

General food hygiene - the certificate training

A translation of the booklet
”Almen fødevarehygiejne – certifikatuddannelsen”

Education material for students participating
in AMU-education course, no. 42426

“General Food Hygiene”

Translation

Hotel- og Restaurantskolen

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Regarding the translation of “General food hygiene the certificate training”

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Venlig hilsen
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General food hygiene

The certificate training

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General food hygiene – the certificate training

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***1 Introduction**

At all times it has been of critical importance in the life of humans, that the food they were served could be eaten safely, without any unpleasant consequences for health and survival.

And at all times humans have experienced that food - even when prepared with great care – has still sometimes caused poisoning or even death for those who have eaten the food. Something went wrong during preparation of the food or maybe during the storage.

Today we know all about the reasons why it sometimes goes wrong and we also know exactly how to avoid it. This booklet explains in details the reasons why food can lead to disease for those who eat it, and also how to work to avoid that it happens.

The primary target group for this booklet is course members participating in the labour market education General Food Hygiene. The course is completed by a test from the Danish Veterinary and Food Administration. When you have passed the test you will be issued a certificate that allows you to work in the food industry.

The target group is also students that through education qualify at a level comparable to the demands in the hygiene education with certificate of the labour market education. Compared to the basic subject Hygiene, this booklet also contains the relevant information. However reference must be made to the booklet “Sundhed” for an explanation of the physical and psychological needs of the human body.

The booklet is regularly updated regarding the newest legislation, relevant illustrations and other innovative features. With regards to matters of current interest it is our estimation that they best be included as a part of the preparation for the education by the individual teacher.

A webpage now belongs together with the booklet www.ef.dk/hygiejne.

There it is also possible for you to participate in debates and send comments regarding the booklet to the publisher.

October 2008

Solveig Sørensen

Benny Løvholm Christensen

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Preface

Hygiene Certificate

Everybody working with foodstuff must be either educated in the foodstuff area, possess a certificate in food hygiene or have comparable knowledge of hygiene.

The education in foodstuff hygiene must, as a rule, be commenced at the latest 2 months after employment or establishment of the business.

A person who has passed the test from the Danish Veterinary and Food Administration will be given a Hygiene Certificate, which gives access to employment in all kinds of foodstuff businesses.

Therefore the education is organised so that everybody gets knowledge of the most comprehensive and complicated production circumstances.

***i ramme

Note

A large part of the contents in "General Food Hygiene" is given for the comprehension of the teaching resources and not meant for reproduction in the certificate test given by the Danish Veterinary and Food Administration.

***ramme slut

**fotos

The legislation covers all retail businesses, as for instance butchers, bakers, fish retailers, fruit and vegetable businesses as well as restaurants, coffee shops and pizzerias, catering centres and take-aways. The rules do also apply for bakeries, fruit and vegetable as well as lettuce businesses.

The 4 smileys

The goal is to get the best smiley every time.

Legislation and food inspection

Food, beverages and stimulants are together called foodstuff

Businesses that handle foodstuff must comply with a number of legislations established by the EU and nationally, that is in Denmark

These legislations are very comprehensive and are composed of as many as several hundred pages

The legislations are divided into three categories

*3 Regulations

Regulations are a bringing together of already existing rules in the EU and DK. The rules are less detailed and estimates are emphasised

*3 Supplementary regulations

Along with the regulations come supplementary regulations in the form of orders and circular letters and so on.

*3 Guidelines

Guidelines are drawn up by the Danish Veterinary and Food Administration. The guidelines go more thoroughly into the legislation, so that they are explained in a more thorough way with many details included. The guidelines are first and foremost directed at the businesses that are responsible for complying with the legislation.

In the rearmost pages extracts from the legislation are reproduced. The selection were made by the authors by an evaluation of which legislation are the most relevant in daily work in a foodstuff business.

***i ramme

Note:

Changes in legislation, orders and guidelines are continuous. At the homepage of the Danish Veterinary and Food Administration you can keep yourself updated with these changes and other relevant matters in the area of food hygiene: www.fvst.dk

***foto

The following guidelines form the primary basis of the rules reproduced in this booklet:

- "Guideline on food hygiene" (Vejledning om fødevarehygiejne)
- "Guideline on own check in food businesses" (Vejledning om egenkontrol i fødevarevirksomheder m.v.)
- "Guideline on education" (Vejledning om uddannelse)

The Food Regions are the controlling authority

It is a task for the the regional veterinary and food administration centres (hereafter Food Regions) to control that the legislation are complied with in the businesses.

The businesses are responsible for the food. The Food Regions are responsible for controlling that the businesses meet the responsibility.

Denmark is divided into a number of Food Regions, which conduct food control. The Food Region approves businesses, e.g. restaurants, canteens and institutional kitchens. Furthermore they supervise that the rules in the order on hygiene are complied with, and they approve the own check programme in the individual business.

Persons, often a supervisor from the Food Region, supervise the maintenance of buildings, design and the standard of order and so on. Moreover the production plan, the standard of cleaning and the final product are supervised

Likewise they offer help and advise on the own check programme and on any hygienic problems in the production. For example they can point out where improvements must be made in the production.

***tegning,

The supervisor evaluate whether the own check programme are complied with.

The supervisor from the Food Region will almost always make an unannounced inspection.

The number of inspections and the duration depends among other things on which kind of products the individual business sell, how the business is designed and how many different kinds of products are handled , and the businesses are divided into risk groups. High risk means more visits than low risk. If the business has achieved an Elite Smiley, the number of visits will be reduced.

*3 What is checked

Hygiene and own check is always checked. In the own check programme is an overview of the critical control points with matching control forms and a plan as to which kind of control the business performs on the critical control points. At the inspection the supervisor will evaluate if the own check programme is efficient and thus secures healthy food. Most frequently the supervisor will also take samples of the food for a microbiological test.

*3 Microbiological sampling

A microbiological examination shows how many bacteria were found in the selected product. Bacteria can be counted in several ways. As a standard the sample will be diluted with brine and spread on an agar plate. The plate is left at 25 °C and the bacteria will grow into colonies in a few days. Then the bacteria are counted. A single microorganism is only visible through a microscope. But by means of propagation a colony arises, where the bacteria are so numerous that they can be counted without the use of a microscope.

***foto

For microbiological examination agar plates are used. After incubation and propagation the bacteria are visible with the naked eye as colonies.

***foto

A single bacterium is only a few µm. By means of the microscope the single bacteria cells are visible.

The total bacteria count is a term for the number of bacteria in 1 g of the examined food..

The number of bacteria gives an overview of the hygienic state in the production. When it is necessary to check if certain bacteria species are present in the sample other methods must be used, e.g. selective substrates and microscope.

*3 Follow up on the inspection.

At every inspection a control report is made, here the following points are assessed on a scale from 1 (very good) to 4 (poor)

Hygiene:

- Handling of raw food
- Cleaning
- Maintenance (premises, inventory)

Education in hygiene

Own check of the business

Labelling and information

Approvals et cetera

AOB

(All points are not necessarily checked every time)

***i ramme

The inspection rapport must be put up visibly at the entrance of the shop/business, so that the customers too can see any mistakes and insufficiencies.

***ramme slut

These mistakes and insufficiencies can lead to prohibitions, injunction orders, administrative fines and reporting to the police, and must then be corrected before a specified date.

If mistakes and insufficiencies are not corrected, the business will be given more advice and if it still does not improve, the Food Region can demand a temporary closing of the business. In repeated cases the approval can be suspended.

****the 5 smileys with text

No remarks

Reprimand

Injunction order or prohibition

Administrative fine, reporting to the police or approval suspended

If you get 4 happy smileys in 12 months, you have achieved elite status and are allowed to put up an elite smiley. The Elite smiley will be printed on the control report.

***Control report,

The poorest result will decide which smiley you get.

Things outside the smiley, but that still can lead to a fine.

The remarks of the supervisor concerning the visit.

The smiley of the inspection day.

The smileys from the 3 previous visits.

This is what the smileys means.

Which kind of inspection? Have samples been taken?

Does the business agree?

Contamination of foodstuff

Contamination from physical things

Pebbles in rye bread, insects in muesli, eggshells in pastry, splinters of wood from utensils, hair, kitchen cloths, cigarette buds and paper clips. A lot of people have experienced these kinds of unpleasant surprises in the food. Everybody must be aware of traces of pests (mice and rats), for example faeces on shelves and bite marks in foodstuff and packaging.

*3 Contamination from chemical substances

Most foodstuffs are being processed or prepared before it is eaten. We have been cooking, frying, smoke curing and backing our foodstuff for millenniums, but new kinds of methods to process or prepare food, as microwaving, radiation and high pressure treatment are also being developed.

Substances that can form during processing and preparation of foodstuff are frying mutagens and acryl amide.

Unwanted substances can get into foodstuff from packaging and kitchen utensils, pesticides and heavy metals. A chemical contamination can also arise when cleaning. It can arise from cleaning and disinfection agents, which are not washed properly away from a table.

Natural toxic substances are usually found in sufficiently small amounts not to pose a health risk for humans. But poisonous lectins are found in dry uncooked beans; however these are destroyed by heat. Also solanine found in potatoes and histamine found in fish, are chemical poisons. Pregnant women should restrain themselves from caffeine from coffee or coke and persons with high blood pressure should not eat too much liquorice.

Contamination from microorganisms

Microorganisms are found everywhere. You can not avoid that some end up in the food, that the food becomes microbiologically contaminated. Some of the bacteria are destroying and will make to food go rotten and still others are useful, but the pathogenic bacteria can make humans ill. This can happen if the microorganisms are present at a sufficient level in the food or if toxins have been produced. The food does not go rotten by pathogenic bacteria. Thus often you will not be able to see, smell or taste if pathogenic bacteria are present in the food.

***2 fotos

Tekst 1:

You must take as many precautions as you can to secure that these kinds of small things does not end up in the food. Think about the contents of your pockets and keep an eye on the food throughout the whole production.

Text 2:

Chemical contamination is not visible.

*1 Microorganisms

Microorganisms are found in soil. Microorganisms are found in water (but normally not in tap water). Microorganisms are found on humans and animals – especially large amounts are found in the faeces of both humans and animals.

Microorganisms are an important part of the circulation of nature and can be found in numerous places.

Many species exist each with different characteristics. Most microorganisms are of great use to nature and for humans and animals too. Only a few creates problems in food, and these few microorganisms will be most focused on in the food hygiene education.

We must distinguish between bacteria and fungi. On page 25 to 28 the pathogenic bacteria and fungi are listed with their names and special characteristics. Moreover information on pathogenic viruses and parasites, that can not be classified as microorganisms, but belong to other categories in the circulation of nature, can be found.

*2 Bacteria

Bacteria are single-celled organisms. During propagation the single cell divides into two parts. This means that 1 bacterium becomes two bacteria, two bacteria becomes 4 bacteria and so on. The time that passes in the division of 1 cell into 2 cells are called the doubling time or generation time. The generation time are affected by the external surroundings such as temperature and oxygen and by the conditions in the foodstuff such as pH, salt and nitrite.

***i ramme

A cell divides into two cells.

Some bacteria grow sufficiently fast to double their number in only 20 minutes.

To have 1 bacterium divide into two in 20 minutes doesn't seem so bad.

But to have 1 million bacteria divide into 2 millions in 20 minutes and to 4 millions in 40 minutes can pose a serious problem.

Put in another way: If you calculate the generation time to be 20 minutes, 1 bacterium will divide into 1,048,576 bacteria in 6 hours and 40 minutes!

***ramme slut

*3 Fungi

***foto

If you eat food containing mildew (mould) you will not become ill instantly, but there is a significant risk that you suffer long term injury.

