

## FOOD WASTE- CONSUMER BEHAVIOR IN THE REPUBLIC OF CROATIA

BENCARIĆ LUCIJA<sup>1</sup>, SUDARIĆ TIHANA<sup>1</sup>, JELIĆ MILKOVIĆ SANJA<sup>1</sup>

<sup>1</sup> Faculty of Agrobiotechnical Sciences Osijek, Josip Juraj Strossmayer University of Osijek  
Vladimira Preloga 1, Osijek, Croatia

\*Corresponding author's e-mail: lbencaric@fazos.hr

**Abstract:** In Croatia, according to the Ministry of Economy and Sustainable Development (2022), the country generates 286,379 tons of food waste, or 71 kilograms per capita per year, of which households generate 216,345 tons (54 kg per capita) and the business sector 70,034 tons (17 kg per capita). The paper aimed to investigate and discover how everyday household practices related to food lead to its waste and examine respondents' knowledge of food waste as well as their awareness of food waste and ways of handling food scraps in Croatian households. An online survey was conducted between February and March 2022 and included a sample of 214 respondents who needed to answer 32 questions. The research showed that Croatian consumers are aware of how much waste food creates, but they are not yet proactive enough to change the situation.

**Key words:** Food waste, Republic of Croatia, household, product label

### INTRODUCTION

Food waste is any removal of food from the food supply chain that is fit for consumption or food that has spoiled or expired mainly due to poor storage, mismanagement of inventory, or neglect [7]. According to Peteljčak [11], food waste is generated through the entire supply chain, from production, processing, and distribution through sales, catering facilities, and retail companies to households. In the production and processing phase, losses are most often caused by inadequate harvesting and climate change. Distribution losses are most often associated with damaged packaging due to inadequate transport or expiration, while in the final stages, in sales, restaurants, households, and retail occur most often due to consumers and their preferences, poor shopping planning, inadequate storage, lack of knowledge about the expiration date, etc. Furthermore, one of the indicators of the growing amount of food waste is the gross domestic product (GDP) because consumers in developed countries spend more and thus throw more [2]. Also, marketing "tricks" with food like 2 + 1 for free can lead the consumer to buy excessive amounts of food. But, on the other hand, such strategies can be positive. For example, a significant reduction in the prices of products that are still healthy and their special labeling and sorting can encourage consumers to buy them to a greater extent and consume their time [2]. It is estimated that one-third of the world's total food production is wasted each year [12]. In the European Union (EU), 88 million tons of food are lost or discarded [15], or 20% of total food production or 173 kilograms per person. More than half of that number (47 million tonnes) is generated by households and they have been identified as key actors in food waste generation, while 70% of total waste is generated by households, catering services, and retail. Estimates show that 10% of the 88 million tons of food waste generated in the EU each year is somehow linked to date labeling of which 53% of consumers don't know the meaning of the "best use to" label. Food waste causes not only food scarcity and economic problems, but also harmful environmental effects. According to Foley et al. [5] food production causes about 30% to 35% of the global climate impact, is the major cause of species extinction, and involves about 70% of the global freshwater use. The later food is thrown along the supply chain, the greater its impact on the environment because then the energy and natural resources consumed during processing, transport, storage, or cooking must be taken into account. Also, food waste that ends up in landfills produces large amounts of methane. It is clear

that when food is wasted, environmental degradation occurs to no avail and food decomposes in a landfill adding further strain to our environment, thus, food waste represents a huge environmental issue globally [3]. Petljak and Principato [11, 12] in their analysis of global food systems, which doesn't include food losses on the farm during production and harvest, estimated that about 6% of total global greenhouse gas emissions come from food waste. How do consumers make a significant contribution to food waste, several studies have examined consumer behavior on this topic from different perspectives, such as factors influencing food choice [4], the impact of social impact on food waste [14] or food purchase practices and their relationship to food waste [8]. Among the many factors that greatly contribute to the generation of food waste, as evidenced by numerous studies, were sociodemographic factors of consumers. According to Flanagan and Priyadarshini [1] research has shown that people aged 16 to 35 throw more than 30% of their total food, while those over 65 throw much less, and the reason is a lack of food in the past. Also, in addition to age, culture and religion play an important role. For example, during holidays such as Christmas and Easter, the amount of food waste may be higher because more is bought and cooked. In Islamic countries during Ramadan food-waste is also often high [6].

