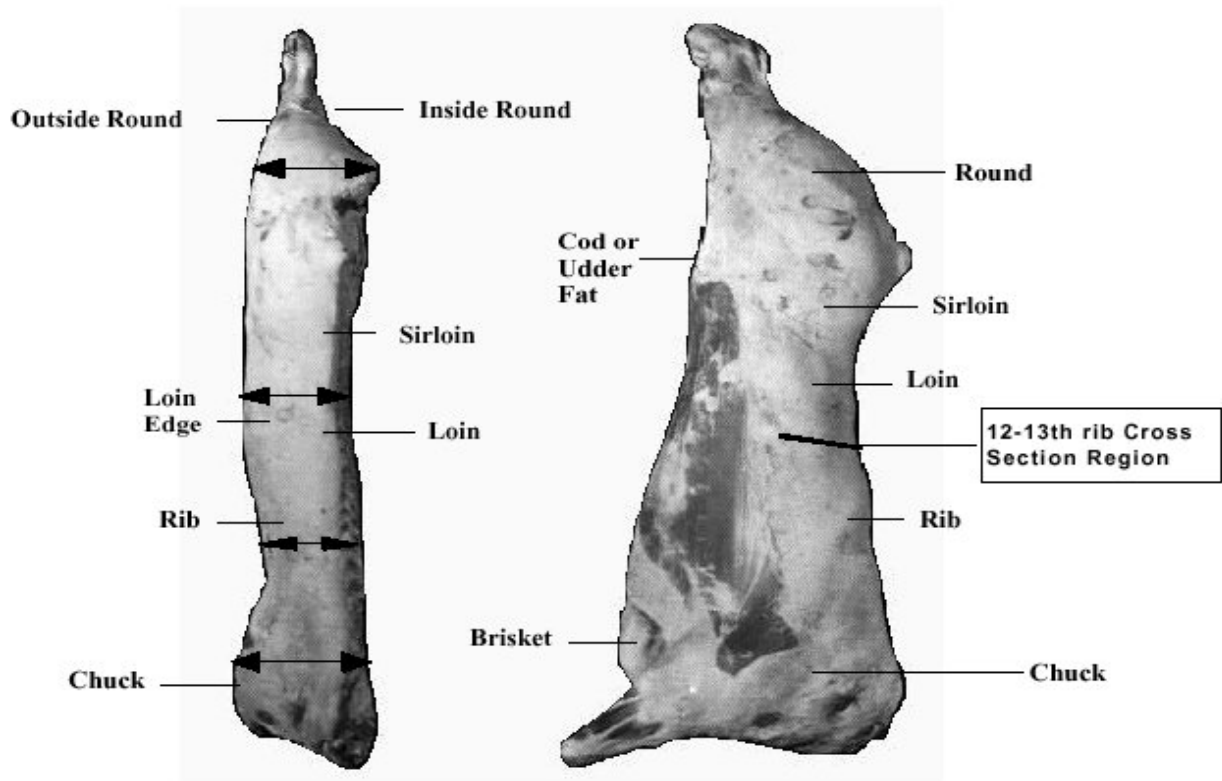


Beef Quality and Yield Grading



The area of meat science is a scientific study, but live animal evaluation is not. The best live animal evaluators are those that beg, borrow, steal, claw, and bite to get all the information they can to improve their “position” in evaluating. The most important thing you have to do, if you have any aspirations of becoming a livestock evaluator, is to develop the expertise of evaluating fat. Fat is the most important variable; we must develop the ability of being able to determine where muscling stops contributing to the thickness of an animal and fat starts.

We need to be aware of the priority order in which animals use nutrients in building body parts. Nutrient usage in the building blocks is:

1. Nervous Tissue
2. Bone
3. Tendon
4. Muscle
5. Fat
 - A. External Fat
 - B. Internal Fat
 - a. Kidney, Pelvic, and Heart [KPH]
 - b. Seam
 - c. MARBLING (distribution of fat)