Mildew is colloquially called mould. Mildew is able to grow in places where bacteria can not.

Mould can grow on the surfaces of foodstuff, where too little water exists for the bacteria to grow, for instance on the crust of liver paste and on bacon and they can grow on very acidic foodstuff like lemon.

Yeast fungus can produce CO₂ and alcohol during their multiplication.

*3 Virus

Norovirus are the number one cause of “Norwalk disease”, which is an acute gastroenteritis accompanied by diarrhoea and vomiting. Norovirus are very contagious and can be transmitted in several ways. It can be passed directly from one person to another through vomit or faeces. It can be passed indirectly through for example cookware, handles etc., water and food. Often norovirus pose a problem in hospitals, nursing homes and in child care facilities. Outbreak of the disease are also commonly seen where mutual meals are consumed, such as in cafeterias and restaurants.

If shell fish are served, the virus can only be killed with certainty if the shell fish are cooked carefully.

*3 Parasites

Parasites are small animals that can be passed on from food to humans. In Denmark it sometimes happens if raw fish, that contains parasites (marine nematodes), are consumed, these parasites can survive being eaten by humans. That is why raw fish must be prepared in such a way that the parasites are killed, before the fish is consumed. The parasites are killed by freezing of the raw fish (-20 °C for at least 24 hours).

***foto

Sushi is prepared from raw fish, which must be frozen, before serving.

Oysters are consumed at your own responsibility.

*2 The useful, the spoiling and the pathogenic microorganisms

*3 Useful microorganisms

Both bacteria and fungi can be added to the food on purpose and can produce products with a high gastronomic value. Even early in history the possibility of using the microorganisms of nature to bring tastiness and variation to food was known, for example in yoghurt, cheese, wine and beer. Coincidence decided if the result was tasteful, because at that time methods to control microorganisms were not known.

When microorganisms are used in production of foodstuff at our time, it takes place under very strictly controlled production procedures. The qualities of microorganisms are used to change aroma, taste and also to extend the shelf life of certain foods.

A collective name for this process is fermentation.

***fotos

The pickled herring, the beer and the rye bread are all fermented.

Soured whole milk, junket, buttermilk, sour cream, yoghurt and cheese are also familiar products and also some salamis.

The yeast fungi are used to produce beer and the exact yeast type and the precise conditions that will give the beer the desired taste are used. In production of wine the natural yeast fungi on the grapes are used, but also a selected yeast culture can be added. During bread-making the added yeast must make the bread rise. This happens because of development of air in the bread during the propagation of the yeast fungi.

*3 Spoiling microorganisms

Spoiling microorganisms makes the food go mouldy, go sour or go rotten. The food smells bad, becomes unappetizing and inedible.

The spoiling action happens with the fastest speed if the microorganisms have good growth conditions, for example if the temperature is sufficiently high.

***fotos

All food that smells bad must be thrown away.

A lot of people think that it is sufficient to cut away mildew from foodstuff, but it must be emphasized that the entire piece of foodstuff must be thrown away if mildew has been discovered on it. Mildew on foodstuff is caused by mould, which can produce mycotoxins (poisonous substance). The mildew is not only present on the surface, but hyphae are present deep inside the foodstuff. Therefore it is not sufficient to cut away the mouldy part of for example bread – the entire bread must be thrown away!

*3 Pathogenic microorganisms

The food does not go rotten by pathogenic bacteria. Thus often you will not be able to see, smell or taste if pathogenic bacteria are present in the food. On page x a directory of the growth conditions of pathogenic microorganisms is presented, and on page x information on transmission and course of disease can be found.

*3 Explanation of concepts

*4 Contamination

That a foodstuff is contaminated means that it is contaminated by bacteria and/or fungi.

- Either the contamination has been passed on from one foodstuff to another. For instance that chicken juice containing bacteria has dripped on some lettuce or that an onion with soil and microorganisms on it touches meat on the same cutting board.
- Or new bacteria or fungi have been added after the foodstuff was prepared. For example that a ready cooked smoked saddle of pork has been moved by dirty hands or has been put to cool of in a bowl containing leftovers of meat juice from the raw smoked saddle of pork.

*4 High risk food

High risk food are foodstuff that over a short period of time, being stored at room temperature,

- Will develop diverging appearance, smell or taste.

or

- Could lay the ground for growth of pathogenic bacteria to a level that might be harmful to health.

Vegetables, fruit, bread and a lot of other kinds of food are not considered to be high risk food.

* 1 To inhibit the growth of microorganisms.

When you work with foodstuff you take on a big responsibility.

You need to have knowledge of for example the growth conditions of microorganisms. Yes indeed you need to know how you can inhibit or completely stop the growth and propagation in practice. The following paragraphs provide an overview of the most important possibilities available in foodstuff production to kill or inhibit the growth of microorganisms.

- The temperature and oxygen will affect the products from the outside.
- Water activity (salt, sugar, dryness as well as acidity) affects the foodstuff from the inside.
- As methods of preserving preservatives, curing and radiation are mentioned.

*2 Temperature

The microorganisms, especially the bacteria, propagate most quickly between 20 and 40 °C, but many bacteria can propagate at both higher and lower temperature. The microorganisms can be killed or their growth can be inhibited by changing the temperature. This take place by:

- Heat treatment.
- Autoclaving (boiling under pressure for a minimum of 15 minutes at 121 °C).
- Cold storing.
- Frost storing.

*3 Heat treatment

Common to all microorganisms is the fact that they will die at high heat. Heat treated foodstuff must reach 75 °C in the centre (core temperature). To put it in another way, it must be ensured that the entire foodstuff is heat treated to a temperature of at least 75 °C. At this temperature all the pathogenic microorganisms are killed. Spores can survive.

***foto

High heat kills microorganisms.

*3 Formation of spores

Some bacteria as *Bacillus* and *Clostridium* form spores that can survive ordinary heat treatment, cooling, drying and exposure to disinfection agents that would normally inhibit or kill bacteria. Under favourable conditions spores can germinate, that is become a bacteria again and constitute a treat for the safety of food.

A bacteria spore is only killed by the use of an autoclave that under pressure heats to a minimum of 121 °C for 15 minutes (canned food).

For instance boiling of rice for 10 minutes is not enough to kill *B. cereus* spores. The spores can germinate and become ordinary bacteria for example by incorrect storing.

*3 Beware of after contamination.

When all microorganisms in a foodstuff are dead it is important to make sure that contamination does not arise from i.e. hands, kitchen utensils and packaging. Certain mutual competitions exist between the different microorganisms and if a recontamination occurs, the new microorganisms will enjoy enhanced growth conditions because all their “enemies” have died.

***tegning

Certain cold-loving microorganisms can posses a week activity as far down as 0 °and some heat-loving microorganisms can posses an activity as far up as 75 °C. The lower limit for mould

propagation is 0 °C.

*3 Cooling

By cooling and storing in cool store and refrigerator the growth of the bacteria is inhibited. However a few bacteria will propagate but this happens very slowly. The cooler surroundings are kept the slower propagation of microorganisms (at lower temperatures than the optimum temperature). That's why a lot of businesses choose a lower refrigerator temperature than the law prescribes. See directory on cooling temperature on page xx
Mould can propagate even at the freezing point. Yeast propagate best at room temperature.

***foto

The growth of bacteria present in open sandwiches is inhibited by cold storage (5 °C).

*3 Freezing

During freezing the water as we all know has solidified to ice. The bacteria can not propagate because of lack of water. But freezing kills hardly any bacteria at all. They enter into hibernation and start propagation once again after defrosting. It is thus important that the food is defrosted in the refrigerator.

***Skema, gerne på side for sig

<i>Foodstuff</i>	<i>Maximum temperature</i>
<p><i>The storage temperature must always be printed on the packaging of high risk foodstuff. This temperature must always be observed, even if it is different (lower) than the rules of the law (which is depicted below)</i></p>	
<p><i>Minced meat, forcemeat and raw Danish pork sausage</i></p> <p><i>High risk fish products, such as cured and gravad fish</i></p> <p><i>Milk and milk products</i></p> <p><i>Foodstuff containing custard, whipped cream and mousse</i></p> <p><i>Heat treated, refrigerated convenience food</i></p>	<p>+5 °C</p>
<p><i>Raw fish</i></p>	<p>+2 °C</p> <p><i>Or on ice</i></p>
<p><i>Refrigerated, pasteurised egg products</i></p>	<p>+4 °C</p>
<p><i>Semi-canned fish products, such as marinated herring, pickled herring, curry herring, caviar, and so on</i></p> <p><i>Foodstuff with custard, whipped cream or mousse, used or sold not later than 12 hours after manufacturing</i></p> <p><i>Mayonnaise, salads and remoulade with a pH above 4.5</i></p>	<p>+10 °C</p>
<p><i>Eggs</i></p>	<p>+12 °C</p>

	<i>As a main rule frozen food must be stored at</i>	<i>-18 °C</i>
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*2 Oxygen

The air contains oxygen. Certain bacteria need oxygen to propagate. By vacuum packaging the oxygen is excluded and thereby the propagation is limited.

Vacuum packaging can extend the shelf life of meat and is often used for uncut cold meat such as ham, cured meat and rolled seasoned meat and for uncut fresh pieces of meat. But if the hygiene was poor during the packaging and the best before date displays long shelf life, the bacteria that don't require oxygen can begin to propagate. This is unfortunate as a number of these bacteria are often dangerous and without competition.

***foto

Vacuumed meat.

A controlled atmosphere or a protecting atmosphere is a method of packaging, where ordinary air is replaced by other gasses. A number of these gasses can inhibit the growth of microorganisms, so that the shelf life of the product is extended. However some bacteria as for example the pathogenic bacterium *Listeria monocytogenes* are able to grow in protective atmosphere. *Listeria monocytogenes* can be inhibited by the combination of several elements, of which the most important one is a low temperature (5 °C) and a high concentration of carbon dioxide (CO₂) in the packaging.

When the packaging of a vacuum packaging or a controlled atmosphere packaging is forced open/opened the durability date does no longer apply. The employees must themselves decide the new durability and preferably write the new date on the packaging.

***foto

The durability date does only apply as long as the packaging has not been opened. When the packaging has been opened the durability shortens. You can write a new (earlier) date on the packaging if it's not provided.

*2 Water activity

Microorganisms need water to grow and if the water is removed the microorganisms will be inhibited or killed.

All high risk foodstuffs contain a lot of water. Meat, fish and poultry contains 70-80 %, eggs approximately 70 % and vegetables and fruit 70-95 % of water. The more water the better growth conditions.

When drying foodstuff the water that bacteria need to feed on is removed – accessible water. Grapes (raisins), plums (prunes) and apricots can be bought in a dry form. Other examples are spices, dry milk, bouillon concentrates, soup powder, fish, meat and pasta.

***fotos

In dried foodstuff or foodstuff with a lot of salt or sugar added (i.e. jam) the contents of accessible water is low and therefore the bacteria will grow poorly. Yeast and mould can grow in foodstuff with a lower water activity than bacteria.

By using big amounts of salt or sugar the growth of bacteria can be limited or decreased totally. The water activity (a_w) is said to be lowered (~~aw~~). The water activity is an expression of how much of the water is bound by salt or sugar and how much of the water is accessible.

The combination of sugar/preservative is often used for instance for jam, fruit preserve and juice. The combination of sugar/vinegar/preservative is often used for instance for cucumbers and beetroot.

The combination of salt/cooling/preservative is used in many cold cuts as well as in bacon, smoked saddle of pork, fish and so on.

The combination of salt/drying is used for both fish and meat. Among known examples are ham imported from Italy.

It is possible to preserve foodstuff solely by the use of salt and sugar, but the products will turn out to salty or to sweat respectively for most people.

