



A simple awareness campaign to promote food waste reduction in a University canteen

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ARTICLE INFO

Article history:

Received 4 July 2017

Revised 1 February 2018

Accepted 20 February 2018

Available online 2 March 2018

Keywords:

Avoidable food waste reduction

Consumer behaviour

Simple environmental education campaign

University canteen

ABSTRACT

Food waste has important environmental, social and economic impacts and increasing attention has been given lately to the unparalleled scale of food waste in the food supply chain worldwide. An initiative aiming to reduce food waste was tested at the School of Agriculture canteen (University of Lisbon, Portugal). The “Clean dish, clean conscience!” initiative consisted of a simple and inexpensive education campaign to raise awareness of reducing plate waste, by establishing the connection between food waste and personal behaviour. As a first stage plate waste from canteen users was measured over a 10 day period. After this period, a waste consumption index and *per capita* waste consumption were calculated to evaluate the level of satisfaction of the consumer and the related concern about food wastage, and was classified as Bad. After this first stage it was concluded that the users did not have strong convictions about avoiding food waste. During the second stage of the project an education campaign was implemented with plate waste being monitored for a further 16 days to assess the effectiveness of the campaign. The approach consisted of displaying simple and affordable informative posters in strategic areas of the canteen with simple messages reminding not to accept food they knew they would not eat. This led to a mean reduction in the waste consumption index of ~15%. A parallel action encouraging separation of organic and inorganic waste was implemented as well, with an active participation of >70% of the users. The initiative achieved its objective of reducing plate waste by raising awareness of the daily food waste problem at the institution’s canteen and by suggesting “how-to” actions for reducing such waste. This study showed how avoidable waste can be reduced simply by making students aware of the topic of food waste. Simple strategies may be useful to improve behaviours and increase sustainability of the canteens at Universities although this proved to be only efficient with the collaboration of the canteen staff that needs solid education. From the results, a set of measures was presented to the University Social Services for adoption to ensure a permanent reduction of food waste and recyclables in the University canteens.

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1. Introduction

Producing food that is not consumed has environmental impacts and costs money. Hence, according to the European Waste Framework Directive food waste prevention and management options are priorities in the waste action hierarchy (EC, 2008). It is estimated by the food and agriculture organization of the United Nations (FAO), that one third of the food produced worldwide (1.3 billion tons) is either lost or wasted throughout the food

supply chain, from primary production to final consumption, and would be enough to feed one in nine people in the world who are undernourished (FAO, 2010, 2014, 2015; Gustavsson et al., 2011). *Per capita* food waste in Europe and North-America is estimated to be 95–115 kg per year, predicted to increase by up to 40% in the European Union (EU27) by 2020 (BIO Intelligence Service, 2010), while in sub-Saharan Africa and South/Southeast Asia it is only 6–11 kg per year.

Both loss and waste result in a decrease in the food supply intended for human consumption, at all stages of the food chain. Food loss occurs at the production, harvest, post-harvest, and processing phases, and it must be reduced to create a sustainable food

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supply chain (Kummu et al., 2012; Papargyropoulou et al., 2014). Food waste is unused food discarded during retail, and final consumption stages (Kummu et al., 2012), and is generally related to behavioural issues (Papargyropoulou et al., 2014). Food waste from meal catering services is generated through spoilage, meal preparation, unserved food or plate waste. The latter is defined as uneaten food, and in the context of this work it refers both to food incompletely consumed as well as to food served but untouched by the customer, and is estimated to be ~14% of the *per capita* food waste in the EU27 (BIO Intelligence Service, 2013).

In addition to social inequality and misdistribution of resources, food loss and food waste also cause negative environmental impacts. Approximately 22% of the global warming potential in Europe is caused by the food sector (Tukker et al., 2006), including significant reactive nitrogen (N) emissions (Sutton et al., 2013). Household food waste alone is estimated to account for ~7% of global greenhouse gas emissions (WRAP, 2012).

Several studies have focused on different aspects of food waste such as the entire food supply chain (Derqui et al., 2016; Bagherzadeh et al., 2014; Papargyropoulou et al., 2014; Garrone et al., 2014; Kummu et al., 2012; EC, 2010), others on the household sector (Graham-Rowe et al., 2014; Katajajuuri et al., 2014; Quested et al., 2013), on the retail sector (Buzby and Hyman, 2012), and on the food service industry including schools food service units (Kessler, 2016; Betz et al., 2015; Silvennoinen et al., 2014; Byker et al., 2014; Katajajuuri et al., 2014; Martins et al., 2014; Cohen et al., 2013; Ferreira et al., 2013; Cordingley et al., 2011; Engström and Carlsson-Kanyama, 2004; Buzby and Guthrie, 2002), with all studies highlighting the need for potential strategies to reduce food loss and food waste.

