

Consumer food waste

Fact sheet

December 2014

The Netherlands Nutrition Centre informs consumers about sustainable food choices. This includes information about preventing food waste. In 2012, between 1.7 and 2.6 billion kilos of food was wasted in the Netherlands. Overall, consumers are the biggest wasters with a share of 38%. It is therefore important to find solutions that are relevant to consumers to enable them to change their behaviour.

In the Netherlands, seven in ten people are prepared to reduce their food waste. The arguments they give include the fact that it's simply wrong, that it's a waste of money and that many people in the world are hungry. However, in reality consumers are faced with several obstacles in preventing food waste, including buying or preparing too much of a specific product and incorrect storage methods.

To combat food waste, it is important for consumers to change their behaviour in terms of buying, preparing and storing food. Simple solutions include making a shopping list, using a measuring cup to determine the right portions and knowing where and how to store a specific product.

This fact sheet focuses on food waste by consumers. How much do they waste, why do they waste and how can they reduce waste?



Who is this factsheet for?

Worldwide, we throw away almost one third of the food produced for human consumption.⁶ In 2012, the total amount of food waste in the Netherlands was between 1.7 and 2.6 billion kilos.¹ This is the total amount wasted in the food supply chain, from the farmer via the shop or food service to the consumer. In terms of total wasted kilocalories, European consumers at home are the biggest wasters with a share of 38%. This is followed by agriculture (23%), the hotel and catering sector (14%), the processing and storage sector (12%), supermarkets (9%) and the food industry (5%).² It is therefore important to find solutions that are relevant to consumers to enable them to change their behaviour. This fact sheet is useful for professionals and chain partners involved in providing information and formulating strategy and policy to prevent consumer food waste.

What are the issues at stake?

How much do consumers waste? What is the environmental burden? And why are consumers wasting food?

How much food do consumers waste at home?

On average, the Dutch consumer wastes 47 kilos of solid food each year, which amounts to € 150 per person.^{3, 4} Solid food includes dairy products and oils, but does not include beverages. Of these 47 kilos, 32 kilos disappear via household waste, and an estimated 15 kilos via alternative flows (Figure 2).

Defining food waste

We refer to food waste when food intended for human consumption is not used as such.¹

We make a distinction between avoidable and unavoidable food losses. Avoidable food losses are viewed as food waste, since this is edible food.² Unavoidable food losses include shells, peels, stalks, cheese rinds, egg shells, coffee grounds, tea residue, and meat and fish remains (bones).³

Some nine kilos of the food we each waste in the Netherlands every year are prepared products, either cooked or baked. About five kilos remain untouched in the packaging or are unpeeled fruit and vegetables. In total, Dutch consumers waste about 14% of their solid food.³ There is little information about beverage waste. Each year, an estimated 3 to 12 kilos of beverages disappear down the sink, not including coffee and tea,⁵ although there is evidence suggesting that this figure may be an underestimation.⁴

Figure 2 shows the products that are wasted the most, based on a waste-sorting analysis of household waste and consumer surveys. Liquid dairy products, bread, vegetables and fruit score highest among household waste. The wasted quantities measured in these studies have remained almost the same since 2010.^{3, 7}

Figure 1
Waste comprises solid food in household waste, alternative flows and beverages^{3, 5}

