

# Understanding Beef Carcass Contest Information

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This NebGuide explains how to interpret data from beef carcass contests.

## Introduction

Beef carcass contests provide youth and their families with information that can enhance the educational experience of a 4-H beef project. Carcass contests help create an awareness of current beef carcass qualities that are considered desirable by the beef industry and by consumers. Carcass contests identify those carcasses that excel in the qualities of meat quality and meat yield, as identified by quality and yield grades. In today's industry, quality and yield grades determine carcass value. Ideally, market animals that excel in live animal characteristics also will excel in carcass characteristics. Carcass contests may have minimum standards for measurable live animal characteristics such as average daily gain, but they seldom account for excellence in these characteristics and do not account for characteristics such as structural soundness. Thus, animals that excel in carcass contests may or may not be the most desirable animals overall. Selection, breeding, nutrition and management practices can affect both carcass and live animal characteristics. The practices that result in high performing live animals that produce superior carcasses can only be identified when carcass information is available and can be easily interpreted.

## Quality Grades

Beef quality grades are determined by two factors: **marbling** and **maturity**. Marbling is the small flecks of fat found within the muscle. Marbling helps keep the meat juicy, adds flavor and has a slight correlation to tenderness of the meat. Maturity is based on characteristics of the carcass, such as the amount of bone cartilage that has turned to hard bone, but relates to the actual age of the live animal. However, in carcass shows, maturity has minimal effects on rankings as nearly all animals are in the "young" or "A" maturity classification, which includes beef animals between 9 and 30 months of age. When animals are all in the same maturity class, they all are eligible for the same quality grades.

The quality grades for "A" maturity animals are *Prime*, *Choice*, *Select* and *Standard*. Marbling is divided into different degrees or ranges from *Abundant* to *Practically Devoid*. *Prime* is considered the highest quality grade and has the most marbling. Nationwide, only about 2% of carcasses grade *Prime*. *Choice* is the next highest quality grade and is divided into thirds: *High Choice*, *Average Choice* and *Low Choice*. The *Select* grade is divided into *High Select* and *Low Select*. *Standard* grade carcasses have the least marbling. Each quality grade has a specific degree of marbling associated with it, which is usually listed adjacent to quality grade on carcass data.

In many carcass contests, carcasses must grade *Choice* or *Prime* to be eligible for the top rankings. This is largely based on industry standards that discount carcasses below a *Low Choice* quality grade. Carcasses that have an *Average Choice* or higher quality grade often receive a monetary premium, and may receive some advantage in the ranking system. Because of the negative effects on juiciness and flavor associated with the lack of marbling in *Standard* carcasses, these carcasses usually are heavily discounted, and are in the lowest rankings in a carcass contest. A "**No Roll**" carcass is one that is not quality graded, usually because it will be a relatively low quality grade, either *Select* or *Standard*.

"**Dark cutters**" are another quality classification that will be in the lowest rankings of a carcass contest. "Dark cutters" have lean that is dark red to almost black in color with a sticky or gummy texture. This condition often occurs in cattle that have been stressed for a relatively long period of time just before slaughter. Dark cutters are safe to eat and their taste and tenderness is usually not negatively affected. However, consumer acceptability and carcass value are reduced.

"**Bullocks**" are carcasses that often are not quality graded and receive a NoRoll classification. Bullock carcasses are those that are in the "A" maturity classification, but exhibit characteristics similar to bull carcasses. These characteristics include darker and coarser textured lean, a heavy crest (neck), and one muscle, commonly called the "jump muscle," in the round that is highly developed.

## Other Defects

In rare cases, a carcass may be **condemned**. Condemned carcasses are those that have been declared unfit for human consumption by the USDA Inspection Service. Condemnation is not due to processes that occur in a meat packing plant, but is based on the evaluation of the animal and its carcass. Reasons that an animal may be condemned include (1) obvious symptoms in the live animal of diseases such as rabies, tetanus, anthrax and others, (2) evidence of current or severe past disease in the lungs, livers, lymph glands, or other internal organs. All meat and products from a condemned animal must be destroyed. Financial responsibility for the animal remains with the owner of the animal, not the packing plant.

**Bruises** on animals result in meat that must be trimmed and thrown away. Bruises rarely result in condemnation of the carcass, but may result in unexpectedly low carcass weights due to the amount of meat that must be thrown away.