In this context, the paper aimed to investigate and discover how everyday household practices related to food lead to its waste, to examine respondents' knowledge of food waste as well as their awareness of food waste and ways of handling food scraps in Croatian households.

### **MATERIALS AND METHODS**

The online survey was conducted between February and March 2022 and included a sample of 214 respondents, and the questionnaire consisted of 32 questions. The first three questions referred to basic data (age, gender, and place of residence (city or village - it was assumed that people from rural areas take more care of food waste and thus would give a better picture of the survey questionnaire). The respondents were asked to express their opinion (example: Do you think that more food of questionable quality is produced?), while the rest was related to the topic itself (example: What are the reasons for throwing food in your household?) and consumer knowledge of the product label and nutritional values (example: The "use by" label on food refers to safety, indicates the date until which the food can be consumed and should not be consumed after its expiration, despite no visible change in appearance and smell to which they had to answer correctly or incorrectly.) Respondents answered the questions offered. The data collected by the survey are detailed in the following text.

The work presents three hypotheses:

H<sub>1</sub>- respondents are aware of how much waste food creates, but aren't yet proactive enough to change the situation

H<sub>2</sub>- respondents know what product labels mean

H<sub>3</sub>- when buying food, at least 50% of respondents make a list of foods they need and reduce the possibility of generating waste from the purchase of food

### **RESEARCH RESULTS**

The results of the basic data of the respondents (Table 1) show that out of the total number of respondents (214), 172 (80.4%) are female and 42 (19.6%) are male. Seven of them (3.27%) are under 18, 85 (39.72%) between 18-26, 63 (29.44%) from 27 to 45, 54 (25.23%) 46-70, and five of them (2.34%) answered that they are more than 70 years old. The next issue was the place of residence. Of them, 175 or 81.8% answered that they live in the city, and 39 answered in the village (18.2%).

### **Respondent's opinions on production, quality, the number of pesticides, and food waste**

In Croatia, according to the Ministry of Economy and Sustainable Development (2022), the country generates 286,379 tons of food waste or 71 kilograms per capita per year of which households generate 216,345 tons, 54 kg per capita, and the business sector 70,034 tons or 17 kg per capita [13]. When it comes to confronting climate change, the growing issue of pesticides in food and greenhouse gases, creating a sustainable food system that will provide enough food for a growing human population, is one of the most pressing challenges facing the 21st century [11]. In general, scientists are finding the solution to increasing agricultural production by investing in technology to increase yields, change the diet and reduce food waste.

Of the total amount of waste generated in the primary sector, 58.5% is occupied by primary production and family farms, restaurants, and catering facilities 21.5%, processing, and production 14.1%, while retail and other food distribution are represented by 5.9%. The next five questions were related to the mentioned topic and the respondents had to express their opinion on them. To the first question, "Do you think the world produces too much food?" 160 (74.8%) respondents said yes, 43 (20.1%) said no, and 11 (5.1%) of them think that is enough. The question, "Do you think that too much food is thrown away in the world?" 212 (99.1%) respondents said yes and only two (0.9%) said no. We can conclude that respondents are sufficiently educated and have knowledge of how much food is thrown away. Regarding the production of questionable quality food, 184 (86%) persons believe that more questionable quality food is produced, seven (3.3%) answered no, and 23 (10.7%) perhaps. The next question was also related to the production of food, and the number of chemicals that are put into it to improve its properties or extend its shelf life. Then 85 (39.7%) stated that are extremely concerned about the number of chemicals in the products, 105 (50%) were concerned and 22 (10.3%) didn't think about it. From the previous two questions, we can conclude that the respondents are aware that more and more food of questionable quality is being produced in the world, including in Croatia. We can assume that this is helped by an application developed by the Ministry of Agriculture in Republic of Croatia which allows consumers to find out every day who recalls products from the market and for which there is a risk or danger to human and animal health or may adversely affect the environment. The last issue in this group was related to product prices. Then 182 (85%) think that the price is mostly too high about the quantity and quality of products, while 32 (15%) think that the prices are realistic. Considering that recently the prices of basic food products (bread, oil, flour etc.) have increased by more than 30%, and the number of respondents who answered that price is too high isn't surprised.

