



**Organización  
Panamericana  
de la Salud**

*Oficina Regional de la  
Organización Mundial de la Salud*

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***FOOD SAFETY EDUCATION IN SCHOOLS***

***EXPERIENCE AT MUNICIPALITY LEVEL  
City of Galvez, Santa Fe, Argentina***

**Pan American Institute for Food Protection and  
Zoonoses**

**(INPPAZ - PAHO/WHO)**

**Agro-Alimentary Development Center (CEDA)**

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## **1. – About the project. Brief Description**

Within the context of the program for the development of a local food safety system, an education project was developed for schools in the city of Galvez, Province of Santa Fe. The project targets 5 and 6-year-old children attending pre-school, as well as 12 and 13-year-old children attending EGB (Basic General Education) stage 3, as consumers, food preparers or future food preparers and as multipliers in relation to their parents.

Although the subject of food is included in school curriculums and food safety is tangentially dealt with, a point was made of actually teaching in class the main concepts related to this matter.

As a result of the joint work, an activity guide was developed for the teachers' benefit comprising a series of classes. Moreover, the guide includes resources which were developed and created for those classes, and a supplementary handbook for teachers was also prepared containing technical information on food safety. The classes cover the main food safety concepts through a series of dynamics, such as lab experiences, text analysis, group assignments, out-of-school research, songs, games, and demonstrations.

The technical concepts to be conveyed are closely related to what children are taught at that age. Preschoolers are familiarized with hygiene concepts. In this case, what we are looking for is to establish a relationship between hygiene and food and health.

In EGB stage 3 courses (12 and 13-year-old children), the focus is on the 5 keys to food safety. Due to its geographical and socio-economic features, this segment is considered a food-preparing audience.

In March 2003, teachers and principals attended a workshop where the educational material was reviewed and adjusted to the school's actual needs. During said workshop, contents were introduced, as well as the activities, dynamics, forms of evaluation, and time limits. As a result of the discussions with teachers and principals, the necessary adjustments were made and the program was implemented in schools under the supervision of the local counterpart Institution. To conclude, in November a workshop was held to evaluate the evolution of the program. The project also contemplates comprehension evaluations to be given to students, who are the ultimate targets of the program. The program also contemplates an evaluation to be given approximately one year from the date on which the implementation of the initial stage comes to an end. It is worthy of mention that every school in the municipality is taking part in the project and in the evaluation workshop all of the school compromise to continue implementing and extending the project.

The local media, government and schools are partners in this project, since the same messages are intended to be multiplied through those channels.

## **2. Practical lessons for the initial level**

### **Training program – Initial Level (5 and 6-year-old children). Classes.**

#### **Program objectives:**

- Appreciate the role played by the main personal habits and the various life styles in the protection of health.
- Identify the hands as a source of food contamination.
- Understand the purpose of handwashing. Recognize its importance as the exclusive measure to prevent foodborne diseases. Identify when it is necessary to wash your hands, which elements are required and which are the steps for a correct handwashing.
- Consolidate the habit of the hygiene of hands through the daily practice, and its communication to the family group.

Safe / healthy food as a source of energy for our body. Contaminated / sick food as the generator of diseases. Personal habits which impair health. The significance of the hygiene (washing) of hands.

- What: hands
- When: after, before
- How: correct hygienic method
- Where: significance of water
- With what: soap, brush, clean and light towels

## **Lesson No. 1: "Hands, food and health"**

### **Activities:**

1. The teacher will prepare a basket with various food products or illustrations and a group conversation will be developed in connection with the food as the fuel for the body: it allows us to learn, play, run, etc.
2. Secondly, the teacher will ask about what happens if we eat food in bad conditions (symptoms): pupils will be encouraged to comment on their own experiences.
3. Afterwards, the teacher will present to the pupils the subject of the Hygiene of Hands (handwashing poster) as the source of contamination, incorporating the concept that food, even in good conditions, can cause disease if not handled adequately.

### **Resources:**

- Basket of food products or illustrations
- Handwashing poster

## **Lesson No. 2: "Before and After"**

### **Activities:**

1. Pupils will be encouraged to think about situations in which our hands get dirty and before which activities we should wash them (in particular in the garden), (support by individual magnetized illustrations for the blackboard, showing the different situations separately).
2. Following that, the teacher will distribute three illustrations in sequence to the pupils, which are to be colored, put in order and glued forming the sequence.

### **Resources:**

- Magnetized illustrations for the billboard of situations after which we should wash our hands.
- Magnetized illustrations for the billboard of situations before which we should wash our hands.
- Illustrations in sequence (for each pupil).
- Color paints
- Glue

### **Lesson No. 3: "The Mischievous Bacterium"**

#### **Activities:**

1. The teacher will start the lesson by reviewing the contents already worked on in lessons Nos. 1 and 2, through a group dialogue.
2. Teacher will invite the pupils to imagine freely that they are washing their hands and to mimic it accordingly.
3. Following that, the teacher will talk to his/her pupils about the elements that are necessary for the correct hygiene of hands. As the pupils name these elements, the teacher will accompany them with foam-rubber elements (soap, brush, water drops, lather, towel, bacterium).
4. Teacher will teach them the song with the mimic of a correct handwashing, paying special attention to and rehearsing the washing of the parts we most frequently forget to wash and incorporating the brush as one element.

#### **Resources:**

- Foam-rubber characters
- Song

## **Lesson No. 4: "The Practice"**

### **Activities:**

1. The teacher will go back to the subject of the hygiene of hands through the song.
2. He/she will present the illustration of the kid washing his/her hands.
3. Afterwards, the group will move to the bathroom and exercise what they have learned about handwashing under the guide and supervision of the teacher.
4. As a conclusion of the activity, the pupils will prepare brochures to hand out at their homes with drawings of the elements necessary for a correct hygiene of the hands.

### **Resources:**

- Song
- Illustration of the kid washing his/her hands
- Elements for hygiene (water, soap, brush, towel).
- Sheets of paper
- Color paints

## Lesson No. 5: "Hot water, soap and hands"

### Activities:

1. The teacher will start the lesson by inviting the pupils to sing the song learned, reviewing the elements that are necessary for a correct hygiene of the hands.
2. Teacher retakes the idea of the importance of washing after ... and before ... (magnetized illustrations for the blackboard used in Lesson 2; adding new illustrations that show situations that take place at home) ...although to our eyes, our hands look clean ..., and the idea of microscopic life is briefly introduced (this can be achieved by showing the foam-rubber element – bacterium – and explaining that it is so tiny that it cannot be seen).
3. The activity will be performed with oil and cinnamon:
  - a. **3 pupils will pour out some cooking oil in their hands until covering them fully. Then, they will spread cinnamon all over them. The cinnamon will play the role of microbes (little bugs).**
  - b. **Subsequently, the three children should wash their hands intensely during 20 seconds as follows:**
    - **Pupil 1: washes hands with cold water and no soap.**
    - **Pupil 2: washes hands with warm water and no soap.**
    - **Pupil 3: washes hands with warm water and soap.**
  - c. **Once the washing is concluded, the pupils will show the result obtained with their handwashing to the class.**
4. The teacher will encourage the children to infer the conclusion from the following question: which is the most effective way to take out the little bugs from your hands? Also, a discussion will be developed with respect to the following: what happens if we only use cold water and no soap to wash our hands? Why does warm water help? Why does soap help? Why does rubbing your hands help?

### Resources:

- Magnetized illustrations for the blackboard of "before" and "after" situations related to their homes.
- Foam-rubber elements.
- Cooking oil
- Cinnamon
- Lavatories to wash hands (cold and warm water)
- Soap
- Brush

## **Lesson No. 6: "Be careful with your hands"**

### **Activities:**

1. The teacher will review together with his/her pupils the subject of colors, emphasizing the red, as the color of danger, warning, caution.
2. The teacher invites the children to look at the illustration exposed and using as an association support, the red as the color of caution, he/she will show the pupils which are the areas of the hands we frequently forget to wash and therefore, we should pay greater attention upon their hygiene. The teacher will underline the importance of eliminating the bacteria that we can see (dirt) as well as that which is invisible to the eye, and which can only be seen by using a special lens (microscope).
3. Afterwards, the teacher presents the giant hands on a magnet (to fit in) and the group/class together, will complete the image.
4. To conclude the activity, the teacher proposes to the children that they draw the contour of their hands on a sheet of paper and color the various areas according to what they have learnt. The teacher will write the respective references. Each kid will take home an informative brochure for his/her parents.

### **Resources:**

- Illustration of hands
- Giant hands on magnet
- Sheets of paper
- Color paints

## **Lesson No. 7:**

### **Evaluation Activity:**

1. The teacher will hand out papers to each pupil with the following exercises:
  - a- Put a story into order (after ... before...)
  - b- Color and circle the elements required for a correct hygiene of the hands.

### **Resources:**

- Illustrations of: before... after...
- Printed sheets containing the hygiene elements together with other inapplicable elements
- Color paints
- Glue

### **Material for home:**

- Hand brochures
- Coloring book

## Evaluation stages:

- 1) Initial diagnostic evaluation:** through the direct observation, the teacher will assess the handwashing methodology of his/her pupils before having a meal.

**Instrument:** observation guide

- 2) Evaluation in progress:** record the evolution of the activities.

**Instrument:** register of activities

- 3) Final evaluation:**

**of pupils:** activity lesson No. 7

**of the program:** evaluation workshop with teachers

- 4) Long-term evaluation:**

**Instrument:** guide of questions on the knowledge regarding the correct way of washing your hands to some students

### 3. Technical Card

Song (lesson 3 and 4)

#### " *THE MISCHIEVOUS BACTERIUM* "

Every day the Mischievous Bacterium wants to scare me  
from my hands to the food it wants to jump.  
I'm not frightened and I will not be afraid  
washing my hands, together with my friends, we are going to scare it out

Water drops start to play,  
They jump into my hands and I can't get them

Mr. Soap, who knows how to skate,  
runs after the Bacterium and doesn't' leave it in peace

Mrs. Lather, oh, she makes me laugh!  
makes the Mischievous Bacterium sneeze.

Mr. Brush also wants to help  
running through my hands onwards and backwards

The Mischievous Bacterium is now tired  
it gets down of my hands and through the pipe

But our job is not done! There is still another step!  
Mrs. Towel shouts at me from behind

I dry my hands and I can start  
to eat the food that is safe now

#### **4. Practical lessons for EGB III**

##### **Training program for EGB III (12 and 13-year-old children). Classes.**

###### **Purposes of the program:**

- To identify food as a source of healthy life.
- To learn the 5 food safety keys developed by World Health Organization (WHO).
- To value the role played by the main personal food habits and lifestyles in health protection.
- To generate changes in the personal habits and lifestyles related to food handling.

## **Introductory class:**

### **Contents:**

#### **How can food safety be preserved? The 5 keys to safer food:**

- Keep clean
- Separate raw and cooked food
- Cook food thoroughly
- Keep food at safe temperatures
- Use safe water and raw materials

### **Objetives**

- Identify the factors affecting human health and explain the relationship between personal habits, lifestyles and human health
- Recognize the most important aspects related to safe food handling
- Visualize the key elements to avoid food contamination

### **Activities:**

1. Teachers will place the 5 posters with messages referred to the 5 keys that WHO developed to ensure food safety.
2. In small groups, students must prepare a 5-column chart. Each column will have a title according to the messages in the 5 keys. From the observation of the posters, students will state and write the ideas that come up in relation to the different categories, as applicable.
3. Then, each group will state their findings, which will be recorded in a common grid on the blackboard.
4. Then, teachers will take all the students' findings and will draw a summary of the ideas that came up, and will complete and clarify as necessary.
5. Teachers will lead the class group to the idea that the role played by consumers in relation to food is important
6. To conclude, an explanation will be given that in the following lessons each of the 5 WHO keys will be worked out.

### **Resources:**

- Posters with messages and drawings referring to food safety (each poster will contain images referring to the content of the messages. It is advisable that each of the posters were visually appealing so that they catch the students' attention).
- Blackboard
- Colour chalks

**Estimated time:** 80 minutes

## **Theme focus: 1st key: hygiene**

### **Contents:**

Safe / healthy food as a source of energy for our body. Contaminated / sick food as the generator of diseases. Personal habits which impair health. The importance of washing hands well and clean surfaces and utensils correctly:

- What: hands, surfaces, utensils
- When: after, before
- How: correct hygienic method
- Where: significance of water
- With what: soap, brush, clean and light towels

### **Purposes:**

- To draw a difference between cleanliness and hygiene.
- To identify potential sources of contamination (hands, materials and equipment).
- To consolidate the habit of washing hands, utensils and equipment through daily practice, and to transmit that habit within the family.

