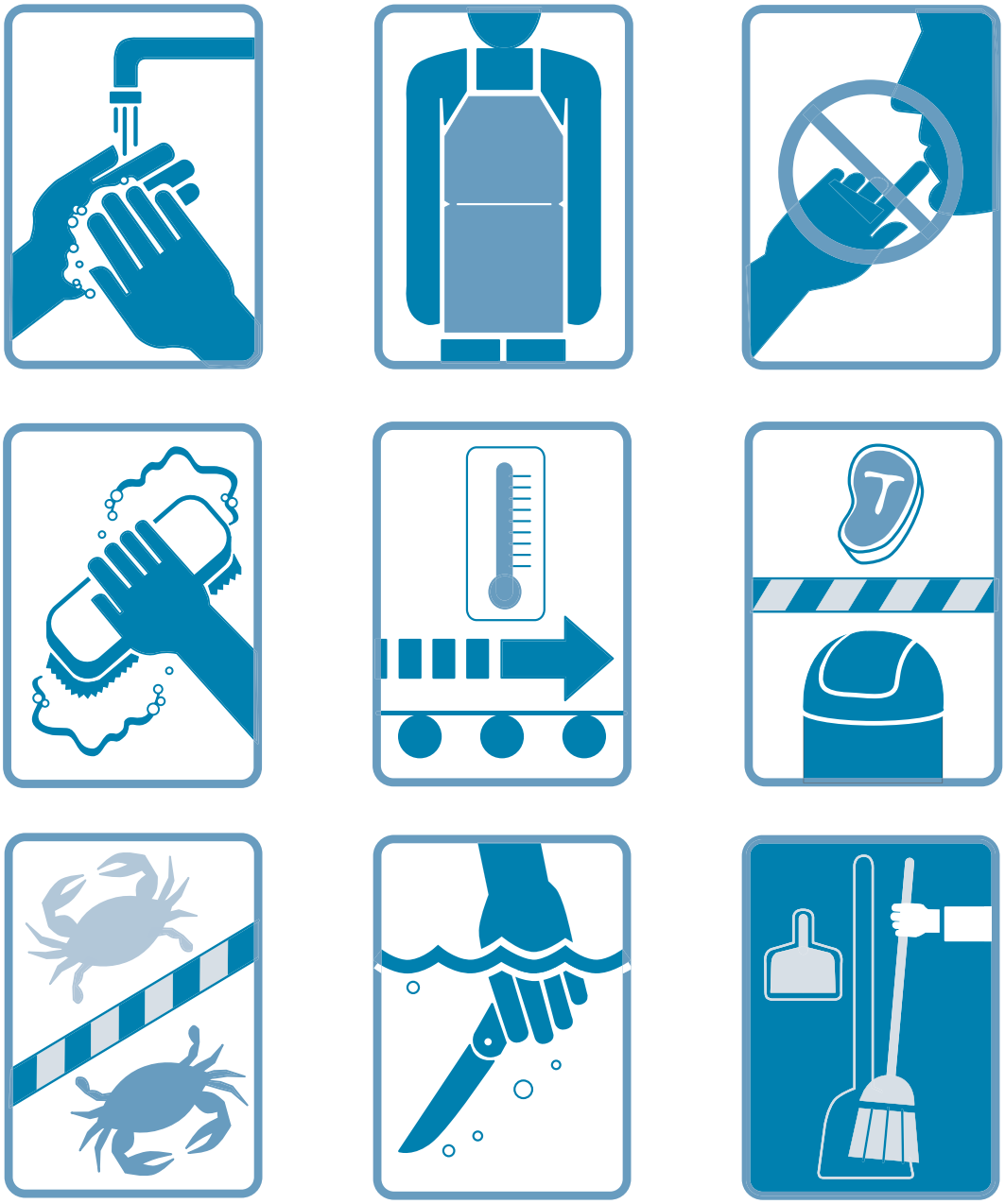
Safe Food Depends on You



Training Guide for Food Handlers

Published by the Maryland Sea Grant College
in cooperation with the University of Delaware

Sea Grant University of Delaware

Safe Food Depends on You

Training Guide for Food Handlers

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Safe Food Depends on You is a comprehensive training program that includes this Training Guide for Food Handlers, training videos in English and Spanish, *Safe Food Depends on You* and *La Comida Segura Depende de Ud*, and bilingual seafood safety posters for use in processing plants and related businesses. The package is published by Maryland Sea Grant College in cooperation with the University of Delaware.

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INTRODUCTION

The purpose of the *Safe Food Depends on You* training program and this training guide is to assist you in teaching entry-level English and Spanish-speaking workers in the food processing industry. The training guide and supplemental resource materials (food safety posters and video) emphasize the importance of food handling practices that reduce the risk of foodborne illness. The workers will learn how and why we handle food products a certain way. At the same time, they will find learning enjoyable, important, and not too technical. If you need more technical background information as the trainer, the reference materials listed at the end should be helpful. You can also contact your local county Extension office or call the Extension food safety specialist in your state (see Appendix I for a list of state food safety contacts).

The training guide covers four important areas that are critical for workers to understand in order to follow your company's Standard Operating Procedures (SOP) for sanitation.

1. Workers will understand the importance of and adopt good handwashing techniques, wear appropriate attire in the processing plant, and practice proper hygiene.
2. Workers will understand how proper cooling and storage methods, recommended cooking times and temperatures, and holding methods minimize risk.
3. Workers will learn how cross-contamination occurs and how to prevent it from happening.
4. Workers will understand the importance of proper cleaning and sanitizing procedures.