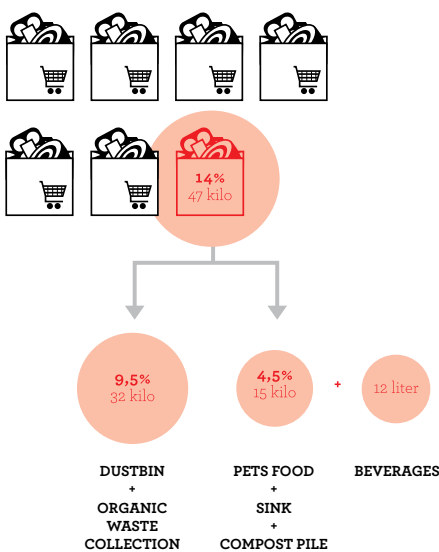
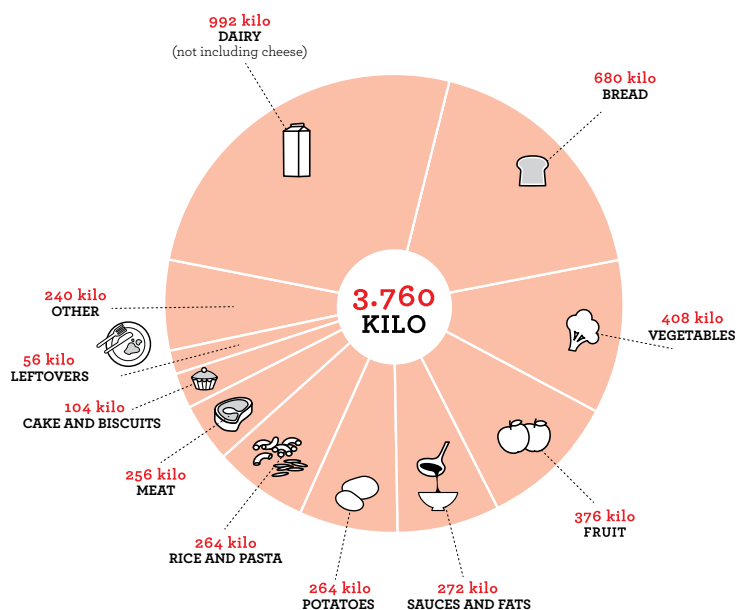


Figure 2
The ten most wasted products, excluding beverages³ (in kilograms during one person's lifetime)



How does food waste affect the environment?

When food is thrown out further down the supply chain, it has a greater impact on the environment as energy has been consumed in processing, transport, packaging and preparation. The environmental burden of food production for consumption in the Netherlands is 229 ReCiPe points per person per year (land use, greenhouse gases and energy consumption combined), a burden that could be reduced by 14% if there was no waste.⁵ Worldwide, food waste costs about 500kg of CO₂ and 250km² of water per year per person, as well as 28% of arable land.⁶ In particular, meat and cold cuts, milk and dairy products, vegetables and rice contribute to the environmental burden from food waste.⁵

Which groups waste more?

As all groups waste substantial quantities of food, policy should be focused on all groups. However, the groups that waste more than average are:

- Single person households.
 - Families with children, especially young children.
 - Young people, especially those younger than 25.
- Wealthier people and working people also appear to waste more on average.⁷⁻¹⁰ The reasons, and therefore the right approach for stimulating prevention, may be different for each group.

Arguments to avoid food waste

Consumers have several reasons for wasting food (see Table 1). However, they also provide the following arguments for wanting to avoid food waste:

1. Throwing away food is just 'not right' or acceptable (67%)
2. It is more economical to use everything (61%)
3. There is a lot of hunger in the world (41%)
4. It is better for the environment (31%)
5. It saves resources, which is good for the economy (17%).¹¹

Financial and social issues contribute to the reduction of food waste, or at least to the intention to waste less food.⁹ Reducing household costs partly results in buying better quality food.¹² Although most people realise that food waste affects the environment, almost half are not concerned about this issue.¹⁰

Factors influencing consumer behaviour

The main factors influencing behaviour with respect to food waste are:

- Awareness: almost two thirds of consumers are aware of the fact that they waste food themselves. This awareness is highest among women and the elderly, and they indicate a desire to do something about it.^{10, 12, 13} At the same time, consumers significantly underestimate their own behaviour in

terms of food waste, and mainly blame the problems on other consumers.^{7, 9, 11, 14}