### **Lesson No. 1:**

1. Teachers will start the lesson by handing out 4 blank cards to each of the students, and will stick the focal topic (HYGIENE) on the blackboard.
2. Teachers will ask students to write a word they associate with the focal topic on each card.
3. Once the 4 cards have been completed, students will deposit them in a box.
4. Teachers will ask students to form groups made up of 4 to 5 students. Then, teachers will hand out the cards that have been previously grouped in decks. Term repetition will be avoided.
5. From the terms in the cards, each group will define the focal topic by using all of the terms and arguing any term they decide to leave out of the focal topic.
6. After that, each group will present their definition of the focal topic.
7. Teachers will widen, correct, or clarify each concept as they come up. Special emphasis will be made on the core difference existing between cleanliness and hygiene (cleanliness + disinfection)
8. Teachers will introduce the importance of hygiene in food handling as the main element which makes a food product safe / healthy and how handlers / consumers have an impact to turn it into a contaminated / diseased food.
9. The whole group will agree upon a sole conceptualization of the focal topic

### **Resources:**

- A poster displaying the word "HYGIENE"
- Blank cards (4 for each student)

**Estimated time:** 80 minutes.

## Lesson No. 2:

1. Teachers will start the lesson by reminding students of the concept of hygiene
2. Teachers will stimulate students to remember the situations after which we must wash our hands and before which others it is important to wash them
3. Teachers will insist on the idea that washing hands even in those occasions on which we may consider, on a visual examination, that our hands are clean, and will introduce here the idea of microscopic life.
4. An experiment with oil and cinnamon will be made:
  - a) Students will make up groups to perform this experiment.
  - b) 3 pupils will pour out some cooking oil in their hands until covering them fully. Then, they will spread cinnamon all over them. The cinnamon will play the role of microbes (little bugs).
  - c) Subsequently, the three children should wash their hands intensely during 20 seconds as follows:
    - I. Pupil 1: washes hands with cold water and no soap.
    - II. Pupil 2: washes hands with warm water and no soap.
    - III. Pupil 3: washes hands with warm water and soap.
  - d) All of the members of the group will observe the three washing methods, and one of them will be in charge of stating the findings and the results obtained from the experiment.
  - e) Each group will prepare a report guided by the following questionnaire:
    - The student could get rid of the "*bacteria in his hands*" by means of ...
    - If I only use cold water and no soap to wash my hands, what happens as a result?
    - Why does warm water speed the process?
    - Why does soap speed the process?
    - Why does rubbing hands speed the process?
    - The washing method which removed more "*bacteria*" was:
    - The washing method which removed less "*bacteria*" was:
5. Each group will state the conclusions they arrived at.
6. A dialogue will be held with respect to the different points of the guide, and teachers will reinforce and complete the doubts that may come up
7. Teachers will introduce and explain the hand poster
8. Teachers will record the experience and the conclusions in the folder
9. Teachers will hand out the home observation guide which the students will work with in the following lesson

### Resources:

- Cooking oil
- Cinnamon
- A sink or containers for hand washing (for cold and warm water)
- Soap, a brush, tissues
- Questionnaire.
- Hand poster

- Home observation guide

**Estimated time:** 80 minutes

### **Lesson No. 3:**

1. Teachers will start the class by reminding students of the concept of hygiene built up by them in previous classes.
2. Teachers will invite their students to analyze, in small groups, the different items in the home observation guide, and also to discuss and draw conclusions about which activities they think are related to safe habits and which relate to unsafe habits.
3. Teachers will hand out sheets of paper and markers so that each student draws two columns and write down the list of safe/unsafe habits.
4. Each group will stick the poster with the conclusions on the blackboard, and all of them will debate the text of a sole poster, under the guidance and data supplement of teachers. The concepts about hand hygiene will be included.
5. An oral summary about the topics worked on will be made.
6. Each student will copy the conclusions in small cardboard sheets that they will take to their homes.

### **Resources:**

- Observation guide
- Posters
- Markers
- Small cardboard sheets

**Estimated time:** 80 minutes

## Theme focus: 2nd key: Cross contamination

### Contents:

Safe / healthy food as a source of energy for our body. Contaminated / sick food as a generator of diseases. Food preparation habits which impair health. Microorganisms and its implications in contamination. The role of food handlers.

### Purposes:

- To identify raw food as a source of contamination
- To understand the notion of cross contamination
- To learn efficient preventative measures to avoid cross contamination in food handling and storage

### Lesson No. 1:

1. Teachers will start the class by inviting students to state their ideas on the term "MICROORGANISMS" (brainstorming), which will be written down on the blackboard.
2. Then, teachers will classify the ideas into groups (a group of ideas may refer to the relationship between microorganisms and food, illnesses or scientific research)
3. Students will be invited to perform an experiment with sponges:
  - a. Students will be divided into small groups
  - b. They must moisten the two sponges with water. One of the sponges will represent a "cooked chicken" and will be separated from the other, which will represent a "raw chicken".
  - c. Paint the raw food with red paint. Use the amount necessary to cover the surface on both sides, since the paint will act as chicken juice, which might be contaminated with *salmonella*.
  - d. The painted sponge will be placed on the cutting board and must be cut in halves with a knife, and must be placed on a dish. The board must not be washed.
  - e. Then, a lettuce leave must be cut on the table that was used to cut the "raw chicken".
  - f. Finally, the sponge acting as the "cooked chicken" (not painted) must be placed on the same dish as the "raw chicken" sponge.
  - g. Students must use observation techniques and will write down the results they say by following this technical guide:

### Technical guide:

#### Preliminary data:

Our observations referred to the red paint representing *Salmonella*:

Our observations referred to the lettuce leave:

Our observations referred to the "cooked chicken" sponge:

#### Conclusions:

- What happens if the cooked chicken is placed on the same dish as the raw chicken?
  - What happens if the lettuce is eaten?
  - How about our hands as bacteria transmitters? What would happen if we touched something without washing our hands, or if we used the knife without washing it?
  - How can we get rid of a bacterium in a cutting board, a knife or a dish?
  - What should we do to avoid contamination from a food product to another?
  - What took place with the cutting board, Can take place somewhere else? Where?
4. Each group will state its findings.
  5. Teachers will take students' statement as a basis and will introduce the term "cross contamination" in relation to prepared and stored food.
  6. A dialogue will be held about the importance of food handling and hygiene in food preparation.

**Resources:**

- Two clean sponges cut in a chicken leg shape
- Red paint, or another bright colour
- A brush
- A cutting board
- A lettuce leave
- A light colour dish
- A knife
- Technical notes

**Estimated time:** 80 minutes

**Class No. 2:**

1. Students will be divided into two groups.
2. The refrigerator drawing will be stuck on the blackboard, and a number of cards representing different types of food will be handed out to them.
3. As if it were a contest, students must place each of the food products inside the refrigerator so that cross contamination inside it is avoided.
4. Once this activity ends, each group will assess the other team's refrigerator and will substantiate the objections that may come up.
5. Teachers will guide students in the assessment and will clarify any confusing item or will elaborate on any topic.
6. An oral summary of the topics discussed will be made.
7. The main notions will be written down in the folder.

**Resources:**

- Refrigerators and food cards.

**Estimated time:** 80 minutes

## **Theme focus: 3rd key: The right food cooking method**

### **Contents:**

The importance of temperature in cooking. Use of the thermometer. The role of food handlers.

### **Objetives:**

- To identify high temperatures as a means to reduce the microorganism load in food.
- To learn the right use and the reading of thermometers.

### **Class No. 1:**

1. The notion of microorganism from the previous class will be reviewed.
2. Students will be stimulated to think which may be, in their opinion, the most efficient ways of reducing the microbial load in food.
3. The notion of temperature as an efficient measure to decrease the microbial load in food through the right cooking method will be introduced.
4. To show in a practical way, the importance of temperature in the reduction of the microbial load in food, an experiment will be performed in which raw milk will be subjected to controlled temperature, as follows:
  - a- First, students will be presented a container with raw milk, and a sample thereof will be placed on a baking tray.
  - b- The rest of the milk will be subjected to thermal treatment. During the experiment, students will be taught how to read a thermometer.
  - c- Once the thermal treatment has finished, a milk sample will again be extracted.
  - d- The identified baking trays will be taken to CEDA.
5. Students will record the development of the experiment in their folders

### **Resources:**

- Raw milk
- boxes with culture medium
- Pipettes
- Heat sources
- A thermometer
- A heat-resistant container

**Estimated time:** 80 minutes

## **Class No. 2**

### **Activities:**

1. Teachers will start the lesson by reviewing the notions taught in the previous class and the steps of the experiment
2. Teachers will present the trays with the milk samples, and each of the students will take a close look at them.
3. Student groups will hold dialogues about their observations, and an experiment log will be completed with the conclusions reached after the tray observation.
4. Teachers will comment the ways to ensure an adequate food cooking process at home, and dialogues will be held about the importance of temperature during the food cooking process as a way to ensure food safety. The fact that this is the end of a process that starts with right hand, utensil and surface washing, and the right of the food we are to eat.

### **Resources:**

- boxes with samples
- A magnifying glass

**Estimated time:** 80 minutes

## **Theme focus: 4th key: safe temperatures**

### **Contents:**

The importance of temperature in preserving food. Safe and dangerous areas.

### **Objetives**

- To differentiate how the different temperatures impact microbial life. Room temperature and food contamination.
- To identify low temperatures as a means to delay the growth of microorganisms in food.

### **Class No. 1:**

#### **Activities:**

1. Teachers will hand out the comic of the microorganisms to students, which will be arranged in small groups.
2. After group reading, students will prepare a report about the comic's contents.
3. Each group will submit the report so prepared.
4. From the reports, teachers will present the poster relating to temperatures on the blackboard, and will explain the different areas (safe/dangerous) and how they impact in microorganisms.
5. As homework, students must prepare a writing, with journal format (classified ad, letter to the editor, article, open letter, editorial, etc.) with relation to the temperature topic.

#### **Resources:**

- A comic.
- A Thermometer sheet

**Estimated time:** 80 minutes

## **Theme focus: 5th key: safe water and raw materials**

### **Contents:**

The function of labels in food. The Argentine Food Code. Containers: the importance of their integrity to keep food quality and safety. The importance of safe water for health. Methods to make water drinkable.

### **Objectives:**

- To reflect about the importance of choosing healthy and safe food.
- To learn how to properly read labels. To identify the different elements of a label.
- To recognize the use of safe water as a preventative measure.

### **Class No. 1:**

#### **Activities:**

1. Teachers will ask students what the function of the ID is.
2. Then, teachers will introduce the label topic as something that allows us to identify different food products and obtain data from them.
3. Teachers will hand out some food products to each group and will ask students to extract the data contained in their labels.
4. Once this task is ended, the data obtained will be written on the blackboard.
5. Teachers will present a sample label with the information which, according to the Food Code, is compulsory.
6. A discussion will be held about the differences and similarities with the labels analyzed, and those data which are extremely important to consumers will be identified.
7. Teachers will also include in their lecture the importance of the food container condition we choose so that the food keeps healthy.
8. Students will copy the sample label in their folders.

#### **Resources:**

- Different labelled food products.
- Sample label.

**Estimated time:** 80 minutes

## **Class No. 2:**

### **Activities:**

1. The previous week, teachers will have assigned the following topics for research by the different groups:
  - Risks ensuing from drinking undrinkable water.
  - Water purification treatments.
  - Cholera as a disease.
2. Each research group will report to the whole class the information collected.
3. From the reports, a discussion will be held about the importance of safe water as a fundamental factor for good health.
4. Teachers will present a map of the city where the drinkable water net is shown.
5. The different areas where there is no access to drinkable water will be identified.
6. Teachers will explain the home made method to purify water.
7. Teachers will hand bibliographic information out to students.

### **Resources:**

- Map of Galvez
- Bibliographic material

**Estimated time:** 80 minutes.

## **Assessment integration activity – 5 food safety keys**

### **“Adriana the homemaker”:**

1. Teachers will hand each of the students out one copy of the story entitled “Adriana the homemaker”.
2. After reading the story, students must discover the mistakes made by Adriana and suggest the correct way.
3. They must exchange their report with a classmate's, who will be in charge of correcting the report.
4. In groups, the different steps will be reviewed. Students must ensure that the 5 keys proposed by WHO for food safety have been followed.

### **Resources:**

- “Adriana the homemaker” reader

**Estimated time:** 80 minutes

## 5. Technical cards for the practical lessons.

### Key No. 2 – Cross contamination

#### Considerations:

Our findings referred to the red paint representing Salmonella:

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Our findings referred to the lettuce:

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Our findings referred to the “*cooked chicken*” sponge:

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#### Conclusions:

What may happen if the cooked chicken is placed in the same dish as the raw chicken?

What may happen if somebody eats the lettuce?

What may happen if we touched something without washing our hands or if we use again the knife without cleaning it?

How can we get rid of the bacteria in a cutting table?

How can we get rid of the bacteria in a knife?

How can we get rid of the bacteria in a dish?

What should we do to remove the bacteria in a chicken?

## Adriana the homemaker

Read the story of "Adriana the homemaker" and find out which are the actions that impair food safety.

It was 4 o'clock in the afternoon, and Adriana was hurrying to leave her job so that she could do the shopping and buy some supplies for dinner. She wanted to celebrate her son's recent winning the school football cup. After going round the aisles, Adriana bought yoghurt and milk, which she was in need of; then, she went on going round the aisles to buy crackers, corn flour and wheat flour. Adriana wanted to buy some melons; so, when she saw them, quickly approached the stand, examined them, smelt them, touched them and thought "these melons are in perfect condition, I'm going to buy them". Then, she also bought carrots, onions, potatoes and a wonderful beef.

When Adriana arrived home, she greeted her children and went right to the fridge. She placed the foodstuff in there and answered her daughter's questions:

Natalia - Mum, what are we going to eat?

Adriana - Bistec and salad.

Natalia - I'm hungry!!!, the girl said.

Adriana - Well, you can have something until dinnertime.

Natalia took some lunch leftovers from the worktop; it was a wonderful flan with whipped cream which somebody had left. Natalia took advantage and eat the delicious dessert.

Adriana opened the fridge and took out the meat and the vegetables. She looked carefully and saw that the meat juice was spilt over the carrots. She hurriedly washed the carrots because she didn't want them to have a bad taste.