The theme of *Safe Food Depends on You* emphasizes a system of values and sharing of the learning and training process. For many workers, knowledge gained as a result of this training format can be practiced at home and with their co-workers. Activities in this guide and videos are in English and Spanish. While the training materials were designed to assist low-literacy workers, they can be used with workers at all educational levels. The training guide will help the food industry meet the continuing high expectations for a safe food supply and the new regulations, which require a more formal educational program for all workers including those working directly on the processing line.

In addition to the training guide and video, nine food safety posters have been designed to assist with training and serve as reminders in your food-processing facility. You can use them to explain food safety practices during the training. The posters then can be placed in appropriate places in the plant to remind employees of what they learned and how they can help keep the food your company produces safe to eat.

The Hazard Analysis Critical Control Point (HACCP) system of inspection became mandatory for seafood processors beginning in December 1997, in January 1998 for large meat and poultry processors, in January 1999 for medium meat and poultry, and in January 2000 for small

meat and poultry processors. The success of any HACCP system depends on the knowledge of the food-processing personnel and the training of these workers to carry out the procedures necessary to follow your company's Good Manufacturing Practices (GMP) and Sanitation Standard Operating Procedures (SSOP). Basic to that knowledge is an understanding of the proper procedures for personal hygiene, temperature control, avoiding cross-contamination, and cleaning and sanitizing.

The Training Guide

The training guide contains four lessons and a list of the resources needed to teach workers about their role in ensuring that the food your company produces is safe to eat.

Each lesson has a side panel that lists the key food safety concepts or main points of the lesson; the objectives or what the workers will be able to do as a result of the lesson; and the materials needed.

The lessons also contain a background section for the trainer describing the issue explored in each lesson. This section offers a step-by-step procedure for conducting the lesson and helping workers understand its principal point. It also contains ideas for extending the lesson with other activities to further reinforce what the workers have learned. For some of the activities you may want to involve an individual from quality control. He or she can assist with setting up the lesson as a demonstration or helping to conduct it as a hands-on activity.

Using the Videos *Safe Food Depends on You* *La Comida Segura Depende de Ud*

You should be able to see how the scenario portrayed in the video applies to your operation. The four lessons are the main themes or messages in the video: (1) personal hygiene, (2) time and temperature control, (3) avoiding cross-contamination, and (4) cleaning and sanitizing. The posters are designed to be used with the lessons and posted in appropriate places in your facility. The lessons are designed so that you can expand them using the reference materials and additional activities. You may choose to show the entire video at the beginning of the training to present an overall introduction to food safety. The videos are approximately 11 minutes long, and each topic is covered in about two to three minutes. You may also use the video at the beginning of each lesson to review each topic by showing only the relevant part.

Posters

Nine laminated posters are included in the training package. They can be used during the lessons as indicated in the directions and then placed in appropriate areas in your facility.

Questionnaires

There are two worker questionnaires each, in English and Spanish. Workers should complete the initial one before training begins. They should complete the post-training questionnaire within a week after the training as a measure of the program's success and whether you will have to reinforce certain safe practices. (Make copies of the questionnaires as needed.)

Directions for Trainer: Read each statement and the directions for the trainees to indicate their response.

TRAINEE INITIAL QUESTIONNAIRE

Directions for Trainees: Circle the frowning face ☹ on the left if you disagree with the statement; circle the smiling face ☺ on the right if you agree; or circle the face in the middle 😐 if you neither agree nor disagree.

STATEMENT 1. When I am at work preparing food, I always should wear clean clothes.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 2. I believe that washing my hands before I handle food is very important.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 3. I can tell by smell or taste when a food would make me sick.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 4. I believe that a thermometer is needed to make sure that food stays safe to eat.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 5. I believe that food like meat and seafood can be safely left out at room temperature for four to six hours.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 6. Refrigerators should be kept below 40 degrees Fahrenheit.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 7. During preparation, you should keep raw meat, poultry, eggs, or fish separate from cooked foods.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 8. After using equipment and utensils, you need to wash them only with hot water, rinse, and air dry.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

QUESIONARIO INICIAL DEL INIDIVIDUO

Instrucciones para los participantes: Haga un circulo en la cara triste ☹ a la izquierda si no esta de acuerdo con la pregunta; Haga un circulo en la cara feliz ☺ a la derecha si esta de acuerdo con la pregunta; o haga un circulo en la cara del medio 😐 si no esta de acuerdo con ninguna de las opciones.

AFIRMACION 1. Cuando estoy trabajando y preparando la comida, siempre debo llevar ropa limpia.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 2. Creo que lavar las manos antes de tocar la comida es muy importante.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 3. Puedo distinguir por los sentidos de olfato y saborear cuando una comida me haría enfermar.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 4. Creo que un termómetro se necesita para que la comida esté segura para comer.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 5. Creo que comida como carne y mariscos se puede dejar a temperaturas ambientes por cuatro a seis horas.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 6. La temperatura en las neveras deben ser menos de 40 grados Farenheit.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 7. Se debe mantener separados de las comidas ya cocinadas los huevos, la carne, el pollo y el pescado durante la preparación.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 8. Después de usar el equipo y los cubiertos, sólo se necesita lavarlos con agua caliente, enjuagarlos y dejarlos secar al aire.

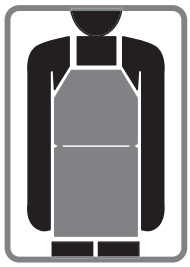
☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

Lesson 1. Personal Hygiene

Lesson Time: 15-20 minutes

Key Food Safety Concepts

WASH HANDS



WEAR PROPER ATTIRE

WATCH WHAT YOU TOUCH

Food processing workers can be carriers of bacteria and other dangerous microorganisms. Learning to pay attention to good personal hygiene can prevent the spread of bacteria from workers to food.