- Intention: 90% intend to reduce food waste.^{7, 11}
- Attitude: consumers find it important not to waste food. The generations born after World War II show less concern, although they agree that throwing away food is simply unacceptable.¹¹ Attitudes about food waste and food quality have a strong negative impact on wasteful behaviour.^{8, 9, 15} Rising affluence also plays an important role.¹⁶
- Self-efficacy: 72% of the public think they can contribute to reducing food waste. Seven in ten are prepared to do something about food waste.⁷
- Knowledge: one in every five consumers, young people for the most part, says they would like access to more information or advice. They say that there is a particular need for better information on food storage, correct amounts and expiry dates.^{7, 9, 17}
- Habits: previous attempts to prevent food waste and related habits are an important predictor of current behaviour and self-efficacy.^{9, 18}
- Involvement: when people are more involved, they are more willing to tackle food waste.^{8, 9, 17} Households that engage in recycling, composting and sorting waste, waste less food.¹⁹

Most Dutch people are prepared to further reduce their own food waste, but they face several obstacles, see Table 1. Food waste is mainly caused by less-than-ideal buying, cooking and storage habits.²⁰ This means that everyday household management is a major factor.^{15, 21} An underlying problem is that food is relatively cheap, so there is little incentive to be economical or eat yesterday's leftovers.²¹ This results in wasteful storage habits, buying too many groceries and throwing out food sooner than necessary because its appearance has degraded.^{8, 15}

Scientific state of knowledge

Most scientific studies focus on the volumes of food waste and the reasons people throw away food, but there have not been many studies into how this can be prevented and dealt with effectively. The Netherlands Nutrition Centre provides the public with advice, based on current scientific knowledge.

What is the best way to prevent food waste?

People wishing to reduce their food waste need a concrete action plan. Buying the right quantities, putting bread in the freezer, checking the pantry and fridge before shopping and preparing meals with products that are close to their expiry dates are the most logical ways for consumers to reduce food waste, but these simple strategies are still employed too infrequently.⁷

Table 1: Matrix of the most important product groups, measures and tools, based on several studies.^{3, 7, 17, 18, 22}

			Most wasted foods ³											
			dairy products	bread	vegetables	fruit	sauces and fats	potatoes	meat	rice and pasta	cake and biscuits	leftovers		beverages
Reasons why consumers throw out food¹⁸			26%	18%	11%	10%	7%	7%	7%	4%	3%	1%		Possible solutions^{7,17,22}
Preparation	Prepared too much	47%			•		•	•	•	•		•		Preparing the right amounts (measuring cup, scales, apps)
	Used the wrong preparation method	9%			•		•	•	•	•		•		
Storage	Past best-before date*	61%	•	•	•		•				•		•	Flexibility regarding the best-before date (look, smell, taste)
			•	•	•				•		•	•		Freezing the product (containers, bags, stickers)
	Leftovers I will not use or eat at a later stage	39%	•	•	•		•	•	•	•		•		Creative food preparation (recipes, apps)
			•		•	•	•		•		•	•		Set fridge at 4°C (fridge thermometer)
	Used wrong storage method so product is spoiled	30%	•		•	•	•	•	•			•		Smart storage (storage indicator, packaging)
Buying	Too much of the product in packaging	18%	•	•	•	•			•		•			Portion sizes (smaller packages, special offers)
	Bought too many units of the product	13%	•	•	•	•	•	•	•		•			Buying the right amounts (shopping list, check household supplies)
Other	Did not have time to consume the product	21%	•	•	•	•	•	•	•		•		•	Do not keep so much in storage
	Did not consume the product as I didn't like it	29%	•	•	•	•	•	•	•		•		•	
	Poured out too much of a drink	6%											•	
	Made too much of the product (coffee or tea)	27%											•	

*"Forgot that I had the product at home"(41%) and "I have hardly been home lately" (32%)¹¹

Studies have shown that households that manage to reduce food waste use products that are past their sell-by dates and do not throw out leftovers. They have also found that it is effective to plan meals, make shopping lists, weigh out the correct amounts and adopt proper storage habits.¹²

Table 1 gives the reasons for food waste for each phase of the food consumption process, the various food products examined and the solutions for reducing food waste. The solutions are further elaborated below. The 'eyes on the future' section discusses solutions that still need to be developed by the food supply chain.

