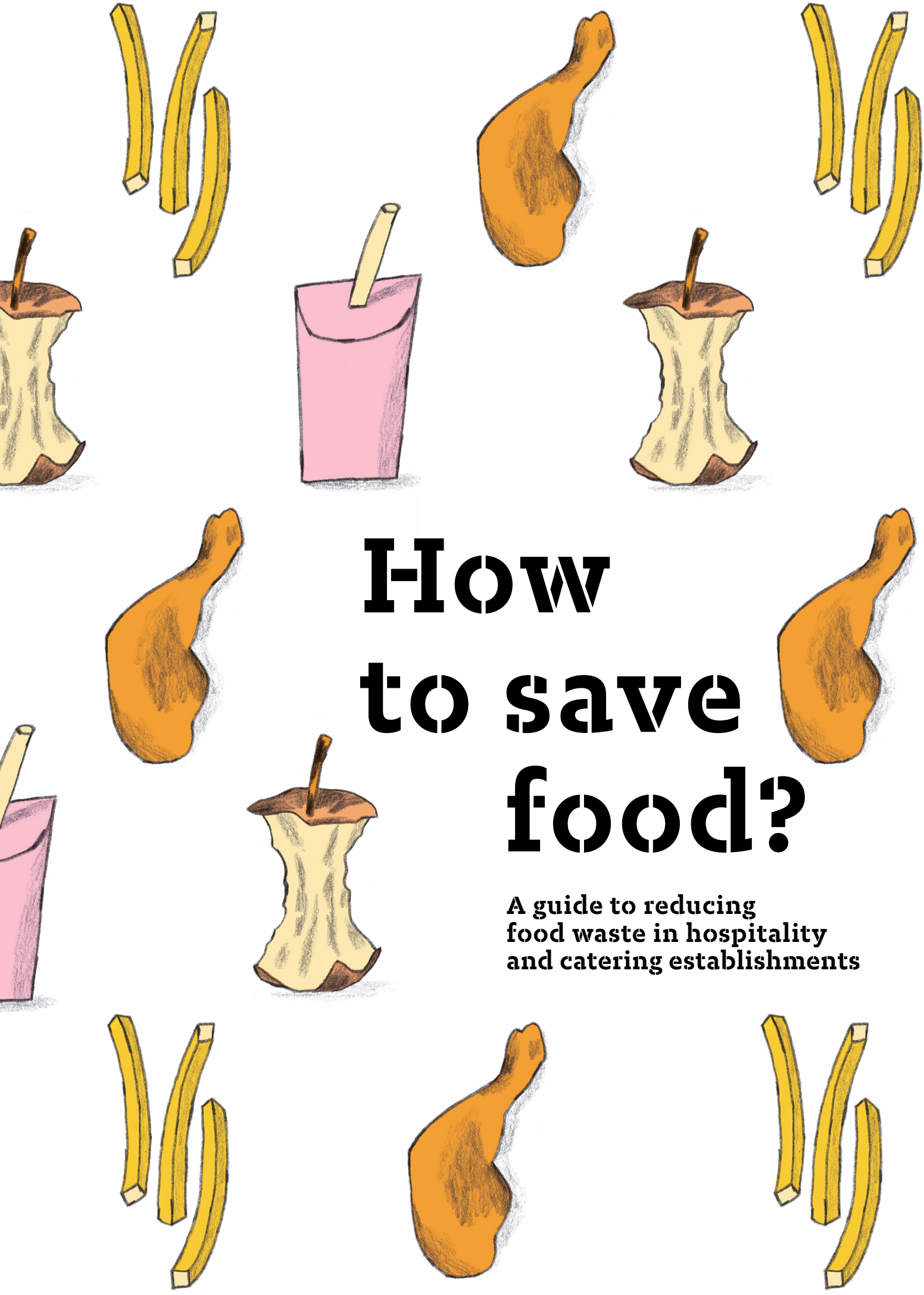

How to save food?

A guide to reducing food waste in hospitality and catering establishments

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Contents

Introduction

This guide is intended for entrepreneurs in the field of hospitality and catering, state administrators, non-profits and other stakeholder entities who intend to reduce their food waste and food loss for environmental, economic, social and other reasons. It summarizes the information gained throughout the research project Food waste reduction in hospitality and catering establishments (RedPot), which was conducted with the support of the ÉTA program of the Technology Agency of the Czech Republic during the years 2018–2020.

This project is one of the first to map food waste in hospitality and catering establishments in the Czech Republic and makes specific recommendations on how to reduce food waste in the everyday practice of canteen and fast food operations.

The RedPot research project was conducted in three basic steps

1.
A field investigation of food loss/waste was conducted in selected quick service establishments such as canteens and fast food restaurants.

2.
Identification was made of the causes of food loss/waste on the operators' side as well as on the consumers' (customers') side in these selected establishments.

3.
A proposal of measures for food loss/waste reduction in the catering segment for restaurants, support (non-governmental) organisations and state administration was written.

This guide is divided into five parts

At the beginning of this guide you will find information about food waste to acquaint you quickly with the issue. In the next part we summarize the knowledge gained from the field survey — we quantified the loss and waste in quick service restaurants and highlighted their causes. We follow up with a set of possible measures to be taken to prevent or reduce food waste. In this guide you will find ways to reuse unsold food still suitable for human consumption and at the same time we introduce options for the waste management of food which is no longer suitable for human consumption. At the end we introduce a set of recommendations for entities of state administrations and other organisations for better food waste management.

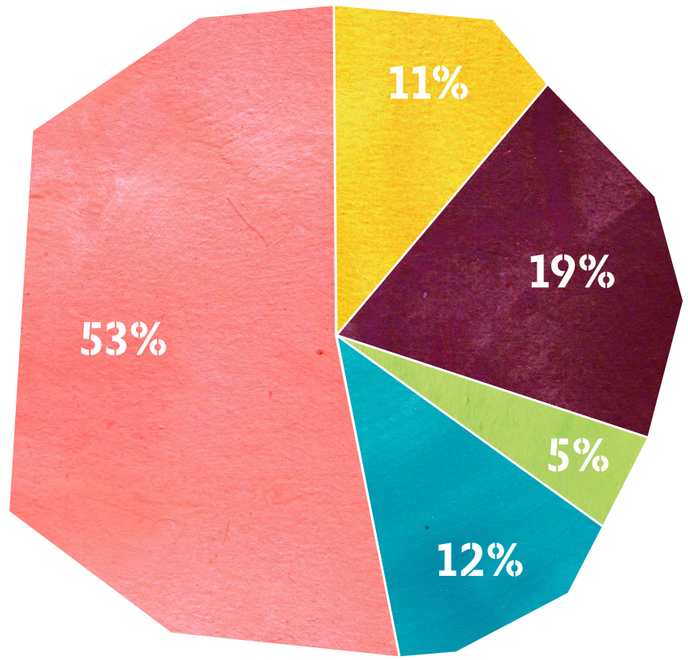
How much food is being wasted and why is it a problem?

According to data from the Intergovernmental Panel on Climate Change (IPCC) Food and Agriculture Organization of the United Nations (FAO) the large amount of food that gets wasted has a great cost — not only financial, but also in other ways such as its effect on water, soil, fertilizers, fossil fuels, packaging materials, as well as human labor. At the same time this waste threatens global food security and has significant environmental impacts. According to estimates from the European Commission, EU countries annually discard 88 million tons of food at a cost of 143 billion euros — more than double the state budget of the Czech Republic for 2020. European restaurants are responsible for about 12% of the total volume of discarded food — producing over 10 million tons of food waste annually. That is more than 17 billion euros.

And it is not just about the finances. Food production leaves a considerable environmental footprint. Agriculture occupies half of the Earth's inhabitable land, it is a source of extensive deforestation (in tropical countries it can be responsible for up to 80% of the disappearing forests) and consumes 70% of our fresh water. If we compared food waste in terms of the volume of produced greenhouse gases with the output of individual countries, it would be the third largest producer in the world, right after China and the USA. According to the UN, food waste is responsible for up to 8% of global emissions.

Food waste is a really significant problem to which hospitality and catering operations also contribute. In very few of them is food waste regularly monitored, or its total quantity is evaluated and targeted measures are put into place leading to reduction. At the same time, waste reduction in gastronomic establishments has a lot of relatively significant economic potential. The RedPot project showed that a key factor for prevention and reduction of food loss and food waste is their measurement and monitoring.

Total volume of food waste in the EU according to different sectors



53% **Households**

11% **Production**

19% **Processing industry**

5% **Wholesale and retail**

12% **Catering**

Source: Market study on date marking and other information provided on food labels and food waste prevention, European Commission, 2018

What was the main focus of the RedPot project?

The project focused on mapping the food management process onto a company — from storage, to preparation, to the final consumer. During this journey, two terms to describe discarded food were identified — food loss and food waste. In addition to these terms this chapter also deals with the nature of the type of establishments, in which the investigation took place, and their categorization.

