



GOOD PRACTICES MODULE:
Strategies to reduce food waste



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Title:

Strategies to reduce food waste

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Duration:

6 hours – The duration of this module is four hours of the lesson and two hours the practice of the exercises.

Objective:

Promote individual responsibility and empowerment through knowledge of the main strategies to reduce food waste.

Introduction:

This module describes the opportunities to reduce food waste in the different stages of the food chain in a general circular approach. It justifies the fight against food waste as a shared responsibility. The module also highlights the target measures, including the role of companies, hospitality industry, consumers and institutions..

Learning outcomes

On successful completion of Learning Unit one participants should be able to...

Knowledge

- Know the concept of circular economy and its implications for food waste.
- Know the concept of the “three r” model.
- Identify the different strategies for the multiple actors involved in the supply chain.
- Acknowledge the opportunities to reduce food waste at home, considering the planning, store and consumption of food products.
- Know the concepts of food banks, soup kitchens and their relevance for reducing hunger and food waste.

Technical skills

- Understand the differences between “use by” and “best before” in food labelling.
- Know the role of the different stages of the food supply chain in food waste.

Soft skills

- Appreciate the complementarities between poverty reduction and food waste reduction.

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- Raise awareness on the global dimension of food waste and the role of the individual, behaviour, attitudinal actions, along with institutional strategies to fight against it.

Main contents

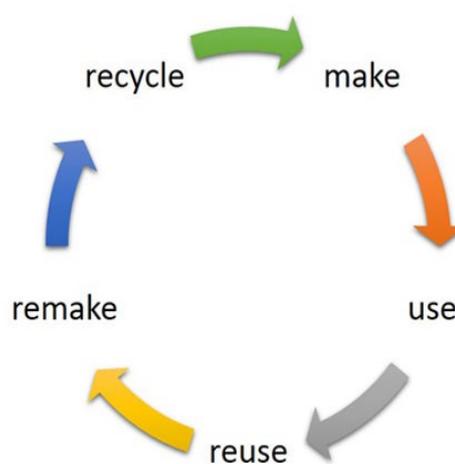


1. | Motivation / General framework

Reducing the levels of food waste requires making some important changes in our behaviour regarding food. These changes can be guided by following the basic criteria of the so-called circular economy.

In contrast to the “take-make-waste” linear model, a circular economy model proposes to close the cycles of production and consumption as much as possible. It starts from the correct making and using of products and follows with the three “r” model.

The circular economy and the three “r” model



Source: own elaboration

The three “r” model implies: “reuse” products as much as possible, making the most of its usefulness; “remake” products, changing components if necessary, to restore the value of the product and keep using it. Once the product reaches the very end of its life, “recycle” its different parts and materials, reducing the generation of waste as much as possible and reusing everything that can be used.

The circular economy model is a suitable way to achieve a sustainable economy, understood as the avoidance of the depletion of natural resources in order to maintain an ecological balance. It represents a powerful contribution, for instance, to achieving global climate targets, trying to avoid the negative effects of climate change.

The circular economy principles are especially attractive for the problem of food waste. For instance, as consumers, we can start buying and cooking the amount of food that we are actually going to consume. We can also reutilize food scraps, and recycle the non-edible parts of food, depositing



them in the right places so that they can be used as compost for new crops, thus helping to close the food cycle.

