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FOOD WASTE: THE CHALLENGE FOR FOOD SECURITY AND SAFETY

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Food waste is one of the big paradoxes of our times: as developing countries continue their efforts to reduce hunger, a huge amount of food is lost and wasted around the world. The issue of food losses is of high importance in the efforts to combat hunger, raise income and improve food security for poor people. By 2075, the United Nations' mid-range projection for global population growth predicts that population will peak at about 9.5 billion people that need to be fed on the other hand resources to produce food are limited.

Food waste and losses have a negative impact on the environment, considering the indirect waste in resources used in the entire life cycle of the food products, let alone the environmental impact of the disposal of the food waste.

Addressing the issue of food waste is a complex task, starting from the fact that there is no unique definition of "food waste" as there are no precise data to quantify the phenomenon. However, coordinated actions between Institutions, retailer, companies and consumers could bring to the table a clear picture and effective solutions.

Defining "food waste"

Food losses and waste happen along all the Food Supply Chain (FSC), and for different reasons: not only consumer behaviours, but also poor practices in production, storage, transportation, processing, etc. .

Up to now there is no universally agreed definition of the phenomenon. Probably, the most accepted definition is the one given by FAO in 2010, in a study conducted by the Swedish Institute for Food and Biotechnology (SIK), where a distinction between food losses and waste is proposed. Food losses refer to the decrease in edible food mass throughout the part of the supply chain that specifically leads to edible food for human consumption, and take place during production, post-harvest and processing phases in the supply chain. Food waste, instead, is defined as the losses occurring at the end of the food chain, that means they are related to retailers and consumers (FAO and SIK, 2011).

The report also makes a difference between "planned" non-food uses to "unplanned" non-food uses, which are accounted as food losses. So, food waste or losses should include food that was originally meant to human consumption but which are excluded from the human food chain for various reasons (unplanned non-food uses), even if it is directed to a non-food use, as feed, bio-energy etc. .

The European Committee on Agricultural and Rural Development, in a report presented to the European Parliament in November 2011 on how to avoid food wastage, has recognized that there is confusion about the definition of the expression "food waste" and "bio-waste", and gave a definition of food waste as "all the foodstuffs discarded from the food supply chain for economic or aesthetic reasons or owing to the nearness of the 'use by' date, but which are still perfectly edible and fit for human consumption and, in the absence of any alternative use, are ultimately eliminated and disposed of, generating negative externalities from an environmental point of view, economic costs and a loss of revenue for businesses" (Committee on Agriculture and Rural Development, 30 November 2011).

This variety in the definition of "food waste" gives an idea about the difficulty to calculate the exact amount of the wasted food. Different attempts have been made to quantify global food waste over several decades and, as pointed out by Parfitt et al, the most often quoted estimate is that about the half of all food grown is lost or wasted before and after it reaches the consumers (Parfitt, Barther, & Macnaughton, 2010).

In its report of 2011, FAO estimated that annual global food waste was about 1.3 billion tons, equivalent to about a third of the total food production intended for human consumption. This figure has been confirmed recently by a new report, "Global Food. Waste not, want not": out of the four billion metric tonnes of food per annum, a percentage from 30 to 50% (1.2 - 2 billion tons) never reaches a human stomach (Institution of mechanical engineers, 2013).

Regardless of exact data, it is evident the scale of the problem, and its complexity since it has not only environmental and "food security" related implications, but also moral and economic dimensions.

Causes for food losses and waste

Food loss and waste happen along all the food supply chain, from initial agricultural production to the final household consumption, and in medium- and high-income countries as well as in low-income ones. The final amount of wasted/lost food in developing countries is as high as in the rich countries, but the big difference is that in developing countries more than 40% of food losses occur at post harvest and processing levels, while in industrialized countries more than 40% occur at retail and consumer level.

Some of the causes of food waste and loss are the following:

General cause:

- The impact of pests and diseases during production and storage
- Poor farming and harvesting practices
- Degradation during transport
- Deficiencies in the processing process

In developed countries:

- Food gets lost when production exceeds demand.
- High "appearance quality standards" from supermarkets for fresh products lead to food waste.
- Final products which are safe for consumption but they do not meet the right shape or size are wasted.
- Consumers' behaviours, lack of knowledge and sometimes confusion regarding some words like "use by" and "best before".

In developing countries:

- Premature harvesting (poor farmers sometimes harvest crops too early due to food deficiency or economic reasons). Often, the food obtained has poor nourishing properties and economic value.
- Poor storage facilities and lack of infrastructure cause postharvest food losses in developing countries. Failure to comply with minimum food safety standards can lead to food losses and, in extreme cases, impact on the food security status of a country. A range of factors can lead to food being unsafe, such as naturally occurring toxins, contaminated water, unsafe use of pesticides, and veterinary drug residues. Poor and unhygienic handling and storage conditions, and lack of adequate temperature control, can also cause unsafe food.

Food waste and the different aspects of the phenomena: social, environmental and food safety impacts.

