Handle & Storage
Keep it clean
Keep it cold
Keep it moving

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ServSafe®
Handling and Storage – The Big Three

Your customers expect and deserve their menu choices to be prepared from the freshest and safest foods available, and handled in a manner that will assure an enjoyable eating experience. The responsibility of the foodservice operator to provide such assurances begins at the moment the beef products are delivered.

Today, the vast majority of foodservice establishments purchase beef from suppliers either as pre-cut, ready-to-use steaks and roasts, or as boxed, vacuum packaged subprimals, which are fabricated (or portioned) into steaks and roasts in the kitchen.

In order for the product to remain fresh and safe, as well as to avoid spoilage, critical handling and storage practices must be followed throughout the foodservice chain, including in the foodservice storage and preparation areas. Physical and biochemical changes continue to occur during storage and processing, even for beef in a vacuum bag. These changes can affect the safety of the product as well as its palatability characteristics, including flavor and tenderness.

In simplest terms, the foodservice operator can follow three practices to assure the freshness and safety of beef to be used in food preparation:

- **Keep it clean**
- **Keep it cold**
- **Keep it moving**

Time, temperature and sanitation – these three critical factors are fundamental in assuring a safe eating experience for customers.

**Keep it Clean**

This applies not only to the food preparation area, but to the receiving and storage areas as well. Use sound sanitation practices on the loading dock and in the freezer and cooler storage areas to reduce the exposure of potentially harmful bacteria to boxes and packaging that could be spread to the beef. Watch for wet boxes, which can be a sign of leakers, or vacuum bags with broken seals. In storage areas, stack boxes off the floor and away from walls to ensure good air circulation.

- Wash hands thoroughly, immediately before and after handling raw meat and poultry.
- Clean and sanitize work surfaces and utensils before and after coming in contact with raw meat and poultry.
- Store properly wrapped raw meat products on lowest shelf in the cooler to avoid contamination of other foods with meat drippings.
- Keep raw and cooked products separate during preparation. *Never place a cooked product on a surface where a raw product has been without first washing, rinsing, and sanitizing the area.*
Keep it Cold

Using thermometers and visual inspection, check product for temperature and signs of temperature abuse before accepting delivery. Immediately move fresh and frozen beef to appropriate storage areas. **NEVER LEAVE FRESH OR FROZEN BEEF ON THE LOADING DOCK UNATTENDED.** Even small temperature changes can impact the safety, quality and palatability of the product later.

Cut subprimals under refrigerated conditions, if possible, and return cuts to the cooler if they are not to be prepared immediately. Follow safe thawing techniques (1. under refrigeration, 2. under cold running water, 3. cook from frozen state) when handling frozen beef, and do not allow fresh or frozen beef cuts to remain unrefrigerated unless they are to be prepared immediately.

Keep it Moving

Practice FIFO – First In, First Out – to keep product moving in the order in which it was received. Rotating fresh beef in this manner minimizes spoilage and avoids losses. Sound product procurement and rotation practices will help ensure food safety and maximize customer satisfaction.

Beef is highly perishable and simple mistakes or carelessness can impact your profitability and reputation if an incident of foodborne illness were to occur.

Storage and Handling Fresh Beef

Proper cooler storage of fresh, non-vacuum packaged beef, or vacuum packaged beef that has been opened, involves three control factors: Temperature; Humidity; Air Circulation. For beef stored in vacuum packages, only temperature is critical, since humidity and air circulation will not affect the sealed packaging.

Refrigerated storage of beef is intended to prolong the life of the product for a relatively limited period of time. Storage temperatures above 40°F encourage the growth of bacteria, which can result in potential spoilage or safety problems. Fresh beef should be received at below 40°F and refrigerated immediately between 32° and 35°F. This temperature range slows bacterial growth, but will not freeze the beef product, since beef freezes at about 28°F (while the freezing point of water is 32°F, beef has a lower freezing point). Storage temperatures above 40°F should be avoided since the growth of bacteria accelerates above 41°F, causing spoilage and safety concerns.

Relative humidity should range from about 85% to 90% in the cooler to minimize moisture loss and surface drying of the fresh beef. Humidity is rarely too high and more often is too low. Higher humidity levels will prevent excessive drying and shrinkage, but will also encourage bacterial growth.

The rate of air circulation is determined by the conditions of the storage area. Such factors as the volume of the room, coil system, the ceiling height of the box, and the stacking or storing devices all affect the rate of air flow (air velocities of 0.5 to 2.5 m/sec are common). The ceiling should be high enough for that air can be circulated above the product and drop over the product. Care should be taken not to stack and crowd the product in such a way that circulation is blocked.

The initial microbial contamination can have a profound effect upon the storage life of fresh beef products. Minimizing further contamination during handling and storage is essential to maintaining optimum quality and to prolong shelf life. Maintaining a constant storage temperature between 32° and 35°F is essential to extending the shelf life.
Storage and Handling of Frozen Beef

Temperatures which result in the freezing of beef (below 28°F) are beneficial because they essentially stop the growth of all microorganisms, including those which might cause spoilage or food poisoning. However, the rate of freezing can affect the quality of beef when thawed.

