



Overview

The need

In the last few years, several innovative valorisation processes have been developed in different countries to prevent and reduce food waste. However, little is known about consumers' acceptance of the end products resulting from these innovations.

The solution

A social experiment was carried out in Barcelona in the context of parents' choices of their children's school meals. They were tested to determine whether they would accept feeding their children with valorised foods from food surpluses or side-flows.

The benefit

The relevant factors that influence the acceptance or rejection of valorised foods were identified. These factors include familiarity, knowledge, perceived risks, perceived benefits, experiences of food processes, involvement, trust between consumers and producers, information, naturalness, local origin, levels of processing, trust in food regulatory institutions, sustainability, safety, complexity, moral considerations, traceability, and transparency.

Valorisation of food surpluses and side-flows and citizens' understanding

Consumer understanding and acceptance of different valorisation methods for food surpluses and side-flows were investigated. Of interest was the extent to which consumers accept and even appreciate products resulting from innovative waste valorisation processes. The requirements were identified for Spaniards to accept the use of valorised products.

Background

One third (1,300 million tons per year) of the food produced in the world for human consumption is lost or wasted [1]. In the EU, about 88 million tons of food is wasted per year (20% of all food produced), which is equivalent to economic losses amounting to around 143,000 million euros [2]. In addition to the economic losses (losing the food itself, and the cost of waste treatment), other impacts include large losses that are generated in natural resources (stress on the use of water, land, energy, labour and capital), social repercussions (price increases), and greenhouse gas emissions [3].

In addition to the need to adapt a sustainable production system and eating practices [4], the use of food surpluses or side-flows from the original food supply chain as valorised foods, ingredient or feeds may be part of the solution; however, it is subject to consumers' acceptance of the valorised foods. In this context, a previous study [5] suggested that consumers are not familiar with valorised foods and they may perceive them as unhealthy. Indeed, consumers are increasingly interested in sustainability, but also in food safety and quality [5].



“We carried out a social experiment where we used a participatory approach to assess citizens’ perceptions of valorised food from food surpluses or side-flows. The experiment was successfully done, and we were able to identify the relevant requirements for Spaniards to accept the use of valorised products.”

—Dr. Djamel Rahmani Post-doc researcher at CREDA-UPC-IRTA

What was the solution?

CREDA assessed consumers’ and citizens’ perceptions of valorised foods from food surpluses or side-flows. The aim was to identify the relevant factors that influence the acceptance of valorised foods. To do this, CREDA carried out a social experiment in Barcelona where parents were tested to determine whether they would accept feeding their children with valorised foods from food surpluses or side-flows.

The social experiment was carried out in Barcelona in the context of parents’ choices of their children’s school meals. A group of parents were tested to determine whether they would be open to their Council favouring catering companies that integrate valorised foods from food surpluses or side-flows when hiring school catering services. In particular, parents’ perceptions of valorised food from four different valorisation processes were assessed: (i) gleaning vegetables and converting them into foods such as soups or creams; (ii) extracting ingredients (vitamins) from product surpluses and using them for food enrichment; (iii) converting food-processing by-products to feed and feed supplements for animals intended for human consumption; and (iv) converting catering food surpluses to liquid feeds for pigs intended for human consumption (currently banned in the EU).

Implementation

The experiment was carried out in collaboration with the Regional Council of Vallès Oriental (Barcelona). The experiment combined a citizens’ jury (participatory method) and a hypothetical discrete choice experiment (DCE: a stated-preference method) that was applied in the context of parents’ choices about school menus. A group of 24 parents listened to expert talks about production processes of different valorised foods from food surpluses and side-flows and chose the hypothetical menus suitable for school catering services. The school menus (Figure 1) consist of a three-course meal (a starter, a main meal, and a dessert) as is usual in Spain.

The experiment was carried out in May 2018, in two sessions with a ten-day interval. Parents were required to choose the meal menu they would buy for their children in twelve days (choice occasions). The first session was held on May 3 and lasted three hours (4:30pm to 7:30pm). Parents attended an informative session, discussed the



issues in a plenary session, answered individually the DCE questions, and voted collectively on the DCE questions. The second session was held on May 14 and lasted two hours (5:00pm to 7:00pm). Parents answered individually the DCE questions, participated in the workshop (pros and cons), and voted collectively on the DCE questions.

