Determining Yield of Livestock

- To determine how much meat you should get from a market animal:
  - Pounds of Meat = (Dressing Percent X Carcass Cutting Yield) X Live Weight
- Therefore, two factors affect the percentage of meat that you will receive:
  - Dressing Percentage
  - Carcass Cutting Yield
**Dressing Percentage**

- Dressing Percentage = The percentage of the live animal that ends up as carcass.
- Dressing Percentage = Carcass Weight / Live Weight X 100

**What affects dressing %**

- Dressing Percentage is affected by:
- **Gut fill** – The more gut fill at the time the live weight is taken, the lower the dressing percentage will be. If an animal is weighed right off of full feed, the dressing percentage will be 2 to 5% lower than if the animal is fasted for 24 hours prior to weighing.
- **Muscling** – A heavier muscled animal will have a higher dressing percentage than a light muscled animal.
- **Fatness** – A fatter animal will have a higher dressing percentage than a lean animal.
- **Mud** – Cattle with a lot of mud attached to their hide will have a lower dressing percentage than clean cattle.
- **Wool** – Lambs with long wool will have a lower dressing percentage than recently-shorn lambs.
Average Dressing Percentages:

- Beef cattle: 62%
- Dairy steers: 59%
- Market hogs: 74%
- Market lambs: 54%
- Market goats: 43%

Carcass Cutting Yield

- Carcass Cutting Yield = The percentage of the carcass that ends up as meat.
- Carcass Cutting Yield = Pounds of Meat / Carcass Weight × 100
Carcass Cutting Yield is affected by:

- **Fatness** – Leaner animals will have higher carcass cutting yields than fatter animals.
- **Muscling** – More muscular animals will have higher carcass cutting yields than less muscular animals.
- **Bone-in versus Boneless** – This will dramatically affect carcass cutting yield. If more boneless cuts are made, then the carcass cutting yield will be lower than if bone-in cuts are made. If bone-in chuck roasts, rib steaks, T-bones, and bone-in sirloin steaks are made, the carcass cutting yield will be much higher than if boneless chuck roasts, ribeye steaks, strip steaks, and boneless sirloin steaks are made. It is important to note that the amount of edible meat will not change, but boneless cuts will take up less room in your freezer. If you get soup bones and short ribs, the carcass cutting yield will be higher than if you have these items boned and put into ground beef.

- **The Amount of Fat Remaining on the Meat Cuts** – If the meat cutter leaves more surface fat on the meat cuts, then the carcass cutting yield will be higher than if the meat cuts are closely-trimmed.
- **The Leanness of the Ground Product** – If the ground product (ground beef, ground pork, pork sausage, ground lamb) is made very lean, then the carcass cutting yield will be lower than if the ground product is made with more fat. For example, a typical beef carcass could have 20 more pounds of ground beef if it is made into 70% lean ground beef than if it is made into 92% lean ground beef.
Beef Examples

• Average beef animal, weighed full, 1200 lbs., boneless steaks and roasts, closely trimmed, lean ground beef:
  • \((.61 \times .62) \times 1200 = 38\% \times 1200 = 456\) lbs. of meat

• Average beef animal, weighed full, 1200 lbs., bone-in steaks and roasts, regular trimmed, regular ground beef:
  • \((.61 \times .71) \times 1200 = 43\% \times 1200 = 516\) lbs. of meat

Lamb/Goat Examples

• Average market lamb, shorn, weighed empty, 120 lbs., bone-in chops and roasts, closely trimmed, regular ground lamb:
  • \((.54 \times .75) \times 120 = 41\% \times 120 = 49\) lbs. of meat

• Lean, heavily muscled market lamb, shorn, weighed empty, 120 lbs., bone-in chops and roasts, closely trimmed, regular ground lamb:
  • \((.57 \times .78) \times 120 = 44\% \times 120 = 53\) lbs. of meat
Pork Examples

• Average live hog, weighing 250 pounds, cut into bone-in chops and roasts, closely trimmed, regular ground pork/sausage:
  • \[ 250 \times (0.72 \times 0.74) = 250 \times 53\% = 133 \text{ lbs. of meat} \]

• Average live hog, weighing 250 pounds, cut into boneless chops and roasts, closely trimmed, lean ground pork/sausage:
  • \[ 250 \times (0.72 \times 0.65) = 250 \times 47\% = 117 \text{ lbs. of meat} \]

Yield Grading

Carcasses of Beef, Lamb, Goat and Pork
USDA Beef Carcass Grades

- **Purpose**: Classify Carcasses
  - Expected Cutability or Retail Yield
  - Expected Eating Quality

USDA Beef Yield Grade

- **Estimates** - % Closely-Trimmed, Boneless Retail Cuts from Chuck, Rib, Loin, & Round

- Yield Grade 1: > 52.4%
- Yield Grade 2: 50.0 - 52.3%
- Yield Grade 3: 47.7 - 50.0%
- Yield Grade 4: 45.4 - 47.7%
- Yield Grade 5: < 45.4%
USDA Beef Yield Grade

- 12th Rib Backfat
- Ribeye Area
- % Kidney, Pelvic, Heart Fat
- Hot Carcass Weight
**USDA Beef Yield Grade**

