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Press release

Disposal of Visually Imperfect Vegetables and Fruits as One of the Forms of Food Wasting – Food 2020

- If there were imperfect and perfectly shaped pieces of fruits and vegetables placed next to each other, 59% of the respondents would chose the perfect one, provided they had the same price.
- As for the reasons that led the respondents to choose the perfect vegetable or fruit, they most often mentioned easier slicing and cleaning, as well as the fact that buying perfect fruits and vegetables is simply normal and therefore they would not think about it. More than 90% of the respondents chose both of these reasons.
- When deciding to buy less perfect vegetables or fruits, the most obvious reasons were the belief that the appearance of food does not matter, as both are equally nutritious (chosen by 88% of the respondents) and also the opinion that imperfection means naturalness, i.e. a more natural way of growing without chemical treatment (chosen by 85% of the respondents).
- As for the estimate of the amount of fruits and vegetables that do not reach consumers at all due to their appearance, the correct share (i.e. 20 to 30%) was estimated by almost two-fifths (37%) of the respondents.
- According to the Czech public, the standards of the European Union (36%) and the standards of retail chains and supermarkets (28%) have a decisive influence on the desired appearance of fruits and vegetables that reach the counters of retail chains and supermarkets.

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In a special study called Food 2020, CVVM SOÚ AV ČR (Public Opinion Research Centre of the Institute of Sociology of the Czech Academy of Sciences) asked for the opinions and attitudes of the Czech public on the issue of food wasting. One part was focused on the purchase of imperfect fruits and vegetables. The respondents specifically commented on which food they would choose if they had a choice - whether perfect or less perfect and whether they would consider the appearance of the selected vegetables or fruits at all. They also chose the reasons that would lead them to such choice. Who decides on the desired appearance of fruits and vegetables that reach the counters of retail chains and supermarkets? The last point was their estimate of the share of discarded food due to visual imperfections in relation to the total production.

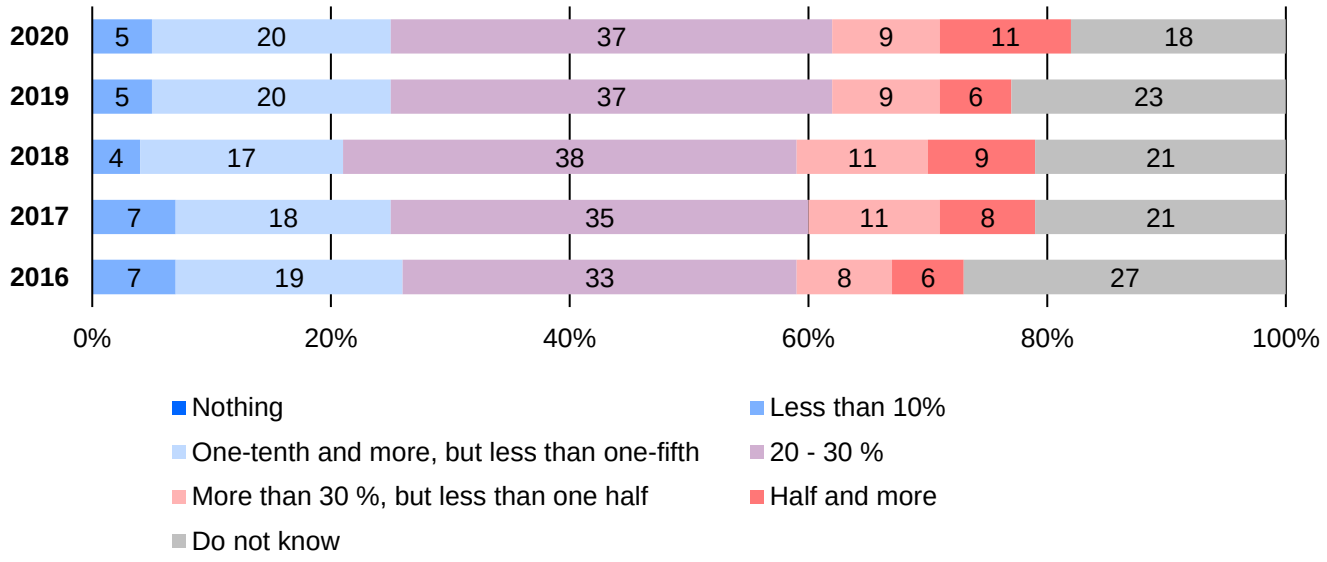
Disposing of crops due to appearance and other standards is one of the possible forms of food wasting. This is not a waste associated directly with households or the disposal of unprocessed (unsold) food but a waste primarily at the level of food production and distribution to consumers.

