

University of Missouri Extension

G2209, Reviewed October 1993

Recommendations for Aging Beef

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The main reason for aging beef is to improve tenderness and flavor of the meat so that if properly cooked it will be more satisfying to the consumer. Proper aging of beef results in a combination of changes that many people appreciate.

Effect of aging on beef flavor and tenderness

Aging or "ripening" of beef is simply holding a carcass or wholesale cuts at refrigerated temperatures to allow "natural processes" to improve flavor and tenderness.

The muscle of beef, and of other meat animals, undergoes progressive changes after slaughter that affect tenderness of the cooked product. First, muscle goes into rigor, a shortening and stiffening process. Rigor generally lasts for a few hours up to one or two days. During this period, the meat will be least tender if cooked. After the rigor process, muscle undergoes changes that result in a gradual improvement in tenderness.

While muscle is undergoing changes associated with tenderness, chemical breakdown of certain muscle and fat constituents occurs, resulting in a more intense flavor and aroma. In general, these changes in flavor and aroma are desirable to most consumers. However, undesirable flavors and aromas can develop during aging due mainly to the effects of microbial growth, rancidity of the fat and adsorption of off-odors if present in the chill room.

Aging environments

Temperature, relative humidity, air movement and general sanitation of the aging room are essential considerations in successfully aging beef. Temperature of the aging room should be maintained at approximately 34 to 36 degrees Fahrenheit, relative humidity at 85 to 90 percent and an air flow of 15 to 20 linear feet per minute at the surface of the product.

The aging room should be clean and free of all off-odors at all times. Floors and walls of the aging room should be thoroughly washed with an alkaline cleaning solution and an approved sanitizer applied weekly or more often if needed. Sawdust should not be used on the floors because it contributes to air contamination.

Cured and smoked meat, poultry, vegetables, fruits or shipping cartons should not be stored in the aging room because of the off-odor produced by such items, which will be adsorbed by the meat. Except during cleaning, walls, floors, and ceiling of the aging room should be kept as dry as possible.

Carcasses and wholesale cuts should be properly spaced on trolleys or hooks to allow complete circulation of air around the product.

Problems associated with aging

Beef carcasses and wholesale cuts are quite perishable and several problems or conditions can contribute toward the product becoming spoiled or unacceptable during the aging period. Most beef spoilage and off-odors and flavors can be attributed to one or more of the following causes:

- Improper chilling of the carcass. The internal temperature of the round and other thick parts should be lowered to 40 to 45 degrees Fahrenheit within 24 hours after slaughter. Failure to do so may result in bone sour.
- When the carcass is chilled and aged in a chill room containing an off-odor, the carcass will adsorb the odor. Most common off-odor is from excess growth of bacteria, yeasts and molds on the meat and chill room walls and floor. Also, storing any other product in the room that has an odor will contribute to the problem.
- Poor sanitation during slaughter, chilling and processing. This contamination with microorganisms causes off-odors, off-flavors and spoilage.
- Excessive aging will result in an accumulation of microorganisms. In addition to the off-odor produced by microorganisms, their presence in large numbers on a carcass or cut results in a slimy-appearing surface. The most likely places for microorganisms to grow are on the moist, lean surfaces of the carcass such as the neck, flank and round. If these growth-contaminated areas are not completely trimmed off and discarded during processing, the end products of microbial growth will produce undesirable flavor and odor in the finished product, especially the ground beef.
- Shrinkage will occur during the aging period. The longer the aging period, the greater the total loss in weight; also the longer the aging period, the greater the need for trimming of lean and fat surfaces that have dried excessively or have detectable growth of microorganisms.
- Aging under-finished carcasses will result in excess shrinkage, surface drying and discoloration. Dried and discolored surface areas should be trimmed and discarded. This trimming can amount to a considerable loss in product.

Aging period

For practical purposes most of the advantages of aging well-finished beef will have been achieved by the end of seven to 10 days at 34 to 36 degrees Fahrenheit. The fat cover on well-finished beef minimizes drying and discoloration. In general, a carcass should be of Good, Choice or Prime grade. Carcasses with little or no fat cover should not be aged beyond three to five days.

Aging in vacuum packages

With the advent of "boxed beef" and more central processing of beef into primal cuts by packers, aging of beef in vacuum bags has become

common. Beef can be successfully aged in a vacuum bag. However, an important precaution must be taken to ensure no loss of vacuum has occurred in the bag. If there is a loss of vacuum, air will be present in the bag surrounding the meat and aerobic microorganisms will grow and cause rapid spoilage.

Economic considerations

The aging of beef requires refrigerated storage space. It is costly to provide and maintain this space. Consequently, it is usually to the advantage of the processor to move products through the facility as rapidly as is feasible. To hold beef for longer than seven to 10 days is costly.

From the standpoint of the consumer who may have beef custom processed, aging and especially excessive aging will result in considerable shrinkage and trim loss. This means considerable loss of otherwise edible product.

Precautions during processing

When processing aged beef quarters or wholesale cuts into retail cuts or for home freezer, certain precautions should be taken to ensure satisfaction by the customer. Dried or discolored surface areas should be carefully trimmed off. Any surface areas containing detectable growth of microorganisms, as evidenced by slime formation or off-odor, should also be carefully trimmed off. None of these trimmings should be mixed with the trimmings for ground beef but should be placed in the inedible fat and bone container.

Both processor and consumer must realize that all beef tenderness problems cannot be solved by aging. Less tender cuts such as shank, neck and plate cuts can be made acceptably tender by grinding into ground beef. Greater improvement in tenderness can be achieved by correct cooking than by aging. Consequently, cuts of beef should be identified and labeled correctly during processing and the proper cooking procedure employed for each cut.

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Related MU Extension publications

- G2208, Home Slaughtering and Processing of Beef
<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G2208>
- GH1504, Quality for Keeps: Freezing Meat, Poultry, Fish, Eggs and Dairy Products
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