



## Handwashing and General Employee Hygiene

**Author**  
Norman G. Marriott, Virginia Polytechnic Institute & State University

Originally published as a National Pork Board/  
American Meat Science Association Fact Sheet.

**Reviewer**  
Lynn Graves Delmore, Golden State Foods

### Introduction

Food safety is a major concern and responsibility of everyone, especially those that handle food such as meat. Thousands of individuals suffer from foodborne illness each year. To reduce the occurrence of such illnesses, proper employee hygiene, including effective handwashing, should be practiced.

During meat processing and handling, employees are the major source of contamination. They transmit microorganisms that cause spoilage and foodborne illness. Their hands, hair, breath, and perspiration are contamination sources as are their unguarded coughs and sneezes, which transmit microorganisms capable of causing illness. Transfer of human and animal excreta by workers is a potential source of pathogenic microorganisms that can cause a foodborne illness outbreak.

### What Is Hygiene?

Hygiene is the use of sanitary principles for the maintenance of health. Personal hygiene refers to the cleanliness of a person's body. Human illnesses that may be transmitted through meat and meat products include diseases of the respiratory tract, such as the common cold, sore throat, pneumonia, scarlet fever, tuberculosis, and trench mouth; intestinal disorders; dysentery; typhoid fever; and infectious hepatitis. In many illnesses, the disease-causing microorganisms may remain with the person after recovery. When people become ill, their potential as a source of contamination increases as compared to healthy individuals (Marriott, 1999).

### Why Appropriate Personal Hygiene and Proper Handwashing is Important

Microorganisms are found almost everywhere in the environment. They exist on all surfaces and equipment as well as on humans. The amount of bacteria on a typical person exceeds the number of people in the United States. Some bacteria are found in the small folds of the skin, on hair, or under fingernails. They can cause body odor, increased spoilage, and disease. Therefore, effective personal hygiene including proper handwashing is very important in the maintenance of hygienic conditions and safe meat.

Foodborne illnesses may occur if a food handler is a carrier of *Staphylococcus aureus* or *Staphylococcus epidermis*, two of the predominant bacterial species normally present on the skin. Since these organisms are present in the hair follicles and the ducts of sweat glands, it is essential to practice effective personal hygiene to enhance the removal of these bacteria. They are capable of causing abscesses, boils, and wound infections.

**Resident Bacteria** The bacteria normally present on human skin are called resident bacteria. These microorganisms exist on the skin of normal, healthy people, and are usually not harmful. As resident bacteria, they have become established on humans' skin and cannot be removed completely. These bacteria live in microcolonies that are usually buried deep in the pores of the skin and protected by fatty secretions of the sebaceous glands.

**Transient Bacteria** Microorganisms that are transferred to the skin are called transient bacteria. A typical transient bacterium is *Staphylococcus aureus*. These microorganisms result from contamination of the hands or other body parts through existing bacterial sources. The hands tend to contain more transient bacteria because they write, pick up the telephone, handle money, prepare meals, dress wounds, and conduct many other manual activities. In fact, the hands gather bacteria from each task that they perform. Therefore, it is necessary to remove as many of these bacteria as possible by washing the hands effectively including the scrubbing of fingernails. Employees should use a hand-dip sanitizer before starting work to reduce the transfer of contamination. Plastic gloves help prevent the transfer of pathogenic bacteria from the fingers and hands to food and have a favorable psychological effect on those observing the food being handled.

The use of plastic gloves offers both benefits and liabilities. A clean surface may be attained initially and bacteria that are attached to the skin are not permitted to enter foods as long as gloves are not torn or breached in some way. However the skin underneath the gloves is occluded, and heavily contaminated perspiration accumulates rapidly between the initial surface of the glove and skin. Furthermore, the use of gloves can promote complacency that is not conducive to appropriate hygiene. Thus, effective handwashing is necessary with or without the use of plastic gloves.

Effective handwashing can reduce the spread of bacteria through dirt underneath the fingernails. Those with dirty fingernails should not handle food. Washing the hands with soap and water remove transient bacteria, and the use of an antiseptic or a sanitizer in hand soap controls the growth of resident bacteria. Hospitals have demonstrated that an alcohol containing a humectant can be beneficial in controlling and removing both transient and resident bacteria without hand irritation (Restaino and Wind, 1990).

Effective personal hygiene is necessary to prevent the spread of diseases such as the common cold, which is one of the most prevalent of all infectious diseases. The common cold may be caused by rhinoviruses. The secondary infection is caused by a variety of agents, including bacteria. Bacteria, especially from humans with a cold, may be transmitted from the nose to hands to food with just a slight scratching of the nose. All employees, especially those who have colds, should use a hand-dip sanitizer after blowing their noses. Otherwise, these bacteria can be transferred to the meat being handled. The discharge from a sneeze or cough should be blocked by the elbow or shoulder by people handling food items who cannot wash their hands following each event.

## Requirements for Hygienic Practices

It is important to establish a protocol to ensure hygienic practices for all that come in contact with meat. Furthermore, we should set an example for others through our own effective hygiene while conveying the importance of these practices. Those that handle meat should be required to have a physical examination to verify that they are in good physical, mental, and emotional health. No individual with skin infections should handle meat and those who work with any food should be checked regularly for signs of illness, infection, and other unhealthy conditions.

