

# Carcass Quality

Improving quality and consistency begins with understanding the industry targets for carcass traits; these targets include the elimination of injection site blemishes & lesions, bruises, dark cutters, and liver condemnation to name a few.

A series of landmark studies called the National Beef Quality Audits (NBQA) have taken a closer look at the quality and consistency of production practices.

The 1991 NBQA demonstrated that U.S. beef was too fat, too tough and too inconsistent to be competitive with pork and poultry in the marketplace. Significant progress has been made by all segments of the beef industry to improve the overall acceptance of beef carcasses that enter the fabrication sections of our processing facilities. But, the 2005 NBQA suggests there is still work to be done.

To improve quality and consistency, it is necessary to receive feedback on the performance of cattle that leave the ranch. Use this information as a basis for setting goals to increase performance.

Producers should realize that if cattle do not gain or convert feed efficiently, the cattle will grade low such as USDA Standard grade, or if carcasses have USDA yield grades of 4 or 5, they should look at make adjustments to improve the quality and consistency of not only the beef products from *their cattle*, but also the beef products within the *whole industry*.

Beef quality grades are one of the main determinants in the value of a beef carcass. Two factors, marbling and maturity or age of the carcass, determine beef quality grades. Marbling is the intramuscular flecks of fat dispersed in the lean tissue. The degree of marbling is measured when a carcass is ribbed or split between the 12th and 13th ribs.

## Ensuring palatability

Flavor, juiciness, and tenderness determines the palatability and overall eating satisfaction. Flavor is provided by compounds in intramuscular fat or marbling of beef muscle tissue, and varies with genetics, nutrition, health and several other factors. Juiciness is determined by the amounts of moisture and marbling in the muscle after it has been cooked.

Tenderness is determined by the amount of connective tissue, the amount of marbling, and the activity of enzymes that breakdown muscle proteins after slaughter. Temperament, handling, castration, growth implants, and intramuscular injections also play a role in palatability.

The 2005 NBQA concluded a 19.2% occurrence of Average and High Choice, and only 2.9% USDA Prime beef.

The majority of carcasses range between USDA Select (36.7%) and USDA Low Choice (35%), with only slight or small amounts of marbling. The true challenge for the beef industry is eliminating the 6.2% of USDA Standard carcasses that more often lead to an unsatisfactory eating experience.



Ask your seedstock supplier to report the Expected Progeny Differences (EPDs) for carcass traits, including marbling. Select for animals with a moderate body size and early maturity – these animals are associated with increased marbling. Keep in mind, however, that by increasing marbling (the main factor in quality grade), yield grade may suffer.

There are 10 different degrees of marbling: abundant, moderately abundant, slightly abundant, moderate, modest, small, slight, traces, practically devoid and devoid. Abundant has the highest degree of marbling, while practically devoid has the lowest degree of marbling.

The second factor, maturity is determined by analyzing the degree of ossification of the bone and cartilage in the thoracic vertebrae (ribs). There are five maturity levels of carcasses, A, B, C, D, and E, with the most youthful carcasses graded maturity A and the oldest appearing carcasses being graded maturity level E.

A and B maturity levels are eligible to receive the grades of prime, choice, select, and standard, and are considered youthful carcasses. Older carcasses, with maturity levels of C, D, and E, usually from cows and bulls, receive commercial, utility, and cutter grades.

Once both the marbling score and maturity level have been determined, the USDA quality grade chart can be used to determine quality grade.



<u>Quality Grade</u>	<u>Amount of Marbling</u>
Prime +	Abundant
Prime	Moderately Abundant
Prime -	Slightly Abundant
Choice +	Moderate
Choice	Modest
Choice -	Small
Select	Slight
Standard	Traces
Standard -	Practically Devoid
Utility	Devoid

**RELATIONSHIP BETWEEN MARBLING, MATURITY, AND CARCASS QUALITY GRADE<sup>1</sup>**

Degrees of Marbling	Maturity				
	A	B	C	D	E
Slightly Abundant	<b>PRIME</b>				
Moderate			<b>COMMERCIAL</b>		
Modest	<b>CHOICE</b>				
Small					
Slight	<b>SELECT</b>		<b>UTILITY</b>		
Traces					
Practically Devoid	<b>STANDARD</b>			<b>CUTTER</b>	

# Carcass Quality

## USDA Yield Grades

The USDA yield grades for beef carcasses predicts cutability or the percentage of the carcass that is closely trimmed, mostly boneless, retail product from the round, loin, rib, and chuck.

The USDA yield grades are 1, 2, 3, 4, and 5; with yield grade 1 yielding the highest percentage of retail product and yield grade 5 having the lowest percentage of retail product.

The table shows each yield grade with its associated percentage of closely trimmed retail product.

Meat graders assign a yield grade to a carcass by evaluating:

- The amount of external fat.
- The hot carcass weight
- The amount of kidney, pelvic, and heart fat
- The area of the ribeye muscle.