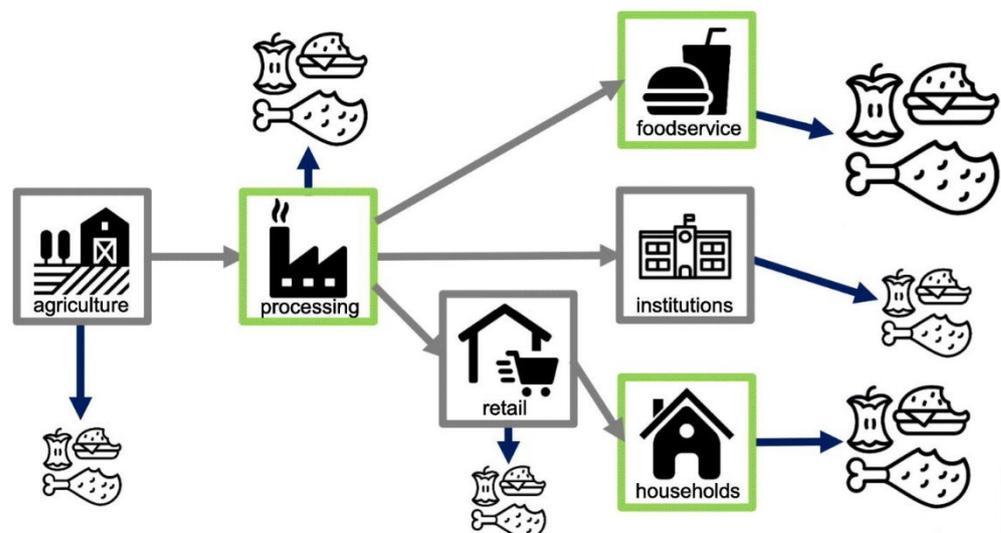
It is necessary to make the food system more sustainable. It requires changes in all the stages of the food chain, transforming as much as possible the ways of producing, storing, manufacturing, distributing, retailing or consuming food. Avoiding food waste is not the only one of the necessary changes to make. However, it helps substantially to achieve sustainability.

2.1 Fighting against food waste is everyone's responsibility. Targeting measures at all the stage of the food chain

If making the food system sustainable affects all the links of the food supply chain, so are the measures to reduce the problem of food waste. Avoiding food waste is not just a consumer problem. The rest of the stages involved in the food chain also have to learn, take responsibility and act to face the problem.

If this is not done, we run the risk that the progress in reducing food waste in some links of the food chain will be overshadowed by the absence of improvements or even by the deterioration in others. Fighting against food waste is everyone's responsibility.

The stages of the food supply chain



Source: Read et al. (2020)

Agriculture is circular by nature. Farmers should do their best to maintain this circularity, trying to reduce food losses in the sowing and harvest processes. Maintaining soil fertility and managing the production process is also fundamental for a sustainable agriculture.

Additionally, the store and the first bulk process of the food after harvest is very important to avoid food losses. Disposing of warehouses with the necessary conditions for a good conservation of food is essential. Also, having machinery that makes the most of the food raw material, and packaging systems that keep the product in good conditions are crucial. The load and unload processes in the distribution systems should be very



cautious to minimize losses. Besides, maintaining transport systems at the correct temperature and humidity level is also of great importance.

Likewise, retailers should improve their food management, storing and packaging in good conditions for food conservation, and offering consumers the option to buy the amount of food they need. Restaurants and catering firms should also help in their processes of cooking and delivery.

Finally, consumers should increase their awareness on the problem, following as much as possible the three “r” model of reuse, remaking and recycling their meals and food, and avoiding waste more than the strictly necessary. In this question, every meal matters.

In addition to the sectors involved in the food chain, institutions can help to improve food consumption habits in all sectors, informing about the problem to increase awareness and applying the relevant and necessary regulations. Including these aspects in both educational and health programs can contribute substantially to reducing food waste.