*2 pH

Only a few pathogenic bacteria can grow $< \text{pH } 4.5$. Sour products as pickled beetroot, cucumber, red cabbage, pickles, mayonnaise, remoulade and many others have a sourness $\text{pH} < 4.5$ and will often have preservatives added. That's why they can be stored without cooling as long as they remain unopened.

***foto

Mayonnaise has a $\text{pH} < 4.5$ and may consequently be stored - unopened - without cooling.

Yeast and mould can however tolerate a lower pH ($\text{pH } 2-6$) and that's why it is common practice to add preservatives to the aforementioned products.

Other foodstuff, as for example sour milk products, have a low pH, but the pH is not sufficiently low for storing without cooling. Sour milk products stored in the fridge have a very long shelf life, much longer than for instance milk, because of the low pH.

***Skema

	Maximum	Optimum
The largest group of bacteria	8.0-9.0	7.0-7.6
Particularly acid resistant bacteria	8.0-9.0	7.0
Yeast	8.0	4.0-7.5
Mould	8.0	4.0-7.5

Tekst: Growth limits of microorganisms compared to pH.

*2 Preservatives

Microorganisms are limited or killed by preservatives. A lot of chemical preservatives exist on the market. The most widely used are benzoic acid, sorbic acid and propionic acid. These products are found in almost all preserved fruit and jam products. Packed rye bread can also be surface preserved with propionic acid.

By lowering the pH in the foodstuff the chemical preservatives have a greater effect.

Sodium benzoate is an aqueous solution of benzoic acid. It is mostly intended for private households.

***i ramme

Note! Preservatives are additives and can only be used in limited amounts. In the positive list records are found on fields of applications, allowed amounts etc.

***ramme slut

*2 Curing

Curing is used for sausages, ham, bacon, fish and other foodstuff. Chemical substances exist in the smoke that produce taste but also contribute to a longer shelf life. Antimicrobial compounds limit bacteria growth. However mould can develop on the surface of certain cured products.

***foto

Curing is among other things used for ham.

*2 Radiation

By radioactive irradiation microorganisms can be killed and thereby all growth can be stopped. It is unclear whether the irradiation has an influence on the health of humans and that's why irradiation is only allowed in Denmark for spices. But irradiation is not used at present times, probably because Denmark has very strict rules for the labelling of irradiated goods. In some businesses ultraviolet light is used to sterilize the air in the production area.

* 2 Canned goods

*3 Canned food

***foto

Canned food is heated under pressure and thereby reaches more than 100 °C.

By canned food is meant a foodstuff in an airtight container, with a shelf life of at least 12 month at 20 °C. Canned food has been heat preserved at a high temperature under pressure, 121 °C for a minimum of 15 minutes. Here the important thing is to kill both bacteria and bacteria spores. Examples of canned food: Canned fruit, vegetables, such as tomatoes and olives, long-life milk, cod roe, kippers, ready to eat meals and so on.

It can occur that canned food has not been heated sufficiently and that a few bacteria spores have survived. When the spores germinate growth of the bacteria can cause decay of the foodstuff and this can appear in several ways, a can will bulge, or the contents will develop a very ugly smell and taste. Furthermore the growth can pose a treat to the food safety. If a can gets bruised, the very thin plastic film can be destroyed, and hereby especially the very acid products can go into combination with the metal of the can.

*3 Semi canned fish

***foto

Semi canned food must be stored in cold storage, often at 10 °C. Look at the diagram on page 19.

By semi canned food is meant a non-heat treated foodstuff, where the shelf life is extended by the addition of salt, acid, sugar and/or preservative. Semi canned food must be labelled with the storage temperature, often at the maximum of 10 °C as opposed to 5 °C.

Examples of semi canned food: Caviar, marinated herring, pickled herring, curry herring and so on.

*2 Water

Normally we can trust that the water from the cold tap has a good quality in Denmark. The hot water must on the contrary not be used directly in food. In part because of the risk of bacteria and in part because of the possible content of heavy metals. Ice cube machines must be cleaned often, because water frozen to ice cubes in these machines can contain pathogenic bacteria and parasites. The same goes for various drinking water machines, where the water contents must be changed at short intervals.

*****Diagram: The growth conditions of pathogenic bacteria in foodstuff**

Bacterium	Temperature		% salt in water-phase	Sensitivity to oxygen	pH
	Min.	Max.	Max.	Aerobic/anaerobic growth	Min.
Campylobacter	30 °C	45 °C	1.50 %	+/-	4.9
Salmonella	5 °C	46 °C	8 %	+/+	4
Listeria monocytogenes	1 °C	45 °C	10 %	+/+	5.2
Verotoxin producing Escherichia coli O157	7-8 °C	45 °C	6 %	+/+	4
Clostridium perfringens	12 °C	50 °C	7 %	-/+	4.5
Clostridium botulinum type E and some B and F	3 °C	45 °C	3-3.5 %	-/+	4.5
Staphylococcus aureus	8 °C	45 °C	15 %	+/(+)	4.2
Bacillus cereus	4 °C	55 °C	11-12 %	+/+	5

*****Billedtekst**

The above diagram presents an overview of the different pathogenic bacteria in proportion to temperature, salt, oxygen and pH. This information is for comprehension of the teaching resource – not for reproduction in the certificate test.

***2 Questions**

1. I which range of temperature do bacteria thrive best?
2. At which temperature are bacteria killed?
3. Can a bacteria spore be killed by heating to 75 °C?
4. Is it possible for bacteria to survive on salty, vacuum packed cold cuts?
5. List at least 5 products where microorganisms are useful.
6. Why is it allowed to keep mayonnaise and remoulade at room temperature in the stores?
7. What is meant by semi canned food?
8. Must semi canned food be stored refrigerated?
9. What happens to bacteria during freezing?
10. List 2 products where preservatives are often used.
11. Does the durability date apply to vacuum packed cold cuts and cold cuts packed in a protective atmosphere after the packaging has been broken?

Course of disease by infection with different pathogenic microorganisms

Species	Campylobacter	Salmonella	Listeria monocytogenes
Foodstuff frequently involved	Poultry, beef and pork, unpasteurized milk	Meat, poultry, eggs, dried milk products, vegetables.	Milk, cheese, meat products, vegetables, fish products.
Infection dose	Infection dose is low. As low as 500 bacteria. No propagation takes place in the foodstuff.	Normally more than 100,000 per gram foodstuff, but could be as low as 10 per gram.	The dose is not known with certainty. Propagation takes place in the foodstuff.
Typical cause	Infection via kitchen utensils, raw meat etc. to foodstuff, which is digested without further heat treatment.	Inadequate heat treatment. Contamination via kitchen utensils, meat fluid etc. to foodstuff, which are not heat treated.	No or inadequate heat treatment. Contamination of heat treated or salted foodstuff.
Infection/poisoning	Infection – Campylobacteriosis	Infection – Salmonellosis	Infection – Listeriosis
Incubation period	2-10 days	½- 2 days.	Large individual variation
Duration	1 week. Generalised weakening for several weeks.	A few days to several weeks.	Depends on which symptoms develop.
Symptoms	Diarrhoea, nausea, abdominal pains. Fever.	Diarrhoea, abdominal pains. Fever, headache. Nausea, vomiting.	Most often affect resistance impair individuals and pregnant women. Influenza symptoms. Abortion. Septicaemia, meningitis. Diarrhoea.

Species	Yersinia enterocolitica	Verotoxin producing E. coli 0157	Clostridium perfringens
Foodstuff frequently involved	Pork and pork products	Minced beef, unpasteurized milk, water.	Heat treated dishes containing meat or poultry. Stews , meat broths.
Infection dose	Quite high infection dose. 100,000 to 1 million per gram foodstuff. Propagation takes place in the foodstuff.	Low infection dose. The dose is not known with certainty – a few hundred is probably enough.	1-10 millions per gram foodstuff. Propagation takes place in the foodstuff.
Typical cause	Contamination of heat treated products, which is stored for a longer period with cooling.	Inadequate heat treatment.	To slow cooling of large portions of heat treated products. Inadequate warming of products.
Infection/poisoning	Infection - Yersiniosis	Infection	Poisoning because of toxin production in the small intestine.
Incubation period	3-10 days	1-2 days	Normally 8-12 hours (could vary between 6 to 24 hours)
Duration	The disease has two causes: 1. From a few days to one week. 2. After 1-2 weeks complications can arise for several months.	5-10 days	1 day
Symptoms	1. Cause of disease: Fever, diarrhoea, abdominal pains, gastroenteritis. 2. Cause of disease: Arthralgia, arthritis symptoms, especially in patients with tissue type HLA-B27	Diarrhoea, bloody diarrhoea, abdominal cramps, vomiting, light fever. Rarer: Acute kidney failure, damage to kidneys or central nervous system.	Diarrhoea, abdominal pains, feeling unwell

Species	Clostridium botulinum	Staphylococcus aureus	Bacillus cereus
Foodstuff frequently involved	Homemade fish products, liver paste, fruit and vegetable products.	Heat treated salted meat and fish products. Ready to eat dinners, custards and sauces.	Flour containing products such as custards, sauces, flour thickened dishes as well as rice and milk.
Infection dose	Propagation takes place in the foodstuff.	100,000-1 million per gram foodstuff. Propagation takes place in the foodstuff.	100,000 per gram foodstuff. Propagation takes place in the foodstuff.
Typical cause	Inadequate salting or souring of foodstuff. Inadequate heating and cooling of foodstuff.	Contamination of heat treated foodstuff via peoples hands, wounds etc. Inadequate cooling.	Slow cooling of heat treated products. Storing milk to long in the refrigerator.
Infection/poisoning	Poisoning owing to production of toxin in the foodstuff.	Poisoning owing to production of toxin in the foodstuff.	Poisoning owing to production of toxin in the foodstuff/ in the intestine.
Incubation period	18-36 hours or longer.	2-4 hours.	Diarrhoea type: 6-24 hours Vomiting type: 1-5 hours
Duration	If the individual survives it might take half a year before the individual gets well.	1-2 days.	Diarrhoea type: 12 hours Vomiting type: 1-2 days
Symptoms	Nausea, vomiting. Diarrhoea. Visual disorders, muscular weakness, constipation. Paralysis of throat and respiration. Cardiac arrest	Nausea, intense vomiting. Abdominal cramps, diarrhoea.	Diarrhoea type: Diarrhoea, abdominal pains. Vomiting type: Nausea, vomiting

Species	Shigella	Fusarium and aspergillus	Anisakis larvae	Norovirus
Foodstuff frequently involved	Vegetables, which are imported from countries with poor hygiene. Faeces	Grain, in various types of nuts, dates and figs.	Raw fish	Fruit infected from polluted water, for example frozen berries or shell fish.
Infection dose	< 1000 bacteria/ml		1 single larva can cause disease.	10-100 virus particles.
Typical cause	Vegetables rinsed in polluted water either in connection with journeys abroad or imported vegetables.	Propagates in foodstuff, which are harvested or stored to humid.	Digestion of dishes made from non-treated, non-frozen fish.	Contamination from infected individuals via vomit/faeces. Raw frozen berries infected with the virus.
Infection/poisoning	Shigellosis	Produces aflatoxin, which is carcinogenic.	In the body the worms can penetrate from the intestinal system to the abdominal cavity and cause peritonitis. Allergic reactions can arise also from dead worms.	“Norwalk virus”. The disease can induce great losses of fluid, this is especially dangerous to the elderly.
Incubation period	1-3 days, until one week	Years.	2 hours	1 to 2 days
Duration	Variable		The larvae must be removed physically.	12 hours to 3 days in grownups Children up to one week
Symptoms	Could cause diarrhoea, possibly with blood, abdominal pains, fever.	No acute symptoms but long term injury.	Severe abdominal pains and vomiting.	Nausea, sudden vomiting. Diarrhoea.

