Introduction

Youth livestock shows often hold market animal carcass evaluation programs or contests following their live show. These programs often prove to be the most educational aspect of the market animal project. The reason is carcass measurements are more quantifiable whereas the live animal placing is more subjective. Unfortunately, carcass contests have historically fallen into the same situation as the live animal shows; identifying one animal or carcass as the “Grand Champion.” This gives the impression that this particular animal is far superior to the remainder of the class. In reality, several of the animals in that class may have equal product value and yield the same eating experience. This carcass of merit program, utilizing a grid pricing system, recognizes harvested animals with carcass traits that would be of similar economic value if they were sold on the open market.

Lamb Carcass Evaluation

The value of a lamb carcass is determined by evaluating four factors: 1) Yield grade; 2) Carcass weight; 3) Quality grade; 4) Carcass maturity. Livestock judges make subjective evaluations of live animal traits and try to relate them to the quality and yield grade of the carcass.

Yield Grade

Yield grade is the largest factor affecting the value of a lamb carcass and is based on the yield of boneless, closely trimmed retail cuts from the leg, loin, rack (rib), and shoulder and is commonly referred to as “carcass cutability.” Historically, factors used in the formula to calculate yield grade have been:

1. The amount of external fat at the 12th rib above the loin eye muscle, adjusted to a final amount based on the fat cover over the shoulder, rack, and leg.

2. The area of the rib eye muscle at the 12th rib of the carcass. However, a rib eye measurement requires the carcass to be ribbed that promotes drying and shrinkage of the meat.

3. The leg score that evaluates muscling in the leg and the width and fullness over the rack and loin. Leg score grades are prime, choice, and good.

4. The amount of kidney, pelvic and heart fat (KPH) as a percentage of the hot carcass weight.

However, the industry currently uses back fat thickness as the determining factor for yield grade and it is important that a lamb carcass has adequate fat cover along the entire length of the carcass. Yield grades are expressed in numerical scores.
ranging from 1 through 5. Yield grade 1 is the leanest with the highest degree of cutability. When a carcass becomes fatter or the degree of muscle becomes less, the numerical yield grade becomes higher. By definition, a Yield grade 1 carcass would be the most desirable, but these carcasses typically have a fat thickness of .10 inches or less at the 12th rib. A fat thickness of .15 to .25 inches (typically a Yield grade 2 or 3) is desired by the lamb industry.

Lamb carcasses have a small meat to bone ratio and it is necessary to have adequate fat cover on the carcass to prevent drying and shrinking of the meat. For example, a carcass may yield grade at a 2 with 0.09 inches of back fat at the 12th and 13th rib, but may not have adequate cover behind the shoulders or back. These carcasses are classified as a blue back and are undesirable.

Carcass Weight

When lamb carcasses are sold on the open market, they are grouped in similar weight classes. At the current time, there are 9 groups with 5-pound ranges. The range of prices paid for these weight groups can vary from week to week depending on market demand.

Quality Grade and Age of Live Animal

The quality grades for lambs (under 12 months of age) are Prime, Choice, Good and Utility. Lamb carcass quality grades are based on conformation, maturity, and flank streaking. Conformation is the degree of total muscling in the carcass in relationship to the skeletal frame size and degree of finish of the leg, rack, loin, and shoulder. Maturity is based on the age of the animal. To determine if the animal is 12 months of age or less to qualify as a lamb, the carcass must have at least one break joint. If the lamb carcass does not meet these requirements, then it is identified as mutton and is disqualified and not graded. Flank streaking is the amount of fat found on the surface of the flank muscle viewed inside the lamb carcass. A qualitative evaluation of flank streaking is determined by rating the appearance of fat streaking. Flank streaking categories are: abundant, moderately abundant, slightly abundant, moderate, modest, small, slight, traces, practically devoid, and devoid. The relationship of degree of flank streaking to maturity of the animal greatly influences quality grade. For example, a young lamb at the age of 9 months with a slight degree of flank streaking may receive a quality grade of “choice,” but the same degree of flank streaking on an 11-month-old lamb may grade at “good.”

At least 95 percent of the lambs harvested in the United States are grade prime or choice with no price difference between the two grades. There are very few lambs that are graded below choice and no market values are reported for carcass grades below choice.

Fed Lamb Grid Pricing

Value-based marketing refers to pricing lambs on an individual animal basis. Prices differ according to the underlying value of meat and by-products from each animal. The goal of grid pricing is to price lamb based on their “true” value to consumers, reduce problems of inconsistency in the final product, and send appropriate market signals to producers by which genetic management changes can be made.

