

## IDEA

Sourcing High Quality Beef:  
The Retailers Guide

Initiative for the Development of Entrepreneurs in Agriculture

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There are many factors on the farm, in transport, and in the processing plant that affect the eating quality of beef. This discussion outlines the primary attributes for measuring beef quality and presents information on how pre-harvest management influences the quality of beef in your meat counter. Working directly with the original source, the beef producer, allows the retailer to create a set of beef specifications that best suit their customers' needs.

**Indicators of Fresh Beef Quality**

- 1) Palatability– Palatability may best be defined as the combination of tenderness, flavor and juiciness. If any one of these characteristics is lacking, palatability and subsequent eating experience will be diminished.
- 2) Marbling- Marbling scores alone explain 12% of the variation in beef palatability. Beef must be of at least Small marbling to reach the Choice quality grade. Marbling is a measurement of the fat that is dispersed between muscle tissues. An increased amount of this fat results in increased juiciness and overall increased flavor.

Low Choice	Average Choice	Low Prime
Small Marbling	Modest Marbling	Slightly Abundant Marbling



**Modest<sup>0</sup>** (above middle picture) is the minimum marbling requirement for most of the high quality branded beef programs such as the Certified Angus Beef Program (CAB). A branded beef program with emphasis on lean beef, such as Laura's Lean Beef, often requires marbling scores lower than Small<sup>0</sup> (above left).

The illustrations above are reduced reproductions of the Official USDA Marbling photographs prepared

for the U.S.D.A. by and available from the National Cattlemen's Beef Association.

- 3) Tenderness- Tenderness is defined as the biting force required to cut through the meat. This can be measured objectively using an Instron machine, which measures the shear force to cut the cooked product. Genetics play a major roll in tenderness, and in the near future, producers will ascertain this information on their farms for the purpose of certifying guaranteed tenderness. No significant differences have been observed in tenderness between sexes, as long as each was of young age.

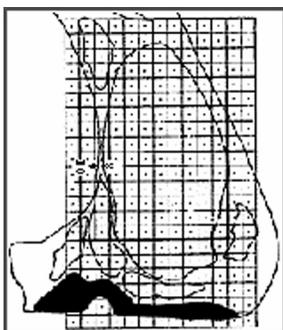


- 4) Flavor- Distinct beef taste is highly influenced by the degree of marbling, breed, age, days on feed, and feed rations. Older animals have a more intense flavor. Beef that is slowly chilled and aged is better quality than fast chilled and short aged beef. Certain grains and forages will influence meat flavor. Corn and soybean meal, major Illinois crops, appear to be important ingredients in producing a flavor preferred by most mid-west consumers.
- 5) Juiciness- Juiciness is the amount of moisture retained in the meat after it has been cooked. This is determined by the beef's genetics and the degree of marbling.
- 6) External Fat Cover– Beef Cattle vary greatly in the amount of external fat cover. This is due to many factors. Ideally, cattle will be processed when

external fat cover is no less than .4 and does not exceed .60 inch over the ribeye between the 12<sup>th</sup> and 13<sup>th</sup> rib.

- 7) Ribeye Area– This refers to the geometric size of the loin muscle as measured in square inches across the face of the cut loin. Rib eye size can vary from less than 8 square inches to greater than 18 square inches. An acceptable range for rib eye size would be between 11 and 14 square inches.

**Harvest weights and breed influence this the most. The traditional supply chain offers many shapes and sizes with little uniformity. This can be controlled through sourcing product from fewer herds with similar genetics and feeding regimes.**



- 8) U.S.D.A. Yield Grade is determined through a complicated formula involving Carcass Weight, Ribeye Area, Percent Kidney, Pelvic, and Heart Fat, and Subcutaneous Fat. Yield Grade is reported on a scale of 1 to 5.

**Relationship of Yield Grade and Cutability**

U.S.D.A. Yield Grade	% Boneless, Closely Trimmed Cuts From the Round, Loin, Rib, and Chuck
1	52.6-54.5
2	50.0-52.6
3	48-50
4	45.7-47.7
5	43.3-45.4



**Yield Grade 4 and 5 carcasses are too fat and/or too light muscled.**

**Yield Grade 1 carcasses can create palatability challenges and lower product consistency.**

- 9) Color- Research has shown that muscle color explains 15 to 23% of the variation in beef palatability. The importance of color is reflected by consumer preference and juiciness. Fresh beef should be cherry red (below) in color. Diet, breed, and animal age affect fat color. Optimum fat color for beef is white.
- 10) Consistency– Delivering consistent color, marbling, tenderness and overall palatability is a major challenge for the traditional supply chain. Farmers that utilize genetics, feed and management regimes that enhance the eating quality of beef are valuable resources for retailers to partner with to procure uniform high quality beef.

**Food-safety**

- 1) High quality and pathogen-free beef is a function of cleanliness at all levels of the chain, including the farm, processor, distributor, and retailer. By making more direct links between the farmer and the retailer, the meat distribution system can guarantee fresher product. In addition, the retailer can ensure wholesomeness if the specific farm has documented management practices.
- 2) The United States beef supply is free from both Hoof and Mouth Disease and BSE (Mad Cow Disease) and consequently at this time these diseases are not a concern to consumers.

