

# Sanitation and Handling Practices for Fresh Meat Processing and Retailing

**E**ffective sanitation has a tremendous impact on the profit picture of meat processors and retailers by reducing spoilage and providing a longer shelf life. Studies have shown that a shelf life of one week is possible with proper sanitation and temperatures that will hold meat below 32°F after packaging. Proper sanitation also helps maintain meat color, which leads to more sales and reduced labor costs. Good sanitation will provide a healthy, clean environment, which upgrades the image and reputation of the store.

The color of freshly cut meat is purplish-red. After it is cut, meat “blooms” by absorbing oxygen from the air, turning bright red. Continued exposure to air causes the meat to turn brownish-red or grayish-red. The length of time between the initial “blooming” and discoloration depends on several factors. Two of these factors, the presence of oxygen from the air and dehydration or loss of water from the surface, are controlled by proper packaging materials. Fresh meat packaging films, when properly used, permit oxygen to enter the package and act as a barrier to moisture loss. Two other factors, temperature and microbes, must be controlled by practices and operations in the retail market.

The most important cause of discoloration is the action of microbes (bacteria, molds, and yeasts) growing on the cut surface. Muscle, fat, and bone in a living animal are practically free of microbes. It is during the slaughtering, handling, cutting, and packaging that the meat becomes contaminated. Many of the microbes of concern in meat processing grow at refrigeration temperatures. They cause spoilage but generally are not the cause of sickness. Although bacteria, molds, and yeasts may be found on meat, bacteria are the more common because they grow faster on moist meat surfaces.

Temperature has a marked effect on the growth of all microbes. The generation time (time to double in numbers) of microbes commonly found on meat is around 6 hours at 40°F but 20 hours at 32°F. An increase in temperature of 8°F will permit the organisms to grow three times faster! This means that steaks beginning with 100 microbes per square inch would have around 800 microbes per square inch if displayed for 2½ days at 32°F as compared with 51,200 if displayed at 40°F.

Bacterial numbers are directly related to the rate of discoloration of prepackaged fresh meat. A shelf life of one week is possible with proper sanitation plus temperatures that will hold the meat below 32°F after packaging.

## Receiving Fresh Meat Products

Meat received in the retail store from the packer has been through considerable handling. This handling, coupled with the time lapse between slaughter and receiving may contribute to varying amounts of surface contamination. Frequently, wholesale beef cuts are more contaminated than quarters because they have been handled more. Contamination may easily be passed



**Caution:** Improper handling (no gloves; no hairnet) causes spoilage!

from the surface of the wholesale cuts to the unscrapped retail cut surface during cutting. *Therefore, pretrimming prior to cutting will reduce the level of contamination. Also, any bloody ends or discolored meat should be trimmed off as soon as possible to prevent further spoilage.* Meat should be removed from the delivery vehicle as quickly as possible. The optimum temperature for the receiving area is 30° to 32°F. Rail meat should be hung on clean hooks, stored at 30°F, and spaced so that air circulates freely around it.

If the processing room is not refrigerated, as much work as possible should be done in the cooler. Cuts such as flanks, kidneys, necks, skirts, and other parts of the carcass that frequently have a high level of contamination should be removed first and processed quickly. Avoid cross contamination by working only one type of commodity at a time. Trimmings should be processed as they accumulate and not held for an extended period of time.

## Processing and Wrapping

The processing and wrapping area should be maintained below 55°F. At higher temperatures bacteria will multiply extremely fast on retail cuts and processing equipment. Products must be quickly processed, packaged, and placed in refrigerated display cases. Work loads should be evenly distributed between cutters and wrappers so packages do not accumulate on the wrapping line for longer than 20 minutes.

## Display Cases

Display cases should be maintained at 29° to 32°F, and the internal temperature of the product should be as close to 32° as possible. If display cases are overloaded, the temperatures may reach 50°F. Also, overloading may cause products on the bottom to freeze.

When using single-deck cases, the shelf should be adjusted so that products are within the refrigerated area. Items should not be stacked more than three high. On high volume days the case should be frequently restocked rather than overloaded. With the newly designed multi-deck cases the height to which a product can be stacked is limited to the space available between shelves.

