

Czech consumers' attitudes to food waste

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Citation: Macková M., Hazuchová N., Stávková J. (2019): Czech consumers' attitudes to food waste. *Agricultural Economics – Czech*, 65: 314–321.

Abstract: The paper deals with Czech households' subjective views on food waste. It examines households' attitudes to food waste, including the causes of food waste. The primary data were obtained via a questionnaire survey with 1 582 respondents. The analyses allowed the identification of three categories of Czech households with different attitudes to food waste and its causes. These findings provide a basis for a proper selection of corrective measures aimed at amending or even completely transforming the current behaviour.

Keywords: attitudes to waste; causes of waste; consumer behaviour; food loss; segmentation

Food loss and waste are grave global problems. Food loss occurs at all stages of the food chain – production, harvest, processing, distribution, and consumption. In developing and low-income countries, most losses occur at production and harvest stages. In developed countries, the problems of food loss and waste lie primarily in consumers' behaviour. The point is that in these countries, people can afford to waste their food. High disposable income and affordable food prices reduce the share of income spent on food products and thus contribute to food wastage. This trend is also supported by sociological factors, specifically by the shift in a typical family/household structure, as well as factors related to changes in lifestyle. Food waste is not just a big economic and ethical problem. It also leads to higher raw material consumption and long-term depletion of our planet's resources (Borma 2017). The European Agency for the Environment (2016) highlighted the amount of ethane created by dumped food and the fact that the ethane also contributes to climate change. All actors in the food chain are able to effectively tackle the process of wastage (European Commission 2018). The focus on this problem is also one of the objectives of the European plans – to halve the amount of food waste by 2030.

There are various definitions of food loss and food waste. Gustavsson et al. (2011) emphasizes the need

of the term definitions and distinguishes between the following concepts: food loss which occurs at the levels of production, harvest, and processing and food waste which occurs at the levels of trade and consumption. Food waste is a characteristic problem in developed countries. WRAP's (2014) study defines three different categories in terms of food waste. Avoidable food waste – it includes food and beverages that are commonly consumed or thrown away in case the consumer does not eat/drink them; possibly avoidable waste – this category includes food that some people consume and others do not (such as fruit peel); and unavoidable food waste – food or drink that is not edible under normal circumstances (e.g. meat bones). Tostivint et al. (2016) add that food waste also includes food and inedible parts of food that have been removed from the food chain for recycling or disposal. Wasting these products has negative environmental impacts.

According to the Food and Agriculture Organisation's (2011), one-third of food produced for human consumption is lost or wasted. Such share represents around 1.3 billion tonnes per year. It should be noted that there are many more or less exact estimates of the total food waste amount. The same applies to measurement methods, while next to keeping a journal about the structure and quantity of food disposed

<https://doi.org/10.17221/364/2018-AGRICECON>

of in individual households and sorting and determining the weight of food waste in landfills, it is also possible to use statistical models. The models can be applied to population metabolism and body weight, shares of total calories consumed, or shares of total food consumed. Given the absence of a common methodology, it is not possible to decide which of the estimated values can be considered relevant.

Most estimates identify consumers as the main producers of food waste. Monier et al. (2011) estimated the average annual food waste per the EU inhabitant to 179 kg, in terms of the household it was 76 kg per household member.

In the Czech Republic, there are many activists who try to draw attention to the issue of food waste. The questionnaire survey conducted by the European Court of Auditors (2017) identified two groups of Czech consumers who waste food the least – people older than 60 years and people whose households' income does not exceed 508 EUR per month. In the Czech Republic, the research on food waste is at its early stage, and it is, therefore, necessary to approach the issue comprehensively with the necessary scientific erudition. We need to identify the causes of food waste and seek ways, suggestions, and recommendations for food waste reduction. Within the initial research phase, we need to focus on food waste in more detail and identify factors that cause the population to waste its food and to define possible preventive measures. The issue of food waste has aroused both political and public interest and the importance of addressing it is growing.

Thanks to the efforts of the European Economic and Social Committee (EESC), the issue of preventing and reducing food waste has been added as one of the European Parliament's political agendas. The EESC formulated the need for a common methodology for objectification and quantification of food waste. Special attention should be paid to research on all the links in the food chain. In developed countries, the greatest share of food losses occurs in the final consumption stage. Therefore, the main effort must be made in the fields of education and communication with consumers. The efficiency of such communication depends on the knowledge of consumers' attitudes to food waste.