The causes of wasting at this stage of the journey of food to the consumer lie mainly in the standards and customers' requirements from farmers, where these customers are mainly large retail chains. Their requirements for the appearance of food (especially vegetables and fruit) not only result in a large part of the crops being disposed of or ploughed under directly in the field but they also force farmers to produce much larger quantities of crops than is necessary. It is estimated that when selecting crops for reasons such as weight, appearance and size, approximately

20 to 30% of the crops grown are discarded[1]. However, no official statistics are kept on the specific amount of food discarded. However, the consequences of the mentioned procedures are not only in the actual disposal of non-compliant food and thus overproduction but also in the depletion of land, the profitability of which may decrease in the future. This means that in a field of the same size, the overall fertility will decrease in the future compared to the current situation. Other dimensions of the ecological consequences are the wastes of water and energy for this overproduction as well as the loss of biodiversity. The consequences of food wasting can also be found in the economic sphere, where the costs associated with growing unused food are incurred and also in the social sphere, where they are linked to health as well as equal access to food.[2] [3]

In the CVVM research, the Czech public estimated what is the actual share of food discarded based on visual imperfections in the total amount of food. Nearly two-fifths (37%) of the respondents, their estimate (share of 20-30% of the total food production) of such discarded food corresponds with the real situation. Less than one-tenth (9%) estimated that the share is higher than 30% but do not think that it is more than half, while slightly more than one-tenth (11%) of the Czech public is of the opinion that the share of food discarded for aesthetic reasons outweighs the amount of the food that gets on the shelves of shops, which means that they think more than half of the food is being disposed. On the contrary, a quarter (25%) of the respondents estimated its share as lower than it really was, of which 20% think that it is less than a fifth but at least 10%, while 5% think that it is less than 10%. At the same time, less than one-fifth (18%) of the respondents were unable to answer this question and chose the "I don't know" option.

Chart 1: The respondents' estimate of the proportion of food discarded due to appearance (%)[4]



Source: CVVM SOÚ AV ČR (Public Opinion Research Centre of the Institute of Sociology of the Czech Academy of Sciences) Food 15th - 31st August 2020; 979 respondents over 15 years old, personal interview.

