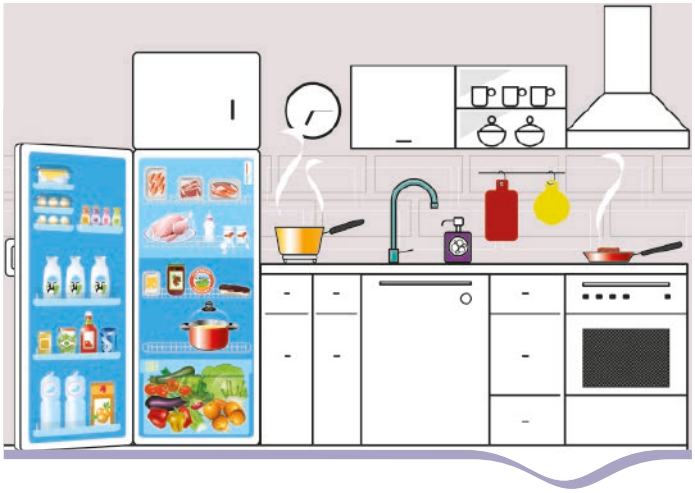
Food hygiene in the home

anses
French agency for food, environmental and occupational health & safety



Food hygiene concerns us all, from production to consumption in the home. About 1/3 of reported foodborne outbreaks occur in a family setting. The recommendations in this datasheet are intended to prevent the microbiological risk related to food prepared at home.

This datasheet describes:

- **the principal routes by which microorganisms** get into the kitchen: ***via* food, people, water, air and animals**;
- how microorganisms are **transferred**: by hands, cloths, utensils, etc.;
- the **conditions allowing them to multiply**;
- and **how to combat these microorganisms**:
  - **cleaning, disinfecting and heating equipment, utensils and other objects in the kitchen,**
  - preserving food: **refrigeration and freezing**,
  - **cooking food,**
  - **washing fruit and vegetables**.

Lastly, recommendations are given for groups considered sensitive (young children, pregnant women, the elderly and the immunosuppressed), especially as regards **the consumption of certain raw foods**.

How microorganisms enter the kitchen, spread, multiply and survive

How microorganisms enter the kitchen

Microorganisms[1] can be brought into the kitchen by several channels: food, people, clothes, air, water and animals. Once inside, microorganisms can adhere to surfaces (equipment, utensils, work surfaces, etc). All microorganisms, whether or not they are potentially hazardous to health, behave in much the same way.

Foods

Most microorganisms are harmless, some of them even being used in the production of foodstuffs (yoghurt, dried sausage, cheese, etc.) while others, if they are able to multiply in food, spoil it by giving it an unpleasant taste, smell or appearance. However, the absence of spoilage does not necessarily mean the absence of danger, and foods that look and taste as though they are in perfect condition can pose a risk.

Important to know

Some of the microorganisms that can find their way into the kitchen are pathogens, meaning that they can cause various disorders, ranging from benign digestive problems to serious illnesses that can lead to death or disability.

Pathogenic microorganisms and the foods involved are described in the "Datasheets on foodborne biological hazards" published by ANSES[2].

(1) "Microorganisms: bacteria, viruses, yeasts, moulds, algae, parasitic protozoa, microscopic parasitic helminths, and their toxins and metabolites" (definition in European Regulation (EC) No. 2073/2005). "Germ" is used as a synonym for microorganism.

(2) http://www.anses.fr/en/content/microbiological-hazards-files

Domestic hygiene sheet
June 2013

People

Irrespective of their state of health, humans carry a vast number of microorganisms on their skin, in their digestive systems and in their respiratory tracts, including the nose and throat. These microorganisms can be transferred onto food by sneezing, coughing or direct contact with unwashed hands, but also via perspiration or flakes of dead skin.

For example, *Staphylococcus aureus*, sometimes known as Golden staph, can be found on the hands but is most frequently harboured in the nose. It has been estimated that 60% of the population carry this bacterium around at least intermittently, and 20% permanently (Kluytmans *et al.* 1997). Several bacteria responsible for foodborne illnesses can be found in the flora of the digestive tract and be transferred by the hands of the carrier (*Salmonella* or *Escherichia coli*, for example). This is a common result of forgetting to wash one's hands after going to the toilet or after handling waste or dirty laundry. Cuts to hands suffered during outdoor work (gardening, etc.) can also be sources of contamination. Pus from abscesses contains high concentrations of pathogens and is a massive cause of contamination.