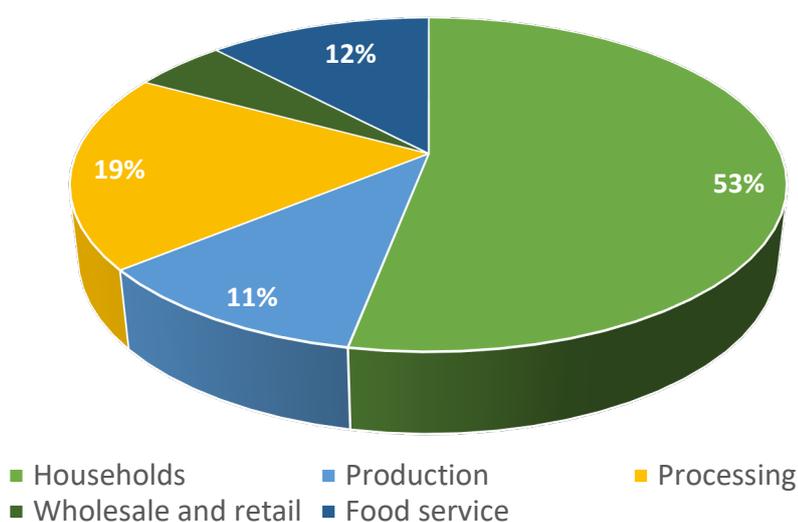
In the rest of the module, we delve into the specific actions that each of the actors involved in the food chain can develop to face this problem.

3. | Reducing food waste at the different stages of the food supply chain

As we have seen in the previous section, reducing food waste needs a comprehensive evaluation of the interdependencies throughout the different steps of the food supply chain. The performance of all the agents involved can affect the decisions and behaviour of other actors upstream and downstream. Thus, an integrated assessment of the food supply chain is essential to reduce food waste. In developing countries, reducing food waste requires significant investments in agricultural infrastructure, technological skills, storage, transport and distribution. On the contrary, in developed economies the largest potential relates to retailers, food services and consumers (Parfitt et al., 2010).

In the following sections, we evaluate how the different actors can contribute to the reduction of food waste.

Distribution of food waste throughout the food supply chain in the EU-28, 2012



Source: own elaboration from Stenmarck et al. (2016)

3.1 | The role of companies

Processing industries

Food processing was responsible for around 19% of the food waste in the EU-28 by 2012 (Stenmarck et al., 2016). In order to avoid food waste, processing companies can:

- Improve packaging, with a clearer labelling about expiration dates, cooking and freezing instructions and easing food dispensing without spoiling the unused food.
- Encourage the consumer's education, providing tips on food packaging and controlling the size of the food portions.
- Forecast adequately the necessary food inputs for the production process, avoiding to waste perishable goods.
- Use ERP (Enterprise Resource Management) software to improve the tracking of lots and to avoid overstocking.
- Remanufacturing in the case of production errors, particularly as for meat, chocolate and pasta production.
- Turn the waste into an income stream through circular collaboration with other businesses.

In sum, the critical issues that processing industries should tackle to achieve the reduction of food waste have to do with its accurate measurement, the coordination among the different business sections (planning, logistics, marketing, etc.) and the organization of the production process (Garrone et al., 2016).

Wholesale, logistics and retailers

Despite food waste at the wholesale and retailer levels only reached 5% in the EU-28 by 2012 (Stenmarck et al., 2016), retailers can influence the agents upstream (producers and manufacturers) and downstream (consumers) the supply chain (de Moraes et al., 2020). Wholesale and retailers could reverse the trend of food waste by:

- Optimizing planning and storage, trying to meet demands with the exact supply of food. They could consider the sales information from previous years or even climatic data. Sharing data and improving transparency would help to achieve it.
- Focusing on avoiding surpluses before its generation, or looking for alternative uses if surpluses have been already generated (Schneider and Eriksson, 2020).
- Optimizing transportation and delivery, shortening the logistic routes, buying goods directly from the farmers and monitoring the temperature in transport.
- Working with suppliers to coordinate the process of food supply.

- Training store employees with specific courses on food waste to increase their awareness.
- Investing in technology (software) to reduce excess inventories and food perishables.
- Simplifying food expiration labels.
- Managing products in the store with, for example, special offers to sell the products close to the expiry date.
- Selling “ugly” products at a lower price.
- Transforming food waste into new products. For instance, selling orange juice made with “ugly” oranges.
- Packaging products adequately to increase their shelf life.
- Collaborating with local entities as food banks to donate unsold food. In this sense, retailers are the largest donors in Europe (FoodDrink Europe, 2019).
- Carrying out information campaigns in the retailer’s website or even in the supermarkets.