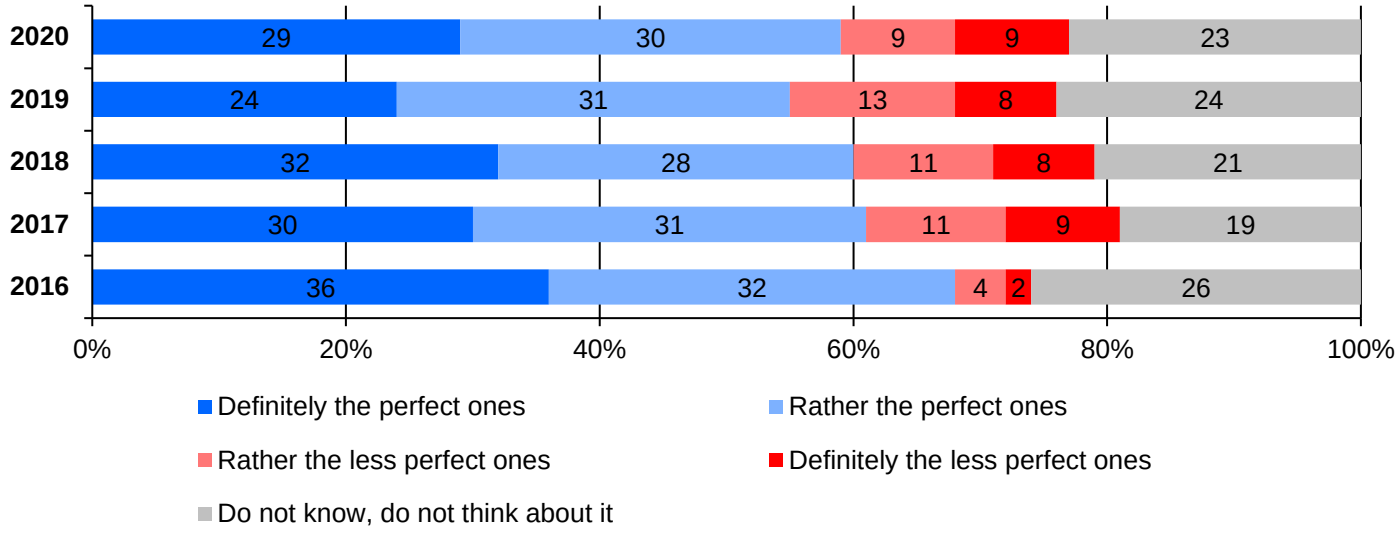
As for the time comparison, since 2016 when this topic was included in the CVVM research for the first time, there have been no significant shifts in the Czech public's opinion during individual years. The only exception is the decrease (by 6 percent) in the share of people who "do not know" between 2016 and 2017 and another one between 2019 and 2020 (by 5 percent). On the contrary, compared to previous research conducted in 2019, the proportion of people who estimated that half or more food is discarded due to visual imperfections has increased (by 5 percent). There is also a statistically significant increase (by 5 percent) in the share of those who estimated the "correct" share of discarded food, i.e. 20 to 30%, between 2016 and 2018.

[1] FAO. 2011. *Global food losses and food waste – Extent, causes and prevention*. Food and Agriculture Organization of the United Nations, Rome.
[2] Stuart, T. 2009. Waste: uncovering the global food scandal. WW Norton & Company.
[3] Stenmarck, A., Jensen, C., Quested, T., Moates, G. 2016. Estimates of European Food Waste Levels. FUSIONS. Reducing Food Waste through Social Innovation. Stockholm.
[4] Question wording: "In some cases, food does not reach shop shelves due to its appearance and, for example, remains on the fields to be ploughed under or as animal feed. Can you estimate what percentage of the total amount of food it is?" Range = 0-100%.

Therefore, there is a question why food and appearance requirements arise. Chains often justify the requirements for the exact shape and size of crops by the demand of the consumers themselves. The strategy of supermarkets is such that they offer to their customers only vegetables and fruits that look practically identical and do not deviate in any way in size, shape, etc. However, it is more about marketing than about the real quality of food [5]. However, some chains are already abandoning these strategies and starting to include non-standard shaped vegetables and fruits in their distribution. We can see these steps not only abroad but also in the Czech Republic. In particular, in the Czech Republic, vegetables and fruits of non-standard shapes are offered by the Tesco, Penny Market and Albert chains or even the Rohlík.cz e-shop.

Let's take a look at what the Czech public says about this topic. The results of the research show, that if there were imperfect and perfectly shaped pieces of fruits and vegetables placed next to each other, almost three-fifths (59%) of the respondents would chose the perfect one, provided they had the same price (in particular, 29% of the respondents would definitely chose the perfect one and 30% would rather chose it. On the other hand, less than one-fifth (18%) of the respondents would choose less perfect vegetables or fruits (of which 9% would rather buy and 9% would definitely buy less perfect pieces). At the same time, almost a quarter (23%) of the respondents would not think about the choice between perfect or less perfect vegetables and fruits at all or could not say which one to choose.

