

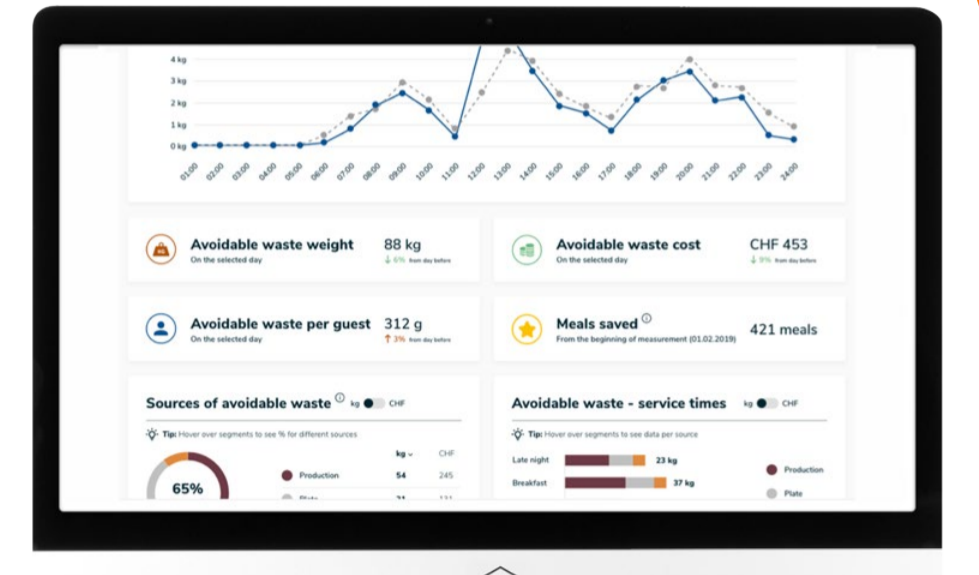
Food Waste Reduction Using a Smart Scale Device in German Catering Facilities

Paula Gerwin and Christina Strotmann

Institute of Sustainable Nutrition, Münster University of Applied Sciences, Germany

paula.gerwin@fh-muenster.de

Background: In LOWINFOOD 14 technological tools and devices as well as organizational and managerial solutions to the food waste (FW) problem are deployed and implemented. Fruits & vegetables, bakery products and fish value chains are selected as well as the consumption stage as settings to apply the innovations as these are particularly concerned by the issue of FW. The consumption stage of the food value chain causes the largest share (65%) of the 88 million tons of food wasted in the EU.