Adriana made her best to cook a good dinner. She chose the best bistecs, cut them up on her chopping board and put them into the oven. Then, she took out the carrots, put them on the same board, cut them in slices and put them in the salad bowl. Then, she cut up the potatoes on the same board and put them in the oven. She added all kinds of dressings; she knew that her family was fond of them. After a while, she took the bistecs out of the oven, making sure that they still were a bit rare, since her husband liked them that way.

It was dinnertime; everybody sat at the table at their usual places. The cup winner arrived last, running from the street and saying:

Sebastian - I'm starving!!!!!! Then, he quickly sat at the table and started to eat the different dishes.

Finally, all were eating and tasting a delicious dinner.

### **Assessment stages:**

**1) Initial diagnosis assessment:** teachers will make an approximate assessment of their students' knowledge through revision of the previous notions

**Tool:** Estimating assessment guide

**2) Process assessment:** record the evolution of the development of activities

**Tool:** Activity log book

**3) Final assessment:**

**students' assessment:** integrating class activity

**program's assessment:** assessment workshop with teachers

**4) Long term assessment:**

**Tool:** questionnaire about notions as regards the 5 WHO keys for safer food to a students sample.

## 6. Technical Manual. Supplementary material for teachers.

### Thematic Issue: Key No. 1 Hygiene

Safe / healthy food as a source of energy for our body. Contaminated / sick food as the generator of diseases. Personal habits that impair health. The significance of the hygiene (washing) of hands.

- What: hands
- When: after, before
- How: correct hygienic method
- Where: significance of water
- With what: soap, brush, clean and light towels

#### Safe food / Contaminated food

**An adequate diet is essential for health. Food provides the essential nutrients and energy that every human being needs to maintain a good nutritional condition.**

Health, unlike many people think, is not the absence of disease but should be understood as a general condition of physical, mental and social welfare. The contribution from safe food is fundamental for a correct nutrition but also to prevent those diseases that may result from its consumption.

The defective preparation, cooking and/or storage of a food product constitute the main causes for the appearance of bacteria in any dish of food, that begin to multiply and make the consumption of such food harmful for health.

The presence of bacteria is not always evident in food. It does not always show changes in taste, smell or even alterations in the food aspect. The objective of hygiene in this sense is to ensure the production and preparation of safe and clean food.

A safe food product is the assurance that it will not cause harm to the consumer upon its preparation or consumption, according to the hygienic-sanitary requirements.

Food safety is a process that ensures the quality in the production and preparation of food products. It guarantees the securement of safe, nutritious and harmless food for the consumption of the population. The preservation of safe food implies the adoption of methodologies to identify and evaluate the potential risks of contamination of food in the place where it is produced or consumed, as well as the possibility of measuring the impact that a disease transmitted through a contaminated food product may have on human health.

As established in the Codex Alimentarius – the code that regulates the quality and safety of food – food is considered contaminated when it contains: living agents (viruses or parasites harmful to health), toxic chemical substances or organic substances strange to

its normal composition and toxic natural components in a higher concentration than that allowed.

### Foodborne diseases

Foodborne diseases (ETA in Spanish) may arise from the consumption of contaminated food or water. They are called “foodborne” since the food acts as the transmission vehicle of harmful organisms and toxic substances.

An outbreak of foodborne diseases takes place when two or more persons suffer from a similar disease after consuming the same food and the epidemiological analyses point to the food as the origin of the disease; a fact that is subsequently confirmed by the laboratory.

Foodborne diseases may reveal themselves through:

-Foodborne infections: these diseases result from the ingestion of food containing harmful living microorganisms. For example, salmonellosis, viral hepatitis type A and toxoplasmosis.

-Intoxications caused by food: they take place when there are toxins or poisons of bacteria or moulds present in the food ingested. In general, these toxins have neither smell nor taste and they are capable of causing disease after the microorganism is eliminated. Certain toxins may be naturally present in the food, as in the case of certain fungi and animals such as the globefish. Examples: botulism, staphylococcal intoxication or from toxins produced by fungi.

-Toxi-infection caused by food: it is a disease arising from the consumption of food with a certain quantity of disease-causing microorganisms, which are capable of producing or liberating toxins once they are ingested. Example: cholera

### Symptoms:

The symptoms vary according to the kind of contamination, and also the quantity of contaminated food consumed. The most usual symptoms are vomits and diarrhea. There may also be abdominal pain, headache, fever, neurological symptoms, double vision, swollen eyes, renal difficulties, etc. According to the Food and Drug Administration (FDA) of the Government of the United States of America, a 2% or 3% of foodborne diseases can lead to a long-term disease.

For example, Escherichia coli O157: H7 can cause kidney failure in children and infants, the salmonellas may generate reactive arthritis and serious infections and the Listeria monocytogenes can produce meningitis or a miscarriage. Nevertheless, there are discomforts produced by food which are not considered foodborne diseases, such as allergies, which cannot be associated to the food that cause them, and which is that having undergone a fermentation process (for example, wines, beer, cheese, yogurt).

For healthy people, most foodborne diseases are transitory illnesses that only last for a couple of days and have no other kind of complication. But certain more severe foodborne diseases may become very serious, leave consequences or even cause death in susceptible persons such as children, old people, pregnant women and sick persons.

### How were foodborne diseases discovered?

Foodborne diseases have been known from very remote times. In the year 2000 B.C., Moses had already set forth laws in connection with the food that could be eaten and that which should be avoided. Also, the methods for its preparation and the importance of having your hands clean before eating food were legislated.

In general, the tales on food intoxications registered through ancient history were attributed to poisonous chemical products, which were sometimes deliberately incorporated. Only in the XIX century, the food diseases caused by germs became known.

Anciently, contaminated food was related to its state of decomposition. Today, it is common knowledge that food contaminated with microorganisms can have a normal aspect, smell and taste.

The bacteria were first seen by Antony van Leeuwenhoek, a Dutch scientist who, in 1674, observed, through various lenses making up a primitive microscope, the presence of small organisms in the shape of rods in a water drop of a lake. In a letter dated September 7 of the same year, he described what he had seen through a new device: "I took water from a lake and, while examining it in detail, I found floating inside earthy particles and some greenish stripes rolled like spirals and orderly arranged. The complete circumference of each of these stripes was on the thickness of one hair of one of its heads, all of which were made up of green, very small globules that remained together".

His drawings showed that the above mentioned particles were the first bacteria ever described; however, his discoveries were not taken into account at the time.

Only two hundred years later, when Louis Pasteur demonstrated the role played by bacteria in the fermentation of wine and beer, these findings were appreciated. Pasteur made a research on diseases in animals and human beings, showing that such diseases were caused by bacteria. He also found that if food was sterilized through intense cooking, the bacteria were killed and the food could only be re-contaminated by external factors (utensils, handling, etc.)

Upon discovering the manner in which these diseases were spread, prevention and treatment methods began to be applied. In the year 1854, John Snow discovered that contaminated water could favor the spreading of cholera. A few years later, it was found that typhoid fever was also transmitted through water.

By the end of the XIX century, milk was found to be involved in the spreading of important diseases; the pasteurization (treatment whereby harmful bacteria are destroyed) being introduced. In the year 1888, a bacterium that caused an outbreak of food poisoning from the consumption of cooked meat was, for the first time, isolated. At the beginning of the XX century, other bacteria were discovered (Salmonellas, Staphylococcus, etc).

## **Ten enemies of healthy food**

Upon reviewing the possible causes of a foodborne disease, the following factors can be found:

1. Inadequate freezing.
2. Preparation too early in advance of consumption
3. Inadequate storage.
4. Storage at room temperature.
5. Insufficient cooking (inappropriate cooking temperatures).
6. Hot preservation at inadequate temperature.
7. Insufficient personal hygiene.
8. Crossed contamination.
9. Ingredients of doubtful origin.
10. Contact of food with animals and/or their feces.

### **What does the WHO say about foodborne diseases?**

The World Health Organization (WHO) has defined foodborne diseases as “those diseases of infectious and toxic nature which are caused, or are believed to be caused, by the consumption of contaminated food or water”. The WHO Experts’ Committee concluded that most diseases caused by food have a microbial origin, which is perhaps the most widespread problem in the contemporary world and an important cause of the reduced economic productivity.

According to WHO researchers, foodborne diseases constitute a pathology with a proportion of people in conditions to contract the disease which includes all populational levels, that is, we are all susceptible to those diseases caused by contaminated food.

The WHO estimates that each year, 1 million children of less than 5 years of age die in developing countries, which implies 2,700 deaths per day. According to the Epidemiological Surveillance System of Foodborne Diseases (SIRVETA), during the year 2000, in Latin America, more than 500 outbreaks of foodborne diseases were reported, of which, 40% took place at home and only 9% in street sales stalls and restaurants.

Source: INPPAZ

### **Which is the food most susceptible to suffer from contamination?**

- Sauces
- Mayonnaise
- Stuffed pastries
- Milk, creams, artificial creams, flans, cream custards
- Egg-based food
- Food prepared with raw eggs or without sufficient cooking
- Meat, poultry and fish
- Shellfish or other products from the sea.
- Cooked food that is consumed cold.

**Source:** Manual of food handlers. Municipal Intendancy of Montevideo: PAHO – WHO and SafeFoodHandler.com program

### **The cost of not ensuring food safety**

- Food contamination.
- The possibility of food contamination causing the death of a person.
- Claims from consumers for the food sold in a particular establishment.
- The shutdown of an establishment for selling food in bad conditions.
- Possibility of facing a legal action for damages to health.
- The food is discarded since it becomes spoiled.
- Loss of productivity of the establishment

### **The benefits of ensuring food safety**

- The clients' satisfaction results in a good reputation of the establishment and can increase its productivity.
- The food storage capacity increases.
- Good working conditions.
- The staff and managers show good predisposition at work
- Good reports from the food inspectors.

**Source:** SafeFoodHandler.com program

### **How to protect food from a probable contamination?**

- Keep the food covered-up as long as possible
- Use clean and adequate equipment to prepare food.
- Use clean clothes during preparation.
- Handle food as little as possible. Utensils, dishes and containers should be used with more frequency than the hands.
- Protect food from the contact with insects.
- Keep the highest hygienic conditions on a permanent basis.
- Avoid touching the parts of the utensils that come into contact with food.
- Keep contaminated food and kitchen wastes far away from the food to be consumed.
- Prevent raw food from spilling their juices on cooked or ready-for-consumption food, or on those utensils that will be used to eat.
- Apply safe and efficient hygiene methods.

**Source:** SafeFoodHandler.com program

### **Sources that may give rise to food contamination**

#### **People:**

There are people who look healthy but may carry microbes in their noses, mouths, intestines or even their skin. Food can get contaminated through the contact with the

hands of these people, and also, upon their talking, coughing or sneezing over it. In addition, it is possible for some hair to fall on the food and therefore, food handlers are recommended to use caps.

### **Raw food:**

Raw food, in particular, red meat, poultry, milk, eggs and shellfish, involves a high risk of contamination. It is necessary to keep raw food away from cooked food, since the juices of the former may spill over the latter.

### **Insects:**

There are many insects in the environment that may contaminate food once they touch it. Flies and cockroaches, the most dangerous, can be attracted by certain food and upon getting in contact with it, they may transmit microorganisms. Bear in mind that insects tend to rest on wastes and animal feces and thus, incorporate a great amount of germs in their legs or any part of their organism.

Insecticides should be used carefully at the kitchen and in those places where food is stored. These products contain poisonous chemicals that may fall over the food, utensils or any area where food is laid on.

### **Rats and mice:**

Both rats and mice carry microbes in their feces. The contamination of food may result from the contact with the feces of these animals and also when there are traces of bites. Those surfaces that have come into contact with rats should be washed fully and disinfected before using them.

### **Animals and birds:**

Pets can also carry harmful germs in their bodies and intestines. In addition, they may contaminate food with the particles of their feet. Therefore, animals should always be kept away from the kitchen. Also, in open places, birds may leave feces on the food. To avoid this, it is important to have all food covered up before consumption. Once the food is consumed, it is recommendable to try to stay away from the places where birds and all kinds of animals circulate.

### **Dust / dirt**

There is a great amount of germs in the dust particles that circulate in the environment. For this reason, food should always be kept covered up and the containers should only be opened at the time of consumption or preparation. It should be taken into account that while doing the cleaning, the sweeping of surfaces may spread rests of dirt on the food.

### **Garbage and food in bad conditions**

Food that has become spoiled should be rapidly removed from the area in which it was stored. In addition, food handlers should wash their hands after putting trash in the garbage can. It is recommendable to throw out the garbage, use waste bags and good quality containers, and to keep them permanently shut down to avoid the contact with the food in good conditions.

**Source:** SafeFoodHandler.com program

### **The development of bacteria**

The bacteria are microscopic organisms that circulate in the environment, even in food, water, people and animals.

It is surprising to know that many of these bacteria are harmless and moreover, some of them are useful for human development. For example, they are necessary to prepare yogurt and also some kinds of cheese. However, a small number of bacteria cause deterioration in food, and some of them, better known as pathogens, are responsible for producing disease.

It is virtually impossible to carry on a food business without encountering disease-causing bacteria. Therefore, it is really important not to give them the possibility to reproduce since their multiplication at a certain level may bring about an outbreak of disease.