Chart 2: Would the respondent buy perfect or imperfect fruits and vegetables? (%)[6] [7]



Note: In 2017, the wording of the question was changed with the use of cards in the form of illustrative images of perfect and imperfect vegetables. In 2020, the same wording as in 2017, 2018 and 2019 was used.

Source: CVVM SOÚ AV ČR (Public Opinion Research Centre of the Institute of Sociology of the Czech Academy of Sciences) Food 15th - 31st August 2020; 979 respondents over 15 years old, personal interview.

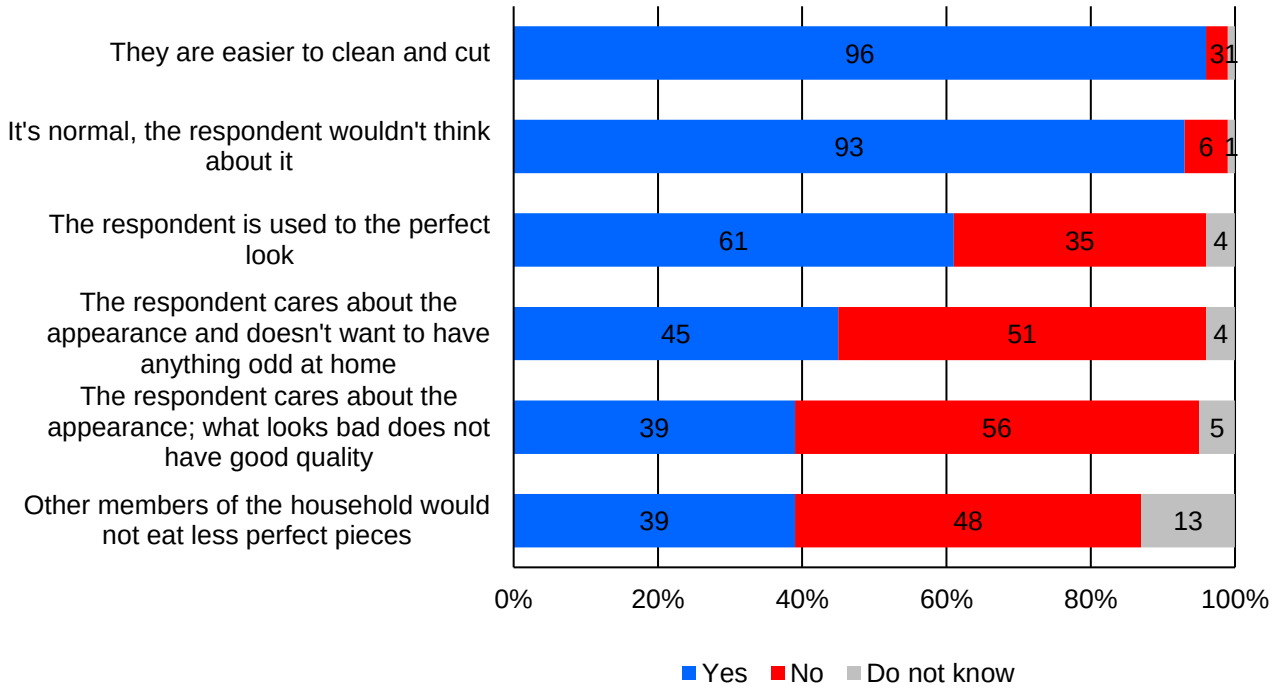
From the time comparison offered in Chart 2, we see that from 2016 to 2019 the share of those who would choose the perfect shapes of fruits or vegetables provided that they have the same price, gradually decreased. However, in the current research this share has increased slightly (by 4 percent). The current result is statistically comparable with the

