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FOOD WASTE PREVENTION: THE CHALLENGE OF MAKING APPROPRIATE DEFINITIONAL AND METHODOLOGICAL CHOICES FOR QUANTIFYING FOOD WASTE LEVELS

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ABSTRACT

To establish reliable food waste statistics, which can be produced continuously over time, it is necessary to produce data within a robust methodological framework based on consistent definitions of food waste, and its components, and consistent system boundaries of the food supply chain. In this work, carried out within the FP7-project FUSIONS, a literature review has been carried out to understand what definitions of food waste; system boundaries of the food supply chain and methodological approaches are commonly used in studies quantifying food waste. Based on the critique a systematic concept on how to address food waste has been suggested.

INTRODUCTION

Estimates suggest that food waste account for about 1/3 of the global food production (FAO, 2011). Preventing and reducing food waste is thus vitally important in the context of both food security and resource efficiency (e.g. Stuart T, 2009). To be able to monitor and compare the effect of different food waste prevention activities, strategies and policy decisions; a consistent definition is needed. To date, no consistent definition exists.

The objectives for the FUSIONS project is to contribute significantly to the harmonization of food waste monitoring, show the feasibility of social innovative measures for optimized food use in the food supply chain and to give policy recommendations in the development of a Common Food Waste Policy for EU27 aiming at delivering a 50% reduction in food waste and a 20% reduction in the food supply chains resource inputs by 2020. Given this, a concept on how to address food waste in a consistent way has been developed.

METHODS

The work has been carried out systematically and progressively. First a critique of literature concerning food waste focusing on the definitions and system boundaries applied at each step of the food supply chain, including summarizing the environmental and economic & socio-economic aspects of food waste was performed. In the next step a criteria document to serve as a methodological reference point for the main definitional choices was developed though an experts' workshop. Finally a concept on how to address food waste in a consistent way was developed.

RESULTS

Literature review

The full review is reported in by Gustavsson et al, 2013. An overview on the number of papers reviewed for each segment is provided in Figure 1. From Figure 1 it can be concluded that most of the relevant studies relate to household wastes. Relevant studies were found on all segments apart from open markets. The different segments of the food supply chain were examined with respects to definitions used and boundary conditions applied. An analysis was then performed with respect to the critical issues regarding definitions and boundary issued.

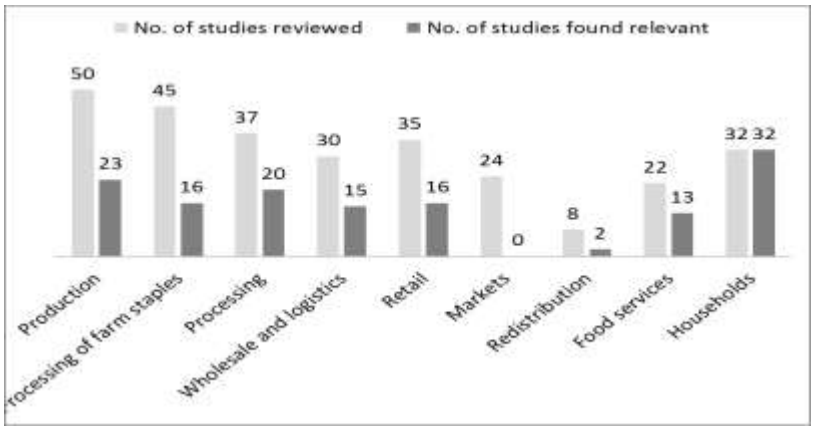

Figure 1. Scope of the literature review (Gustavsson et al, 2013)

One of the major results from the literature review is that the same terms are often used but defined differently. Commonly used terms are "food waste", "food loss", "avoidable food waste", "unavoidable food waste", "potentially avoidable food waste" etc. but these terms are *not* always defined in the same way. Some terms and definitions are very specific for the supply chain step to which they refer and for the context in which they are used. Differences were also found regarding the basis of different definitions. Most definitions are based on a mass, which means that the primary measure of food waste is weight. A few definitions take an economical perspective meaning that the primary measure of food waste is loss in revenue. Some definitions include also nutritional loss from food waste. One of the major questions which were highlighted in the literature review was which system should be conceded. That is, should the whole agricultural system be considered, the food production system or only the

food supply chain? This was in particular highlighted in the review of the primary production system (Gustavsson et al., 2013).

