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Food losses and waste

Issues and policy options

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Cited papers and publications were selected as they contribute to summarize the growing body of studies on the topic.

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1. The issue

Rough estimates, based on only a handful of studies, suggest that around one third of the annual food produced in the world for human consumption, approximately 1.3 billion tons, gets lost or wasted. According to a study by the FAO (2013), 54 percent of the world's food losses and waste occurs "upstream" during production, post-harvest handling and storage, while the remaining occurs "downstream," at the processing, distribution and consumption stages.

As a general trend, low-income countries suffer more food losses during agricultural production due to poor infrastructure, low levels of technology and low investment in the food production systems, abetted by uncertainty in weather and market conditions and weak institutional framework. Food waste at the retail and consumer level tends to be higher in middle- and high-income regions – where it accounts for 31–39 percent of total food losses and waste along the whole food chain of those regions, compared with 4–16 percent in low-income countries. Food waste is most often caused by both retailers and consumers over-purchasing and throwing away perfectly edible foodstuffs. Per capita waste by consumers is between 95–115 kg a year in Europe and North America, while consumers in sub-Saharan Africa and South and Southeast Asia each throw away only 6–11 kg a year (FAO, 2011).

For instance, food waste at retail and consumer level only, is estimated in the United States of America at more than 60 million tons per year i.e. 31 percent of the total available food at that food chain level, corresponding to around 1 250 calories per capita per day (Buzby, Wells and Hyman, 2014). The European Commission reports that more than 100 million tons per year are wasted in the European Union (European Commission, 2016). Industrialized and less industrialized countries dissipate roughly the same quantities of food, respectively 670 and 630 million tons (FAO, 2011). In Africa, around 13 million tons per year of cereals, i.e. more than 15 percent of the total, are lost in post-harvest operations only (APHLIS, 2016). Attempts were made to quantify some global environmental impacts such as the total carbon emissions, land and water use and biodiversity. For instance, FAO (2013) estimates that FLW generate more than 3.3 gigatons of CO_2 equivalent/year (ref. 2007), corresponding to, e.g., all annual CO_2 emissions of Russia and Japan together.

Unfortunately, different studies use different definitions and estimation methods to assess FLW, refer to non-homogeneous segments of the value chains or use as unit of measure the weight in tons, which does not necessarily reflect the forgone benefits due to FLW. Therefore, an up-to-date global picture of FLW is difficult to obtain.[1] To overcome difficulties in measuring and comparing the "Food Loss & Waste Protocol", a multi-stakeholder effort to develop global accounting and reporting standards (known as the FLW standard) has been set up. The first version of the standards is due in June 2016.[2]

[1] For instance, FAOSTAT, the FAO global database of food and agriculture (http://faostat3.fao.org/home/E) report Waste by commodity country and year as an item of the so called "commodity balance sheets". Figures in FAOSTAT exclude waste before and during harvest, waste at household level and wastes occurring in processing, as they are embedded in extraction rates. In addition, they are often calculated as a fixed percentage of availability, the latter being defined as production plus imports plus stock withdraw (see FAOSTAT glossary). This makes comparisons of waste data from FAOSTAT not directly comparable with other data provided by global and regional studies.

[2] The FLW Protocol is coordinated by the World Resources Institute (WRI) and comprises the Consumer Goods Forum (CGF), FAO UN, the EU funded project Food Use for Social Innovation by Optimising Waste Prevention Strategies (FUSIONS), UNEP, the World Business Council for Sustainable Development (WBCSD), and the UK-based charity WRAP (available at www.wri.org/food/protocol).

Despite objective difficulties in measuring FLW, there is enough evidence on the magnitude of FLW to raise the concern of the development community regarding their impacts on the sustainable use of natural resources and the current and future food and nutrition security. For instance, "Zero food loss and waste" is one of the pillars of the "Zero Hunger Challenge", launched by the UN Secretary General in 2012, reinvigorated by the 2030 Agenda on Sustainable Development Goals (SDGs).

