporting having implemented various measures to reduce food waste elsewhere in the value chain

The figure shows that improved communication with customers to ensure correct orders was the most frequent measure (29%), followed by optimisation of packaging to suit consumers (size of packs) (26%) and information and attitude-changing campaigns (26%). In 2018, introduction of additional information on date labels was the most frequently implemented measure (37%), followed by increasing the shelf life, optimising consumer packaging and changing the product itself to increase its shelf life (all 32%).

Apart from the most popular measure in 2019, we see that measures aimed at consumers have generally been implemented by a large proportion of companies. This indicates that producers are aware of the challenges associated with downstream food waste, since “past its expiry date” has long been one of the main causes of food waste by consumers (Stensgård et al. 2018).

4.1.4 Food Waste Management

Figure 4-6 shows the proportion of food that companies have avoided wasting (i.e. food that was potential food waste, but which was salvaged) and food that was discarded, by management method. The salvaged food amounted to 25% and was either used as an input factor in other food production (20%), sold at a reduced price (3%) or donated/redistributed (2%). The proportion of food allotted to alternative management was 75%; most of this was animal feed (54%), followed by incineration (11%) and biogas (9%).

It should be noted that data quality varies considerably between the two main categories, salvaged food and food waste. This is because most companies have a good idea of how much food they send to animal feed or waste management as this is invoiced. However, several companies do not know how much food they donate, as this is currently not included in the accounts. These companies are working to gain a better idea of these figures, and amounts of food donated are likely to be larger than shown in our chart.

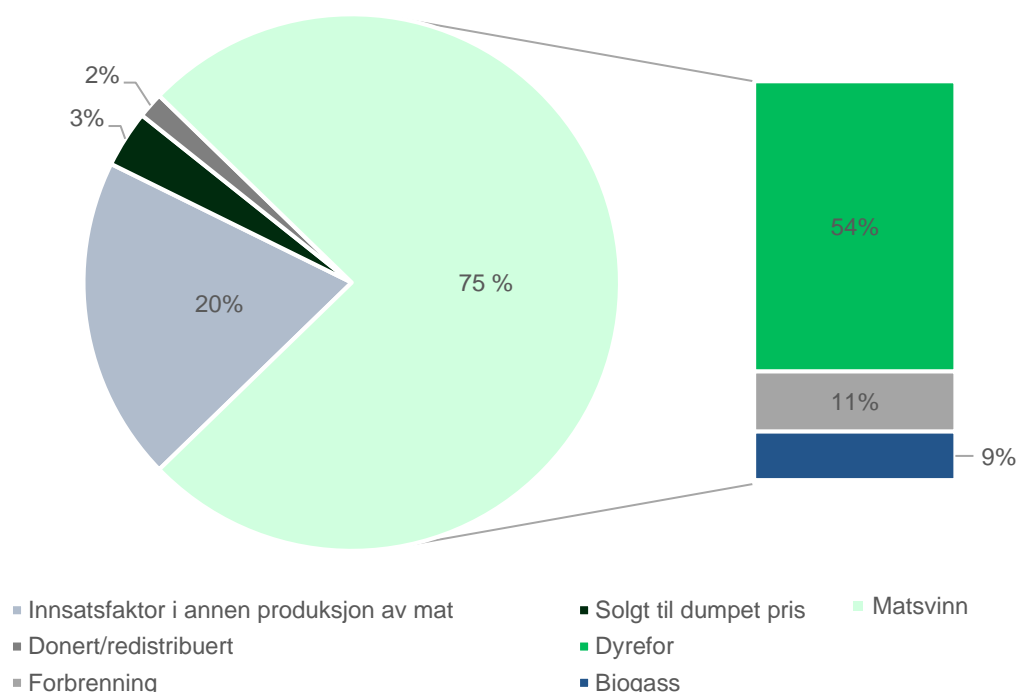


Figure 4-6 Proportions of food salvaged and food waste by management method and resource use

Compared with last year's report, the proportion of food waste has increased from 53% to 75%. Since the number of companies reporting increased considerably from 2018 to 2019, the figures for the two years are not comparable, being based on two different samples. It is a positive development that so much food is sold at a reduced price and used as an input factor in other food production, but the figure also suggests that there may be a great potential for increasing the proportion of food donated/redistributed at the expense of food that currently ends up as food waste (animal feed, biogas and incineration).

4.2 Wholesalers

4.2.1 Trends by Product Group

This section presents trends in food waste by product group for wholesalers from 2015 to 2019 in tons and percentages of sales, and causes of wholesale food waste.

Figure 4-7 shows the composition of product groups involved in food waste by wholesalers for 2015-2019

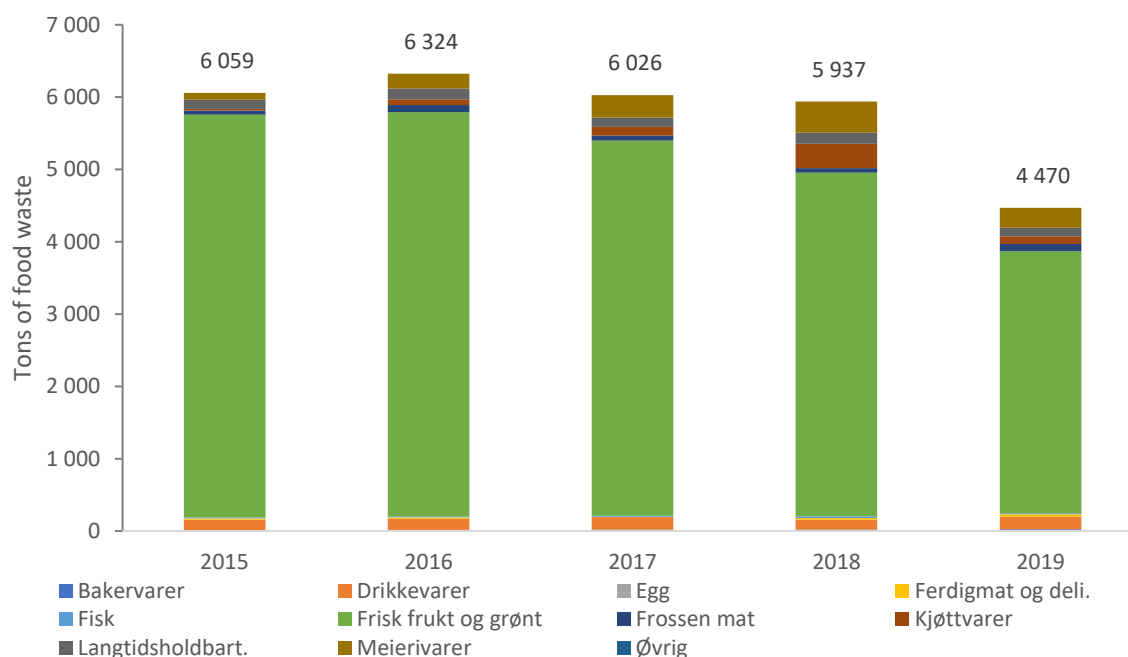


Figure 4-7 Changes in tons of food waste by wholesalers for 2015-2019 by product group

The figure shows that food waste by wholesalers decreased from about 6000 tons in 2015 to about 4500 tons in 2019, which is a reduction of 1500 tons or 26%. Fresh fruit and vegetables accounted for most of the food waste, but also most of the reduction in waste. This product group is susceptible to damage during transport and storage and has a short shelf life, which may explain why it predominates in the statistics. This is also the group with the greatest waste reduction in tons.

Note that the composition of product groups at the wholesale level is very unreliable, as the data include few direct distributors.

In addition to tons of food waste per product group, food waste is also calculated as percentages of sales. The fact box below shows the results as percentages.

Fact Box 4-2 Summary of figures for wholesalers in 2015 and 2019, and trends from 2015 to 2019

<p>At the wholesale stage, product groups with the <i>most</i> waste as a percentage of economic value were:</p> <ol style="list-style-type: none"> 1) Fresh fruit and vegetables (0.30%) 2) Fresh ready-made food and delicatessen items (0.29%) 3) Fish and shellfish (0.10%) <p>Product groups with the <i>least</i> waste as a percentage of economic value were:</p> <ol style="list-style-type: none"> 1) Dry goods (0.02%) 2) Beverages (0.02%) 3) Frozen food (0.04%) 			
Product group	% waste 2015	% waste 2019	Change in % waste 2015-2019
Frozen food	0.02%	0.04%	53%
Fresh fruit and vegetables	0.47%	0.30%	-35%
Baked goods	0.01%	0.04%	206%
Fresh ready-made food and delicatessen items	0.16%	0.29%	82%
Fish and shellfish	0.18%	0.10%	-42%
Meat	0.01%	0.05%	296%
Dairy products	0.04%	0.08%	110%
Dry goods	0.02%	0.02%	-24%
Beverages	0.02%	0.02%	-16%

Figure 4-8 shows wholesale food waste as a percentage of sales from 2015 to 2019, and provides a summary of the figures in the fact box, and from 2015 to 2019. The percentages marked represent the waste for the various product groups in 2019 and the broken line shows the weighted average for food waste in 2019.