Human hands or unclean gloves, aprons, and uniforms are a primary means of contaminating foods. Handwashing, sanitizing gloves or aprons, and clean uniforms help prevent the spread of dangerous bacteria and other microorganisms to food.

Objectives. After this lesson workers will be able to:

- Describe how handwashing can affect the safety of the food their plant produces.
- Identify situations where handwashing is needed.
- Demonstrate how to wash hands properly to reduce the number of bacteria.
- Evaluate the cleanliness and appropriateness of their clothing.

Materials Needed

- Containers or sink with warm water, soap, and towel for demonstration purposes.
- Company hand sanitizer solution or 25 ppm iodine solution.
- Extra uniforms or pieces of attire typically worn by workers.
- *Safe Food Depends on You* Video
- Posters (see above)
  Wash Hands
  Wear Proper Attire
  Watch What You Touch

Background Information

The hands are especially important in transmitting foodborne pathogens (harmful microorganisms). Employees can carry pathogens and seem healthy. For example, *Staphylococci* are commonly found on the skin and in the mouth, throat, and nose of many employees. The hands of workers can be contaminated by touching their nose or other body parts.

Handwashing is especially important to remove viruses since foodborne viruses are nearly always due to human fecal contamination. According to the Centers for Disease Control and Prevention, handwashing is the "single most important means of preventing the spread of infection" from bacteria and viruses that cause disease and foodborne illness. Workers with dirty hands and/or fingernails may contaminate the food being processed. Therefore, any activity which may contaminate the hands must be followed by thorough handwashing.

Workers need to be reminded to "watch what you touch." Workers can inadvertently touch their face or body, but can't always stop to wash hands. The handwashing activity will help emphasize the fact that what you can't see can hurt you. Remind employees to always think *clean* on the job and at home.

Many workers fail to wash their hands as often as necessary and even those who do may use a flawed technique. It takes more than just the use of soap and running water to remove transient pathogens that may be present. It is the abrasive action obtained by vigorously rubbing the surfaces being cleaned that loosens the dirt or soil present.

If your company has no specific instructions for handwashing, the following double hand washing procedure is recommended.

HAND WASHING PROCEDURE

1. Wet hands under hot, fast flowing water (100°F to 120°F, 2 gallons per minute).
2. Apply sufficient soap to develop a good lather.
3. Use a fingernail brush to eliminate dirt on fingertips and under fingernails.
4. Rinse hands and brush in hot, fast flowing water.
5. To ensure removal of pathogens, wash hands again without using the fingernail brush. Wash arms as far up as will make contact with food.
6. Rinse hands and arms again in hot, flowing water.
7. Dry hands and arms with disposable paper towels.

Worker's gloves, aprons, or uniforms may become soiled, and steps need to be taken to make sure workers are not a source for contaminating the foods being produced. Workers need to know when they should sanitize gloves or aprons and change uniforms.

DOING THE LESSON

1. Show the entire video or the first 4:30 minutes.
2. Explain to the employees the importance of washing hands to prevent the transmission of harmful bacteria. If your company has specific procedures to follow, these would be explained here. Remind employees about the importance of washing their hands before handling food and between handling raw and cooked foods, after using the toilet, and after going on break.
3. Explain the sources for harmful bacteria (fecal material, skin/nose, waste/trash barrels, floors/drains, soil, raw product, etc.), where they are, and how they are transferred to hands and uniforms.
4. If the facilities are accessible, it is highly recommended that you demonstrate how to wash hands properly and then have the employees do the same. This is also listed as an optional activity for emphasis. Based on experience, problem areas include the backs of hands, wrist area, side of the hand, and under the fingernails. Some people with palms that cup may have problems. Remember friction is important, and if the hands don't touch, there is no friction.
5. Review with employees the importance of wearing clean clothes to work each day and/or putting on clean uniforms each day; also when they are transferred from a raw product area of the plant to a cooked or finished product area.

6. Hold up the suggested posters and review with the trainees what each one means and where it will be located in your facility.

Additional Activities

1. **Handwashing Activity.** (Count to 20) Demonstrate and have workers practice washing hands properly. Wash hands and exposed portions of arms with a cleaning compound in a sink with running water. Rub vigorously together the surfaces of lathered hands and arms for at least 20 to 30 seconds, and then thoroughly rinse with clean water. Practice the double handwashing procedures described in the background information section of this lesson.

2. **Glo-Germ Handwashing**. This is also a handwashing activity. You will need a bottle of Glo-Germ lotion and a black light. Both can be purchased from Glo-Germ at 1-800-842-6622, (P.O. Box 537, Moab, UT 84532). Squeeze a small amount of Glo-Germ into the palm of your hand and then rub all around just like hand lotion. Darken the room and examine hands under the black light. The hands should have a bright orange glow. (Note: You may want to tell trainees that this orange glow is not germs but "pretend" germs.) Then, just as you learned in the handwashing activity, wash your hands. One person may be asked to do a poor job of handwashing. Than all hands are looked at under the black light in a darkened room. Any Glo-Germ that was not washed off will shine or glow, representing bacteria that may not have been removed by handwashing and that could then become a source for contaminating food, utensils, uniforms, or equipment.

> **Safety Note**. When using a black light, it is important not to stare at the light for an extended time to avoid damaging your eyes.

3. **Microbiology Demonstration**. This is an activity in which you may want to involve quality control personnel to assist with obtaining materials and using proper techniques. This activity will demonstrate to workers many of the different places and things that they may not realize have bacteria on them. The Watch What You Touch poster would then serve as a reminder to the workers that they can transfer bacteria from themselves to food, utensils, or equipment if they don't properly wash their hands after the activities listed in the background and illustrated in the video. The activity can be conducted as a demonstration or as a hands-on exercise in which the trainees would review the results within 3 to 4 days. The following list contains examples of items to sample for the presence of bacteria using Petrifilm™, a trade name product (3M Corporation) used to enumerate bacteria. Follow the third method listed under Step 7 in the Petrifilm™ directions (see Appendix II).