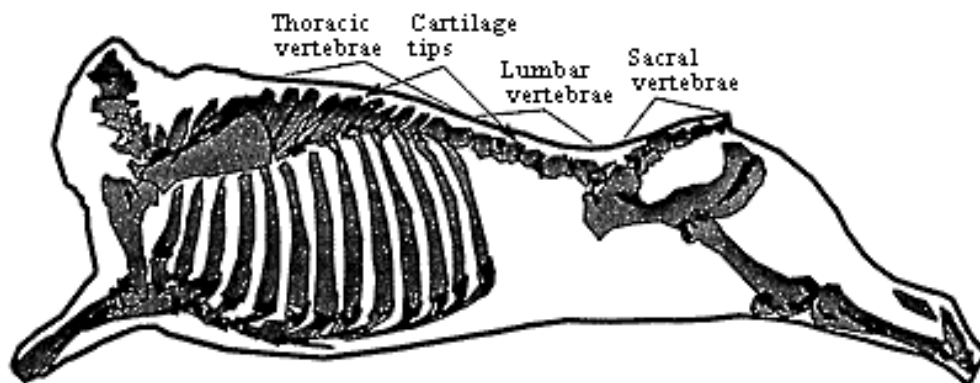
Let's look at the various evaluations one needs to make on steers and heifers to make quality and yield grade determinations. There is; *maturity, distribution of fat, firmness of muscling, adjusted fat thickness at the 12th rib, percent kidney fat, rib eye area, and carcass weight.*

Fatness has historically been connected with predicting the amount of marbling one can expect to be in the carcass. At best, it is simply, connected. Although, some believe the correlation between outside fatness and marbling to be fairly high, fact of the matter is, it is alarmingly low. So the bottom line is, marbling is not the best predictor of eating characteristics, but it is the best we have at this time.

Slaughter Cattle quality grades are based on an evaluation of factors related to the predicted palatability of the lean (tenderness, juiciness, and flavor). Quality grades of slaughter cattle are evaluated primarily by the amount and distribution of finish; the firmness of muscling, and the physiological characteristics of the animal associated with maturity.

Maturity

a.) Maturity refers to the physiological age of the animal rather than the chronological age. The indicators are bone characteristics, ossification of cartilage, and color and texture of the rib eye muscle. Cartilage becomes bone, lean color darkens and texture becomes coarser with increasing age. Cartilages in all these areas are considered in arriving at the maturity classification. The buttons are the most prominent, softest and least ossified in the younger carcasses. Ossification begins in the sacral region and with advancing age proceeds to the lumbar region and then even later it begins in the thoracic region (buttons) of the carcass.



b) The degrees of maturity are A, B, C, D, and E. Age ranges for these maturity groups are approximately:

‘A’



AGE- 9 to 30 months

‘B’



AGE-30 to 42 months

Maturity group

C, D, and E maturities are mainly used to describe slaughter cows. Maturity is something you should hardly spend time on when grading slaughter steers and heifers. If you have a heifer in front of you that has had a calf (has produced some milk and has nursed), you had better think about considering the fact that she may be too old to be considered for the Prime, Choice, and Select grades. In these cases, the heifer may go all the way to Standard. However, this problem only occurs in about 2% of the population. Pregnancy seems to accelerate physiological maturity. Even though you know a heifer is within 30 months of age, if she has had a calf, you better precede cautiously—that pregnancy may have pushed her over the maturity limit for Prime, Choice, and Select. However, outside of this situation, you can consider all others to be in ‘A’ maturity (9-30 months old).

c) Ossification of the vertebral column

	Maturity Group				
Vertebrae	A	B	C	D	E
Sacral	Distinct separation	Completely fused	Completely fused	Completely fused	Completely fused
Lumbar	No ossification	Nearly completely ossified	Completely ossified	Completely ossified	Completely ossified
Thoracic	No ossification	Some ossification	Partially ossified	Considerable ossification (outlines of buttons are still visible)	Extensive ossification (outlines of buttons are barely visible)
Thoracic buttons	0-10%	10-35%	35-70%	70-90%	>90%

d) Lean Maturity Descriptions

Maturity	Lean Color	Lean Texture
A°	Light cherry-red	Very fine
B°	Light cherry-red to slightly dark red	Fine
C°	Moderately light red to moderately dark red	Moderately fine
D°	Moderately dark red to dark red	Slightly coarse
E°	Dark red to very dark red	Coarse

c. Marbling

Marbling (intramuscular fat) is the intermingling or dispersion of fat within the lean. Graders evaluate the amount and distribution of marbling in the rib eye muscle at the cut surface after the carcass has been ribbed between the 12th and 13th ribs. Degree of marbling is the primary determination of quality grade.

