

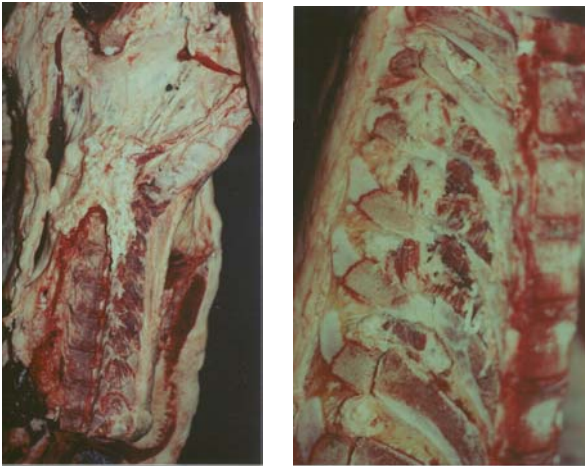
Beef Grading

Quality Grade

Quality grade is based on carcass maturity, degree of marbling in the ribeye and color of the lean.

Maturity

Maturity in beef carcasses is determined by the amount of ossification seen in the sacral, lumbar and thoracic vertebra. The first indication of age in a beef carcass is the complete ossification of the sacral and lumbar vertebrae. The second place that is looked at is the cartilaginous tips (buttons) on the tips of the thoracic vertebrae. If there is any indication of ossification in the thoracic buttons then the carcass is considered a B maturity carcass and requires more marbling to qualify as Prime or Choice. If the carcass only has enough marbling for Select, then it is graded as Standard. If the buttons are 40% ossified then the carcass is a C maturity and would be disqualified from any of the young quality grades (Prime, Choice, Select or Standard).



Young sacral, lumbar and thoracic vertebra



C20 thoracic vertebrae



D90 thoracic vertebrae

Marbling

Marbling is the fat deposited within the muscle. More marbling is required to grade higher. The marbling categories are practically devoid, traces, slight, small, modest, moderate, slightly abundant, moderately abundant and abundant. USDA standard cards can be purchased from the National Cattlemen's Beef Association. These cards represent the zero point of traces, slight, small, modest, moderate and slightly abundant.

The grading chart below shows the marbling required for a given grade. As the carcass maturity increases, more marbling is needed to grade the same grade. For example a B50 carcass must have Moderate marbling to grade low Choice. Furthermore, there is no Select in the B age group. The same applies for those carcasses that would be classified as "hard bones" (C, D and E maturity).

Degrees of Marbling	Maturity ¹				
	A ¹	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.

Lean Color

The color of the lean should be a bright cherry red. The color should be even with no darker portions. Any carcasses with a dark, sticky surface should be disqualified.

Yield Grade

Yield grade is a numerical value from 1 to 5 based upon the yield of boneless, closely trimmed (approximately 0.3 in), retail cuts from the round, loin, rib, and chuck. In the official USDA grading standards, yield grades range from 1.0 to 5.9, but only the whole number yield grade is "rolled" on the carcass by the grader. Thus, carcasses with yield grades of 3.0 to 3.9 are rolled yield grade 3. Yield grades close to the next higher yield grade are not rounded upward but are rolled yield grade 3. Yield grades below 1.0 and above 5.9 are designated yield grade 1 and 5, respectively.

Using fat thickness at the 12th rib, ribeye area, percentage kidney pelvic and heart fat (KPH) and hot carcass weight, regression equations were developed that can be used to predict either the yield grade itself or the percentage of boneless, closely trimmed, retail cuts from the round, loin, rib and chuck. The two equations follow:

$$\begin{aligned} \text{Yield grade} &= 2.5 + (2.5 \times \text{adjusted fat thickness, 12}^{\text{th}} \text{ rib, inches}) \\ &+ (0.0038 \times \text{hot carcass weight, pounds}) \\ &+ (0.2 \times \text{percentage KPH}) \\ &-(0.32 \times \text{ribeye area, sq. in}) \end{aligned}$$

In actual everyday grading of beef carcasses, the regression equation is not used, but a working formula has been developed to simplify the procedure. The working formula involves the same four factors as the regression equation. The procedure for measurement or estimation of each of the four factors is described in the following discussion.

1. Fat thickness at the 12th rib is used to estimate the amount of external fat on a carcass. This measurement is made perpendicular to the outer surface of the fat over the ribeye and 3/4 the length of the ribeye muscle from the backbone
2. Ribeye area is determined by a direct grid reading of the eye muscle. When using the plastic grid, place it on the eye muscle with either the 8, 9, or 10 in. square covering the area within the perimeter of the eye, depending on the largest area that lies entirely within the eye. Then count all of the dots outside the 8, 9 or 10 in. square but within the perimeter of the eye muscle. Count only the dots within the perimeter of the eye muscle while being careful not to include adjacent muscles. After the dots have been counted, divide the total counted by 10 (10 dots per square inch). Then add this figure to the square that covered the eye muscle to obtain the area.
3. Hot carcass weight is usually obtained in beef slaughter plants.
4. Kidney, Pelvic and Heart fat (KPH) is estimated in pounds for each side. The two sides are totaled and divided by carcass weight to arrive at percentage. KPH will range from 0.5% to 6% and average about 2.0%. Thus, a 700 lb. carcass will have 14 lb. of KPH or 7 lb. per side.

Weight-Eye Method of Calculating Yield Grade of Beef Carcasses

1. Estimate the fat thickness at the 12th rib and adjust, if necessary. From this estimate determine a preliminary yield grade (PYG).

Adjusted Fat Thickness Estimate (in.)	PYG	Adjusted Fat Thickness Estimate (in.)	PYG
0.1	2.25	0.7	3.75
0.2	2.5	0.8	4.0
0.3	2.75	0.9	4.25
0.4	3.0	1.0	4.5
0.5	3.25	1.1	4.75
0.6	3.5	1.2	5.0

2. Adjust the PYG using hot carcass weight and ribeye area. Ribeye area is influenced by carcass weight. Carcass with typical muscling would have ribeyes of

Hot Carcass Wt. (lb)	RREA In. ²	Hot Carcass Wt. (lb)	RREA In. ²
500	9.8	700	12.2
525	10.1	725	12.5
550	10.4	750	12.8
575	10.7	775	13.1
600	11.0	800	13.4
625	11.3	825	13.7
650	11.6	850	14.0
675	11.9	875	14.3

3. In other words, a typical 600 lb. carcass would have an 11.0 in² ribeye. For every 25 lb. Over 600, add 0.3 in.² to the 11.0 in.² required ribeye area (RREA); and for every 25 lb. Under 600 lb., subtract 0.3 of a yield grade from 11 in.² RREA. Then for each 1 in.² of estimated ribeye in excess of the calculated RREA, subtract 0.3 of a yield grade from the PYG; and for each 1 in.² of ribeye are a less than the calculated RREA, add 0.3 of a yield grade to the PYG.

4. For each 0.5% KPH in excess of 3.5%, add 0.1 yield grade to the PYG; and for each 0.5% KPH less than 3.5%, subtract 0.1 yield grade from the PYG.

Example:

	Adj. Fat Thickness	HCW	REA	% KPH
Estimated Values	0.4 in	650	12.0 in. ²	3.0%
Adjustments	-0.5 or PYG = 3.0	650 - 600=50 50/25=2 2X 0.3=0.6 11+0.6=11.6	12- 11.6=0.4 0.4/.3=0.1 3.0 - 0.1=2.9	3.5 - 3.0 = 0.5 or -0.1 FYG = 2.8