## Beef Yield Grades

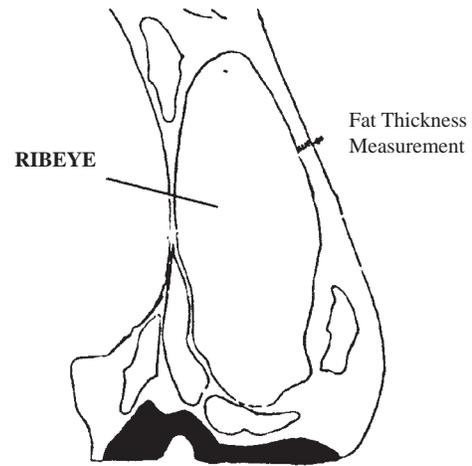
Beef yield grades provide an estimate of how much lean, edible meat the carcass will produce. Yield grades are 1, 2, 3, 4 and 5, with 1 being a lean, heavy muscled carcass that will yield a high percentage of lean meat, and 5 being an overly fat, light muscled carcass. If all the bones and fat are removed from the major portions of the carcass (the rounds, loins, ribs and chucks), roughly 53 - 55 % of a *Yield Grade 1* carcass will become saleable, retail meat. From a *Yield Grade 1*, 800 pound carcass, you would expect approximately 430 lbs of meat. From an 800 pound, *Yield Grade 5* carcass, you could expect a 43 - 45 % yield, or about 350 lbs of meat. The percent yield of the carcass is also called the **cutability** of the carcass. The cutability of the carcass is calculated from the following formula:

$$\% \text{ retail cuts} = 51.34 - (5.78 \times \text{Adj. Fat thickness}) - (.0088 \times \text{hot carcass weight}) - (.462 \times \% \text{KPH}) + (.740 \times \text{ribeye area})$$

For carcass shows, yield grades are calculated to the nearest one-hundredth (.01) of a grade. Four different factors are used to calculate the grade, including:

- External adjusted fat thickness (more fat = less desirable yield grade)
- Hot carcass weight (HCW) (heavier weight = less desirable yield grade)
- Percentage of kidney, pelvic and heart fat (KPH) (more fat = less desirable yield grade)
- Ribeye area (REA) (larger ribeye = more desirable yield grade)

External fat thickness is measured in tenths of an inch and is the amount of fat covering the ribeye at the point of the 12<sup>th</sup> and 13<sup>th</sup> ribs. Hot carcass weight and REA work together as an indication of overall muscling of the animal. A heavy carcass is expected to have more total muscle than a lighter weight carcass. If a carcass does not have as much muscling as you would expect from an average carcass of that weight, it makes the yield grade less desirable. If a carcass has more muscling than average for that weight, it helps the yield grade. Percentage of KPH measures the amount of internal fat. All



animals have some fat surrounding their internal organs such as the liver or heart. The less of this fat a carcass has, the better for the yield grade. The amount of KPH is expressed as a percentage of carcass weight. For example, an 800 pound carcass with 2.5 % KPH has 20 pounds of internal fat.

## Carcass Contest Guidelines

Carcass contest will vary in their specific rules, but there are some guidelines that are followed for most contests. These include:

- Carcass must quality grade *Choice* or higher to be purple ribbon category.
- Carcasses that meet minimum quality grades are ranked on yield grade or cutability.
- Carcasses may receive a pre-determined increase in cutability for quality grades above a minimum level.
- Carcasses that are outside the weight range considered acceptable by the packing industry (generally under 550 lbs or over 950 lbs) are penalized.
- Carcasses with other defects considered unacceptable or outliers by industry standards are penalized. Carcasses in this category include *Standard* grades, No Rolls, Dark Cutters, *Bullocks*, *Yield Grade 4* and *Yield Grade 5* carcasses.

## Example Contest Data and Interpretation

To illustrate a specific example, a set of steer carcass data will be analyzed using the rules for the 2000 State Fair 4-H Beef Carcass Contest, which are as follows:

- To be eligible for blue or purple ribbons, carcasses must be from steers with a minimum average daily gain of 2.2 lbs and have a minimum live weight of 1000 lbs. A carcass that qualifies for a purple or blue on the basis of yield grade and quality grade but does not qualify on the basis of weight and or average daily gain will receive a red ribbon.
- Basis For Placing in Ribbon Groups: Every carcass that grades *Average Choice* or higher and *Yield Grade 3.99* or better will be given a 1.15 increase in cutability for ranking purposes. Carcasses will be placed as follows:
  - Purple- Grade *Choice* or better with a *Yield Grade 2.99* or better, carcasses must weigh between