Degrees of Marbling for live cattle below 30 months of age:

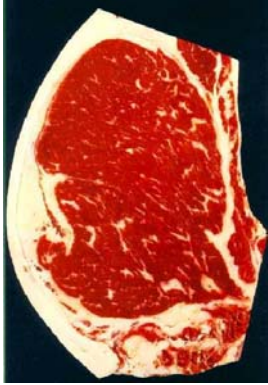
Quality Grade	Marbling Score
Prime +	Abundant
Prime °	Moderately Abundant
Prime -	Slightly Abundant
Choice +	Moderate
Choice °	Modest
Choice -	Small
Select +	Slight
Select -	Slight
Standard +	Traces
Standard °	Practically Devoid to Traces
Standard -	Practically Devoid

Disclaimer

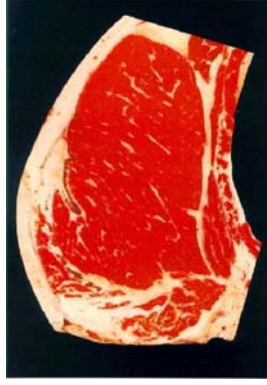
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<http://www.ams.usda.gov/lsg/ls-st.htm>

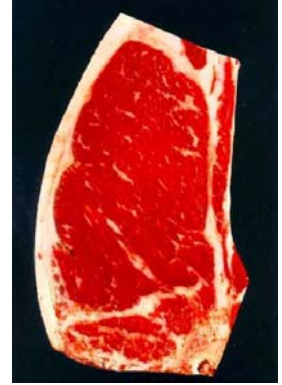
Quality Grading



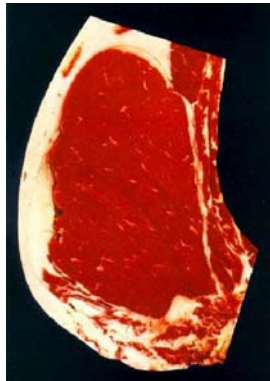
Slightly Abundant



Modest



Moderate



Small



Slight

RELATIONSHIP BETWEEN MARBLING, MATURITY, AND CARCASS QUALITY GRADE¹

Degrees of Marbling	Maturity ²				
	A ³	B	C	D	E
Slightly Abundant	PRIME				
Moderate			COMMERCIAL		
Modest	CHOICE				
Small					
Slight	SELECT		UTILITY		
Traces					
Practically Devoid	STANDARD			CUTTER	

¹Assumes that firmness of lean is comparably developed with the degrees of marbling and that the carcass is not a "dark cutter."

²Maturity increases from left to right (A through E).

³The A maturity portion of the Figure is the only portion applicable to bullock carcasses.

U.S. Standards, January 1997

ADVANCED QUALITY GRADING

UNITED STATES DEPARTMENT OF AGRICULTURE
 AGRICULTURAL MARKETING SERVICE
 LIVESTOCK AND SEED PROGRAM
SLAUGHTER CATTLE EVALUATION

Trait	English	Exotic	Brahman	Dairy	English X Exotic	English X Brahman	Exotic X Brahman	Trait
Approximate Fat Thickness	0.3 in. Standard 0.4 in. Select 0.45 in. Choice 0.8 in. Prime	0.2 in. Standard 0.4 in. Select 0.55 in. Choice	0.4 in. Standard 0.5 in. Select 0.6 in. Choice	0.2 in. Select 0.35 in. Choice	0.4 in. Select 0.5 in. Choice	0.5 in. Select 0.6 in. Choice	0.5 in. Select 0.6 in. Choice	Fat thickness
Pones	X	MOST		MOST	X	MOST	MOST	Pones
Lower round 1/4	MOST		X		MOST	MOST	X	Lower round 1/4
Cod/udder	MOST	MOST	MOST	NO	X			Cod/udder
Brisket	X	MOST	X	MOST	MOST	X	X	Brisket
Flank	X			MOST	X	MOST	X	Flank
Cheeks/jowls	MOST	X	X	X		NO	X	Cheeks/jowls
Turn over the top	MOST	NO		NO		MOST	X	Turn over the top
Round creases-heifers only	MOST		MOST	NO			MOST	Round creases-heifers only
Disposition		X	X	NO				Disposition
Dew claws	Black English-MOST	NO		NO				Dew claws
Thickness	X	NO	X	NO				Thickness

MOST = Most important factor to consider when determining final quality grade
 X = Very important factor to consider when determining final quality grade
 NO = Does not assist when determining final quality grade