			Could in some people cause allergic reactions, both by ingestion of living and dead anisakis larvae.	Stomach-ache Abdominal cramps Some furthermore experience: Low fever, goose bumps, headache and pain in joints and muscles.
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*1 Own-check

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Own-check is the systematic actions that the businesses conduct to make sure that the legislation on foodstuff is complied with. That is, own-check is routines that the staff carry out during all productions.

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The own-check must ensure that the food that is served or sold does not constitute a risk for the health of humans.

To work with own-check means to focus on the critical points in the kitchen. When the critical points have been identified, and kitchen routines and working procedures have been put into system, you will have a nice tool to secure an efficient own-check.

***i ramme

Critical points

A critical point is a place:

- Where danger exists for the propagation of microorganisms that is already present in the food.
- Where danger exists for adding new microorganisms to the food.
- Where physical or chemical contamination of the food can happen.

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A critical control point is a critical point you are able to control.

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A part of working with the own-check program is to register the critical points (risk analysis).

*2 Risk analysis and critical control points

A risk analysis consists of:

- a) Assessing which risks are associated with the current handling and selling/serving of foodstuff and how serious and frequent these risks are. To point out where these risk can occur.
- b) Deciding which of the identified risks can be controlled in the production procedure and thus is a critical control point.
- c) Establishing limits for what is acceptable (critical limit), so that it is clear in advance when deviations or irregularities occur.
- d) Establishing and completing surveillance procedures to make sure that the foodstuff is treated correctly at the critical control points. Effective surveillance procedures must exist for all critical control points, including the frequency of the procedure and who is responsible.
- e) Specifying what must happen with the product in question, if errors are disclosed and perform a corrective action, so that the error is not repeated.
- f) Establishing when, how and how often the own-check must be revised, that is establishing a procedure that ensures that the procedures described from a to e works properly. The own-check must also be adjusted to changes in the activity of the business.
- g) Drawing up documents and keeping records to document that the procedures works efficiently.

***foto

The result must be recorded to prove that the work has been performed correctly.

***i ramme

Own-check must be performed the following places.

- Raw materials – see the section with the identical name, page 32
- The production – see the sections: “When the products are received” page 37, “When the raw materials are made ready” page 39, “Heat treatment” page 41 and “Cold servings” page 43.
- Finished products – see the sections “Cooling down”, page 48, “Hot holding”, page 49 og “Service at room temperature”, page 50.
- Maintenance – see the section with the identical name, page 53
- Cleaning and disinfecting – see the section with the identical name, page 54.
- Personal hygiene – see the section with the identical name, page 57.

***ramme slut

* Own-check program

A business must themselves draw up their own-check program. In the program, besides measurements of temperatures and observations on other hygiene, routine analytical control may be included, either consisting of simple tests or of laboratory studies.

An own-check program and the documentation for the own-check (see below), must exist on the premises of the business that the own-check program covers.

*2 Sector codes

Sector codes are guidelines for good hygiene practice among businesses that resemble each other. A sector code contains examples of risk assessments, critical control points, surveillance procedures and corrective actions and other relevant requirements in the food legislation, such as the design of the business. It is voluntary for a business if they want to follow the guidelines of a sector code.

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The sector code for the hotel and restaurant industry.

***i ramme

A directory on sector codes can be found on the webpage of the Danish Veterinary and Food Administration www.fvst.dk. On the same webpage different pamphlets from the Danish Veterinary and Food Administration can be found.

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Insertion thermometers must come in direct contact with the product.

*Nyt billede MTLF.tif

Touch-free thermometer with infrared beam. The thermometer can show the temperature of the surface.

*1 Raw food

***foto

Whole pieces of meat usually only have microorganisms on the surface – not inside the meat.

*3 Raw meat

Meat originate from animals, and animals have a lot of microorganisms on the skin, in their mouth, nose and in the content of the intestines. During slaughtering and cleaning some of these microorganisms will be transferred to the rest of the meat. At room temperature it only takes a short amount of time before microorganisms form a layer of smelly slime on the surface of the meat. The pathogenic bacteria will also be present at a high number, but they can't be seen or smelled.

No bacteria are present inside a whole piece of meat. Bacteria are present on the surface of the meat, but at the moment a piece of meat is chopped in a machine or cut with a knife, the bacteria on the surface will spread to the entire meat. High hygiene – including cooling – is important when working with meat, especially with minced meat.

*4 Pork

Pork can among other things contain pathogenic bacteria such as for instance *Yersinia enterocolitica*, *Salmonella*, and in rare cases *Salmonella Typhimurium* DT 104 too, which is a multi resistant bacterium, that is resistant to a series of antibiotics. Pork can also contain several kinds of bacteria that decay the meat

*4 Beef

E. coli O157 and *Salmonella* are among some of the pathogenic bacteria found in beef, just as different kinds of decaying organisms can be present. BSE, mad-cow disease, is a brain ailment in cattle, which can be transferred to humans. BSE can not be inactivated when beef is prepared using heat. The disease can be registered at the slaughtering, after which the meat is discarded.

*3 Poultry

In poultry the following kinds of pathogenic bacteria can be present: *Campylobacter*, *Salmonella* and *S. Typhimurium* DT 104. Poultry must, in contrast to red meat, be washed when the bowels have been removed. The washing off contains blood and bowel remnants, but microorganisms can't be washed away. On the other hand cross contamination can occur, whereby the water used can transmit pathogenic microorganisms from one animal to another.

***foto

Egg containers can also spread bacteria.

*3 Egg

Freshly laid eggs rarely contain microorganisms in the yolk or the egg white themselves. But a lot of microorganisms can be found on the egg shell. The shell is porous, i.e. full of tiny holes, and from here the microorganisms from the outside of the shell can penetrate the shell, and get inside the egg itself. A thin layer of wax lies on the shell, designed to counteract this. If the eggs get moist, e.g. when moved from warmth to cold, the microorganisms will have an easier time penetrating the shell.

Due to the danger of salmonella, special laws are in place, especially governing the use of raw eggs: One has to use pasteurized, salmonella free egg products in all dishes not heated to 75°C.

*3 Raw fish

Naturally fish does not contain microorganisms in the fish meat itself, but many are found in the intestines and on the skin. Fish develops a smelly layer of slime very fast, because the microorganisms break down the meat at a very fast rate. The feared *Clostridium botulinum*, which is lethal, very rarely appears in Denmark. In addition fish can contain a parasite, the *Anisakis* larvae (also called Herring Worm). Parasites are killed by the most common ways of preparing, such as frying, boiling, grilling, warm curing, salting and marinating, such as for instance herring in Denmark. But there are a few traditional Danish ways to prepare fish, which do not kill the

parasites. This includes for instance light salting (of for instance matjesild) and graving. Therefore the demand that fish must be frozen in 24 hours at -20°C apply for these products.

Raw fish can of course also contain pathogenic bacteria and virus. It is however possible to limit this risk by using raw materials of a high hygienic quality. Fish must be kept on ice or at 2 °C and for no longer than 24 hours.

***fotos

The bacteria growing on fish are very resistant to cold. Therefore it is important to keep the fish at a very low temperature – preferably on ice and always below 2°C.

Fish for sushi is raw – and so it must always be frozen before consumed.

*3 Shellfish

Oysters consumed raw can contain norovirus. Shellfish can concentrate these viruses in the meat, if they have been living in contaminated water.

***Foto

The spore forming bacteria, *Bacillus cereus* and *Clostridium perfringens* can often be found on dirty vegetables. They will especially cause food poisoning in heat treated dishes, where the cooling down has been too slow, combined with an inadequate reheating.

*3 Vegetables

Vegetables grow in or on soil. Soil contains great amounts of microorganisms e.g. *Bacillus cereus* and *Clostridium perfringens*, that both form spores. The soil bacteria reside on the vegetables even if they have been washed. Vegetables by themselves are very resistant to microorganisms, but if their peel or shell is penetrated, or they are exposed to pressure and blows, the microorganisms will have an easier time penetrating and spoiling the product. It is important to keep vegetables and other kinds of foodstuff separated to minimize the risk of cross contamination.

*3 Fruits

***Foto.

It is always a good idea to rinse fresh fruits and berries with water before eating them.

Fruits have a low pH-value and are mostly attacked by mould that sits on the surface. To prolong the shelf life it is allowed to use chemical substances on fruits where you normally don't eat the peel. (Citrus fruits and bananas).

Virus can occur on berries, e.g. raspberries, strawberries, and blackberries. When stored in the sunlight and at 20°C the viruses are weakened. Due to that, fresh berries do normally not cause disease. But it is always a good idea to rinse fresh berries and fruits with water before eating them.

In that way you remove possible viruses and bacteria completely or in part.

Virus on frozen berries does on the other hand survive well while frozen. As a rule no virus should be found in frozen berries. But it's very difficult for the manufacturer to examine them. For vulnerable population groups, such as children, the elderly and the sick it is recommended to treat all kinds of frozen berries with heat before they are used in deserts or the like. The berries need to boil (bubble) for a minute. That way you can be sure that virus are killed.

***Foto

Bacterial spores can survive the drying of spices, and it is possible for them to germinate when used in dishes later.

*3 Spices

Most spices contain spores from soil bacteria such as *Bacillus cereus* and *Clostridium perfringens*. The bacteria spores will survive the drying, but when the spices are put into food, the spores can germinate under favorable conditions and can subsequently propagate and constitute a treat for the food safety.

*3 Herbs

Herbs such as parsley, basil and thyme contain earth bacteria such as *Bacillus cereus* and

Clostridium perfringens in large amounts

***foto.

Cold dishes with herbs and other vegetables must be stored in the refrigerator. Otherwise the soil bacteria will start reproduction.

*3 Corn, flour and grain.

Corn, flour and grain can contain spores from some of the soil bacteria that are found in the soil that plants have been growing in. As long as the products are dry the spores won't develop.

Consequently it is very important that they are stored in a dry storeroom. The moment fluid is added the spores can germinate. Especially at room temperature good growth conditions exist for the subsequent growth of bacteria.

If damp, poisonous mould can grow in corn-, flour- and grain products.

Small insects can also occur in flour- and grain products.

***foto

Flour can contain bacterial spores. When the flour is mixed with water or other moist types of food e.g. milk or meat, they will be able to germinate and develop into bacteria.

*1 Purchasing

Most businesses purchase both raw materials (raw meat, fish and poultry, eggs and so on) and semi-manufactured and whole-manufactured foodstuff (frozen vegetables, ready cold cuts, pre-roasted chickens, filets of fish coated in breadcrumbs and so on)

Everybody expect that the hygienic quality of the foodstuff is ok, when it arrives at the business.

But nobody can be really sure before a careful check has been performed. The hygienic control is most important when dealing with high risk food, but does also apply for non-high risk food.

Have the goods been transported in vehicles equipped with a cooling cabin? With a freezing cabin? Or does the vehicle have the same temperature as the surrounding air that is hot in the summer and cold in the winter?

***foto

Inspect the goods when they are received and discard the ones that haven't been stored properly during the transportation.

The goods must be stored properly during transportation. The surest way of all is to check the goods before unloading, or just after unloading.

It is crucial, that the goods have been transported at the right temperature, that the goods have been separated (to avoid cross contamination) and that the packaging has not been destroyed. High risk food that have been left without cooling for a longer period of time must be discarded or heated to 75 °C (also look later in this booklet).

***i ramme

Own-check when receiving goods:

- Measure the temperature of high risk food when unloading (see temperature diagram, page 19)
- Smell if the goods are fresh.
- Check that the good are separated – that no cross contamination has occurred.
- Check that the packaging is not broken, clean, bumped (cans).
- Check that the shelf date is not exceeded.

