

## **Correct cooling: Frequently asked questions on refrigerating foods in private households**

BfR FAQ of 13 February 2023

In addition to handling food hygienically, the right temperatures during transport and storage are also important to avoid foodborne infections. Roughly 100,000 illnesses that have been caused by the presence of microorganisms in food, in particular bacteria, viruses or parasites, are reported in Germany every year, and the real figure could be much higher. Foodborne infections are usually self-limiting and accompanied by stomach cramps, diarrhoea and vomiting. For people whose body's defences against foodborne infections are impaired or not yet fully developed (small children, pregnant women, the elderly or people with previous illnesses), they can also be life-threatening in extreme cases.

Against the background of global climate change and due to high energy costs, consumers are wondering whether it is possible to adjust or slightly increase the temperature of the freezer and refrigerator in the home to reduce electricity consumption without endangering food safety. Further questions arise from possible power outages, in particular how to deal with chilled and frozen food in private households. Refrigeration of food slows down or stops the growth of most bacteria and extends the storage time of perishable food. Freezing plays also an important role in extending the maximum shelf life of food. In the following, the BfR has compiled frequently asked questions on the cooling and frozen storage of food in private households.

### **Why is it important to ensure adequate refrigeration when handling food?**

In addition to hygienic deficiencies in food handling, which can lead to contamination with pathogens, improper refrigeration of food is another important trigger for foodborne illnesses. Insufficient temperatures during transport and storage of food allow pathogenic germs to survive and multiply. Therefore, perishable food should be stored as cold as possible until consumption or processing. Refrigeration serves to maintain quality and, in particular, to prevent foodborne infections and intoxications, because the growth of most bacteria is slowed down or even stopped by refrigeration.

### **What do I have to consider when transporting foods?**

To prevent bacteria from propagating in food when the cold chain is broken, refrigerated and frozen food should be brought home as quickly as possible and placed in the fridge or freezer. When purchasing large amounts of groceries, these products should be placed in the trolley last. In summer, it is also advisable to transport particularly perishable foods in coolers when travelling long distances. Alternatively, consumers should shop for groceries early in the morning or late in the evening. The same precautionary measures apply when perishable prepared foods are to be brought to parties or celebrations.

### **Which foods should be kept refrigerated?**

Perishable foods should be kept in the refrigerator until they are consumed or processed, as refrigeration slows down or even stops the growth of most bacteria. This includes animal products such as meat, sausage, cheese, milk, eggs and fish, which should be stored in the refrigerator according to the cooling recommendations on the packaging. Plant foods such as cut vegetable salads and cut fruit, especially pieces of melon, should also be kept in the refrigerator.

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Leftovers should also be kept in the refrigerator and consumed within two to three days. Before that, they should be cooled to below + 7 °C within a few hours; larger amounts of food can be filled into several flat bowls for this purpose.

If perishable foods are offered outdoors over longer periods at barbecues, picnics or garden parties, these also need to be adequately cooled.

### **What do I have to consider when storing foods in the fridge?**

- Store cut vegetable salads and cut fruits, particularly melons, in the fridge until consumption
- Even in the fridge, store foods in sealed containers or completely covered
- Place raw meat, poultry and raw fish on the lowest shelf in the fridge (right above the vegetable compartment) close to the back wall or in a special compartment (0°C compartment) so that meat juices cannot drip onto other foods and because this area is the coldest
- Follow cooling recommendations on packaging (use the food on the day of purchase if the cooling temperatures cannot be maintained to, e.g. + 2°C for minced meat)
- Set the fridge temperature to no more than + 7°C (lower than + 5°C is ideal); check the temperature regularly in different parts of the fridge and store foods according to their cooling recommendations
- Do not open the fridge more often than necessary and do not leave it open
- To make sure that cool air can circulate adequately between the foods, do not overfill the fridge
- Defrost fridges without automatic defrosting occasionally or when frost is clearly visible, according to the manufacturer's instructions
- Check foods for the shelf life specified by the manufacturer and for spoilage at least once a week (people with weakened immune systems should consume foods as quickly as possible after purchase and long before the specified best before date)
- Use up highly perishable foods as soon as possible after opening the packaging; this also applies to food remaining in open cans or jars and to dry products dissolved in liquid, such as powdered sauces and powdered milk
- Clean the inside of the fridge several times a year

### **At which temperature should the refrigerator be set?**

There is no general temperature requirement for the storage of food in the household for consumers, as this must be determined individually for each food (case-by-case decision). According to DIN 10508:2022-03, the storage/product temperatures for foods requiring refrigeration in the commercial range are  $\leq + 2$  °C (e.g. pre-packaged minced meat) to  $\leq + 10$  °C (e.g. butter). The World Health Organisation (WHO) recommends that all cooked and perishable foods should preferably be stored at a temperature below + 5 °C. Two pathogens that

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can grow in food below + 5 °C are *Listeria monocytogenes* and *Yersinia enterocolitica*. According to DIN 10508:2022-03, perishable foodstuffs of animal and plant origin should be stored in such a way that a product temperature of  $\leq + 7$  °C is ensured, unless other regulations exist.