ITEMS TO SAMPLE FOR THE PRESENCE OF BACTERIA

- Compare a clean thumb with a dirty thumb
- Swab under a finger nail
- Swab around a piece of jewelry
- Swab around a Band-Aid
- Place a strand of hair on the Petrifilm™
- Place a small bug on the Petrifilm™
- Swab inside an ear
- Swab teeth, tongue or nose
- Swab a doorknob
- Swab the outside of a drinking glass
- Swab faucet handle
- Swab restroom door push plate
- Swab processing room door/curtain

You don't need to sample all of these items, but depending on the number of trainees you have, each trainee could do one and then talk about the results at the next meeting or lesson. Growing bacteria provides the employees with visual proof that bacteria exist. You can also use the Petrifilm™ activity as part of lesson 2, 3, or 4. If you involve your quality control people, they could set up a demonstration using your company's cleaning and sanitizing procedures in which an object is swabbed before and after cleaning. This is excellent training for the cleaning crew.

Reminder. It is important to keep all Petrifilm™, contact plates, or pre-prepared agar plates that have been innoculated separate from all food processing areas or possible food, utensils or equipment surfaces. Be sure to dispose of them properly: all could potentially contain pathogens. (See direction for disposal in Appendix II.)

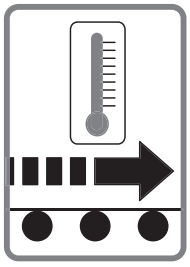
Note. To conduct this activity you need to order standard plate count Petrifilm™ from the 3M Company. You may contact them in St. Paul, Minnesota, at 1-800-328-6553 to order the materials. The Petrifilm™ comes with directions for use (Appendix II contains step-by-step directions that have been adapted for demonstration and group activity). Petrifilm™ is just one type of product that can be used for this activity. You can also purchase pre-prepared agar plates. Instead of Petrifilm™, the above activity can also be conducted with contact plates. Contact plates are touched directly to the object being sampled. Incubation (controlled heating) of the plates or Petrifilm™ is not required if 2 to 5 days are allowed for bacterial growth to occur. Appendix II contains a list of companies that sell contact plates.

Lesson 2. Temperature Control

Lesson Time: 15-20 minutes

Key Food Safety Concepts

KEEP AREA CLEAN



KEEP PRODUCT MOVING

Keep cold food cold (below 40°F) to slow bacteria growth and keep hot foods hot (above 140°F) to destroy and prevent the growth of harmful microorganisms. Bacteria grow fastest within the Danger Zone (between 40°F and 140°F); therefore, food should sit at room temperature for as little time as possible.

Objectives. After this lesson workers will be able to:

- Identify conditions that promote the growth of bacteria.
- Explain why cold foods need to be kept cold and hot foods need to be kept hot.
- Know the importance of keeping foods out of the Danger Zone.

Materials Needed

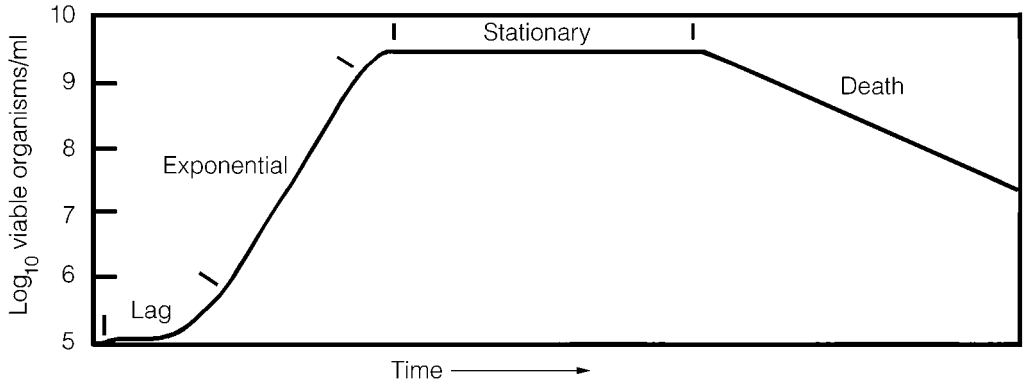
- Thermometer with Danger Zone marked. (Note**:** There is one depicted in the training video.)
- Sample equipment the workers might use on the line.
- Sample food in raw, unprocessed state.
- See steps 3 and 7 in Doing the Lesson for additional materials.
- *Safe Food Depends on You* Video
- Posters (see above)
  Keep Area Clean
  Keep Product Moving

Background Information

Any number of conditions can affect the growth of every microorganism. Each has an optimum, minimum, and maximum temperature at which it will grow when other environmental conditions are present as well. These other conditions include food, water, time, pH (acidity), and the presence or absence of oxygen. Since many of these environmental conditions are present in a food processing plant, temperature becomes very important in controlling the growth of microorganisms. That is why the video emphasizes the Danger Zone. Many organisms that cause foodborne illness find their optimum, minimum, and maximum temperatures for growth in the Danger Zone. Food processing personnel need to know this in order to help minimize the amount of time food spends in the Danger Zone and follow company guidelines for temperature control in the area where they work.

To explain bacterial growth, look at the growth (multiplication) of a population of bacteria. The following figure illustrates a typical growth curve for a population of bacteria.

Typical Bacteria Growth Curve



Lag Phase

The first part of the growth curve is the "Lag Phase." When bacteria find a new or different food source, they need some time to familiarize themselves with their surroundings. During this phase, bacteria are producing enzymes that will allow them to digest the new food. Very little growth takes place during this phase. The "lower" number of bacteria present in the Lag Phase (no growth) can be maintained for up to a day or two by proper temperature control and sanitation.