In conclusion, wholesalers and retailers can contribute to food waste actions not only directly, but also indirectly as a result of their interconnections with other stages of the food supply chain.

3.2 | The role of hospitality industry

The food service sector represents around 12% of the food wasted in the different stages of the supply chain (Stenmarck et al., 2016). Hotels, restaurants, event and contract catering would be included in this sector. Besides, most food waste stems from leftovers post-preparation. Among the main recommendations to reduce food waste, we can enumerate (FoodDrinkEurope, 2019):

- To measure food waste to reduce production while meeting customer demand, that is, behave as a food auditor.
- To invest in technology capable of predicting food orders in advance.
- To plan menus carefully, changing them frequently.
- To train the staff so they can adequately communicate with customers about portion sizes, menu choice, etc.
- To store food appropriately and at the optimum temperature.
- To use a food in multiple dishes, trying to use the different components of a product into different recipes.
- To cook using seasonal products.
- To ensure that food is clearly labelled and to handle food according to the “first in, first out” criteria.
- To control Inventory days on hand (DOH).
- To move from batch food to cook-to-order preparation.
- To plan how to use the potential surplus food as extra ingredients.
- To use non-edible food scraps into compost.
- To recycle all the packaging.

- To shifting away from disposable to reusable items (napkins, cutlery, etc.).
- To donate food surplus to food banks or charities.
- To run offers and discounts in order to repurpose unused food before it spoils.

To sum up, most actions of the food service sector are related to supply chain efficiency and consumer behavioural changes (FoodDrinkEurope, 2019).

3.3 | The role of consumers

We can distinguish between individual (the things each of us can do) and collective (the things all as society can do) actions.

Individual actions

Households are the most critical stage regarding food waste, as they represent nearly 60% of the total food waste in the supply chain, with an average of 67 kg/person /year in the EU (Stenmarck et al., 2016). Consumer attitudes and behaviour towards food and food waste are determining factors to fight against food waste. Consumer attitudes can also influence how restaurants and market activities deal with and reduce food waste.

The differences between “used by” and “best before” labels



Source: https://ec.europa.eu/food/system/files/2020-06/fw_eu-actions_date-marking_infographic_en.pdf

The changes needed in consumers’ behaviour include, among others (FoodDrinkEurope, 2019):

- Adopt healthier diets, with less elaborate products. Including oddly-shaped and ugly fruits and vegetables as they contain the same nutrient properties.
- Buy only what is needed: Plan the food you will include in your basket and calculate the size of the portions. This also will help you to save money.

- Store food properly: Storing the food in the best places (fridge, freezer, cupboard) helps to keep the food fresh longer. Keep the fridge between 1° and 5°C.
- Pay attention to food labelling: “Best before” refers to quality and means that your food will be at its best before the date given. After this date, although it might not be at its best, it will still be safe to eat. ‘Use by’ refers to safety: you must not eat food past the ‘use by’ date.
- Use leftovers for food that you are not going to eat in each meal at home or when you go to a restaurant.
- Buy from local food producers and eat in season. This helps to reduce distances and steps in the supply chain.
- Share and donate the food that otherwise would be wasted to food banks and rescue programs.
-

Way for reducing individual food waste



Source: <https://changeformclimate.ca/story/the-problem-of-food-waste>

Collective actions

Food banks, soup kitchens and shelters provide food assistance, helping to reduce hunger. At the same time, they contribute to supporting sustainable food systems and reducing food waste through community-based and multi-sector collaborations. The GFBN (2019) highlights the impact of local food bank organizations. Innovation technologies and infrastructure are critical to increase the efficiency of food systems and to reduce food losses and waste.

Food banks emerged in high-income countries to complement the public sector to reduce inequality and food insecurity in vulnerable populations.