The renewed focus on FLW in the SDGs requires also renewed attention on research, measurement, monitoring and actions for FLW reduction. For instance, to address knowledge gaps, raise awareness and operationalize FLW reduction through policies, programmes and projects, global public-private partnership initiatives have been launched, such as the Global Initiative on Food Loss and Waste Reduction (Save Food Initiative).[3] This is an umbrella public-private partnership hosting various global, regional and international programmes aimed at FLW reduction. FAO is also working on a "Global Food Loss Index (GFLI)" indicator, based on the calories content of food as a common unit of measure.[4]

In an attempt to clarify what "Food Losses" and "Food waste" refer to, FAO has provided the following definitions:[5]

- **Food losses (FL):** the decrease in quantity or quality of food in the production and distribution parts of the Food Supply Chain (FSC) mainly caused by the functioning of the food production and supply system or its institutional and legal framework.
- **Food waste (FW):** part of the food loss which refers to the removal from the FSC of food (whether processed, semi-processed or raw) which is fit for consumption, by choice, or which has been left to spoil or expire as a result of negligence by the actor, predominantly, but not exclusively, the final consumer at the household level.

These definitions clearly state that FW is a component of FL. In addition, FW is characterized by an element of deliberateness (removal of food fit for consumption by choice or negligence). It is legitimate to interpret the complementary component of FL as something undesired, occurring for reasons not under the direct control of agents concerned, such as inadequate technology, poor logistics, malfunctioning of markets, etc.[6] It is also worth noting that FW, "predominantly, but not exclusively" is associated to final consumption, thus recognizing that deliberate discarding of food may occur at all stages of the food supply chain.[7] FAO (2014) recognizes however that the difference between FL and FW "is not defined sharply" whereas this distinction is important because the underlying reasons causing FL and FW are very different. This implies that policies and strategies to reduce them have to be different as well.

To systematically investigate causes, impacts and solutions for FLW, the Committee on World Food Security (HLPE, 2014) outlined a framework where causes of FLW are classified by level:

- **Micro-level causes.** Causes of FLW at a given stage of the food chain that result from actions of agents at the same stage of the chain (e.g. Poor harvest scheduling and timing, careless handling of produce, lack of appropriate storage conditions, careless transport, behavioural causes at consumer level).
- **Meso-level causes.** Causes of FLW related to a whole food chain pertaining to decisions or missed decisions of agents in that chain (e.g. lack of coordination among segments, too long chains, missing product standards, pesticide-contaminated processed products).

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3 The Save Food Initiative is a joint programme between FAO and Messe Dusseldorf, a German exhibitions company, involving private and public partners aimed at achieving FLW reductions (available at www.fao.org/save-food/en).

4 The GFLI index covers losses at farm, transport, storage and processing levels, although waste at household level is still excluded. FAO UN Technical Platform on the Measurement and Reduction of Food Loss and Waste (available at www.fao.org/platform-food-loss-waste/en).

5 FAO's definitions of Food Losses and Waste. FAO UN Technical Platform on the Measurement and Reduction of Food Loss and Waste (available at http://www.fao.org/platform-food-loss-waste/en).

6 In these definitions, there is a grey area associated to deliberate choices. Undesired reductions of output may occur, in many instances, as a consequence of deliberate choices not to invest to prevent them. For instance, deliberately deciding not to invest in storage facilities because the investment is not considered profitable may lead to reductions of outputs which are still undesired, although occurring as a consequence of a deliberate choice grounded on economic rationale. Being this an indirectly deliberate reduction of output, it could be classified as a food waste. A different situation may occur when an economic agent considers it profitable to invest in preventing food losses but he/she has no possibility to do that (e.g. for missing credit facilities). In this case, the reduction of output could be considered a loss, at least from the private agent's perspective.

7 At least in principle, these new definitions do not limit the occurrence of FW at the end of the food chain (distribution, sale and final consumption) as for instance in Parfitt, Barthel and Macnaughton, 2010.

- **Macro-level causes.** Causes of FLW that pertain to the overall socio-economic environment and reflect on the food chain micro and meso-level causes (lack of infrastructures, low educational level, missing legislative frameworks, ...).

However, policies and strategies to reduce FLW must be grounded on the recognition that, to a large extent, FLW are rational from a private perspective (see sections 3 and 4 below), as they are the result of the optimizing behaviour of agents (de Gorter, 2014).[8] However, from a societal perspective, i.e. from the point of view of the well-being of the whole society, FLW are claimed to generate net losses due to the associated socio-economic and environmental consequences, such as:

- **Lowering incomes for producers.** FL during harvest and in storage, other things being equal, translates into lost income for farmers, raising concerns for the poorest and most vulnerable.
- **Increasing food prices for consumers.** FL, by subtracting a share of supply, other things being equal, are likely to lead to higher food prices, negatively impacting poor consumers.
- **Squandering of resources.** FLW also amount to a squandering of resources, including water, land, energy, labour and capital and needlessly producing environmental damage including excessive greenhouse gas emissions, contributing to climate change.
- **Jeopardizing long-term food availability.** Increasing food requirements due to rising populations and incomes imply ensuring sustainable food production and consumption in the long run. FLW are claimed to endanger the sustainability of food systems.