As pointed out before, addressing the issue of food waste is mandatory in a time in which world population is expected to grow and hunger is still a huge burden for many countries. How it will be possible to feed all the people, considering also that resources are limited and we are continuing to waste and lose food? The situation will be critical not only because of the population growth, but also for changes in the dietary habits of developing countries, since a shift from grain-based foods to animal products has been noticed. This is what it is called "the social impact" of food waste, and that is strictly related to the concept of "food security" and "access to food".

However, this is not the only impact of food waste on society. Wasting food means losing not only life-supporting nutrition but also precious resources, as water, land and energy. This is the "environmental aspect" of food waste.

In general, the food and drink value chain has a big impact on the environment: in the EU, it causes the 17% of the direct greenhouse gas emissions and the 28% of material resource use, with our consumption patterns having global impacts, in particular related to the consumption of animal proteins (European Commission, 2011).

Of course, food that is not consumed "incorporates" the resources used for its production (as water and soil), generates GHG emission (together with other environmental impacts, e.g. on biodiversity) and creates waste. Some studies have been conducted in order to assess the environmental impact of food waste. Segrè and Falasconi, for example, estimated the impact of wasted fruits, vegetables and meat in the distribution stage in Italy. 1 kg of vegetables that is thrown away during this stage consume 0,7 m³ of water, generates 0.08 kg. of CO₂ equivalent and has an ecological footprint of 3.7 m² of land. Throwing away one kilo of meat "costs" 5.8 m³ of water, 4,449 kg. of CO₂ equivalent and 38 m² of land (Segrè & Falasconi, 2011). In the report published by OPERA in 2010 and developed by Humboldt University in Berlin (von Witzke & Noleppa, 2010) it is estimated that the net balance of the "virtual imports of land" of the EU, meaning the net equivalent of land needed for the production of the agricultural products imported by the EU, is of 35 mil. Ha annually. A reduction in food losses and waste would reduce this global impact on the use of land. Finally, it is necessary considering also the "economic aspect" of food waste, since losing and wasting food represent an economic loss not only for the single consumer, but also for food companies and retailers. The lost value is not only in the missed profit, since the disposal of food waste has costs that, in some cases, can be extremely high.

As previously highlighted in the "causes for food losses and waste", the confusion regarding some expressions as "best before" or "use by" can create confusion in consumers' mind, increasing the food

waste phenomena. This is another important aspect to evaluate: the indication regarding “best before”, “used by”, “sell by”, “display until” are not always consistently used (European Commission, 2010).

The European Parliament suggested dual-date labeling “sell by” and “used by” in order to avoid extra food wasting due to wrong interpretation of the indications “use by” and “best before” by the consumers. According to the present legislation on the provision of food information to consumers, the ‘use by’ date is dedicated to highly perishable foods. After this date they are deemed unsafe (safety indicator). The ‘best before’ date refers to minimum durability: beyond this date, the food is unlikely to cause any harm but there is a warning from the manufacturer that the sensory qualities (taste, texture etc.) may not be as good as intended. When integral to their validity, advice on storage conditions must accompany the date (European Parliament and the Council, 2011; European Parliament and the Council, 2000).

It is clear that - in order to encourage a better understanding of these indications - an effort from the Institutions is required. If some parameters have to be respected in order to preserve the quality and the safety of food, is there the possibility that sometimes communication is unclear and can encourage the phenomena?

Food waste in the European Union: what the EU is doing?

A report from the European Commission highlighted that every year approximately 89 Mt of food wastes are generated in the EU27, or 179 kg per capita (European Commission - Bio Intelligente Service , 2010). The amount is break down as follow: manufacturing 39%, retail/wholesale 5%, Food Service/Catering 14%, Households 42%¹. Although data refer to 2006 - and there is a lack of new evidences - these numbers are impressive: it was estimated that this amount could rise up to 126 million tones, with an increase of GHG emissions of the 40%.

The EU 2020 Resource Efficiency Flagship and the Roadmap to a Resource Efficient Europe set the context for EU actions and policies aiming at reducing and preventing food losses. During a workshop in Barcelona "Food Waste in the EU: a study by the European Commission", five policy options have been identified in order to prevent and reduce the amount of food waste:

1. improving the reporting methodologies and activities by EUROSTAT, since it is evidence that there is a lack of data on this issue;
2. clarification of labelling: sentences as "best before" and "use by" are often confused by consumers;
3. awareness campaign, necessary to bring a behavioural change in the long-term. The EU should promote the sharing of best practices and informational tools accross Member States;
4. creation of specific food waste prevention targets, to be integrated in the MS.s Waste Prevention Programmes as required in the 2008 Waste Framework Directive;
5. requirements on separate collection of waste.

In 2011 the European Parliament reported to the Commission asking to take practical measures to halve the food waste by 2025. The working group of the Advisory Group on the food chain discussed food waste on 5 October 2012: the objective of the meeting was to exchange views on possible actions with an EU added value and to present a number of good practices, with the final objective of analyzing the problem in

¹ Agricultural food waste was not included in the scope of the study.

the most accurate way and to find practical solutions. Having asked to the stakeholder regarding food losses in their specific sector, different points were highlighted: even if there is a general lack of extensive data, there is a spread acknowledgement that waste occurs at all levels of the food chain. Moreover, the constraints are mainly technical, economic and legislative, but also awareness and cultural.