Other routes of entry

In France, tap water is monitored for safety and must comply with standards and limit values for microbiological quality. In rare cases (i.e. flooding or the malfunctioning of a public water system) the water supply may carry pathogens. In the event of microbiological contamination, the competent authorities inform the population of any restrictions on use, while awaiting a return to normal as a result of the corrective measures applied. Water from private wells or boreholes must be closely monitored to ensure the efficacy of treatment and water quality.

Worth remembering

Water from private wells or boreholes should not be used unless it has been analysed to ensure water quality (in compliance with the regulations on water intended for human consumption).

Microorganisms can be transported through the air attached to dust particles, especially those swept up from the ground. Aerosols of water droplets (water vapour, condensation) carrying microorganisms can settle on kitchen surfaces and foods, thereby contaminating them (e.g. aerosols formed from water running from a tap and splashing onto the sink, food or the hands).

Important to know

Animals (dogs, cats, pets of all kinds, livestock animals, etc.) can transmit diseases to humans.
The hands of people who have been in contact with infected animals, whether sick or healthy carriers, can transfer the pathogens responsible for these diseases and contaminate food and kitchen surfaces.

Insects, and especially flies, are also vectors for contamination, as the latter in particular are constantly travelling between manure, excrement, waste and foods. Dirty laundry can also be a source of contamination.

How microorganisms spread

It should be borne in mind that a contaminated surface can contaminate all other surfaces with which it comes into contact. **The commonest way for microorganisms to spread about the kitchen is on the hands**, which can transfer them easily to food or kitchen utensils. But there are other agents for transfer such as cloths, sponges and other cleaning utensils, cutting boards, and also slicing, grating and grinding equipment if they are not properly cleaned between uses. Handles (of both doors and equipment) and taps can also be transfer points between the hands and food.

How microorganisms multiply

At ambient temperatures, in the presence of water and nutrients from food with the right composition (non-acidic, low-salt, etc.), a bacterial cell can divide into two daughter cells in about 20 minutes, meaning that considerable quantities of new cells can be produced rapidly. In a refrigerator on the other hand, if the temperature is maintained at 4°C, most bacterial pathogens are unable to multiply and those which can, such as *Listeria monocytogenes*, do so much more slowly.

Important to know

Areas suitable for multiplication tend to be permanently or intermittently damp: sponges, cloths and other cleaning utensils, the sink, the u-trap, the draining board, the vegetable compartment of the refrigerator, the dustbin, the water filter system, etc.

How microorganisms survive

Many microorganisms can survive on dry surfaces such as the handles of doors and domestic appliances, etc., which are often not cleaned frequently. Bacteria and viruses survive better under cold conditions, which is why *Staphylococcus aureus* are found more often inside the refrigerator than on its door handle (Carpentier *et al.* 2012).

Ways to combat microorganisms

Kitchen equipment, utensils and other objects: cleaning, disinfection, heat treatment

The purpose of cleaning equipment and utensils is to eliminate the vast majority of dirt and microorganisms on their surfaces. Dirt washed down the drain means fewer nutrients on which microbes can feed. If surfaces are also dried after cleaning, further multiplication becomes impossible.

After the cleaning stage, very dirty surfaces should be disinfected in order to reduce the quantity of microorganisms. Disinfection should be systematic in the homes of subjects with a high-risk profile. The best widely available disinfectants are bleach (sodium hypochlorite), and sodium dichloroisocyanurate, found in tablet form. Such products are very effective for disinfecting sponges and other cleaning utensils, as long as they are washed beforehand.

However, bleach[3] should never be mixed with an acid (a deliming agent, for example) or heated, as both of these actions result in the production of toxic chlorine gas. As for bactericidal detergents for household use (e.g. a disinfectant washing-up liquid), their usefulness in domestic hygiene remains unproven.