The following handling practices should be conducted to ensure appropriate personal hygiene:

1. Physical health should be maintained and protected through cleanliness.
2. People with an illnesses or disease should not handle meat.
3. Hygienic work habits should be developed to eliminate potential contamination.
4. The hands should be washed after using the toilet, handling garbage or other soiled materials, smoking, coughing, or sneezing.
5. Personal cleanliness should be maintained through daily bathing, use of deodorants, washing hair at least twice a week, cleaning fingernails daily, using a hat or hairnet, and wearing clean underclothing.

## Personal Contamination of Meat Products

Microbial contamination by people is affected by:

1. **Body location** Bacterial composition found on the human body can vary depending on the body area. The face, neck, hands, and hair contain more transient microorganisms and a higher bacterial density than other areas. The exposed areas of the body are more vulnerable to contamination from environmental sources. When environmental conditions change, the microbial flora adapt to the new environment.
2. **Hair** Because of the density and oil production, hair on the scalp enhances the growth of bacteria.
3. **Chronological age** As a person matures, the microbial population changes. This trend is especially true for adolescents during puberty when they produce large quantities of lipids known as sebum, which promotes acne.
4. **Nutrients** Perspiration contains water-soluble nutrients, whereas sebum contains oil-insoluble materials, but the role of perspiration and sebum in the growth of microorganisms is not understood fully.

## Effective Handwashing

Approximately 25% of food contamination is attributable to improper handwashing. Handwashing with soap and water is conducted to break the transmission route of microorganisms from the hands to another location to reduce resident bacteria. Increased friction through rubbing the hands together or by using a scrub brush with soap can reduce the number of transient and resident bacteria more than through quick handwashing.

Proper drying of the hands and other skin surfaces should also be considered. Paper roll and sheet towels are acceptable if promptly deposited in a waste container. Electric blow dryers should be used only in restrooms to avoid temperature rise in other areas. This equipment should not be located in processing areas because it can blow dust off of the floor onto meat contact surfaces.

Because of the importance of proper handwashing to enhance food safety, mechanized handwashing is now being used in many food plants (including meat). A typical handwashing unit is located in the processing area. Workers that enter the processing area must use the mechanized handwashing unit. This equipment is responsible for increasing handwashing frequency by 300% (Marriott, 1999). The user inserts the hands into two cylinders, passing a photo-optic center, which activates the cleansing action as noted in Figure 1. Jet sprays within each cylinder introduce a mixture of antimicrobial cleansing solution and water on the hands, followed by a potable water rinse. The 10-second massage-like cycle has been proven to be 60% more effective at removing pathogenic bacteria from the hands than conventional handwashing. Furthermore, this process can remove contamination from gloves and accomplish hand or glove washing with only one-third of the amount of water used in most manual handwashing methods.

Antimicrobial agents used for handwashing exert a continuous antagonistic action on emerging microbes. The overall efficacy of antimicrobial hand soap depends on continuous use throughout the day. A contact time of less than five seconds during handwashing has little effect on reducing the microbial load. A cleaning compound will remove more transient bacteria, with subsequent destruction by the sanitizer. A potential barrier to cross-contamination by the hands is an antibacterial lotion. This viscous lotion, which is commercially available, forms an invisible and undetectable coating that bonds electrochemically to the outermost layer of skin to provide protection from normal exposure in the workplace. Figure 2 illustrates a wall-mounted sanitizer to reduce microbial contamination of workers. The suggested procedures for use of a recommended double handwash-



**Figure 1** Mechanized hand washer. Courtesy of Meritec Handwashing Systems, Englewood, Colorado.



**Figure 2** Wall mounted no-touch hand sanitizer with reservoir. Courtesy of Ecolab, Inc., Menota Heights, Minnesota

ing method include:

1. Wet hands
2. Apply soap
3. Lather hands
4. Brush hands, fingers, and fingernails
5. Rinse
6. Soap-lather
7. Rinse
8. Towel dry

This recommended double handwashing method should be incorporated when the hands are heavily soiled. Lighter soiled hands may be washed by the single handwashing method that omits steps 5 and 6 of the recommended double wash technique.

## References

Marriott, N. G. 1999. Principles of Food Sanitation-4th ed. Aspen Publishers Inc. Gaithersburg, Maryland.

Restaino, L. and C. E. Wind. 1990. Antimicrobial effectiveness of hand washing for food establishments. *Dairy Food Environ. Sanit.* 10:136.

Reference to products in this publication is not intended to be an endorsement to the exclusion of others which may be similar. Persons using such products assume responsibility for their use in accordance with current directions of the manufacturer. The information represented herein is believed to be accurate but is in no way guaranteed. The authors, reviewers, and publishers assume no liability in connection with any use for the products discussed and make no warranty, expressed or implied, in that respect, nor can it be assumed that all safety measures are indicated herein or that additional measures may be required. The user therefore, must assume full responsibility, both as to persons and as to property, for the use of these materials including any which might be covered by patent.  
This material may be available in alternative formats.

Information developed for the Pork Information Gateway, a project of the U.S. Pork Center of Excellence supported fully by USDA/Agricultural Research Service, USDA/Cooperative State Research, Education, and Extension Service, Pork Checkoff, NPPC, state pork associations from Iowa, Kentucky, Missouri, Mississippi, Tennessee, Pennsylvania, and Utah, and the Extension Services from several cooperating Land-Grant Institutions including Iowa State University, North Carolina State University, University of Minnesota, University of Illinois, University of Missouri, University of Nebraska, Purdue University, The Ohio State University, South Dakota State University, Kansas State University, Michigan State University, University of Wisconsin, Texas A & M University, Virginia Tech University, University of Tennessee, North Dakota State University, University of Georgia, University of Arkansas, and Colorado State University.