**On-Farm Practices that impact the eating qualities of Beef**

- 1) Genetics- Choices of breeds can greatly affect the eating quality of beef. Beef cattle differ from dairy in that they are heavier muscled cattle that yield more retail product and are more efficient in turning feedstuffs into edible product for human consumption. Within the beef sector there are generally three divisions of beef breeds. The British breeds (Angus, Shorthorn, Hereford) are known for their ability to marble quickly and for their eating quality, the Continental breeds (Limousin, Simmental, etc.) are recognized for leanness, greater total muscle mass, and percent yield, and the Eared cattle are heat resistant breeds (Beefmaster, Brahma, etc.) and are located primarily in the Southern United States and South America. These eared cattle breeds are generally considered to have difficulty-dispersing marbling and tend to have problems with tenderness and palatability.  
*(Note: variation within breed can be significant and is heavily influenced by management.)*



**Angus Pair**



--Note ossification (red) in buttons at tips of chine bones.  
 --Ossification becomes less obvious moving down (toward anterior).  
 --Cartilage is ~.40% ossified; typical of middle C maturity.

**Simmental Cows**



- 3) Feedstuffs and Additives- High energy, corn based diets will increase feedlot gain while also initiating the marbling process at an earlier age. To guarantee a consistently high-quality meat product, feed ingredients must also be consistent and high quality. High-oil corn has been shown to increase marbling and unsaturated fatty acid make-up of beef loins. The use of other additives can also be advantageous. Vitamin D supplementation has been shown to improve tenderness in beef. Supplementation of Vitamin E has been shown to increase the shelf life of the meat once it is delivered to the retailer.



**Brahma Cow**



**Corn, as the starch source in the beef animal's diet is the most effective dietary influencer on the deposition of marbling.**

Photos Courtesy of Oklahoma State University and The American Brahman Breeders Association, Copyright 1997  
 For additional information on beef genetics, check out the Oklahoma State University web-site at <http://www.ansi.okstate.edu/breeds/cattle/>.

Beef producers currently have genetic selection indexes to aid them in selecting genetics for increase growth, increased lean product, and increased marbling. The challenge to beef producers is that many of these traits are antagonistic to other positive traits. For example, increasing selection pressure for lean product results in a subsequent decrease in marbling.

- 2) Age of Cattle- The age of the animal influences tenderness, with the older the animal the tougher the meat. Cattle of "A" maturity. Less than 30 months of age, should be the most desirable for palatability. However, for maximum eating quality, cattle should be less than 18 months of age.



--Note the white cartilage "buttons" at tip of chine bones.  
 --Indicates a young carcass.  
 --Note evidence of ossification (red) in tips of top (posterior-most buttons).  
 --Indicative of A/B borderline maturity

- 4) Ultrasound- New Ultrasound Technology can enable cattle to be marketed in a way that optimizes carcass quality and feedlot efficiency. Ultrasound images are taken of the longissimus dorsi, which reveal the rib-eye area and the percent intramuscular fat. Using these images, estimations can be made of yield and quality grade of the cattle, thus giving the owner a relatively accurate idea of when cattle need to be marketed for optimum eating quality.
- 5) Environment and Handling- Cattle are produced and grown under a variety of programs. Proper animal handling techniques reduce stress and



resulting quality problems such as bruising, dark cutters, and lower quality grades in beef. Bruising alone costs the U.S. beef industry an estimated \$22 million per year. Reducing pre-harvest stress is also important. Dark cutters are created when cattle are stressed due to poor pre-harvest management. Certainly animal disposition and implanting regiment can influence dark cutters, but quality people and facilities do as well.

**Example of a  
“Dark Cutter”**



- 6) Health- Proper injection technique is critical. Choosing the best injection site and route of administration, correct needle size, proper sanitation, proper animal restraint, all help to reduce incidence of tissue damage. Very aggressive implanting systems have been shown to reduce tenderness in beef cattle. Antibiotic injections have also been shown to reduce tenderness in beef.

**Conclusion**

Genetic and environmental factors probably impact eating satisfaction more than other factors. Breed of cattle and diet appear to make the largest impact on all sensory attributes, such as flavor, juiciness, and tenderness. It is critical for the cattle industry that producers do everything in their power to insure a quality product to the retail market.

**What is Organic Beef?**

This includes products from cattle that have been raised—and meat products that have been processed—and handled in compliance with USDA’s Organic Standards. These standards involve the entire processes in which synthetic inputs in all phases of animal production and meat processing are prohibited. **Visit <http://www.ams.usda.gov/nop/indexIE.htm> to learn more.**

**What is Natural Beef?**

These products have been processed and handled in compliance with USDA’s natural standards. These standards prohibit the use of artificial ingredients, coloring or chemicals and require minimal meat processing.

**Bovine Spongiform Encephalopathy (BSE)  
Or Mad Cow Disease**

- The U.S. beef supply is BSE-free.
- The BSE agent is not found in muscle meat. It is found in central nervous system tissue such as brain and spinal cord.
- All U.S. cattle are inspected by a veterinarian before going to slaughter. Animals with any signs of neurological disorder are not permitted to enter the human food chain and are tested for BSE.
- BSE affects older cattle, typically with symptoms appearing in animals more than 36 months of age. The vast majority of cattle going to market in the U.S. are less than 24 months old. BSE has never been found in commercial cattle less than 24 months of age.



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