Worth remembering

Whenever food is spilled inside a refrigerator, the soiled surfaces should be cleaned without delay. All the inside surfaces should be cleaned as necessary and at least once a year. Racks and other accessories should be removed beforehand and cleaned separately.

All cleaned surfaces (utensils, crockery, work surfaces, etc.) must then be wiped dry with a clean cloth or single-use kitchen paper, or left to dry.

Heat is a very good way of destroying most microorganisms (temperatures above 60°C). With a view to saving electricity, the current tendency is to reduce temperatures in both dishwashers and washing machines. It is recommended practice to run a wash cycle at a temperature of at least 60°C at regular intervals and systematically when the laundry or dishes are very dirty (Stahl Wernersson *et al.* 2004).

Lastly, a word about water-treatment devices. These can be either systems connected temporarily or permanently to the tap or separate devices such as filter jugs. The manufacturer's instructions should be followed strictly as regards maintenance and replacements, because if used improperly they can be a major source of microorganisms.

Storing and processing food

Refrigeration

Length of storage

Refrigeration enables foods to be stored for a limited period of time. The use-by date[4] indicated on the packaging of refrigerated products indicates that these foods can be consumed up to this date on the condition that they are kept at a sufficiently low temperature during storage and that the packaging is neither opened nor damaged.

Worth remembering

Certain prepared products, such as cooked dishes, cream pastries, "highly perishable" foods sold in custom cuts, not pre-wrapped, produced on the premises or sold loose without a use-by date, as well as dishes prepared in the home, must not be kept for too long.
It is best to ask the shopkeeper for advice; consumption within three days is usually recommended.

Worth remembering

Baby food or a bottle of baby's milk should not be kept for more than 48 hours at 4°C. The time between preparation and consumption for these products should not be more than one hour at room temperature or 30 minutes if re-heated.

As a general rule, all rehydrated foods should be placed in the refrigerator if not consumed immediately and in any case must always be consumed within 48 hours.

Worth remembering

- **Leftovers from meals that have sometimes sat for a long time at room temperature must be consumed very rapidly or thrown away, especially if they are the remains of picnics, parties or buffet meals in summertime.**
- **Under no circumstances should a dish that has just been prepared be left overnight at ambient temperature, in order to cool it before placing it in the refrigerator.**
- **It is best not to wait more than two hours before refrigeration and, if there is a large quantity of food prepared (more than a litre or a kilogram), it should be divided into smaller portions to allow it to cool more rapidly.**

This is true even if dishes have undergone a long period of cooking; they may contain heat-resistant cells called spores (e.g. spores of the bacteria *Clostridium perfringens* or *Bacillus cereus*). Prepared dishes containing raw eggs (mayonnaise, for example) should be placed in the refrigerator immediately.

Storage temperatures

Important to know

The ideal temperature for storing foods is between 0 and +4°C. At these temperatures, multiplication of most pathogens is interrupted and multiplication of the remaining pathogens is slowed considerably.

For example, at 4°C the cells of *Listeria monocytogenes* take about 10 days to reach the number of cells formed in a single day at 20°C.

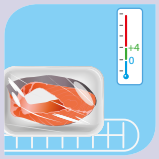
In domestic refrigerators sold since 2002, the cold compartment must be indicated with a visible and indelible label. This does not apply to refrigerators with air circulation systems in which the temperature is more uniform. The manufacturers must also include a system to indicate the temperature in the cold compartment, where the temperature is equal to or below +4°C. However, there are still refrigerators is which it is difficult to get down to +4°C or below without freezing part of their contents.

A study carried out in 2001 showed that the temperature of one in four domestic refrigerators in France was above +8°C and that there could be a difference of several degrees between the warmest and the coolest parts (Derens *et al.* 2001).