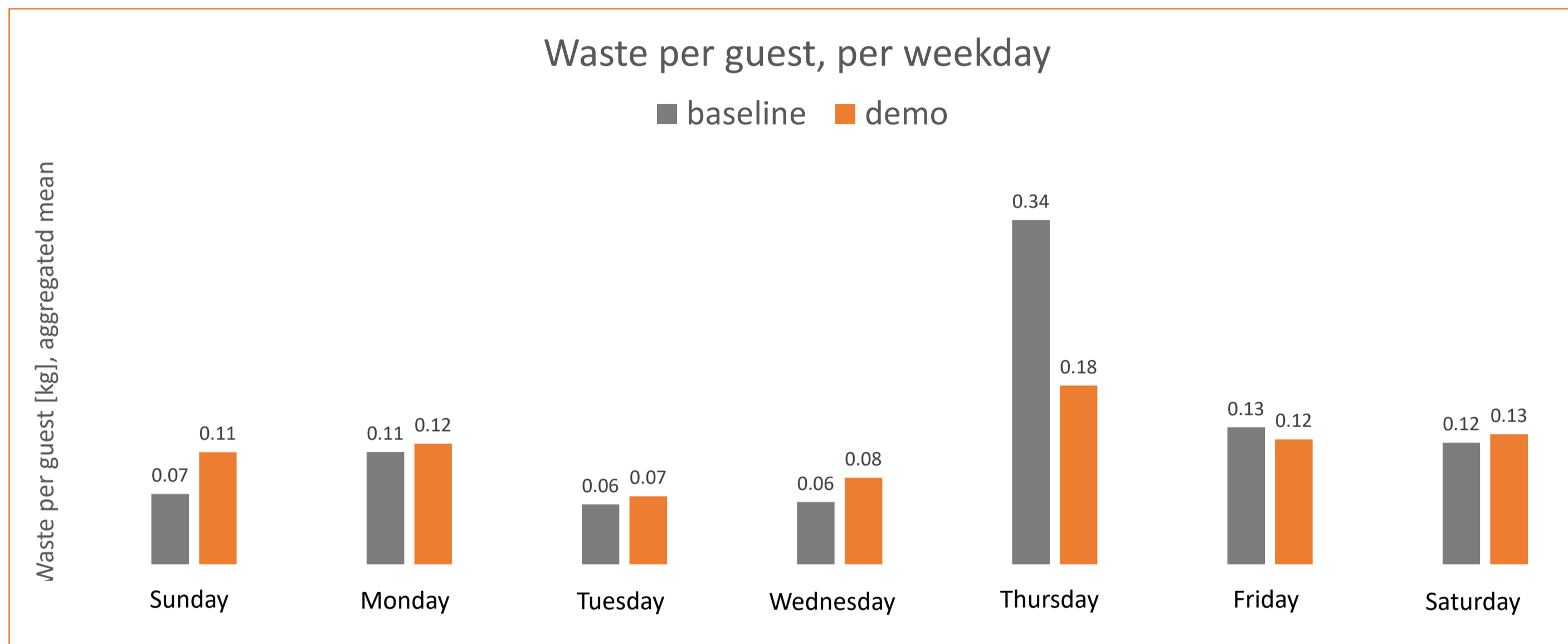


KITRO is one of the innovations. It provides restaurants, canteens and hotels with a fully automated FW management solution. By combining image processing and deep learning technologies with a hardware solution, relevant information on the food being thrown away is captured and analysed. Food services receive detailed insights into their FW via an online dashboard, empowering them to make informed decisions and optimize work practices which may lead to a reduction in FW, food cost and their negative environmental impact. The hardware comprises a scale, that is placed underneath the waste bin of the kitchens, where serving losses and plate waste is discarded and an Internet of Things device with camera on top.