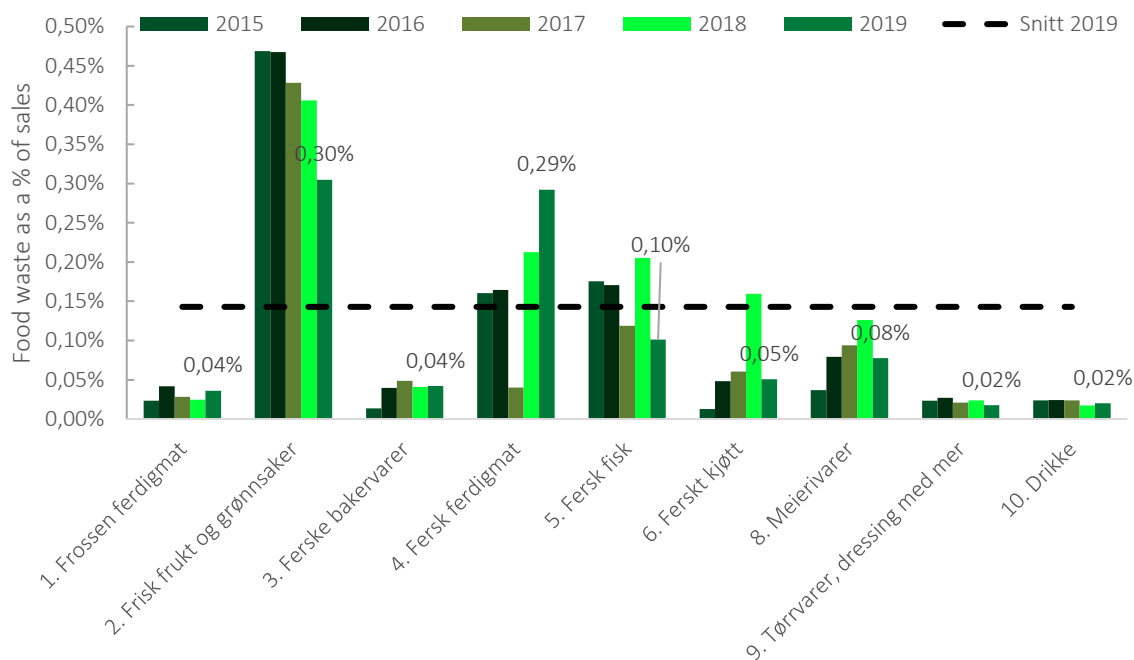


Figure 4-8 Trends in wholesale food waste as percentages of sales from 2015 to 2019

The figure shows that food waste as a percentage of sales was 0.15% at the wholesale stage in 2019, which is 32% lower than the figure for 2015 (0.22%).

Several product groups showed an increase in food waste from 2017 to 2018, such as fresh fish, fresh meat and dairy products. This was due to the introduction of a new cold storage facility. Most product groups have seen reduced waste after this, except for fresh ready-made food, which increased significantly in 2019. This increase was due to a new seasonal product that was not handled correctly by wholesalers, and is therefore temporary. The analysis shows that food waste statistics for the wholesale stage are more vulnerable to individual events, since little food waste occurs at this stage.

4.2.2 Causes

Figure 4-9 shows causes of wholesale food waste from 2017 to 2019.

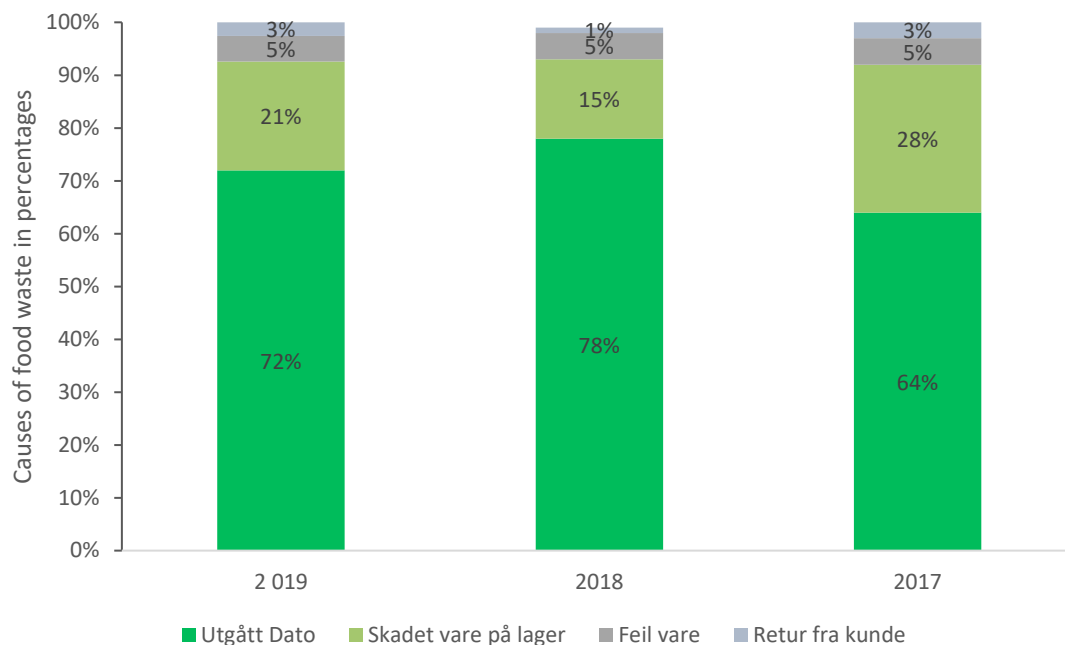


Figure 4-9 Causes of wholesale food waste in 2017 and 2018

The figure shows that most food waste at the wholesale level is related to food being past its expiry date (72% in 2019) or damaged during storage (21% in 2019), while defective items and those returned by customers account for a smaller proportion.

Estimated food waste by wholesalers is very low (only 0.15% of total sales); therefore, although much of the waste is due to food being past its expiry date, this is still a very modest proportion of all food sold.

4.3 Retailers

4.3.1 Trends by Product Group

This section presents trends in retail food waste for selected product groups from 2015 to 2019 in tons and percentages of sales, and describes causes and anti-food waste measures.

Figure 4-10 shows the composition of product groups involved in food waste by retailers for 2015-2019.

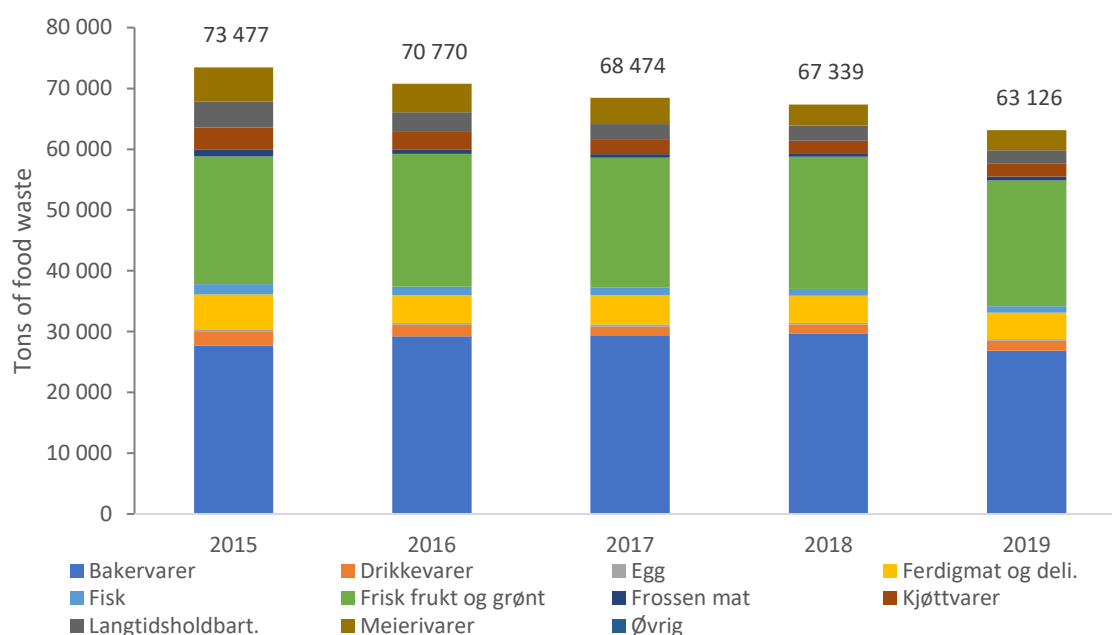


Figure 4-10 Changes in tons of food waste by retailers for 2015-2019 by product group

The figure shows that retail food waste decreased from 73 500 tons in 2015 to 63 150 tons in 2019, giving a total reduction of 10 350 tons or 14%. Fresh baked goods accounted for most of the retail food waste, followed by fresh fruit and vegetables. These two groups have a short shelf life, high sales volume and high quality requirements, which may explain why they predominate.

The figure also shows that in order to reach the target of a 50% reduction in tons of food waste by 2030 (as stated in the sector agreement and the UN Sustainable Development Goal), retailers must implement measures to reduce waste of fresh baked goods and fruit and vegetables. Waste in these two groups has in fact changed little during the entire period studied.

At the same time, trends in the retail sector show that financial losses and the carbon footprint associated with food waste have been reduced by 20% and 26%, respectively. This indicates that retailers have made major strides in reducing waste of the least environmentally friendly foods, such as meat products, dairy products and ready-made food. This is important as the main rationale of the sector agreement on food waste reduction and the UN Sustainable Development Goals is to improve both the environmental impact and profitability.

In addition to tons of food waste per product group, food waste is also calculated as percentages of sales. The fact box below shows the results as percentages.

Fact Box 4-3 Summary of retail figures for selected product groups in 2015 and 2019, and trends from 2015 to 2019

At the retail stage, product groups with the <i>most</i> waste as a percentage of economic value were:			
1) Fresh baked goods (9.9%)			
2) Fresh fish (4.5%)			
3) Fresh fruit (4.5%)			
Product groups with the <i>least</i> waste as a percentage of economic value were:			
1) Beverages (0.2%)			
2) Frozen ready-made foods (0.4%)			
3) Dry goods (0.5%)			
Product group	% waste 2015	% waste 2019	Change in % waste 2015-2019
Frozen ready-made foods	0.5%	0.4%	-29%
Fresh fruit	4.6%	4.5%	-4%
Fresh vegetables	4.3%	4.3%	0%
Fresh baked goods	9.9%	9.9%	-1%
Fresh ready-made food	5.0%	3.0%	-40%
Sausages	3.6%	2.1%	-40%
Sliced meat and pâtés	2.4%	1.5%	-35%
Fresh fish	7.3%	4.5%	-39%
Fresh meat	5.2%	2.9%	-44%
Minced meat	2.1%	1.1%	-47%
Fresh eggs	0.8%	0.6%	-20%
Dairy products	1.1%	0.6%	-46%
Cheese	1.0%	0.7%	-34%
Dry goods	1.0%	0.5%	-44%
Beverages	0.3%	0.2%	-21%

Figure 4-11 shows retail food waste as a percentage of sales of selected product groups from 2015 to 2019, and is a summary of the figures in the fact box, in addition to the years between 2015 and 2019. The percentages marked represent the waste for the various product groups in 2019 and the broken line shows the weighted average for waste in 2019.