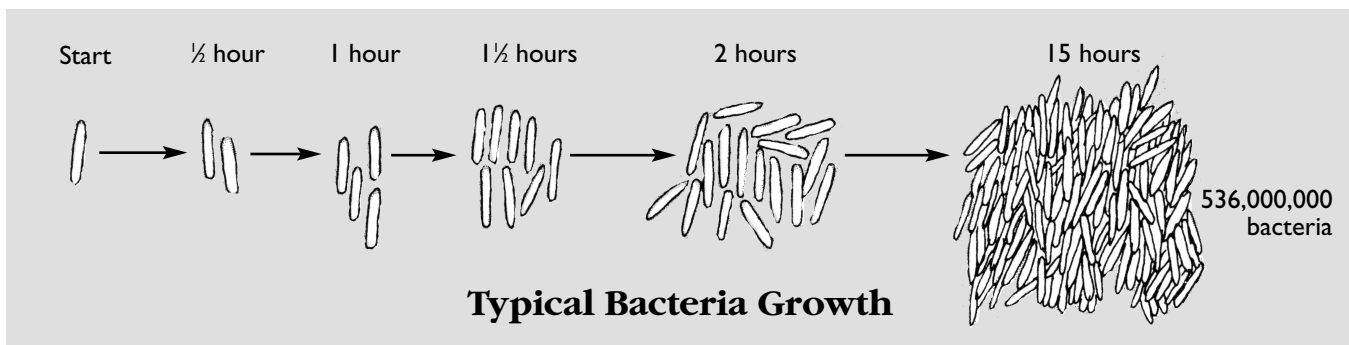
Defrosting should be done when the store is closed. This will depend on the hours the store is open, the efficiency of the equipment in use, and

the temperature of the store. If the sales area is around 72°F, it may be necessary to have three defrost cycles.

Because of placement of thermometers in retail cases (usually in the back of the case) the temperature recorded may not apply to the entire case. Therefore, check the products regularly. Flowing juices are a positive sign that the temperature is too high.

## A Guide for Meat Product Handling

- Move meat rapidly from truck to cooler.
- Avoid stacking and overloading in cooler space. Generally, 3½ square feet of cooler space per foot of linear display space is recommended.
- Remove fresh meats from boxes and place on cooler storage racks so that cold air can circulate around them.
- Plan your work so that the meat remains in the cutting room for a minimum of time. Use 20 minutes or less as a goal.
- Except during entry and exit, keep cooler door closed tightly.
- Move meat products from cooler to display case as rapidly as possible.
- Cover display cases at night.
- Remove all meats from display case and hold in cooler if store is closed over weekends.
- Check temperatures at least twice daily for proper levels and install two recording thermometers if possible.
- Set defrost cycles for times when the store is not open for business.
- Avoid frost build-up on equipment and keep all cold air passages free from obstructions.
- Do not permit meat to sit in the cutting room during the employees' breaks and lunch periods.
- Do not stack prepackaged meat immediately after packaging—heat sealing process will raise the temperature of the meat and hasten discoloration.
- Never stack meat or primal cuts in push carts for storing in the cooler.
- Do not reduce air flow by overloading meat hooks or hanging meat so that it rests against the wall of the cooler.
- Never display canned hams above the chill line of cases or stack them in the aisles where there is no refrigeration.



## Sanitation of Food Handling Facilities and Equipment in Stores

Cleaning and sanitizing of all food processing equipment and facilities is essential for maintaining a satisfactory shelf life of all perishable foods. The purposes are to remove the food (nutrients) that bacteria need to grow and to kill those bacteria that are present. Cleaning removes the nutrients and sanitizing kills the bacteria. When this is coupled with cold temperatures and dry surfaces, bacterial growth is not a problem because the three essentials for bacterial growth—food, moisture, and proper temperature—have been removed.

Management must recognize that good sanitation is costly. It requires time, labor, and proper materials. In most store processing and packaging areas, at least 1 hour of each 8 is necessary for clean up. For some food processing plants, this may be 10 percent to 20 percent of the total working time. It is especially high for single shift operations.

Personnel must be trained to clean and sanitize facilities and equipment. It is not something that most of us like to do. Therefore, the least experienced people are usually assigned the task of cleaning. The opposite should be the case where perishable foods are involved. That is, the most experienced people should clean and sanitize equipment.

The necessary equipment and materials for cleaning must be available. Pails, brushes, scrapers, cleaners, sanitizers, and a high-pressure washer should be available.

The primary source of soil left on equipment is from the food that was handled. However, minerals from the water and residues from cleaning compounds can contribute to films left on equipment.

Sugars and starches are quite easily removed. However, protein, fat, and minerals are not soluble in water and are more difficult to remove.

Alkaline cleaning materials are used for removing fat and protein from surfaces. Alkaline materials emulsify, saponify, and peptize these protein and fat deposits. This breaks them up so they combine with water, causing a chemical action that places insoluble soils in a colloidal solution. Cleaners also function to provide good penetration, rinsing and softening of hard water.