[5] FAO. 2011. *Global food losses and food waste – Extent, causes and prevention*. Food and Agriculture Organization of the United Nations, Rome.
[6] Question wording in 2017, 2018, 2019, 2020: "Imagine that you are in a shop and you see fruits or vegetables on the counter that do not have perfect shapes or colours (crooked carrots, curved cucumbers, etc. - see picture A) and right next to it, there are perfectly shaped fruits or vegetables (see picture B). If their price was the same, which of them would you rather buy? Response options: Definitely the one from picture A, rather the one from picture A, rather the one from picture B, definitely the one from picture B, you don't know, you do not think about it."
[7] Question wording in 2016: "Imagine that you are in a shop and you see visually imperfect but not spoiled fruits or vegetables (crooked carrots, curved cucumbers, etc.) and that there are perfectly shaped fruits or vegetables right next to them. If their price was the same, which of them would you rather buy? Response options: Definitely the perfect ones, rather the perfect ones, rather the less perfect ones, definitely the less perfect ones, you don't know, you don't think about it."

years 2017 and 2018. In all of these years, there was always a relatively high proportion of the respondents (from 19 to 26%) who were unable to answer this question precisely and chose the "I don't know, I don't think about it" option.

The respondents, who preferred perfect fruits and vegetables to imperfect ones, assessed whether any of the observed reasons were relevant to their choice. As for the reasons that led respondents to choose the perfect vegetables and fruits, they most often mentioned that such good-looking food is easier to clean and slice (96%) and also that they consider it normal and would not even think about it (93%). Another reason is that people are used to the perfect appearance of fruits and vegetables, which was cited as the reason by more than three-fifths (61%) of the respondents. For the remaining reasons, the share of the negative answers prevailed over the positive ones. More than two-fifths (45%) of the respondents said that the reason for them was that they care about the appearance of fruits and vegetables and do not want anything odd lying around their home (for more than half - 51% - this reason did not matter). Almost two-fifths (39%) of the respondents stated that the appearance played a role in their decision-making, as what looks bad does not have good quality (for 56% this reason is not decisive) and that other members of the household would not eat less perfect pieces (for 48% this reason is not decisive and 13% were unable to make any statement about this option).

Chart 3: Reasons for buying perfect vegetables (%)[8]



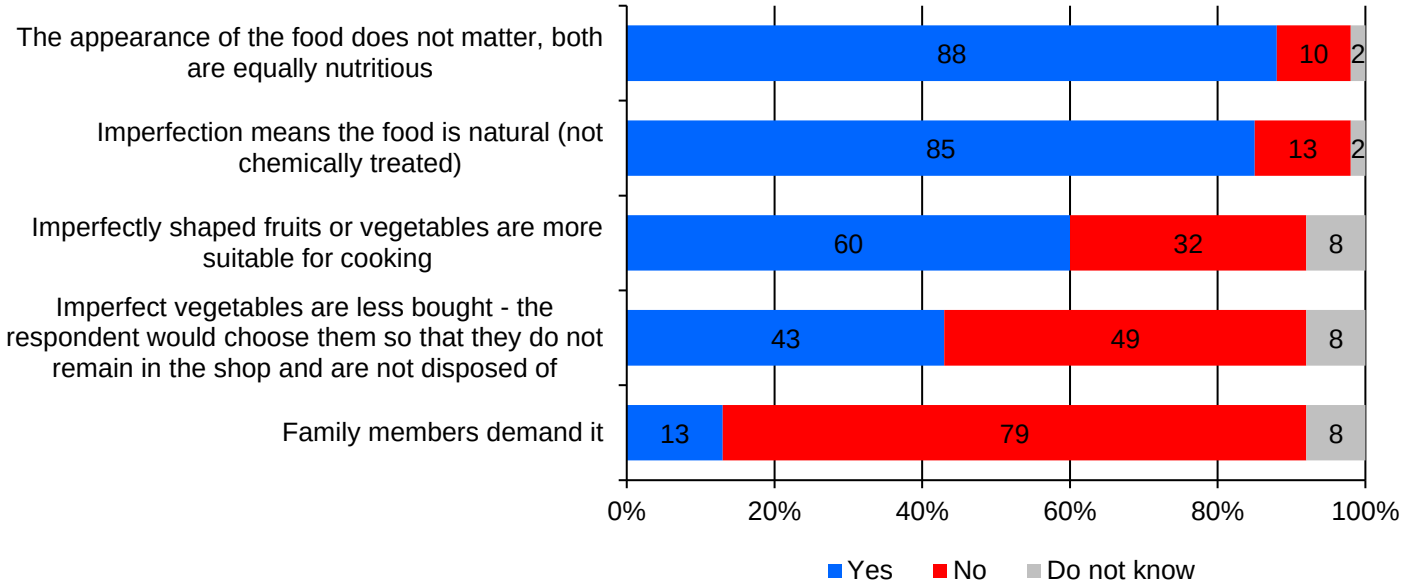
Source: CVVM SOÚ AV ČR (Public Opinion Research Centre of the Institute of Sociology of the Czech Academy of Sciences) Food 15th - 31st August 2020; 581 respondents over 15 years old, who would prefer perfectly shaped vegetables and fruits, personal interview.