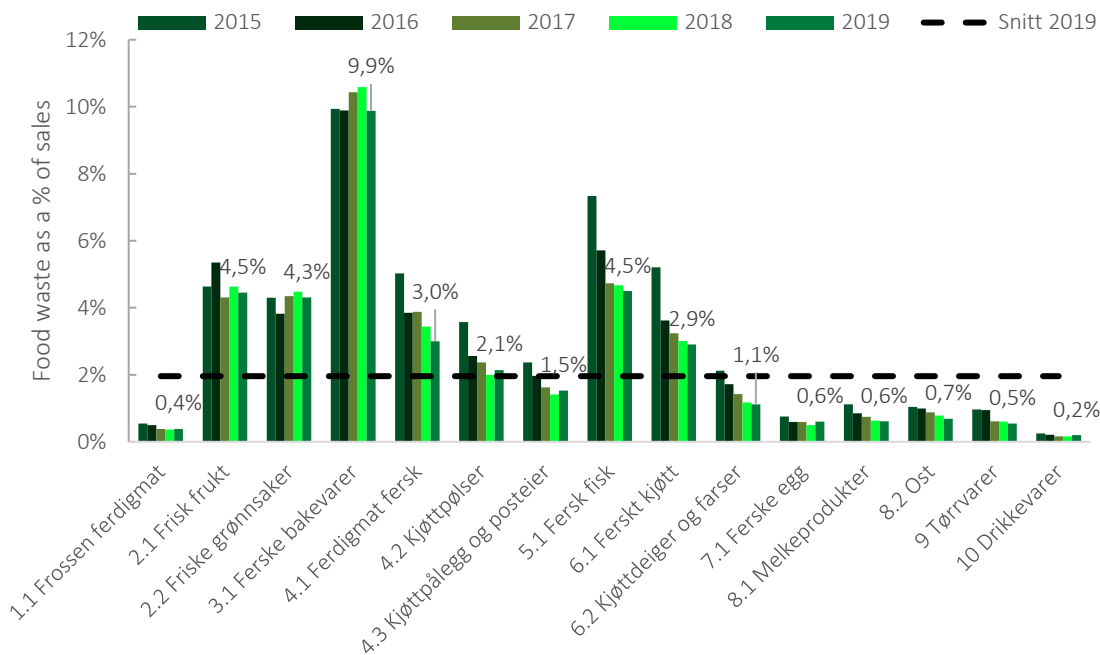


Figure 4-11 Changes in retail food waste as a percentage of sales from 2015 to 2019

The figure shows that the proportion of food waste by retailers was about 2% on average for all product groups in 2019 (broken line). In 2015, the proportion of retail food waste was 2.6% for all groups, and it has thus been reduced by about 25% in the period 2015-2019.

Although food waste has not been greatly reduced for the largest product groups in the retail trade (fruit/vegetables and bread/baked goods), the figure shows that retailers have achieved large reductions in waste for the other groups, including some with traditionally rather high wastage such as fresh ready-made food, sausages, sliced meat, fresh fish, fresh meat and processed meat. This is largely due to price reductions on items with a short shelf life and an increased focus on ordering procedures and forecasting. These measures lead to a considerable reduction in carbon footprint and costs associated with food waste, as the food waste reduction has been achieved for relatively expensive and environmentally unfriendly products.

The figure and fact box show that food waste as a percentage of sales is greatest for fresh baked goods. This is probably closely related to the return schemes for bread and bakery products in the retail sector, where several stores have free return of unsold baked goods. The combination of high sales volume, consumer expectations of bread just before the store closes, and the fact that bread is regarded as a destination product means that stores find it challenging to reduce this food waste. It should be noted that since there is such a large proportion of waste in this product, it leads to considerable expense for the retailer.

Retailers therefore have financial incentives to reduce this waste and various measures have been implemented to reduce waste of fruit/vegetables and bread/baked goods: better quality, improved ordering procedures, price reductions, relocation, etc.

4.3.2 Causes

Much of food waste in the retail sector is food of reduced quality (fruit/vegetables and bread/baked goods) or food that has expired. This is to be expected, since the retail trade is one of the last stages of the value chain.

A short shelf life may be symptomatic, meaning that there are one or more root causes of products being past their expiry date in stores. Some of the root causes identified by the retail chains themselves are as follows:

- Sub-optimal storage/display of products: This applies, for example, to fruit and vegetables that are kept cool and dark until displayed in stores. Here, several stores have good procedures of either limiting light exposure by covering the products or refrigerating them overnight, but for some fruits and vegetables that need dark and cool storage, current display methods lead to reduced quality and thus a shorter shelf life.
- Excessive product range: Some stores attract customers with a large product range. If the range in a store is greater than the demand/need, so that product rotation is inadequate, more products will pass their expiry date.
- Destination products with a short shelf life: Fresh bread is a so-called “destination product” in the retail sector, i.e. a product that has a decisive influence on whether customers choose to shop in a particular store. The idea is that if a store cannot offer a satisfactory selection of fresh bread throughout its opening hours, customers will choose another store. This is particularly problematic as many Norwegians consider bread as a fresh item, and this, in combination with the broad selection, means that large quantities of bread are returned to the bakery and sent to animal feed (collected early the next morning).
- Variations in sales are also an important root cause of food passing its expiry date. Despite good planning tools, it is challenging for stores to order the right amount of goods as sales vary greatly in the course of a week.

4.3.3 Measures Implemented

The most important anti-food waste measure by retailers has been price reductions on food that is close to its expiry date; this has not only reduced food waste and costs but also had a positive effect on the carbon footprint of retail food waste.

Retail chains will continue to reduce prices in this way, even though much of their food waste has already been reduced for several product groups. There is a potential for further reduction in the integration of the date stamp in the barcode or another code format, such as 2D codes. This is because staff do not always find the food to be discounted in time, and stores therefore have to discard food that has passed its expiry date. If the expiry date is included in the code for the food, the staff will find it easier to see which products are approaching the date. This will ensure that the products are found in time and reduce the time spent looking for food with a short remaining shelf life. This measure was first tested in 2019.

No data are available on the total amount of food discounted by retailers, but one of the chains has data for amounts of fruit/vegetables and bread/baked goods sold at reduced prices from 2015 to 2019. Figure 4-12 shows the development in price reductions for these two groups in this particular chain.

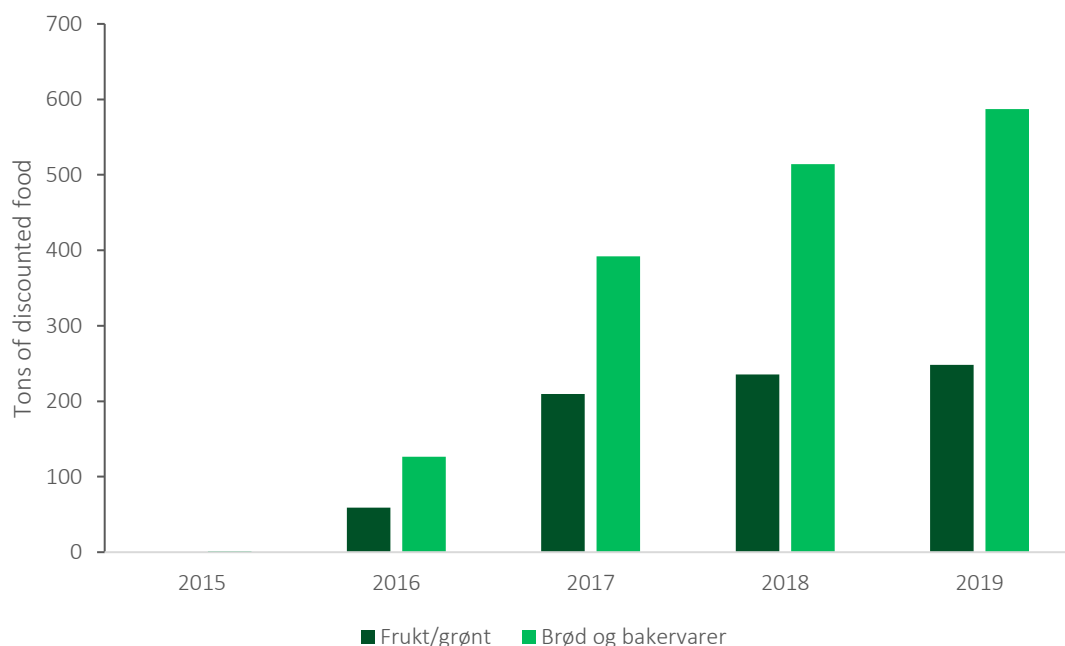


Figure 4-12 Tons of fruit/vegetables and bread/baked goods sold at reduced prices by one retail chain

The figure shows that amounts of discounted fruit/vegetables and bread/baked goods increased from 2015 to 2019 in this retail chain. We can also see that discounted bread/baked goods have increased throughout the period, while for fruit/vegetables there has only been a small increase since 2017.

If more retail chains introduce price reductions for these groups, retailers may be able to reduce the volume of fruit/vegetables and bread/baked goods currently wasted. At the same time, it is worth noting that the main focus of the chains is to reduce food waste for the product groups with the highest environmental and economic costs, and that customers may be more inclined to choose discounted food of greater value.