Results

Location 1: restaurant in a vacation parc

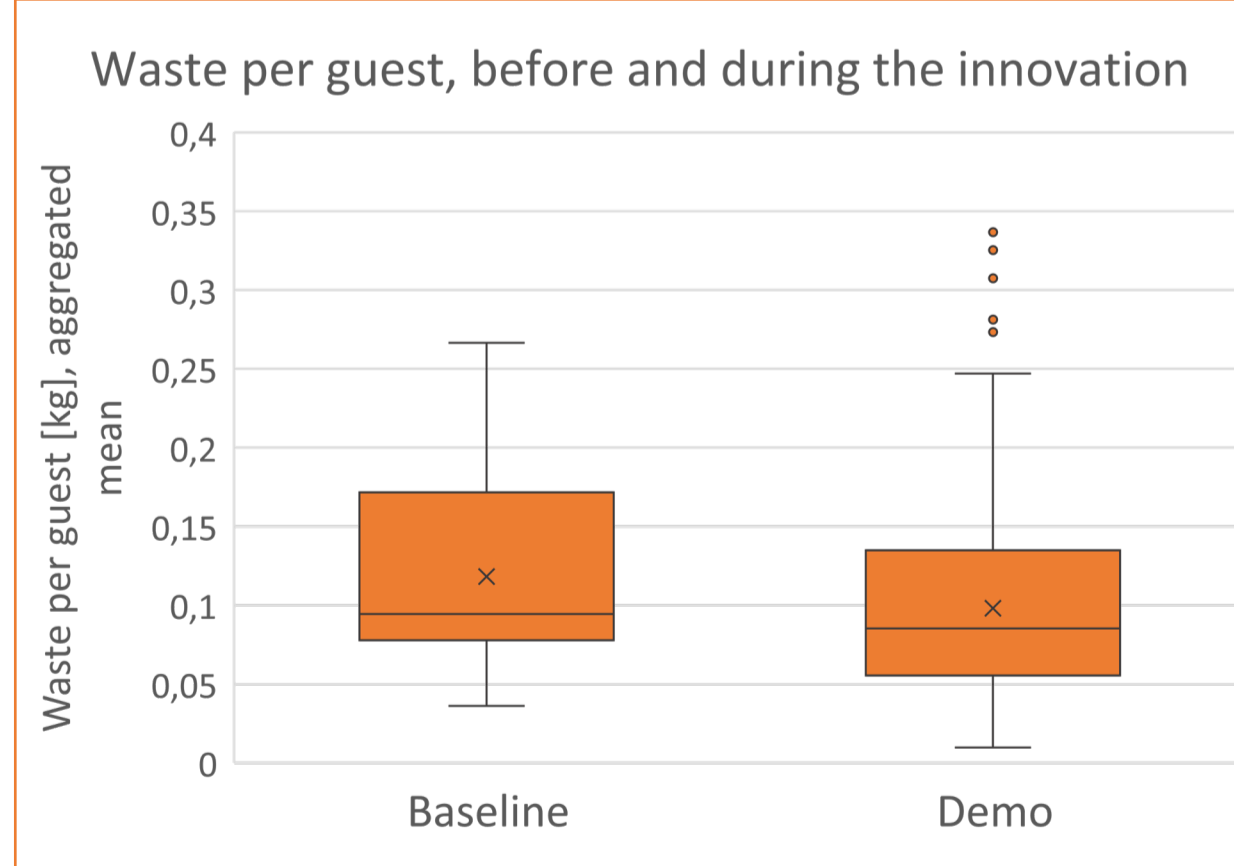
Though there is a reduction from 100g waste per guest to 95g waste per guest between baseline and demonstration phase, the results are not statistically significant ($p = 0.71$).