A number of movements to counter food loss and waste have recently emerged, aiming to increase awareness about wastage and to reduce it. E.g., in Portugal, the “Ugly fruit” project aims at recovering fruits and vegetables which do not meet the grade standards to be sold in supermarkets, and has recovered more than 110 million tons since 2013 (UF, 2015). ReFood (2015) was founded in 2011 to recover cooked but unserved food from restaurants, and is currently rescuing 20,000 meals per month in the Lisbon area alone on a voluntary basis. ReFood has expanded in mainland Portugal and into Spain, Italy, the UK, and the Netherlands and even as far as Argentina and India as well (ReFood, 2015). Many other initiatives for reducing food waste exist worldwide (e.g. www.lovefood-hatewaste.com, www.foodrecoverynetwork.org, feedbackglobal.org).

According to previous studies, the third largest source of food waste in Europe is the food service industry including the hospitality and health sectors with plate waste as main source (Beretta et al., 2013; BIO Intelligence Service, 2013). The hospitality sector includes for-profit and non-profit food service establishments such as staff and school canteens and cafeterias (Pirani and Arafat, 2015). In the Nordic region alone, 27% of all food waste is attributed to the hospitality and food service industry (Marthinsen et al., 2012). In the UK, 920,000 tons of food are wasted per year, of which 75% are avoidable (Parfitt et al., 2013), with an increasing concern over school food services (Engström and Carlsson-Kanyama, 2004). In several studies on plate waste in schools, from pre-kindergarten to university, plate waste values determined, ranged from 33 to 200 g per person (Betz et al., 2015; Buzby and Guthrie, 2002; Byker et al., 2014; Cohen et al., 2013; Cordingley et al., 2011; Ferreira et al., 2013; Katajajuuri et al., 2014; Martins et al., 2014; Silvennoinen et al., 2014).

Similar to other sustainability issues, technological solutions alone will not do the job – a change in attitude, behaviour and culture is essential for achieving any substantial change (Redman and Redman, 2014). Raising awareness and promoting a sense of guilt may also help to reduce food waste (Miroso et al., 2016).

The first objective of the study was to analyse food waste behaviour of the university students at the canteen. The second objective was to evaluate whether simple poster messages and direct communication to raise awareness could help reduce plate waste at the canteen. Additionally, recycling behaviour of the users was also monitored.

2. Methods

Plate waste at the canteen of the School of Agriculture, one of the 18 schools of the University of Lisbon (ISA-UL), was assessed on a population of approximately 240 students per day during one and half months which is the period of full time lecturing, and when most students are using the ISA-UL canteen. This facility did not operate during weekends and holidays and closes in August. Field work was performed by some of the students in the last year of the Environmental engineering degree class.

2.1. Ethics

Written consent to perform this study was given by the Social Services of the University of Lisbon who are responsible for the management of the canteens. The timing of the study was agreed with the canteen management staff at their convenience but, with a stipulated number of days of intervention.

2.2. Study unit and meal characterisation

This study was conducted during the period when the majority of the students actually attends the classes and represented the greatest attendance to the canteen to have the most representative sampling possible. This study consisted of two stages and observations focused on avoidable plate waste. Other bio-wastes such as unavoidable wastes in food preparation (e.g. peels, spines and bones) were not considered, as they are inedible. The only liquid food waste considered was soup, which is strongly rooted in Portuguese food culture.

The canteen serves approximately an average of 240 prepared onsite lunches per day, at reduced prices, with no previous booking, and is used predominantly by students aged between 19 and 22 years old, both genders, during the school year. Users collect their own tray, a paper bag with silverware and napkin, glass and optional bagged bread. For health reasons, users are not allowed to have direct contact with food, and canteen staff members are responsible for plating, serving, and distributing meals.

A single main course of users' choice is served by the staff using standard serving spoons and utensils by the same staff members every day. Due to the high number of users during the busy lunch hour, users were usually not allowed to change plate composition including portion size during stage one of the study. However, in stage two of the study canteen staff were instructed to allow users to choose smaller portions if desired. Bread, soup and dessert were optional. Menus are prepared according to weight-based recipes and include an optional soup, one of three main dish options (meat, fish or ovo-lacto-vegetarian¹), optional dessert (fruit, sweet or yogurt), and a drink (water, juice or tea). The dish type served is either mixed or non-mixed. Mixed dishes consist of a mixture of carbohydrate ingredients (e.g. pasta or rice) with a smaller amount of the main protein source (small pieces of fish or meat), cooked together. In non-mixed dishes, the main protein source is accompanied by a side dish carbohydrate source, cooked separately, and raw or cooked vegetables.

¹ Restrictive diet that includes fruits, vegetables, pulses, legumes, nuts, seeds, dairy, and egg products and excludes red meat, fish, and poultry.

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