In addition to regular price reductions, several stores have used sales promotion apps to market their discounted food. Examples of these solutions are Too Good To Go, FoodList and Throw No More. Such solutions will increase the likelihood of selling discounted items, and thus help to prevent these being discarded, especially in view of plans to increase the use of these apps.

Retailers are also working on solutions to improve product flow and forecasting accuracy. These measures are being implemented in collaboration across the value chain and this focus area is expected to lead to significant reductions in food waste throughout the value chain.

Retailers also provide financial support to Food Banks Norway, in addition to donating surplus food that would otherwise be wasted, through their wholesalers.

Measures to **prevent** food waste at the retail stage include:

- Efforts to improve procedures and product flow
- Adaptations of amounts of products in stores based on historical data.
- Internal studies of food waste using KPIs
- In-house training and internal measures such as rewarding stores that have reduced food waste and have most price reductions
- Focus on everyday procedures related to special offers and expiry date checks.

Measures to **reduce** food waste at the retail stage include:

- Price reductions on goods with a short remaining shelf life
- Price reductions on fresh fruit and vegetables and fresh baked goods, including relocation (discounts on fruit and vegetables removed from packs) and reduced prices 30 minutes before closing time
- Use of large-volume goods with a short shelf life in internal production
- Cooperation with apps/solutions for marketing of discounted items (Too Good To Go, Throw No More, FoodList, etc.).
- Donation of food.

In addition to efforts at food waste prevention and reduction, various measures have been implemented aimed at consumers and other stages of the value chain, such as the sale of “ugly” vegetables and fruit and information and attitude-changing campaigns (see Stensgård & Hanssen 2016) Retailers have also implemented measures for packaging of their own brands, including the introduction of an opening/closing mechanism, additional information on date labels and a “look, smell and taste campaign”.

4.4 Hotels and Catering and the Public Sector

This section shows tonnage of food waste in 2019 in hotels and catering and the public sector divided into areas. For further information on these parts of the value chain, see the KuttMatsvinn2020 final report (Møller et al. 2020).

Efforts to prevent and reduce food waste in the hospitality industry have been organised in KuttMatsvinn2020, divided as mentioned into a research project and a sectoral project. The aim of the sectoral project is to involve as many actors in the hospitality industry as possible (hotels, restaurants, employee cafeterias, convenience stores and the public sector) and for them to reduce their food waste by 20 percent by the year 2020. The research project (2017-2020), which has run parallel to the sectoral project, has been focused on surveys of food waste in catering outlets and overall for the sector. This section is based on the final report of the research project (Møller et al. 2020).

Figure 4-12 shows estimated total food waste in the areas of the catering sector studied in 2019.

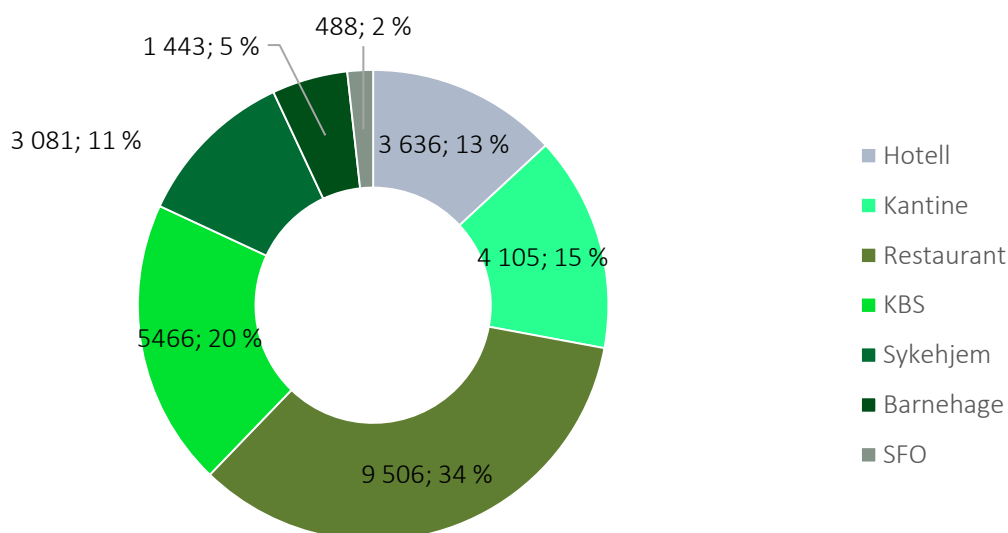


Figure 4-13 Estimated tons of food waste in the parts of the catering and public sectors studied

The figure shows estimated food waste in 2019 in the private catering sector (22 700 tons) and the public sector (5000 tons). Restaurants accounted for the most food waste (34%), followed by convenience stores (20%), employee cafeterias (15%) and hotels (13%). The public sector (nursing homes, kindergartens and after-school programmes) accounted for about 18% of the total. However, it should be mentioned that not all catering outlets in the public sector are included in the results; the quantity of food waste in the public sector has therefore probably been underestimated.

Data quality is poor for restaurants and the public sector, which means that the results for these segments are very unreliable (link to report: <https://norsus.no/publikasjon/kuttmatvinn2020-forskning/>)

5 Consumer Surveys

This section presents results from the annual surveys of consumer food waste habits, attitudes and behaviour from 2010 to 2020.

5.1 What kinds of food are we throwing away the most?

Trends in the proportion of respondents who report having thrown away different product groups in the past seven days for the years 2015 to 2020 are presented in Figure 5-1. The five most important groups are shown with one line each in the figure, while the remaining groups are shown with a single line, as a weighted average.

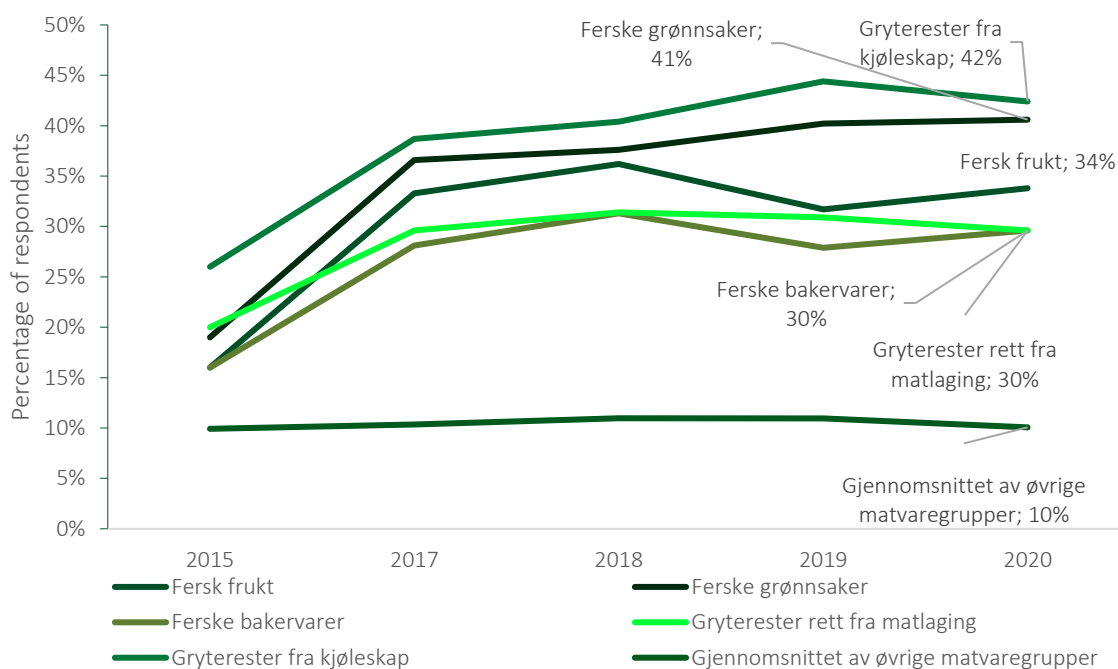


Figure 5-1 Proportion of consumers reporting having thrown away different types of food in the past week 2015-2020

The figure shows that Norwegian consumers still most often report having thrown away fridge leftovers (42%), a slight reduction from last year. Fresh vegetables, on the other hand, have increased from last year's survey, and this year 41% of respondents stated that they had discarded fresh vegetables in the past seven days. These were followed by fresh fruit, which 34% of respondents had wasted. Further, 30% of respondents reported having thrown away pan leftovers from meals or fresh baked goods during the past seven days.

The average percentage of consumers who reported having discarded the other food groups is 10%, which is considerably lower than the five groups discarded most frequently by Norwegian households.

Table 5-1 shows the waste frequency for all 20 food groups in 2020, as well as the total change from 2017 to 2020. Percentage changes in red indicate a negative trend (increased food waste) since the survey started, while green indicates a positive trend in the same period.

Table 5-1 Percentages of consumers reporting having thrown away different types of food in the past week (2017-2020)

Food group	2017	2020	Percentage change 2017-2020
Fridge leftovers	39%	42.4%	10%
Fresh vegetables	37%	40.6%	11%
Fresh fruit	33%	33.8%	2%
Pan leftovers from meals	28%	29.6%	5%
Fresh baked goods	39%	29.6%	0%
Sliced meat for open sandwiches	17%	16.7%	-2%
Milk/cream	18%	15.6%	-11%
Yoghurt/sour cream	16%	14.7%	-6%
Cheese	9%	11.6%	27%
Fresh meat	12%	11.4%	-2%
Mayonnaise/dressings	14%	11.3%	-17%
Fresh ready-made food	8%	10.4%	33%
Fresh ready-made fish meals	8%	8.8%	17%
Dry goods	10%	8.2%	-15%
Snacks	10%	8.1%	-16%
Frozen ready-made food	6%	5.6%	-3%
Eggs	6%	4.5%	-24%
Biscuits	4%	4.0%	14%

Fridge leftovers are again this year the category most often reported as having been thrown away in the past seven days (42.2%). Close behind come fresh vegetables, at 40.6%. Fresh ready-made food is the group with the greatest increase in waste since 2015, at 33%.