The conditions for a food-contaminating bacterium to reproduce are as follows:

### **Room temperature**

Most bacteria multiply faster at 37°C (the normal temperature of the human body), although they may also reproduce rapidly at a temperature between 20 and 50°C. To prevent their growth, we should ensure that the food reaches a temperature below 5°C when stored in the refrigerator, or above 65°C upon being cooked. The range between these two temperatures is known as the dangerous zone for consuming food.

Bear in mind that certain bacteria are capable of producing spores that allow them to survive difficult situations such as high temperature and thus, we should avoid the formation of microorganisms in every part of the process from the purchase to consumption.

### **Food and humidity**

Germs prefer humidity and food with a high proteinic content, such as meat, poultry, fish and dairy products. High concentrations of sugar, salt and certain dressings help to prevent the growth of germs.

### **Weather**

Given the right conditions of kind of food, humidity and temperature, some bacteria may divide in two every 20 minutes. If enough time is allowed, it is possible for a small group of bacteria to increase to a significant number, capable of producing food contamination.

For this reason, it is essential not to leave high-risk food at the dangerous-zone temperatures longer than necessary.

***In a few hours, the germs can multiply into millions!***

**Source:** SafeFoodHandler.com program

## **Other issues to take into account in the personal hygiene**

### **The nose, the mouth and the ears**

Above 40% of the healthy adults have a germ called staphylococcus in their nose and mouth that contaminate food.

The action of coughing or sneezing may send out small infected beads through a significant distance and thus, it is advisable for those people suffering from a cold not to handle or prepare food. In these cases, it is recommendable to use disposable tissues instead of fabric handkerchiefs.

In addition, harmful germs can develop in the mouth. For this reason, food handlers should not smoke, eat, chew gum or taste the food with their fingers. Besides being an unacceptable behavior, to spit on the food also generates contamination.

### **Cuts, wounds and sores**

Cuts, wounds and sores provide the ideal framework for the growth of bacteria.

To prevent food contamination, any wound should be fully covered by a protecting tape of a very visible color, in case it falls down, and also by a latex glove. The cuts in fingers of the hand need additional protection to ensure that the blood and other infectious materials do not come into contact with the food.

The germs present in raw food (in particular, meat and poultry) may generate a risk to the food handlers having cuts in their skins and cause them serious infections.

### **Jewelry and perfumes**

Food handlers should not wear watches, earrings, rings or brooches since these physical elements incorporate dust particles that may contain bacteria. Moreover, the precious stones or little pieces of jewelry can fall into the food and cause intoxication.

In addition, it is recommendable for food handlers not to use perfumes or lotions with strong scents since they may deteriorate the food.

### **Hair**

Hair is constantly falling in the environment and may give rise to food contamination. From time to time, the scalp contains harmful germs and therefore, should be washed on a daily basis. For this reason, food handlers are required to wear a cap covering their hair completely.

It is always recommended to comb the hair and adjust the cap before preparing food. This should be done in areas where food is not prepared. Be careful when touching your head, since hair may fall on your shoulders and then, in turn, on the food.

### **The smoking habit**

In certain countries, it is illegal to smoke in the kitchen or in places where food is prepared. Apart from the annoyance that it may cause consumers to see a food handler smoking while preparing the food, it is very feasible to contaminate the food with the cigarette ashes and to impregnate the food with odors of the smoke.

Another negative circumstance derived from this habit is that if a person smokes, he/she may start to cough and the saliva particles sent out may fall over the surfaces used to handle food.

**Source:** SafeFoodHandler.com program

## **The importance of washing your hands before consuming or preparing food**

Human beings carry millions of invisible microbes in their hands. Most of them are harmless but some of them may cause diseases that are subsequently transmitted by the food. In addition, they may cause diseases such as flu, colds and diarrhea.

Thus, foodborne diseases are contracted upon consuming food that has been contaminated during its procurement or preparation and it is good to know that these diseases are almost always produced as a result of the incorrect handling of the food upon being prepared.

These diseases affect most susceptible sectors (such as children, old people, pregnant women and sick persons) and it is known that about two thirds of the epidemics from this cause, occurs as a result of the consumption of food at restaurants, coffeehouses, school dining rooms and at our very homes. It is important to know that by adopting hygienic habits in food handling, they can be prevented.

When we forget to wash our hands or do not do so adequately, we may transmit these microbes to the food when being handled.

We may also attract germs from certain physical objects, such as bathroom faucets, doorknobs, armrests and other elements which were touched by other people who have not washed their hands. Think about all the things we touch during the day and how many people may have touched them before us.

When we cough, sneeze or wipe our nose, microorganisms are sent out which can end up in our hands or in any other part of our body. The same happens when we are in contact with a person that is suffering from a disease, whose germs can also go into our body. Moreover, the germs can reach us while being outdoors or performing recreative activities in a park. When these situations take place, it is necessary to wash our hands well to eliminate the presence of these microorganisms.

### **Handwashing:**

- Prevents and controls the spreading of bacteria, pathogens, viruses, microbes that cause foodborne and other diseases.
- It is a one of the good hygienic habits we should all have.

### **To wash your hands:**

- Whenever possible, use warm water and soap. It is best to moisten the hands before applying the soap; this way you can prevent irritations.
- Roll up your sleeves. Soap and rub your hands vigorously during 20 seconds until

forming lather even in your arms and up to the elbow. Wash both sides of the hands, between your fingers, around the thumbs and under the nails. Preferably, use a brush to clean the nails.

- Afterwards, rinse the hands with clean water from the elbows to the hands.

- Dry the hands rapidly with a white, clean and dry towel or with a disposable paper towel. Use the same paper towel to close the faucet and open the door. This way, we prevent microbes from resting on the bathroom facilities or returning to our body.

In those cases in which no paper towels are available, there should be a towel permanently clean, which should be renewed when it is too wet or its cleanness condition is not optimum.

## **WHEN TO WASH YOUR HANDS?**

### **Before**

-Touching or handling food

- Preparing food

-Eating

### **After**

-Going to the bathroom

-Handling raw food (meat, fish, chicken and eggs)

-Touching pets

-Scratching the face or head, wiping your nose, sneezing or coughing.

-Touching a sick person

-Touching or throwing out the garbage

-Using cleaning products

## ***Importance of Handwashing***

### **Prevention of Diseases**

Several researchers have shown that an appropriate handwashing helps to prevent diseases. The Center for Disease Control of the United States (CDC) declared that: "handwashing is one of the best ways to prevent the expansion of infections", and that, in

addition, it constitutes the first defense line for infectious diseases, including respiratory infections and gastrointestinal disorders, among others.

## **Consequences of not washing your hands or doing so incorrectly**

### **Antibiotic Resistance**

In addition to preventing the expansion of epidemics, the regular handwashing may reduce the expansion of the antimicrobial resistance of bacteria.

We may rub our dirty hands on the clothes we are wearing or we may simply, throw a little water on the hands to clean them but neither of these two practices is going to liberate us from germs. An appropriate handwashing helps us to get rid of all present microbes. Water helps to remove the microorganisms but if we use warm water and, in addition, soap, the task is much easily fulfilled.

To rub the hands and create friction between them makes microbes go away and removes the dirt that may have adhered between the fingers and the palm.

**Source:** Center for Disease Control of the United States (CDC).

### **6 steps for an effective handwashing**



*1) Moisten the hands completely with water.  
Take some soap.*



*2) Rub your hands palm to palm.*



*3) Put the right hand behind the left hand.  
Change and repeat*



*4) Rub the fingers on the palm.*



*5) Pass the right hand around the left thumb,  
Change hands and repeat,*



*6) Pass the right hand around the left wrist,  
Change hands and repeat.*

**Source:** [www.medicchem.co.uk](http://www.medicchem.co.uk)

## Thematic Issue: Key No. 2 Crossed Contamination

Contents:

Safe / healthy food as a source of energy for our body. Contaminated / sick food as a generator of diseases. Habits in preparing food that are harmful for health. Microorganisms and their involvement in contamination. Role played by food handlers.

### What is crossed contamination?

A food product is said to be **contaminated** when it contains a **microbe** or a substance that exceeds the limits established by regulations and is capable of causing disease to the person who consumes it.

**Contamination:** presence of an agent in the body or in any object or food that is capable of causing disease in a person. Introduction or appearance of any contaminating substance in a food product or the food environment.

**Contaminant:** a contaminant is any substance, not intentionally added to the food, which is present in such food as a result of its production (including operations carried out in agriculture, zootechnics and veterinary medicine), manufacture, processing, preparation, treatment, packaging, transportation or storage or as a result of environmental pollution. This term does not include insect pieces, rodent hairs and other strange matters (Codex Alimentarius).

**Crossed contamination:** it is the transfer of contaminating agents from a contaminated food product to another which is not. The most usual example is to cut raw chicken on a cutting board and then, without cleaning it, cut the vegetables to prepare a salad. The same can happen with the various utensils or with our own unwashed hands, which act by transferring the bacteria.

Crossed contamination is one of the main causes of food intoxication but it is easy to prevent.

### Means of transmission

- Hands of the food handlers (lack of hygiene)
- Utensils already used for raw food that are used for cooked dishes.
- Cutting boards or containers that held raw food and are then used to serve cooked food.

### How is crossed contamination prevented?

- Handwashing by the food handler
- Raw food stored in containers separate from cooked food.
- Effective cleanness and disinfection of the surfaces of contact (kitchen, boards, utensils, etc.)

## How is crossed contamination produced?

In general, **crossed contamination** involves the contact of **raw food**, such as unwashed vegetables, meat, chicken or fish with **cooked food**. This way, contamination may start from the moment the food is purchased and continue through its storage or preparation. But the important thing is that it is very easy to prevent.

For example, if a person spills the juices of raw meat on a cutting board and then cleans it with a dishrag and cuts lettuce on this same board, each time the lettuce is served raw, it will carry the **germs** of the meat even though the cutting board looks clean. Moreover, the same dishrag may contaminate other surfaces with the juices that emanate from raw meat, chicken or fish. It is advisable to use a cutting board **exclusively** for meat and another one for salads or other food products ready for consumption.

Another example of crossed contamination is provided by a food handler who has been in contact with raw meat or eggs and then handles vegetables **without previously washing his/her hands**. It is advisable for the food handler not to cook when he/she is sick or suffers from a cutaneous infection.

Upon purchasing a cooked food product at a supermarket, we should watch that the food handler does not mix the **raw** food with that that has already been **cooked**. Likewise, it is important that they clean or change the utensils when going from a food product to another one.

The **incorrect placement** of food in the refrigerator is very frequent due to the lack of knowledge of consumers. In general, this happens when raw meat, chicken or fish are placed close to food already cooked or ready for consumption, and the former are left to spill their liquids over the latter.

## How is contamination prevented?

In general, **cleanness** is essential. The surfaces of kitchens, tables and floors should be cleaned three times a week or whenever they are considered to be contaminated by a spill, with **hot water** and detergent, and then with a cup of bleach every five liters of water. Be careful not to leave the kitchen surfaces exposed to the contact with domestic animals, which are another source of contamination. Rags, dishcloths and towels for hands should also be washed on a daily basis with hot water and detergent, and subsequently, **disinfected** with  $\frac{1}{4}$  of a bleach cup per liter of water, leaving them submerged for at least 5 minutes. After this, they should be rinsed with potable water and left to dry rapidly to prevent the multiplication of any remaining microbe. The ideal is to leave knives, forks and spoons, and crockery to drain and dry naturally, or in a dishwasher.

These advices are also applicable to the rags used to clean the floor which, obviously, should be washed, disinfected and kept separately.

Cleaning products and other articles containing antibacterial agents can be helpful in limiting crossed contamination but they are not a definitive solution. They should be considered an additional barrier and not an infallible protection.

To prevent crossed contamination, it is advisable to acquire the following habits and teach them to your family and friends:

- Upon purchasing raw food, such as meat, chicken, eggs or fish, avoid their contact with other food; for which, it is advisable to **separate** them into different containers.
- Wash your **hands** before touching the food and after having handled raw food.
- Wash **cutting boards**, knives, utensils, tables, equipment and dishcloths carefully after having been in contact with raw meat, chicken, eggs or fish.
- Whenever possible, use a cutting board for raw meat and another one for salads and for food already cooked or ready for consumption.
- Never place cooked food on a table, cutting board or dish on which cooked meat, chicken or fish were **previously** placed.
- Place cooked or ready-for-consumption food on the **upper** part of the refrigerator, then, put the vegetables, and leave raw meat, chicken and fish at the **bottom**, preferably in sealed containers or bags, so that they may not **spill** their juices over the cooked food.
- The sauces in which raw meat, chicken or fish have been seasoned should not be used on cooked food, unless previously boiled.

### Causes of contamination

Pathogenic microbes can be found almost everywhere. Therefore, they are frequently found in the **raw food** used in the kitchen such as meat, poultry, eggs and vegetables. In general, this does not constitute a problem since an adequate cooking of the food renders the few surviving microbes harmless. However, there is the risk of crossed contamination, which is produced when the microbes that are in the **raw food** pass to the food that is consumed **without previous cooking** such as cheese, salads, snacks, etc. or to dishes prepared and ready for consumption.

## Thematic Issue: Key No. 3 Adequate cooking of food

### Contents:

Importance of temperature in cooking. Use of the thermometer. Role played by the food handler.

### Cook food fully at the adequate temperatures

When cooking grilled meat, it is common for some food consumers to take it out when the joint is no longer red, forgetting to watch its inside, or what is worse, in the case of chicken, they serve it half raw since according to them: "this way it keeps a special flavor".