Fat thickness required to grade 'Choice' varies by breed type

- Heavier muscled cattle grade lower than light muscled cattle
- Thickness due to muscle = lower quality grade; Thickness due to fat = higher quality grade
- Pones were one of the top five evaluation factors for all breed types
- Lower round 1/4 (collar fat or fat over the inside round) 2nd most helpful factor when predicting quality grade
- Cheeks and jowls = use when the cattle are on the line to bump up to the next higher quality grade
- Disposition and swirls - high swirl = lower quality grade
- Frame size is related to fatness and weight when determining quality grade (e.g. large frame steer @ 1100# will not be Choice; however a small frame steer @ 1100# will be better than Choice)
- Implants will have a negative impact on final quality grade (reducing grade by 5-30%)



Approximate Choice Thickness

.35 to .6 inches

Fat Thickness- Different breed types have a different relationship to fat thickness needed for quality grades. Bos Indicus type cattle require more fat (.6 inches) while dairy cattle require less fat (.35 inches).

Pone fat - The fat deposited on either side of the tail. Tail pones are useful in predicting quality grade in all cattle, especially dairy and exotic breeds. Animals showing no fat deposits on either side of the tail head should be considered for the standard quality grade. Select quality grade will show only small amounts of pone fat (about the size of a tennis ball) and choice grade cattle will show moderate amounts of pone fat (about the size of a soft ball).



Pone Fat

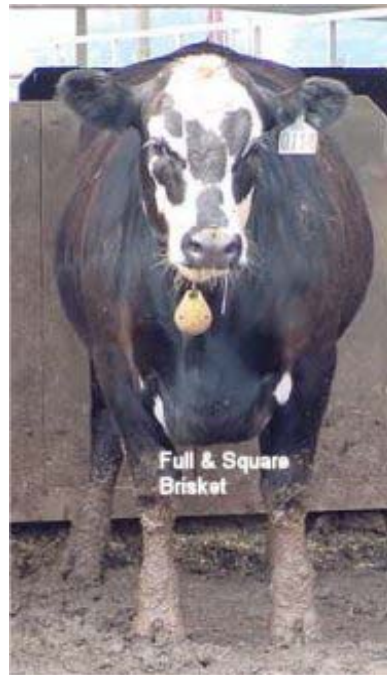
Lower round quarter- Lower round quarter is useful in determining quality grade in all breed types, especially English and English Brahman cross. **Caution;** this is not the cod or udder area but the area inside the rounds. Animals showing Standard quality will show no fat. Select quality will show small amounts of fat and Choice quality will show a moderate amount of fat.



**Choice Lower Round 1/4
and Cod/Udder Fat**

Cod and Udder Fat- Caution; one must be careful using cod fat, how a steer is castrated may affect his ability to express cod fat. Some steers are cut or clamped so high and tight that there is no place left to deposit fat in the cod region. On the other hand some are cut or clamped where there is a sack left the size of a gallon bucket. Choice cod/udder fat appears full; standard cod/udder fat shows no fat, skin is folded and loose.

Brisket- Brisket thickness is useful in determining quality grade in all breed types especially Exotic, English-Exotic Cross, and Dairy. Standard quality will show no fat in the brisket area and the brisket will appear narrow and pointed. Select quality will show a small amount of fat, while Choice briskets appear full and square.



Choice Brisket



Choice Flank, Cheeks and Jowl

Flank- Depth of flank is a good predictor of marbling especially in English, English cross, and Dairy cattle. One of the best indicators of fatness on an animal is disproportionate depth of body. An animal that has a deeper than natural underline, is fat.

Standard quality shows no fat, the flank angles up from the elbow to the rear flank. Select quality, shows a small amount of fat. Choice quality, the underline from the elbow to the rear flank will be approximately parallel to the ground. A fist-full of fat may push out in the flank area when the animal walks.

Cheeks and Jowl- This can be used to select a quality grade when other indicators leave the evaluator uncertain as to which grade most accurately describes the quality grade (i.e. tiebreaker).

Thickness- Overall dimension of the body is most important in English and Brahman breeds.



Choice Thickness

Dew Claws- Good indicator of extended time on feed and of Choice and higher quality grade when dew claws are swollen.



Turn over the top- As the amount of fat increases as viewed down over the back of animals. They take on a flat or tabletop appearance. As this condition reaches excessive levels, a shelving effect appears out over the edges of the loin to form a shelf.