The aim of this paper is to identify subjective attitudes to food waste, together with individuals' conscious reasons for wasting food. The authors also aim to identify consumer groups who have consciously or unconsciously positive attitudes to food waste

and find ways how to efficiently address and educate these groups. Knowledge of attitudes and causes of food waste is also a prerequisite for the preparation of methodology for monitoring the quantity and structure of wasted food.

MATERIAL AND METHODS

The aim of the paper is to find the causes of food waste, as well as to evaluate Czech households' attitudes to food waste. The questionnaire survey was primarily aimed at information on food purchasing habits, attitudes to food waste, causes of food waste, and most commonly wasted food products, including estimates of waste amounts.

The survey had 1 582 respondents. It was conducted in late October and early November 2017. The questionnaire consisted of 21 questions related to food waste and 9 identifying questions. Respondents' attitudes and opinions were evaluated on a 10-point scale where 1 meant "I absolutely disagree" and 10 "I fully agree". Table 1 shows the respondent structure based on identification data.

The results of the survey were processed by the use of descriptive statistics. The authors also employed the cluster analysis in order to make it possible to efficiently address respondents in future via the creation of opinion-homogeneous groups.

The cluster analysis allowed the identification and testing of factors and the relationship between variables. The cluster analysis divides sample files into several groups containing the most similar objects possible. The authors decided to use the *k*-means clustering and the Euclidean distance from the centroid. Data are sorted into clusters based on their characteristics. The clustering process starts with the selection of the initial sample points. The points are randomly selected from the input set of objects. The aim is to group the objects into clusters with minimal internal variabilities. Each object is assigned to the nearest sample point until a stable decomposition is achieved. The analysis leads to the definition of the main cluster-classification criteria as the segments' homogeneities are also determined by the number of clustering variables. Then the criteria with the most differing respondents' answers are selected. The criteria selection is followed by the determination of questions with the most significant impacts on clusters. Subsequently, an analysis of interdependence between individual criteria is performed in order to avoid misallocation of a variable's importance.

Table 1. Respondent sample structure

Identification	Absolute frequency	Relative frequency (%)	
Sex	female	973	61.50
	male	609	38.50
Age (year)	18–29	266	16.81
	30–49	735	46.46
	50–64	361	22.82
	65 and more	220	13.91
Highest qualification	elementary school	32	2.02
	secondary education, no high school degree	211	13.34
	secondary education high school degree	697	44.06
	higher education qualification	78	4.93
Household members	university education	564	35.65
	I live alone	209	11.72
	I live with my parents	203	11.39
	I live with my partner	276	15.48
	I live with my husband/wife	294	16.49
	I live with my partner and my children	112	6.28
	I live with my husband/wife and my children	484	27.15
	I live with my siblings	74	4.15
	I live with a friend	77	4.32
I live with someone else	54	3.03	
Children living in the household	0	1 107	69.97
	1	225	14.22
	2	199	12.58
	3	37	2.34
	4 or more	14	0.88
Economic activity	employee	911	57.59
	farmer	5	0.32
	private entrepreneur	148	9.36
	pensioner	248	15.68
	unemployed	9	0.57
	student	198	12.52
	maternity leave	39	2.47
	other	24	1.52
Income evaluation	insufficient (household depends on state contributions or short-term bank loans, its monthly income is not sufficient)	11	0.70
	low (household's income covers its basic needs only, they need to cut down on expenses)	140	8.85
	average (household's basic needs, i.e. food, housing, clothing, are fully covered)	551	34.83
	satisfactory (household's income covers all its needs within a reasonable scope)	788	49.81
	high (household can afford larger investments and luxury goods)	92	5.82
Municipality of residence	less than 2 999 inhabitants	530	33.50
	3 000–89 999 inhabitants	566	35.78
	90 000 or more inhabitants	486	30.72

Source: own analysis based on the questionnaire survey

<https://doi.org/10.17221/364/2018-AGRICECON>

This analysis is performed through a cross-section analysis. Dependencies are determined by the use of Cramer coefficient. Statistical variables' critical value was set to 0.7 for coefficients and 0.05 for the significance level.

Data processing was performed by the use of SPSS Statistics and Statistica by StatSoft.

RESULTS AND DISCUSSION

The survey showed that the average Czech consumer bought food regularly (about 80% of respondents), while the same percentage of consumers did their shopping after some kind of preparations (they checked the food they had in their refrigerators, pantries). A smaller percentage of respondents said they went shopping less frequently and bought larger amounts of food products. Thus, we can assume that food purchases do not bother consumers and that frequent shop visits suit consumers as they can, for example, take advantage of other occasional offers/sales.