Nine of the groups have seen a reduction in waste since 2017 (varying from -2% to -27%). None of the groups reported as being most frequently discarded are included in the nine groups showing a reduction during the period.

Figure 5-2 shows the composition of fridge and meal leftovers, based on the question: “What types of food does your household most often throw away as leftovers from meals?”

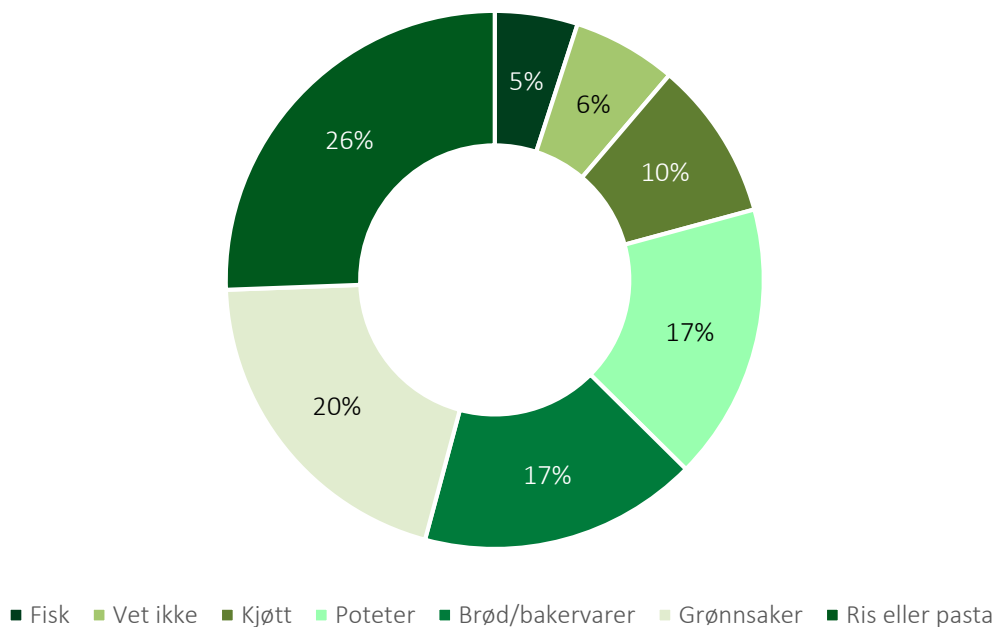


Figure 5-2 Types of food most often discarded as fridge and meal leftovers (2020)

Rice and pasta are most often mentioned as being discarded after meals (26%), followed by vegetables (20%) and bread/baked goods and potatoes, both at 17%. There is thus most waste of foods that are not usually considered as the main components of the meal. There are only minor changes in the 2019 results (from 0 to 2 percentage points for each group).

5.3 Why are we throwing away edible food?

The reasons for discarding selected product groups are shown in Figure 5-6, presented as a weighted average of eight groups (yoghurt/sour cream, cheese, vegetables, fruit, baked goods, fish/fish products, sliced meat and milk/cream). The question on food waste behaviour was expanded from previous surveys to include more possible causes, which means that the results cannot be directly compared with results from years prior to 2019.



Figure 5-3 Main reason for discarding eight different types of food, weighted average (2020)

Figure 5-3 shows that again this year “forgotten about it in the fridge or elsewhere” was the most frequently stated reason for consumer food discard, at 27%. This is nevertheless a decrease of four percentage points from the figure for 2019, which may indicate that consumers are becoming better at keeping an eye on what they have in the fridge. A quarter of respondents stated that “past its expiry date” was a reason for throwing away food in their household, and this is thus the second most common reason for consumers to throw away food. There is still little to suggest that packaging-related causes are an important factor in consumers’ food waste, at least according to the consumers themselves.

5.4 Consumer Knowledge of Anti-Food Waste Measures in the Industry

This year's consumer survey again included questions about measures the food industry has introduced to help reduce consumer food waste. The results of these questions are presented in Figure 5-4.

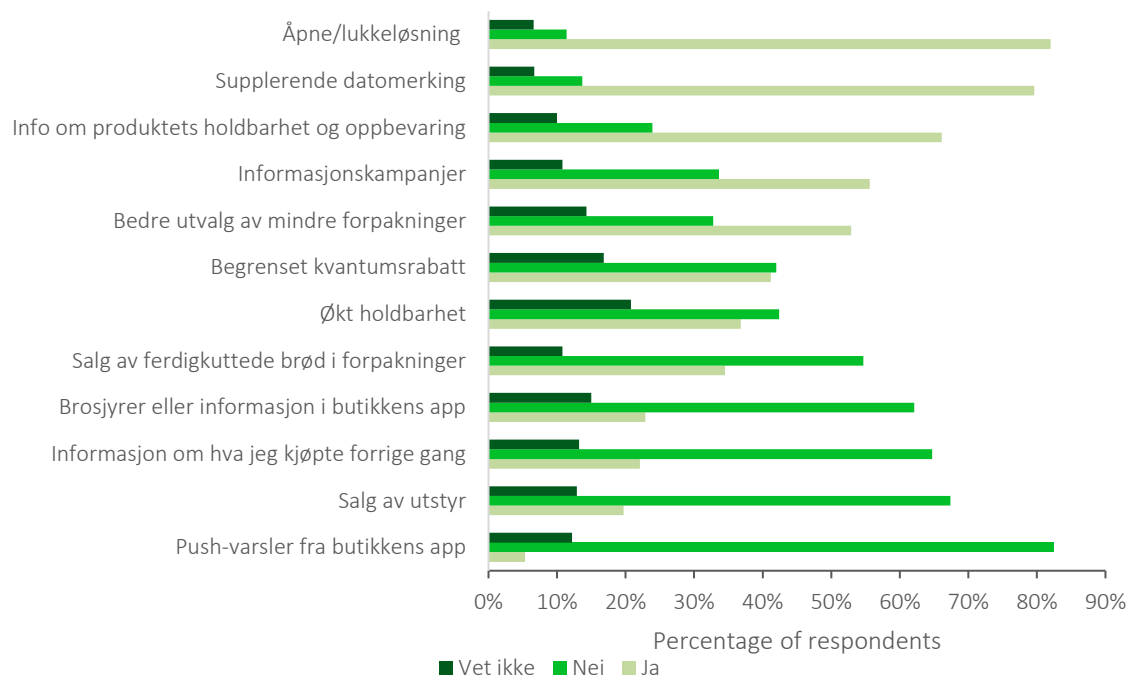


Figure 5-4 Consumer knowledge of anti-food waste measures in the food industry (2020)

The measures most familiar to consumers are opening/closing mechanisms on packaging and additional information on date labels; over 80% of respondents stated that they knew about these. Like last year, there were very few consumers who used apps to help reduce their food waste.

Respondents who stated that they had heard about the various measures were then asked if each measure had reduced food waste in their household. The results are presented in Figure 5-5.

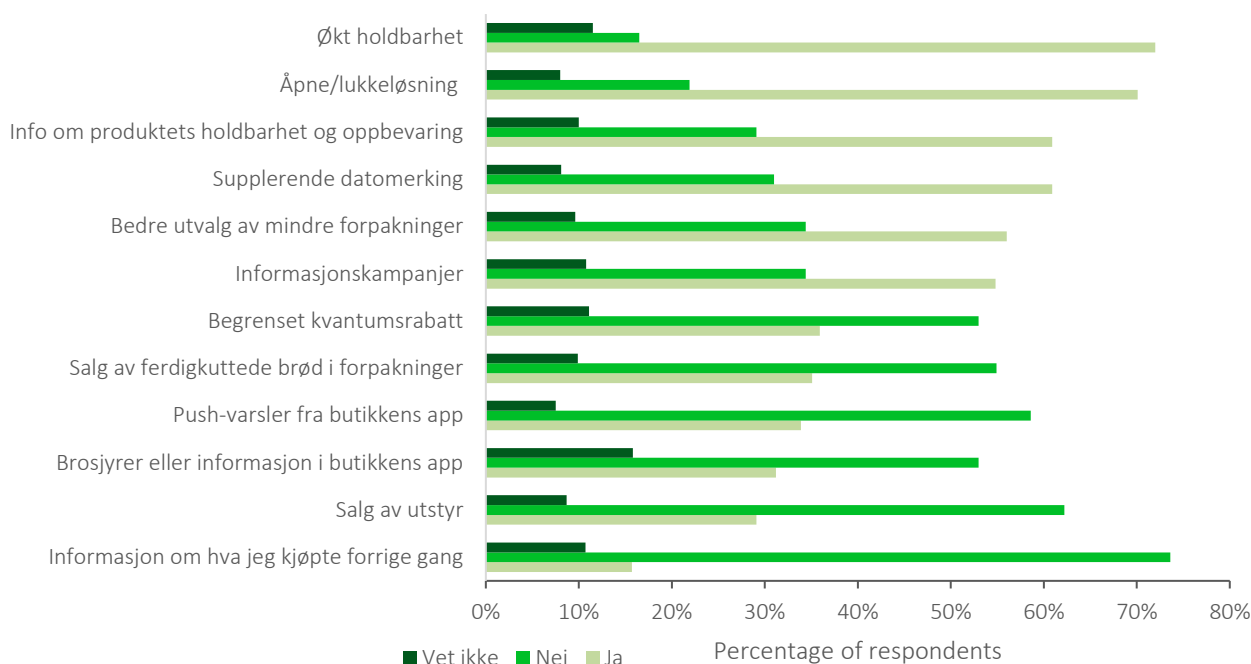


Figure 5-5 Respondents' answers to the question "Has this measure reduced your food waste?" (2020)

The measures that most respondents stated had reduced food waste in their household were longer shelf life, opening/closing mechanisms, and information about shelf life and recommended storage after opening.