Nowadays, food banks have rapidly expanded in middle- and low-income countries

“In Europe, FEBA members collectively sourced more than 756,000 tons of food, providing 4.1 million meals. The Feeding America network of 200 food banks provided more than 4.2 billion meals to people in need and rescued more than 3 billion pounds of food that would have otherwise gone to waste” (GFBN, 2019).

Food banks receive donated food, which mainly comes from surpluses from different steps in the food chain.

The functioning of a food bank



Source: GFBN (2019).

3.4 | The role of Institutions

Reducing food loss and waste requires collaboration of a wide range of actors such as households, companies and farmers. Institutions play a central role promoting these collaborative efforts, boosting technological and behavioural changes as well as financing and supporting initiatives and infrastructures to reduce food loss and waste. Public and private institutions, researchers, NGOs and the civil society are key actors to identify and share best practices, provide technical assistance, raise awareness along the supply chain, establish waste reduction targets and work with main stakeholders. Institutions are also responsible for establishing regulatory frameworks in terms of standards, norms and guidelines to reduce food loss and waste in the supply chain (FUSIONS EU Project, 2016).



Some institutional actions to help in the reduction of food waste would be related to:

- The increase of awareness about food waste along the supply chain through the design and implementation of information and communication strategies for producers, households and local and national authorities. These strategies include communication campaigns, public events (festivals, weeks, conferences, competitions...), educational activities targeted to different stakeholders, institutional agreements, among others.
- The regulatory framework: National and international legislation and initiatives on food security and labelling are necessary. Similarly, establishing mandatory targets for food waste prevention, for the separation, collection and recycling of food waste and boosting national legislation to promote food donation would help to reduce food waste.
- Price-based instruments with positive and negative incentives: Positive incentives through subsidies and grants could favour technological improvements, increasing efficiency in the supply chain, surplus donations, the development of strategies for food waste reduction or the reduction of price for consumers (price-reduced for food with a close expiration date or perceived as suboptimal). Negative incentives to internalize the social cost of food wasting would also contribute to the reduction of food waste.
- The cooperation between public authorities, trade associations and food banks to implement logistic and technological solutions.
- The investment for the development of municipal infrastructure to handle food waste (collection and distribution of surplus, etc), urban and vertical farming opportunities.

Evaluation section



1. | Multiple choice questions

1. **“The linear economy model is better to achieve sustainability because it is easier to implement than the circular model”**. This sentence is:

- a) True.
- b) False.

2. **Which of the following questions are true?**

- a) It is necessary to make the food system more sustainable.
- b) All the links of the food chain can be improved to achieve sustainability
- c) Avoiding food waste helps substantially to sustainability
- d) All of the above are true.

3. **“Avoiding food losses and waste is not a question for farmers. Only food consumers are involved in the problem”**. This sentence is:

- a) True.
- b) False.

4. **“Reducing food waste is a matter for everyone involved in the food chain, from producers to final consumers”**. This sentence is:

- a) True.
- b) False.

5. **Considering the role of retailers in the food supply chain, we can say that:**

- a) They can only influence the agents upstream the supply chain.
- b) They can influence the agents upstream and downstream the supply chain.
- c) They cannot influence any agent in the supply chain.
- d) All of the above are true.

6. **“In 2012, the largest share of food waste in the EU-28 through the food supply chain was direct responsibility of the food processing companies”**. This sentence is:

- a) True.
- b) False.

7. **“Turning food waste into an income stream through circular collaboration with other businesses is a good action to reduce the food waste of companies”**. This sentence is:

- a) True.
- b) False.

8. **Wholesale and retailers could reduce food waste by:**

- a) Selling "ugly" products at a higher price.
- b) Packaging products adequately to increase their shelf life.
- c) Focusing on generating surpluses.
- d) None of the above are true.

9. "Donating food to local institutions as food banks is a way of incentivising food waste". This sentence is:

- a) True.
- b) False.