Food loss and food waste

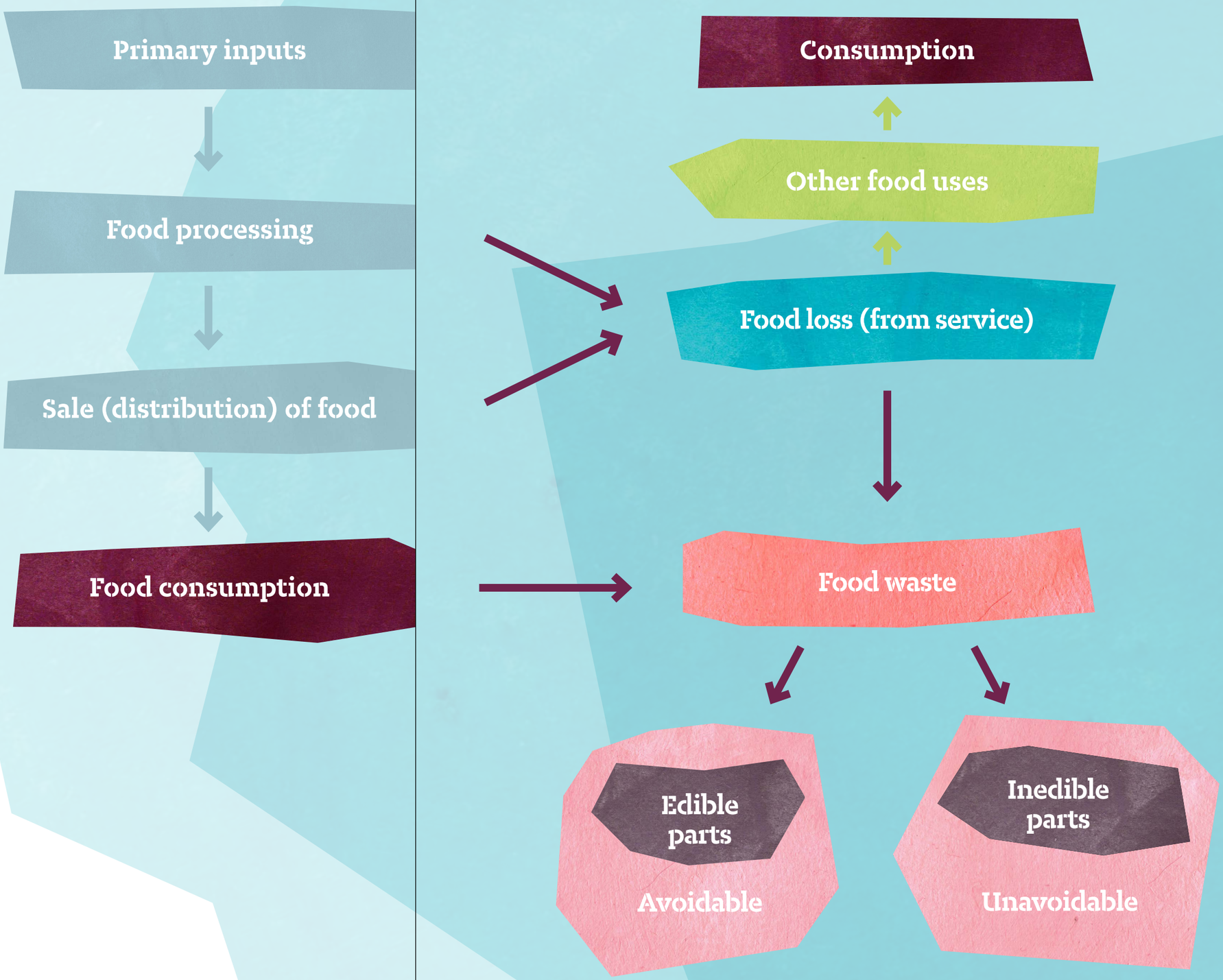
Food loss

In the RedPot project, food loss is defined as food discarded during processing or selling in a given operation, which if saved, would not necessarily degrade to waste, but could have been used as food suitable for human consumption (e.g. for food banks). The food could have been consumed, but it was not. For such cases we use the term "loss" in the manual.

Food waste

Based on the methodology of the EU FUSIONS project "Quantification of food waste", we formulated a simplified, pragmatic definition of food waste as: any food (including the inedible parts), which are not consumed and are not served for human consumption, no matter how this waste is further used or disposed of. Therefore this definition considers as food waste also the parts of food which are used as animal feed, used for the production of biological materials and used for biochemical processing.

Scheme of origin of food waste and food loss



What types of establishments was the RedPot project conducted in?

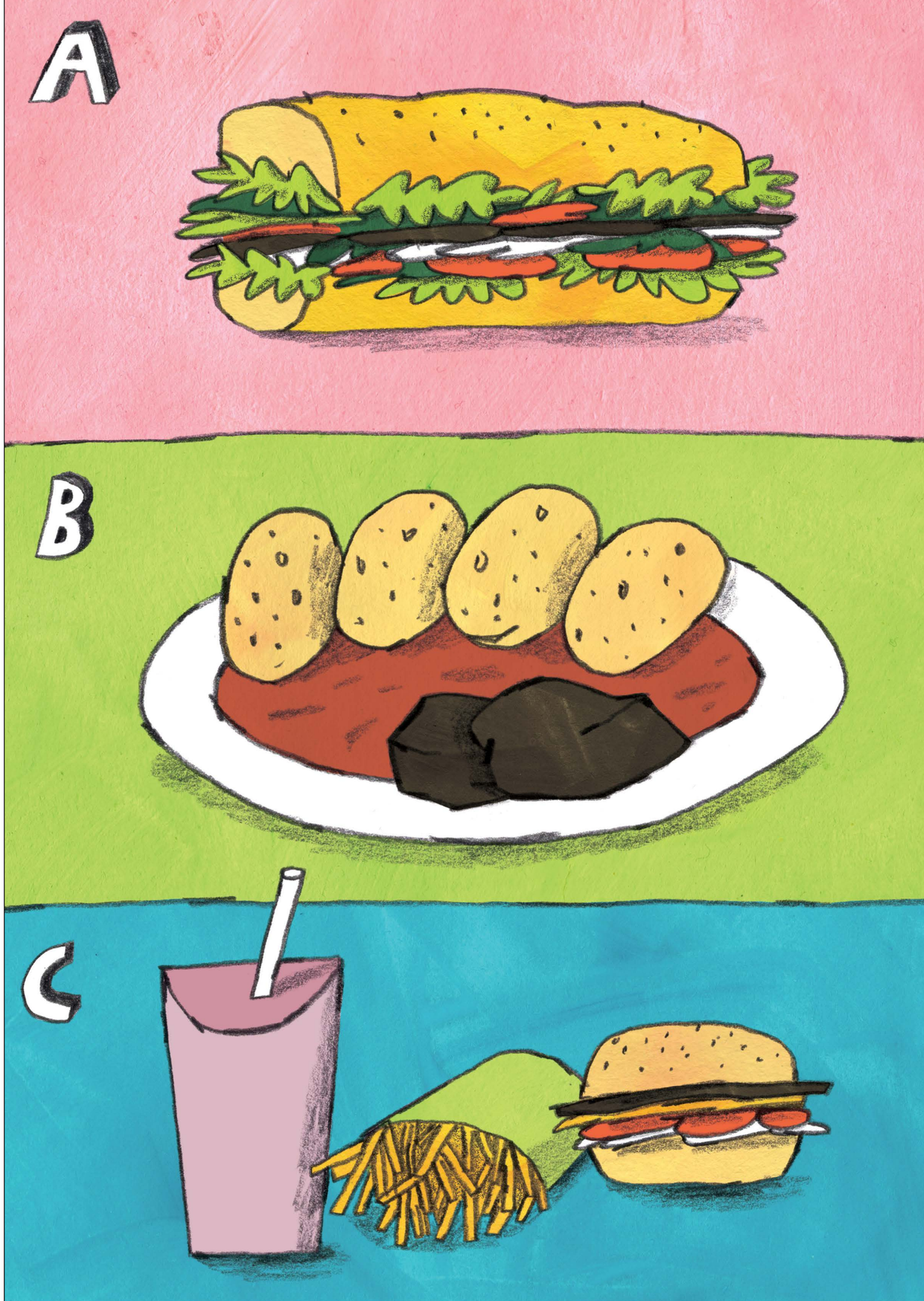
The project focused on the operations of catering companies, which are restaurants with quick service operation (QSR). These are canteens, cafeterias and so-called fast food restaurants, which focus on the customers' need to eat in a relatively short time and at a low price.

RedPot project worked with these types of QSR establishments

Type A: Sandwich shops or baguetterias, the simplest form of fast service catering, where meals are prepared according to customer orders from pre-prepared raw ingredients, possibly heated up. The proportion of direct processing of raw materials is minimal. These establishments are open for the general public.

Type B: Canteens, cafeterias and self-service restaurants, intended normally for a closed circle of customers, where, on the contrary, food is cooked from primary raw ingredients. Most meals are prepared on the same day before service starts, so waste depends on a good estimate by the establishments, about which dish the customers demand more and which less. The menu changes daily and repeats in longer cycles.

Type C: Fast food chains, which is a compromise between type A and B. The assortment is stable and changes in large cycles and affects a few items only. The proportion of the direct processing of primary ingredients in the kitchen is more significant. These establishments are also open to the general public.



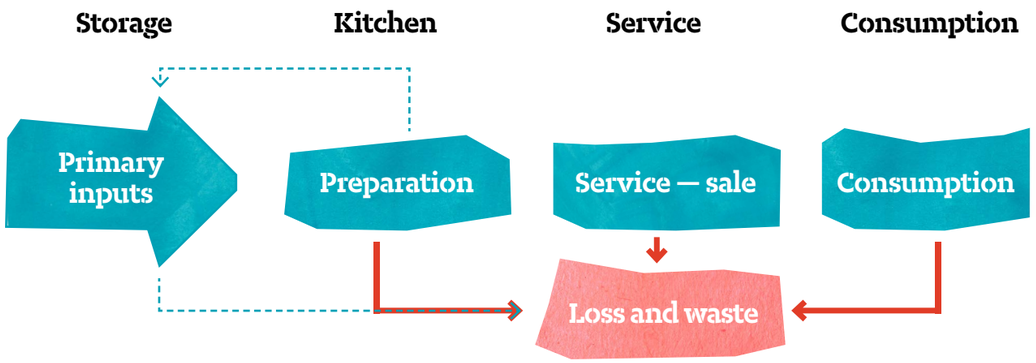
How much food waste and food loss was measured in these establishments and what is the cause of it?

This chapter summarizes the findings of the measurement of food waste and losses in quick service restaurant operations. It indicates how much these businesses throw away, where waste and loss arises, what categories of foods are involved as well as how much food is thrown away within this segment in the Czech Republic in one year. In the following research the causes of food waste and food loss were discussed with some of the companies involved. Comments from customers on these causes were collected also. We summarize the findings in the chapter Causes of food waste and food loss.

The critical stages of generating food waste and food loss

In order to find reasonable solutions for reducing food loss and food waste, we first need to know where and in what quantity it occurs. It is obvious that it can arise wherever food is handled in QSR establishments, including the consumption of it. As part of the RedPot project there were originally four parts of the operation, which were identified as the so-called critical stages of generating food waste and food loss (CS). The nature and causes of each individual critical stage differs based on how the food is handled.