Therefore, given the current decisional space available to private agents, i.e., considering the options currently available to producers, processors, traders, consumers, FLW may well be fully rationale. However, there are economic costs that individual economic agents do not consider in their decisional process, because of missing or imperfect markets, informational asymmetries, and negative externalities. As the society has to bear such costs, what is optimal by the private point of view results to be sub-optimal by the societal perspective? This divergence between private and social optimality suggest the need for policies to arrive at a socially optimal level of losses and waste.

[8] A detailed discussion of the economic rationale of FLW can be found for instance in De Gorter (2014).

2. Economic rationale of food losses

In many instances, losses in production processes occur as a consequence of technological choices and market-driven expectations of producers, based on the expected profitability of the various options. Events leading to FL, whose probability of occurrence can be reasonably assessed by agents (risks), are accounted for when deciding which mix of inputs to apply in view of obtaining a given level of output.[9] Selected technically feasible options to reduce FL are discarded because they are not expected to be profitable, given the opportunity cost of labor, capital and other inputs. Other options are out of reach of single agents in terms of investment requirements, know-how, organizational capacities etc. This occurs at various levels of value chains, for instance:

- **Pre-harvest.** Overplanting often occurs because the expected cost of falling short of a given crop, particularly if prices will be high, is higher than the cost of producing too much.[10] Actual output prices then influence harvested areas. Marginal areas with harvesting costs higher than revenues may be left un-harvested. In addition, the cost of adopting some techniques to reduce the risk of crop losses, such as anti-hail nets, manual watering, water storage etc., may exceed the expected benefits from a more abundant output.
- **Post-harvest.** In some instances, the cost of transporting small quantities of late-ripened fruits and vegetables or lately harvested crops due to adverse weather conditions, exceeds the value of output. In other instances, additional costs to improve storage facilities may exceed the revenue from reducing losses. Furthermore, selected actions to reduce post-harvest losses are beyond the capacities of single producers as they would require coordinated efforts of several actors (e.g. value chain organization), and/or there may be informational gaps regarding economically viable options that are unknown to the farmer. Finally, missing or incomplete financial markets may impede the adoption of economically viable options.
- **Processing.** The value of losses at processing level due to the use of particular processing equipment may be lower than the cost of improving the processing equipment.
- **Retail.** Some undesired losses may occur also at retail level due to the same type of inefficiencies which may occur at production processing level (e.g. out-of-order or worn out equipment, etc.). The same considerations above hold also at retail level.

9 Other extraordinary events leading to food losses may be neither foreseeable nor assessable in probabilistic terms (extreme droughts, earthquakes etc.) falling out of the rational decision-making process of single agents.

10 Food losses consequent to overplanting could also be considered food waste, as they are the consequence, although indirect, of a deliberate choice.

3. Economic rationale of food waste

Also food waste may occur at different levels of the food chain. At the retail level, for instance, retailers may tend to over-purchase, in terms of quality, quantity and variety to avoid the risk of leaving customers unsatisfied. At the same time, they may be reluctant to sell left-over food in less than perfect conditions due to the risk of endangering consumers' health and/or damaging their reputation. The expected costs from such events exceed the benefits from selling left-over food.[11]

At the consumer level, wasting food, i.e. discarding edible or formerly edible food items, given the current state of consumer preferences, has to be seen not as a loss of income but as an expenditure that generates welfare per se, or as a direct consequence of choices which are sources of welfare.[12] For instance, to avoid the risk of falling short of food at home, the consumer over-purchases. Given the price level, the cost of purchasing too much, i.e. the cost of the food she/he will not consume, is lower than the expected cost of falling short of food when needed. In addition, the consumer enjoys "capabilities", i.e. freedom of choice among several options. Individuals enjoy not only consumption when it physically occurs, but also the possibility to opt at any time, even while at home, for different types of food consumption. Once the choice materializes, food items not consumed are discarded as no longer welfare-generating. Furthermore, for cultural reasons, regulatory norms, habits, lack of information or knowledge, the consumer may over-purchase and over-prepare foods and/or discard good quality edible food because it is reputed unsafe, unhealthy or no longer tasteful. In these instances not consuming such food is perceived as a welfare-protecting choice.