Log Phase

After adapting to their new environment, the bacteria enter the "Log Phase" of growth. During this phase, growth is rapid and exponential. The numbers of bacteria double in population in a given time span. Temperature, acidity, food supply, water, and other environmental conditions regulate the rate of growth. As long as conditions remain favorable, the growth rate remains constant.

Under ideal conditions, many bacteria can duplicate themselves every 20 minutes. At a rate of 20 minutes per cell division, each bacterial cell will produce 8 cells after one hour, 64 cells after two hours, and 4,096 bacteria after four hours. After eight hours of growth, one bacteria cell can produce over 16,000,000 new bacteria. The Jelly Bean Activity which is described in the Additional Activity section of this lesson, will help you explain this concept to the trainees.

Bacteria are always present on raw protein foods and in processing plants. For example, fresh seafood/poultry can contain 30,000-100,000 bacteria per square inch of surface area and conveyers often contain 50,000 or more bacteria per square inch. If a conveyer belt has 50,000 bacteria per square inch, by the end of one hour there could be 400,000 bacteria per square inch on the belt. At the end of three hours, the number of bacteria could be over 256,000,000 per square inch of belt surface.

Stationary Phase

Log growth does not continue indefinitely, however. When bacteria grow, they produce waste materials and byproducts that change the environment. At some point during the log phase of growth, the bacteria begin to show signs of stress due to the build up of these toxic waste materials. Growth begins to slow and the bacteria enter the "Stationary Phase" of growth.

During the stationary phase, some bacteria are dying and others are still growing. The number of living cells remains constant. In many foods, bacterial growth begins to slow only after there are about 100,000,000 or more bacteria per square inch of surface (or per gram of flesh). In general, decomposition and strong off odors are evident when 100,000,000 bacteria are present. Contaminating products with high bacterial soils (e.g., dirty aprons) greatly shortens the time to spoilage.

Death Phase

Eventually, the population of bacteria moves into the "Death Phase." Toxic waste materials produced by the bacteria have polluted their environment. The population is dying. Eventually, there will be no living bacteria left. If the bacteria produced spores, the spores remain until conditions again become favorable for growth.

Doing the Lesson

Trainers Note. In addition to knowing the factors that affect the growth of microorganisms, it is important for workers to understand how quickly bacteria can grow. Microorganisms grow by a process called cell division. One bacteria cell grows by dividing into two cells. Each of these two divides into two more cells, and so on. Under favorable conditions, discussed previously, this type of growth leads to a tremendous increase in the number of bacteria over a relatively short time. It is important that food handlers minimize the amount of time perishable food remains under conditions (i.e., room temperature) favorable to microbial growth. This is especially important for those bacteria that cause illness.

1. Show the entire video or the second segment that discusses the Danger Zone and the importance of temperature control (from 4:30 to 7:10 minutes on VCR display clock).
2. Review the fact that bacteria can grow in food and cause it to become unsafe, because it can make you sick.
3. Use a learning activity like the Jelly Bean demonstration suggested in the optional activities to demonstrate how microorganisms grow (divide and multiply). Some other small object could be substituted for jelly beans such as small colored beads.
4. Review the environmental conditions that would be favorable for the growth of bacteria, including pathogens. Explain how these conditions can be found in a food processing facility. Give examples from your company and compare with others. For example, you might use ice at your facility to keep product cold at a certain step and prevent bacterial growth, while another company might use mechanical refrigeration.
5. Hold up the suggested posters and review with the trainees what each one means and where it will be located in your facility.
6. Now would be a good time to take the trainees on a tour of the processing facility to highlight areas of temperature control.

7. Review what the Danger Zone is and why it is important to minimize the length of time a perishable food spends in the danger zone. If you purchased prepared agar plates (petri plates) or the Petrifilm™ product from the 3M Company, you can demonstrate how bacterial numbers can increase or decrease as a product moves through the Danger Zone. This is an activity in which you may want to involve quality control personnel to assist with obtaining materials and using proper techniques. The activity can be conducted as a demonstration or as a hands-on exercise where the trainees would review the results within 3 to 4 days. If you plan to do the activity as a demonstration; set it up several days ahead of time or swab the samples during class and observe the results within 3 to 4 days. Review its significance with the workers. For both scenarios, you will need a fresh food sample divided into three portions. Select a product that requires refrigeration and will ultimately be cooked (can be one

TREATMENTS FOR FOOD PORTIONS

- Hold one portion at less than 40°F.
- Hold second portion at room temperature (approximately 65°F to 90°F) for approximately 4 hours.
- Cook the third portion according to appropriate time and temperature requirements for the food sample.

your company produces). Treat the three portions as follows:

Swab the food in approximately a 1-inch square area and transfer to the agar plates or the prepared Petrifilm™ according to the manufacturer's directions summarized in Appendix II. Swab the food using the first technique listed under step 3 in the Petrifilm™ directions. Allow to grow, count the number of colonies (small opaque dots), and interpret for the workers. Results should indicate that the second handling technique has the most bacteria, then the first, and then the third.

ADDITIONAL ACTIVITY

Jelly Bean Microbes. This activity will help workers visualize the role of time in the growth of microorganisms and how microorganisms increase in numbers. Using jelly beans or other small objects to represent microorganisms, workers will be able to match cards with elapsed time shown on clocks to jars containing various numbers of jelly beans.

EQUIPMENT NEEDED

- 5 jars (large enough to hold 1,280 jelly beans or other small objects)
- Approximately 1,705 jelly beans
- 9 - 3x5 cards with drawings of clocks depicting elapsed time of 0 min., 15 min., 30 min., 45 min. 60 min., 75 min., 90 min., 120 min, and 240 min.