10. In order to reduce food waste, the food service sector should:

- a) Cook using seasonal products.
- b) Store food at an optimal temperature
- c) Recycle all the packaging.
- d) All of the above are true.

11. "Replacing batch food for cook-to-order preparation triggers food waste". This sentence is:

- a) True.
- b) False.

12. The hospitality sector consists of:

- a) Hotels, restaurants and logistics.
- b) Catering, restaurants and logistics.
- c) Catering, restaurants and hotels.
- d) Wholesale and retailers.

13. "Households are not responsible for food waste as they are at the end of the supply chain". This sentence is:

- a) True.
- b) False.

14. "In order to reduce food waste at home, households should "store the food in the best places (fridge, freezer, cupboard) and keep the fridge between 1 and 5°C". This sentence is:

- a) True.
- b) False.

15. "If today is 14th of July and the label of a product says best before 13th of July, it is dangerous to eat the product". This sentence is:

- a) True.
- b) False.

16. "If today is 14th of July and the label of a product says use by 13th of July, you should not eat the product". This sentence is:

- a) True.
- b) False.

17. To increase the awareness about food waste along the supply chain institutions could:

- a) Implement education activities.
- b) Implement communication campaigns.
- c) Sign institutional agreements.
- d) All of the above are true.

2. | Activities/optional exercises

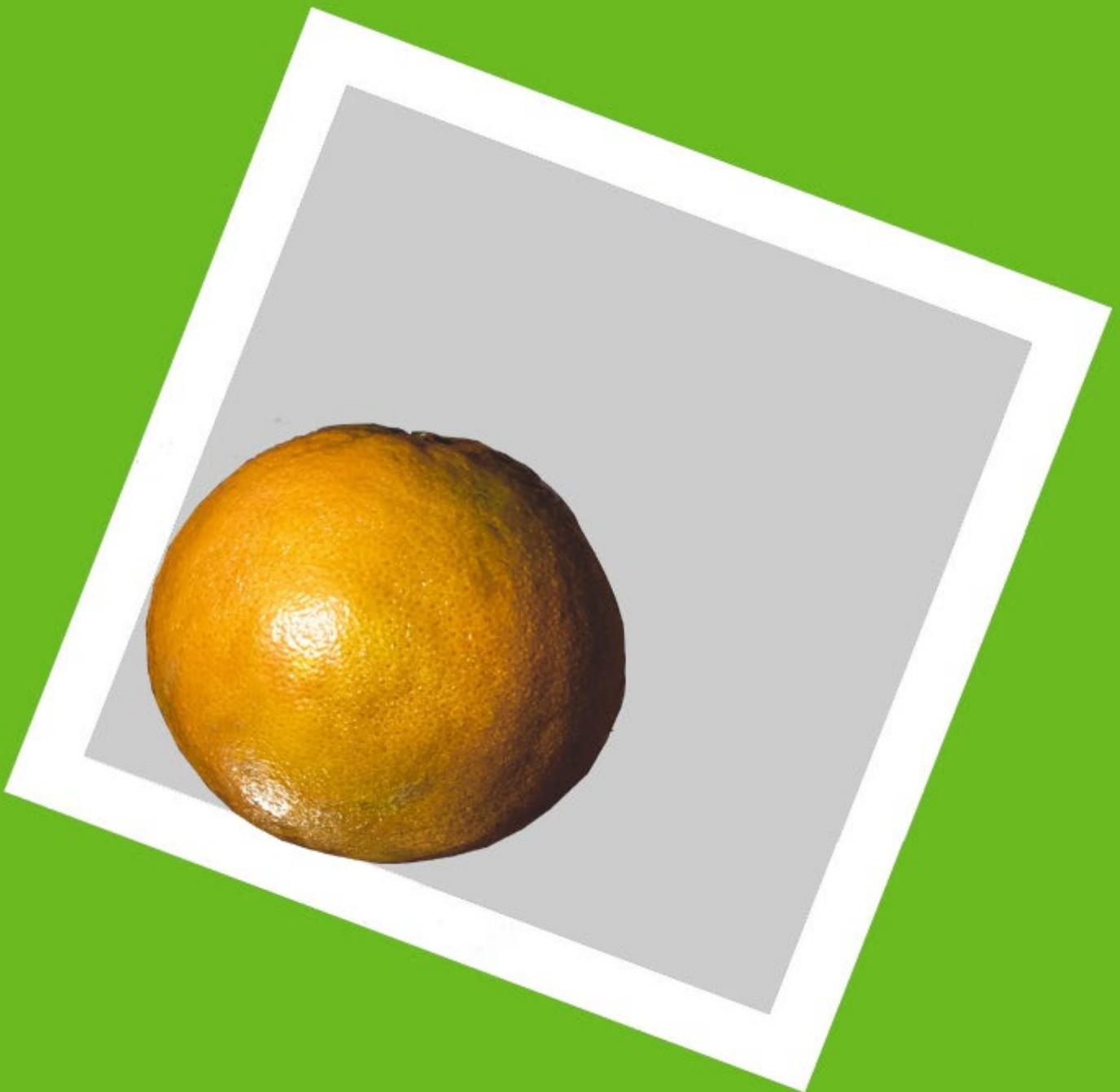
- Go to your fridge and take five different products. Look at their label and note the “use by/” best before” date thinking about their meaning.
- Imagine you are a member of the government. Think which activities you would implement to raise awareness about food waste.
- Now, imagine you own an important agri-food company of your country. Explain its importance in the food supply chain and the actions it can implement to reduce food waste.
- When you go to the supermarket, look for the different food offers. Do you think they contribute the reduction of food waste or on the contrary it aggravates the problem? Explain your answer.