(3) Bleach cannot be kept for very long, and must be used more rapidly the more it is concentrated. Concentrated bleach sold in flexible PVC "berlingots" in France (9.6% of active chlorine) must be diluted within 3 months of manufacture, according to the instructions displayed on the packaging. Bottled bleach is pre-diluted (2.6% of active chlorine). Once diluted, the bleach solution must be kept cool, sheltered from the light, kept out of reach of children, and used within 6 months. If this last rule is not observed, the concentration in active substance will be lower than indicated, making the product less effective.
Bleach can damage surfaces, especially metal surfaces (risk of corrosion). It must be used unheated and diluted before use, and surfaces must be rinsed so as not to be left in contact with this solution for more than 10 minutes. To clean the inside of refrigerators, the French federation of bleach manufacturers (http://www.eaudejavel.fr) recommends using half a cup (75 ml) of bleach at 2.6% of active chlorine in 1 litre of water, applying the solution with a sponge or cloth and leaving it in contact for 10 minutes before rinsing. For disinfecting sponges, the federation recommends using a solution of between ½ and 1 cup of bleach in 5 litres of water and leaving the sponge to soak for 5 minutes before rinsing.
(4) The use-by-date (UBD), indicated by the words "Use by" followed by the date after which the food must no longer be consumed, should not be confused with the "Best before ..." date. The food can still be consumed after the best-before date but it may have lost some of its flavour.

*in French only

Worth remembering



It is therefore recommended to monitor the temperature of refrigerators and to keep sensitive foods (especially meat, including poultry and fish) in the coldest area, which depends on the position of the area producing the cold (see the manufacturer's instructions).

To maintain a constant temperature, it is best to open the door as little as possible and not to overfill the refrigerator, so as to allow the air to circulate freely inside. If the inner surfaces are often covered with condensation (or droplets of water), it is a sign that air from outside the refrigerator is constantly getting in. The condition of the joint and the door hinges should be checked and repairs undertaken if necessary, to ensure that the door is airtight.

Lastly, it is important not to confuse foods that need to be refrigerated with those that can be stored at room temperature. Certain prepared dishes are preserved in such a way that they can be stored at room temperature, while others that may have very similar outer cardboard packaging must be kept cold.

Freezing

Domestic freezers, operating at -18°C, can prevent microorganisms from multiplying but most germs survive freezing. After thawing, the structure of the food deteriorates which makes the nutrients they contain more easily accessible to microorganisms. Thawed foods offer a favourable environment for the growth of microorganisms; those that have survived are ready to multiply as soon as the temperature is suitable. For this reason foods should be consumed rapidly (in no more than three days) and not refrozen.

Produce sold chilled may sometimes have been frozen and thawed, so it is important to read the label carefully in order to avoid refreezing a previously frozen product.

When purchasing deep-frozen products you should take care to ensure that any break in the cold chain is as slight and as short as possible. For this reason, in warm conditions or if there will be a delay before the goods can be placed in the freezer, the buyer should use a cool bag. Thawing should take place in the refrigerator, in the microwave on the "thaw" setting, or rapidly by cooking or reheating.

Worth remembering

Freezing for 7 days is an effective way of destroying parasites in fish (Anisakis spp., for exemple), so this is recommended before preparing dishes using raw fish (carpaccio, tartare or sushi). Thorough freezing can also inactivate parasites in meat.

However, home freezing at -18°C does not inactivate all parasites, especially the eggs of *Echinococcus multilocularis*, a parasite found in wild plants and berries accessible to foxes and dogs and soiled by their excreta.

Washing fruit and vegetables

À retenir

Fruit and vegetables (including sprouted seeds) should be washed with extreme care using drinking water in order to remove soil and impurities, which can be heavily loaded with microorganisms.

Fruit and vegetables in punnets or bags must always be washed except in the case of prewashed or ready-to-use fruit and vegetables, as indicated on the wrapper.

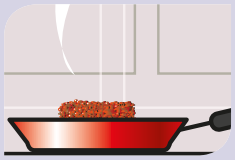
The picking and consuming of wild plants (cress, dandelion, lamb's lettuce, etc.) exposes consumers to risk, especially of parasites. Even careful washing may not overcome the persistence of possible contamination of plants by liver fluke (*Fasciola hepatica*). Nor is washing sufficient to eliminate the eggs of *Echinococcus multilocularis*. It is recommended that vegetable gardens be protected by fencing. Wild plants should always be consumed cooked.

In countries with inadequate hygiene, you should only consume vegetables and fruits, whether cooked or raw, if peeled yourself.

Cooking foods

Cooking food can considerably reduce the microbial load as long as the internal temperature is sufficiently high.