Procedure. Place 5 jelly beans in one jar, 20 in another, and 80, 320 and 1,280 in the other 3 jars. Line up the jars in order on a table. Show the audience the cards and explain what they represent; minutes or time elapsed. Encourage the audience to match the 3x5 cards (showing the times elapsed), to the jelly beans jars, based on how long they think it took for the original 5 microorganisms (elapse time = 0) to reproduce at room temperature to the numbers in the jars. Discuss their answers and make sure they understand microbial growth. Assuming the bacteria divide every 15 minutes, here are correct the answers:

ANSWER KEY

Number of Beans	Elapsed Time
5 beans	0 min.
20 beans	30 min.
80 beans	60 min.
320 beans	90 min.
1,280 beans	120 min.

Other Points to Make:

1. Ask trainees how many jars of 1,280 jelly beans they would have in 2 hours if they started with 1,280 instead of 5. Answer: 256 jars or 328,000 beans. Explain that this shows how important it is to avoid contaminating food contact surfaces or products. Use poster: Keep Area Clean.
2. Explain that the jar containing 20 jellybeans is all they would have after 2 hours, if they'd been refrigerated. This illustration reinforces the idea of keeping cold food cold. Use poster: Keep Product Moving.

Lesson 3. Preventing Cross-Contamination

Lesson Time: 15-20 minutes

Key Food Safety Concepts

Worker knowledge about how to prevent cross-contamination is critical to an effective food safety program. Employees need to know how harmful bacteria may be transferred from one food to another and how careful attention to the use of utensils, equipment, and hands will prevent cross-contamination.

Objectives. After this lesson workers will be able to:

- Understand how cross-contamination between products occurs (how harmful bacteria are transferred from human hands, utensils or equipment).
- Identify procedures for preventing cross-contamination.

Materials Needed

- Equipment or utensils used in your facility.
- Cleaning and sanitizing agents used in your facility.
- Sample food in raw, unprocessed state
- *Safe Food Depends on You* Video
- Posters (see above)
  Wash Hands
  Watch What You Touch
  Avoid Cross-Contamination
  Store & Use Equipment Where Designated

Background Information

This lesson introduces the concept of cross-contamination and ways to prevent it from happening in your plant. Cross-contamination is the transfer of harmful microorganisms from one item to another. The harmful organisms can be found on food, utensils, human hands, or processing equipment and transferred to any other item. Contamination of one food with harmful bacteria from another food or dirty equipment is a significant cause of foodborne illness. Preventing cross-contamination involves all workers' awareness of its causes and care in the use of equipment.

Careful cleaning and sanitizing of utensils and equipment and proper handwashing will help prevent the spread of dangerous bacteria. Proper storage techniques and separation of work areas (raw foods/ingredients from finished foods) are essential for preventing cross-contamination. Workers need to be shown the proper cleaning and sanitizing procedures for their work area. They also need to know where to store equipment they use on the job and equipment used for cleaning and sanitizing. Cross-contamination from equipment (or people) associated with dirty or raw ingredient areas, including soiled cleaning equipment such as brooms, have contributed to the spread of disease-causing microorganisms in processing plants.

Doing the Lesson

1. Show the entire video or the fourth segment (8:20 to 9:20 minutes on VCR clock display).
2. Review with workers what harmful bacteria are and where they can be found.
3. Explain what cross-contamination is and how bacteria are transferred from one food product to another food product or from dirty equipment to food, etc.
4. Explain different ways for preventing cross-contamination in food-processing plants. Use examples of procedures from your company.
5. Review how to properly clean and sanitize utensils and equipment used by employees in your company.
6. Review how and where employees should store equipment that they use on the job.
7. Use one of the additional activities to demonstrate how cross-contamination occurs and how cleaning and sanitizing can prevent the transfer of harmful bacteria from one food to another.
8. Hold up the suggested poster and review with the trainees what each one means and where it will be located in your facility.

Additional Activities

1. **GlitterBug Powder Demonstration.** Equipment needed:
   - GlitterBug powder and a black-light (Both can be purchased from Glo-Germ™ at 1-800-842-6622, P.O. Box 537, Moab, Utah 84532. (Also see website: http://glogerm.com/)
   - cutting board
   - carrot
   - sharp knife
   - dish cloth
   - small bowl

Procedure: Sprinkle one shake of GlitterBug powder onto cutting board, wipe with damp cloth. Try to do this without being observed by the trainees. Shine black-light on carrot and have the trainees observe. Ask trainees if the cutting board looks clean. Ask a trainee to come forward to cut up the carrot and place in a bowl. Shine black-light on the carrots, knife, cutting board and hands so the trainees can see where the "contamination" came from.

Another form of Glo-Germ or GlitterBug powder comes in a spray form. This product is called Clue Spray and can be purchased from Brevis Corporation at 2700 East 3310 South, Salt Lake City, Utah 84109, 800-383-3377. (The Brevis Corporation also sells Glo-Germ lotion, GlitterBug powder and black-lights.) It is similar to the other products and works well in the following activity: Have workers view their hands under the black light before going on break. Meanwhile you have already sprayed some items such as a door knob, door push plate, papers,

faucet handle in the restrooms, etc. (not food or food containers). After workers come back from break, view hands again. This activity reinforces the idea that bacteria can be found in many places and people can transfer them from one place to another. Remind workers that the spray and powder are "pretend" germs.

> **Safety Note.** When using a black light, it is important not to stare at the light for an extended time to avoid damaging your eyes.