The marketing tool for discount offers was perceived as an important decision-making factor. Almost 70% of respondents said they bought special offer products even if they did not need them. This finding points at one of the possible causes of food waste. The question of whether consumers planned their purchases in order to prevent food waste showed that most consumers did not think of food waste at all. However, more than 75% of respondents said they consumed all purchased food products. We need to examine what do the consumers mean by "consuming all food products" (taking into account the responses to buying special offer goods).

Food waste was considered an important problem by a vast majority of respondents (almost 90%) while the same percentage of respondents thought food waste represented a threat to society. Despite this, respondents admitted they were wasting their food. The most frequent reason for wasting food was food spoilage during storage (65% of respondents), followed by expirations of "use by" or "best before" terms. The other reasons were (sorted by frequencies): we cooked too much food, we did not like the food, the packaging was damaged, I did not like the food product's appearance when I brought it home.

The most frequently wasted products were baked goods (half of the respondents reported they wasted bakery products), followed by vegetables, fruits, and dairy products. A significantly lower share of respondents reported they were wasting home-made

meals, meat products (20%), raw meat (8%), food from restaurants, preserves and cans, and other types of food. These results are shown in Figure 1.

Respondents were also asked to total their total weekly food waste. 55% of respondents said they threw away 51–500 g of food per week, 15% of respondents said they threw away 50 g of food per week, and a similar share of respondents said they threw away 501–1 000 g of food per week. Less than 10% of respondents said they threw away 1 001–1 500 g of food per week. The remaining 5% of respondents reported they threw away more than 1 500 g of food per week. With respect to individual family members (father, mother, children, parents), the survey showed that all family members' shares in food waste amount were about the same.

The most frequent answers to questions on attitudes to food wastage were:

- I think that food waste should be more widely spoken and written about in the media.
- We would appreciate more information on the possibilities of reducing food waste.
- If somebody grows crops or breeds animals, their attitude to food changes.
- I have heard about the food bank, but I would need more information.
- It is necessary to explain the "use by" and "best before" terms better.
- I am familiar with the negative impacts of food waste on the environment.

648 respondents claim that they can explain the differences between "use by" and "best before" dates; 218 respondents admit they throw away the food which "best before" date has expired (yet the food is still edible). This can be caused by the ignorance of the term meanings.

Many respondents also said they had not heard about the food bank's public collections and that they were not interested in the issue of food waste. These opinions were held by 10–20% of respondents. The insufficient awareness of the food bank's activities was also evident from the survey results. Only 17% of respondents have donated food to the food bank, 67% said they were willing to do so, almost 30% said they would not donate anything, and the remaining 3% were undecided respondents.

The existing knowledge of the area of food waste confirms that in rich societies, mainly end consumers waste food. A change in such consumer behaviour would require multi-channel communication at all stages of education and in all age groups.

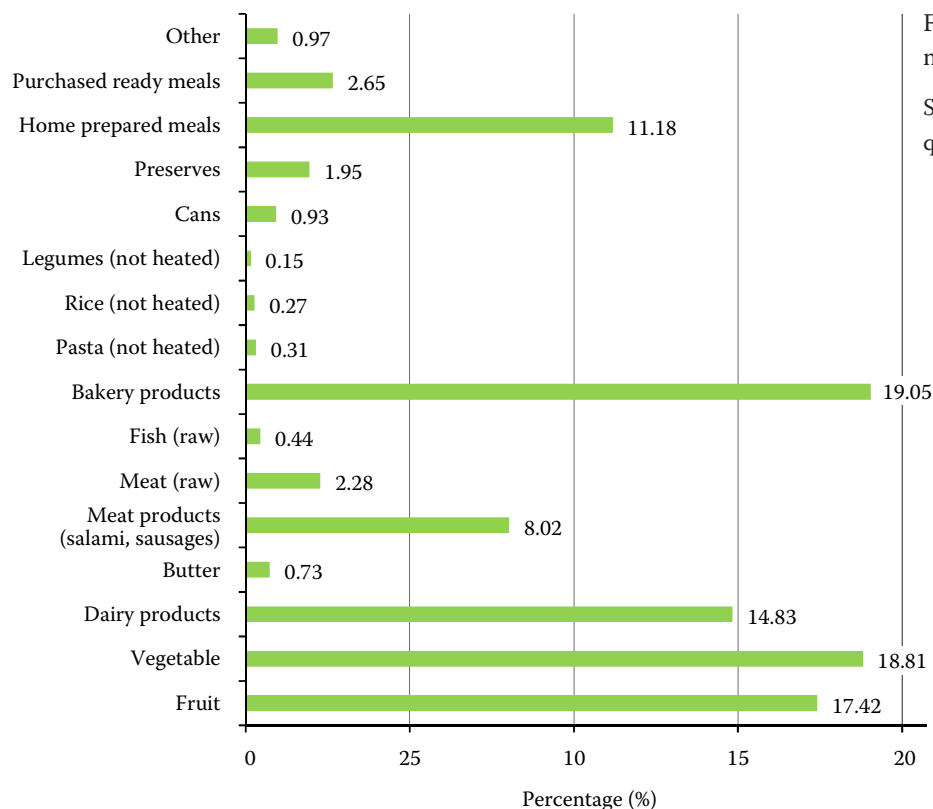
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Figure 1. Food products most commonly wasted by households

