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Aging Big Game

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Hunters seldom agree as to the length of time a big game carcass should be aged.

What is the aging process? When is it beneficial to age big game meat? Under what conditions is it inadvisable to age game? What should be done from the time the carcass is eviscerated until it is cut into steaks and roasts?

This pamphlet is concerned with answers to these questions.

What is aging?

Aging of meat—also called seasoning, ripening or conditioning—is defined as the practice of holding carcasses or cuts at temperatures ranging from 34° to 37°F. During this time, enzymes (catheptic or proteolytic) break down some of the complex proteins contained in the muscle.

Some meat should not be aged

Aging usually improves tenderness, but not all meat should be aged. Meat specialists do not recommend aging carcasses with little or no fat cover because they lose moisture rapidly, resulting in excessive weight loss and surface discoloration. In addition, lean meat is susceptible to deterioration through microbial growth, and slime formed by bacteria and mold growth must then be trimmed.

Carcasses that are ground or made into salami, frankfurters, or other sausages do not need to be aged because grinding or chopping tenderizes meat. In addition, meat for jerky should not be aged. At least one case of food poisoning resulted when jerky was made from deer aged at 60°F.

Pork carcasses are not aged because the animals are young when slaughtered and the meat is naturally

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Figure 1. All meat decreases in tenderness immediately after harvest. Tenderness increases during the first 14 days of aging. The largest improvements in tenderness, however, occur early during the aging period.

tender. Additionally, the unsaturated fats found in pork oxidize during aging, causing rancidity and off flavor.

In addition to being young and tender, veal has very little protective fat covering and is high in moisture; thus it does not lend itself to aging. Some markets require the "hog style" veal carcass (skin on) because it prevents the outer surface of the carcass from becoming dark and dry.

Whether or not game carcasses should be aged can be determined by first understanding the changes that occur during aging.

Changes in tenderness

All meat decreases in tenderness immediately after the animal's death (Figure 1) because muscle fibers shorten and harden as a result of rigor mortis. The changes are similar to those that occur during muscle contraction. Meat that has been cooled at 34°F usually returns to its original tenderness level on the third day after harvest.

If the carcass is to be made into chops, steaks, and roasts, aging at 34°F is often recommended. At 34°F and high relative humidity, bacterial slime usually takes 10 to 14 days to develop on the meat. Aging should be limited to a maximum of two weeks, partly to limit microbial growth, but also because tenderization slows considerably after 14 days of aging.

Aging game that has been skinned often results in drying and high weight loss. For this reason, hunters who age game at home during cold weather should leave the hide on during aging to protect against drying and dirt. State laws that require game to be skinned in commercial coolers do not apply. Some people think that leaving the hide on causes off-flavor, especially in antelope, but our research on factors affecting the flavor of game has failed to substantiate this claim.

Many meat processors do not recommend aging game because much of the game delivered to the meat processor has already been aged long enough. Quick aging of the meat often occurs because the game carcass could not be chilled at 34°F immediately after harvest. Further aging only enhances bacterial growth and could result in food poisoning from growth of pathogenic bacteria.

Aging game shot in warm weather

A 65°F temperature at the time of harvest will result in less toughening and hardening of the muscles due to rigor mortis than a temperature of 34°F. In addition, the actions of natural enzymes, which are responsible for improved tenderness, are much faster at 65°F. Thus, aging at 65°F for three days gives the same amount of tenderization as the more conventional aging temperature of 34°F for

two weeks. Therefore, game harvested when the temperature is near 65°F should not be aged.

Game harvested in cold months should be aged longer than game harvested in warm months. Alternating temperatures, such as 65°F days and 30°F nights also speed up the aging process and shorten recommended aging times.

During warm hunting seasons, special care should be taken to keep the carcass cool. It should be kept in the shade and allowed as much air circulation as possible. A carcass should be transported to camp and skinned if the temperature is expected to be above freezing the first night after harvest. Cheesecloth or light cotton bags should be used to protect the meat from insects and dirt. Airtight bags or tarps should not be used because they retain heat and cause the meat to spoil rapidly. Locker plant operators and meat scientists agree that game shot during warm weather and chilled slowly should not be aged. In addition to growth of spoilage bacteria, the possibility of health problems resulting from growth of pathogenic bacteria also exists.

Aging game shot in coldweather

Game carcasses under 100 pounds often chill rapidly if the temperature is below freezing at the time of harvest.