## Expected percentage of boneless, closely trimmed retail cuts (BCTRC) from beef carcasses within the various yield grades

Yield Grade	% BCTRC
1	> 52.3
2	52.3 - 50.0
3	50.0 - 47.7
4	47.7 - 45.4
5	< 45.4

## Birdshot/Buckshot in Meat

Cattle producers tend to point their fingers at hunters with regards to this problem. However, there are producers that sometimes use shotguns/scatter guns to gather unruly cattle.

Regardless of who is at fault, this defect should be prevented with education about the consequences. Other means of animal control and capture can be used. To ensure that foreign objects are not found in carcasses, never use a shotgun to gather cattle.

Lead birdshot/buckshot cannot be detected by metal detection devices used in packing and processing facilities. Furthermore, lead is considered an adulterant by the Food and Drug Administration.

If shot is detected during ground beef production, the entire lot of ground beef must be condemned. In large slaughter and processing plants, this can be several thousand pounds in one batch!

In the 1994 audit of non-fed beef cattle (cull cows and bulls), one processor commented that his company lost a total of 100,000 lbs. of ground beef in a six-week period due to the presence of lead shot.



## Dark Cutters

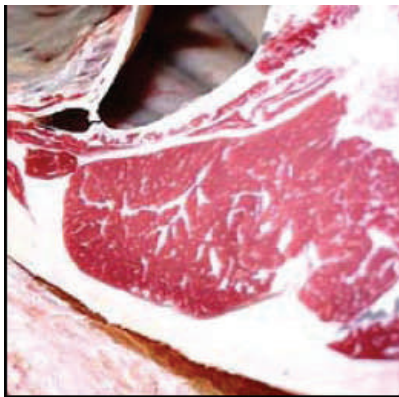
The 2000 NBQA reported that dark-cutting beef carcasses (dark cutters) result in a loss of \$5.43 per beef animal harvested in the U.S.

Dark cutters result from pre-harvest stress, which depletes muscle glycogen storage. Without sufficient glycogen in the carcass, lactic acid cannot be produced after death to reduce the pH of the meat. The result is lean meat that is dark, firm, and dry. Weather, growth promotants, genetics, disposition, and handling practices before harvest all play a role in causing dark cutters.

### Reducing Dark Cutter Losses

**Implants**—Data from Colorado State University indicate that cattle tend to have a lower incidence of dark cutters per pen when the time from re-implantation to harvest was longer than 100 days.

**Environment**—The occurrence of dark cutting beef is highest during very cold weather combined with precipitation. This increases the rate of body-heat loss and elicits shivering. The incidence of dark cutters is also high in hot weather or when large fluctuations in temperature occur over short periods of time.



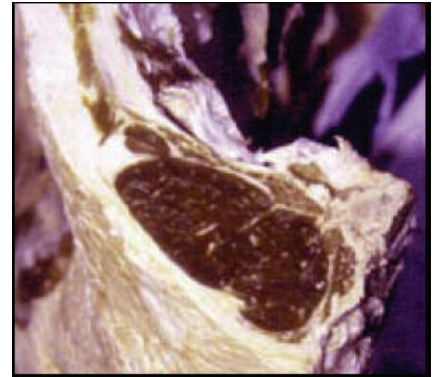
### **Mixing Different Groups of Cattle**

—Don't mix strange animals. Fighting to establish a new social order 24-48 hours prior to slaughter can increase the incidence of dark cutters. Mixing bulls can cause dark cutters within 90 minutes.

**Crowding**—Crowding can increase the incidence of dark cutters.

**Genetics**—Temperament appears to be inherited. Producers are encouraged to add disposition as a selection criteria.

**Feedlots**—Cattle that are “start-up” cattle to be processed at the beginning of the week can be expected to have more dark cutters because they may have more time to stand around than other sets of cattle brought in during the week.



## Carcass Bruises

Bruising rates are often monitored at the packing plant. Bruising costs the beef industry \$22 million annually in carcass trim at the time of processing. The most common cause of bruising is a hard bump against a protruding object or horns. Rough, careless handling causes more than 50% of all bruises.

Recommended practices to help reduce bruising:

**Horns** - Groups of horned cattle have more bruises than polled cattle; however, tipping will not reduce bruising. Dehorning of cattle (manual or genetic) is recommended.

**Gates** - A common cause of loin bruises is throwing a gate into the side of an animal.

**Protruding Objects** - Broken boards, nails and exposed bolts should be eliminated. Check facilities by looking for shiny, rubbed spots or tufts of hair.

**Fencing** - Planks, sheet metal or other fencing materials should be installed on the side of posts toward the cattle. If animals are being handled on both sides of the fence, install a belly rail to prevent them from catching hips on the posts. The area from 28 inches to 52 inches from the floor is the hazard zone.