***ramme slut

*1 Own-check: When the goods are received.

The frozen and cooled goods must be put in place quickly. Some goods will enter processing directly and other goods must be put in the dry store, some in the cool room or the like.

***i ramme

The own-check:

- Avoid mixing different goods.
- Make sure that the temperature doesn't become too high.
- Distribute the goods quickly to the right places in the frost store, in the cold store and in the dry store.
- Avoid that the goods cross and thereby contaminate from one to the other.
- Don't bring dirty packaging into clean rooms.
- Defrost the frozen goods in a refrigerator and be sure to put them in a place where they can't drip on other goods.

***ramme slut

***tegning

This is not the way to fill a refrigerator! The raw chicken will drip and contaminate the rest of the contents of the refrigerator. Thawing must be done in closed containers.

*2 Refrigerators – cold stores

*3 Large cooling capacity

In a business with large cooling capacity, fish for example can be stored in one refrigerator/cold store, meat in another and finished products in a third. The temperature can be adapted, so that it fits whatever the refrigerator/cold store is used for.

If the cooling capacity is little and maybe only one refrigerator is available, it is important keep different kinds of food separated and covered. Furthermore it is also important to check the temperature often and to tidy up in old and new food.

No requirements exist concerning storage temperatures for fruit, vegetables, bread and margarine and so on. Thus these goods can be stored outside the refrigerator.

The lower the temperature is the longer shelf life is. Most foodstuffs require a maximum temperature of 5 °C, but exceptions to this rule exist, that you must know (see the diagram on temperature rules on page 19).

If you cool down hot food in a refrigerator/cold store, you must keep an eye on the temperature. The temperature must never exceed 5 °C. Possibly you may need a blast chiller or a special refrigerator/cold store for cooling down (see page 48 on cooling down).

The foodstuff must not be put directly against the wall. Good air circulation must exist. For this reason you must avoid to overload the refrigerator/cold store.

All foodstuffs must be covered.

***foto

In a retail business the same rules on storing in the cold and in the freezer applies as in a manufacturing company. The mandatory temperatures must be complied with – in open cooling and freezing basins too. On hot days extra attention is required to comply with these rules.

The customers must be able to see the temperature in both the closed and open cooling and freezing basins.

*3 Cleaning

Refrigerators and cold stores require very frequent cleaning. Order must be kept, it must be cleaned when needed and the cleaning could possibly be completed with disinfecting (see the paragraph on cleaning). One must be able to read the temperature of a refrigerator.

***i ramme

The own-check:

- You must control the temperature with regularly intervals.
- The goods must be placed separated from each other.
- The goods must be kept covered.
- Frequent cleaning and possibly disinfecting.

***ramme slut

*2 Freezing room - freezer

In a freezing room/freezer a temperature below -18 °C must be kept. Defrosting must be performed with regular intervals. A thick frost layer on the freezing unit can cause problems in keeping the temperature below the -18 °C.

Goods left for defrosting must always be put in a container, because "drippings" from a foodstuff that defrosts, contains bacteria and these must not be allowed to contaminate other types of food.

*2 Dry depot - dry storage.

In the dry storage adequate ventilation must exist to avoid humidity. Humidity gives potential for mould to develop in many of the goods.

There's a possibility that pests can invade a dry storage. Pests, frequently beetles, could be found in a lot of grain or flour and spread to other goods. It might be necessary to throw away large parts of the goods and call for professional help to exterminate the pests.

***Foto

A dry storage must be dry.

*1 Own-check: When the raw materials are prepared

*3 Raw meat

On raw/fresh meat the propagation of bacteria starts immediately, when the meat is moved to be cut or minced in the hot kitchen. Don't let the meat stay at room temperature longer than is absolutely necessary. It is crucial that you work on clean working surfaces/tables/cutting boards with clean hands and using clean knives.

*3 Raw poultry

Raw poultry poses the same problem. The risk of cross contamination of *Salmonella* and *Campylobacter* means that used kitchen utensils must pass through the dish washer, the work surfaces must be cleaned and possibly disinfected, and used cloths must be washed. Another possibility is to use paper instead of cloths.

*3 Raw fish

Raw fish must be prepared as fast as possible. Concerning the storing of fish, see page 33.

Concerning the serving of raw fish, see the paragraph "cold preparation", page 45.

*3 Minced meat and minced fish.

Minced meat, forcemeat and raw Danish pork sausage, as well as minced fish and fish pudding must as a rule be used at least 24 hours after mincing.

In some cases these foodstuffs can be sold with a shelf life longer than 24 hours.

***foto

Note: The minced meat must be stored at 2 °C.

If it is stored at ordinary refrigerator temperature, the meat must be used within 24 hours.

In these cases the Danish Veterinary and Food Administration has provided the business selling minced meat with a special approval. The approval has been given because the business has accomplished a number of extra own-check demands and because documentation exist that the determined microbiological threshold value is complied with

***foto

The bacteria from the surface spread in all the meat during mincing. Make sure that mince machines and other equipment do not contain bacteria from previous work. Minced meat should be cooked thoroughly.

*3 Raw vegetables and spices

Raw vegetables must be cleaned in a separate room or in a separate sink.

Keep vegetables separate from all other goods – at receiving, during storing, during cleaning and during cutting.

Spices will always add many bacteria to the dish. When vegetables and spices are mixed with meat, poultry or fish, for instance for minced meat, then mix the contents as late as possible before frying or cooking. That is: Store spiced raw materials in the cold and for a short period of time.

***foto

Carving/mincing/cutting must take place in the vegetable room or on a table that is used solely for vegetables.

***i ramme

The own-check:

- Take out meat, poultry and fish from the cold store as close to the preparation time as possible.
- Use clean kitchen utensils and clean hands.
- Keep raw meat, poultry and fish separated from the vegetables, the already prepared dishes and the cold cuts.
- Minced meat and raw fish must be used within 24hours after mincing.

- Be extraordinary aware that when these foodstuffs are mixed with for instance chopped onions, parsley, spices and eggs, new bacteria will be added at the same time.
- Cook meat, poultry and fish quickly after it has been prepared for the cooking.
- Disinfect used kitchen utensils in the dish washer, with boiling water or by the use of chemical disinfectants (see the paragraph on cleaning).

*3 Eggs

If eggs are served raw or only heated a little bit like in a Danish omelette, an omelette, sauces containing eggs, raw custard, ice cream or cold buttermilk soup, pasteurized eggs must be used instead of eggs directly from their shells.

Pasteurized eggs have been given a heat treatment, so that they do not contain salmonella bacteria.

Eggs directly from their shells are only allowed for dishes that have been heated to 75 °C, for example minced meat, pancakes, gratin, hard-boiled eggs and other dishes,

***foto

Pasteurized egg products are sold as yolks, white and whole eggs. They are either added salt or sugar. They are sold frozen as well as refrigerated. If they are sold refrigerated they must be stored at maximally 5 °C. If they are sold frozen they must be stored at maximally -12 °C.

***i ramme

Own-check by the use of eggs:

- Wash your hands thoroughly after touching the egg shell.
- Remove shells and egg tray from the table. Egg trays must not be reused for other purposes.
- Clean the table, possibly disinfect it.
- Make sure the cloths are washed or use paper.

***ramme slut

*1 Own-check: Heat treatment.

Food can be heat treated in many ways:

- By boiling and steaming in a casserole, in the oven or in the microwave oven.
- By roasting in the oven, on a frying pan, in deep fat or by grilling with grill elements, charcoal or other.

Lack of heat treatment is one of the most common reasons for food born disease.

***i ramme

Raw materials that are heat treated must always reach a temperature of at least 75 °C in the centre too.

A cooled or frozen ready to eat dish, which is reheated must also in all places of the dish reach a temperature of 75 °C ***ramme slut

Possibility exists to use another heat treatment method if the business is able to document that the finished product does not pose a danger to health. This could for example be long term frying where time and temperature are combined in a controlled way.

***i ramme

At 75 °C all bacteria are killed. But remember: The bacteria spores are still present.

Note: Even if the pot bubbles heavily you can not be sure that the temperature has reached 75 °C.

***ramme slut

***foto

The meat balls must be cooked thoroughly when they are done, so that the temperature everywhere is at least 75 °C.

*3 Seasoning of the food

Remember that the last seasoning with spices must take place while the food is still at least 75 °C.

*3 Microwave oven

During the use of microwave oven you must remember that large variations in how fast the food is heated exist. Different temperatures in the same dish can be found within only a few centimetres.

Use the thermometer as a control.

*3 Döner Kebab

The frozen Döner Kebab is put on the skewer directly. The meat (Shawarma) which is cut from a Döner Kebab must be heated to at least 75 °C as everything else.

A skewer must be cut completely on the same day it was put up. The skewer must not be dismantled and put in cold store until the next day. If remnants exist at closing hour it must be cut into pieces at 75 °C and next the pieces can be cooled down in a sound way.

***Foto

Döner Kebab (5-20 kg) is produced from slices of meat/minced meat from calf, ox, chicken and (more rarely) lamb. The meat has had spices added and is possibly marinated in yoghurt and then stacked around a tube end frozen.

***i ramme

The own-check:

Be absolutely sure that the temperature of the food has exceeded 75 °C, in the middle too.

Measure with a thermometer if any doubt exists.

***ramme slut

***foto

Use a thermometer to control that the temperature is at least 75 °C in all parts of the foodstuff.

*3 Exceptions from the rule

Exceptions from the requirement on heat treatment to 75 °C

- Whole pieces of meat, where tradition exists of servings of red or rose meat, for example roast beef.

- Single servings of pieces of meat, where thoroughly cooking is not wished for, for example beefsteak
- Single servings of eggs for example fried egg and soft-boiled egg.
- Foodstuff containing eggs, when pasteurized eggs are used.

***fotos

In serving a soft-boiled egg, the rule on heat treatment to 75 °C is dispensed with. Exceptions apply because the individual consumer on a conscious level can choose a dish that may constitute a risk. The customer eats these dishes at their own responsibility. Exceptions from the requirement may also occur if the business is able to provide documentation that a lower temperature could be used without any danger to health.

*1 Own-check: Cold food

*2 Cold cuts

Salted, cured and boiled meat products, for example cold cuts are often provided in a vacuum packaging. When the vacuum packaging is broken a change in durability takes place. The change takes place because now ordinary (atmospheric) air surrounds the cold cuts. Moreover it is easy to add new bacteria to the food from hands and slicing machine. The new durability must be evaluated by the employee and written on the packaging.

***3 fotos

1) At the carving on the slicing machine you must make sure that bacteria are not transferred from one cold cut to another cold cut.

2 and 3) If colonies of bacteria grows on the stick the machine wasn't properly cleaned.

*2 Cold servings

When preparing cold open faced sandwiches, burger buns, pitas, sandwiches and sausage servings it is almost impossible to avoid the occurrence of a contamination. Cold dishes are mostly composed of many different raw materials, both vegetables (salad, herbs, cress), cold cuts (ham, scrims, cold fish, roast beef, pork loin) and decoration (mayonnaise, dressing, remoulade). To mix different raw materials, such as salad and herbs with cold cuts and with mayonnaise/dressing is per se critical. It is especially critical when the temperature exceeds 5 °C and this is almost always the case in a kitchen.

If you change from one kind of work to another without washing your hands you will spread the bacteria all over the kitchen.

In short terms: Cold cuts like this can develop into absolute bacteria bombs!

***i ramme

As a rule foodstuff should not be kept without cooling for more than 3 hours, this includes the time spend on service and handling.

***ramme slut

***i ramme

The own-check:

- Preparation should be done as close to the time of eating as possible.
- Store the goods as cold as possible during and at after the work being done.
- Use clean kitchen utensils and clean hands
- Clean tables and cutting boards often.
- Use paper instead of cloths.