A rule of thumb when freezing and thawing meat is to “freeze it fast and thaw it slowly”. This minimizes the formation of larger ice crystals which can break cell membranes, causing moisture loss during thawing and cooking.

The optimum temperature range for frozen beef stored in a foodservice freezer is –10° to –40°F. Since maintaining this temperature range can be costly, good management practices, such as reducing the amount of time a freezer door is left open, should be enforced.

The length of time frozen beef remains in storage can result in a gradual increase in unacceptable odors and flavors, usually caused by rancidity development and “freezer burn”. Recommended freezer packaging, time and temperature guidelines should be closely followed to assure optimum beef quality. Coupled with effective procurement management, product losses due to frozen storage should be minimal.

Beef that has been improperly wrapped or partially thawed and refrozen it loses surface moisture. This dehydration by sublimation (moisture evaporating from the frozen meat without thawing) can cause “freezer burn”. Appearing as a discolored, dry-looking surface, freezer burn is an irreversible condition. While it doesn’t make the beef unsafe to eat, it does produce a tough texture and a bland or rancid flavor in cooked beef.

There are several terms for methods used to commercially freeze beef. Several types of freezing methods that a foodservice operator may encounter when purchasing frozen beef are:

1. **Still air freezing**: Uses temperatures as low as –50°F without air circulation to freeze the beef and requires the longest time to complete.

2. **Plate freezing**: Also uses the low temperature (-50°F) of still air freezing but the plate-type freezer substitutes metal for air and shortens the freezing time because of a better coolant transferring medium.

3. **Cold air blast**: Utilizes low temperatures and velocities of air as high as 2,500 feet per minute, thus reducing the time required for freezing. Unless beef is well protected by appropriate packaging, the high velocity of air will also cause moisture loss during freezing, increasing the possibility of “freezer burn”.

4. **Liquid immersion**: Freezes by immersing sealed packages in a super-cooled liquid.

5. **Cryogenic freezing**: Uses a liquefied gas (such as liquid nitrogen). Cryogenic freezing results in the formation of very small ice crystals, resulting in minimal damage to the tissue. Cryogenically frozen beef, when thawed, has characteristics similar to fresh beef.

Freezing fresh beef in the foodservice kitchen should be avoided if possible. If freezing of fresh or cooked beef becomes necessary, be sure it is tightly wrapped in moisture-proof packaging, and freeze the product quickly in small batches to reduce potential moisture and flavor loss, as well to reduce the strain on the freezer. However, proper menu planning and procurement planning should minimize the need for in-house freezing of beef.

In order to preserve optimum quality, beef that is going to be frozen must be handled in the same manner used for refrigerated beef. Fresh beef frozen between 0°F and –10°F may be stored for 6 and 12 months; however, the longer the storage the greater the loss of quality.

Rapid thawing is NOT recommended. It has the potential to do as much damage to beef as slow freezing. Rapid thawing provides a greater opportunity for the formation of new, larger ice crystals and increased microbial growth, especially when beef is thawed at a high temperature. The more desirable smaller ice crystals formed during rapid freezing may thaw too quickly and then refreeze into less desirable larger crystals, which can rupture muscle cells. This can result in increased purge during thawing, as well as greater drip loss during cooking. Slow thawing reduces the opportunity for smaller ice crystals to thaw and refreeze into larger crystals.
Unless beef products are being cooked directly from the frozen state, they should be thawed slowly with the packaging material left intact in order to minimize drip loss. Thawing methods tend to affect the amount of drip losses in direct proportion to the rate of thawing. Factors to consider when thawing frozen beef products include meat product size and the temperature used for the thawing process.

The recommended procedure is to thaw beef products at refrigerated temperatures, between 32° and 35°F. This is a slow process, so one must plan ahead. The thawing process is frequently abused, however, by thawing beef products at room temperature or in warm water. These procedures can speed up the thawing process, but they also greatly increase the rate of microbial growth and can cause excessive drip losses. In fact, thawing beef too rapidly at higher temperatures can actually undo the benefits of quick freezing.

Thawed meat products should be used promptly. In fact, cooking from the frozen or partially thawed state largely eliminates the opportunity for any appreciable microbial growth to take place.

**Characteristics of Vacuum Packaged Beef**

One of the most significant product innovations for the beef industry was the introduction of vacuum packaging systems for storage and transportation of subprimal cuts. This concept has increased the shelf life of fresh beef and has allowed the sale and movement of beef products over great distances with a minimal loss of product quality.

Keep in mind that once the vacuum bag is opened (intentionally or accidentally), the product in the bag needs to be treated as if it is a fresh, unwrapped beef product.

**Effect of the Vacuum**

Most bacteria that can either cause the rapid deterioration of beef cuts or cause food safety problems require oxygen (air) to grow and reproduce. Therefore, by virtually eliminating air from beef products by placing them in an oxygen-impermeable bag, and then drawing a vacuum and sealing the bag, the growth of these bacteria is essentially stopped, and the deterioration process is slowed to a minimum.