Source: own analysis based on the questionnaire survey

An effective solution would require targeted addressing of individual population segments, not across-the-board campaigns. Based on the results of the survey of food waste causes and attitudes to food waste, an identification-feature-based cluster analysis was performed. The analysis resulted in the creation of three separate segments (clusters) shown in Table 2.

Cluster 1. Segment of “unintentional food economisers”

This segment mostly consists of women; 91% of the segment is people aged 65 and more; one-third of the segment members live alone; about half of the segment members are married. The most common educational background in the segment is primary or secondary school; segment members are mainly retired persons. 25% of the segment members find their incomes insufficient; another 30% considered their incomes sufficient to meet their basic needs; the remaining said their income was sufficient. Most of the segment members live in municipalities with up to 3 000 inhabitants.

They do not distinguish between “use by” and “best before” terms, and they did not report any causes of wastage, i.e. they do not waste their food. They do

not know much about food waste; they do not follow nor are interested in advertisements or publications on food waste. They are generally aware of the harmful impacts of food waste on the environment, yet they did not mention any specific impacts. About 20% of the segment members are aware of the food bank. This segment is identifiable; its members do not waste their food, which is given by their education and life experiences. Their behaviour can be described as unconscious non-wasting. It is not necessary to address this segment, nor to seek a change of its behaviour – it would be counter-productive and probably even unachievable.

Cluster 2. Segment of respondents “affected by systematic education since primary school”

The segment consists both of men and women; most of the members (almost 95%) belong to the young generation, i.e. the age group of 18–29 years. Most of the segment members have secondary education; they mostly live with their parents or siblings, a certain number of them live with their friends or as single individuals. The vast majority of the segment members are students, and thus they cannot judge their income situations (they consider their incomes average, cover-

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Table 2. Results of the cluster analysis – the most common option of variables

	Variable	Relative share (%)
Cluster 1	aged 65 and higher	91.2
	pensioner	98.4
	grows his/her own vegetables	74.4
	lives in a town with a population up to 2 999	52.0
	average income	50.4
	South Moravian Region	50.4
	"use by" date exceeded	52.0
	women	67.2
	food is spoiled during storage	66.4
Cluster 2	aged 18–29	95.2
	student	71.0
	lives with parents	57.0
	secondary with maturita –secondary school leaving exam	73.7
	adequate income	55.9
	I have already heard about the food bank and know its purpose	54.8
	I think more should be talked and written about food waste	62.3
	South Moravian Region	68.8
	"use by" date exceeded	59.1
"best before" date exceeded	52.7	
women	57.0	
food is spoiled during storage	54.8	
Cluster 3	aged 30–49	72.8
	employee	78.9
	lives with husband/wife and children	52.4
	adequate income	55.8
	I think more should be talked and written about food waste	55.8
	South Moravian Region	59.2
	women	62.2
food is spoiled during storage	68.6	

Source: own analysis based on the questionnaire survey

ing all their needs). They are not characterised by a typical size of their municipality of residence – they live both in smaller towns and cities.

As the main causes of food waste, this segment reports the “use by” and “best before” terms, followed by food spoilage or quality loss, and the fact that they do not like the food. These are also reasons to throw food away. Some of the segment members are aware of the connection between food waste and the environment, as well as the issue of food waste (they learned about it through advertisements, articles, or the internet). They recognise that the issue should be discussed more. We can say this segment is aware of the problem of food waste, is interested in it, and

would appreciate more information about it. This is the segment that should be addressed. The communication should be systematic and incorporated in compulsory education. Well-prepared communication/education would be very effective in this segment.