2. **Microbiology Demonstration.** To conduct this activity you first need to order Petrifilm™ from the 3M Company. You may contact them in St. Paul, Minnesota at 1-800-328-6553 to order the materials. The Petrifilm™ comes with directions for use (see Appendix II). The following list contains examples of sampling scenarios to illustrate bacterial cross-contamination. Use the second and third (b + c) swabbing techniques listed under step 7 in the Petrifilm™ directions (Appendix II). Use pieces of equipment from the line that employees work with and food products produced by your company. Samples can be prepared ahead of time, so that results can be observed the day of class; or hold for a follow-up meeting 3 to 4 days later, if workers do their own sampling. The used Petrifilm™ can be refrigerated for up to two weeks if necessary.

SAMPLING FOR MICROBIOLOGICAL DEMONSTRATIONS

- Swab a piece of equipment or utensil that has been properly cleaned and sanitized.
- Swab the same piece of equipment after it has been soiled by a food product and allowed to sit at room temperature for 2 to 8 hours before cleaning and sanitizing.
- Allow the soiled piece of equipment to come in contact with clean equipment, swab after 2 to 8 hours.

The above activity can be conducted also with contact plates instead of Petrifilm™. Contact plates are touched directly to the object being sampled. Incubation (controlled heating) of the plates or Petrifilm™ is not required if 2 to 5 days are allowed for bacterial growth to occur. Appendix II lists different sources for contact plates.

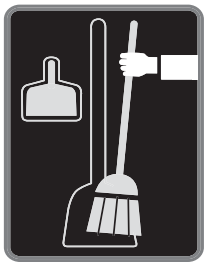
Lesson 4. Cleaning and Sanitizing

Lesson Time: 15-20 minutes

Key Food Safety Concepts

KEEP AREA CLEAN

USE SANITIZER



STORE & USE EQUIPMENT WHERE DESIGNATED

Consumers expect their food to be produced in a sanitary manner. Food processing personnel need to know how and why cleaning and sanitizing are important steps taken to minimize the risk from foodborne illness.

Objectives. After this lesson workers will be able to:

- Understand and explain the steps for cleaning and sanitizing food processing utensils, surfaces, and equipment.

Materials Needed

- Sample cleaning and sanitizing agents and equipment for demonstration purposes.
- *Safe Food Depends on You* Video
- Posters (see above)
  Keep Area Clean
  Use Sanitizer
  Store & Use Equipment Where Designated

Background Information

Food plant sanitation can be defined as the controlling of all conditions or practices within a plant which might otherwise result in unsafe or microbiologically contaminated products. Cleaning and sanitizing also minimizes the risk of cross-contamination between foods and between foods and equipment.

Cleaning is the removal of all dirt, grease, and food particles. To accomplish this task, a detergent is used. Detergent helps to remove dirt and food materials from food processing equipment or utensils. After thorough cleaning with detergent, the surfaces are rinsed and sanitized. Sanitation destroys microorganisms.

Keep in mind that application of a chemical sanitizer is not a substitute for thorough cleaning. In order for many sanitizers to work properly, the surface must be free of food soils, i.e., they must be clean. Remind employees to use proper equipment and chemicals as specified by their supervisor.

If your company is in the process of setting up or already has a HACCP plan, ensuring that all daily cleaning and sanitizing steps are followed will help its success. The plan will require that a strict schedule of procedures be followed to keep the plant clean and sanitary.

Doing the Lesson

1. Show the entire video or the third segment (7:10 to 8:20 minutes on the VCR clock display) covering the importance of following proper cleaning and sanitizing procedures.
2. Review the procedures used in your company for cleaning and sanitizing. Demonstrate the step by step procedures for cleaning and sanitizing equipment from your operation.
3. Explain that to kill bacteria, it is important to first remove any soil from equipment and utensils before sanitizing.
4. Hold up the suggested poster and review with the trainees what each one means and where it will be located in your facility.

Additional Activities

1. **Sanitizing Solutions**. Prepare sanitizing solution (chlorine or iodine) according to company procedures. Divide into two containers. Contaminate one with chicken or other food. Measure an amount of sanitizer before contact with food and after 2 to 4 hours, using test strip for sanitizer. This demonstrates that food residues inactivate sanitizers. Sanitizer concentrations must be checked and maintained, and processing surfaces must be thoroughly cleaned before applying sanitizer.
2. **Microbiology Demonstration.** You may choose to set up another activity that demonstrates how effectively sanitizers work. Again you would use the directions in Appendix II for Petrifilm™ or contact plates and sample a piece of equipment or utensil used in your facility before and after sanitizing. Use the first swabbing technique (a) listed under step 7.

WRAPPING UP

Even if you assume that workers know what to do, it is still important to review the basics. Then you can discuss possible things that could go wrong and what can be done to correct them. For example, once you have completed the lessons, you can do the following activity. It can be conducted in conjunction with a second viewing of the video.

Reinforcement Activity: If time remains during the training session, or possibly at another session after the employees have had time to practice what they have learned, you may elect to carry out the following activity.

Watch the video again. This time look for actions that are not done properly or may be wrong. This activity is like playing "What is wrong with this picture?" Below is a list of possible places in the video that workers may indicate are "wrong." Ask the trainees if they see any problem areas in the video. Use the area they mention as points for further discussion, or use the items listed below.

PROBLEM AREAS IN THE VIDEO

- There are several places where a worker is wearing a ring.
- A worker is using a sponge when a brush or pad is more appropriate or care needs to be taken to store the sponge properly after use (i.e., store in a sanitizer solution).
- Worker touching nose while waiting in line at the cafeteria before eating.
- It is best for workers to wash hands up to their elbows (if exposed) and between fingers.
- There is a clipboard present for recording temperatures. Is it on plastic or touching raw product?
- At the end of one of the chicken-processing lines, cut pieces are being transferred to a container. What happens to the pieces that look like they are falling off? What should happen to those pieces of food? What is the company's policy?
- The script is somewhat out of sequence in the last segment on cleaning and sanitizing; the proper steps should be (1) dry clean, (2) apply detergent, (3) rinse, (4) apply sanitizer.