Round creases- A good indicator of quality grade in Heifers only. A rope looking seam of $\frac{1}{2}$ inch- $\frac{3}{4}$ inch of fat can be seen extending from the vulva to the udder, between the rounds.



Select Round Creases

These external fat indicators are not absolute, but are useful when other information is not available (i.e. genetics, environment, days on feed, and prior grading information). Using these indicators should increase the degree of accuracy when evaluating groups of slaughter steers and heifers.

Yield Grades

4) Beef Yield Grades

- A) Yield grades, are denoted by numbers 1 through 5, with Yield Grade 1 representing the highest cutability or yield, of closely trimmed retail cuts. Thus, an "increase" in cutability, means a smaller yield grade number while a "decrease" in cutability means a larger yield grade number.
- B) Expected percentage of boneless, closely trimmed retail cuts from beef carcasses within the various yield grades are as follows:

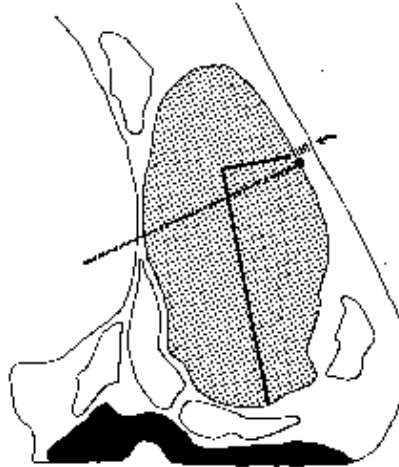
Yield Grade	% BCTRC
1	52.3
2	52.3 - 50.0
3	50.0 - 47.7
4	47.7 - 45.4
5	< 45.4

Factor	Effect of increase on yield grade	Approximate change in each factor required to make a full yield grade change
Thickness of fat over ribeye	Decreases	4/10 in.
Percent of kidney, pelvic and heart fat	Decreases	5%
Carcass Weight	Decreases	260 lb.
Area of Rib eye	Decreases	3 in.

Steps in determining live yield grade:

- 1) The amount of external fat at the 12th rib by measuring the thickness of fat three-fourths the length of the rib eye from the chine. The preliminary yield grade is determined based on the estimated adjusted fat over the rib eye.

Fat Over The Rib Eye	PKG
0.2 inch	2.5
0.4	3.0
0.6	3.5
0.8	4.0
1.0	4.5
1.2	5.0



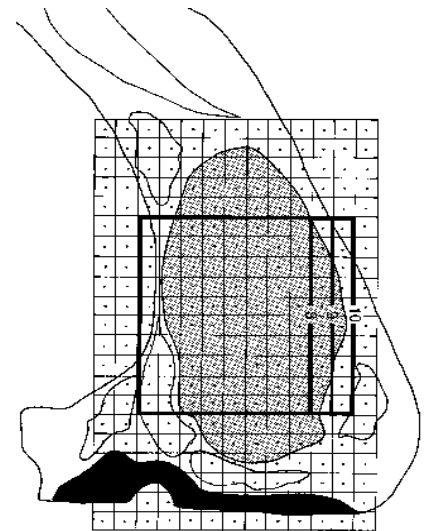
2) Kidney, pelvic, and heart (KPH); fat is evaluated subjectively and is expressed as a percentage of the carcass weight.

<u>% Fat</u>	<u>Adjustment</u>	<u>% Fat</u>	<u>Adjustment</u>
.5	-.6	3.0	-.1
1.0	-.5	3.5	0
1.5	-.4	4.0	+.1
2.0	-.3	4.5	+.2
2.5	-.2	5.0	+.3



3) Carcass weight; the "hot" or non-chilled weight in pounds (taken on the slaughter-dressing floor shortly after slaughter). The area of the rib eye is determined by measuring the size (in inches, using a dot-grid). The adjustment for area of rib eye is based on the area of rib eye carcass weight relationship in the following table. For each square inch by which the area of rib eye is estimated to exceed the area shown for the estimated carcass weight, subtract .3 of a grade. For each square inch less than the area shown for the estimated carcass weight, add .3 of a grade.

Hot Carcass Weight	Area of Rib eye	Hot Carcass Weight	Area of Rib-eye
350 lb.	8 sq. in	650 lb.	11.6 sq. in
400	8.6	700	12.2
450	9.2	750	12.8
500	9.8	800	13.4
550	10.4	850	14.0
600	11.0	900	14.6



4) Combine the preliminary yield grade and the adjustments to obtain the final yield.

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