11 The same reasoning applies to collective feeding establishments such as hospitals, schools, restaurants.

12 In most cases waste is intended to include all food discarded at retail and consumer level, whether referring to edible food (waste in a strict sense) or no longer edible food (loss at consumer level in a strict sense). There is no unanimous consensus yet on how to define food losses versus food waste.

4. Environmental externalities in the food sector and food losses and waste

Food production and consumption entail negative environmental impacts. They are very often external to producers and consumers, i.e. producers and consumers generate negative "externalities". These include the overuse of natural resources in production, processing and distribution processes, such as, land salinization and erosion, overuse of ground and river water; externalities from the use of pesticides and chemical fertilizers, such as water and air pollution, health problems for workers and consumers; GHG emissions generated in the production of food and its transport, depletion of organic content of soil, deforestation to extend arable land. All this implies that:

1. FLW, as a component of food production and consumption, generate negative externalities.
2. FW generate also specific consumption externalities linked to the disposal of food waste, such as collection of waste in urban areas, or problems related to landfill or incineration.
3. Optimal FLW from the private perspective diverge from optimal societal FLW.
4. FWL, pretty much as total food production and consumption, contribute to unsustainable food consumption patterns in the long run (at local, national and global levels).

Therefore, FLW are intrinsically linked to environmental externalities in food production and consumption. This implies that the following: i) Public choices regarding FLW should be based on analyses which take into account externalities; and ii) Private choices, both at production and consumption level, would lead to different results regarding FLW if production and consumption externalities are internalized. Internalizing environmental externalities at production, processing and consumption level is at the same time: i) a way of reducing FLW through expected upward shifts in food prices; and ii) a way of progressing towards the same environmental goals to be achieved through FWL. Reducing FWL and internalizing externalities can be a synergetic policy package towards (long term) sustainable food security, with significant cross-country interdependencies, particularly considering climate change issues and factor substitution effects. However, reducing external costs of food systems (and of other sectors as well) should be pursued anyway, as an efficiency improving measure, independently from FWL reduction.[13] The impact of higher food prices, that integrate the costs of externalities, may require compensating policies to ensure food affordability for the poor.

[13] In other words, measures to internalize the costs of FWL will also affect the costs of normally consumed foods, and in fact, if generalized, will affect the costs of all goods and services.

5. Economic rationale to reduce food losses

Private perspective. The economic rationale to reduce food losses rests on the same considerations that hold for improving, in whatever way, the efficiency of any production process (improving total factor productivity). Assuming that a private agent behaves rationally, she/he is expected to use all information and opportunities available regarding technical options, current and future prices of inputs and outputs, weather conditions etc., to maximize her/his monetary and non-monetary net benefits, regardless the quantity of food losses. However, policy-induced shocks affecting the environment within which the private agent takes decisions are expected to change production/processing outcomes, including food losses, which may shift upwards or downwards. Two broad families of policy measures, to be applicable to different extents in different countries, are expected to affect food losses:

1. Policies specifically aimed at reducing food losses;
2. Policies aimed at internalizing externalities in view of sustainable natural resource use.

In the first case, policy-induced incentives for private agents, whether efficient from a societal perspective or not, are likely to reduce food losses only if effectively designed to achieve this goal. In the second case, policies aimed at internalizing production externalities are expected to change the cost of inputs and outputs, shifting the "optimal" level of food losses by the private perspective, because private producers would reassess their convenience to generate food losses and/or investing in food losses reduction.

Societal perspective. Addressing food losses is expected to improve social conditions of both poor producers and poor consumers. Food availability would increase for both producers (own-consumption) and the society. In addition, food access would increase for producers through increased income, and for poor consumers through reduced food prices. Furthermore, as food losses, pretty much as all food production, engender stress of natural resources, including climate, it is expected that reducing food losses would reduce the pressure on natural resources.

However, unless social considerations above overcome any economic consideration, public policies aimed at reducing FL need to be tested on efficiency grounds from the societal perspective. This implies that: 1) societal benefits to implement any FL policy should exceed societal costs; 2) Cost-Benefit analyses of FL policies should take into consideration environmental externalities of food production, including carbon emissions and related climate change implications, to lead to optimal decisions by the societal point of view. A set of possible policy measures aimed at reducing food losses is provided in the annexed table.