***ramme slut

*2 Retailing

When a whole piece of meat is cut for retailing, a box of cured herring is re-packed 2 and 2, liver paste and pâté are cut and re-packed, the situation is exactly the same. It is the temperature, the cleanness of the kitchen utensils and your hands that are the critical points.

***foto

If open sandwiches and salads are not handled with high hygiene, these are absolute bacteria bombs.

**i ramme

The own-check:

- Keep the goods separated during production.
- Keep the foodstuff as cool as possible during processing.
- Keep the slicing machine as clean as possible; take care not to transfer bacteria from the slicing machine to the cold cuts.

- Store the packaging in a clean place, so as not to introduce new microorganisms during packaging
- Wash your hand frequently.
- Clean the working area and wash the cutting boards and the kitchen utensils in the dish washer frequently.

**ramme slut

*2 Cakes and desserts.

Dishes as mousse, raw custard and ice cream are not heated to 75 °C. Thus only pasteurized eggs must be used – never use eggs directly from their shells for the sake of the salmonella bacteria.

If a dish contains boiled custard, the dish must be cooled down as soon as possible.

***Foto

Cakes and desserts containing eggs, custard and whipped cream hold many critical points.

***i ramme

Cakes containing whipped cream, mousses and other desserts like this must always be stored at 5 °C as a rule, but they can be stored at 10 °C if sold within 12 hours.

***ramme slut

*2 Raw fish and shell fish

It is standard practice to serve certain dishes of raw fish This for example apply to gravad salmon, lightly marinated fish and sushi. Parasites can often be found in the meat of raw fish. These parasites are harmful to humans. That's why fish must be frozen for 24 hours at -20 °C before it is prepared and served.

The parasites will also be killed by heavy salting and by the influence of acid, as is the case with the preparation of for example salted herring and pickled herring. It might take a week though before this takes effect. A common preparation as with lemon and a little salt is not enough and cold curing is not enough either. That's why fish must be frozen for 24 hours at -20 °C if you want to serve it raw as in the dishes mentioned above.

*foto

Pickled herring is heavily salted and influenced by acid and thus any parasites are dead.

Shell fish can accumulate a virus, which may cause disease when they are eaten raw. Raw shell fish are thus eaten at the customers own responsibility.

*+ svarlinjer til det følgende, få det til at passe med en side+

*2 Questions

1. Pieces of custard pie and other cakes containing whipped cream are sold from a cold counter, where the temperature is 8 °C. For how many hours is it allowed to sell these cakes?
2. Pineapple custard and Danish rice pudding with almonds are prepared on a Saturday morning and stored in the refrigerator at 5 °C. For how long can these desserts be sold/served?
3. A retailer has been slicing and packing smoked saddle of pork in packages of 100 g. They are stored in the shop in the refrigerated display counter at a maximum temperature of 5 °C. A date of the maximum duration must be shown on the packaging.

Who should determine this date?

4. Open sandwiches, sandwich with chicken salad and burgers with cold cuts are made in the morning and put in the cold store at 5 °C.

At lunch time it is put on a canteen counter without cooling. It is left there for 1 ½ hours for the customers to help themselves.

Is it allowed to put leftovers in the refrigerator and serve the same food again in the afternoon?

5. A serving of sushi can only be prepared from frozen fish. Why?
6. A salmon cut in thin slices are to be marinated with lemon, lime, salt and pepper. Is it allowed to use a freshly caught salmon?

7. Is it allowed to:

- Serve rose roast of veal? _____
- Serve red beefsteak? _____
- Serve soft-boiled eggs? _____
- Serve raw custard (cream, sugar, vanilla, eggs from the shell)? _____
- Serve pound cake (eggs from the shell, sugar, margarine, flour, backing powder)? _____

8. State 2 critical points in a dish made of beef, carrots, leeks, spices and water.

What would you do to avoid that the food becomes disease-promoting at these 2 critical points?

How would you control the 2 critical points?

9. You are to make a chicken salad. The chickens must be boiled, carved and mixed with mayonnaise and spices.

State 2 critical points.

How would you control the 2 critical points?

10. You are to make homemade ice cream from double cream, egg yolks, sugar and vanilla.

State 2 critical points.

How would you control the 2 critical points?

1 side

*1 Cooling down

Many heat treated foodstuffs are cooled down immediately after the preparation:

- Cold cuts such as ham, rolled seasoned meat, chicken sausage, pork loin, roast beef, salty meat.
- Many different kinds of sausages.
- Food for senior citizens living at home.
- Many cooled dishes sold from retail businesses.
- Stocks, sauces and soups that are cooled for later use.

***i ramme

Cooling down after heat treatment must take place in such a way that the temperature range from 65 to 10 °C is passed as quickly as possible and preferably within 3 hours.

Afterwards the food must be stored in the refrigerator at a maximum of 5 °C, covered up and separated from other foodstuff.

***ramme slut

Other combinations of time/temperature might possibly be applicable. The business must be able to document through their own-check program, that the applied cooling procedure does not entail danger to health.

***Foto

In any case it is a good idea to divide the portions in smaller, thin layers, because then the cooling will take place as quickly as possible.

If large portions are to be cooled down, it is necessary to use a blastchiller. Divide the food into small portions with an appropriate layer thickness. By experimenting you will find out what is manageable for the cooling capacity in the production facility in question.

Cooling down with ordinary water requires very large amounts of water and a special authorization. Cooling in water containing ice is an effective but time consuming way of cooling.

*3 Portioning and packaging.

It is often planned by the business that exactly the cooled food (cold cuts, ready to eat meals and other) must have durability as long as several weeks. If food is designed for a long durability strict surveillance and own-check is necessary.

Large portions of cooled food is often portioned and packaged on a production line. The entire process must be controlled.

***i ramme

The own-check:

- Cool down fast (to avoid germination of spores with subsequent propagation of bacteria).
- Maintain a high standard of cleaning for containers, serving tools and other things coming into contact with the food.
- Maintain a high standard of hygiene in handling the packaging.
- Maintain a high personal hygiene – no sick employees.
- Make sure that the storage temperature does not exceed 5 °C.

***ramme slut

*1 Hot-holding

Often there is a need to keep heat treated food hot for a certain period of time. This for example applies to:

- Food being delivered for senior citizens living at home.
- Food being delivered as diner transportable.
- At a buffet.
- In a hot water basin / bain marie.
- “Take away” food.

***i ramme

The hot-holding must take place at least at 65 °C.

You must decide the time period yourself.

The own-check program must specify how leftovers are handled. Leftovers from food that has been kept hot can normally not be cooled for later use. Usually qualitative changes will take place that renders the food unfit for human consumption.

Reuse is allowed though, if the food is reheated to 75 °C.

***ramme slut

If the temperature drops below 65 °C, a possibility exist that the spores germinate with subsequent propagation of bacteria as a result. Recontamination with bacteria from the dish, from the salad decoration or from the persons providing themselves with the food, can occur.

To keep the temperature at 65 °C, heat can be supplied from a bain marie or another kind of heat unit. The food could also be portioned very hot and packaged in an isolating material.

***foto

The heat unit and the hot water basin must ensure that the food is kept warm at a minimum of 65 °C.

***i ramme

The own-check:

- Measure frequently that the temperature is kept at least at 65 °C.

***ramme slut

*1 Service and serving

When food is being served at room temperature on a buffet or on a canteen/café counter many critical points exist:

- The temperature of the room is often high.
- The customers will come close to the food.
- Raw materials and prepared courses may exist in the same service.
- Very often decorations containing soil bacteria are used.

***i ramme

As a rule foodstuff should not be situated outside the refrigerator for more than 3 hours, this includes the time for servicing and handling.

In dealing with buffets it is good hygienic practice to specifically make up your mind as to how long the duration time is without cooling for the specific foodstuffs.

If the evaluation implies that it is reasonable to keep a foodstuff without cooling for more than 3 hours, documentation should exist to prove this.

As a main rule leftovers must be discharged. Leftovers from certain types of foodstuff can be reused, if they receive a heat treatment that secures that they do not constitute a health risk. Thus you must make sure that the keeping ahead of the heat treatment haven't loaded the food with microorganisms.

***ramme slut

***Foto

Tongs, spoons or the like must be available for each dish. The food must be protected as well as possible against the introduction of new bacteria from other sources.

For example slices of ham must not be used for a ham salad after it has been left on a buffet. But the ham could be used in a pizza which is heated to 75 °C. Dishes not fit for reheating must be discharged.

***i ramme

The own-check:

- The food must be protected in the best possible way against contamination arising from the costumers.
- Avoid putting too big quantities of food at the buffet at the same time.
- Avoid replenishing "new" food on top of "old" food.
- Avoid putting leftovers back in a container, for instance remoulade.
- As a rule food that has been left in a customer area must be discharged.

***ramme slut

**fotos

Avoid replenishing "new" food on top of "old" food!

*1 Questions

1. Is it allowed to use leftover potatoes for a cold potato salad?
2. Is it allowed to use leftover potatoes for a hot potato salad, hash and the like?
3. 5 Vegetable pies that the customers are supposed to cut themselves are put on an ordinary table. For how long is it allowed to leave them here?
4. Is it allowed to reuse leftovers from e.g. a hot stew dishes after heating these to a minimum of 75 °C?
5. Is it allowed to use leftovers from raw cut fruit and vegetables from a salad buffet?
6. You have fried 3 kg of meat balls, that you want to use as cold cuts the next day. State 2 critical points regarding the meat balls.
What are you planning to do to avoid, that the meat balls become a disease-promoting? How would you control the 2 critical points?

7. In the heating counter you have put liver paste in trays, pork loin with crackling, rose roast beef and tenderloin with softly fried onions. The temperature is 70 °C. For how long can you leave the dishes at this temperature?

Is it allowed to use the pork loin for open sandwiches the next day?

8. You buy and bring raw meat and poultry yourself to feed the nursery.

State 3 critical points.

How would you control the critical points?

*1 Maintenance

As a part of the own-check premises and equipment must be kept in a good condition.

The maintenance should take place in areas, which could be the reason of poor hygiene and should promote the hygienic efforts. As examples of areas of maintenance addressed by the own-check program the following may be mentioned:

- Paint that is peeling off, broken tiles, leaking doors and so on.
- Controlling the temperature of the water of the dish washer (80 °C) and if necessary perform technical service.
- Controlling the temperature of the refrigerator and if necessary perform technical service.
- Controlling the exhaust capacity of ventilators and if necessary do a follow up cleaning.
- Checking the state of kitchen utensils, for instance scratched cutting boards, worn wood utensils (splinters), corroded aluminium equipment.
- Protection against pests.

**foto

Maintenance includes both premises and equipment. The cutting board must be planed off, when deep scratch occurs.

*1 Cleaning and disinfecting

Proper cleaning plays a major role to the hygienic quality of the food. By the end of a work day, or perhaps several times a day, all food scraps and other dirt must be removed by means of an effective cleaning of the premises. If food scraps are left on tabletops, kitchen utensils, machines, floors and so on, the microorganisms will propagate. Kitchen utensils, machines, the goods in dry storage and cold storage must be arranged so that cleaning is possible. When buying new equipment you have to consider both if it works properly but also if the equipment is easy to clean.

*3 Water

The most important thing during cleaning is water. Ordinary cold water is the best choice for cleaning dough bowls and tables, where dough has been kneaded. But water alone is not always sufficient. For example water can not dissolve grease films, so for this purpose you have to use cleaning agents as well.

***fotos

Cleaning must be performed carefully. Everywhere.