In the lamb industry, packers emphasize carcass weight, yield and quality grade. Yield grade grids for lambs place value on back fat thickness and muscling while quality grade grids place more value on degree of fat streaking in the flank. Grid pricing is not traditionally used in the sheep industry as it is in the beef industry. However, for the purpose of the Market Lamb Carcass of Merit Program, a grid has been developed. Table 1 illustrates a grid that rewards a carcass by weight and yield grade. The grid lists a base price for a yield grade 3 carcass weight 65.1 to 70 pounds. The price listed is on a carcass basis and not a live weight basis.

Merit Grid

To determine the carcass merit for a particular carcass, simply find the numbers from the grid in Table 1 corresponding to the carcass weight and yield grades plus the loin eye adjustment. Find the corresponding merit in Table 2. For example, a
A lamb carcass weighing 55 pounds with a yield grade of 1, with at least one break point, a quality grade of choice and a loin eye area of 1.53 square inches would have a combined score of -$5.68. The 55 pound, yield grade 1 carcass would have given the carcass a -$9.00/cwt discount on the grid; however, the loin eye adjustment would have received a $3.32/cwt premium \((1.53 \times 0.20 \times 10 \times (55/60))\), resulting in the -$5.68/cwt discount to the base price. The previous calculation adjusts the loin eye to a 60-pound carcass basis and then calculates $0.20 for every 0.10 square inches of rib eye.

The -$5.68 discount would identify that carcass as a white carcass merit. This animal hit the industry standards for quality grade and carcass weight but had an undesirable yield grade. These types of animals are undesirable by the packing industry so why should they not be discounted in a youth show?

Hitting the “grid” can add value to each animal. Missing the high value part of the grid can be economically devastating indicating changes in genetics and management are necessary. The merit program should serve as a valuable educational tool to help youth and parents to align the market lamb project with the sheep industry. It is suggested that youth and parents refer to the 4-H Sheep Resource Handbook for additional information to help educate themselves and produce lambs that meet industry standards. You can get a copy of the 4-H Sheep Resource Handbook from your local Extension office or order it through Ohio State University for $10 plus shipping. To order, call 614-292-1607 and ask for publication number 4-H 194R Resource Handbook.

### Table 1. Nevada Youth Market Lamb Carcass of Merit Grid

<table>
<thead>
<tr>
<th>Carcass weight</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40</td>
<td>-$14.00</td>
<td>-$9.00</td>
<td>-$10.00</td>
<td>-$12.00</td>
<td>-$14.00</td>
</tr>
<tr>
<td>40.1 - 45</td>
<td>-$12.00</td>
<td>-$6.00</td>
<td>-$8.00</td>
<td>-$8.00</td>
<td>-$12.00</td>
</tr>
<tr>
<td>45.1 - 50</td>
<td>-$10.00</td>
<td>-$0.50</td>
<td>-$1.00</td>
<td>-$7.00</td>
<td>-$10.00</td>
</tr>
<tr>
<td>50.1 - 55</td>
<td>-$9.00</td>
<td>-$3.00</td>
<td>-$2.00</td>
<td>-$5.00</td>
<td>-$8.00</td>
</tr>
<tr>
<td>55.1 - 60</td>
<td>-$7.00</td>
<td>-$7.00</td>
<td>-$4.00</td>
<td>-$3.00</td>
<td>-$4.00</td>
</tr>
<tr>
<td>60.1 - 65</td>
<td>-$5.00</td>
<td>-$6.00</td>
<td>$0.00</td>
<td>-$1.00</td>
<td>-$4.00</td>
</tr>
<tr>
<td>65.1 - 70</td>
<td>-$8.00</td>
<td>$3.00</td>
<td>-$3.00</td>
<td>-$3.00</td>
<td>-$4.00</td>
</tr>
<tr>
<td>70.1 - 75</td>
<td>-$10.00</td>
<td>-$2.00</td>
<td>-$3.00</td>
<td>-$4.00</td>
<td>-$6.00</td>
</tr>
<tr>
<td>&gt; 75</td>
<td>-$12.00</td>
<td>-$3.00</td>
<td>-$4.00</td>
<td>-$5.00</td>
<td>-$8.00</td>
</tr>
</tbody>
</table>

### Table 2. Carcass of Merit Categories

<table>
<thead>
<tr>
<th>Award</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purple</td>
<td>Carcasses with combined value of +$5.00</td>
</tr>
<tr>
<td>Blue</td>
<td>Carcasses with value of $0.00 to $5.00</td>
</tr>
<tr>
<td>Red</td>
<td>Carcasses with value of -$5.00 to $0.00</td>
</tr>
<tr>
<td>White</td>
<td>Carcasses with value of -$10.00 to -$5.00</td>
</tr>
<tr>
<td>No recognition</td>
<td>Carcasses with value below -$10.00</td>
</tr>
</tbody>
</table>

### Glossary of Terms

- **Blue back** – a lamb carcass with inadequate or poorly distributed back fat cover where the color of the muscle is visible displaying a bluish color.