Scheme of critical stages of food waste and food loss generation

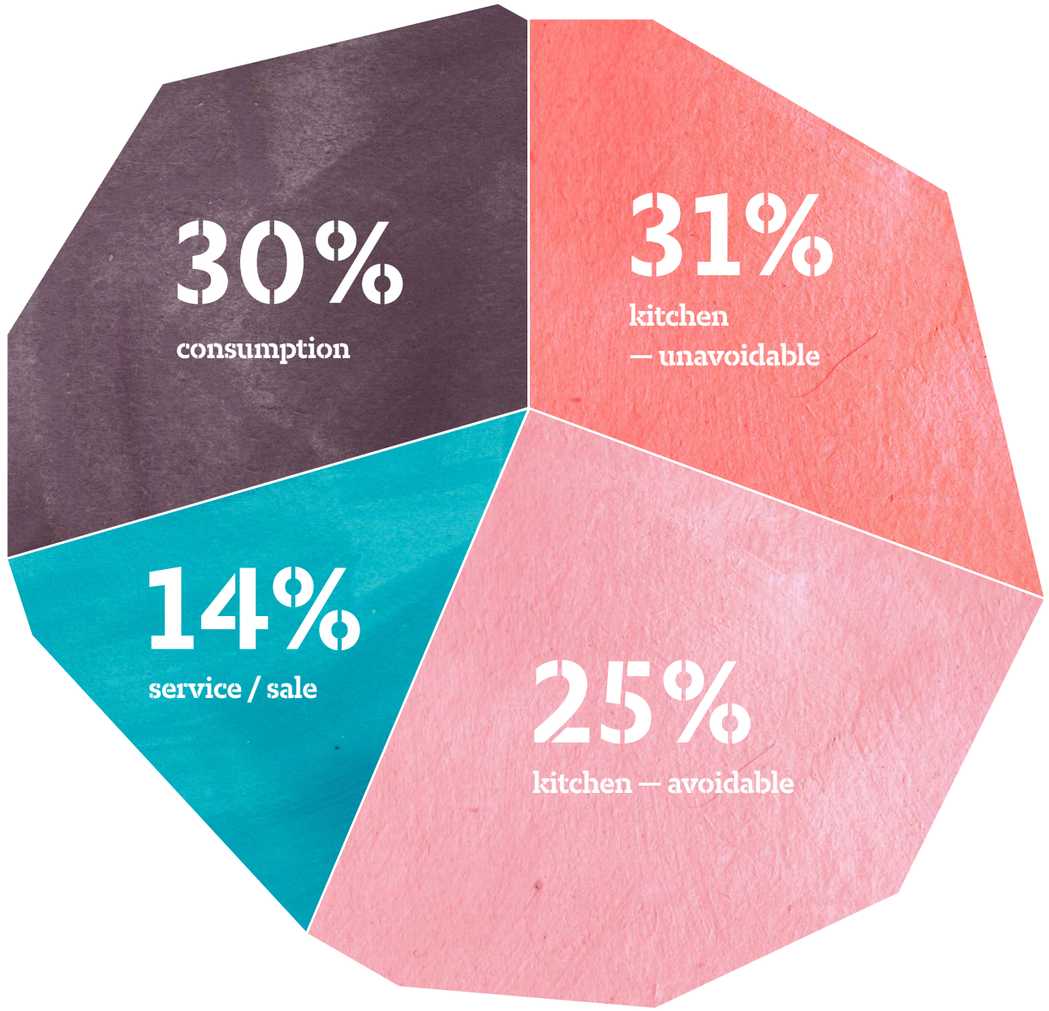


A different process takes place at each critical stage of handling food. The reasons for discarding food differ as well as its form (raw, cleaned, cooked etc.). In this project the classification of discarded food was determined so that it can be used for all critical stages. During testing, the field investigation showed that the first two critical stages actually merge into one and therefore we only need to consider three critical stages since the storage is not strictly operationally separate from the kitchen in QSR establishments; it being a place with a quick turnaround of raw ingredients so the loss is therefore minimal.

Results of the measurement of food waste and food loss

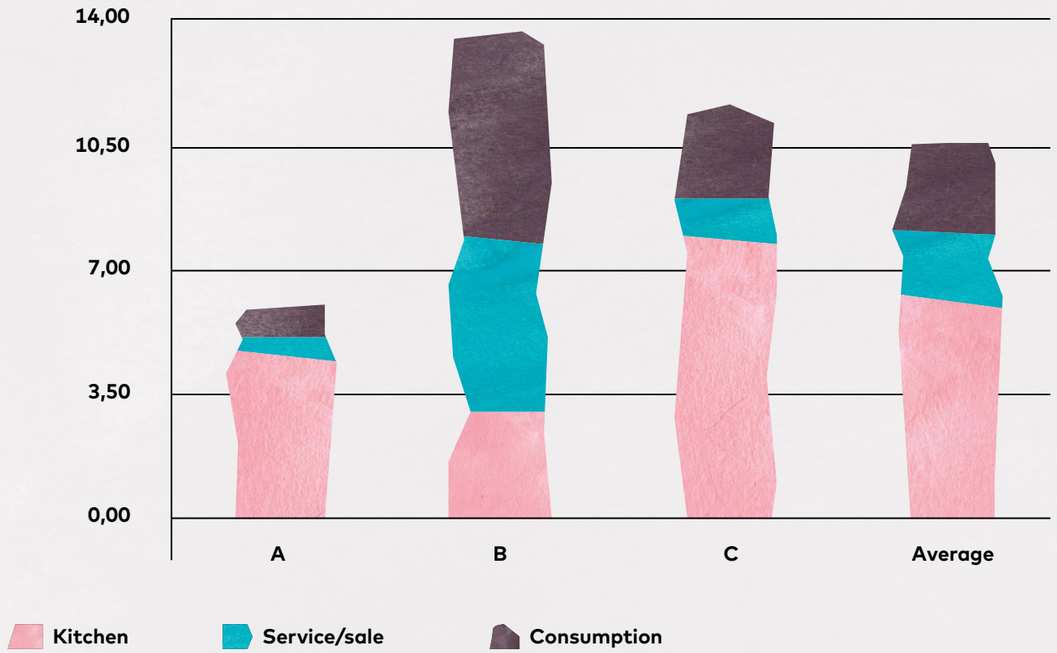
These measurements show that the QSR establishments will on average be discarding 11 kg of food per 100 kg of prepared meals, which is on average 45 kg of food waste and food loss per day. Of this loss, 56% is generated in the preparation of the meal (in the kitchen), 30% during consumption (leftovers from meals sold to consumers) and 14% during the process of serving and selling ready meals (prepared but unsold food).

Structure of food waste and food loss according to the critical stages of food waste and food loss generation



However as these statistics are based upon the average, the measurement results significantly vary in the ratios between individual critical points, but also in volume/weight depending on the type of operation.

Daily amount of food waste and food loss by the type of operation (kg)



The differences in the amount of food waste and food loss between kitchen and service/sale correspond to different methods of food processing and distribution in individual types of operations.

In canteens, cafeterias and self-service restaurants (type B) dishes remain in the kitchen where they are prepared by staff over a few hours. The service/sale of these dishes is organisationally separated from the kitchen. In baguetterias, sandwich shops and fast food chains (types A and C) food handling is minimized. Separation of the kitchen from the service/sale is less significant here and meals are passed on very quickly.

Other differences can also be found at the critical places of consumption. In cafeterias, canteens and self-service restaurants (type B) almost 100% of the dishes are consumed in the establishment itself. In baguetterias (type A) and a substantial portion of fast-food chains (type C) customers often take their food with them and consume it outside of the establishment. This means that food loss in these establishments cannot be measured completely because the research is conducted on the premises only.

The graph shows that the larger the rate of processing of primary raw ingredients (flour, meat, unprocessed vegetables) in the establishment, the larger the amount of food waste and food loss. This way of food processing, on the other hand, does not require much packaging materials and also demands lower levels of storage.

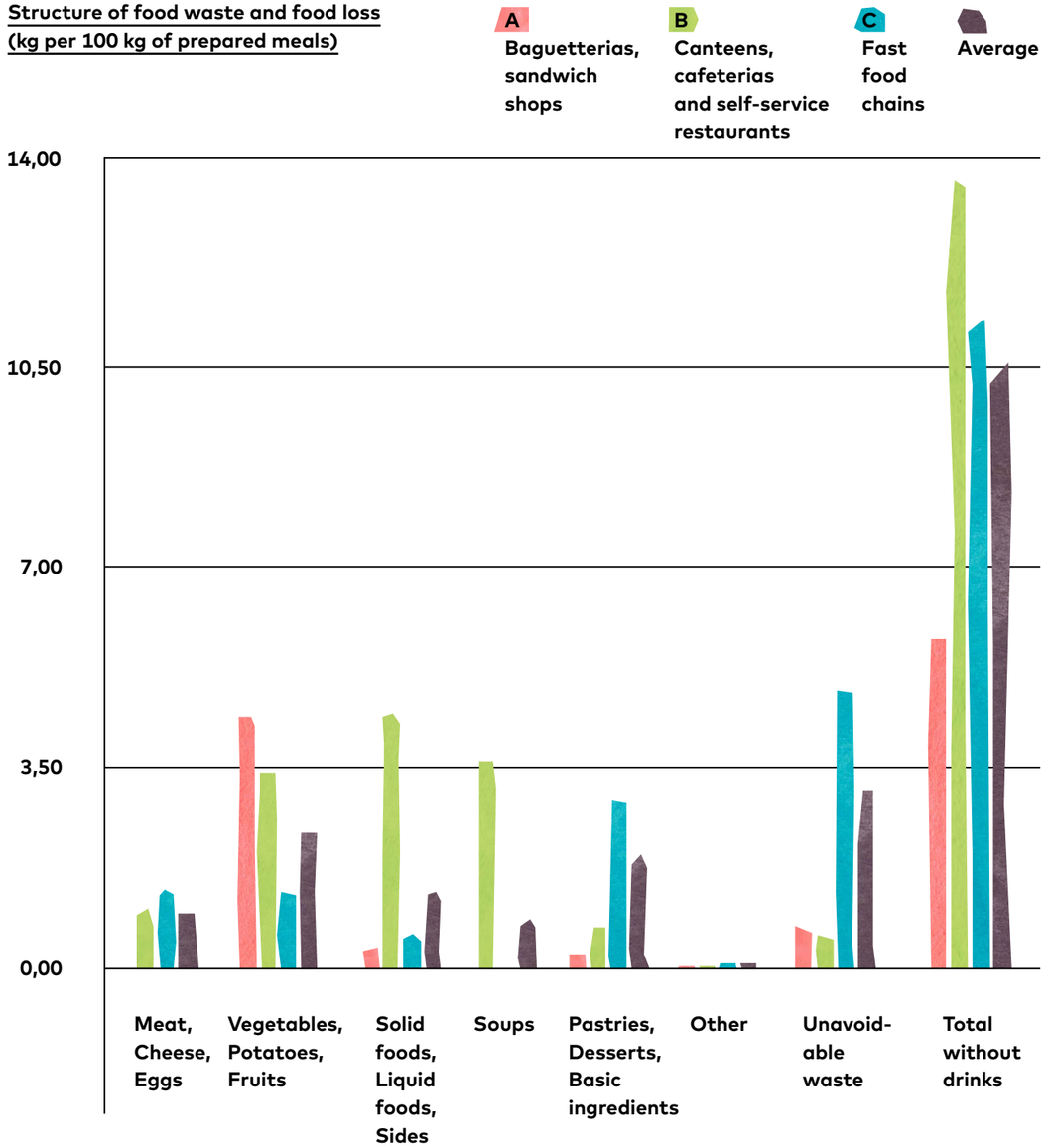
These are not the only findings gained from the measurement. For the examined type A chains we found that the largest share of food waste and food loss was in the leftovers after squeezing fresh orange juice. This leads us to another important insight into food loss and food waste: what is the structure of food waste and food loss?