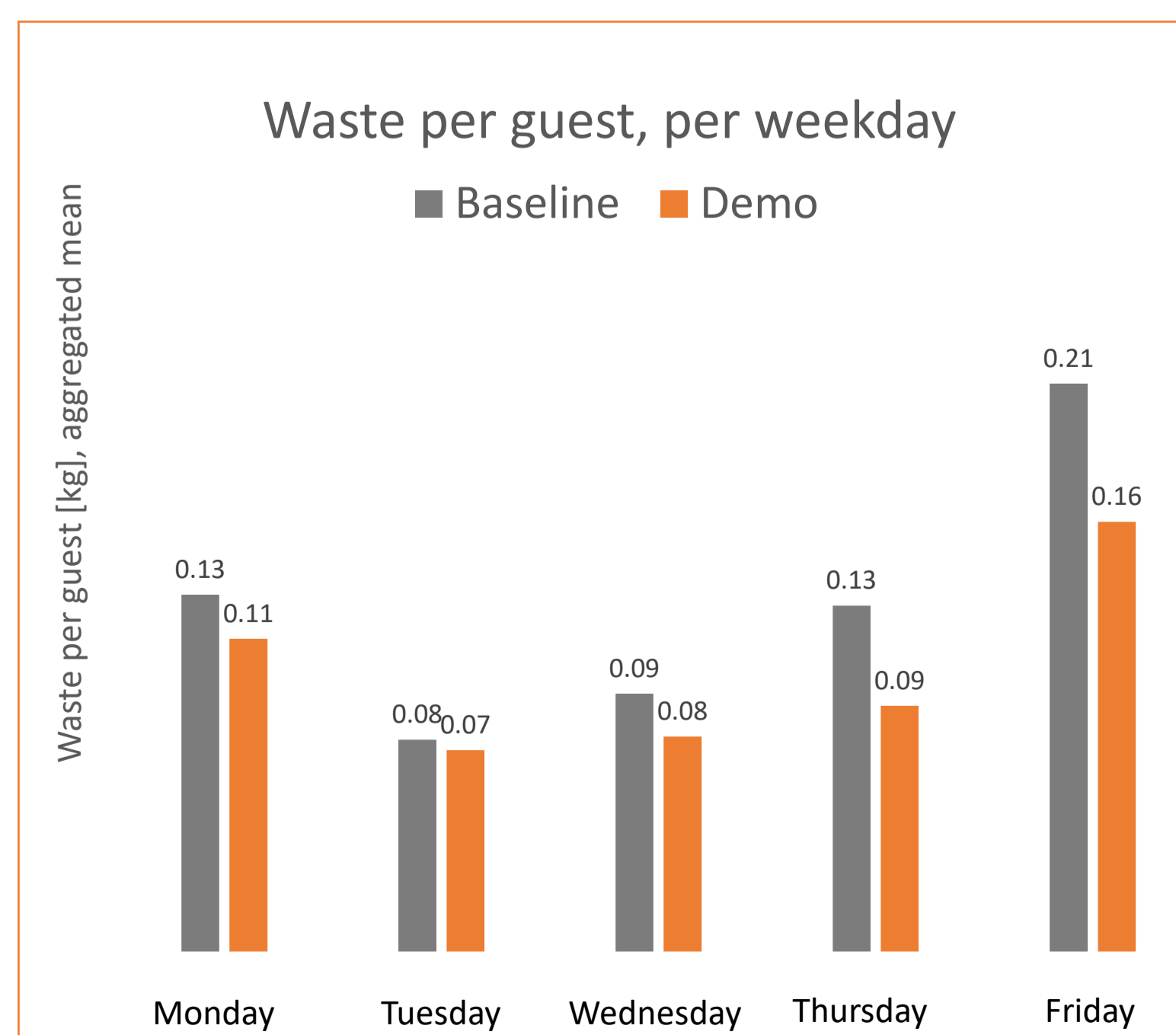
Especially during the baseline phase (grey), there is a high variance of waste per guest between week days. Waste per guest was reduced the most on thursdays.

Location 2: business canteen

Waste per guest was reduced from 118g during the baseline period to 98g during the demonstration phase. This change is not statistically significant ($p = 0.08$).



When comparing waste per guest per weekday between baseline and demonstration period, it becomes visible this reduction is most apparent on thursdays and fridays. Those were the days with the highest waste levels during the baseline period.



Method

1 month baseline period
Location 1: Nov '21
Location 2: May '22

11 months demonstration phase (directly after baseline)

The Kitro device was placed in the kitchens for one year. During the first month, businesses could not access the dashboard. We use this as a baseline period. From the second month on, reduction measures were implemented, which we call demonstration phase or demo.

Kitro produced data sets which register a picture and weight every time something being thrown away. Data was aggregated per day. To compare different restaurants, waste per guest was used as the unity. If waste per guest was over two times the average or under 1.3 times the average, the pictures were checked. If some error could be observed, the days were excluded from evaluation. A two-sided t-test was conducted for each location.

Summary – Take home message

While there has been a small reduction of waste per guest in both locations, the results are not significant. Looking at differences between weekdays reveals a unique situation in each location. This shows that waste reduction needs to be fitted to the individual situation.

As the locations were still impacted from the Covid-19 pandemic, especially during the baseline period, this might have skewed the data. In location 2, a business canteen, increased prices for heating also had an influence. Workers were asked to work from home on fridays during the winter of 2022/2023, which affected guest numbers in the canteen.

Outlook:

Kitro was placed in another restaurant in Switzerland and two Greek hotels, for which data still needs to be evaluated. Furthermore, additional variables such as cost of fw, category of food wasted and a differentiation between different waste types were recorded by Kitro for each location. This additional data needs will be examined next to give more insight into the results.