- **Equation**

\[
2.5 + (2.5 \times 12\text{th Rib Backfat, in.}) - (0.32 \times 12\text{th Ribeye Area, sq in.}) + (0.20 \times \text{KPH Fat, %}) + (0.0038 \times \text{Hot Carcass Wt, lbs.})
\]

**Lamb Yield Grades**

<table>
<thead>
<tr>
<th>Yield Grade</th>
<th>Expected Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield Grade 1</td>
<td>47.4 % or more</td>
</tr>
<tr>
<td>Yield Grade 2</td>
<td>47.2 – 45.6%</td>
</tr>
<tr>
<td>Yield Grade 3</td>
<td>45.4 – 43.8%</td>
</tr>
<tr>
<td>Yield Grade 4</td>
<td>43.6 – 42.0%</td>
</tr>
<tr>
<td>Yield Grade 5</td>
<td>41.8 % and less</td>
</tr>
</tbody>
</table>
**Expected % Yield Calculation**

- Percent of Boneless Chop and Roast Cuts
  \[ = 49.9 - (0.0848 \times \text{HCW}) - (4.376 \times \text{FT}) - (3.53 \times \text{Body wall thickness}) + (2.456 \times \text{REA}) \]
  
  - \( \text{FT} \) = Fat thickness
  - \( \text{HCW} \) = Hot carcass wt
  - \( \text{REA} \) = Rib eye area
  This % BCTRC not Yield Grade number

**USDA Lamb Yield Grade Equation**

- USDA Yield Grade (old equation)
  \[ = 1.66 - (0.05 \times \text{leg conformation score}) + (0.25 \times \% \text{KPH}) + (6.66 \times 12^{\text{th}} \text{ Rib FT}) \]

- **USDA Yield Grade (new equation)**
  \[ = 0.4 + (10 \times 12^{\text{th}} \text{ Rib FT}) \]

- Adjust to the whole number - NO rounding!!
Lamb/Goat Fat Thickness

Location where fat thickness over the loin eye is measured.

Body wall thickness is measured 5 inches laterally from the middle of the backbone between the 12th and 13th ribs.

Goat Carcass Selection Classification

1\textsuperscript{50} 2\textsuperscript{50} 3\textsuperscript{50}
Side carcass views

Kidney, Heart and Pelvic Fat, %
### Subcutaneous Fat Cover Score

![Image of subcutaneous fat cover on carcasses]

### A look at Lamb/Goat Carcass Yields

<table>
<thead>
<tr>
<th>Trait</th>
<th>Range</th>
<th>Average</th>
<th>% of LW</th>
</tr>
</thead>
<tbody>
<tr>
<td>LW (Live Weight)</td>
<td>62 - 86 lbs</td>
<td>72 lbs</td>
<td></td>
</tr>
<tr>
<td>HCW (Hot Carcass Weight)</td>
<td>24.8 - 34.9 lbs</td>
<td>31 lbs</td>
<td>43.1 %</td>
</tr>
<tr>
<td>DP (Dressing Percentage)</td>
<td>38.8 - 49.2 %</td>
<td>43.1 %</td>
<td></td>
</tr>
<tr>
<td>CCW (Cold Carcass Weight)</td>
<td>23.8 - 33.6 lbs</td>
<td>29.9 lbs</td>
<td>41.5 %</td>
</tr>
<tr>
<td>KH (Kidney Heart Fat)</td>
<td>0.12 - 0.44 lbs</td>
<td>0.30 lbs</td>
<td>0.4 %</td>
</tr>
<tr>
<td>BWT (Body Wall Thickness)</td>
<td>0.30 - 0.55 inches</td>
<td>0.40 inches</td>
<td></td>
</tr>
<tr>
<td>Fat Trim</td>
<td>1.10 - 2.55 lbs</td>
<td>1.78 lbs</td>
<td>2.5 %</td>
</tr>
<tr>
<td>Bone</td>
<td>8 - 11 lbs</td>
<td>9.5 lbs</td>
<td>13.2 %</td>
</tr>
<tr>
<td>Lean Trim</td>
<td>14.3 - 21.8 lbs</td>
<td>18.3 lbs</td>
<td>25.4 %</td>
</tr>
</tbody>
</table>
USDA Pork Grades

<table>
<thead>
<tr>
<th>US Grades</th>
<th>Expected Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>US 1</td>
<td>&gt; 60.4%</td>
</tr>
<tr>
<td>US 2</td>
<td>57.4 - 60.3%</td>
</tr>
<tr>
<td>US 3</td>
<td>54.5 - 57.3%</td>
</tr>
<tr>
<td>US 4</td>
<td>&lt; 54.3%</td>
</tr>
<tr>
<td>US Utility</td>
<td>Unacceptable Quality</td>
</tr>
</tbody>
</table>

Expected yield (or cutability) of 4 lean cuts (Ham, Loin, Boston Butt and Picnic Shoulder)

Calculating US Grade

- 4 x Last Rib Fat - Muscle Score
- Muscle Score (Overall)
  - 1 Thin
  - 2 Average
  - 3 Thick
Last Rib Fat