The food industry survey conducted among retailers, wholesalers and producers also included questions about the kinds of measures the industry has introduced to help consumers reduce their food waste. Nearly half of the food producers (46%) replied that they were making efforts to provide clearer information about storage on packaging, while 42% stated that they were working to increase the shelf life of products. The fact that 37% of respondents in the consumer survey stated that they knew that the industry has increased the shelf life of products, while as many as 72% believed that longer shelf life had decreased their food waste, indicates that information about this measure does not reach many consumers, and that they do not consider the increased shelf life of the products to be a specific anti-food waste measure by companies. The food industry survey also revealed that 22% of the companies were working to introduce additional information on date labels, while as many as 61% of consumers believed that this measure helped to reduce their food waste. Coupled with the fact that a high proportion of consumers (80%) stated that they were aware of this measure, this indicates that food producers can help consumers to reduce their food waste by increasing the use of additional information on date labels on relevant products.

5.5 Changes in Consumer Behaviour Due to the COVID-19 Pandemic

This year's consumer survey contained new questions about how consumers felt that food waste habits and volumes in their household had changed as a result of the introduction of lockdown restrictions in Norway due to the COVID-19 pandemic.

Figure 5-6 shows the results of consumer responses to the question "Has your household experienced any of the following changes following the lockdown in Norway on March 12th?"

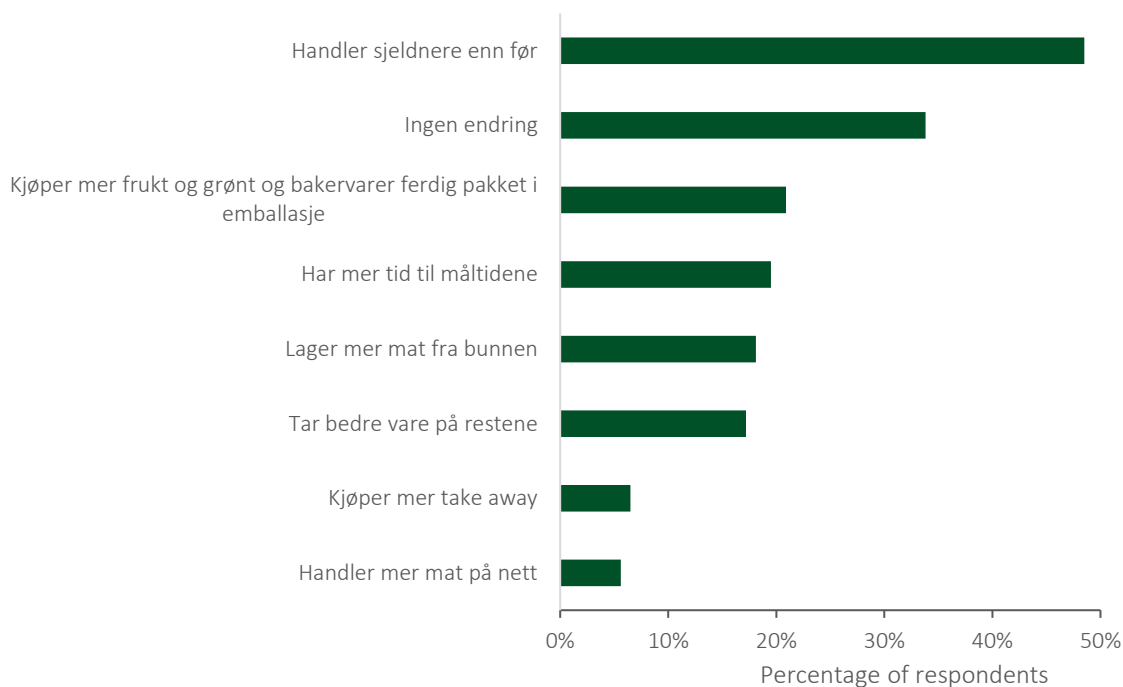


Figure 5-6 Changes in consumer habits due to the COVID-19 situation (following the lockdown in Norway on 12 March 2020)

As many as 49% of consumers stated that they shopped less frequently than before the COVID-19 measures were fully introduced, while about one-fifth of respondents bought more pre-packed fruit and vegetables and baked goods. An equal number felt that they now had more time for meals. This is interesting because reports from previous years' surveys show that the time consumers have available is related to the amount of food waste in their households.

It is also worth noting that about one-third of consumers (34%) had not experienced any changes in relation to the alternatives provided.

Figure 5-7 presents consumer responses to the question "To what extent do you think the various changes in behaviour in your household will continue in the future?"

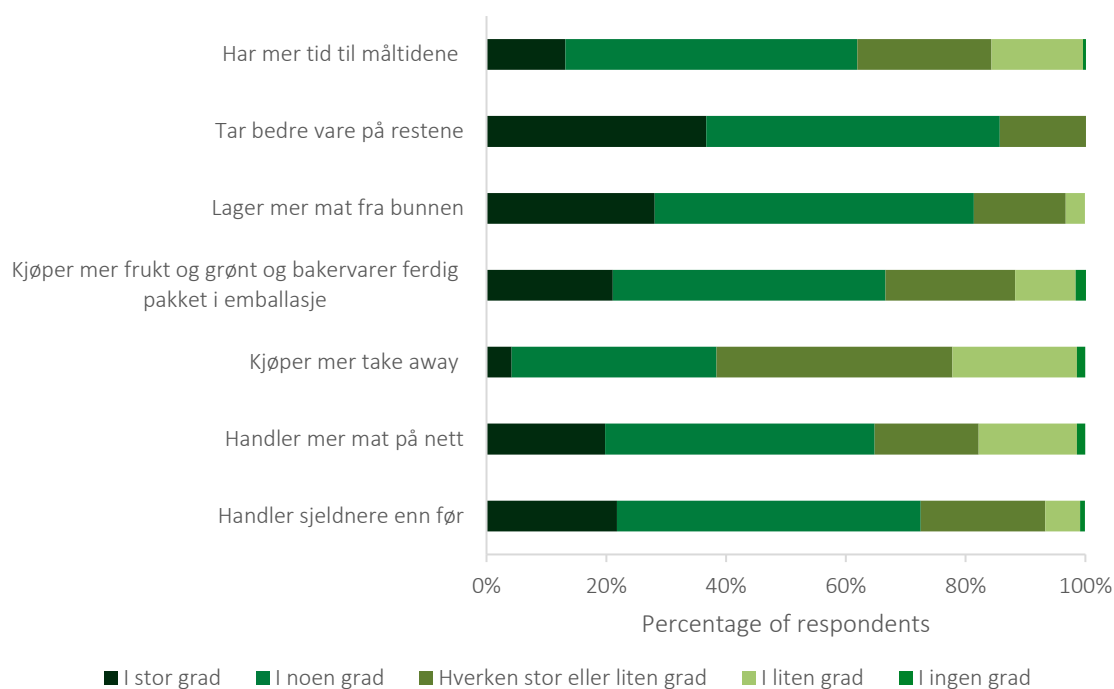


Figure 5-7 To what extent do you think the various changes in behaviour in your household will continue in the future?

Respondents seemed to think that using up their leftovers better and cooking more from scratch were the two changes in behaviour they were most likely to continue into the future. Having more time for meals and buying more take-aways, on the other hand, were perceived by consumers as less likely to continue.

Consumers were also asked how they felt that their food waste had changed since the pandemic hit Norway. Further, they were asked what they thought their food waste would be like in the future. The results of these questions are presented in Figure 5-8.

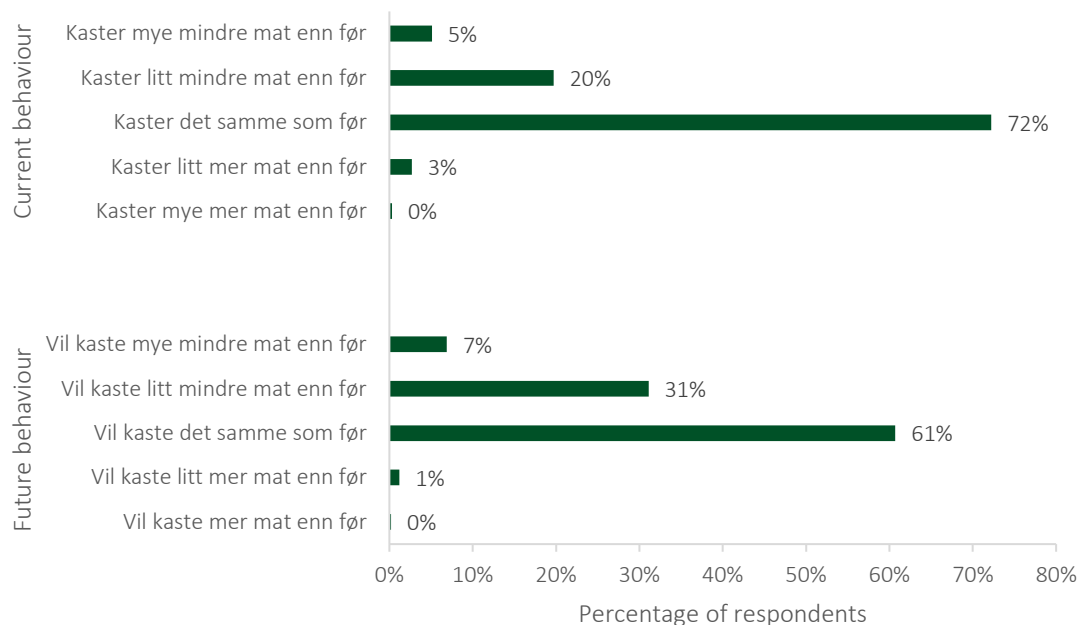


Figure 5-8 Consumers' changes in food waste as a result of COVID-19, and what they think about their future food waste

As many as 72% of respondents stated that their household had the same amount of food waste as before the COVID-19 pandemic, while 20% thought that they threw away a little less food than before. Only 5% reported discarding much less food than before 12 March. When asked about their future food waste, a much larger percentage replied that they would throw away a little less food than before (31%), while 60% said that the amount would be the same as before. In other words, respondents generally had a more positive view of their future ability to reduce their food waste than the current situation.