An online survey conducted by the BfR from 2020 with 1,000 people aged 16 years and over showed that although the average temperature in private refrigerators in Germany is + 5.5 °C, only half of the respondents have a built-in temperature display or a separate thermometer in their refrigerator. As a result, a large proportion of respondents did not know the exact cooling temperature of their food at home. An evaluation of 35 studies conducted worldwide published in 2017 concluded that the average temperature of refrigerators is around + 6.1 °C. This evaluation also showed that many households do not know what the recommended cooling temperature range is, how this is achieved and how to ensure compliance with this range.

It should be noted, however, that the significance of average temperatures is generally low. In order to collect real temperature data, representative long-term studies are necessary.

### **What would be the effect of raising the refrigerator temperature?**

The effects of raising the refrigerator temperature by, for example, 0.5 to 2 °C are influenced by many factors, in particular the existing refrigerator temperature. If a comparatively low refrigerator temperature of + 4 °C is increased by up to 2 °C, this will hardly affect the safety and quality of most foodstuffs. If a comparatively high refrigerator temperature of + 7 °C is increased by up to 2 °C, perishable food may spoil more quickly or pathogens present in it may lead to foodborne infections due to multiplication. For this reason, the BfR recommends that the manufacturer's instructions for storage and shelf life are respected for pre-packaged foods and that all other perishable foods be stored as cold as possible.

### **What is the purpose of freezing food?**

Freezing is used to extend shelf life and preserve quality during longer storage. From a microbiological point of view, the temperature reduction during the freezing process plays an important role as it leads to a reduction of water activity in the food, which inhibits bacterial growth. Most of the bacteria survive the freezing process, while others don't. In addition, under certain conditions, freezing is a suitable measure for killing parasites. For viruses, however, freezing has no killing effect.

### **What are the legal requirements for freezing food?**

The legal requirements are primarily aimed at commercial production, storage and distribution. Frozen foods are foods that are subjected to a suitable freezing process. In this process, the phase of maximum crystallisation is passed as quickly as necessary, depending on the type of food, so that the temperature of the food after thermal stabilisation is at least minus 18 °C at any point. They are then placed on the market with the indication that they are frozen (§ 1 German Ordinance on Frozen Foods, TLMV). According to the TLMV, short-term temperature deviations are permitted during transport and minor temperature deviations of no more than 3 °C during distribution and storage in retail (§ 2 paragraph 4 TLMV). When accepting frozen food, responsibility for maintaining the cold chain shifts to the buyer.

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### **What would be the effect of increasing the freezer temperature from - 18 °C up to - 12 °C in the home?**

Increasing the freezer temperature to - 12 °C in private households can affect the quality and shorten the shelf life of the frozen food, e.g. due to greying, freezer burn or snow formation. However, this does not pose a health hazard. A significant growth of microorganisms is not expected, as most food-relevant bacteria stop multiplying in the temperature range of - 5 to - 8 °C and the minimum growth temperature of most food-associated pathogenic microorganisms is above the freezing point. Therefore, the health risk to consumers from food-relevant bacteria would not increase with a corresponding increase in temperature when storing frozen food in the home up to - 12 °C. An important food safety measure in this context is the complete heating of the food before consumption, if this is recommended for the product.

### **What should be considered in the event of a power failure?**

In the event of a power failure, freezers can keep the stored frozen food sufficiently cold for many hours, provided the freezer is filled with plenty of frozen food and is not opened for at least the first few hours.

If thawing occurs, i.e. food thaws to such an extent that the outer layer of the frozen food is soft but the inner core is still frozen, this can lead to a loss of quality and shorten the minimum shelf life. Cooked food and raw plant foods can be refrozen after defrosting or processed or consumed as quickly as possible after refrigerated storage (max. + 7 °C). Raw animal products should always be heated completely after defrosting. Afterwards, refrigerated storage or refreezing (after complete cooling) is possible. Thawed ice cream should be discarded.

### **What is the best way to defrost food?**

Frozen food should be defrosted in the refrigerator if possible. If frozen food is defrosted at room temperature, any germs that may be present can also defrost and multiply. Enough time for defrosting in the refrigerator should be allowed.

Unless otherwise indicated on the packaging, frozen raw meat and poultry as well as frozen raw fish should be defrosted before cooking so that the temperature required to kill pathogens is reached even in thick pieces or on the bone. To defrost, the packaging should be removed, the frozen food placed in a bowl and covered to prevent contamination of other food. The defrosting liquid must be disposed carefully. All utensils, surfaces and hands that have been in contact with the defrosting liquid should be thoroughly cleaned immediately.

### **Can I store my food on the terrace, in the garden or on the balcony in winter?**

In the event of power failures or when defrosting the refrigerators, it may be useful to temporarily store perishable or frozen food on the balcony or terrace in accordance with the cooling recommendations on the product packaging. The food should be well-packed, protected from contamination, animals and sunlight. However, perishable food should not be stored outdoors for a longer period of time, as possible temperature fluctuations can favour the growth of pathogenic bacteria. As a general rule, it is recommended to check food carefully for visible spoilage before consumption or processing, to heat it thoroughly or, if necessary, to discard it.

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**Further information on foodborne infections from the BfR:**

Frequently asked questions about protection against foodborne infections in private households

<https://www.bfr.bund.de/cm/349/frequently-asked-questions-about-protection-against-foodborne-infections-in-private-households.pdf>

Video series “Correct Cooling”

[https://www.bfr.bund.de/en/correct\\_cooling-305867.html](https://www.bfr.bund.de/en/correct_cooling-305867.html)

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