None of these habits could be more wrong since a **correct cooking** should reach, according to several scientific studies, at least **70°C** (to verify the temperature, it is recommendable to use a thermometer) to kill the microorganisms that may have developed during the storage of the food. The temperatures vary according to the kind of food. When cooking **large pieces**, it is convenient to verify that they reach this temperature inside. To ensure that the food is correctly cooked, you can look at the color it shows

after being cooked. In general, the color of meat goes from pink to grey. Since they require a longer cooking period, large pieces of beef, chicken and pork should be well cooked and without the presence of red juices.

Before consuming food that has been refrigerated and is consumed hot, it should be heated until it reaches cooking temperatures. The best way to cook a food product is on slow fire for such time as may be necessary for its inside to be well cooked.

### **When food is exposed to heat**

When man discovered fire, their feeding improved significantly in taste, hygiene and variety. Cooking made it possible to turn into edible food certain products which due to the hardness of their fibers or for lack of appropriate hygiene were not previously consumed.

Basic forms to apply heat:

- Direct cooking on fire;
- Dry heat: generated by an oven;
- Through the heat of a gridiron or grill;
- Boiling;
- Steam;
- Microwave.

### **When cooking fish**

It should be taken into account that fish, like most food products, should be cooked fully, even more since raw shellfish constitute a significant source of food contamination. In general, fish is cooked when, upon using a fork, its meat separates easily into flakes and loses its translucent or raw appearance.

### **Pasteurized milk, one exception**

It is not necessary to boil pasteurized milk since it has already been subject to a hygienic process by means of heat at a dairy plant.

### **Vegetables**

The cooking time should be sufficient for the vegetables to turn soft but not overdone or overcooked. Long cooking times destroy the vitamins and change the taste of the product. It is recommendable to cook them with little liquid since vegetables have a high content of water in their composition and it is possible to prepare them this way.

In addition, it is important to boil them in covered-up containers to prevent the contact with the air from destroying their vitamins.

### **Adequate cooking temperatures**

entire fowls, legs, thighs and wings	82° C
turkey and chicken breasts.	77° C
Well-done beef, veal and lamb	
leftovers, stuffings and casseroles	74° C

Ground meat, hamburgers, meatballs, medallions Medium beef, veal, lamb. Egg-based dishes.	71° C
Medium-rare beef, veal, lamb.	63° C

### Use of the thermometer

The **thermometer** is the right hand of the food handler since maybe the most important factor to be taken care of at the various stages of food preparation is the temperature in order to ensure that the food is kept out of the dangerous zone (don't forget that this is between **5 and 60°C!**).

The most frequently used **kitchen** thermometer has a metallic rod of about 12 to 15 centimeters, enough to be introduced in the **thickest part** of the food and reach the center of the piece.

This kind of thermometer possesses a screw in the joint between the rod and the dial that allows its calibration from time to time.

There are different kinds of thermometers:

- **Instantaneous reading:** It is not designed to stay in the food while it is being cooked. For its use, the rod should be inserted until the end reaches the center of the food. In the case of pieces that are not too thick, such as a hamburger or chicken breast, the rod is introduced sideways. The temperature stabilizes in 15 or 20 seconds.
- **Digital:** It should not stay in the food while it is being cooked either. The rod end should be placed in the center of the thickest part of the food and the temperature will stabilize in about 10 seconds. It is very adequate for food that is not too thick.
- **Ovenproof:** It is indicated to stay in the food during the whole cooking. Its rod is also placed in the thickest part of the food and is inserted up to the center of the piece. It will show the temperature the food progressively reaches during the whole cooking.
- **Fork-type:** In general, it is used in grilled food. It is attached to a fork that acts as a rod and has a reading indicator.
- **Disposable:** In general, it is directly placed in the food to be cooked in the oven, such as turkeys.

Being a measuring instrument, the thermometer needs to be **calibrated**. The rod and dial thermometer is the most frequently used at the kitchen as well as the one with the adjustment screw for the calibration. This calibration can be accomplished by introducing the thermometer in water with plenty of ice, waiting a minute for the temperature to stabilize and verifying whether its reading reaches zero centigrade degrees. Otherwise, it will be necessary to move the screw until it is adjusted to such temperature.

**Source:** Manual of Food Handlers. Municipal Intendancy of Montevideo. PAHO-WHO.

The salmonellosis cases in human beings appear sporadically or as part of an outbreak. In some kinds of salmonellosis, in particular with the *Salmonella Typhimurium* -serotype, undercooked beef is an infection source extensively documented in industrialized countries.

A research on three outbreaks of salmonellosis occurred in France between 1998 and 2000, confirmed the involvement of minced meat consumption and emphasized the importance of the preventive measures. The danger of intoxication through the consumption of hamburgers, meatballs or meat empanadas slightly cooked is very high since the trituration of the product increases the risks. The meat piece presents more juices and, being in small portions, it has a greater surface of contact with the air.

According to the study performed in France, the consumption of hamburgers was the cause of the three salmonellosis outbreaks. The frequency of the infections by *Salmonella Typhimurium* is particularly high in children. To identify the risk factors that determined the infections, a case-control study was carried out by the National Network of Public Health. In children who had consumed minced meat, the risk of disease associated to the consumption of almost raw meat, compared to the consumption of the product well cooked was five times higher, especially in children from 1 to 5 years of age. The results of the three researches on the outbreaks and the study of sporadic cases showed that insufficiently cooked hamburgers, irrespective of whether they were acquired fresh, precooked or frozen, played a decisive role in the transmission of the salmonellosis.

**Source:** [www.eurosurveillance.org](http://www.eurosurveillance.org)

## Thematic Issue: Key No. 4 Safe temperatures

### Contents:

Importance of the temperature in food preservation. Safe zones and dangerous zones.

### Keep the food out of the dangerous temperatures

The adequate storage of the food is a measure to **reduce the risks** of food contamination. Some products should be stored in the refrigerator and consumed within a **short period of time**, such as in the case of fresh meat, cheese and ham. On the contrary, other products such as flour, vegetables, and canned food (unopened preserves) can remain in storage for a longer time and be kept at room temperature.

However, all food products have a limit of time to be kept in storage. In the case of cooked food products, it is recommendable not to expose them to **room temperature** for more than two hours, not to leave them on the kitchen table or in the oven. Microorganisms multiply rapidly when the food is kept at room temperature since this favors the conditions for their growth (humidity and temperature).

In general, the microbes that cause disease grow very fast at the human body temperature, that is, at 36-37°C. As the temperatures move up or down from these figures, their development is progressively hindered. Under 5 degrees, that is, at the temperature of a home refrigerator, the growth of microbes **becomes slower** or may even stop, and above 60 degrees, the bacteria start to die. In addition, **freezing** prevents bacteria from reproducing.

For this reason, it is important to rapidly refrigerate all such food that may require it, for example: raw or cooked meat, poultry, fish, shellfish, dairy products, raw or cooked eggs, vegetables, rice, dough, among others (preferably under 5°C), or to keep the food hot (above 60°C) if the cooking is finished but it is not to be immediately consumed.

Do not defrost food at room temperature. It is advisable to do so in the refrigerator, the microwave oven or under a tap of running water.

### The good care starts with the purchase

At the supermarket, we should leave the purchase of refrigerated or frozen products **for the end**. Once our purchase is concluded, we should separate the products by kind (meat, dairy, etc) in the bags and, if possible, place them in an **isothermal container** to maintain their temperature and prevent the cold chain from breaking. Once we get to our homes, the respective food should be stored in the refrigerator or the freezer **as soon as** possible.

Every time we take the food out of the house (either when we return from doing our shopping or to consume them outdoors), we should avoid exposing or placing it in warm places, such as near the car engine or under the sunlight. The best way to carry perishable food is in a portable refrigerator.

In case the food is delivered to our homes, we should check that the employee has **stored it correctly** during its transportation. When ordering food that has been heated, you should verify that it is still hot, at 60°C.

Raw food, such as meat or poultry, may contain microbes that cause diseases. To prevent them, we should store the products in the **refrigerator**. To avoid crossed contamination, we should keep raw food in containers separate from the other food, in particular, cooked or ready-for-consumption food

(such as salads, cheese and sandwiches). Eggs should also be placed in the refrigerator, in the respective packaging.

Microorganisms spread easily through the **air** and, therefore, they may fall over the food. The microbes coming from animal feces, wastes, etc. are disseminated in the **environment** and many of them can remain viable and endure low temperatures without losing their vitality. Germs can survive according to their nature and the room temperature. For this reason, it is recommendable to **keep** all edible products to be consumed or cooked **covered up**. In the case of perishable products, you should put them rapidly in the refrigerator.

Keep the respective food refrigerated through its consumption. In addition, the products purchased that are to be consumed on the same day should also be **kept in the refrigerator**. Check the labels of the articles in order to determine which products should be stored in the refrigerator and for how long once the packaging has been opened.

When storing cooked food in the refrigerator, we should empty the freezer – in case it contains raw food- and place labels on the food to be stored, indicating the date and the description of the content. Consult the refrigerator manual to find out for how long cooked food can be kept in storage.

Never place **open cans** of preserves in the refrigerator. Their content should be transferred to covered-up containers or trays protected by a lid. Remember to consume them in the next few days. The food can also be covered with aluminum paper but it should not be used again to package other food.

### **Frozen food**

When the weather is too **hot**, it is recommendable to put the frozen food in an isothermal bag so that it does not begin to defrost before getting to your home.

Frozen food maintains all its nutritional values provided the cold chain is not broken during its storage.

The **less time possible** should pass from the moment we purchase the food until we place it in the freezer, especially in days of high temperatures.

### **Storage in the refrigerator/freezer**

To keep the food safe and healthy, we should verify that the refrigerator is **working correctly** and that it remains clean on a permanent basis.

A **thermometer** can be used to check the refrigerator and freezer temperatures. Please bear in mind that the cold does not kill the microorganisms. Bacteria develop and multiply more rapidly between 5°C and 60°C. This method **delays** the growth and multiplication of the bacteria. Therefore, a refrigerator working between 0°C and 5°C will prevent, through the low temperatures, the rapid multiplication of the bacteria. The adequate temperature for freezing is -18°C. There are certain measures that facilitate its correct operation:

- Avoid **overloading** the refrigerator since it will hinder the preservation at low temperature.
- Clean frequently all the internal and external surfaces, specially the **shelves and doors** of the compartments used for storage. Dry and remove any liquids as soon as they are spilled.

- Defrost the refrigerator/freezer on a regular basis.

**Source:** PANALIMENTOS

**How is food stored in the refrigerator?**

To place food in the refrigerator, it is important to take into account that each food product should occupy its respective space, considering the **coldest** places and where the air circulates more effectively. Please bear in mind that we should always place cooked or ready-for-consumption food on the upper shelves and raw food on the lower shelves to prevent them from spilling their juices over the cooked products.

## Thematic Issue: Key No. 5 Safe Water and Raw Materials

### Contents:

The role of the label on food. Argentine Food Code. Packaging: the importance of its integrity to maintain the food quality and safety. The importance of safe water for health. Methods to obtain drinking water.

**The water and food that we consume should come from reliable sources.**

**SAFE RAW MATERIALS** (refer to the **appendix** of the Argentine Food Code as regards the Regulations on Food Labeling and Advertising).

Upon making a food purchase at the supermarkets, groceries or similar stores where we usually shop, we should take into account a series of requirements to prevent a possible intoxication as a result of purchasing food in bad conditions.

Raw materials can not only contain microorganisms but also harmful chemical products. For this reason, we should be careful upon selecting raw products or those prepared without any control (for example, homemade cheese and cold meats). We should choose food already processed such as pasteurized milk. In the case of raw food, we should take preventive measures, such as its washing and peeling.

### **The establishment**

It is always safer to visit those establishments known to us and which deserve our trust for their hygiene, quality and good preservation of the products offered.

The selected business should offer cleanness and tidiness; expose the food on clean shelves (never on the floor or near walls); and ensure the absence of animals on the premises. Perishable food should be displayed correctly refrigerated. For example, meat should be stored at temperatures between 0 and 5°C. It is necessary for refrigerators and freezers to have a thermometer to verify the temperature.

### **The packaging**

The packaging fulfills the function of ensuring the preservation and facilitating the transportation of the food. It should always be in perfect conditions. Discard bruised, swollen or rusted cans of preserves. Do not purchase packages that have been opened or are moist. The same applies to broken jars or that have a loose lid since the food may have been contaminated.

In the case of meat or poultry, verify that the package is well sealed and the products do not spill any liquids. In the case of eggs, make sure they have no cracks since microbes may enter through them.

After having checked the packaging conditions, we should read the label.

The expiration date means that the product should not be consumed after the indicated day. Therefore, do not purchase food whose shelf life has elapsed. It is important to distinguish it from the date of manufacture. The expiration date is stated as follows: "*Best before day, month and year*", and as from the date indicated there, the sale of such article is forbidden.

Verify that the food products have their respective **identification label**. This label should be visible, legible, unchanging, precise and written in Spanish. In addition, it is important for the label to include the minimum shelf life, the kind of food involved, the list of components and additives, net content, identification of origin, batch number, preparation and instructions for use, if applicable. Check that the

dates of manufacture and/or expiration have not be adulterated (crossed out, erased, overprinted) and be careful not to consume the food after the indicated dates.

As consumers, we should always pay attention to the information provided on the label or through advertising.

It is recommendable to take a minimum time to make the purchase. Verify at all times the quality and price. The most expensive is not always the best.

Do not purchase prepared food that is exhibited at **room temperature**. In the case of refrigerated products, verify that the temperature of the shelves does not exceed **5°C**.

