



Full length article

Mapping of food waste quantification methodologies in the food services of Swedish municipalities

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ABSTRACT

Since food waste valorisation measures, like energy recovery, have limited possibilities to fully recover the resources invested in food production, there is a need to prevent food waste. Prevention is most important at the end of the value chain, where most sub-processes have already taken place, like in catering facilities. In Sweden, the public catering sector serves a large number of meals through municipal organisations, including schools, preschools and elderly care homes. Many of these organisations quantify food waste, but since Sweden has 290 municipalities with a high degree of independence, the possible variation is significant. This study therefore investigated how food waste is quantified, in order to help formulate a national standard for food waste quantification.

Mapping of food waste quantification practices was conducted using a questionnaire and follow-up telephone calls, achieving a response rate of 93%. Of the 290 Swedish municipalities, 55% replied that they quantify food waste on central level. The most common practice at present is to quantify plate- and serving waste from school lunches during two weeks per year, and to compile waste data in spreadsheets and compare the values against the number of plates used, giving a result in grams per portion served. There are many similarities between municipalities, so there is great potential to implement a common standard that many municipalities already fulfil. This is important in order to gain acceptance and fast implementation, thereby speeding up the process of establishing a benchmark for food waste in the Swedish public sector catering sector.

1. Introduction

Waste, loss or spoilage of food is an efficiency issue that has attracted increasing attention from the media, researchers, politicians, companies and the general public in recent years. Although food waste seems to be a simple problem, with the solution “to just stop throwing it away”, it is much more complex than would appear at first glance. The complexity of the food waste issue also links it to the three pillars of sustainable development (Lipinski, 2015): economic, social and environmental. This does not mean that reduced food waste automatically results in sustainable development e.g. if the waste reducing measures is more resource demanding than the savings they achieve (Eriksson et al., 2016a), but reducing unnecessary food waste has the potential to make an important contribution and also has high symbolic value. Food waste can be associated with a substantial waste of money (FAO, 2013) and natural resources (Steinfeldt et al., 2006; Garnett, 2011; Scholz et al., 2015), but also has moral implications in relation to food security (Stuart, 2009; FAO, 2012). The political will to work on food waste reduction can be seen as rational and positive, since there are few good

arguments for continuing to waste food. This has resulted in several goals on waste reduction among companies (Tesco et al., 2014), states (Rutten et al., 2013) and international organisations (UN, 2016). As pointed out by Godfray et al. (2010) and Garnett (2011), reducing food waste is not the only way to make the food supply chain more environmentally sustainable, but it has the added potential to save money and improve food security. Reducing food waste is also less controversial than e.g. reducing meat consumption or increasing productivity by extending the use of genetically modified organisms.

Food is wasted for a large number of reasons and by different actors in the food supply chain, which makes it difficult to find a ‘quick fix’ to reduce food waste once and for all. Food can also be wasted as a consequence of measures to increase economic profit or preserve public health, which are often a higher priority. In many countries the food waste in itself creates a problem if it is landfilled or left in illegal dumping sites. In other countries, Sweden included, landfilling of organic waste is prohibited (Ministry of the Environment and Energy, 2001) and surplus food is considered a resource that can be used for biogas production or for feeding people in need (Eriksson et al., 2015;

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Eriksson and Spångberg, 2017). It is therefore not the wasted food that should be the main concern, but the wasteful behaviour that results in unnecessary food production.

In the Swedish public food service sector, environmental issues related to food waste have been an increasing concern during recent years. This is partly due to the approximately three million portions served every day in this sector and the substantial amount of food waste generated. According to the Swedish Environmental Protection Agency (SEPA, 2016), 70,000 tons of food waste are generated every year in the Swedish public food service sector, including schools, pre-schools, elderly care homes, hospitals and prisons, which corresponds to 7 kg capita⁻¹ y⁻¹. This is much lower than the corresponding estimate for Swedish households (74 kg capita⁻¹ y⁻¹), but households serve a much larger volume of food so comparisons in absolute numbers give a limited view of the problem. It is even likely that the public food service sector has a similar level of waste as households in relation to mass of food served. According to a recent study by Eriksson et al. (2017a), relative waste in the 30 kitchens in the Swedish municipality of Sala amounts to 75 g per portion served or 23% of mass of food served. Other studies of relative waste levels in similar types of food services indicate what could be considered the normal level, although these studies have different scopes and refer to different times and geographical locations. For example, two schools in Stockholm investigated by Engström and Carlsson-Kanyama (2004) wasted 18% and 15% of delivered mass, which corresponded to 115 and 46 g per portion served, while two kitchens in the education and business sectors in Switzerland investigated by Betz et al. (2015) wasted 10.7% and 7.7%, corresponding to 91 and 86 g per portion served.