Alkaline cleaners in solution give pH readings between 8 and 11. The higher the reading, the stronger the alkaline solution. Acid cleaners are not commonly used in stores. In food processing plants with closed systems, acid cleaners are necessary to prevent mineral deposits. The pH readings of these solutions would be 4 to 6.

Facilities and equipment must be cleaned and sanitized on a regular schedule. Hand tools, dishes, and table surfaces must be cleaned and sanitized each day. Never handle raw then processed foods without thorough cleaning and sanitizing. Handle products in separate areas if possible. Keep fruits, vegetables, dairy, and delicatessen products away from raw meat, fish, and poultry.

Coolers and display cases should be cleaned weekly or as needed. When they become dirty, clean them. Consumers are aware of unclean conditions in stores and lack of clean facilities affects sales volume.

Local, state, and federal regulations related to food handling and quality are increasing. To prevent regulatory action and negative publicity, sanitary facilities and practices are necessary.

A seven-step process is commonly used for manual cleaning of hand tools, equipment, and facilities in the meat or delicatessen preparation areas. This involves the following:

1. Dry clean the area, picking up all scraps of meat, paper, etc.
2. Scrape equipment with a rubber scraper to remove as much contamination as possible.

3. Rinse all surfaces with lukewarm water of about 100°F to 120°F.
4. Wash with an alkaline solution and brush.
5. Rinse with hot water of about 180°F.
6. Sanitize with a chemical solution.
7. Let drip dry or remove excess water with a clean rubber scraper.

Loose food particles must be removed as the initial step in cleaning. Use a rubber scraper to do this. Metal or abrasive tools scratch surfaces, making them more difficult to clean.

All surfaces should be of metal or other material for easy cleaning. Wooden or porous plastic surfaces are unacceptable. Stainless steel is the most sanitary.

Rinsing equipment soon after use makes cleaning much easier, especially with foods that dry on the surface. Do not use hot water before using the detergent since it will denature the protein and cook it on the surface. Water at about 100°F melts fat and removes it.

For hand tools, use a three compartment sink. After rinsing fill the second compartment with water at about 120°F. Measure the water and add the proper amount of cleaner for the volume of water. Don't use perfumed cleaners or those with disinfectants, as they may cause odors or tastes in food.

Don't use cloths or sponges for washing. They provide little scrubbing action and contaminate surfaces with bacteria, as they don't usually dry between uses. Bristle brushes should be used. Avoid metal sponges and scouring pads as these scratch metal surfaces making cleaning more difficult. When possible, let hand tools soak for 5 minutes. This provides time for the alkaline cleaner to work.

Rinse all surfaces with clear water. This removes the alkaline solution and permits more effective sanitizing.

Cleaning does not remove all the bacteria. Therefore, chemical sanitizing of all food contact surfaces is necessary. Either chlorine or iodine compounds should be used at strengths of 100 to 200 ppm and 12 to 25 ppm, respectively. Chlorine is less expensive and readily available as bleach. However, it is irritating to skin and corrosive for metal surfaces. Iodine compounds are much less corrosive and less irritating to your skin. To be sanitized, surfaces must be clean. Contact time of at least 30 seconds is necessary.

Put equipment on racks to drain, if possible. With a clean rubber scraper, remove excess moisture from surfaces that will not drain.

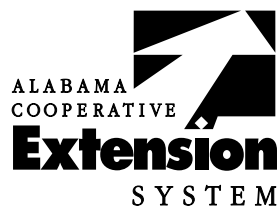
High-pressure washers should be available in all stores. They can be used to wash stationary equipment, ceilings, walls, and floors. In packaging rooms, equipment, tables, and floors should be washed each day. Proper strength solution and adequate temperature and pressure are necessary for high-pressure cleaning.

One step cleaning/sanitizing should be used only for non-food product contact surfaces such as walls, ceilings, floors, coolers, and display cases. As a general rule, clean coolers and display cases weekly. Frozen food cases may be cleaned as infrequently as four times a year.

Clean display cases and coolers whenever they need it. If containers leak or are broken and food spills, clean the area immediately.

Commercial companies can advise you on products and procedures for all of your facilities and equipment. Follow their directions. If you have cleaning problems, contact their technical representatives for assistance.

**Note:** This publication is based in part on *Handling Prepackaged Meat*, University of Missouri Extension Manual 64, by **H. D. Naumann, W. C. Stringer**, and **P. F. Gould**, and on *Meat Sanitation Fact Sheet*, by **F. A. Oats** and **William Vastine**, Texas A&M University.



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