If we purchase products **on sale**, confirm the product quality and expiration date.

### **Storage of raw materials at home**

To prevent any kind of contamination in food, it is essential to keep the raw materials in order and in a clean, ventilated and illuminated place. It is always convenient to put the newly acquired food products behind those that have been stored for a while.

Use at all times shelves or stands to hold up the raw materials. Store the food in containers well sealed, **labeled** and with an expiration date.

Keep toxic products (such as insecticides, fuels, detergents, disinfectants) **closed**, correctly identified and **separated** from the food.

Do not keep food under pipes that may **drip** over it.

Do not use containers that have been used for **toxic products** to store food.

### **Useful advices to purchase food**

To be **prevented** from a possible intoxication as a result of a disease transmitted by the consumption of food in bad conditions, it is recommendable not to acquire products **with no labels**, or manufacture or expiration dates, or which have superposed or **dirty** labels, expired products, **bruised** or rusted cans or broken jars or that have a loose lid.

As regards the product expiration date, it should be noted that its location on the container should be such as **not to be broken** upon being opened. The moment on which the product will be consumed should always be taken into account. For example, if a mayonnaise bag says that the product expires on December 24, it should not be consumed **after** such date. On the other hand, if a flan powder box shows the expression "Best before", it can be consumed after such date since there is no intoxication hazard although then, it will begin to lose its **nutritional qualities**. In addition, from time to time, certain product containers show the expiration date indicating only the day and month. In such cases, the product involved is only preserved **for three months**. In case they were suitable for consumption for a longer period, the expiration year would also be indicated.

For an efficient control of the quality of packaged food, the following indications should be printed: the container must show the **name** ("low-fat XX Yogurt") and the list of ingredients. It is essential for food safety to check whether the container is **bruised or broken** since this may affect the content preservation.

The food product label should state the **country of origin** where the product was manufactured since this way the imported food that may transmit diseases is individualized (For example, when in certain places, a "Red Tide" is reported affecting shellfish and other seafood).

The information should be in the **language spoken in the country** where the imported product is sold, it may even appear on a label adhered to the container. In addition, the label should indicate the **storage conditions**; whether it should be kept in cold, frozen or dry storage.

Another datum to take into account is the **batch** identification number, which determines the manufacture lot to which the food belongs. This is very useful since it allows the identification of all products manufactured at the same time and in equal conditions. In case the lot suffers any alteration and has to be taken out of sale, these goods may be rapidly detected.

It is advisable to leave the purchase of perishables such as ice-cream, milk, yogurt, etc. **for the last minute** since if they stay for a long time outside the refrigerator – while going through the establishment - the cold chain may be broken. Therefore, the last products that have to be removed from their place are those which are frozen. The storage conditions of these products in shelves or refrigerators and at home should be: 5 degrees for cold-stored food and -12 or -18 degrees below zero for those that are kept frozen.

Make sure that each frozen food container is **separately** packed to prevent the contact with those products that may give off juices or blood (for example, meat). The package should be **well sealed** and cold to the touch.

For the storage of perishable food at home, it is convenient to use **quick freezing** (a temperature of 18 degrees below zero in a 4-hour term) which will prevent the deterioration of nutrients and vitamins. The food should be defrosted in the refrigerator or, otherwise, in the microwave oven. The products should never be exposed to room temperature. It is recommendable to take the food from the refrigerator or freezer all at once avoiding thus the loss of cold from repetitively opening the refrigerator door.

When your purchase the food prepared by the establishment (they are usually offered at large supermarkets), avoid the food containing any **half-cooked shellfish or meat or egg derivatives** (such as salad seasonings or certain fish such as sushi or ceviche).

When applicable, (for example, powders to prepare desserts) the **information** on how to prepare or use the food sold is valuable. A series of the steps to be taken may be briefly detailed on the package – with explanatory graphics – to help the consumer prepare the food acquired adequately.

In the case of dietetic products or that are used for special diets, it is mandatory to show the nutritional information about such food on the container.

### **Packaging alterations**

On certain occasions, the preserves containers show alterations known as **swelling** (*abombamiento*), which may be hard or soft. In the first case, both extremes of the can are permanently **distended** and cannot be pressed down. In the second case, the extremes are distended but go down slightly upon exerting some pressure. In general, this swelling may appear as a result of the following: an insufficient thermal heating or an insufficient refrigeration after an adequate thermal heating or contamination subsequent to the preserve treatment. The most frequent defects observed are: the can **lid and bottom** are convex; the can emanates a strange odor and the content is decomposed. Such alterations are produced by bacteria which trigger decomposition reactions in food, followed by the emanation of toxic gases.

In addition, the swelling may result from a **chemical or physical source**. The chemical swelling results from the interaction of the food with the packaging components or corrosion. This irregularity is evidenced by a pervading odor which is not unpleasant but which has a **metallic flavor** caused by the corroded areas. On the other hand, the physical swelling results from an **excessive filling**, compression or freezing. Although such alterations are not harmful for health, the product has to be sold at a lower price. To detect whether a standard-looking can has gases within, it should be hit with a metal. If it emits a dull sound, there is no gas in its interior, otherwise there is gas and thus, the product is not suitable for human consumption.

### **How is the food that we purchase protected?**

Food should be **protected against humidity and heat** by keeping it in jars or cans with screw-on and clamp-on lids to avoid the entrance of humidity and the possible growth of fungi that are harmful for health. Fresh products, such as dairy products and their derivatives, fresh pasta, meat, fractionated cold meat, pre-cooked food such as pre-pizzas, cakes, etc. should be refrigerated at a convenient temperature. When shopping at the market, leave this kind of products for the last minute. This way, they will not be exposed to room temperature for a long time until you reach your home and refrigerate them. Thus, the cold chain will not be broken.

In addition, preserves should be displayed at a **dry fresh place**, free from humidity. Both cans and jar lids get rusted and deteriorated and thus, microorganisms that produce foodborne diseases may get into the product. An example of this is provided by the growth of the *Clostridium botulinum*, which causes botulism. This is a fatal disease and therefore, rusted, swollen, bruised and badly conditioned cans should be discarded.

### To keep well informed: one consumer duty

In supermarkets, groceries and similar stores, it is possible to acquire food, either packaged or not. Upon purchasing a product, a series of requirements should be taken into account to avoid a possible intoxication from the consumption of food in bad conditions.

Before purchasing the product, the consumer should **look for the information** on the label or that provided by advertising. The general purpose will be the assurance that the food is sold as per the conditions required by **health authorities**: indication of the manufacture and expiration dates, besides the warranty of the most absolute hygiene in its presentation, etc.

It is convenient to read the label to find out whether or not it is recommended, after the product is opened, to keep it **refrigerated** or to transfer it to another container (For example, preserve cans since they get rusted and contaminate the food even though refrigerated).

For the product display at the various stores, glass containers or special cans **approved** by each country's Alimentary Code are recommended.

The **establishment** where the product is manufactured as well as the item in itself should be **registered** according to the food legislation in effect in each country. Even the registration should appear on the label. If the registration is not documented or the phrase "in progress" is not shown, the **sale** of such product **is not allowed** by law. The consumer will have to bear in mind all these details to avoid consuming such products.

In many cases, the human body is capable of resisting the presence of certain harmful bacteria. However, certain people have more weaknesses and may contract serious diseases in case of suffering from food intoxication, such as pregnant women, newly born children, the elderly and people with a weakened immunological system. Therefore, upon acquiring food, the **people with whom the product will be shared** should be taken into account.

### CONSUMPTION OF DRINKING WATER

Water is a vital resource for all living creatures. Each benefits from it differently but all of them need water to survive.

Human beings have 70% of water as part of our body weight and it is essential for all the vital functions of our organism.

Fresh water is used by human beings for direct consumption and cooking food; personal hygiene, cleaning of our clothes and homes in general; for agriculture and livestock; for industrial uses; as a means of transportation and recreation and for the production of power.

To ensure a healthy life, every community should have an adequate access to water in optimum

conditions for its procurement. To meet these requirements, it is necessary to turn the fresh water that is obtained into drinking water.

Fresh water is potable when:

- It does not contain any germ or parasite that cause diseases;
- It is clean, clear and tasteless;
- It does not contain toxic or undesirable substances.

In the absence of tap drinking water, it is possible to make the water potable by adding two drops of bleach per liter or else, by boiling it for 5 minutes. It should be taken into account that the water to wash the fruits and vegetables for our consumption should also be potable

### **How is safe water obtained?**

The water sources should receive a special care since the possibilities of having clean water, which is essential for our health, are derived therefrom.

The natural sources which provide us with water are:

- Rain water;
- Rivers, streams, lakes or thaws (which are superficial waters);
- Springs or aquifers (which are ground waters).

In case the water comes from underground sources, the extraction wells should be constructed not less than 15 meters from latrines, water puddles or garbage dumps. The wellhead should be protected to avoid the entrance of harmful elements. The vegetation around the springs should be taken care to act as a protective fence. The rivers, streams or lakes should be protected against contamination and inadequate uses.

It is necessary for the communities to become aware of the importance of having clean water sources. They should avoid using them as latrines or throwing there garbage or agricultural and industrial wastes without previous treatment.

### **Disinfection of the water through physical processes**

Water is disinfected to destroy the microbes or parasites found therein and which may cause diseases to the people. Water can be disinfected through heat.

#### **Boiling**

It is an efficient method since all bacteria die or become inactivated when water reaches its boiling point (100°C). It is recommended to boil water for 5 minutes.

After boiling the water, it is essential to avoid any probable source of contamination. In particular, be careful about a possible recontamination caused by the hands, utensils, storage containers or even the particles transported by the air.

A good practice is to store the water in the container used for its boiling. In case it were necessary to transfer the boiled water to another container, it is essential to clean this container before introducing the water.

## **Disinfection of the water through chemical processes**

Among the chemical processes to disinfect water, the elemental iodine, the chlorine and its compounds, such as the sodium hypochlorite or the calcium hypochlorite, should be noted.

### **Chlorine**

Chlorine is not only one of the most effective disinfectants for fresh water but also one of the cheapest. It is very efficient against the bacteria related to diseases transmitted through water.

The easiest way to apply chlorine to water is in tablets or in a solution. After applying two drops of sodium hypochlorite or bleach, the water should be mixed up and left to rest for 30 minutes so that the chlorine may get in contact with the microorganisms.

### **Iodine**

It is an excellent disinfectant for water. It is effective against bacteria, viruses and other microorganisms of diseases transmitted through water. However, its availability and use have been restricted. Its cost is from 6 to 10 times higher than that of chlorine. The use of a solution of 2 percent of iodine tincture is a practical way to disinfect water in small quantities.

A dosage of two drops per liter can be enough for clear water.

Similarly to the case of chlorine, any turbidness may interfere and, if there are particles present, these may protect the microorganisms. Filtration as a preliminary treatment increases its effectiveness.

After applying iodine, the water should be mixed up and left to rest from 15 to 20 minutes. The water treated with iodine is appropriate to wash vegetables. In general, it is recommendable to wash and leave the vegetables to rest in the solution for about 10 minutes.

**Source:** PANALIMENTOS

### **Use water to wash vegetables**

The washing of fruits and vegetables in drinking water removes microbial cells. In some cases, a vigorous washing reduces the microbial populations from 10 to 100 times.

The water temperature should be higher than that of the fruits and vegetables to minimize the absorption of the microorganisms from the surface to the interior of the tissues.

Even though disinfectants produce variable effects on the control of pathogens in fresh fruits and vegetables, they are very effective at disinfecting the water for their washing. This way, the contamination resulting from the use of unsafe water is prevented.

There is scarce information on the disinfectants to eliminate the parasites and viruses present in fruits and vegetables.

### **Irrigation water**

Most hazards linked to fresh fruits and vegetables are in the field production environment (for example parasites such as Cyclosporine and Cryptosporidium, E. Coli O157:H7 and possibly, enteric viruses through waste waters).

Although the use of drinking water to wash or cool vegetables is helpful both in the commercial practice and at home, the effect of the rinsing water on the contamination level should not be overestimated.

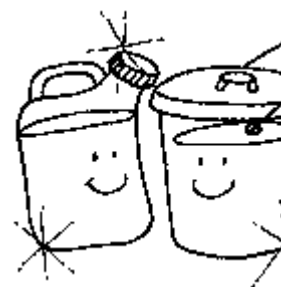
**Source:** Axis. Food Information Center

### **Maintenance of adequate containers to carry water**

The containers to carry water should be of plastic, transparent or clear and with a lid to protect the content adequately. They should not have a secondary use.

It is necessary to clean the containers with water and soap on a regular basis. If they are dirty, even though our source supplies clean water, the water will arrive contaminated to our homes and all the work to protect the source will have been wasted.

Therefore, it is essential to look after the containers that carry the water with the outmost care.



Drinking water can also be carried on tank trucks, which could be adequately maintained and cleaned so that the water arrives the consumers in appropriate conditions.

In case buckets are used to carry water to the house, they should be clean and have a lid to prevent foreign elements from contaminating the water on our way there.

### **Inter-American Water Day (first Saturdays of October each year) (it could be commemorated at schools).**

The Pan-American Health Organization (PAHO) in conjunction with the Inter-American Association of Sanitary and Environmental Engineering (AIDIS) and the Caribbean Water and Wastewater Association (CWWA) sponsor the **Inter-American Water Day in the Region**. From its creation in 1995, this celebration takes place on the **first Saturdays of October each year**.