Structure of food waste and food loss

Our research shows that meat, cheese and eggs are used relatively effectively and do not represent items of significance, adding to total food waste and food loss in the researched operations. On the contrary vegetables, fruits, solid foods (e.g. french fries) and liquid foods (e.g. sauces), side dishes, pastries and others are much more represented — although they vary according to the type of operation.

With vegetables, potatoes and fruits, waste and loss are generated especially in the kitchen. It is a similar situation with the categories of pastries, desserts and basic raw ingredients of plant origin. Waste and loss in the category of liquid and solid parts foods and side dishes are mainly caused by the end consumers but can also arise in limited rates during service.

Structure of food waste and food loss (kg per 100 kg of prepared meals)



Unavoidable food waste

A significant volume of the food waste and loss in hospitality and catering establishments is represented by what we call unavoidable food waste. Unavoidable food waste as described in the chart on page 13 represents its narrower definition, into which only the essentially inedible parts of food such as seeds, bones, egg shells etc. are included.

Categories of unavoidable food waste

Definition	Narrow	Enhanced 1	Enhanced 2
	Tea bags	Narrow +	Enhanced 1 +
	Coffee grounds	Peels and offcuts	Residual ingredients from breading, dipping, marinating etc.
	Bones	Juiced oranges	Flour used for breading
	Egg shells		
	Corn cobs		
	Excess flour after frying		
	Frying oil		

Chain	Amount of kg per 100 kg of prepared meals excluding drinks per day		
A	0,68	2,39	2,39
B	0,52	1,10	1,10
C	4,86	4,86	6,81

Chain	Percentage of unavoidable food waste of total food waste and food loss		
A	12%	41%	41%
B	4%	8%	8%
C	44%	44%	62%

It is clear from the chart that the QSR types also differ in the proportion of unavoidable food waste within the total volume of food discarded. Operations with a large share of unavoidable food waste probably have less chance of this waste being reduced, or sell the type of food from which more food waste and food loss is generated.

Despite the very limited sample, on which the losses were measured, the total amount of food waste and food loss can be estimated for the entire QSR segment per year. In canteens, cafeterias and self-service restaurants (type B) it could be about 8.5 thousand tons annually; for fast food operations of type A and C it can be up to 18.3 thousand tons.
So all together they make up just under 27 thousand tons of food waste and food loss, almost all of which turn into general waste. In terms of per capita, in the Czech Republic the number is 2.7 kg of food waste generated per year — and this is only coming from quick service establishments.

Causes of food waste and food loss

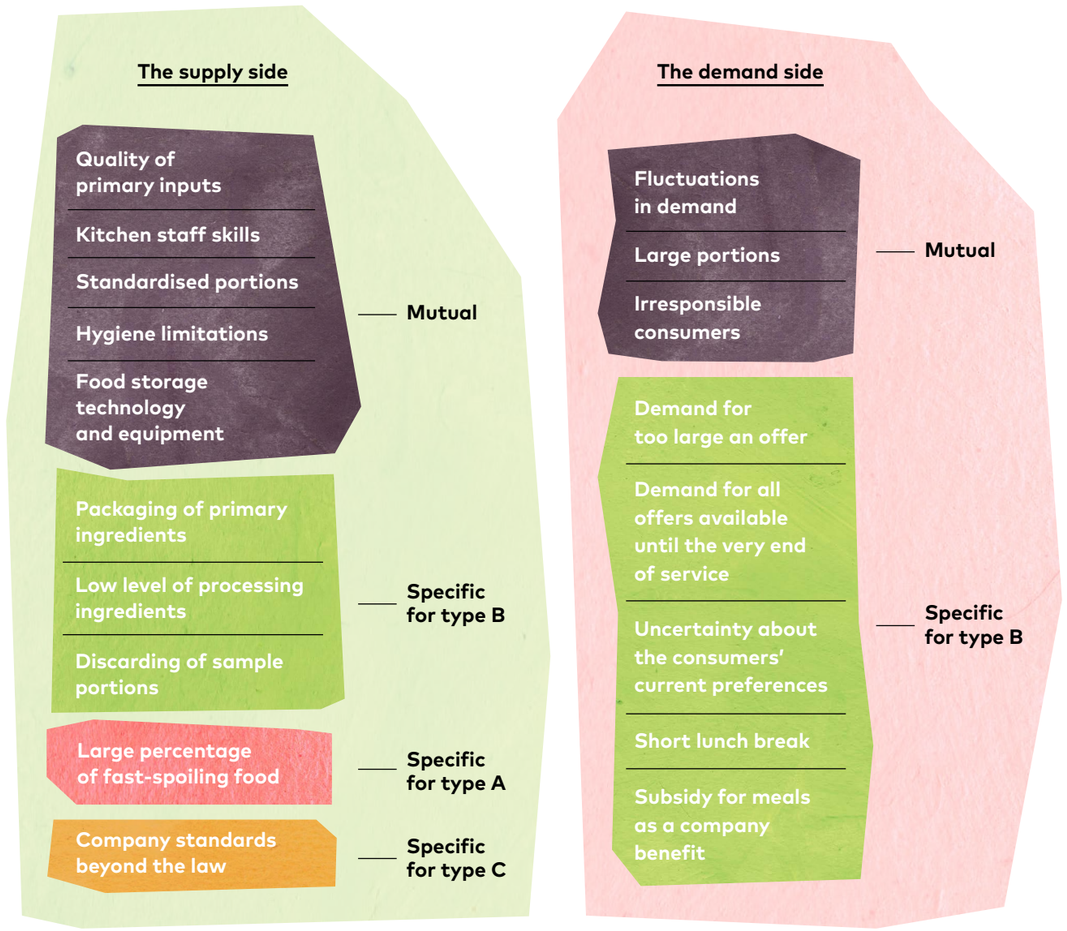
When researching and identifying the causes of food waste and food loss in QSR operations it is important to evaluate the whole process of preparation, service and consumption by both parties — the people involved as well as the independent observers. People involved know their practices and can explain the reasons behind these routines. On the other hand they may be so bound by their procedures that they cannot see alternative solution or for some reason cannot put them into practice. Independent observers, though they do not have such good knowledge of the internal processes, can bring new and novel solutions.

Therefore both parties were invited to identify key causes of the measured food waste and food loss. Independent researchers and QSR staff at various positions from managers to ordinary workers met in person several times and engaged in a conversation.

In addition to this, the opinions of consumers were collected. They were addressed in the form of a questionnaire when the measurement of food waste and food loss took place in the establishment.

As we have already mentioned, operations of type A, B and C are different not only in the offered assortment, but also in the modes of preparation and sale. Therefore, the causes of food waste and food loss are partially identical, but partially specific to certain types of chains. Schematically, the causes of the avoidable food waste and loss are shown here:

Causes of food waste and food loss



The quality of primary inputs

On the supply side, even prior to preparation, there can already be food waste and food loss caused by bad quality primary inputs. It is often an accidental occurrence, poor quality ingredients, but sometimes it can happen that the operator is limited by their finances and buys cheaper, lower quality ingredients, to ensure a sufficient quantity will be served or sold.

Kitchen and service staff skills

The skills of the kitchen and service staff have an influence on whether all dishes are prepared correctly or if some are devalued (e.g. burn, fall or they have an unsightly appearance). In establishments where cooking is done with basic primary inputs, low skilled chefs can cause unnecessarily large amounts of scraps, poor tasting food and inconsistent quality, if the food is cooked repeatedly. Another problem which operators often face is excessive staff turnover. Especially for type A and C operations, a large proportion of staff are short-term part-time workers. Frequently changing workers need to be trained, but usually the employee learns more complex tasks such as portion sizing, after up to half a year on the job. New employees are being trained directly at the establishments under the guidance of a more experienced worker; at present, however, the time for training tends to be tighter than in the past. Workers are not often loyal enough to the company and sometimes they do not have the motivation to do quality work. All this can be reflected in the lack of quality in the preparation of the food.

Portion sizes

Not all consumers can eat the same sized portion. Most QSR operations offer standard portions for a predetermined price. A consumer receives an amount of food that they know in advance, they might not be able to eat. This situation occurs especially with type B establishments, but it's not uncommon for type A and C either. Measurements show that the side dishes in particular remain left over on the plates.