*3 Cleaning agents

Cleaning agents are produced for many purposes and have different contents and strength. The most powerful cleaning agents will remove the dirt in the quickest and easiest way and it might be necessary to use these for example for films in ovens. However the most powerful cleaning agents have the disadvantage that they are harmful to both the people working with them and to the environment. All cleaning agents degrease the skin and the most powerful ones are the most degreasing. Moreover it could cause health problems to inhale the fumes from the cleaning agents. That's why you should never use a more powerful agent than necessary. The cleaning agent must fit the task. If you use a relatively weak agent maybe you have to use a longer time for effect to take place and more power ("elbow grease") to reach the same result.

No remains of cleaning agents must be left on surfaces, which come in direct contact with the food. That is why you must rinse with clean water on all surfaces, which come in direct contact with the food. The cleaning agents must be stored separate from the food.

*3 Dosing

To overdose constitutes a big mistake that is if you add more cleaning agent than it is necessary for the task. It is economically unsound, but it also destroys the environment and inventory. Dosing equipment exist, which might be of use for the correct dosing.

Instruction manuals exist for all cleaning agents; here you can study how much cleaning agent must be dosed for a given amount of water. Large variations exist from brand to brand, according to the concentration and contents of the agent.

Often both an upper and a lower limit for dosing are recommended.

- The upper limit is used when the lime content of the water is high and the location is very dirty.
- The lower limit is used when the lime content of the water is low and the location is not very dirty.

***i ramme

The cleaning agents must not be mixed. Poisonous chlorine fumes will develop if chlorine and acid containing cleaning agents are mixed.

***ramme slut

The person doing the cleaning must know both the lime contents of the water and be able to evaluate how dirty the works that must be done is, to be able to determine the precise dosing.

3 Methods

Effective cleaning equipment exist on the market for any task, for example 2- bucket systems, equipment for high-pressure cleaning, for laying out foam, for scrubbing of floors, for steam

cleaning and continually development of new remedies and methods takes place. From one business to another different methods are used, these will not be mentioned here.

***i ramme

Water for cleaning is meant to loosen the dirt.

Clean water is meant for rinsing afterwards.

***ramme slut

A key point is that you do not transfer microorganisms from one place to another during the cleaning, neither from dirty water nor from dirty working clothes. The cloths, brushes, cleaning sponges or other tools used for cleaning must also be clean.

To avoid transferring disease promoting microorganisms use different colours of cloths and utensils, for example red for toilet areas, blue for areas containing many soil bacteria, white where meat, fish and other exposed foods are handled, and yellow for disinfection.

During the production itself avoid cloths and use paper instead.

*3 wiping off

Wiping off is not necessary for hygienic reasons, but a layer of lime may deposit, when water is allowed to evaporate by its own time after time. That's why many prefer to wipe of the water in the end. A clean wiper or a clean cloth/dishcloth is appropriate. But it must be clean. If we add dirt during wiping off we are back to where we started.

*3 Heat disinfecting

An important disinfecting process takes place in the dish washer. The legislation demands that the water in the dish washer reaches a temperature of at least 80 °C. You have to control this temperature regularly with a thermometer. All equipment that tolerates dish washing must be passed through the dish washer. This is the best and most effective way of disinfecting.

***foto

Heat disinfection. The dish washer disinfects quickly and effectively.

***foto

Chemical disinfection. It takes about 10 minutes to fight off the microorganisms by disinfecting.

* 3 Chemical disinfection.

It is not possible to wash all equipment in the dish washer, for example a slicing machine, equipment like stirring kettles, because they are too big, and knives, meat mincer and other stuff made from aluminium, because the materials could be destroyed. Equipment like this and tables comes in direct contact with the food, and thus it might be necessary to use chemical disinfection. It is especially necessary if the same place is used for different raw materials one just after the other. Chemical disinfecting can only be used on clean surfaces. The effect of the disinfectant is lost on a dirty surface and the work is wasted. Common to the disinfectants are that they need time to take effect. It takes about 10 minutes to fight off the microorganisms by disinfecting. If you wash off the disinfectant just after applying it, it doesn't take effect as intended.

All disinfectants are harmful to the environment and most are not healthy to work with, thus chemical disinfection must only be used in places where it is needed.

Only chemical disinfectants approved by the Danish Veterinary and Food Administration are allowed.

As an alternative to chemical disinfection boiling water can be used if the conditions including the safety allows for it.

*1 Personal hygiene

Every employee must come to work clean from the inside and out.

People have bacteria on their entire body. The largest concentration of bacteria is found where sweat is produced. Large concentrations of bacteria are also found in the throat and mouth. But especially faeces contain many and often very dangerous bacteria.

Bacteria from a human being seldom harm the person himself. But if bacteria spread to the food you are working with, the pathogenic bacteria could propagate in the food to a critical level.

***foto

The working clothes must be washed often and therefore it should preferably be of an easy washable quality.

*2 Clothing

*3 Pieces of jewellery, bracelets and watches.

Pieces of jewellery, bracelets and watches must be removed during work. A lot of microorganisms can hide in pieces of jewellery.

*3 The work clothes

The work clothes are an important part of the personal hygiene. The work clothes should be comfortable for working and should be able to adjust the temperature of the body.

Different kinds of food businesses have different demands on the personal hygiene and the staffs clothing. The working clothes must be kept clean. Normally it must be changed every day or more frequently, depending on the nature of the work.

Panels are a part of the work clothes for many employees. If the panel is used for many purposes, for example to keep things warm, to dry your hands, to wipe off the kitchen utensils, to wipe off the work place, the panel could be as big a bacteria spreader as your hands.

***foto

Headgear, which covers the hair totally or in part, is a requirement in some businesses.

*3 Sick people

Sick people are not allowed to work with food, if the disease can spread through food, for example contagious stomach/throat diseases, hepatitis, salmonellosis and other. A person can transmit disease without knowing – be a so-called disease carrier without disease symptoms.

You have a duty yourself to tell your supervisor if you have a contagious disease, if you know this. The supervisor must then inform the Food Region.

It is recommended that kitchen staff with a gastrointestinal infection must be given a sick note until 48 hours after the symptoms have ceased. Kitchen staff taking care of sick children or others with gastrointestinal infections is recommended to be most careful when it comes to hygiene.

* 3 Wounds and so on.

People with open wounds, scratches, inflamed fingers or abscesses are not allowed to work with food. Inflammation contains a high concentration of disease promoting bacteria – which goes for the inflammation found on the skin of the neck and face too, when you suffer from impure skin. In every case you have to evaluate if for example using gloves will provide ample protection.

**Foto

Washing your hands is the most important thing in personal hygiene. Yes to wash your hands thoroughly and often is clearly one of the most important routines in a foodstuff business.

*3 The hands

With our hands we can move bacteria from one place to the other. We use our hands for many things: We are working with soil, with fish and meat, carry out the trash, go to the toilet, cough and sneeze in our hands and many other things.

***1 ramme

Always wash your hands:

- Before commencing work.
- If you have touched your face or adjusted your hair.
- If you have been coughing or sneezing.
- After you went to the toilet.
- When you change from one raw material to another.
- When you change between raw materials and ready products.

This is how you should do it:

- Wet your hands and take the soap from the soap automate.
- Work the skin for 10-15 seconds – remember your wrists and between your fingers.
- Rinse your hands thoroughly with water.
- Wipe your hands off with paper – use the same piece of paper to turn off the tap (possibly also to open the door).

***ramme slut

When gloves are used, they must be washed just as often as your hands.

***1 ramme

The own-check:

- High personal hygiene.
- Clean working clothes.
- Proper hand washing habits.
- Pay attention to scratches, wounds and abscesses.
- Standard health.

***ramme slut

*2 Questions

1. What are proper working clothes from a hygienic point of view?
2. How often must clothes be changed?
3. What if an employee has an infected wound or a festered finger?
4. Is it allowed to work with a small scratch on your hand?
5. What should you do if a colleague often comes to work with greasy hair?
6. Should you use soap every time you wash your hands, or is it enough to rinse them with water?
7. Why is it not allowed to taste the food using your finger?
8. You discover that one of your colleagues doesn't wash his hands after he has been to the toilet. What would you do?
9. How should you cope with a sudden coughing fit?
10. Is it possible to disinfect the dish washer?
11. What are the advantages of a week cleaning agent?
12. Why must chemical disinfecting take place on clean surfaces?
13. For how long must a chemical disinfectant be allowed to take effect?
14. You have to clean a kitchen with water, cleaning agent and cloths. State 2 critical points in the cleaning process.

How would you control the critical points?

Extracts from legislation

REGULATION (EC) No 853/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on the hygiene of foodstuffs.
(Regulation on hygiene)

Chapter VIII

Personal hygiene

1. Every person working in a food-handling area is to maintain a high degree of personal cleanliness and is to wear suitable, clean and, where necessary, protective clothing.
2. No person suffering from, or being a carrier of a disease likely to be transmitted through food or afflicted, for example, with infected wounds, skin infections, sores or diarrhoea is to be permitted to handle food or enter any food-handling area in any capacity if there is any likelihood of direct or indirect contamination. Any person so affected and employed in a food business and who is likely to come into contact with food is to report immediately the illness or symptoms, and if possible their causes, to the food business operator.

Chapter IX

Provisions applicable to foodstuffs

1. A food business operator is not to accept raw materials or ingredients, other than live animals, or any other material used in processing products, if they are known to be, or might reasonably be expected to be, contaminated with parasites, pathogenic microorganisms or toxic, decomposed or foreign substances to such an extent that, even after the food business operator had hygienically applied normal sorting and/or preparatory or processing procedures, the final product would be unfit for human consumption.
2. Raw materials and all ingredients stored in a food business are to be kept in appropriate conditions designed to prevent harmful deterioration and protect them from contamination.
25.6.2004 EN Official Journal of the European Union L 226/19
3. At all stages of production, processing and distribution, food is to be protected against any contamination likely to render the food unfit for human consumption, injurious to health or contaminated in such a way that it would be unreasonable to expect it to be consumed in that state.
4. Adequate procedures are to be in place to control pests. Adequate procedures are also to be in place to prevent domestic animals from having access to places where food is prepared, handled or stored (or, where the competent authority so permits in special cases, to prevent such access from resulting in contamination).
5. Raw materials, ingredients, intermediate products and finished products likely to support the reproduction of pathogenic micro-organisms or the formation of toxins are not to be kept at temperatures that might result in a risk to health.
The cold chain is not to be interrupted. However, limited periods outside temperature control are permitted, to accommodate the practicalities of handling during preparation, transport, storage, display and service of food, provided that it does not result in a risk to health. Food businesses manufacturing, handling and wrapping processed foodstuffs are to have suitable rooms, large enough for the separate storage of raw materials from processed material and sufficient separate refrigerated storage.
6. Where foodstuffs are to be held or served at chilled temperatures they are to be cooled as quickly

as possible following the heat-processing stage, or final preparation stage if no heat process is applied, to a temperature which does not result in a risk to health.

7. The thawing of foodstuffs is to be undertaken in such a way as to minimise the risk of growth of pathogenic microorganisms or the formation of toxins in the foods. During thawing, foods are to be subjected to temperatures that would not result in a risk to health. Where run-off liquid from the thawing process may present a risk to health it is to be adequately drained. Following thawing, food is to be handled in such a manner as to minimise the risk of growth of pathogenic microorganisms or the formation of toxins.

8. Hazardous and/or inedible substances, including animal feed, are to be adequately labelled and stored in separate and secure containers.

Order no. 788 of 24th July 2008

(Order on hygiene)

Chapter 9

Temperature regulations

§ 20. This chapter applies to storage, transportation and heat treatment of foodstuffs in all foodstuff businesses; unless other regulations determine particular temperature demands for a foodstuff.