Reminder: please remember that if you do not like any of the three menus or the prices seem very high, you should choose the "None" option.										
C.1. which of the menus, shown here, would you buy for your child?										
	Menu A			Menu B			Menu C			None
Starter	Conventional pumpkin cream			Valorised pumpkin cream			Conventional pumpkin cream			None of the three menus
Main course	A pork steak fed with conventional feeds			A pork steak fed with by-product feeds			A pork steak fed with ecofeeds			
Dessert	Valorised Yogurt			Yogurt conventional			Valorised yogurt			
Price	€7 per day (€154 per month)			€5 per day (€110 per month)			€4 per day (€88 per month)			
<i>I buy:</i>										
Please, how certain you are about your choice?										
Totally uncertain Totally certain										
0 1 2 3 4 5 6 7 8 9 10										
○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○										

Figure 1 – The three school meals used in the projects choice experiment.

Parents were also invited to participate in a workshop where they discussed the pros and cons of each of the considered valorisations methods (Figure 2).

“Our participants identified the pros and cons of each of the different innovative valorisation methods. We are pleased to contribute to better understanding of consumers’ and citizens’ perceptions of foods resulting from innovative valorisation methods of food surpluses or side-flows.”



Figure 2 - A small group of parents debating the pros and cons of the methods.

Outcomes



The identified relevant factors that influence the acceptance or rejection of valorised foods were familiarity, knowledge, perceived risks, perceived benefits, experiences of food processes, involvement, trust between consumers and producers, information, naturalness, local origin, levels of processing, trust in food regulatory institutions, sustainability, safety, complexity, moral considerations, traceability, and transparency.

A remarkable result from the study is that although gleaning-based valorised products were deemed acceptable to be used within the setting of school lunches, the other valorisation methods were not. However, the participants did not view them as unsuitable for adult consumption. In contrast to their stated perception of valorised products as safe for health, presented with the option of giving these products to their children evoked a negative response ('just in case'...).

Based on the evidence from the experiments performed in the study, we find that informational strategies can contribute to the acceptance of valorised products by consumers.

Thoughts for the future

The findings of this study are based on a very specific sample, which is not representative of the Spanish population (overrepresentation of women, specific age cohort, etc.). Any results regarding trust towards stakeholders, including governmental and regulatory institutions may be influenced by the current political situation in Catalonia, but we cannot attribute its extent. Additionally, the purchasing intentions for valorised food behaviours of the studied group may differ from those of the rest of Spain or other European countries. Therefore, we recommend further research to investigate these preliminary results in the context of other settings and EU Member States.

Finally, in the present experiment public purchasing intentions for hypothetical valorised food products were assessed. However, sensory factors might also influence the acceptance for valorised food and could be studied in future research, including consumer taste and texture appreciation in experimental settings or action-based pilot studies using existing valorised food products.

“Our participants perceived foods resulting from food surpluses or side-flows as safe for health, however, when they were presented with the option of giving these products to their children, this evoked a negative response.”

—Dr. Djamel Rahmani Post-doc researcher at CREDA-UPC-IRTA

If you would like to know more about the project, further information can be found within the [REFRESH Work Package 1.7 report](#) [6].



References

1. FAO (2011). *Global food losses and food waste. International Congress "SAVE FOOD" at Interpack 2011, Düsseldorf, Germany.* Online: <http://www.fao.org/docrep/014/mb060e/mb060e00.pdf>
2. Stenmarck, A., Jensen, C., Quedsted, T., & Moates, G. (2016). *Estimates of European food waste levels.* Online: <https://www.eufusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf>
3. Vermeulen, S.J., Campbell, B.M., & Ingram, J.S.I. (2012). *Climate change and food systems.* *Annual Review of Environment and Resources* 37, 195-222.
4. Dagevos, H., & Voordouw, J. (2013). *Sustainability and meat consumption, is reduction realistic.* *Sustainability Science, Practice and Policy* 92(2), 60-9.
5. Frewer, L.J., & Gremmen, B. (2007). *Consumer's interests in food processing waste management and co-product recovery.* In: Waldron K, editor. *Handbook of Waste Management and Co-product Recovery in Food Processing.* (Vol. 1), Cambridge, UK: Woodhead Publishing (2007). p. 21-33.
6. Rahmani, D., Gil, J.M. (2018). *Valorisation of food surpluses and side-flows and citizens' understanding.* Online: <https://eu-refresh.org/valorisation-food-surpluses-and-side-flows-and-citizens%E2%80%99-understanding>