Fluctuations in demand

Although gastronomic establishments try to predict and prepare according to the demand for everyday as much as possible and estimate the amount of dishes they will actually sell, fluctuations are difficult to prevent. There are many factors which can affect this. Corporate events can play a role, business trips, vacations, promotions in another catering facilities nearby, or even the weather. At the same time it is expected that the consumer will be served quickly and therefore the food will be ready at the right time.

In order for operations to be able to satisfy this fluctuating demand, they must have dishes available in different degrees of preparedness. One solution for more efficient food storage is cooling, however, more advanced technological equipment is necessary. Rapid cooling (or freezing) should occur immediately after the preparation of meals and then meals should be stored at 4 °C (and in the case of frozen meals at -18 °C). Chilled dishes have a significantly extended shelf life (usually five days) and may be heated as appropriate — so-called regenerated. However, the corresponding technology is costly. It requires cooling equipment as well as equipment for food regeneration and at the same time an adjustment of work organisation and preparation. For these reasons, only a fraction of the operations have this equipment available.

Strict company standards

Fast food restaurants often have stricter in-company standards than those defined by the law. This applies in particular to temperature control requirements for ready-made meals, which are very time limited. These standards are determined by the brand owner (QSR chains) and their compliance is checked internally. Among other things, they define the assortment of items that must be ready for sale at the establishment. Ready-made dishes containing meat may only be served to the customer within 30 minutes of preparation. For french fries, the time limit is 7 minutes. The appearance of meat, vegetables and other products is also checked. Withering on vegetables or cracks and visual imperfections on items are reasons to exclude food from serving (e.g. a cracked tortilla). The reason for discarding ingredients can also be as little as damaged packaging, etc.

Baguetterias and sandwich shops work with lots of fruit and vegetables, so are therefore very sensitive to discarding food due to the spoilage of raw ingredients. Similarly, fast food operations are more sensitive to the destruction of raw materials or prepared meals. This is especially the case for global fast food chains that have their own company quality standards that are stricter than Czech law. They demand food to be thrown away earlier than the Czech law would demand.

Packaging size

In the cafeterias, canteens and self-service restaurants, basic raw ingredients are predominantly used. In some smaller operations there is a problem with the size of the supplied orders of fresh ingredients. They are often not available in quantities in which a particular operation would prefer. Often there is no other option but to make a larger order. Sometimes it is even more financially advantageous to make larger orders with the risk that the raw material will not be used, rather than making multiple smaller orders.

Scraps and offcuts

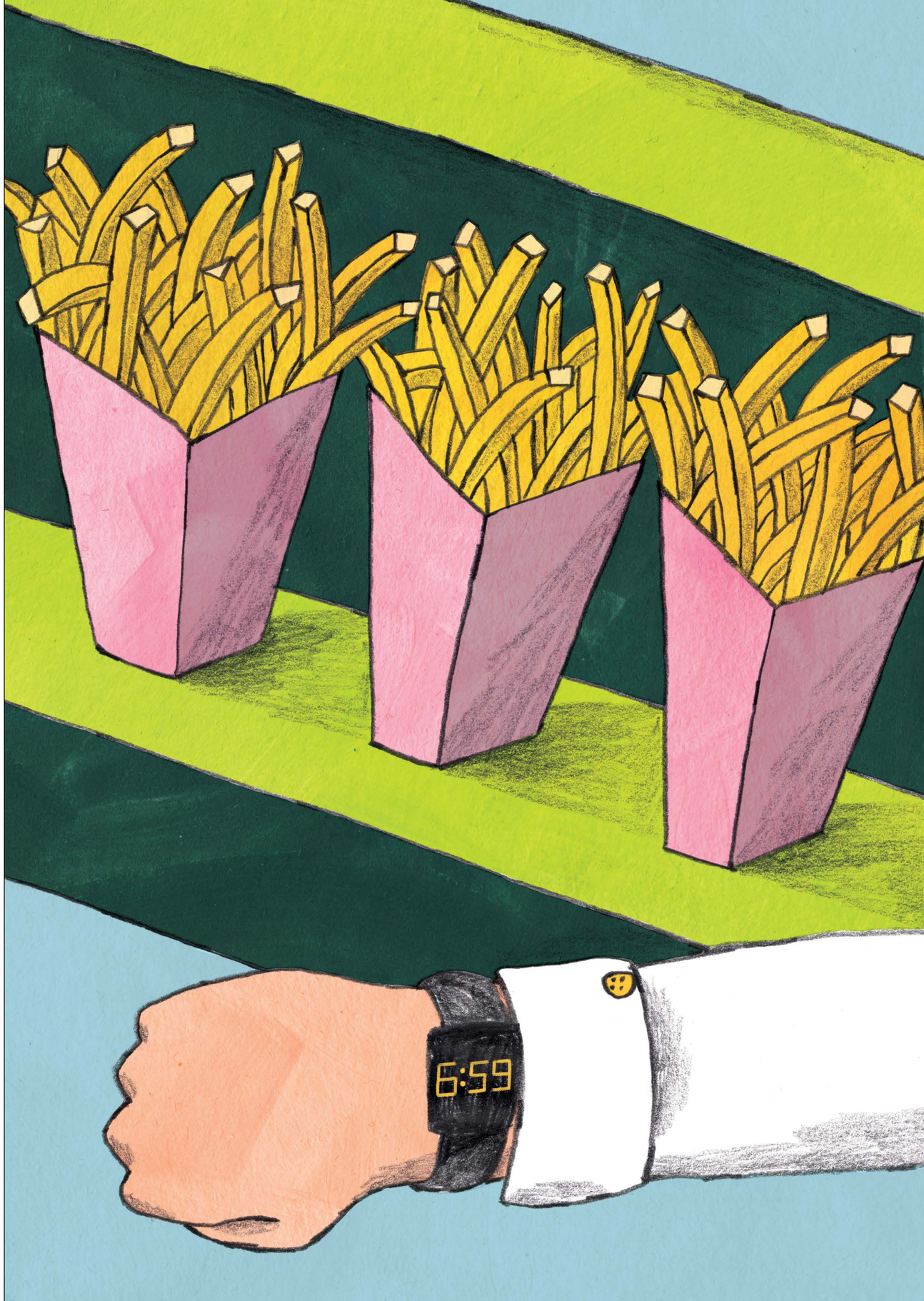
When working with basic raw ingredients in cafeterias, canteens and self-service restaurants, a large amount of scraps and offcuts are generated. There is currently no central processing system, raw ingredients are processed within the individual branches. Only some ingredients are delivered as a semi-finished product (peeled potatoes, sliced meat). While in the centrally operated preparation rooms such left overs could find additional use by being reused, in individual operations they end up as waste.

Sample portions

In canteens, cafeterias and self-service restaurants there are very often sample portions being shown at the beginning of the service. Once service is over, this portion is discarded for hygienic reasons. This way, several dishes end up in the waste every day.

Contracts with clients

Specific problem for QSR type B establishments (canteens and cafeterias) are contracts with companies to provide meals for their employees. Cafeterias and self-service restaurants put down this "corporate framework contract" as the most clear cause of the generation of food waste and food loss. Companies generally consider provided meals an employee benefit and also often financially support them. The contract is therefore quite comprehensive in setting the consumers' conditions, which mostly ensure: that consumers have a wide range of meals available until the end of the serving period, the consumers are quickly served portions which are "sufficient" as well as other benefits. But employees usually have lunch time limited to half an hour and some state that this is not enough time to eat such a large meal. The problem with a wide range of options is also the uncertainty as to what dish the consumer feels like eating on the day. All of these requirements often lead to preparation of excessive amounts of food, which often also leads to these portions being oversized. The numbers from our research show that this is indeed the case. Avoidable waste and loss in cafeterias, canteens and self-service restaurants was the largest of all the types of operations researched.



Recommendations for quick service restaurants

The following topics were formulated during discussions in which researchers met with company employees holding various positions up to senior positions at the company headquarters, heads of establishments and executives. They took part in the discussion with representatives of state administration in the fields of legislation, hygiene supervision, the environment and others. Joining this discussion were also representatives of private companies that provide raw ingredients, technologies, communication networks, waste disposal as well as non-governmental representatives organisations that run food banks and other ancillary services. The aim of the discussions was to look for possible solutions to food waste and food loss and identify the factors that support these solutions or prevent them.

How to prevent emerging food waste and food loss?

This chapter touches on a number of specific topics about how food waste and food loss, created in quick service restaurants, can be reduced.

Control and monitoring of raw ingredients

Regular inspections of raw ingredients in storage and the monitoring of waste and loss in the kitchen will help to better capture the extent to which waste and loss arise as a result of the storage and processing of raw ingredients. More rigorous quality control is also needed when raw ingredients are handed over by the supplier.

Pre-processing of raw ingredients

Pre-processed raw materials reduce waste and loss in QSR operations and transfer some of the responsibility to suppliers. These can, unlike QSR operations, use the leftovers from the preparation of raw ingredients efficiently so that they do not become entirely waste (e.g. vegetable offcuts for broths). However, the use of pre-processed food can mean an increase in packaging of the supplied raw ingredients and the need to build packaging lines, washing equipment, etc. Another objection is that pre preparation can (at least in the customer's eyes) reduce the freshness of raw ingredients. The sizes of packed pre-processed ingredients can also be a problem as they can be supplied in larger quantities than the establishment is able to process within the timeframe of the guaranteed shelf life.

Shock cooling and freezing

Equipment for rapid cooling and freezing of food is for financial reasons still uncommon in most operations. The decision to acquire such equipment could become part of the company environmental protection strategy. QSR type B operations may deal with a long term client to finance the purchase of this equipment (if the kitchen equipment is owned by the client). Support for the acquisition of shock cooling systems could also be incorporated into the relevant strategy at a national level.

Vacuum packaging

Another way to extend the shelf life of food is vacuum packaging. This technology usually adds about three extra days of shelf life. However, considerable investment is needed to be put into purchasing the equipment.