Food waste generated by the Swedish public food service sector is normally sorted and treated as part of the organic waste stream, together with organic waste from restaurants and households. In Sweden, municipalities have a monopoly on household-like waste, which includes waste from professional kitchens, and therefore the possibilities for individual kitchens to use other treatment methods are extremely limited. Swedish municipalities normally use one of three methods for waste disposal: i) anaerobic digestion for biogas production, ii) composting or iii) incineration for production of district heat and electricity. Therefore the waste is properly handled and nutrients and/or energy are recovered. Thus the waste management of Swedish municipalities can be considered appropriate and resource-efficient in a global perspective. However, the energy recovery options used are not those most highly prioritised in the European Union (EU) waste hierarchy (EC, 2008). In terms of food waste valorisation, Eriksson and Spångberg (2017) report that the potential to reduce greenhouse gas emissions increases significantly by going from energy recovery options to re-use options where surplus food is still used for human consumption. Waste prevention through source reduction can reduce the environmental impact even further (Gentil et al., 2011; Bernstad Saraiva Schott and Andersson, 2015; Eriksson et al., 2016a).

In order to reduce food wastage, it is necessary to understand the exact problem to be solved (e.g. Steen et al., 2018). According to Eriksson (2012, 2015), detailed quantification is an essential first step in this process. Moreover, accurate food quantification is needed in order to evaluate the effect of any food-reducing measures taken. Despite this, a recent survey showed that only about 50% of Swedish schools measure food waste for at least one week per semester (School Food Sweden, 2013). Another survey showed that a majority of Swedish municipalities have conducted projects in school canteens with the aim of reducing food waste (Stockholm Consumer Cooperative Society, 2015). However, similar efforts are rare in elderly care homes, even though food waste is higher in elderly care homes than in schools (Eriksson et al., 2017a). Moreover, waste quantification studies are often short and include limited material, so it is difficult to compare different studies and to generalise based on the results obtained for one municipality in one case study (e.g. Eriksson et al., 2017a,b). Several previous studies have sought to quantify the waste from the catering

sector, but using short measuring periods in a rather small number of catering units, e.g. two days in three hospitals in the UK (Sonnino and McWilliam, 2011), two days in four kitchens in Sweden (Engström and Carlsson-Kanyama, 2004), five days in two kitchens in Switzerland (Betz et al., 2015), 471 school meals during one month in Portugal (Martins et al., 2014), five days in a kitchen in the USA (Byker et al., 2014), 28 days in one hospital in the UK (Barton et al., 2000), one week in 55 kitchens in Finland (Katajajuuri et al., 2014) and three months in 27 kitchens in one municipality in Sweden (Eriksson et al., 2016b, 2016c, 2017a). A short quantification time may produce results that are inconclusive or difficult to interpret, e.g. it makes the results highly dependent on the dishes served during the quantification period, since different dishes can be expected to produce different levels of waste and different composition of waste. An example of this is chicken drumsticks, which result in a high level of unavoidable plate waste due to the bones, and should not be compared with bone-free chicken fillets, where the bones have been removed from the meat during processing.

In the present study, the main focus was on municipal catering in Sweden, mainly for pre-schools, schools and elderly care homes. There are variations across Sweden, but school meals typically include lunch and sometimes breakfast and snacks (typically with fruit and sandwiches), while a majority of preschools serve breakfast, lunch and snacks. At elderly care homes, all meals are usually provided. Under Swedish law, lunches must be served free in compulsory schooling (Swedish Parliament, 2010). At preschool, parents pay a fee for their children, but there is no extra charge for the meals. In elderly care homes, the residents pay a fee for their meals, which varies across the country. Public meals vary depending on where they are served but, taking school meals as an example, a typical school lunch in Sweden often consists of a choice of one or more cooked dishes comprising a warm component, typically fish, meat or poultry or a vegetarian alternative, served with a carbohydrate-rich component, usually pasta, potatoes or rice. Additional components of the meal are cooked vegetables and/or a salad buffet, milk or water to drink and crispbread with spread (National Food Agency, 2013). The food is usually served as a buffet in a self-service system, which means that schoolchildren typically determine which of the available options end up on their plate.

Since many of the public services are organised on municipal level in Sweden, these organisations have extensive power to act on political will. This should be positive for food waste reduction, since the same public organisation is responsible for purchasing and preparing food, for the buildings and teaching/care/nursing staff in schools/pre-schools/hospitals/elderly care homes and for waste collection and management. Many of these functions can be outsourced to private companies, but the public body is always responsible for funding them through the taxation system and therefore has a powerful position. However, if the problem of food waste is not apparent or acknowledged, it is difficult for any organisation to act. Therefore many Swedish municipalities have started to quantify food waste during recent years. However, since these quantifications are often communicated through internal or external webpages and/or newspaper articles, it is difficult to get a good picture of how the sector is progressing. Another problem is the lack of a common standard for quantifying and reporting food waste, which makes results from different organisations difficult to compare. The Food Loss and Waste Accounting and Reporting Standard (World Resource Institute, 2016) can be used to specify a reasonable trade-off between resources used for waste quantification and relevance, completeness, consistency, transparency or accuracy. Eriksson et al. (2018) extended existing quantification methodology by demonstrating how different datasets can be compared and designed in a common framework. However, there have been no suggestions to date on the categories that should actually be recorded if all Swedish municipalities were to quantify waste in the same way. This problem is highlighted by Suhonjic (2017), who found that even though many Swedish schools quantify food waste, they have no benchmark to compare with and therefore do not know whether they need to improve

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