A Communication on sustainable food is going to be adopted in 2013, addressing also the issue of food waste.

It is necessary to highlight that different actions have been carried out by the stakeholders in these years, in order to prevent and minimize food waste: some example are the Italian projects "SitiCibo" (recovering surplus meals from the catering sector and perishable and non perishable surplus food from the distribution sector) and "Last Minute Market" (to create a market for unsold goods), the British WRAP "Waste and Resources Action Programme", or the single initiatives of some retailers as Tesco, Sainsbury etc.

Conclusions

To address the problem of food there no singular solution, rather than a "set" of actions that should be carried out, since the phenomenon complex and has different sides.

First of all, it is important to stress the role of Institutions: the reduction of food losses and waste has to be a priority in the political agendas. An important step should be to have a common definitions and metrics. Reaching a common definition can be the starting point to completely understand the real dimension of the problem.

Regarding the practical solutions that can be implemented in all the phases of the supply chain, the FAO report pointed out a series of ideas in order to prevent and reduce food waste.

- It is necessary to avoid premature harvesting, to promote communication and cooperation between farmers (to avoid overproduction), to organize small farmers and diversification of production.
- It is fundamental to spread innovation and new technologies in order to provide the most accurate possible forecast for consumers' demand.
- invest in infrastructure and transportation.
- Avoid unsafe food that doesn't fit for human consumption and therefore is wasted: developing the knowledge and capacity of food chain operators to apply safe food handling practices.
- Counteract 'Disposing is cheaper than using or re-using' attitude in industrialized countries through the development of the market for sub-standards products (e.g. Last Minute Market in Italy, Banco Alimentare etc).
- Improve coordination in the supply chain.
- Reduce wasted food due to too high "appearance" standards. surveys on consumers on their expectations would be a first step in that direction.

Avoid marketing strategies that lead to food waste: this is a very critical point. Consumers in rich countries in general buy more food than they need, and sometimes some promotions like "Buy three, pay two" can encourage the phenomenon, as well as the oversized ready-to-eat meals produced by the food industry Restaurants frequently offer fixed-price buffets that spur customers to heap their plates.

We could explore some additional solutions:

- Promote technology to control pests and diseases
- Implement production practices to ensure best use of resources
- Promote best practice guidelines in transport, storage and processing
- Improve trade opportunities to avoid excess on the markets
- Improve clarity of labeling
- Recommend to consumer strategies to reduce their waste
- Promote technological solutions to manage household food stocks

It is very important to stress the idea that only the cooperation between Institutions, all the stakeholders, and the consumers can lead to real and effective solutions. A lot of initiatives has been conducted at national level, from public and private sector actors, and we know that the issue will be soon discussed at a European Level. Anyway, there are still many questions remaining open. Consumers' education is a priority: but how can we speak about "rational consumptions" to the populations in the developing countries that have just discovered a new economic well-being? How is it possible to combine the "marketing needs" of producers and retailers with sustainable consumption? Could innovations and new technologies in the food sector, as Genetically Modified Organism, help avoiding food loss?

References

Committee on Agriculture and Rural Development. (30 November 2011). *Report on how to avoid food wastage: strategies for a more efficient food chain in the EU.*

European Commission - Bio Intelligente Service . (2010). *Preparatory study on food waste accross EU 27.*

European Commission. (2011). *Roadmap to a Resource Efficient Europe.* Brussels.

European Commission and Council. (s.d.). *Regulation (EU) No 1169/2011 of the European Parliament and the Council of 25 October 2011 on the provision of food information.* <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:304:0018:0063:EN:PDF>

European Parliament and the Council . (s.d.). *Directive 2000/13/EC of the European Parliament and of the Council of 20 March 2000 on the approximation of the laws of the Member States relating to the labelling, presentation and advertising of foodstuffs.* <http://eur-lex.europa.eu/LexUriServ/site/en/consleg/2000/L/02000L0013-20070112-en.pdf>

FAO. (1981). Food loss prevention in the perishable crops. *FAO Agricultural Service Bulletin*(43).

FAO and SIK. (2011). *Global food losses and food waste. Extent, causes and prevention.*

Institution of mechanical engineers. (2013). *Global food. Waste not, want not.*

Parfitt, J., Barther, M., & Macnaughton, S. (2010). Food waste within food supply chains: quantification and potential for change to 2050. *Philosophical Transactions of the Royal Society B:Biological Sciences*, 3065 - 3081.

Segrè, A., & Falasconi, L. (2011). *The black book of waste in Italy: food .* Ambiente.

Stuart, T. (2009). *Waste, uncovering the global food scandal*. London: Penguin.

von Witzke, H., & Noleppa, S. (2010). *EU agricultural production and trade: can more efficiency prevent increasing "land-grabbing" outside of Europe?*