

# Weber County Jr. Livestock Carcass Contest - Beef

## Scoring Components

Carcass Merit Indicators	Formula
Intramuscular Fat %	$\text{IM FAT \%} = 2.33$ $+ [4.056 \times ((\text{Top Quip} - \text{Bottom Quip}) / \text{Loin Depth})]$ $- [0.594 \times ((\text{Top Quip} - \text{Bottom Quip}) / \text{Loin Depth})^2]$ <hr/> <p>This formula calculates the Intramuscular Fat Percentage (IM FAT %) of a steer using ultrasound data—specifically measurements from the loin eye area. Intramuscular fat (IMF), commonly known as <i>marbling</i>, is a key indicator of beef quality and flavor.</p>
Avg. Intramuscular Fat %	$\text{Avg. \% IM Fat} = (\% \text{ IM Fat Location A} + \% \text{ IM Fat Location B}) / 2$ <hr/> <p>This formula calculates the Average Percent Intramuscular Fat (% IM Fat) of a steer using ultrasound data taken at two different spots on the loin eye (ribeye) muscle:</p>
Yield Grade	$\text{Yield Grade} = 2.5$ $+ (2.5 \times \text{Fat Thickness at Last Rib})$ $+ (0.2 \times 2.5)$ $+ (0.0038 \times \text{Projected Carcass Weight})$ $- (0.32 \times \text{Rib Eye Area})$ <hr/> <p>Yield Grade is a number that estimates the cutability of a beef carcass—that is, how much boneless, closely trimmed retail cuts a carcass will yield from the round, loin, rib, and chuck.</p>
Retail Yield %	$\text{Retail Yield (\%)} = 51.34$ $- (5.78 \times \text{Fat Thickness at Last Rib})$ $- (0.462 \times 2.5)$ $- (0.0093 \times \text{Projected Carcass Weight})$ $+ (0.74 \times \text{Rib Eye Area})$ <hr/> <p>Predicts the percentage of the carcass that will become boneless, closely trimmed retail cuts from the four major wholesale cuts: round, loin, rib, and chuck.</p>

<b>Projected Carcass Weight</b>	<p><b>Projected Carcass Weight = 0.62 × Final Weight</b></p> <hr/> <p>This formula estimates the Projected Carcass Weight of a steer using its Final Live Weight before harvest</p>
<b>Final Score</b>	<p><b>Final Score = Retail Yield (%) + Avg. % IM Fat</b></p> <hr/> <p>Final score reflects steers that balance muscle, fat cover, and marbling, reflecting real-world industry values.</p>

**Contest Overview**

This contest uses ultrasound technology and final live weight to evaluate steers for carcass quality. The goal is to educate youth on the importance of carcass merit and help them better understand factors that influence beef value. No animals are harvested; all data is collected on live steers.

**Relevant Resources**

- Beef Improvement Federation (BIF) Guidelines – Standardized performance testing and ultrasound protocols for beef cattle.
- USDA Agricultural Marketing Service (AMS) – Official Yield Grade and Quality Grade standards for beef.
- Iowa State University Beef Teaching Farm – Research-based evaluation of carcass traits using ultrasound.
- Colorado State University Beef Carcass Research – Formulas for yield grade, retail yield, and IMF prediction.
- National Cattlemen’s Beef Association (NCBA) – Educational materials on carcass evaluation and beef value.
- Ultrasound Guidelines Council (UGC) – Certification standards for beef ultrasound technicians and data interpretation.
- National 4-H Livestock Judging Manual – National-level criteria and contest formats for youth beef carcass evaluation.

## Example Calculation

Beef Data	Step - By - Step
<p><b>Final Weight = 1,360 lbs</b></p> <p><b>Rib Eye Area = 13.5 in<sup>2</sup></b></p> <p><b>Fat at Last Rib = 0.45 in</b></p> <p><b>Top Quip A = 309, Bottom Quip A = 156, Loin Depth A = 247</b></p> <p><b>Top Quip B = 276, Bottom Quip B = 120, Loin Depth B = 259</b></p>	<ul style="list-style-type: none"> <li>● <b>Projected Carcass Weight</b>  <math>= 0.62 \times 1360 = \mathbf{843.2 \text{ lbs.}}</math> </li> <li>● <b>IM Fat % Location A</b>  <math>= 2.33 + [4.056 \times ((309 - 156)/247)] - [0.594 \times ((309 - 156)/247)^2]</math>  <math>= 2.33 + [4.056 \times 0.6190] - [0.594 \times 0.3832]</math>  <math>= 2.33 + 2.510 - 0.2275 = \mathbf{**4.61%**}</math> </li> <li>● <b>IM Fat % Location B</b>  <math>= 2.33 + [4.056 \times ((276 - 120)/259)] - [0.594 \times ((276 - 120)/259)^2]</math>  <math>= 2.33 + [4.056 \times 0.6015] - [0.594 \times 0.3618]</math>  <math>= 2.33 + 2.439 - 0.2150 = \mathbf{**4.55%**}</math> </li> <li>● <b>Avg. % IM Fat</b>  <math>= (4.61 + 4.55) / 2 = \mathbf{**4.58%**}</math> </li> <li>● <b>Yield Grade</b>  <math>= 2.5 + (2.5 \times 0.45) + (0.2 \times 2.5) + (0.0038 \times 843.2) - (0.32 \times 13.5)</math>  <math>= 2.5 + 1.125 + 0.5 + 3.204 - 4.32 = \mathbf{**3.01%**}</math> </li> <li>● <b>Retail Yield %</b>  <math>= 51.34 - (5.78 \times 0.45) - (0.462 \times 2.5) - (0.0093 \times 843.2) + (0.74 \times 13.5)</math>  <math>= 51.34 - 2.601 - 1.155 - 7.838 + 9.99 = \mathbf{**49.74%**}</math> </li> <li>● <b>Final Score</b>  <math>= \text{Retail Yield \%} + \text{Avg. \% IM Fat} = 49.74 + 4.58 = \mathbf{**54.32%**}</math> </li> </ul>