| Rank/Rib. | Live wt.    | ADG         | Carc wt.   | Fat  | REA   | %KPH | Cutability | Yield Grade | Marb         | Quality Grade |
|-----------|-------------|-------------|------------|------|-------|------|------------|-------------|--------------|---------------|
| Purple1   | 1270        | 2.5         | 837        | 0.35 | 17.42 | 3    | 54.6048    | 1.58        | Mt 90        | Ch o          |
| Purple2   | 1145        | 2.99        | 695        | 0.35 | 14.29 | 2    | 54.0002    | 1.84        | Mt 00        | Ch o          |
| Purple3   | 1350        | 2.61        | 891        | 0.3  | 17.78 | 2    | 53.9972    | 1.34        | Sm 00        | Ch -          |
| Purple    | 1245        | 2.59        | 812        | 0.4  | 16.82 | 2    | 53.4036    | 1.60        | Sm 10        | Ch -          |
| Blue      | <b>1400</b> | 2.87        | <b>942</b> | 0.5  | 15.95 | 2.5  | 51.9564    | 2.72        | Mt 80        | Ch o          |
| Blue      | 1205        | 2.21        | 759        | 0.3  | 13.19 | 2    | 51.7622    | 2.31        | <b>SL 80</b> | <b>Se +</b>   |
| Red       | 1055        | <b>1.15</b> | 689        | 0.35 | 12.12 | 2.5  | 51.0662    | 2.61        | SL 90        | Se +          |
| Red       | 1195        | 2.70        | 765        | 0.5  | 12.46 | 2.5  | 49.7814    | <b>3.17</b> | <b>SL 70</b> | <b>Se +</b>   |
| Red       | <b>1160</b> | 2.36        | 773        | 0.7  | 13.02 | 2.5  | 50.1186    | <b>3.52</b> | Mt 90        | Ch o          |
| White     | 1200        | 2.12        | 743        | 0.2  | 13.95 | 2    | 53.0438    | 1.76        | Tr 20        | <b>NoRoll</b> |

- 650 and 899 lbs and must meet live show gain and weight requirements.
- Blue- Grade *High Select* with a *Yield Grade 2.99* or better with carcass weight 650-899; or Grade *Choice* or better with a *Yield Grade 3.49* or better and carcass weights of 540 to 949 lbs. Also, must meet live show gain and weight requirements.
- Red- Grade *High Select* with a *Yield Grade 3.49* or better; or grade *Choice* with a *Yield Grade 3.5* to *3.99*.
- White- All others (*Low Select*, *Standard*, *No Roll*, *Dark Cutters*, *Bullocks*, *Yield Grade 4*, *Yield Grade 5*, Carcass weights of 539 lbs. or less or 950 lbs. or more)

For all carcasses, the cutability index is calculated using the formula listed previously. For the first purple ribbon carcass this would be  $[51.34 - (5.784 \times .35) - (.0088 \times 837) - (.462 \times 3) + (.740 \times 17.42)] = 53.455$ . Because this carcass quality graded *Average Choice*, it receives an increase in cutability of 1.15. The resulting cutability index is  $53.455 + 1.15$ , or 54.605. This is the highest cutability index of all carcass listed, and the carcass does not have any other “defects” and thus ranked first. The same method can be used for all other purple ribbon carcasses. Those that graded *Low Choice* did not receive an increase in cutability above that calculated by the formula. The increase in cutability rule can cause carcasses with slighter higher (less desirable) yield grades, but higher quality grades, to rank above a *Low Choice* carcass with a more desirable yield grade. This is true for the carcasses ranked first and second, as compared to the third ranked carcass.

In the blue, red and white ribbon groups of carcasses, the primary reason these carcasses did not qualify for a higher ribbon placing is highlighted in red. The highest placing blue ribbon carcass had a carcass weight of 942 lbs, which is considered over the ideal weight range for carcasses. Thus, even though its yield and quality grade would have qualified

this carcass for the purple ribbon category, it is not eligible due to carcass weight. The second blue ribbon carcass did not qualify for purple ribbon category because of its quality grade. The “SL80” indicates a marbling level *Slight*. Within a marbling level, the marbling “call” may range from “0” to “90”. The higher the number, the closer it is to the next higher marbling level. Marbling calls of *Slight 50* to *Slight 90* correspond to a *High Select* quality grade. Because the carcass did not meet the minimum quality grade of *Low Choice*, it received a blue ribbon.

The first red ribbon carcass is there because of the live animal requirements. The average daily gain of 1.15 lbs/day does not meet the minimum standard of 2.2 lbs/day. The next carcass has a relatively poor combination of quality and yield grade. Neither a *3.17 Yield Grade* nor a *High Select* quality grade are extremely undesirable, but in combination, they result in only a mediocre carcass. The final red ribbon carcass is ranked there due to yield grade. Yield grades over 3.5 are somewhat fatter and/or lighter muscled than desirable, as is evidenced by the .7 inches of fat on this carcass.

Marbling score and lack of quality grade are the determining factors for the white ribbon carcass. A marbling score of “TR20” indicates *Traces 20*, or very little marbling and would place the carcass in the *Standard* grade. The “NoRoll” indicates the packing plant chose not to quality grade this carcass, because it would be in the *Standard* quality grade.

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