Similarly, we asked individuals about the reasons for buying imperfect fruits and vegetables. The most frequently mentioned reason was that the appearance of food does not matter, as both are equally nutritious, when 88% of the respondents who would choose the imperfect vegetables or fruits when choosing between perfect and imperfect ones, agreed with this statement. A similar proportion (85%) of the respondents also stated that the reason for them was the

[8] Question wording: "Why would you rather buy the perfect vegetables or fruits? Please indicate which of the following reasons apply to you: a) It is easier to clean and cut, b) you care about the appearance, what looks bad does not have good quality, c) you care about the appearance, you do not want anything odd lying around your home, d) you are used to a perfect look and you do not want to change it, e) other members of the household would not eat less perfect pieces, f) it is simply normal, you would choose the perfect one without thinking." Response variants: yes, no.

fact that imperfection means the food is natural and that imperfect pieces of fruits and vegetables are not chemically treated. Three-fifths (60%) of the respondents expressed the opinion that imperfectly shaped fruits and vegetables (e.g. small potatoes) are more suitable for cooking. More than two-fifths (43%) of the respondents said that imperfect fruits and vegetables are less bought and they would therefore buy them to avoid their disposal. On the other hand, for less than half (49%) of the respondents, this would not be the key reason in decision-making. More than one-tenth (13%) of the respondents stated that family members require imperfect fruits or vegetables. However, for almost four-fifths (79%) of the respondents this reason is not decisive.

Chart 4: Reasons for buying imperfect vegetables[9]