1. Preparing the right amounts

The main reason people throw away food is because they prepare too much. Almost 50% say they measure the ingredients as much as possible when preparing a meal, but only one in five does this on a daily basis. People do not know the right amounts (when cooking rice, for example), they just follow their instincts (when cooking pasta) or they simply cook the whole pack. Households that never measure how much they need to cook throw away more.^{7, 22}

Possible solution: providing the right information regarding quantities and measuring out quantities with a measuring cup or scales.

2. Flexibility regarding the best-before date

Confusion and lack of knowledge regarding the use-by and best-before dates are an important cause of food waste.²⁰ If consumers focused less on the best-before dates, that could save up to 14 kilos in food waste per person per year.²² Only 38% know the difference between the best-before and the use-by date.⁷

The difference between the best-before and the use-by date

There are two types of expiry dates: the best-before date (THT in Dutch) and the use-by date (TGT). Products with an expired best-before date (quality guaranteed) can often still be consumed without people becoming ill. Products with an expired use-by date should be thrown out immediately as people may contract a food-borne disease if they consume the product.

People forgetting what they have in stock and frequently being away from home results in products passing the best-before date or spoiling.^{7, 9} People who decide whether to consume a product based on appearance and smell tend to use products two days or more after the best-before date.²⁴ Consumers throw out food immediately after the best-before date has

expired less frequently than was the case in 2011,⁷ but half of consumers still discard food immediately after the best-before date has expired.²² According to the Netherlands Food Safety Authority (NVWA), a range of products such as canned vegetables, coffee, tea, pasta, rice, sweets and syrup can be consumed after the best-before date without any problem.

Possible solution: be flexible with the best-before date. Explain the difference between the use-by and the best-before dates and emphasise the importance of looking, smelling and tasting before you decide to throw out products past their best-before date.

3. Creative food preparation

The reason consumers throw out food after having prepared too much is that they consider the leftover portions too small for storage or they simply do not know what to do with their leftovers or partly used products,⁹ such as dairy, vegetables, sauces and other ingredients. Consumers store all products with the intention of consuming them later, and only throw them out if they really feel the food can no longer be eaten. Two thirds of consumers sometimes throw out leftovers from the fridge.⁴

Possible solution: recipes and apps giving ideas for using leftovers. Plan your menu for the whole week.

4. Freezing and refrigerating at 4°Celsius

Many people mention freezing or refrigeration as the most important measure to combat food waste.¹⁷



Freezing products will keep them for a very long time. Products suitable for freezing are bread, leftovers and meat. Plastic trays, bags and stickers are very useful in this respect. Refrigeration is important for products such as dairy, meat and vegetables. Storing products at a temperature of 4°C extends or maintains their storage life. One in four households has set the fridge over 7°C, and more than 75% over 4°C. Half of the public checks the fridge temperature occasionally. One fifth knows that 4°C is the best temperature for the fridge, but this number is growing.⁷ Households that consciously use a fridge thermometer set the fridge at the right temperature.

Possible solution: inform the public of proper freezing and refrigeration methods and the best places for storing food. A fridge thermometer can help keep the fridge at the right temperature. Make sure packaging indicates proper storage advice.

5. Smart storage

Storage methods play an important role. Many consumers think products should be removed from their packaging before storage, but that is not the case.²³

Possible solution: inform the public about correct storage methods. An important message to convey is that packaging helps keep the product fresh for a longer period, both at home and on the shop shelves.²³

6. Portion sizes

One in every five consumers purchases excessive quantities if a particular product is not available in smaller portions. Fifty-eight per cent indicate being able to buy the right-sized portions would help them to waste less food.²⁵ One in every four consumers throws out food regularly as the packaging is too large or non-resealable. Among young single people and double-income households, this is almost 40%.⁸ The numbers of one and two-person households, and households maintained by the elderly, are growing substantially.²⁷

Possible solution: raise consumer awareness of the risk of buying products on offer in bulk and point out the

availability of smaller packaging. However, with regard to packaging sizes, it is primarily up to the supermarkets and producers to make changes.