6. Economic rationale to reduce food waste

The private and societal interest to reduce FW is at least threefold:

- **Improving consumer welfare.** Bounded rationality of consumers implies that they take decisions within the boundaries of their knowledge, information, awareness and time. In this framework, habits and social conventions play an important role. Providing consumers with additional information and shifting FW habits is likely to improve their welfare, other things equal, or reducing their expenditure required to achieve a given welfare level.
- **Reducing environmental impacts.** Reducing food waste should help in reducing the ecological footprint of both food production and consumption activities. On these grounds the internalization of environmental externalities at production, processing and consumption levels should reduce the "optimal" level of food waste for the consumers who would reassess their convenience to generate food waste.
- **Sectoral, cross-sectoral and cross-country impacts.** Reduction of FW may lead to a food price reduction, to the advantage of poor net food consumers (as well as all the other consumers) due to reduced demand pressure. It would likely have a negative impact on net food producers as it results in lower perceived demand. This, indeed, may imply an increase in food consumption and a reallocation of income on non-food items, so that other sectors may experience an increased demand. However, the magnitude of these impacts and the extent to which they would spread across countries, particularly from rich food-importing to poor food-exporting countries, has to be assessed, also taking into account price transmission mechanisms. A set of possible policy measures for reducing FW is provided in the annexed table.

7. Concluding remarks

The following considerations can be put forward as concluding remarks:

- **FLW reduction as an instrument.** Reducing food losses has to be considered as one among the instruments to improve food security, poverty reduction and environmental sustainability, not necessarily as a policy objective per se. This implies that policy measures aimed at reducing FLW need to be tested on economic, social and environmental grounds, against other policy measures suitable to achieve the same objectives.
- **Getting the food prices "right".** Producers and consumers have to receive the "right" signals from prices. Internalizing environmental externalities of food production processes through appropriate policies reduces FLW through shifts in food prices and contributes as well to the same environmental objectives to be achieved through FLW reduction. However, internalization of environmental externalities at all levels has to be pursued anyway, as an equity-efficiency measure with important cross-country implications, particularly through climate change and general price level shifts.
- **Broadening the "decisional space" of agents.** Both producers and consumers take decisions within a given set of doable options, for instance, choices of investing in relatively less efficient storing facilities or choices to discard edible food. However, choices that are considered optimal in a given set of options may well be sub-optimal if the decisional space is broadened, e.g. by providing credit facilities to fund better storing facilities or by better informing consumers. Policies, programmes and other actions that broaden the decisional space of economic agents can lead to FLW reduction by exploiting the optimizing behavior of both producers and consumers.
- **Further analyses.** Further analyses at local, national and global level are required to assess direct and indirect economic, social and environmental impacts of FLW, assessing costs and benefits of different policy options for FWL and other polices aimed at achieving environmental objectives, such as policies for internalizing environmental externalities in food production and consumption. More specifically, cross-country interdependencies, particularly between rich food-importing countries and poor food-exporting countries, have to be carefully explored to determine the extent to which the adoption of different policy packages is likely to affect different stakeholders in different locations, as the extent to which they may reduce environmental impacts. The establishment of measurement standards, such as the mentioned "FLW Protocol" or the "Global Food Loss Index (GFLI)" is a pre-condition for meaningful cross-country comparisons and sound economic analyses of FLW reduction policies.

A three-level analytical framework, comprising value chain analysis frameworks, country-level General Equilibrium (GE) and global GE models, is proposed. Cost-benefit analysis of policy options in a value chain framework (Bellù, 2013), integrated by appropriate methodologies to measure FLW (WRI, 2016), provide a quite disaggregated picture of socio-economic and environmental changes brought by selected measures for FLW reduction. Country level CGE models, such as MANAGE (van der Mensbrugghe, 2012) or the dynamic IFPRI CGE model (Lofgren, Lee Harris and Robinson, 2001) complement the disaggregated analysis by providing FLW policy implications on cross-sectoral and factor income implications in a consistent country macro-economic framework. FLW policy modelling through global CGE models such as ENVISAGE

(van der Mensbrugghe, 2009), MAGNET (Woltjer et al., 2013), or GLOBE (Thierfelder and McDonald, 2011) help in capturing cross-country interdependencies among importing and exporting countries as well as implications and feedbacks from carbon emissions. In addition, multi-region partial equilibrium models such as the FAO GAPS,[14] help highlight and likely cross-country commodity-specific interdependencies and implications for production systems.