Muscle contraction or rigor mortis hardens the muscle to a greater extent than if the temperature is above freezing. Very rapid chilling and hardening causes meat to be tough. This condition is known as cold shortening; it will occur if the internal muscle temperature drops to 32°F within 12 hours after the kill. Leaving the hide on during cold weather will help prevent cold shortening and also keep the carcass from freezing.

Carcasses that undergo cold shortening should be aged at 34°F. If the carcass is frozen while hanging, little additional tenderization will occur because enzyme action is very slow at freezing temperatures. Frozen carcasses should be thawed and maintained at 34°F. Alternate periods of freezing and thawing should be avoided because these temperature variations lower meat quality.

Recommended aging times

Antelope carcasses should be cut and wrapped for the freezer within three days of harvest. This short aging period helps prevent the “liver-like” or “mushy” texture often found in antelope meat.

Deer, sheep, goat, cow elk, and cow moose carcasses should be cut approximately seven days after harvest. If they have been held at higher temperatures (above 40°F) the meat should be cut before seven days of aging are completed.

Under ideal conditions, bull elk and bull moose carcasses should be cut after a 14-day aging period at 34 to 37°F. However, these carcasses are seldom handled under ideal conditions. Slow chilled carcasses and carcasses that have been in camp for a few days require less aging.

The recommended aging periods are sufficient for tenderness and flavor development in most game carcasses. Aging is not needed if carcasses are to be ground, cured, or made into jerky or sausage. In addition, most game meat recipes utilize moist-heat cooking methods that tenderize the meat and shorten the needed aging period.

Do not age any game carcass if the animal was harvested during warm weather and not chilled rapidly, if the animal was severely stressed prior to harvest, if gunshot areas are extensive, or if the animal was under one year of age. Animals severely stressed from running long distances or from being wounded and trailed several hours prior to the kill should not be aged because energy sources that are

normally converted to lactic acid in the muscle are used up during stress.

Spoilage bacteria grow much faster if the level of lactic acid in the muscle is low. Therefore, meat from stressed animals will often sour if the meat is aged. Meat sours rapidly if gunshot areas are extensive. The Ph of blood is optimal for bacterial growth, and extensive gunshot areas have greater bacterial contamination from dirt and hair.

Aging periods longer than those recommended are often accompanied by extensive bacterial growth, drying, and discoloration of the meat. Reducing the aging period limits bacterial growth on the carcass. At present, there does not appear to be any evidence that there is a health risk in eating properly prepared game meat, but when proper aging and cooking procedures are ignored, food-borne illnesses can occur. Therefore, adequate precautions with regard to aging time and aging temperatures should be followed.

Aging carcass parts

Individuals who cut and wrap their own game may want to process the entire carcass—except the loin and rib cuts—three days after harvest. This practice eliminates drying and spoilage of cuts that are often ground or moist-heat cooked. The loin and rib cuts (which are usually dry-heat cooked) may then be aged in a cool, clean place. These cuts usually have some fat cover to protect the meat against drying during aging. Fat should not be trimmed before meat is aged because it protects the meat during the aging process. However, trimming fat after aging is recommended to avoid undesirable flavors associated with the fat.

Summary

Many practical considerations must be taken into account when deciding whether or not to age game meat. Among these are the temperature at the time of harvest, the chilling rate, the internal temperature of the muscle after chilling, the youthfulness of the animal, the relative humidity, the amount of weight loss the hunter is willing to sacrifice, use to be made of the meat, and the cooler space and labor available if the game is commercially processed. Ground or chopped game meat does not benefit from aging.

Under ideal conditions, age antelope up to three days after harvest at 34°F; deer, sheep, goat, cow elk and cow moose up to seven days; and bull elk and bull moose up to 14 days. If the temperature is higher, the aging period should be shorter. Game should be cut immediately if the temperature at harvest is 65°F or above. Generally, it is better to err on the side of shorter aging periods.

Consult the following publications for more information: You and Your Wild Game, B-613R; Skinning and Boning Big Game, B-884R; The Pronghorn Antelope Carcass, B-575; The Mule Deer Carcass, B-589R; The Elk Carcass, B-594; Deer and Antelope Yield, AS-102; Nutritional Content of Big Game Meat, B-920. To obtain these publications phone UW-CES Resource Room at 307-766-2115.

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