Finishing cooking during service

Individual components of the dish can be cooled immediately after cooking and then reheated according to the amount of incoming customers. Such systems are used for night shifts — in company (large cafeterias) kitchens which are equipped with cooling and heating technologies. In other operations, the owner of the kitchen must be willing to invest in this equipment. In the case of cooling and heating food, there are extra energy costs that would have to be reimbursed by the long term client or consumers.

Better employee motivation and targeted compensation

According to the participants in the discussions, financial motivators for staff are gradually improving their salaries, particularly because of the pressure created by the shortage of employees in the segment of catering. Companies are interested in young educated workers. However, the demand for workers is higher than the supply in the labor market due to the underdevelopment of specialised education. Jobs in cooking, sales and hospitality are also challenging, but are not considered prestigious. That is why it is hard to stabilize the workforce. Improving motivation through an employee focused policy from the employers, including employee benefits is one of the solutions to these large fluctuations of employees.

Education and training of workers

An important factor for increasing the efficiency of the kitchen and service staff is their education and training. That includes working with raw ingredients, learning from more experienced workers, understanding the use of leftovers and how to use modern kitchen equipment the right way. Partially, the problem is, that not all facilities are equipped with the same equipment, which limits the benefits of the training focused on certain technologies. Large staff fluctuation also hinders centrally operated employee training. Central training starts with the managers, kitchen and service staff must be trained directly in the establishment, which has limited possibilities. Employee training is time consuming and expensive. Also, the law no longer allows previously proven successful trial shifts to occur.

Increased supervision of workers

Increased supervision of staff can reduce mistakes due to negligence, but requires the time of other employees. It is an organisational measure that encourages the transfer of experience between new and already established workers. This method can work as effectively as education and training.

Optimal size

Some fast food establishments offer size selection in their menu, where you can choose small or large portions or put together a menu consisting of several parts. In comparison canteen and cafeteria operators are often bound by their contract to provide a universal portion size. It would be helpful if the consumer could request a smaller portion, if he or she already knows in advance that the standard portion is too big or something doesn't suit them. But this presupposes a responsible consumer who is willing to be active in reducing waste. Consumers often accept a larger portion served to them just to be sure they will feel full, provided that the surplus may be discarded.

Ordering system in combination with a buffet

A system where consumers can order their dishes one or two days in advance, can be combined with an open buffet in canteens, cafeterias and self-service restaurants (QSR type B). This would help to balance food preparation with the level of demand. Consumers can choose whether to order food according to their own long-term preferences in a standard portion, or whether to choose on-site from the open warm buffet. In addition, the warm buffet can also cover the increased demand for any unexpected consumers and the range of what it offers can narrow down towards the end of the service period.

Photographed sample portions

Presentation „sample" portions that are used especially in QSR type canteens, cafeterias and self-service restaurants and which are replaced and disposed of several times during the serving period, can be replaced by electronic boards with a photograph of the dish and a description of the ingredients (as is common with QSR type establishments). Unlike a real portion, electronic boards would also make it possible to state other information about the food, e.g. spices used, allergens, etc.

Information about consumers' satisfaction

A supporting solution would be to organise a consumer education program focused on reducing food waste. It is also possible to carry out more frequent consumer satisfaction surveys to better capture changes in their behavior, or their requirements and their view of food waste.

Demand prediction

Another option is to implement a sophisticated system of demand prediction based on data from these operations. In order for such a system to provide reliable demand estimates, it is necessary to collect data from consumers, long term clients (information about their operations and departments), alternative dining options and other factors influencing demand. Instead of this sophisticated demand estimation system it is also possible to work with a long term client that would inform the kitchens about changes in the attendance of employees (holidays, work from home, shutdowns etc.) and about visitors that will be visiting the company (or school) canteen.

Contract revision

Negotiations with long term clients on the revision of contracts is considered to be the main solution in the field of food waste reduction in the company (catering service provider). According to experience, there has not been too much inclination to back away from the client's currently understood requirements which increase food waste. Companies as well as the organisations representing employees consider them an employee benefit (low price paid by the employee for the availability of a full and wide range of meals for lunch, without prior reservation). Although the opening of contract negotiations may jeopardize its continuation, most company managements tend to be open to the conversation. The meeting could also focus more on the ecological aspects of the operation, stressing them as a part of potential environmental efforts by the company (e.g. offer an assortment before the end of serving, which is in the competence of the catering provider services, narrowing the range of dishes, combination of pre-ordering system and warm buffet, etc.).

Building a relationship with the client

The revision of the contract presupposes a good level of communication between the catering service providers and the client representatives. It is good to continue to strengthen the relationship and present strong arguments based on the systematic monitoring of food waste and loss affected by the contract (i.e. during service and on the consumers' side). This includes the need to regularly inform clients about food waste and food loss. Emphasis should be also placed on proper communication with individual employees

at the establishment who communicate directly with the customers (regarding portion sizes, etc.).

Loosening of the above and beyond corporate standards

"Above-standard" and strict corporate standards for time, in regards to how quickly the food must be served, are part of certain company's policies concerning quality and freshness. Changing the policies of international QSR chains, is not really possible by management at the national level in the Czech Republic, and therefore it is necessary to look for other options that would lead to the improvement of company policy relating to food waste and food loss.

Food donation

Another solution can be donating the leftover food to another entity (e.g. donation to charity). Some QSRs have examples of their foreign branches handing over frozen food once a week for further use by another entity. Another option was noted by participants as selling at a discounted price and in the use of a sharing application for unsold dishes. The barrier can be formed by their own internal international chain regulations, the loosening of which may not be feasible in the interest of the parent company. External barriers can be formed by applicable hygiene and veterinary regulations and the need to adapt to these regulations with logistic and technological procedures.

One of the chains cooperating on the RedPot project mentioned their experience with their foreign branches, stating that they could successfully donate deep-frozen meat to food banks. This way the chain could save up to 11 tons of meat waste per month. The donation of deeply frozen food in the Czech Republic is still complicated due to inconsistent interpretation of hygiene standards by each individual regional hygienic department, high administrative complexity (for example the necessary re-approval or the preparation space, etc.), insufficient necessary logistics for redistribution and less flexibility in hygiene regulations.

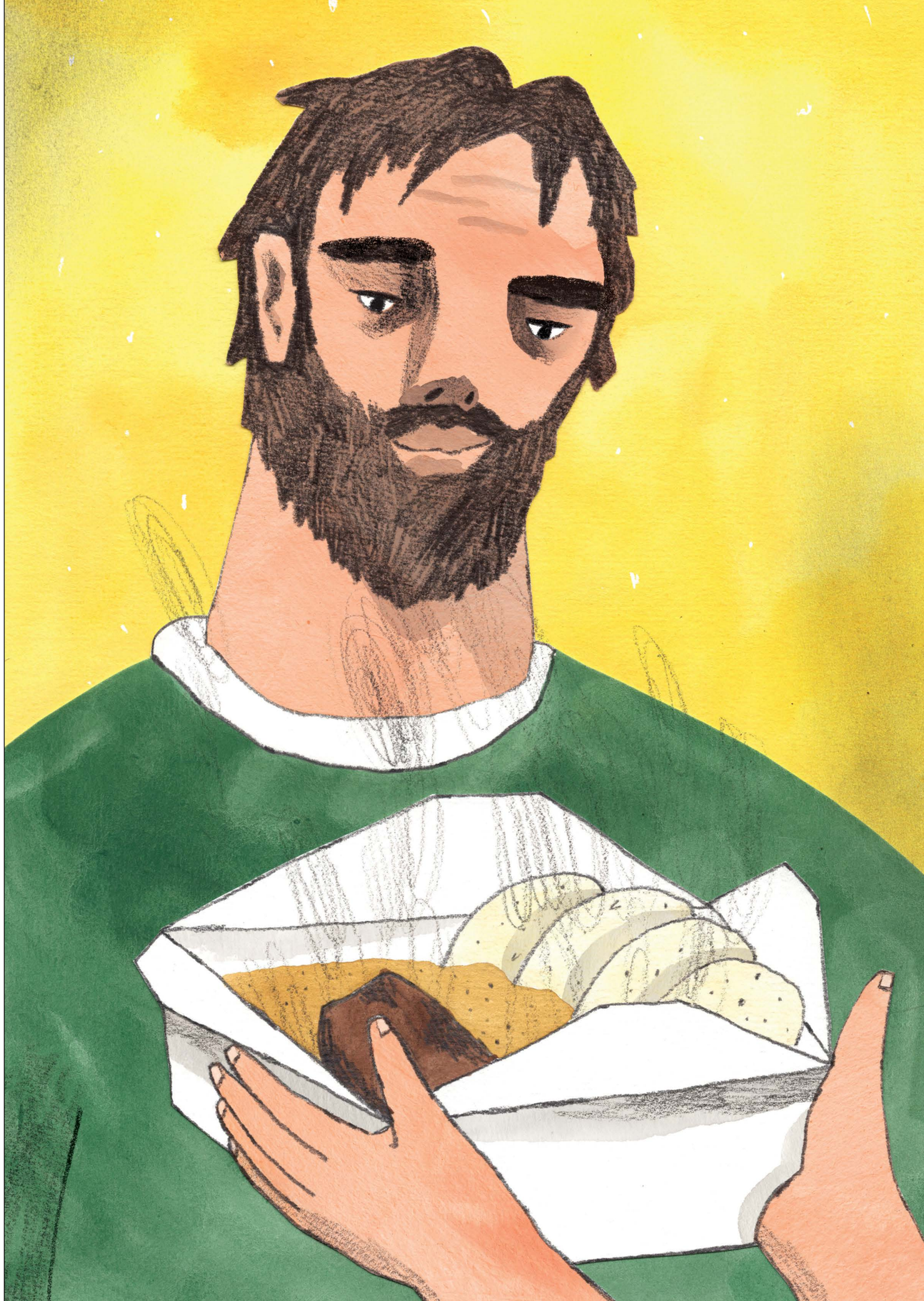
How to use unsold food portions?

This chapter summarizes the ways of dealing with excess food so it does not have to be discarded as loss. In addition to the possible solutions that emerged from the discussions with the parties involved and from the RedPot research, it also discusses inspiration in the form of already existing projects and examples of good practice.