- **Carcass** – the muscle, bone, and fat associated with the harvest of an animal, after removal of the head, pelt, feet and internal organs.

- **Cwt.** – an abbreviation meaning hundredweight or 100 pounds.

- **Cutability %** - is directly related to yield grade and is the percentage of the carcass that will be realized in closely trimmed, semi-boneless and boneless retail cuts from the loin, rack, shoulder, and leg.

  - Yield Grade 1.0 = 47.3%>
  - Yield Grade 2.0 = 45.4 to 47.2%
  - Yield Grade 3.0 = 43.7 to 45.3%
  - Yield Grade 4.0 = 41.9 to 43.6%
  - Yield Grade 5.0 = <41.9%
**Dressing** – the removal of the pelt, head, lower legs, blood, organs (except kidney), and gastrointestinal tract at harvest.

**Dressing percentage** – the proportion of carcass weight relative to live weight of an animal. Heavier muscled animals tend to have a higher dressing percentage. Animals with a higher degree of finish usually have a higher dressing percentage. The more weight that is contained in parts such as the rumen, pelt, head, etc., the lower the dressing percentage. Lambs that have been shorn will have a higher dressing percentage. The average dressing percentage for lambs is 52 percent. To calculate dressing percentage, take the carcass weight divided by live weight multiplied by 100.

\[
\text{Carcass weight} \times 100 \\
\text{Live weight}
\]

*Example:*

\[
\frac{65 \times 100}{125} = 52 \%
\]

**Fat thickness** – the typical linear measurement of fat taken over the rib eye between the 12th and 13th rib.

**Flank streaking** – intramuscular fat on the surface of the flank muscle, which is an indication of quality. Degrees are classified (most to least) as: Abundant, Moderately Abundant, Slightly Abundant, Moderate, Small, Slight, Traces, Practically Devoid, and Devoid.

**Hot carcass weight** – carcass weight prior to chilling.

**KPH** – the amount of fat contained in the regions of the kidney, pelvis and heart as a percentage of the carcass weight.

**Lb.** – an abbreviation meaning pound.

**Leg score** – a quantitative estimate to score muscling in the rear leg and the width and fullness over the rack and loin.

**Live weight** – animal’s live weight adjusted for distance traveled to the show. Often these adjustments are as follows: 0-10 miles – 3%; 11-20 miles – 2%; 21-50 miles – 1%; 51 plus – 0%

**Maturity** – physiological maturity of the animal at the time of slaughter. Lamb carcass grades provide 4 maturity groups: young lamb, older lamb, yearling mutton, and mutton.

**Mutton** – classification of meat from an animal that is 12 months or older and the carcass does not have at least one break joint that does not break.

**Packer** – the person or entity that harvests (slaughters) and dresses the animal and sells the carcass whole or as primal and wholesale cuts.

**Quality grade** – a grade that reflects palatability (flavor, tenderness, and juiciness) and is determined by estimating the amount of flank streaking and the physiological age.

**Retail cuts** – the cuts of meat that the consumer buys at the meat counter.

**Retailer** – the person or entity that buys primal or wholesale cuts and then processes and packages retail cuts for the consumer.

**Ribbed** – a cut between the 12th and 13th rib of the carcass that exposes and allows measurement of the rib eye.

**Yield grade** – identifies carcasses for differences in cutability. Grades are 1, 2, 3, 4, and 5, with 1 being the leanest of the highest cutability. Industry currently uses the formula \(0.4 + (10 \times \text{back fat thickness in inches})\) to calculate yield grade.

**Literature Cited**


Portions of this publication are extracted with permission from the Ohio 4-H Sheep Resource Handbook 194R. Contributing authors are Norman Suverly, North Region Livestock Agent Michigan State University Extension; Willie Riggis, Eureka County Extension Educator; Wayne Jesko, UNR Main Station Herd Manager and Sarah Chvilicek, Washoe County 4-H Program Coordinator.