This commemoration emphasizes the importance of water as one of the key factors for health, **to teach its appropriate use** and promote ongoing community activities that lay stress upon the preservation and protection of the water resources.

The basis for this day is found in the Declaration of the Inter-American Water Day, subscribed by the three organizations mentioned above in November 1992, with reference to the Declaration of Rio de Janeiro on Environment and Sustainable Development.

**Source:** [www.cepis.ops-oms.org](http://www.cepis.ops-oms.org)

## **GENERAL ISSUES**

### **Learning to take care of food at school**

When classes start, many children change their habits since they stay for lunch at school and begin to enjoy outdoor excursions or trips. For this reason, it should be taken into account that when mothers prepare lunchboxes for their children, the food may stay for a long time at room temperature, which favors the development of microbes.

Therefore, we should plan what kind of food is the most adequate for the children's lunchboxes, to ensure that the food they take to school will be nutritious and safe.

There are two kinds of food: the low risk food (nonperishables) and the high risk food (perishables).

Low risk food does not change or become decomposed at room temperature, provided it is correctly handled. The risk of suffering any deterioration is low, but it is always recommended to handle the food carefully, especially upon storage.

Some of these food products may be: sweet or salty cookies, washed and uncut fresh fruits, juice cans or boxes, dry fruits, among others.

On the other hand, high risk food is that which should be stored cold, or that whose features generate the development of bacteria. For example: a chicken piece, cold meats, mayonnaise-based products or dairy products. This food runs great risks of being contaminated and therefore, you should be careful not to break the cold chain during its storage. You may even include a small bag of ice to keep it cold up to lunchtime.

Taking into account that children may perform outdoor activities when they are at school or when outings are organized, remind them to wash their hands carefully before eating. For additional protection, you may include towels and soap in the lunchbox.

Find out whether the children have access to a refrigerator at school and remind them to refrigerate their lunch as soon as possible. Make sure that the food is identified with a label.

Bear in mind that childhood is the time in which a person starts to define his/her feeding habits for the future.

Some practical advices to prepare the children's lunch are as follows:

- Wash your hands adequately before preparing the lunch.
- Make sure the lunchbox is clean.
- Use clean utensils to prepare the food.
- Take the children's food out of the refrigerator right before they leave for school.
- Package the food to be placed in the lunchbox correctly. Remember to separate raw from cooked food.
- To prevent crossed contamination, we can include canned food or any food product that does not require refrigeration, such as biscuits or canned fruits.
- If the food is to spend a long time at room temperature, it is recommendable to keep it refrigerated. In this case, you can include a cold maintenance device such as those used in portable refrigerators. Or else, you can use the juices that come in cardboard packages, previously frozen.
- To package food, use waterproof materials, such as plastic bags or aluminum paper.
- To carry the food, it is convenient to keep it in durable containers, preferably of plastic material and easy to clean.

Remind your children to throw away all perishable leftovers after lunch.

## **Foodborne Diseases**

### **Salmonella spp.**

In general, it is found in the intestinal tract of man or animals.

-Symptoms: nausea, vomits, abdominal colic, diarrhea, fever and headache. The incubation period is from 12 to 36 hours.

-Chronic consequences: arthritic symptoms that may appear from 3 to 4 weeks after the acute symptoms.

-Associated food: raw meat, chicken, eggs, milk and its derivatives, fish, prawns, frog legs, sauces and salad dressings, blends for pastries, cream-based desserts, jelly powder, peanut butter, cacao and chocolate.

-Control measures

-(1) Heat the food until it reaches a temperature sufficient to eliminate the bacteria, from 65 to 74°C (149 to 165°F);

-(2) Store the food at temperatures below 5°C (41°F);

-(3) Avoid crossed contamination after the thermal treatment; and

-(4) Prevent people with salmonellosis symptoms or carriers from handling food.

### **Escherichia coli**

The Escherichia coli is a common inhabitant of the intestine of all animals. The Escherichia coli O157:H7 is a variety of the bacterium that usually produces hemorrhagic colitis. Certain infected persons (especially when it affects children) may develop the hemolytic uremic syndrome, characterized by renal failure and temporary anemia. This disease may leave renal insufficiency as a consequence.

-Symptoms: acute colic (abdominal pain) and diarrhea, which is liquid at the beginning and then turns bloody. There may also be vomits. Fever is usually low or is not apparent. This disease may lead to a permanent loss of the renal function. The incubation period is from 3 to 9 days.

-Associated food: raw beef or ground meat (hamburgers), raw milk, lettuce, apple juice and any food that has been contaminated with fecal matter.

### **Control measures**

- (1) Heat food between 65 and 74°C (149 and 165°F);
- (2) Store the food at a temperature below 5°C (41°F);
- (3) Avoid crossed contamination; and
- (4) Stop people infected with gastroenteritis from working with food.

### **Campylobacter spp**

It was isolated from healthy bovines, chickens, poultry and insects such as flies. From time to time, it is present in untreated waters, such as streams and ponds.

- Symptoms: diarrhea, which may be watery or mucous and, from time to time, may contain blood (in general, hidden) and leukocytes (white blood cells) in the fecal matter, fever, abdominal pain, nausea, headache and muscular pain. The incubation period is from 2 to 5 days.

- Associated food: insufficiently cooked chicken and raw milk. The bacterium may contaminate other food through crossed contamination.

- Control measures

- (1) Cook food completely;
- (2) Avoid the consumption of raw milk;
- (3) Use drinking water;
- (4) Prevent crossed contamination;
- (5) Apply adequate cooking time and temperature values; and
- (6) Do not allow domestic animals in the areas where food is handled.

### **Listeria monocytogenes**

It may be isolated from the earth and other environmental sources.

*L. monocytogenes* is very resistant and may perfectly survive the effects of freezing, desiccation and heating.

It does not form spores.

Listeria, unlike other microorganisms, can reproduce at low temperatures, even in the refrigerator. It may resist heat, salts and nitrites to a higher degree than other microorganisms. However, as it happens with the rest of the bacteria, the adequate cooking and the pasteurization destroy it completely.

Symptoms: Some people may present symptoms similar to those of a flu, with persistent fever and develop gastrointestinal symptoms. The symptoms may appear from 3 to 21 days.

Consequences: septicemia, meningitis, meningoenzephalitis, encephalitis and intrauterine or cervical infection in pregnant women, which may produce a miscarriage (second/third quarter) or the fetus death.

Associated food: raw or incorrectly pasteurized milk; cheese (in particular the varieties slightly matured ), ice-cream, raw vegetables, raw fermented sausages, raw and cooked chicken, raw meats (all kinds) and raw and smoked fish.

- Control measures

(1) Adequate cooking and good hygiene practices during the food processing;

(2) Prevention of crossed contamination.

### **Bacillus cereus**

The sources of contamination are the earth and dust, feces of animals and human beings.

The *Bacillus cereus* can form spores when the conditions are unfavorable for its growth. The spores are not destroyed by heat. If after being cooked, the food is cooled at room temperature, these spores can germinate and the reproduction of the bacteria begins. Two kinds of toxins are produced, one that is sensitive to heat: the diarrheic toxin that is produced in the food and/or the intestine, and another one that is resistant to heat: the emetic toxin that is produced in the food.

-Diarrheic intoxication symptoms: watery diarrhea, abdominal colic and nausea. Nausea can accompany the diarrhea but vomits are rare. The symptoms are similar to those of the intoxication caused by the *Clostridium perfringens*. The incubation period is from 8 to 16 hours.

-Emetic intoxication symptoms: acute nausea and vomits. Some cases may present abdominal colic and diarrhea.

-Associated food: food kept at room temperature after being cooked, rice, starch products, potato, dough and cheese. Mixtures of food such as sauces, puddings, soups, casseroles, pastries and salads.

Control measures

-(1) Adopt effective measures to prevent the formation of spores. Prevent the germination of spores in cooked food by keeping it refrigerated at 5°C or hot at > 60°C.

-(2) In case the refrigeration conditions were deficient, avoid preparing food in a larger amount than that to be consumed immediately after the cooking is finished.

### **Clostridium botulinum**

*Clostridium botulinum* is the name of the bacterium that causes the disease of botulism. It forms spores and is a powerful producer of neurotoxin.

The wound botulism: it is the rarest form of this disease. The disease is produced similarly to the case of tetanus.

The infantile botulism affects children of less than 6 (six) months of age. This kind of botulism is caused by the ingestion of *C. botulinum* spores that colonize and produce the toxin in the intestinal tract of children.

Honey is one of the sources of *C. botulinum* which is most linked to infantile botulism.

Botulism from a food origin: it is the most serious food intoxication caused by the ingestion of food that contains the powerful neurotoxin formed during the growth of the *Clostridium botulinum*.

The toxin can be destroyed through heat at 80°C (176°F) for at least 10 minutes.

The incidence of the disease is low but is considered of significance due to the high rate of mortality if not diagnosed and treated appropriately.

- Symptoms: extreme fatigue, weakness and vertigo, usually followed by double vision and progressive difficulty to talk and swallow. Flaccid paralysis.

The gastrointestinal symptoms may include abdominal pain, diarrhea or congestion.

The incubation period is from 12 to 36 hours but, in certain cases, it can extend to 8 days.

Death occurs as a result of respiratory insufficiency and obstruction of the air entrance in the trachea.

Associated food: Food that was incorrectly processed or raw food that contains spores and is subsequently kept in temperature and pH conditions that allow the multiplication of the bacterium and the development of the toxin. In general, food that is not heated before consumption. For example: palmetto, preserved corn, pepper, green bean, soaps, beet, asparagus, mushrooms, olives, spinach, tuna, chicken, chicken liver and liver pâté, cold meats, ham, sausages, stuffed eggplant, lobster, salty and smoked fish.

-Control measures

(1) Prevent the germination of spores;

(2) Control the thermal treatment of canned food and other processes such as salting or drying, fermentation or acidification;

(3) Good hygiene practices;

(4) Do not consume preserves in bad conditions and avoid preserves whose manufacture processes are not controlled.

## **Clostridium perfringens**

It is widely spread in the atmosphere and is frequently found in the intestine of human beings and of many domestic and wild animals. The microorganism spores are present in the ground, sediments and areas subject to fecal pollution from humans and animals.

-Symptoms: acute abdominal colic and diarrhea in an incubation period from 8 to 12 hours after consumption.

- Associated food: the preparation of food for collectivities (such as schools, coffee shops, hospitals, lodgings, penitentiaries, etc) is the most common cause of intoxication by *C. perfringens*, and it takes place when a large amount of food is prepared many hours in advance of its consumption. The *Clostridium perfringens* can reproduce during the cooking of great amounts of food on very slow fire, and is deeply related to the consumption of cooked meat.

Meat and its derivatives and meat broths are the most dangerous.

- Control measures

-(1) Monitor the production and storage of the food;

-(2) Refrigerate the food appropriately below 10°C (50°F) in 2-3 hours, and keep hot food above 60°C (140°F).

-(3) Upon reheating cold or refrigerated products, they should reach an interior temperature of at least 75°C (167°F).

## **Staphylococcus aureus**

The presence of this bacterium in animals results in the contamination of food, mainly the milk obtained from animals with mastitis. It is a toxin resistant to temperature.

- Symptoms: nausea, vomits, feeling of anxiety, abdominal colic and prostration.

- Associated food: meat and its derivatives, poultry and egg derivatives, salads with eggs, tuna, chicken, potato and dough, bakery products such as pastries stuffed with cream, cream cakes, snack stuffing in addition to raw milk and dairy products.

Control measures:

(1) Verify time and temperature;

(2) Avoid preparing the food too much in advance of consumption and keeping it at room temperature;

(3) Appropriate personal hygiene and adequate cooking to destroy the microorganism;

(4) Food handlers should not have any purulent wounds on their skin and should wear a chin strap.

It is found in the intestines, on the skin, the mouth and wounds of animals and humans. It can be transmitted to the food through the hands or beads coming from the nose and mouth, and when it stays at room temperature for too long. The production of the toxin in the food can be prevented by keeping it in the refrigerator. Food handlers may become the main source of contamination if they do not meet the most rigorous conditions of hygiene (washing of hands with soap, of utensils, etc). The toxin, once produced, is not eliminated through cooking. This is a case of intoxication of a food origin and the best way to avoid it is through the hygiene and refrigeration of the food.

## Glossary

**Acute diarrheic disease (Outbreak):** It is the appearance of two or more cases mutually related and where the epidemiological evidence discards the involvement of water or food. This kind of outbreak is characterized by the person-to-person transmission that may take place at the care units of infants, old people, etc. The conclusions are evidenced by the epidemiological curve with more than one incubation period in the outbreak.

**Acute diarrheic disease:** It takes place when the person has three or more liquid or watery evacuations in a 24-hour period.

**Antimicrobial soap:** It is a soap that contains ingredients capable of destroying or preventing the growth of microorganisms.

**Antiseptic:** Reduction, by means of chemical agents (70° alcohol), of a number of microorganisms on the skin of humans or animals without producing harmful effects on the skin.



**Bacteria:** They are unicellular microorganisms that reproduce by binary fission, many of which are saprophytes, others are beneficial and man uses them to produce substances in their benefit (for example, yogurt, antibiotics). However, there is a group of them that cause diseases, which are called pathogenic bacteria. To exercise their aggression, the bacteria need to feed and multiply, which is done at the expense of the substances making up the food or the organism cells.

**Case of foodborne disease:** It refers to a person that has fallen ill after consuming food and/or water deemed to be contaminated, based on the epidemiological evidence or the laboratory analysis.