### **Factors that affect of food selection and country of origin**

The following questions aimed to find out what is most important to the respondents when buying groceries and where they buy the most from. Namely, consumer habits during the pandemic have changed a lot and home-grown food produced by local farmers has gained in importance. Quality and healthy food proved to be the most important factor when buying, which was confirmed by 175 (81.78%) respondents. Then 20 (9.35%) chose the price, 14 (6.54%) pick the look and five of them, or 2.33% voted for none of the above. The next question was related to the products they buy more, and here the respondents could choose more suits. Consequently, 171 (79.9%) chose domestic products, 54 (25.2%) imported from EU countries while six (2.8%) chose from third countries.

The following survey questions, which we can see in Table 2, wanted to find out how everyday household practices related to food lead to its waste. From the above results,

we can conclude that although respondents (the vast majority of them) plan to purchase, there are still foods on the list that end up in the waste (176 of them answered that they buy the food they don't eat). The most common reason for throwing away food is the expiration date, and most respondents throw away bread and bakery products. However, a positively surprising fact was that as many as 44 respondents doesn't throw away food at all.

**Table 1.**

**Question about daily food handling**

Description	n	%
You buy food:		
Planned (make a grocery list)	173	80,8
Unplanned	41	19,2
Make a grocery list before you go shopping:		
Always	99	46,26
Sometimes	108	50,47
Never	7	3,27
You buy food (except bread):		
Every day	11	5,14
Once a week	69	32,24
Several times a week	107	50,00
Several times a month	22	10,28
Once a month	5	2,34
Do you happen to buy food that you do not eat?		
Yes	176	82,2
No, always buy as much as I need	38	17,8
What are the reasons for throwing food in your household		
Expired	74	34,6
Bought too much food	33	15,4
Too much food cooked	64	29,9
Food is improperly stored	18	8,4
I never throw away food	25	11,7
What foods are most often thrown away in your household		
Fruits and vegetables	55	25,70
Meat and meat products	22	10,28
Milk and dairy products	33	15,42
Cakes and sweets	18	8,41
Bread and other bakery products	86	40,19

Source: Author according to the survey

**Respondent's knowledge of product labels**

One of the most important segments of consumer protection is food labeling. Customers must get complete information about the product to be able to make the right purchase decision. It's also important that the consumer understands what this information means because otherwise, it will haven't a purpose.

The next five questions were related to consumer knowledge of product labels. To the question "How often do you read the information on the declaration?", 30 (14%) respondents answered always, 110 (51.4%) sometimes, and 64 (29.9%) answered only on the first purchase. Accordingly, 106 of them (49.5%) reads expiration date, the country of origin 33 (15.4%), the table of nutritional values 26 (12.1%), the list of ingredients 42 (19.6%), and the net quantity four of them (1.9%). The others stated that they didn't read the information on the declaration. The next question concerns the knowledge of nutritional information (energy, amount of fat, protein, sugar etc) to which 83 (38.8%) stated that they fully understand, partially 119 of them (55.6%), while 12 of them (5.6%) don't understand. The other two questions were about the labels "use by" and "best to use" to which respondents had to agree on whether it was true or not. In both cases, the vast

majority answered exactly from what it could be concluded that the respondents understand what it means when one of the two mentioned terms is written on the product.

### Respondent's empathy towards food waste

The last questions were about people's empathy towards food waste. Although the majority of respondents said that they sometimes think of food waste while buying it or eating it in a restaurant or at home, during a meal more than 70% of them said that they care about how many people will eat that meal. Almost all (213) respondents in some way, either by checking food in the refrigerator, pre-purchase list, proper storage, etc., try to reduce food waste. Also, 205 of them feel some kind of remorse when throwing food.