After you have made a list of what is "wrong," compare it to the key and discuss what the correct action should be.

TRAINEE POST-QUESTIONNAIRE

Directions for Trainees: Circle the frowning face ☹ on the left if you disagree with the statement; circle the smiling face ☺ on the right if you agree; or circle the face in the middle 😐 if you neither agree nor disagree.

STATEMENT 1. When I am at work preparing food, I always should wear clean clothes.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 2. I believe that washing my hands before I handle food is very important.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 3. I can tell by smell or taste when a food would make me sick.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 4. I believe that a thermometer is needed to make sure that food stays safe to eat.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 5. I believe that food like meat and seafood can be safely left out at room temperature for four to six hours.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 6. Refrigerators should be kept below 40 degrees Fahrenheit.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 7. During preparation, you should keep raw meat, poultry, eggs, or fish separate from cooked foods.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

STATEMENT 8. After using equipment and utensils, you need to wash them only with hot water, rinse, and air dry.

☹ Disagree 😐 Neither Agree Nor Disagree ☺ Agree

QUESTIONARIO INICIAL DEL INDIVIDUO

Instrucciones para los participantes: Haga un circulo en la cara triste ☹ a la izquierda si no esta de acuerdo con la pregunta; Haga un circulo en la cara feliz ☺ a la derecha si esta de acuerdo con la pregunta; o haga un circulo en la cara del medio 😐 si no esta de acuerdo con ninguna de las opciones.

AFIRMACION 1. Cuando estoy trabajando y preparando la comida, siempre debo llevar ropa limpia.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 2. Creo que lavar las manos antes de tocar la comida es muy importante.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 3. Puedo distinguir por los sentidos de olfato y saborear cuando una comida me haría enfermar.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 4. Creo que un termómetro se necesita para que la comida esté segura para comer.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 5. Creo que comida como carne y mariscos se puede dejar a temperaturas ambientes por cuatro a seis horas.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 6. La temperatura en las neveras deben ser menos de 40 grados Farenheit.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 7. Se debe mantener separados de las comidas ya cocinadas los huevos, la carne, el polly y el pescado durante la preparación.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

AFIRMACION 8. Después de usar el equipo y los cubiertos, sólo se necisita lavarlos con agua caliente, enjuagarlos y dejarlos secar al aire.

☹ No estoy de acuerdo 😐 Ni estoy de acuerdo ni discrepo ☺ Estoy de acuerdo

Appendix I

State Food Safety Contacts and Web resources

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APPENDIX II

PETRIFILM™ DIRECTIONS

1. Refrigerate Petrifilm™ until ready to use.
2. Prior to training session, boil water and dropper in glass jar in microwave about 5 minutes to sterilize. Boiling the water and dropper for five minutes will not completely sterilize them, though it will reduce bacterial numbers sufficiently for these exercises. Cool.
3. Place Petrifilm™ on a flat surface.
4. Lift top film.
5. Fill dropper with sterile water and dispense onto grid (~1 ml).
6. Close film and lay plastic spreader over film. A thin gel will form within about 10 minutes.
7. Lift up film (lid) and inoculate with sample in **one** of the following ways:
   a. moisten sterile swab with sterile water, swab area to be sampled, gently rub swab on gel
   b. place sample directly on gel
   c. touch lid of Petrifilm directly on sample then lay back on Petrifilm™ bottom.
8. Incubate at room temperature for 72 to 96 hours (3 to 4 days) or place under refrigeration and read results in 5 to 10 days.
9. Red dots indicate bacterial growth.

Sources for Pre-prepared Contact Plates (TSA agar)

> **Safety Note.** Dispose of the "used" Petrifilm™ by soaking in a strong bleach solution (1 tablespoon bleach such as Clorox plus 1 gallon of cold water).
>
> 1. Separate layers of Petrifilm™.
> 2. Place both layers in chlorine solution and soak overnight.
> 3. Discard.
> 4. Wash hands after handling the used Petrifilm™.

Sources for pre-prepared contact plates (TSA agar) are listed below. Prewetting with sterile water or buffer is not required. Simply touch the exposed growth media to the surface your wish to sample and incubate as in step 8 above. Contact plates and surface sampling methods vary by manufacturer. Follow the directions provided with the plates.

Nelson-Jameson, Inc.
2400 E. 5th Street
P.O. Box 647
Marshfield, WI 54449
800-826-8302
Ph: 715-387-1151 Fax: 715-387-8746
www.nelsonjameson.com/

Birko Corporation
9152 Yosemite Street
Henderson, CO 80640
800-525-0476, Ph: 303-289-1090 Fax: 303-289-1190
(request Con-Tact-It sampler)
www. mtgplace.com/com/.birko/

or

Neogen Corp.
620 Lesher Place
Lansing, MI 48912
Ph: 517-372-9200 Fax: 517-372-0108
www.neogen.com/

Gene-Trak Systems
31 New York Avenue
Framingham, MA 01701
800-338-8725
(request Hygicult-TPC)

Remel, Inc.
12076 Santa Fe Drive
Lenexa, KS 66215
Ph: 800-447-3635 Fax: 800-621-8251
(contact plates)
www.remelinc.com/

3M Petrifilm™
www.mmm.com/microbiology/index.html

3M Microbiology Products
3M Center Bldg. 275-500-05
St. Paul, Mn 55144-1000
Ph: 1-800-328-1671 Fax: 1-800-328-5496