Excess food is de facto food loss. This is food that has been discarded from further processing or sale in a particular operation, but has not degraded to waste and is still suitable for human consumption. Excess arises especially during service as well as a small percentage also in the kitchen. These are mostly ready meals that are subject to strict hygiene regulations. These regulations can play a key role, as for many operations they can be very difficult to meet. **Research has shown that the amount lost from these dishes varies considerably according to the nature of the establishment, with 1.8 to 24.9 kg of waste measured per establishment per day.** The amount can be a limiting factor for further use of excess food. In the case of small volumes the cost of logistics may outweigh the social benefits of reusing the food.

What types of food is not suitable for further human consumption?

- **Excess food that has come into direct contact with the consumer, not just leftovers on the plate, but also, the remaining food from the open buffet etc.**
- **Expired and spoiled food.**
- **Dishes which have not been stored at correct temperatures for a longer period, than permitted by hygiene standards.**



Discounted sale

Ready meals that failed to be served or sold the standard way, can be in many cases sold at a discount. Discounts serve as an effective attraction for the customer, and therefore as an effective way to use the excess food. One of the ways is the use of a mobile application on which the operation advertises the food that needs to be sold. The customer can then choose from a variety of restaurants near them, order food in advance and pick it up and pay on the spot. The benefit for the QSR establishment is not just mitigating economic losses as a result of selling the excess food at a reduced price, but also the potential to gain new customers through the application. The first to come up with the idea in 2016 was the project Too Good To Go, which operates in 15 European countries today. Similar applications also exist in the Czech Republic — for example Nesnězeno or Jídlov. Apps offering discounted food are popular especially among smaller establishments, from cafes and bistros to standard restaurants. For quick service restaurants and canteens or cafeterias, this method can be challenging for a number of reasons, such as internal regulations up the management chain, time limits for selling the dishes, a closed type of operation (for example, canteens for employees of one company only) etc. At the same time mobile applications have a limited reach because they are only aimed at customers who are used to using the technology and have a mobile phone. This way of using food excess is therefore more targeted to younger customers, students, etc.

Food donation

The donation of raw ingredients from public catering operations to food banks or charities can operate in a similar way as, the now widespread, donation of unsold food from supermarkets. If they comply with prescribed storage conditions and the food is not devalued in any way or cannot pose a potential risk to human consumption, it is possible to donate chilled food and beverages, fresh and frozen meat, fish, fruits, vegetables and baked products. The key here is logistics. In the Czech Republic there are not yet channels through which food can be distributed from public catering. Operations that would like to donate unused food, therefore have to find their own way how and to whom donate the food.

There is also potential for donations for ready (cooked) food that has not come into contact with a consumer. Right now in the Czech Republic, this possibility does not have an established tradition or sufficient practice, because it is relatively difficult to ensure the compliance of all hygienic regulations. Meals must be either cooled as soon as possible, immediately after preparation (or frozen) or kept at all times at a temperature above 60 °C. Temperatures must be observed throughout the handling of food, as well as during the transport.

Therefore in order to be transported and stored correctly the food banks and organisations need to be equipped with proper equipment as well. Domestic food banks and most organisations are not yet sufficiently equipped for handling ready meals and their redistribution. If the recipients do not have their own kitchen, food needs to be sliced and prepped in advance, divided into packages or boxes, cooled or frozen and labeled for further handling. Therefore food banks are considering, in the long run, building their own kitchens. Currently there is inconsistency in the interpretation of hygiene regulations from individual regional departments of hygiene, and therefore ambiguity surrounding the donation process across the whole of the Czech Republic. To remove these ambiguities Zachraň jídlo (Save the food) organisation is working to remove these ambiguities as part of the Darování jídla šetří klima (Food donating saves the climate) project.

The project of the Center for Social Services in Brno "Meníčka pro bezdomovce" ("Menus for the homeless") collects unsold lunch menus from restaurants and redistributes them to people in difficult situations. Between 2010 and 2018, 244,622 portions were distributed, almost 98 tons of food. The idea came from a local businessman who mediated the dialogue among representatives of the department of hygiene, social services and the city of Brno. The project connects the national, business and the non-profit sector in helping the homeless, preventing food waste, increasing solidarity with people in difficult situations and helping them maintain their dignity.

What to do with generated food waste?

With food waste which is impossible to avoid, it is necessary to properly sort and secure its proper processing. The aim of this chapter is to summarize basic responsibilities of the waste producer and to highlight how effective management and the sorting of food waste can be done, with experience gathered throughout this research.

What to do when food waste is generated?

Even in an effort to reduce generating food waste it is probably not possible to prevent its occurence completely. However, this waste may be used in other ways, if it is properly sorted and further processed. In addition, consistent sorting may have financial benefits for the establishment, as the collection of mixed waste is usually more expensive than the collection of sorted waste.

It is important to follow some basic rules. Carefully avoid the contact of organic waste with waste of animal origin, because they can be a source of various infections. Proper storage of sorted food waste is also important. For storage before collection, it is good to use closable containers, which are easy to disinfect and clean.

Basic responsibilities of waste management

According to the Czech Waste Act the restaurant facility is the producer of waste and is therefore obliged to sort the generated waste according to individual types and categories. In the case of catering establishments, the separating and collection of gastro-waste is controlled (waste catalog number 20 01 08 Biologically decomposable waste from kitchens and canteens) and so is its transport to authorized collection points. Catering facility checks are performed by the staff from the environmental department, coming from different individual authorities, municipalities or cities. Biological biodegradable waste is then transferred to biogas plants, composting plants (other obligations are related to these) or rendering plants, they must not be landfilled.

What food waste can be further sorted and used for other purposes?

Used oil is collected separately into special containers and sold to specialised companies for further use, e.g. for the production of biofuels.

Organic waste — vegetable waste as well as "sorted kitchen waste" (e.g. peels and offcuts of fruit and vegetables), which did not come in contact with raw animal ingredients (e.g. raw meat, raw milk), is ideal for composting.

Gastro-waste (e.g. leftovers, meat offcuts, eggshells, expired food and other) can be used in biogas plants.

The remains of the meat and bones are transported to a rendering plant.

Old baked goods can be used to feed animals.

Recommendations for the state administration

How can public administrators help reduce food waste in catering? At the beginning, it is necessary to find out where food waste and food loss occur and why it's the case. Only then can one look for a suitable way to prevent their occurrence, or if waste is generated, find options for its use. If the state administration was to initiate waste generation prevention action plans, knowing the areas and causes of food waste and loss is an essential starting activity.

Therefore state administrations should try the following:

Support applied research and projects similar to the RedPot project

This project focused on exploring areas and the causes of food waste and food loss in QSRs and finding ways to reduce food waste and ways to prevent it. However, it focused on only one sub-segment; the public catering market. Situations in other types of catering or hospitality establishments may be different, and it is therefore desirable to try to support similar research activities also in other segments of catering.

Provide a uniform interpretation of the standards and regulations

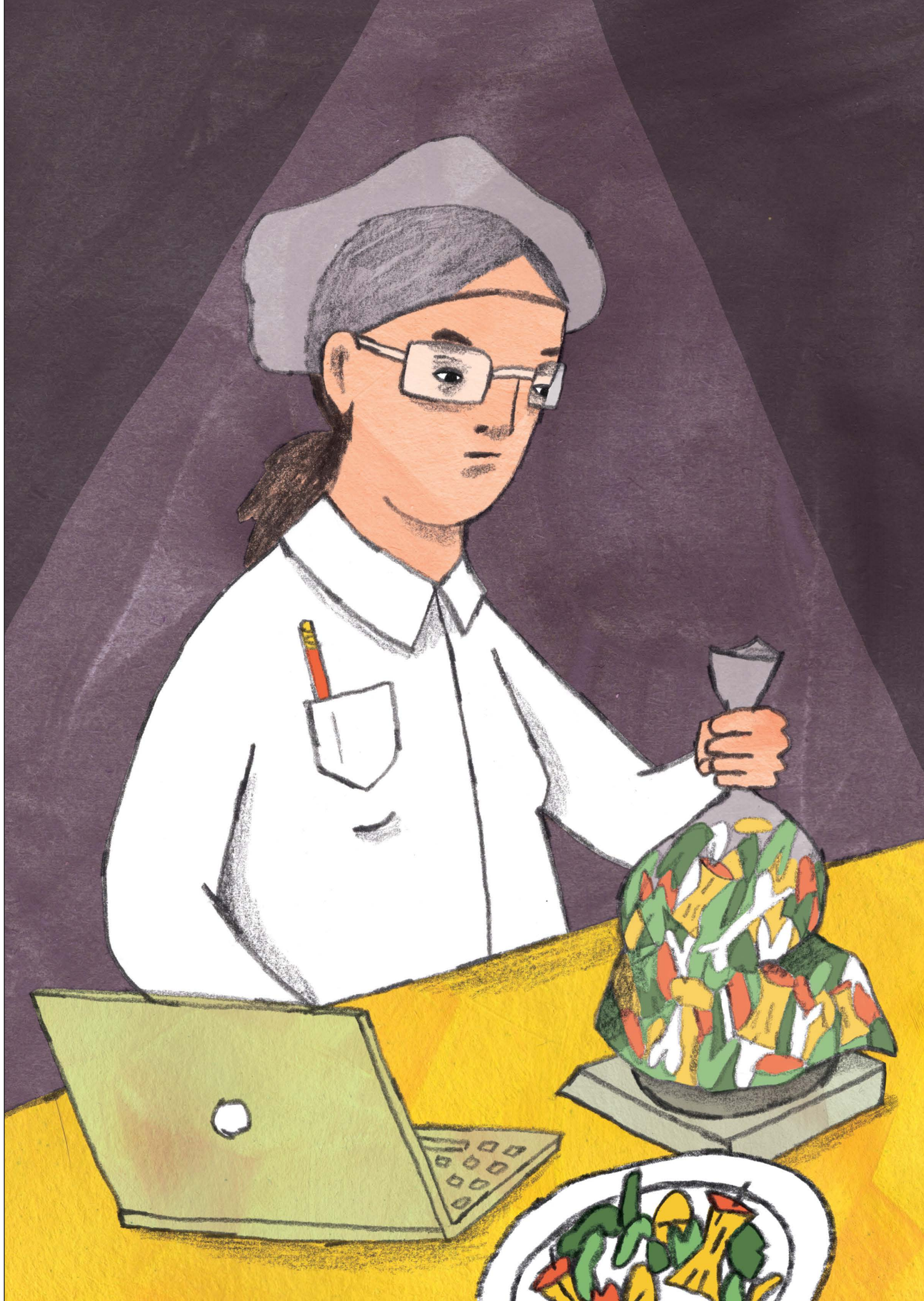
Not only ingredients were put into preparing a meal, but also human labor, water and other resources, which would be wasted if the food was discarded. Therefore donations of cooked meals should be made possible for people in need. In order to do this, the state administration has various management tools, from informational support to financial support. State administrators should provide entities in this regard with uniformed interpretation of their standards in the field of hygiene regulations and safe food handling, especially for cases of donations of cooked uneaten meals.