**Table 2.**

### Question about daily food handling

Description	n	%
When you buy grocery, how often think about food waste:		
Always	20	9,3
Sometimes	141	65,9
Never	53	24,8
When you eat food out (restaurant), how often do you think about food waste		
Always	31	14,5
Sometimes	102	47,7
Never	81	37,9
When making a meal, how much do you take care of the number of people who will eat it, and therefore the amount of food you will make		
Always	163	76,2
Sometimes	48	22,4
Never	3	1,4
When you throw food, you feel		
Uncomfortably	81	37,9
Think about people who don't have something to eat	103	48,1
I assure myself that the product could not have been used in a better way	21	9,8
I don't have a guilty conscience	9	4,2
Household food waste is usually thrown in		
Mixed municipal waste	136	63,6
Composter	36	16,8
Biowaste	42	19,6

Source: Author according to the survey

## CONCLUSIONS

The research showed that Croatian consumers are aware of how much waste food creates, but they are not yet proactive enough to change the situation. This fact is supported by the question "Do you think that too much food is thrown away in the world?" to which 99.1% of respondents answered that they think, which indicates that they are aware of how much waste is generated from food. But, that they are not yet proactive on this issue indicates that as many as 82.2% of people answered yes to the question "Do you happen to buy food that you do not eat?". Further, results related to consumer knowledge of food labels and declarations revealed that most consumers understand expiration labels, but even more than half of the respondents partially understand the information contained in the nutrition table and sometimes read the information on the label. A good indicator that consumers are ready to work on activities to reduce food waste is shown by the results of survey questions related to the purchase of food, to which 80.8% answered that they buy as planned, and 76.2% said that they always take into the number of people who will eat. Most importantly, only one of the 214 respondents answered that they are not trying to

reduce food waste in any way, and 136 of them think that they are below average (40% is average) when it comes to the contents of the average household bin.

## REFERENCES

- [1]. **ANGELA FLANAGAN, ANUSHREE PRIYADARSHINI**, 2021, A study of consumer behaviour towards food-waste in Ireland: Attitudes, quantities and global warming potentials, *J Environ Manage*, 5-6
- [2]. **BRANKA ILAKOVAC**, 2018. Households behavior in food waste management, Sveučilište u Zagrebu, Agronomski fakultet, 1-3
- [3]. **ĐEKIĆ ET AL**, 2019. Household food waste in Serbia – Attitudes, quantities and global warming potential, *Journal of Cleaner Production* Volume 229, 44-52.
- [4]. **J. DE BOER CAROLIEN, HOOGLAND T., BOERSEMA J.J.**, 2007. Towards more sustainable food choices: value priorities and motivational orientations, *Food Quality and Preference*, Vol. 18 No. 7, 985-996
- [5]. **FOLEY J. A. ET AL**, 2011. Solutions for a cultivated planet, *Nature* 478, 337–342
- [6]. **EMEL AKTAS ET AL**, 2021. A consumer behavioral approach to food waste, *Journal of Enterprise Information*, 658-673
- [7]. **FAO**, 2014. Save food: Global Initiative on Food Loss and Waste Reduction, Definitional framework of food loss, working paper, 3-4
- [8]. **FARR-WHARTON G., FOTH M., JAZ HEE-JEONG CHOI**, 2014. Identifying factors that promote consumer behaviours causing expired domestic food waste, *Journal of Consumer Behaviour*, Vol. 13 No. 6, 393-402
- [9]. **HANNAH RITCHIE, ROSER M.**, 2020, Environmental Impacts of Food Production, Published online at [OurWorldInData.org](http://OurWorldInData.org).
- [10]. **INSTITUTE FOR ENVIRONMENTAL PROTECTION AND NATURE**, 2022. Food waste in the Republic of Croatia - research results
- [11]. **KRISTINA PETLJAK**, 2021. Food waste and food loss in the retail supply chain: *InterEULawEast*, 119-132
- [12]. **LUDOVICA PRINCIPATO ET AL**, 2021. The household wasteful behaviour framework: A systematic review of consumer food waste, *Industrial Marketing Management*, 641-649
- [13]. **MINISTRY OF AGRICULTURE**, 2020. Hrana - a new application for food, downloaded: March 23, 2022
- [14]. **R. COMBER, ANJA THIEME**, 2013. Designing beyond habit: opening space for improved recycling and food waste behaviors through processes of persuasion, social influence and aversive affect, *Personal and Ubiquitous Computing*, Vol. 17 No. 6, 1197-1210
- [15]. **WWF-WRAP**, 2020. Halving Food Loss and Waste in the EU by 2030: the major steps needed to accelerate progress, 12-13