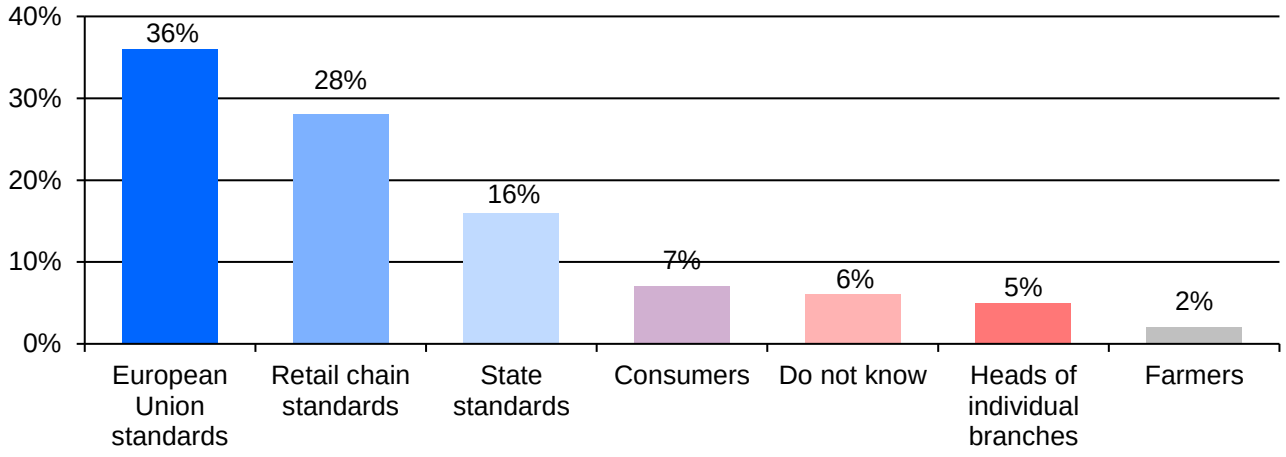


Source: CVVM SOÚ AV ČR (Public Opinion Research Centre of the Institute of Sociology of the Czech Academy of Sciences) Food 15th - 31st August 2020; 172 respondents over 15 years old, who would prefer imperfectly shaped vegetables and fruits, personal interview.

We also asked the respondents who, in their opinion, decides how fruits and vegetables should look like so that they get on the shelves of retail chains and supermarkets. More than one-third (36%) of the respondents were of the opinion that European Union standards have a decisive influence on the appearance of fruits and vegetables. 28% of the respondents are of the opinion that the requirements for the appearance of fruits and vegetables are influenced mainly by the standards of retail chains and supermarkets. About one-sixth (16%) believed that state standards have a decisive influence. Less than one-tenth of the respondents believed that consumers (7%) and branch managers (5%) have the greatest influence. Only 2% of the respondents believed that farmers have an influence on the appearance. The remaining 6% of the respondents were unable to choose an answer and chose the "I don't know" option.

[9] Question wording: "Why would you rather buy the imperfect vegetables or fruits? Please indicate which of the following reasons apply to you: a) the appearance of the food does not matter, crooked and straight vegetables / fruits are equally nutritious, b) imperfection means naturalness (not chemically treated), c) imperfect vegetables are less purchased, you would chose it so it is not left in the shop and disposed of, d) your family members require it, e) such imperfectly shaped fruits or vegetables are more suitable for cooking (e.g. small potatoes)." Response variants: yes, no.

Chart 5: Who decides on the desired appearance of fruits and vegetables that reach the counters of retail chains and supermarkets?[10]



Source: CVVM SOÚ AV ČR (Public Opinion Research Centre of the Institute of Sociology of the Czech Academy of Sciences) Food 15th - 31st August 2020; 979 respondents over 15 years old, personal interview

From the time comparison (see Table 1) we can see that since 2017, when the question was included in the research for the first time, there have been no statistically significant changes in the respondents' opinion on who they think has the last word when deciding what the requirements for the appearance of fruits and vegetables are, so that they get to the shelves of retail chains and supermarkets. The only exception in the current research was a slight decrease in the share of people who "do not know" how to answer this question (a decrease of 4 percent compared to 2018 and 2019).

Table 1: Who decides on the desired appearance of fruits and vegetables that reach the counters of retail chains and supermarkets? - time comparison.

	VI/2017	VI/2018	IV/2019	VIII/2020
European Union standards	34	33	33	36
standards of retail chains	29	28	27	28
state standards	14	14	17	16
consumers	5	6	5	7
leaders of individual branches	7	7	6	5
farmers	2	2	2	2
do not know	9	10	10	6

Note: The values in the table are the sum of the answers "yes, regularly" + "yes, sometimes". The remaining 100% consists of the "no" and "do not know" answers. The items are sorted in descending order according to the results of the current research.