5.6 Food Waste by Consumers under 40, 2017-2019

On behalf of the Norwegian Environment Agency, NORSUS conducted an analysis in the winter of 2019-2020 of the data from the consumer surveys in 2017-2019 with a focus on “young consumers” i.e. respondents under the age of 40 (Prestrud 2019). This section summarises the main results of this work.

The aim of the analysis was to identify possible measures to be targeted directly at those consumers who throw away relatively large amounts of food. The analysis was based on results from previous consumer surveys conducted in 2017, 2018 and 2019.

Part of the analysis aimed to examine how the food waste behaviour of younger consumers differed from somewhat older age groups. The table below mainly focuses on differences between consumers under and over 40.

Table 5-2 Food waste attitudes and behaviour: Differences between consumers aged 18-40 and those over 40

Behaviour/attitude	Results
I use a shopping list	Older people do this much more often than younger people
I know what is needed when shopping for food	Older people know this better than younger people
I make sure that food is stored correctly from store to home and at home	Older people agree with this more than younger people
I am often tempted to buy too large/too many items	Younger people do this to a greater degree than older people
I always throw away food past its expiry date (labelled "use by")	Younger people do this more than older people, but for food labelled "best before" there is a lower correlation with age
I always eat up leftovers from meals	Older people do this much more than younger people
I often try out new foods and then throw them away because I didn't like the taste	Somewhat more frequent among younger people than older people
I throw away poor-quality food and choose fresher food instead	The youngest age groups reported doing this much more than the older age groups
The food we throw away has little economic value and does little to limit my food waste	The proportion that agrees/strongly agrees increases with age
There is little environmental impact of the food thrown away in our household, and this does little to limit my food waste	More younger than older people disagree/strongly disagree with this
In our household we always sort our food waste to help the environment	Fewer younger than older people agree/strongly agree with this statement

The table shows that for all questions related to behaviour, older consumers (over 40 years) demonstrate more anti-food waste behaviour than younger consumers.

The fact that younger people more often state that their finances affect their food waste shows that available income may have an effect on food waste, although the analyses do not show that income has a direct association with food waste frequency. We also see that groups of younger consumers are more likely to believe that the environmental effect of food waste helps to limit food waste. This may indicate that although older people report less frequent food discard than younger people, this is not necessarily a conscious pattern of action related to economic value or environmental effect, but is more related to their attitude to food from childhood, and their knowledge of shelf life and correct storage. Nevertheless, only 66% of 18-25-year-olds and 77% in the age group 26-39 years state that they sort food waste for environmental reasons, compared to up to 85% for the older age groups, which contradicts the finding that more younger people than older people make conscious choices with regard to food waste from an environmental perspective.

In the age groups within "younger people" (below 40 years), there are significant differences in the following behaviour and attitudes:

- I always keep food sufficiently cool during transport home (those over 33 do this more than younger age groups)
- I always store food correctly at home (over 33 more than younger age groups)
- Respondents under 25 are more aware of the environmental impact of food waste than those over 25
- Waste sorting: the group aged 25-32 years most often report always sorting their food waste.

In 2019, a new question was added to the consumer survey regarding knowledge of food storage and handling as well as assessment of the condition of food. An analysis of these questions related to age reveals significant differences in the degree of knowledge about food storage and what kinds of food can be eaten even if some of it is damaged or mouldy.

Note that in this respect there are no significant differences between the youngest and the second youngest age groups (18-25 and 26-39 in this part of the analysis).

Table 5-3 Knowledge of food storage and management and assessment of the condition of food: Differences between consumers aged 18-40 and those over 40

Statements about food storage and management	Elaboration
I know what to do with leftovers	Younger people have poorer knowledge of using up leftovers than older people
I generally know what kinds of food can be frozen	Younger people have somewhat poorer knowledge of freezing food than older people
I know what kinds of food can be eaten even if parts of it are mouldy or damaged	Older people have better knowledge of this: a big difference
I know how to thaw different kinds of frozen food	Older people have better knowledge of this: a big difference
I know how to store different kinds of food	A much larger proportion of older people know this: a big difference

The results in this table suggest that younger consumers need more information and knowledge related to the storage and handling of different types of food.

6 Discussion and Recommendations

The value of the Sector Agreement on Food Waste Reduction

For the past three years, the Sector Agreement on Food Waste Reduction has recruited new companies to anti-food waste efforts across the sectors of the food industry. When a company joins the agreement, it is obliged to provide food waste data and the number of companies that now share their data on food waste has increased more than fivefold since the agreement was signed in 2017. In addition, the agreement has led to food waste surveys and waste prevention work in new segments of the industry (catering, seafood producers and agriculture), and food waste has been reduced in more sectors. This demonstrates the importance of the agreement both for recruitment of new companies and for enhancing the knowledge base for future developments in food waste in Norway.

All three links in the value chain with comparable time series going back to 2015 (producers, retailers and wholesalers) have managed to reduce their food waste, and they have achieved a combined reduction of 4.2 kg per capita or 12% from 2015 to 2019. This suggests that they are likely to achieve the first interim goal of the agreement of a 15% reduction by 2020. This is in addition to the food waste reduction achieved in these stages of the value chain through the ForMat project from 2010-2015.

Producers

Producers, with a 7% reduction in food waste, are furthest from the target of 15% by the year 2020. This means that producers must implement further measures to meet the first interim goal of the sector agreement. At the same time, it is important to realise that trends in food waste are closely linked to trends in amounts of food produced, distributed and sold. At the production stage, for example, the amount of food produced has increased while the amount of food discarded has decreased. This reveals a problem related to the target figures in the sector agreement, since “kg per capita” is not a true measurement of resource efficiency for several links in the value chain, with the exception of households. This is because the indicator denominator (inhabitants of Norway) is independent of the production volume or sales of the companies or sectors. Thus, the indicator does not detect changes in production or sales, which will often affect amounts of food waste. In other words, the indicator kg per capita means that increased sales, food production and exports and an increased degree of self-sufficiency are negative factors in terms of achieving the target of the agreement. In this context, it is worth noting that the indicator kg per capita only applies to the stages of the value chain that follow the production stage in the UN Sustainable Development Goals, in contrast to the sector agreement which has used the same indicator for the entire value chain. Furthermore, it is important to point out that it is challenging to develop a single indicator that perfectly measures the performance of a system.

The main reasons why food waste occurs at the production stage are the quality of raw materials and finished products. In many cases, this is linked to quality requirements later in the value chain. Here, the retail and catering sectors have a particular responsibility, as they can influence consumer demand, provided that the reasons for changes in quality are communicated adequately.

In contrast to food waste caused by e.g. production errors, this kind of waste is difficult to deal with for producers as they do not have direct control over the causes. In order to reduce this waste, there is thus a need for increased collaboration between the primary sector, producers, retailers, wholesalers and the

catering industry, as well as joint efforts to persuade consumers to accept more “undesirable” items. There is currently some collaboration in connection with ordering procedures and logistics, which subsequently may make it easier to improve collaboration in other areas, such as quality requirements. Here it is important to point out that a number of quality requirements are linked to food safety. These involve e.g. removing food that is damaged or rotten. For this type of food waste, quality requirements are not the problem, but rather the handling of the food. It is primarily the quality requirements related to the appearance of food such as shape, size and colour that are important to address, where perfectly edible food is discarded due to requirements set at later stages of the value chain.

The analysis also suggests a great potential for increasing the proportion of food donated/redistributed by producers at the expense of food that today becomes food waste (animal feed, biogas and incineration). This could also be an important step forward for producers to achieve the targets in the sector agreement.

Retailers

The findings in this report show that retailers have reduced their food waste by 17% in terms of kg per capita, and have therefore already reached the sector agreement’s first interim goal of a 15% reduction by 2020. The retail stage has also achieved the greatest reduction in emissions related to food waste (-26%). This is partly due to price reduction measures that have decreased waste from relatively environmentally unfriendly and expensive products. Retailers will continue to focus on price reductions as this measure works well, and there is still a potential for further waste reduction by including the expiry date in barcodes or other types of code and thus ensuring that staff can more quickly find food about to expire. Work related to price reductions may thus become even more effective. GS1 Norway and Matvett are working together to introduce novel barcodes that include the expiry date. As mentioned above, this will simplify discounting in stores, but also enable more direct communication with consumers.

Further important measures that retailers are working on are more accurate forecasts and improved product flow. These measures are implemented in collaboration across the value chain value chain and this focus area is expected to lead to significant reductions in food waste throughout the value chain.

Since the key figure for the sector agreement is the amount of food waste rather than the environmental effect or financial loss, efforts must be directed towards finding measures to reduce waste of fresh baked goods and fruit and vegetables, despite their relatively low environmental impact and cost, in order to reach the goal of halving food waste by 2030. Waste from these two product groups has remained relatively unchanged throughout the period. It would seem that familiar solutions such as price reductions and donation are currently not financially sustainable for these groups as stores lack suitable logistics systems and sales opportunities; further, such measures would require much more manual work in stores than other categories. An environmental report (“Climate Cure”) showed that the three largest retail chains considered it unrealistic that a large proportion of food waste from fruit/vegetables and bread/baked goods could be used as human food (either through price reductions or via charities), and that the most realistic and probably the best socio-economic solution would be to use this food waste for animal feed (Stensgård et al. 2019).