While vacuum packaging of beef inhibits bacterial growth, it still allows the natural tenderization (or aging) process to continue as usual. The end result is an increased storage life of refrigerated beef subprimals from just a few days to perhaps several months if proper storage and handling procedures have been strictly followed by all handlers of the vacuum packaged beef.

The ultimate shelf life of vacuum packaged beef, however, can be influenced by a number of factors outside of the immediate control of the foodservice operator. Contamination of the fresh beef during harvesting, fabricating or packaging, improper transportation practices, and rough handling of boxed beef are a few conditions that can substantially decrease the storage life of the product. This makes it even more critical that the foodservice operator exercise proper handling and storage practices at all times to minimize the effects of such potential problems.

Remember that once the bag is opened, the beef must be handled as if it were fresh. Therefore, use of proper planning for food preparation is critical to avoid product loss and to optimize profitability.
Leakers

In addition to increased storage life, vacuum packaging has several advantages over other types of packaging materials. The packaging material (film) is flexible, tough, durable and, due to the composition of the film, easily sealed for oxygen resistance. Although the film is much tougher than most packaging materials, it is possible to penetrate it, thereby compromising the integrity of the bag and causing a loss of vacuum.

“Leakers”, or packages that have lost their vacuum (air has entered the package), are a source of potential problems. When air enters the bag, it permits the bacteria that have been inhibited by vacuum packaging to again resume their original growth patterns, which may eventually result in spoilage of the product.

Leakers can be caused by faulty seals on packages or by the mishandling of products during shipping or other points of product transfer. In addition, vacuum packaged bone-in products have a higher percentage of leakers due to bone punctures, especially if care is not taken to properly protect the areas of bone-to-bag contact.

The foodservice operator must exercise caution in checking all incoming product for leakers. When leakers are found, the supplier should be notified, particularly if the incidence is high in a particular shipment, or if the incidence is common in all shipments from a particular supplier. Leaking packages that show no evidence of product spoilage should be used immediately, regardless of product rotation.

Purge

“Purge,” “exudates” or “weep” are all terms used to identify the purplish-red fluid found in packaged beef cuts (vacuum or others). Although purge may not be directly related to product freshness nor indicate a food safety problem, the amount of purge in the package can be an indicator of past handling problems.

Excessive purge in the package can be an indication that the product may have been temperature-abused at some point. Although the temperature of the product might be in an acceptable range at the time of delivery or opening, it may have been elevated at an earlier date resulting in excessive purge. In addition, as the time following packaging increases, the amount of purge found in the bag will also increase.

Another reason for excessive purge in the case of vacuum packaged cuts is that the bag may not have had a full vacuum drawn, resulting in extra space in the bag for purge. Further, several beef subprimals (such as the knuckle/round tip, top sirloin butt, and chuck roll) tend to have more purge than other cuts, although there is no clear explanation for this occurrence.

Storing the product at the recommended refrigerated temperatures throughout the entire marketing chain, and practicing product rotation, will keep purge to a minimum.
Color

The color that people normally associate with fresh beef is bright cherry-red. This bright color seen in fresh beef is the result of the muscle being exposed to air.

However, the packaging system used for vacuum packaged beef excludes air. Consequently, the color of vacuum packaged beef is not red, but rather a deep-red or purple color, which should not be confused with spoiled product. This color is the normal, natural color of muscle in the absence of oxygen from the air.

When a vacuum packaged beef subprimal or portioned cut is removed from its vacuum packaging and exposed to the air, it “blooms” in the presence of oxygen to a bright cherry-red color in about 15 to 30 minutes.

After a few days of being exposed to air, however, the surface of beef cuts will begin to turn brown due to a chemical reaction (oxidation) with oxygen in the air, and by initial bacterial spoilage on the surface. When cuts exposed to oxygen begin to have discoloration areas, they should be trimmed and used immediately. Under no circumstances should such cuts be frozen for later use, or mixed with fresh beef for use as ground beef.

The same color change also occurs when using fresh, bulk ground beef. When exposed to air (as seen in fresh ground beef packages in a retail meat case) the surface of the ground beef is bright cherry-red. However, when the bulk ground beef is divided into smaller portions, the color of the inside of the ground beef is a darker, purplish-red color. As with vacuum packaged beef, the color of the inside portion should brighten to a cherry-red color in 15 to 30 minutes.

Odor

Vacuum packaged beef may have a slightly undesirable odor when the bag is first opened, due to the type of bacteria that are dominant when oxygen is not present. This is a normal occurrence in vacuum packaged beef which should disappear after exposure to air for approximately 15 to 30 minutes.

Once the bag is opened, wait about 30 minutes before preparing the beef to be sure the odor disappears. If it does not, check the box code dates to determine the age of the product. The longer the beef ages in the bag, the longer it will take for the odor to dissipate. If it doesn’t disappear, the flavor of the prepared product may be affected.

Also check with whoever opened the bag to determine if it was a leaker. If so, the off-odor may be caused by bacteria spoilage and may not be fit for use in food preparation.

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