Source: CVVM SOÚ AV ČR (Public Opinion Research Centre of the Institute of Sociology of the Czech Academy of Sciences), Our Society, Food

[10] Question wording: According to your opinion, who do you think has the last word when deciding what the requirements for the appearance of fruits and vegetables are, so that they are offered by retail chains and supermarkets. European Union standards, state standards, retail chain / supermarket standards, leaders of individual branches, farmers, consumers“

Technical Parameters of the Research

Research:	*Food 2020*
Implementer:	*Centrum pro výzkum veřejného mínění, Sociologický ústav AV ČR, v.v.i. (Public Opinion Research Centre of the Institute of Sociology of the Czech Academy of Sciences)*
Project:	*Strategy AV21 "Food for the Future"*
Date of field investigation:	*15th August - 31st August 2020*
Selection of the respondents:	*Quota sampling*
Quotas:	*Region (NUTS 3 areas), size of the area of residence, sex, age, education*
Data weighting:	*Education X NUTS 2, age X NUTS 2, sex X region, size of the area of residence X age, education X age*
Source data for quota sampling And data weighing:	*Czech Statistical Office*
Representative rate:	*Population of the CR, 15 years old and older*
Number of the respondents:	*979*
Number of interviewers:	*161*
Data collection method:	*Personal interview of the interviewer with the respondent - a combination of CAPI and PAPI interviews*
Research tool:	*Standardized questionnaire*
Questions:	*PL.16, PL.17, PL.18, PL.19, PL.32*
Message code:	*OR201116*
Published on:	*16 November 2020*
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Dictionary of Terms:

Quota sampling - it mimics the structure of the basic set (in our case it is the population of the Czech Republic older than 15 years) by setting the size of selected parameters, the so-called "quotas". In other words, the quota selection is based on the same percentage of selected properties. We use data from the Czech Statistical Office to create the quotas. Our research sets quotas for gender, age, education, region and community size. The sample is therefore selected so that the percentage of e.g. men and women in the sample corresponds to the percentage of men and women in each region of the Czech Republic. Similarly, the percentage of the population of individual regions of the Czech Republic, citizens of different age categories, people with different levels of education and from differently sized municipalities is preserved.

A representative sample is such a sample from the whole population, from the characteristics of which it is possible to validly conclude the characteristics of the whole population. In our case, this means that the respondents are selected so that we can generalize the data to the population of the Czech Republic older than 15 years.

Data weighting - a way to increase the representativeness of the file with respect to selected characteristics of the population by assigning a weight to each respondent. The weights are generated using the iterative proportional weighing method and they range from 0.333 to 3.

Public Opinion Research Centre (CVVM) is the research department of the Institute of Sociology of the Czech Academy of Sciences (Sociologický ústav AV ČR, v.v.i.) Its history dates back to 1946, when the Czechoslovak Institute for Public Opinion Research began operating as part of the Ministry of Information. The current Centre was established in 2001 by transferring its predecessor (IVVM) from the Czech Statistical Office to the Institute of Sociology of the Czech Academy of Sciences. Incorporation into a scientific institution guarantees a quality professional background and workplace credit; as a part of the academic environment, CVVM SOÚ AV ČR (Public Opinion Research Centre of the Institute of Sociology of the Czech Academy of Sciences) must meet all requirements and thus reach the highest professional level. The main task of the department is the "Our Society" research project, within which ten surveys are conducted annually. This is public opinion research on a representative sample of the Czech population from the age of 15 years old, in which it is always participated in by approximately 1,000 respondents. The omnibus form of the questionnaire makes it possible to cover a wide range of topics, and therefore such political, economic, and other general social issues are regularly included in the research. The research uses repeated questions, which make it possible to monitor the development of the studied phenomena, as well as new topics that respond to current events. Due to its long-term and continuous nature, this scientific project of public opinion research is unique in the Czech Republic.

The activity was supported by the AV21 Strategy of the Academy of Sciences within the "Food for the Future" research program. http://www.potravinyav21.cz/