**Cleaning:** Removal of all impurity, food residue, dirt, grease or other objectionable matter.

**Codex Alimentarius:** In the year 1962, the FAO and the WHO created a code for the purpose of facilitating the international trade of food and ensuring consumers not only the quality of the food but also its safety and security.

Eventually, the Codex Alimentarius (Food Code or Law) became one of the regulations most widely accepted and adopted in the world. The reason for this is that the Codex contains scientific grounds and that the correct application of the hygiene regulations in the production, processing, packaging and transportation, ensures the food safety. The Codex Alimentarius made it possible to minimize (even though the problem has not been completely solved) the risk of propagation of foodborne diseases since one of the basic concepts of the Codex states that "food is not nutritional if it is not safe".

**Contaminant:** It refers to any substance, not intentionally added to the food, that is present in such food as the result of its production (including operations performed in agriculture, zootechnics and veterinary medicine), manufacture, processing, preparation, treatment, packaging, transportation or storage or as the result of environmental contamination. This term does not include insect pieces, rodent hairs and other strange matters (Codex Alimentarius).

**Contaminated:** Any Food that has a contaminant.

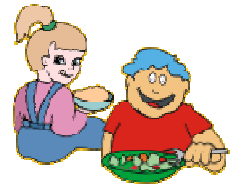
**Contamination:** The presence of an agent in the body, or in any object, or in food, that is capable to cause disease to a person. Introduction or appearance of a contaminating substance in the food or the food environment.

**Cross contamination:** It is the transfer of contaminating agents from a contaminated food product to another which is not. The most usual example is to cut raw chicken on a cutting board and then, without cleaning it, cut the vegetables to prepare a salad. The same can happen with the various utensils or with our own unwashed hands, which act by transferring the bacteria.



**Disinfection:** Reduction, by means of chemical agents and/or physical methods, of a number of microorganisms in the environment to a level that does not compromise the safety or suitability of the food. The objective of disinfection is to reduce the number of living microorganisms. In general, the disinfection does not kill bacterial spores. To be effective, the disinfection should be preceded by a thorough cleaning.

**DNA:** (Deoxyribonucleic Acid): nucleic acid formed by nucleotides in which the sugar is the deoxyribose and the nitrogenous bases are adenine, thymine, cytosine and guanine. Except for retroviruses that have RNA, the DNA encodes the information for the reproduction and functioning of cells and for the replication of the DNA molecule itself. It represents the hard copy or deposit of the primary genetic information, which in eukaryotic cells is confined in the safe of the nucleus.



**Epidemic:** It is the appearance of disease cases above the expected number. In general, it refers to outbreaks.

**Familiar outbreak of foodborne disease:** Episode in which two or more people that live in the same place present a similar disease, after consuming a common food and where the epidemiological evidence points to food or water as the origin of the disease.

**FBD:** It is the acronym used for foodborne diseases in English.

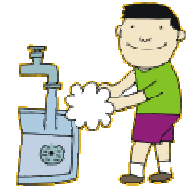
**Food additive:** It is any substance that is not normally consumed as food by itself nor is it used in general as the typical food ingredient, irrespective of whether it has nutritional value or not. Its intentional addition to the food for a technological purpose (even sensorial) in the manufacture, preparation, treatment, packaging, transportation or storage, will reasonably make (directly or indirectly) the substance itself or its subproducts become a supplement of the food or affect its characteristics.

**Food containers:** They are used to hold the food, conditioned within them from the moment of manufacture, for the purpose of protecting such food from external agents of alteration and contamination as well as from adulteration until being used by the consumer. These containers should be dietetically fit and to such end, should meet the following requirements:

- Be manufactured with materials authorized by the Food Code.
- Meet the particular requirements where specified.
- Should not transfer undesirable, toxic or contaminated substances into the food in an amount in excess of that allowed by the Code.

- Should not release substances that modify the compositional or and/or sensorial characteristics of the food.
- Should have seals or sealing systems capable of preventing the involuntary opening of the container in reasonable conditions.
- No systems or mechanisms to make the containers inviolable or to show evidence of intentional opening will be required except in the cases specially provided for in the Code.

**Food Hygiene:** It comprises the necessary conditions and measures for the production, processing, storage, distribution, marketing and even the culinary preparation of the food, to ensure a safe product, in good conditions and edible, fit for human consumption.



**Food infections:** They are the foodborne diseases produced by the ingestion of food or water contaminated with specific infectious agents, such as bacteria, viruses, fungi, parasites that in the intestine can multiply and produce toxins or invade the intestinal wall, and from there, reach other systems.

**Food intoxications:** They are the foodborne diseases produced by the ingestion of toxins formed in plant or animal tissue, or of metabolites of microorganisms in food, or by chemical substances that are introduced in the food either accidentally, incidentally or intentionally at any moment from its production to consumption.

**Food packaging:** It refers to the materials or structures that protect the food, whether or not in a container, against bumps or any other physical damage during its storage and transportation.

**Food product:** Any harmless matter, in the absolute or relative sense, that without having nutritional value (or if it does have nutritional value, its use does not depend on this attribute) can be used in nourishment or be related to food or to its means of entrance to the organism. This term includes additives, packaging materials, containers, detergents, disinfectants, as well as construction materials of machinery, water tanks, conveyor belts, facilities, transportation vehicles, utensils, installations, etc. used in industries and other trades.

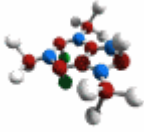


**Food Safety:** As established by the Codex Alimentarius, it is the assurance that a food product will not cause harm to the consumer upon its preparation or ingestion, according to its intended use. Food is the main source of exposition to pathogenic agents, both chemical and biological (viruses, parasites and bacteria), to which nobody is immune, neither in developing nor in developed countries. When food is contaminated at unacceptable levels of pathogenic agents and chemical contaminants or with other dangerous characteristics, they imply substantial risks for the consumers' health and represent heavy economic burdens for the various communities and nations. The subject of safety is very extensive. It also refers to the chemical contaminants present in food, food produced by modern biotechnological means, assessment of microbiological risks, and publications and documents.

**Food:** According to the Codex Alimentarius, it is all finished, semifinished or natural substance earmarked for human consumption, including beverages, chewing gum and any other substance used in the manufacture, preparation or treatment of food; however, it does not include cosmetics or tobacco or substances used as medicines.

**Foodborne diseases (FBD):** They are syndromes originated from the consumption of food or water containing etiological agents in sufficient quantities to affect the health of the consumer either individually or in groups of population. The main symptoms are characterized by. diarrhea, vomits, nausea, abdominal pain, muscular pain, headache and/or fever.

**Friction:** Rub two objects together. For example, to rub both hands creates friction.



**Gen:** Physical and functional unit of hereditary material that determines the character of the individual and is transmitted from generation to generation. Its material basis is constituted by a portion of chromosome (locus) that encodes the information through DNA sequences.

**Germ:** They are microorganisms that may cause disease in human beings and, in general, can only be seen through a microscope. Example: bacteria, viruses, moulds.

**Healthful:** It is something that serves to preserve health. Thus, the question of food being healthful depends intrinsically of its nutritional properties but there are also extrinsic factors (weather, psychological or physiological aspects of the consumers, availability of food, etc) which will render it more or less healthful. The generalized belief that all food products are healthful makes it difficult to spread the knowledge that unsafe food can also produce disease. See the differences of concept between safe, healthy and healthful.

**Healthy:** "*Means enjoying good health*". The second meaning of the Spanish language, defines it as "*Safe without risk*", safety. The third meaning defines it as "*conductive to good health*" and from there, the possible confusion that all food products must be healthful.

**Host:** A person or animal that lodges a specific infection agent without showing any clinical signs of the disease and is capable of transmitting such agent.

**Hygiene:** Part of the medicine engaged in preserving health and preventing diseases. Cleanliness, tidiness. Public Hygiene is that applied with the intervention of the authority through regulations. In terms of the Argentine Food Code (Law No. 18.284): it is all substance or mixture of natural or finished substances which upon being consumed by humans provide the materials and energy necessary for the development of the biological processes to their organisms. The term "food" also includes such substances or mixtures of substances that are consumed by habit, custom or as supplements, irrespective of whether they have nutritional value or not.

**Infection:** Entry, development or multiplication of an infectious agent (germ) in the body of a person or animal. Infection is not a synonym of infectious disease since the infection may be inapparent or manifest. The presence of germs on the surfaces of various articles constitutes contamination and not an infection.

**Infectious disease:** It is a disease clinically manifest that is produced as the result of an infection, for example, foodborne diseases.

**Label:** Sign or inscription which indicates or informs the content of something. Section No. 220 (Res. 2343, 19.4.80) of the Argentine Food Code defines the following: "*Labeling is any inscription, legend or provision printed, adhered or engraved in a product or its container, wrapping or packaging, which*

*identifies the product according the regulations of this Code". Any food product, additive, dressing or beverage, as well as their raw materials should carry a label with well defined characters, written in Spanish, stating: (1) The name of the product and its exact composition in the cases established in this Code, excluding those products as the competent sanitary authority may determine from the second requirement of the previous paragraph (2) (Res. 101 of the 22.02.93) "the net weight or volume of each unit, stated according to the Argentine Legal Metrical System (SIMELA)". (3) Name and address of the producer and/or packager and/or distributor or seller. In the case of imported products, it should also include the place of origin, name and address of the importer and/or packager and/or distributor or seller. (4) (Res. 615, 10.05.88) "the indication of the year of harvest, processing or packaging. According to the requirements specifically provided in this Code the respective indications should be included. When having a limited useful life, the competent sanitary authority will require the expiration date, with the intervention of the National Sanitary Authority". (5) Number of the authorization certificate of the product granted by the competent sanitary authority and registration number of the manufacture establishment.*

**Labeling:** It is any inscription, legend, image or graphic or descriptive matter that is written, printed, stenciled, marked, embossed or copper printed or attached to the food packaging.

**Microorganisms:** They are living organisms (bacteria, viruses, fungi, parasites) that can only be seen through a microscope.

**Notifiable disease:** It is a disease which, according to the laws and resolutions of the sanitary authority, should be notified.

**Outbreak of foodborne disease:** Episode in which two or more people present the same disease after consuming food from the same origin and where the epidemiological evidence or the laboratory analyses point to the food or water as its vehicle.

**Pasteurization:** The process of pasteurization was so called after Luis Pasteur discovered that contaminating organisms that produced the disease of the wines could be eliminated by applying temperature. The process was then applied to other products to achieve its conservation. It is a common practice to pasteurize milk. The process consists in the application of different temperatures and times to destroy the pathogenic microorganisms and most of the saprophytes present in the product, and thus, ensure its microbiological quality and prevent its degradation. The pasteurization at low temperature and extended time is at 63° during 30 minutes while that performed at high temperature and short time is at 72° during 15 seconds.

**Pathogen:** Any organism that may produce disease or start a pathological process.

**Prevalence:** Number of persons having a disease or condition in a particular population in a specific period of time.

**Prevent:** Avoid or stop something from happening.

**Risk:** It is a biological, chemical or physical property that may determine the loss of safety of the food.

**Safe (*Inocuo* in Spanish):** Means free from danger, trustworthy, that does not produce any harm. Certainty that the ingestion of the food will not produce disease, assuming that the manner and quantity

of the ingestion is adequate. *Inocuo* (safe) is a synonym of *seguro* (secure) according to one of its meanings in Spanish but the use of *seguro* is not recommendable since it may be confused with food security, which differs from food safety. The use of the word *seguridad* as a synonym of *inocuidad* is not adequate since they are not equivalent. The English "food safety" was translated as "*seguridad de los alimentos*" and, actually, in English "*seguridad de los alimentos*" is "food security" while "*inocuidad de los alimentos*" is "food safety".

**Safety:** The state of being safe.

**Source of Infection:** It may be a person, an animal, any object or substance, from which an infectious agent is transmitted to the host. It should be clearly distinguished from a source of contamination, such as a septic tank that contaminates the underground sheets of water.

**Spores:** They are resistance forms of the bacteria that produce them when they are in unfavorable conditions. They are not a method of multiplication. They resist heat, dehydration, the action of cleaning products, etc. All bacteria of the *Bacillus* and *Clostridium* genera produce spores.

**Surveillance of Foodborne Diseases (VETA):** It is a simple information system, operating on an ongoing basis, in connection with certain diseases that are contracted from the consumption of food or water, which includes the research of the determining factors and the causal agents as well as the establishment of a diagnosis of the situation, allowing for the planning of strategies of action for their prevention and control. The VETA system should also meet the attributes of being: flexible, acceptable, sensitive and representative.

**Tag:** Mark, sign or docket attached to an object or commodity for its identification, valuation, classification, etc. It contains printed information that warns about the risks of a harmful commodity by means of colors or symbols and is attached to the containers or packaging of the goods. See label.

The fourth meaning describes it as "*without damage or corruption, in the case of vegetables or things linked to them*". This definition could be generalized for application to all food products to give the idea that they are complete without damage.

To avoid confusion, it is advisable to use the last definition as the most appropriate to ensure a correct interpretation of its meaning, discarding, somewhat arbitrarily, its possible synonyms of safe or healthful.

**Transmission:** It is the ability of infectious germs to circulate from one person to another, or to spread from one place to another.

**Zoonosis:** It is an infection or infectious disease transmitted, under natural conditions, by vertebrated animals to humans.

**Sources:** INPPAZ and "*Handwashing teaching module*" Kansas Health Foundation. "The importance of Handwashing: Handout #2" Instructor´s Teaching Guide.