3. | Multiple choice answers

1	b	6	b	11	b	16	a
2	d	7	a	12	c	17	d
3	b	8	b	13	b		
4	a	9	b	14	a		
5	b	10	d	15	b		

Key concepts and vocabulary



Key concepts and vocabulary

“Best before”: refers to quality and means that the food will be at its best before the date given. After this date, although it might not be at its best, it will still be safe to eat.

Circular economy: an economic proposal to close the cycles of production and consumption as much as possible, contributing to reduce consumption and emissions and to get a sustainable economy.

First In, First Out: asset-management and valuation method in which assets produced or acquired first are sold, used, or disposed of first.

Food banks: Non-profit, charitable organization aimed at distributing food to vulnerable people with difficulties to purchase food.

Food processing: Transformation of agricultural products into food, or of one form of food into other forms.

Hospitality industry: broad category of fields within the service industry that includes lodging, food and drink service, event planning, theme parks, travel and tourism. It includes hotels, tourism agencies, restaurants and bars.

Inventory days on hand: average number of days you hold inventory before selling it.

Retailer: person or business that sells goods to the public in relatively small quantities for use or consumption rather than for resale.

Soup kitchens: Meal centres where food is offered to vulnerable people usually for free or at a below-market price

Sustainable food chain: food supply chain organization so as all its stages avoid the depletion of natural resources and the generation of emissions and waste in order to maintain an ecological balance in all the steps of the chain.

Three “r” model: is part of the circular economy proposes to get a sustainable food chain, reusing, remaking and recycling materials and food to avoid losses and waste.

“Use by”: refers to safety and means that you must not eat food past the ‘use by’ date.

Wholesale: Business of selling goods in large quantities and at low prices, typically sold on by retailers at a profit at later stage.

Useful resources





Useful resources

<http://www.fao.org/international-day-awareness-food-loss-waste>

<http://www.fao.org/fao-stories/article/en/c/1309609/>

<https://stopfoodwaste.org/resources>

<http://www.fao.org/3/i7059e/i7059e.pdf>

https://ec.europa.eu/food/food/food-waste/food-waste-communication-materials_en

<https://lovefoodhatewaste.com/portion-planner>

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