Worth remembering



Cooking a hamburger "rare" is not sufficient to ensure its safety. Infants under the age of five and immunosuppressed subjects should only consume hamburger meat that has been thoroughly cooked[5]. All types of meat for consumption by pregnant women and immunosuppressed subjects should also be cooked thoroughly.

Cooking fish so that it is still pink along the bone ("rose à l'arête") will not destroy any parasites.

The most thorough treatment is sterilisation; this involves exceeding 100°C for several minutes, which can only be achieved under pressure. The instruction leaflets for pressure cookers give sterilisation times for different foods, which must be strictly observed when preparing "home-made" preserves to avoid botulism poisoning. Food from cans that are misshapen (including swelling), leaking, or smell doubtful when opened must not be consumed.

Worth remembering

If food is reheated in the microwave for too short a period, the required temperature will not be reached evenly throughout the food, and will not achieve the same degree of protection as reheating in a saucepan. It is preferable to reheat food in a covered recipient until steam is seen to escape.

(5) Food service professionals in the catering sector are habitually taught that this means food reaching an internal temperature of 70°C, measured with a thermometer. Taking this temperature correctly requires special know-how.

Particular case of foods consumed raw

Dishes with meat or fish served raw (tartare, carpaccio), marinated or prepared in the Japanese fashion (sushi) are increasingly popular. This new trend requires considerable vigilance regarding the origin and freshness of foods and the way they are prepared.

Worth remembering

The consumption of raw meat or fish (tartare, carpaccio), and of dairy products made from raw milk (with the exception of cooked, hard pressed cheeses such as Gruyère or Comté) should be strictly avoided by children under the age of five, pregnant women or immunosuppressed subjects.

Adopting the right habits to avoid transferring contaminants

Hand washing

Worth remembering

- **It is essential to wash hands with soap before and during the preparation of meals in order to prevent food contamination as well as contaminating yourself through the oral route. Hands should be washed after handling raw food (both meat and vegetables) and after any potentially contaminating operation (after going to the toilet, after changing a baby's nappy, after stroking an animal, after changing the cat's litter, after handling soil or touching soiled objects, etc.).**
- **Individuals presenting symptoms of gastroenteritis shed considerable quantities of pathogens by both faecal and oral routes and should not prepare meals for other people. If such individuals cannot be excluded from the process, they must be even more vigilant when washing their hands, or use foods requiring minimum preparation.**

In the home of a pregnant woman who is toxoplasmosis-seronegative, the cat's litter should be changed and the tray washed with very hot water every day, and the pregnant woman should wear gloves for this operation if she performs it herself. Ideally, another person should change the litter.

Keeping foods separate

One food can contaminate another by simple contact; raw foods should therefore be kept separate from cooked foods in the refrigerator, by enclosing them in containers or closed packaging before storage.

Cutting up raw poultry can cause considerable contamination. The bacteria on the surface of raw poultry contaminate the hands and the utensils used, which should be washed carefully before touching other foods or utensils.

Worth remembering

- **It is recommended to have one cutting board for raw meat or fish and a separate one for cooked food or clean vegetables.**
- **Above all, dishes or utensils used to transport or handle raw meat or fish, especially during barbecues, must not be reused to transport or handle cooked food.**

The other items responsible for contamination

Worth remembering

Just like the hands, sponges, cloths and other cleaning utensils must be washed and disinfected frequently, or alternatively heat-treated.

It is recommended to boil sponges, washing-up brushes and scourers in a saucepan (switch off the heat as soon as the water starts to boil), to soak them in diluted bleach (see recommended procedure above) or, for non-metallic wipes or sponges only, to thoroughly wet them with water and place them in the microwave for two minutes at the highest setting (be careful to avoid burns). Drying a surface with a cloth that has already been used can contaminate the surface in question. It is preferable to let surfaces or crockery dry in the air, to use a clean cloth or single-use kitchen paper.

Food should not be placed on a damp surface. Cutting boards must be cleaned immediately after use with very hot water using a brush or scourer and a detergent, and then dried before being reused.

Dogs and cats should not be allowed to lick plates. Lastly, to prevent flies and other insects from contaminating food, it should not be left unwrapped.

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Regulation

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