Methodological reference points
A criteria document was developed to act as a reference point for all discussions. The purpose was to create a consistent methodological framework to enable, encourage, engage and support key actors across to reduce the amount of edible food waste and resource in puts in the food supply chains. Bearing this aim of FUSIONS in mind, a concept for addressing food waste explicitly for the food supply chain was targeted.

Considering definitional choices, the criteria document states that the definition should be unambiguous, applicable to all types of food and across all parts of the food supply chain. Furthermore, the definition should support the practical work on quantification, evaluation & monitoring of food waste; understanding different drivers of food waste on different parts of the food supply chain; and be framed in the context of a mass balance approach. Considering the boundary issues the definition should provide a definite starting- and end-point of the food supply chain.

The concept approach to address food waste was built up progressively by first defining "food" and then the "food supply chain" and the fractions being wasted. The definition of "food" is suggested to follow the existing European defintion of food (EU, 2002) stating that food is "any substance or product, whether processed, partially processed or unprocessed, intended to be, or reasonably expected to be eaten by humans" The food supply chain is defined as "the connected series of activities used to produce, process and distribute food to the end consumer, from farm to fork". Principal starting points of the food supply chain are for grown crops and bred animals when crops are mature for harvest and animals ready for slaughter and for wild crops and animals when crops are harvested and animals are caught/killed. The end point of the food supply chain is defined by when food is a) consumed b) removed from the food supply chain.

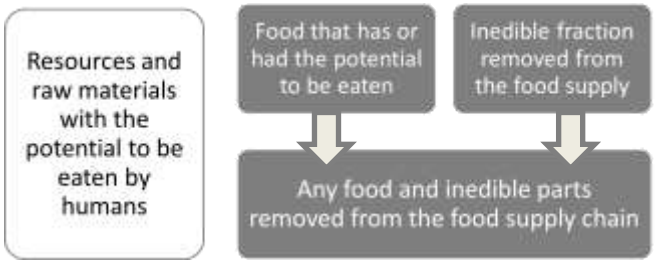

Figure 2. Wasted resources in the system for food production. The shaded boxes refer to streams leaving the "food supply chain".

Figure 2 provides an overview of a set of well-defined fractions leaving the food chain to be accounted for from a resource efficiency perspective. Resources and raw materials with the potential to be eaten by humans are separated out. This refers to the fraction that is discarded, which is part of the economic and technical system for food production, but which is currently not intended for human consumption and are thus not included as a part of the food supply chain, e.g. male chickens and laying hens, as well as material intended for human consumption but which has not reached the stage to be defined as food.

DISCUSSION

The concept developed address a mainly post farm activates. This will facilitate the aim of FUSIONS. However, it can easily be fitted into larger systems considering overall resource efficiency and environmental impact of food wasted in relation to the food production system as a whole including primary production and feed production or other bio based systems. By using mass as a base the resource use and the environmental impact from food waste, as well as other indicators relating to economy and nutritional value, can be calculated.

The presented concept may serve as a base for further work on an explicit defintion of terminologies to be used and methodologies for monitoring food waste. Although FUSIONS is limited to food waste prevention in the food supply chain it should be stressed that from a resource perspective the impact from all fractions defined in Figure 2 needs to be considered. The environmental, economic and social life-cycle thinking needs to be considered as well in order not to sub-optimize prevention strategies with regards to resource efficiency. It should also be recognized that food waste not currently being treated can be a valuable resource for further valorization; to produce new food products or bio-energy. The waste hierarchy presented in the Waste Framework Directive (EU, 2008) states the priority order for waste management; being prevention, as the most-preferred option followed by preparing for re-use; recycling; other recovery and disposal as the least-favoured option. Better quantification of food waste at all stages of the food supply chain, will help us target waste to be moved up the waste hierarchy helping achieve our resource efficiency goals.

CONCLUSIONS

Based on a structured analysis of wasted resources in the food chain a concept for addressing food waste has been developed.

ACKNOWLEDEMENTS

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