Cluster 3. Segment of consumers who need “re-education”

Shares of men and women are almost equal in this segment; the segment mostly consists of middle-aged people in the “productive age” with secondary or university education. They mostly live with a spouse or a partner and children. Most of the segment mem-

<https://doi.org/10.17221/364/2018-AGRICECON>

bers are employees or self-employed. This segment also includes women on maternity leave. They live in municipalities of all sizes (up to 3 000 inhabitants, up to 90 000 inhabitants, and over 90 000 inhabitants) while the shares are almost equal. They consider their incomes satisfactory, rather higher.

According to this segment, the main causes of food waste include the expiration of “use by” or “best before” terms, the food’s quality loss, spoilage during storage, bad look, and bad taste. Each of these facts is a reason to throw food away, i.e. this segment does not avoid food wastage. In their value hierarchy, food waste is lower than health concerns related to consuming longer-stored food.

They are aware of the food waste issue, as well as the negative impacts of food waste on air quality, they understand the whole concept of food waste and are familiar with the term of the food bank. However, they do not care about food waste reduction as they do not consider it their problem. They prefer other factors, such as health care, financial possibilities, and social status. In their view, these factors allow them to consume fresh, high quality, and visually appealing food only. This segment can be seen as the segment in which behaviour will be hard to change. The change will require a sophisticated approach to communication; it will be very demanding to achieve a shift in the segment’s opinions.

CONCLUSION

The results of the survey of Czech consumers’ attitudes to food waste and the identification causes of food waste confirm the opinions published in the literature. The results of the survey also show that food wastage is most common among well-off households, i.e. it is behaviour resulting from affluence, which is a typical feature of today’s consumerist society. The survey results confirmed the need for a more intense public communication about the issue of food waste, including its negative impacts on the environment, economic consequences of food loss, and the need to provide food to people who do not have the access/cannot afford sufficient nourishment. The main contribution of the survey is the identification of consumer clusters determined by opinions and attitudes to the issue of food waste. Based on these clusters, it will be possible to prepare and deploy effective communication means for addressing consumers.

The analysis performed identified three distinct consumer segments: “Unintentional food economis-

ers” who do not waste food because they have no choice but to behave economically. Their behaviour is determined by their education and life experiences. It is not necessary to specifically address this segment.

The segment of “consumers affected by systematic education since primary school” includes consumers who are aware of all the negative consequences of food waste, yet they waste food because they have sufficient financial resources. It is necessary to develop a comprehensive system of education on the subject of food waste aimed at this consumer segment. The system would need to address all the negative impacts of food waste on society, the environment, and general living conditions. If a proper systematic education system is deployed, positive results can be expected. Consumers who fall into this segment, yet who are too old for participation in an organised education system, can be addressed by modern marketing tools like guerilla marketing or on-line marketing campaigns.

Education in this area is crucial. It is, therefore, necessary to develop appropriate policy instruments that can be implemented to contribute to the long-term improvement of the situation with food waste. It is appropriate to make this issue a compulsory part of the education process starting at primary school. Pupils and students should be taught about the basic pillars of reducing food loss through information, for example, on proper food storage and its use in order to keep it fresh for as long as possible and not spoiled unnecessarily. This group should definitely be made aware of both the environmental and economic impacts of food waste from the point of view of households, but ultimately in global terms.

The third segment consists of consumers who need “re-education”. These are the typical food-wasters whose consumer behaviour is determined by sufficient or surplus income. The prospective change of this segment’s attitudes to food waste is the most demanding task, both in terms of the time needed, as well as the search for change-motivating arguments (human health, environmental protection, limited natural resources). This segment is risky and therefore requires a specific approach. A good option is communicating with emphasis on the consequences of risk behaviour with regard to food waste and especially with emphasis on the aspect of health. Consumers in need of “re-education” can be efficiently addressed via mass-media campaigns.

Czech households’ attitudes to food waste differ, which is also evidenced by the results of the analyses conducted. The same applies to causes and reasons

<https://doi.org/10.17221/364/2018-AGRICECON>

of food waste, however, there is a primary common background factor – the affluent life of today’s society. It means the primary causes of food waste do not stem from individual characteristics and attitudes. Therefore, it is necessary to focus on educating the entire population segments. An important factor is proper value orientation – it should be built in every individual both by the family (i.e. from their early age) and educational institutions. Marketing activities can act as a useful supportive tool here.

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Received December 4, 2018

Accepted February 5, 2019