Muscle Score
Pork Value Grading

• US grades not currently used by pork packing industry (WHY)

• Percent muscle and Percent fat-free lean are the standards used by the industry

Percent Fat Free Lean

• Measurements (Ribbed carcass)**
  ▪ Hot Carcass Weight (HCW)
  ▪ 10th Rib Loin Eye Area
  ▪ 10th Rib Fat Thickness

• Industry will use Fat-O-Meter (unribbed)
Hot Carcass Weight

10th Rib Fat Thickness
10th Rib Loin Eye Area

LEA in$^2$

10th Rib Loin Eye Area
Lean and Fat Free Lean

Ribbed Carcass

\[ \# \text{ of lean} = 7.23 + (0.437 \times HCW) + (3.877 \times LEA) - (18.746 \times TRBF) \]

\[ \% \text{ Lean} = \left( \frac{\# \text{ of lean}}{HCW} \right) \times 100 \]

\[ \# \text{ FFL} = 8.588 - (21.896 \times TRBF) + (0.465 \times HCW) + (3.005 \times LEA) \]

\[ \% \text{ FFL} = \left( \frac{\# \text{ of FFL}}{HCW} \right) \times 100 \]

Quality Grading Carcasses of Beef, Lamb, Goat, and Pork
USDA Beef Quality Grade

- Estimates Eating Characteristics
  - Tenderness, Juiciness, Flavor

- USDA Prime
- USDA Choice
- USDA Select
- USDA Standard
  - USDA Commercial
  - USDA Utility
  - USDA Cutter
  - USDA Canner

USDA Beef Quality Grade

- Carcass Maturity/ Age
- Marbling Score
  - Lean Color
  - Lean Texture
  - Lean Firmness
**Beef Carcass Maturity**

A  9 to 30 months  
B  30 to 42 months  
C  42 to 72 months  
D  72 to 96 months  
E  more than 96 months

- A maturity
- Note cartilage in buttons on tip of chine bone
- No evidence of bone
• D maturity

• Note ossification of buttons on tip of chine bone

USDA Beef Marbling Score

• Abundant
• Moderately Abundant
• Slightly Abundant
• Moderate
• Modest
• Small
• Slight
• Traces
• Practically Devoid
• Devoid
Lamb Quality Grade

- To segregate lamb carcasses into palatability groups based on the expected eating quality of the cooked retail cuts from the lamb carcass

- What to look for
  - Carcass conformation
  - Maturity
  - Fat deposition (Flank)
  - Fat and lean firmness
Basic Carcass Conformation

Maturity

- Determine Break or Spool Joint
  - A maturity - at least 1 break joint, moderately red, moist and porous “Young Lamb”
  - B - at least 1 break joint, slightly red, dry, hard (<12 mon) “Old Lamb”
  - Yearling Mutton - may have break or spool joints, need to look at other indicators
  - Mutton - two spool joints + other indicators
Maturity - Ribs

A₀ Rib Maturity

B₀ Rib Maturity

Maturity Lean

A³⁰

B³⁰
Fat Deposition / Flank Streaking

<table>
<thead>
<tr>
<th>Firmness</th>
<th>Prime</th>
<th>Choice</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderately Firm</td>
<td>Slightly Firm</td>
<td>Slightly Soft</td>
<td></td>
</tr>
</tbody>
</table>

Pork Quality Grading

- No standard Quality grades
- Must have “acceptable” quality to meet standard Grading System
- Pale, soft and exudative
  - less appealing to consumer
  - water loss affects yield and profitability
Pork Minimum Quality Standards

- **Fat and lean firmness**
  - Slightly Firm

- **Feathering**
  - Slight

- **Lean color**
  - Grayish pink no PSE

- **Belly thickness**
  - 0.6 inches

Pork Color
Marbling (Not currently used)

Retail Cuts from Carcasses of Beef, Lamb, Goat and Pork
Beef Carcass

- Round – 24%
- Sirloin - 7%
- Loin – 8%
- Rib – 10%
- Flank – 6%
- Plate – 9%
- Brisket and Shank – 8%
- Chuck – 28%
Lamb/Goat Carcass Primals

- **Loin** - 13%
- **Rack** - 8%
- **Shoulder** - 36%
- **Leg** - 34%
- **Breast** - 17%
Carcass Cuts

Additional Cutting Methods

<table>
<thead>
<tr>
<th>IMPS Style</th>
<th>Carcass Weight Range</th>
<th>Recommended Skeletal Cuts</th>
<th>Recommended Muscular Cuts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platter</td>
<td>15 lb. or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roasting</td>
<td>15-30 lb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barbeque</td>
<td>20-40 lb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Service</td>
<td>30-40 lb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel</td>
<td>40 lb. or more</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pork Carcass Primals

Ham – 25%
Loin – 25%
Belly/Spare Ribs – 20%
Butt Shoulder – 10%
Picnic Shoulder – 11%

Pork Carcass Cuts
Websites of Interest

- http://bovine.unl.edu/
- http://porcine.unl.edu/porcine2005/pages/index.jsp

THE END!

Any Questions???