7. Buying the right amounts and reducing excessive storage

Around a quarter¹⁸ to a half of consumers⁹ say they buy too much food. They do this due to special offers, unavailability of the product in smaller amounts, inability to assess the right amounts or concern that they would have an insufficient quantity of the product in storage.²⁵ Consumers who try to avoid buying excessive quantities of food throw out almost 24 kilos less than those who prefer to have too much than too little of a product. Around half of consumers are careful about not storing too much food.²² Consumers also mention that sometimes they simply do not have enough time to finish a product before it spoils, but this is also the result of storing too much of a specific product in the first place. Making a shopping list and sticking to it helps reduce food waste,²⁶ accounting for a 4-kilo reduction in waste per person per year. One in five consumers never makes a shopping list, however 60% regularly do.^{7, 22}

Possible solution: stimulate consumers to buy the right sizes by sticking to a shopping list, planning meals ahead and checking household stocks before shopping.



Special offers and consumer buying behaviour

Special offers, promotions and large portion sizes tempt consumers to buy more of the product than they require.²⁷ The more often consumers make unplanned purchases, the higher the levels of waste. This applies in particular to consumers with impulsive buying behaviours.²⁸ The main reasons for overbuying, however, are not the special offers, but rather changed plans, cooking for more people than will actually be present at the meal, trying out new products, or buying products for recipes for special occasions.^{26, 29}

Netherlands Nutrition Centre: tools and resources

- Website: www.voedingscentrum.nl/minderverspillen
- Storage guide (leaflet): www.voedingscentrum.nl/bewaarwijzer
- The digital storage guide: www.voedingscentrum.nl/nl/mijn-boodschappen/minder-verspillen/digitale-bewaarwijzer.aspx
- Smart cooking app ('Slim Koken'): www.voedingscentrum.nl/apps
- Useful recipes (including tips for what to do with opened products and packages): www.voedingscentrum.nl/recepten
- The Eetmaatje (see picture): In February 2014, one million of these Eetmaatjes were distributed to cook the right amounts of rice and pasta. This was a joint initiative of the Netherlands Nutrition Centre and the Albert Heijn supermarket chain.
- Wageningen University and Research Centre's FoodBattle (provides guidelines to reduce food waste as a group over a three-week period): www.foodbattle.nl
- Tool 'Mijn Stap naar minder voedsel verspillen' (my steps towards reduced food waste): www.voedingscentrum.nl/mijnstap

Milieu Centraal provides a useful 'throwing out' test: www.weggooitest.nl



Focus on the future

Solving the complex food waste problem cannot happen overnight. In recent years, considerable effort has been put into raising awareness and knowledge, and several interventions have been developed. Behaviour change is required to further reduce food waste in the future. This will require resources such as internet solutions and smart shopping list apps with self-learning abilities. But it will also require technological innovations, such as stickers for fridges that change colour when the temperature is right or chips on packages that keep track of the expiry date.^{9, 13, 23}

Measures to combat food waste are more effective when consumers, producers, retailers and authorities work together. A good example is offering smaller-sized portions and packages due to the increase in households with fewer people and the elderly. Some consumers are prepared to pay extra for smaller portions and do not consider the extra packaging a problem.²³ Better smarter packages that are adapted to storage conditions offer a solution, especially for products with a short shelf life.²⁰ In addition, consumers would also benefit from clearer and bolder storage advice on packaging. Clarity and uniformity about the best-before date can also contribute to less food waste.³⁰ Finally, reduced prices for products close to their best-before dates would also be a great incentive to reduce food waste.¹³ A substantial reduction in food waste is a key condition for more sustainable food patterns.

Government objectives

Both the Ministry of Infrastructure and the Environment and the Ministry of Economic Affairs have included reducing food waste in their policies. The Ministry of Economic Affairs will focus on reducing food waste by 20% relative to 2009.³¹ The Ministry of Infrastructure and the Environment considers this area as one of the promising areas in waste flows for reducing the environmental burden. The European Commission's proposed target is to reduce food waste by 30% between 2017 and 2025.

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