§ 21. Foodstuff must be stored and transported at temperatures, which secure that the foodstuff by ordinary use, are not harmful to health or of other reason unfit for human consumption.

§ 22. If there in connection with labelling of the foodstuff is stated a storage temperature, this temperature must secure compliance of § 21, and the stated temperature must be complied with during storage and transportation, with reference to sub-section 2 and 3 and § 23.

Sub-section 2. Regardless the demand in sub-section 1 the business are allowed to transport foodstuff directly to the final consumer, without having to comply with the storage temperature, which are indicated on the single foodstuffs, when the business secures that the transportation not give rise to foodstuff safety problems.

§ 23. During storage and transportation of the foodstuffs the temperature and the time limits mentioned in appendix 3 opposite the particular foodstuffs must not be exceeded, cf. § 20.

The temperatures stated in the appendix must be complied with, regardless of a higher storage temperature stated in connection with the labelling of the foodstuff.

Heat treatment

§ 24. In heat treating and reheating of foodstuff, the whole material must be heated to a temperature of least 75 °C.

Sub-section 2. However this does not apply to:

- 1) Dairy products, which are heat treated in compliance with § 14.
- 2) If the business are able to document, that another heat treatment not imply any danger to health.
- 3) Serving portions of meat that the customer does not want cooked thoroughly.
- 4) Serving of individual hen's eggs
- 5) Treatment of other foodstuff, which because of the nature of the foodstuff can not be heated or reheated to at least 75 °C, and where the heating or reheating to a lower temperature does not imply any danger to health.

§ 25. Regarding egg-containing foodstuff, the entire foodstuff must be heat treated to at least 75 °C, unless pasteurised egg products are used.

Hot holding

§ 26. Heat treated foodstuff in retail businesses can be kept hot, if the temperature in the entire foodstuff is kept at least at 65 °C.

REGULATION (EC) No 852/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on the hygiene of foodstuffs
(Regulation on hygiene)

Article 5

Hazard analysis and critical control points

1. Food business operators shall put in place, implement and maintain a permanent procedure or procedures based on the HACCP principles.

2. The HACCP principles referred to in paragraph 1 consist of the following:

(a) identifying any hazards that must be prevented, eliminated or reduced to acceptable levels;

(b) identifying the critical control points at the step or steps at which control is essential to prevent or eliminate a hazard or to reduce it to acceptable levels;

(c) establishing critical limits at critical control points which separate acceptability from unacceptability for the prevention, elimination or reduction of identified hazards;

(d) establishing and implementing effective monitoring procedures at critical control points;

(e) establishing corrective actions when monitoring indicates that a critical control point is not under control;

(f) establishing procedures, which shall be carried out regularly, to verify that the measures outlined in subparagraphs (a) to (e) are working effectively;

and

(g) establishing documents and records commensurate with the nature and size of the food business to demonstrate the effective application of the measures outlined in subparagraphs (a) to (f).

When any modification is made in the product, process, or any step, food business operators shall review the procedure and make the necessary changes to it.

3. Paragraph 1 shall apply only to food business operators carrying out any stage of production, processing and distribution of food after primary production and those associated operations listed in Annex I.

4. Food business operators shall:

(a) provide the competent authority with evidence of their compliance with paragraph 1 in the manner that the competent authority requires, taking account of the nature and size of the food business;

(b) ensure that any documents describing the procedures developed in accordance with this Article are up-to-date at all times;

(c) retain any other documents and records for an appropriate period.

5. Detailed arrangements for the implementation of this Article may be laid down in accordance with the procedure referred to in Article 14(2). Such arrangements may facilitate the implementation of this Article by certain food business operators, in particular by providing for the use of procedures set out in guides for the application of HACCP principles, in order to comply with paragraph 1. Such arrangements may also specify the period during which food business operators shall retain documents and records in accordance with paragraph 4(c).

Order no. 123 of 15th February 2008

(Order on education)

Education

§ 2. The person responsible for a foodstuff business covered by this order, must secure that people that treat foodstuff completes education with certificate on food hygiene, which are established in accordance with the legislation concerning the labour market educations, with reference to sub-section 2 and § 3.

Sub-section 2. People, who treat a reduced product range, where the raw materials and the handling are of a nature, that makes the health risk by handling and serving limited, could instead of the education mentioned in sub-section 1, complete a basic education in food hygiene, established by the Danish Veterinary and Food Administration, cf. § 4.

§ 3. The demand mentioned in § 2 does not apply to people, which

- 1) are under 18 years,
- 2) exclusively treats foodstuff, which are not associated with hygienic problems.,
- 3) exclusively treats foodstuff in foodstuff businesses, which serves at the most 12 regular guests for eating., for example canteen business, boarding houses, institutions and the like.
- 4) exclusively treats foodstuff in foodstuff businesses, which serve breakfast in connection with overnight stays, when number of guests do not exceed 12 people,
- 5) have completed an education within the foodstuff area or have participated in a course in food hygiene at least at the same level as mentioned in § 2, sub-section. 1, or
- 6) are employed in or have established a foodstuff business before January 1st 1997, as long as subsequent employment or establishment of another foodstuff business does not take place.

§ 5. The mentioned education in § 2 must be commenced at the latest 2 months after employment or establishment. People, which not until after the employment or establishment turn 18, must at the latest 2 months after they turn 18 have commenced the education mentioned in § 2.

Sub-section 2. The Food Region can authorize in particular cases, that the education has not been commenced within the deadline of two months mentioned in sub-section 1.

§ 6. The Danish Veterinary and Food Administration can, after an application, approve places of education, that establishes education on food hygiene, as a replacement for the educations mentioned in § 2, sub-section. 1.

Sub-section 2. The education must comprise:

- 1) own-check, covering critical control points and supervision procedures,
- 2) general microbiology, covering food-borne diseases,
- 3) hygiene principles, covering cleaning, personal hygiene, and treatment and storage of foodstuff and
- 4) the foodstuff legislation and the function of the Food Regions.

List of terms

Aerobic bacteria

- Bacteria, which needs oxygen to propagate.

After contamination

- Contamination of a foodstuff after it has been produced.

Agar

- Growth medium, based on bouillon, for the propagation of bacteria in Petri dishes.

Anerobic bacteria

- Bacteria, which needs an oxygen free environment to propagate.

Antibiotics

- Medicine, which kills bacteria, for example penicillin.

Antibodies

- Substances, which are produced in the body for protection against diseases.

Apathogenic

- Not pathogenic.

Autoclave

- A container/pot used for heating under pressure. The lid can be tightened completely.

Authorise

- To approve a business to perform a certain kind of work.

Bain Marie

- A water bath for hot holding of food.

Biotechnology

- A technique, which applies microbiology to change products, for example by genetic engineering.

Blast cooling

- Technique, where goods are cooled by means of cold air currents.

Buffet

- Table, where food has been put for self-service.

Cold permissive

- The ability of bacteria to survive at low temperatures.

Contamination

- Pollution or transferral of infection.

Control report

- Evaluation from the Food Region as follow-up on a visit.

Controlled atmosphere

- Packaging, where the ordinary air is replaced with other gases. The same as gas packaging

Critical control points

- The locations in the business, where systematic control is implemented.

Critical point

- Somewhere in the production process, where new microorganisms are added, or where the microorganisms already present gets good chances of propagation.

Cross infection or cross contamination

- Transmission of microorganisms from one foodstuff to the other.

Disinfection

- To kill microorganisms by means of heat or chemical influence.

Dosing

- Apportioning of a certain amount.

Fermentation

- Maturing a foodstuff by means of bacteria.

Food Region

- Controlling unit, in Denmark 3 national controlling units/Food Regions exist

Non-mandatory aerobic

- Does not require oxygen to propagate, but propagates better when oxygen is available.

Non-mandatory anaerobic

- Oxygen has no influence on propagation.

Gas packaging

- Packaging, where the ordinary air is replaced with other gases. The same as packaging in controlled atmosphere.

Genes

- Hereditary factors in a cell.

Gene splicing

- Deliberate changing of the hereditary factors of genes.

Growth conditions

- The surroundings, for instance temperature, moisture, salt and pH, which affect the propagation and lives of the microorganisms.

Growth substrate

- Nutrition for microorganisms.

Heat resistant

- Resistant to heating.

Hurdle-effect

- Several methods used simultaneously to prolong the durability and safety of the foodstuff, for example both lowering of pH and packaging in controlled atmosphere.

Hygiene

- The teachings of preserving and promoting health by avoiding disease.

Hyphae

- The branching of fungi.

Identification

- The pointing out of critical areas.

Immune system

- The defence of the body against infectious diseases.

Incubation period

- The time that passes from infection to outbreak of the disease.

Infect

- Transmit, add contamination.

Infection

- Attack of infectious diseases.

Infection dose

- The amount of infectious substance needed to transmit a disease.

Life conditions

- The surroundings, for instance temperature, moisture, salt and pH, which affect the lives of the microorganisms.

Microorganisms

- Organisms, which are sufficiently small only to be visible in a microscope, for example bacteria, yeast fungi and moulds.

Microscopy

- To look at something through a microscope.

Multi-resistant

- A term for a bacterium, which can withstand the use of many kinds of antibiotics.

Own-check:

- What the employees must control themselves.

Own-check program:

- Systematic routines established by the business. An own-check program must ensure that the legislation on food hygiene is complied with.

Packaging

- Wrapping.

Pasteurize

- Heat treatment to kill microorganisms.

Pathogenic

- Disease promoting.

Permissive

- Microorganisms, which can withstand for example a high temperature.

Petri dishes

- Look at the picture on the left side of page 10, where 3 Petri dishes are depicted. Are used for the cultivation of bacteria.

pH

- Value ranging from 1-14, which indicate how acidic or basic a substance is. Foodstuff will often be found on the acidic part of the pH scale that is, having values below 7.

Portioning

- To divide the food into portions.

Preservation

- Prolongation of the durability of a foodstuff

Recontamination

- Addition of new bacteria to ready-cooked food.

Redox potential

- A measurement of the degree of oxygenation of a system.

Reinfection

- Contamination of a foodstuff after it has been produced. Are also called after infecting

Screening survey

- Ongoing investigations, for example to record a certain infectious matter.

Sliced cold cuts

- Cold cut, which have been sliced on a machine.

Slicing

- To slice on a machine.

Sous vide

- A production mode, where raw materials are packaged, heat treated and cooled.

Spores

- Survival-“seeds”, which some bacteria produces. Bacteria spores are able to survive harder conditions than the bacteria itself, for example heat, drought, salt and so on.

Sushi

- Serving, which among other things contain raw fish

Total bacterial count

- The number of bacteria in 1 gram of foodstuff.

Toxin

- Poison produced by microorganisms.

UV-light

- Ultraviolet light, which has a certain sterilizing effect.

Vacuum packaging

- Packaging, where the air in the packaging has been removed as much as possible.

Water activity a_w

- How much of the water is bound (for example to salt or sugar) and how much is freely accessible. The higher a_w , the more freely accessible water.

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General Food Hygiene

This booklet is an indispensable help for everybody that needs knowledge on the subject of food borne diseases and practical guidelines on how to avoid these diseases.

The following subjects are covered:

- Legislation and food control.
- Microorganisms and their growth conditions, including how to limit their growth.
- Own check, including risk analysis and critical control points.
- Own check of the food, from raw materials through purchasing, receiving, preparing, heat treatment, cold food, cooling, hot holding, to service and serving.
- Maintenance and also cleaning and disinfecting.
- Personal hygiene.

The booklet has been approved by the Danish Food and Veterinary Administration and is based on the current legislation concerning food hygiene.

The booklet was produced for the certificate training in food hygiene, but the target group is also other students, which through education qualifies at a level that corresponds to the demands in the certificate training.