The outputs of the RedPot project point to the fact that QSRs would like to donate meals that they do not manage to serve or sell, however, vague interpretations of the regulations and their complexity makes this difficult for them to do voluntarily. If regulations were simplified or a simple food donation guide was provided, many businesses from the public catering services segment would look for possibilities for donating food before disposing of it as food waste.

Coordinate the regional approach of the departments of hygiene and inspectorates

In the context of the above recommendation, it would be appropriate to coordinate the approach of regional departments of hygiene and regional inspectorates (especially the Czech Agriculture and Food Inspection Authority and the State Veterinary Administration) in their uninformed decision-making or approach to the procedures regarding the intended processes of food donation. Unfortunately there is no consistent action within the different regional departments of hygiene, which in the case of companies operating in several regions, makes it difficult to act in favour of food donation. Competent institutions could therefore consider whether any simplification would be possible in the processes that businesses have to go through to donate unsold or unserved meals. The number of required actions and their administrative complexity is a discouraging factor for the QSR operations.

Public administration institutions should take into account the fact that donating food is a voluntary step for the catering facilities and that it is desirable not only from a social but also environmental point of view. If the conditions for food donations are not set unambiguously and simply, it is less likely for donations to be made. It is therefore appropriate to find a compromise between the health, social and environmental aspects.



Supporting food donations

It would seem appropriate to provide financial support to entities that choose to donate food to those in need. Support to acquire cooling equipment (shock cooling systems), which will allow the donation of cooked meals. Another possible method of support is a financial subsidy for compliance costs when donating food (re-approval of workspaces, storage of deep-frozen food, securing suitable packaging for the meals, where appropriate distribution of donated food, if in the competence of the restaurant facility, etc.).

It is also necessary to resolve the issue of the distribution of donated meals and the responsibility for the potential food safety risks. At the same time, the capacity of food banks and similar non-profit organisations needs to be enlarged to address the issues not just of the distribution and storage of deep-frozen meals, but also the purchase of equipment for preparing meals and providing the space for serving those meals. State institutions and administrations should simplify existing regulations as much as possible or create specific instructions on how to ensure all processes related to the donation of cooked meals and their acceptance and service to those in need are acceptably straight forward to follow. In addition to providing a clear interpretation of the rules and regulations, it would also be appropriate to set up some sort of financial support to provide the necessary storage capacities at food banks or other organisations ensuring the distribution of food to those in need.

An appropriate piece of informational support to entities involved in the field of food donation seems to be the sharing of examples of good practice. Competent authorities or state administrators (especially regional inspectorates and regional departments of hygiene), which process approvals of donations and registration procedures for restaurants registered as food production facilities, should have a clear overview of how the donation related processes are going and for which entities they work well. It should be relatively simple to inform interested parties on how food is donated, which can be a valuable inspiration for catering establishments that are still considering food donations.

Supporting further use of food waste and food loss

In the case of cooked meals that were not served or sold and raw ingredients which cannot be donated, using them for animal feed can be an option. However not everything can be used in this case. Absolutely essential is proper sorting, e.g. plant based raw ingredients separately, dry baked goods separately. If cooked meals cannot be used as feed, other handling methods can be used with such food waste — composting, use in biogas plants, etc.

In accordance with the above mentioned, the state administration can motivate subjects to properly sort biologically degradable waste — on one hand it is appropriate to provide information about how to sort waste correctly (like where it is possible to send etc.), and it is also desirable to inform businesses in the hospitality and catering industry about the benefits that are the result of proper waste sorting (e.g. reduction of charges for the disposal of mixed waste).

For restaurants that behave ecologically, which try to prevent the production of food waste and food loss, donate cooked unserved or unsold meals, and correctly sort their waste, the state administration can initiate the creation of a certificate declaring their efforts as positive. Some environmentally conscious consumers could take their corporate social responsibility and waste reduction efforts into account when deciding which restaurant to visit.

Open discussions should be attended not only by representatives from the Ministry of Health, but also the Ministry of Agriculture, the Ministry of the Environment, representatives of regional departments of hygiene, the State Veterinary Administration and the Czech Agricultural and Food Inspection Authority. It is advisable to also invite representatives of catering establishments themselves, possibly also distributors of salvaged food. The point of the open discussion should be the simplification of existing rules in an effort to achieve a compromise between public health, food safety, focusing on the social and environmental aspects. An overview of selected legislative requirements and regulations that must be followed is listed at the end of the document under sources of used literature.

Recommendations for non-profits and other organisations

Non-profit organisations often complement the role of the state and its institutions, especially in the activities for which the state alone is not enough. They fulfill a number of important functions, from social services and environmental protections to the research activities as well as education. The issue of food waste is no exception as it interconnects all the above-mentioned activities. What specifically can non-profits and other involved organisations do to help reduce food waste in hospitality and public catering? This chapter is divided into two types of organisations — organisations involved in the redistribution of food and food waste research and education organisations.

Organisations redistributing food

These organisations play a mediating role and are intermediaries in practice. Redistribution can take place either directly between the QSR and the receiving organisation or through another entity, e.g. food banks. What exactly can these organisations do to avoid unnecessary waste?

- **Actively look for ways to expand the practice of donating ready made meals from catering establishments in the Czech Republic**, so that everyone respects the necessary hygiene and food safety standards. In this regard, it is crucial to work with the state administration and other involved parties and other involved parties and create clear instructions on how to carry out the redistribution.

- **Appeal to the state administration to fully support the redistribution of food as a practice.** Redistribution organisations should on the basis of their experience clearly define all their needs — financial, technological, logistical, legislative and other preconditions, that would allow implementing an effective and secure donation system. These preconditions should be actively communicated with the representatives of the state administration to obtain the necessary support.

- **Share their own experience, good practice, specific barriers and opportunities** in the field of redistribution of ready-made meals from public catering with other organisations that provide these services.

- **Build a network** of regular donors and recipients and build the foundation of functional logistics.

Research and education organisations

When reducing the amount of food waste and food loss, the key is to bring relevant local and foreign data about the issue of waste and

to educate. In the Czech Republic, a lot of data on food waste, the amount of waste in individual parts of the food chain and other aspects of food production and consumption is completely missing. What can research and education organisations do in this regard?

- **Be one of the actors who initiate research projects.** Collaborate with other entities from academic, research, state or business fields. New data helps us to better understand the whole food chain and the causes of food waste and food loss as well as to identify specific problems and weaknesses in the current (not only food) system. These can take on various forms — from legislative obstacles, overly strict food safety or security standards, logistical issues or misinformation provided to the parties involved. Clearly naming and recognising the problem is the first step to its successful solution.

- **Inform about and motivate change.** On an EU level and in other countries, a number of research projects are carried out and the information learned is relevant in our country also. Non-profit organisations are often the only involved party which can present this information in a simple and appealing form. It is therefore important that we follow what is happening where, write articles, communicate on social media and try to reach out to other parties involved.

- **Bring practical information and education.** A large part of food waste and food loss is generated by ignorance and a lack of information, on the side of consumers as well as people working in the food industry. It is therefore important to expose the extent of food waste and all its consequences to as many people as possible. Organisations can share practical information in the form of employee training directly at their establishments, or in hotel schools can be useful to help teach more, or help with awareness-raising campaigns targeted at consumers.

- **Connect.** Non-profit organisations can play the role of mediator or „interconnector" between various parts of the food system. Great ideas and solutions often arise just by brainstorming with other parties at one table, debating the problem and sharing their experiences and points of view.

Conclusion and acknowledgments

Environmental awareness and the behavior that goes along with it is becoming more and more common in the everyday life of individuals, companies and organisations. Reducing food waste is an important part of a responsible approach to maintaining our natural resources. The purpose of this guide is to highlight possible solutions to this complex issue in the segment of quick service restaurants.

We believe that these basic steps and procedures can also be applied in other types of catering establishments.

Thank you to everyone who contributed to the creation of this guide, especially to research project guarantors from the state administration, to the external reviewers and participating companies and their employees for cooperation on this project as well as your own research.

www.redpot.strast.cz

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Ministerstvo životního prostředí

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Overview of legislative requirements and regulations

Selected legislative requirements and regulations, which the catering establishment must comply with

Act No. 110/1997 Coll. on food and tobacco products and amendment of related laws

Act No. 258/2000 Coll. on the protection of public health and amendment of related laws

Act No. 166/1999 Coll. on veterinary care and amendment of related laws

Act No. 185/2001 Coll. on waste and amendment of related laws

Decree No. 289/2007 Coll. on veterinary and hygiene requirements for animal products, which are not directly applicable regulations of The European Communities

Decree No. 602/2006 Coll. amending the decree No. 137/2004 Coll. on hygiene requirements for catering services and personal and operational hygiene principles in epidemiologically serious activities

Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety

Commission Regulation (EC) No 2073/2005 of 15 November 2005 on microbiological criteria for food

Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foods

Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin

Council Directive 2002/99/EC of 16 December 2002 laying down the animal health rules governing the production, processing, distribution and introduction of products of animal origin for human consumption

Further regulations can be found here: **http://eagri.cz/public/web/mze/legislativa/**