[14] The FAO Global Agricultural Perspectives System is a partial equilibrium model covering 182 countries and 35 agricultural goods built on the FAOSTAT database, used in the Global Perspectives Studies (GPS) team to derive global long-term projections of food demand and supply.

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Annex Selected policy options to address food losses and waste

Table 1. Selected options to reduce FL and FL related issues

Specific issue	Phase	Policy measure(s)	Expected first round impacts	Expected secondary impacts	Assumptions/ notes
Overplanting/ over-breeding to reduce the risk of falling short of output due to erratic events	Pre-harvest	Improve know how and favor investment on available techniques (better varieties, improved use of inputs drip irrigation, hail-nets, wind barriers, soil and moisture conservation, agro-forestry and Good Agricultural Practices (GAP) in general) to increase crop/livestock resilience to pests and weather variability	Reduced variability of output volumes Reduced production costs per unit of output	Increased net income to producers	Effective economically and environmentally sustainable techniques exist, and are applicable
	Pre-harvest	Mitigate climate change through controlling/ reducing GHG emissions at all levels	Long run positive impacts on climate variability including reduction of erratic extreme events	More stable food supplies and reduced price variability	Climate changes are still reversible or controllable
	Harvest	Favor investment to improve timely and properly sequenced harvesting Ensure alternative markets for over-production	Increased output Increased income to farmers	Possible final output price reduction and advantages to net consumers	Organizational aspects and linkages with downstream agents are addressed
Harvested crops or milk is lost due to ineffective handling and storage	Post-harvest	Favor investment in storage facilities, including cooperative action to exploit economies of scale and shorten distances from farm to processing plants	Increased output Increased income to farmers	Possible final output price reduction and advantages to net consumers	

Specific issue	Phase	Policy measure(s)	Expected first round impacts	Expected secondary impacts	Assumptions/ notes
Primary output lost while processing	Processing	Improve processing techniques through investment in human and physical capital	Increased output Increased income to processors	Possible final output price reduction and advantages to net consumers	
	Whole food systems	Internalize environmental externalities from natural resource and input use		Food price increase Shifts in factor demands	Effective policy design and implementation modalities at all levels are identified

Table 2. Selected options to reduce FW and FW related issues

Specific issue	Phase	Policy measure(s)	Expected first round impacts	Expected secondary impacts	Assumptions/ notes
Excessive food waste at consumer level	Consumption	Regulating food waste (beyond a given threshold)	Consumers reduce food purchases and waste	Consumers may lose welfare Food prices decrease Producers lose welfare External costs of food waste are reduced	Economic benefits of the policy measure exceed implementation costs including loss of welfare It is possible to enforce the measure
	Consumption	Tax food purchases	Consumers reduce food purchases and waste External costs of food waste are reduced	Consumers may lose welfare Food prices decrease Producers lose welfare But poor food consumers may increase their welfare due to price decline	The overall economic impact need to be assessed
	Consumption	Educate consumers to waste less food	Consumers shift preferences and reduces wasted while increasing food consumed	Food prices decline Poor food consumers may increase their welfare due to price decline	The policy measure is effective in changing consumers' behavior
Unpaid disposal costs of food waste	Disposal	Internalize externalities of food waste (tax food waste)	Consumers may decrease food waste and increase food consumption Consumers may decrease both External costs of food waste are internalized	Food prices decline Food producers lose welfare Poor food consumers may increase their welfare due to price decline	Costs of implementing the policy measure do not offset the benefits

Food losses and waste
Issues and policy options

This paper highlights some of the key issues related to the current debate on food losses and waste (FLW). There is increasing interest from the international community and national governments on FLW. However, there is no consensus about the definitions and measurement of FLW, the rationale for reducing them, the "optimal" level of their reduction, the likely impacts on food and nutrition security and on the environment, as well as the policies to implement for efficiently reducing FLW. With no pretention of being comprehensive, this paper: 1) outlines some facts about FLW facts and related socio-economic and environmental implications; 2) summarizes the economic rationale for food losses and waste; and 3) identifies some of the economic, social and environmental rationales of adopting appropriate policies to address them. Some concluding remarks, including suggestions for further analyses and possible policy options are reported at the end of the paper.

TO KNOW MORE

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