Bread is a high-volume product, customers expect to find a good selection just before the store closes, and it is considered to be a destination product. This is also partly true of fruit and vegetables, where display is important, which in turn makes the products popular. Retail chains are afraid that a reduced range of products could have a negative effect on sales. The main challenge is thus related to competition, where stores fear that food waste measures related to the range and display of fruit/vegetables and bread/baked

goods will lead to customers choosing other stores (the first store to try out such measures will pay for it). This is to be expected as Norwegian consumers are primarily loyal to brands rather than retail chains. In order to test whether this is true, Matvett will conduct a study in autumn 2020 to determine whether in fact customers do stop using a particular store if they do not find precisely the items they want towards closing time. The question is whether customers will be more willing to accept this when they know why the stores are introducing a more limited range at the end of the day, as long as they can find an alternative.

As mentioned above, systematic price reductions of food with a short remaining shelf life is a food waste reduction measure that has proven to be effective in retail outlets. It has mainly been used for foods with a date stamp, but in 2016 some chains also introduced price reductions on fruit and vegetables and bread and baked goods in certain stores. Unfortunately, this has not reduced waste significantly in these groups, but the effect might be greater if it was introduced in more stores. Sales promotion apps such as Too Good To Go, FoodList and Throw No More are used by a number of stores for discounted items.

In price reductions, the discounted items are often placed in a separate area. However, it could be argued that discounted items should stay on their original shelves, as this provides better storage conditions (adapted to the product) and to prevent customers wasting food at full price when the same items are discounted elsewhere in the store (which leads to unnecessary store waste). In addition, many refrigerated displays of discounted items are not particularly clear or attractive.

Retailers are working to introduce more detailed food waste codes, which will make it easier to see how much of the food recorded as waste actually is food waste. Some food sold at reduced prices and donated is currently recorded as waste in certain stores. The proportion of stores that use their own codes to record donations and reduced prices is increasing, and hopefully it will be possible for retailers to report this next year, as wholesalers and producers do already.

Retailers will also continue to provide funding to food banks to ensure that surplus food is redistributed to disadvantaged people.

Consumers

The consumer survey shows that “forgotten about it in the fridge or elsewhere” is still stated to be the most frequent cause of food waste. This can probably be linked to the important factor of available time, as we have seen in previous years’ analyses of various consumer groups; it seems likely that busy consumers can easily forget about food they have in the fridge or in cupboards. It may also be because many people are more concerned about eating what they want rather than being responsible and eating up what they have. The second reason for food waste frequently stated by consumers is “past its expiry date”. This can more readily be linked to poor knowledge and use of the senses to decide whether food is edible, and there are many indications that good food is thrown away solely because of its expiry date. The analysis of young people (under 40) emphasises this, as young consumers feel less sure than older ones about how bad food looks, smells or tastes.

The analysis also shows that the consumers who discard the least food are those over 65 years of age. The post-war generation that grew up in the 1950s and 1960s, and which was the last generation to grow up during the “housewife era”, is generally good at not wasting food. Younger consumers are more likely than older ones to believe that the environmental effect of food waste helps to limit food waste, which means that they should be somewhat more aware of their own food waste habits. Since the results show that young

people have less knowledge about raw materials and their shelf life and best storage methods, it is important to focus on young people growing up today to ensure that they acquire sufficient knowledge in these areas.

The consumer surveys indicate that the food industry and the government should focus on the following areas: additional information on date labels, better packaging to increase shelf life after opening, information on storage and use of foods, and how to encourage consumers to plan purchases and have a better idea of the food in their fridges and cupboards. The authorities should strongly target schools, as there are clear indications of poor knowledge of food among children and adolescents. A greater focus on the quality of raw materials, on using different senses and on how to keep and store food in food and health classes can help to reduce food discard by future generations.

As for the responses to the pandemic-related questions in this year's consumer survey, we see that about two-thirds of consumers reported having changed their habits or behaviour related to the various factors mentioned to a greater or lesser degree. Further, about a quarter stated that they threw away less food during the lockdown, but a significantly larger number said that they would discard less in the future. Respondents were thus generally more likely to discard less food in the future than at present.

Future prospects

Although the food industry as a whole is well placed to reach the first interim target in the sector agreement (-15% by 2020), the report also shows that the industry must work in an intensive and goal-oriented manner to meet the targets in the agreement, as these increase from a 15% reduction in 2020 to a 30% reduction in 2025 and a 50% reduction in 2030.

In order to achieve the goals of the sector agreement, efforts must be directed towards:

- Continuing measures that work (such as price reductions, internal procedures, etc.)
- The large product groups in terms of volume across the value chain: fruit/vegetables and bread/baked goods
- Better collaboration and information sharing between companies and across the value chain to improve ordering and forecasting
- Reduced quality requirements related to the appearance of food, particularly fresh products, and improved opportunities for alternative utilisation of items with reduced quality or shelf life
- Increased consumer acceptance of items currently considered non-saleable.

There is little to suggest that consumer food waste is on the decrease. This means that the food industry, in collaboration with the government, has important work ahead to reduce food waste by consumers, in addition to reducing their own food waste. This responsibility cannot be left to consumers themselves.

The food industry should focus on the following measures aimed at consumers:

- Correct date labelling including additional information
- Better packaging (e.g. opening and closing mechanisms) to increase shelf life
- Information on storage and uses of products
- Encouraging consumers to plan better and know more about the contents of their fridges and food cupboards.

The government should focus on:

- Enhancing knowledge in schools and kindergartens
- Continuing anti-food waste work in the public sector
- Conducting waste sample analyses of household waste
- Ensuring stable and adequate funding of food banks.

7 References

Carvajal, A., Myhre, M. S., Mehta, S., Dyrstad, J. S., Remme, J. F. 2020. "Kartlegging av mengder og årsaker til matsvinn i sjømatnæringen" [A Survey of Quantities and Causes of Food Waste in the Seafood Industry]. SINTEF Ocean AS Sirkulær bioøkonomi 2020-06-22.

Helgeberg, E. 2020. "Produksjonsstatistikk for 2019, kategori 10 – 12 Nærings-, drikke- og tobakksindustri, etter 8-sifret pomkode" [Production Statistics for 2019, Categories 10-12: The Food, Beverage and Tobacco Industry, by 8-digit Prodcom Code]. Statistics Norway 2020.

Møller, H., Callewaert, P., Stensgård, A. 2020. "KuttMatsvinn2020 -forskning" [KuttMatsvinn2020 Research]. NORSUS, OR.19.20.

Nielsen, Dagligvarehandelen. 2020. "Dagligvarefasiten 2020" [Retail Statistics 2020]. https://dagligvarehandelen.no/sites/default/files/dagligvarefasiten_2020.3.pdf. Accessed 05.05.2020.

Prestrud, K., 2019. "Unge og Matsvinn" [Young People and Food Waste]. Ostfold Research, AR 09.19 / M-1493|2019.

Stensgård, A. E., Pettersen, I., Grønlund, A. 2019. "Samfunnsøkonomisk analyse av halvering av matsvinn i henhold til bransjeavtalen om redusert matsvinn – Klimakur 2030" [Socio-Economic Analysis of Halving Food Waste in Accordance with the Sector Agreement on Food Waste Reduction: Climate Cure 2030]. NIBIO No. 177. (<https://www.miljodirektoratet.no/globalassets/publikasjoner/m1495/m1495.pdf>)

Stensgård, A. E., Hanssen, O. J. 2016. "Food Waste in Norway 2010-2015. Final Report from the ForMat Project". Ostfold Research, OR.17.16.

Syversen, F., Bratland, H., Hanssen O. J., Bjørnerud, S., Stensgård, A. E., 2018. "Nasjonal beregning av mengde matsvinn på forbrukerleddet" [Calculations of Consumer Food Waste at the National Level]. Avfall Norge, 01/2018.

Appendix

Food waste that occurs in the various stages is divided into product groups in order to simplify the presentation of the statistics and calculate the economic and environmental impacts of food waste. The same division is used for the different stages of the value chain to ensure comparability between stages. Ten main groups have formed the basis of the surveys throughout the value chain; these are presented in the table below.

Overview of the division into product groups used in the surveys

Main groups	Product groups	Details
1. Frozen food	Frozen fruit/vegetables/berries/potatoes, ready-made food, ice cream/desserts, meat, fish, baked goods, etc.	
2. Fresh fruit and vegetables	Unprocessed fruit/vegetables/berries/potatoes Processed fruit/vegetables/berries/potatoes	Pre-cut salads/vegetables, etc.
3. Bread and baked goods	Bread (fresh) Baked goods (fresh)	Buns, rolls, cakes, pastries, etc.
4. Fresh ready-made food and delicatessen items	Ready-to-eat meals og prepared food (not frozen) Refrigerated toppings Sausages Open sandwiches/filled rolls/wraps Prepared meat	Ready-to-eat meals/salads, fried/grilled meat/fish, sous vide food, etc. Salads, sliced meat, pâtés, etc. for open sandwiches. Minced meat, raw burgers, etc.
5. Meat/poultry/other animals	Unprepared meat	Fresh pieces of beef, lamb, pork, poultry, other meat (venison, reindeer meat, horse meat, etc.)
6. Fresh fish and seafood	Prepared fish Unprepared fish Prepared shellfish Unprepared shellfish	
7. Eggs	Eggs	
8.1 Liquid dairy products	Cream Soft cheese products Dairy derivatives/by-products Milk Yoghurt Other dairy-based products	
8.2 Solid dairy products	Cheese Butter	
9. Durable foods	Flour, grains, cereals and baking ingredients Dressings, oils, ketchup Nuts/seeds/dried fruit and berries Dry foods for meals Sweet and tinned toppings for open sandwiches Snacks Sweets/desserts/chocolate	Rice, pasta, noodles, tinned meals, packets of soup, etc. Jam, chocolate spreads, tinned fish, etc.
10. Beverages	Non-alcoholic drinks Alcoholic drinks	Bottled water/juice/soft drinks/squashes, etc. Beer, cider, wine, spirits

