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Outline

 How did we get here?
 What is beef cattle mobility?
 How do you measure it?
 Is all mobility data subjective?
 Other considerations?
 Where are we today?

Beef Cattle Welfare

• Current welfare concerns in the beef industry:
  ➢ Weather extremes (Heat/Cold Stress)
  ➢ Pain associated with standard husbandry practices
  ➢ Negative handling
  ➢ Transitional effects
  ➢ Slaughter and euthanasia
  ➢ Technology use

How did we get here?

Early August 2013 – concerns and questions surfaced regarding the feeding of growth-promoting technologies

➢ National Cattlemen’s Beef Association (NCBA) meeting
  • Beta-adrenergic agonist (‘Beta agonist’; BAA)
  • Packers and animal welfare experts expressed concerns related to
    • Poor mobility of cattle moving through packing plants
    • Possible lameness issues
    • Animals appear stressed, lethargic, ‘tender-footed’, stiff, and not wanting to move

Table: Tyson Foods to suspend buying cattle fed Zilmax additive

 Tyson Foods, Inc.

Mobility of cattle arriving at packing plants
Beef Cattle Mobility

• Cattle mobility scoring is becoming one of the widely accepted methods of assessing potential welfare effects
  ➢ But no such tool existed two years ago

• What is mobility scoring?
  ➢ Animal-based measure
  ➢ Typically this is accomplished using a scoring system
  ➢ Severity scale: Normal → severe condition of that trait
  ➢ Scale requires the evaluator(s) to assign a score (number) to the trait observed

• Cattle Mobility
  ➢ Gait or motion of cattle
  ➢ The pattern of movement of the limbs of cattle during locomotion

Beef Cattle Lameness

• Cattle locomotion scoring has recently been developed for detecting lameness in cattle (2013) **Step-Up**
  ➢ Systematic approach: identify and manage cattle lameness
  ➢ Designed specifically for beef cattle
  ➢ Visual evaluation system helps identify, diagnose, and treat lameness

➢ Goal: Lameness and lesion identification for prevention, management, and treatment protocols

Beef Cattle Lameness vs Mobility

<table>
<thead>
<tr>
<th>LAMENESS SCORING</th>
<th>MOBILITY SCORING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gait</td>
<td>Stride length</td>
</tr>
<tr>
<td>Head bob</td>
<td>Obvious stiffness</td>
</tr>
<tr>
<td>Stride length</td>
<td>Difficulty taking steps</td>
</tr>
<tr>
<td>Favoring a specific limb</td>
<td>Tender feet</td>
</tr>
<tr>
<td></td>
<td>Discomfort</td>
</tr>
<tr>
<td></td>
<td>Keep up with herd</td>
</tr>
<tr>
<td></td>
<td>Response to handlers</td>
</tr>
</tbody>
</table>

Beef Cattle Mobility Scoring

• Currently used to score individual cattle
  ➢ Controlled scientific studies
  ➢ Cattle individually treated, weighed, etc.
  ➢ Can score cattle live or record with cameras

• Currently used to score groups of cattle
  ➢ Feedyards and packer
  ➢ When cattle are weighed, moved, or loaded
  ➢ Arrival to facilities/unloading
**Beef Cattle Mobility Study (2013)**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal – Long, fluid stride; Even rhythm and weight bearing on all four feet</td>
</tr>
<tr>
<td>2</td>
<td>Slightly hesitant and stiff (shuffling); Moves with group</td>
</tr>
<tr>
<td>3</td>
<td>Obviously stiff and sore-footed; Reluctant to move; Cannot keep up with the herd</td>
</tr>
<tr>
<td>4</td>
<td>Extremely reluctant to move; Animal will refuse to move even when encouraged by a handler; Any steps are short and very unsteady</td>
</tr>
</tbody>
</table>

**Loading (OSU Feedyard)**

**Unloading (Packing Plant)**

**Loading at Feedyard**
Beef Cattle Mobility Scoring

- Individual Scoring
  - Accurately score every animal
  - Time consuming
  - Typically a small sample size
  - Subjective

- Group Scoring
  - Larger sample size
  - Difficult to score every animal
  - Subjective

Is all mobility data subjective?

- Quantitative Measures
  - Step Length
  - Travel Time (to and from facilities/load outs)

Is all mobility data subjective?

- Quantitative Measures
  - Pressure Plates
  - Hoof Dissections
  - Magnetic Resonance Imaging (MRI) of the Hoof

MRI Analysis

Measurements:

- Distal, mid and proximal dermal thickness of:
  - Lamina
  - Corium
  - Total dermis
- Transverse, coronal and sagittal plane of the digital cushion:
  - Axial
  - Mid
  - Abaxial
- Characterization of:
  - Lamina
  - Distal phalanx bone
  - Deep digital flexor tendon

MRI Analysis (Lamina Measurements)

- Laminitis Diagnosis Ratio = (Width of the Lamina / Total Width of the Dermis)
- Threshold for laminitis in equine: Ratio > 0.70

MRI Analysis

Coronal Plane

Sagittal Plane

Transverse Plane
MRI Analysis (Lamina Character)

Other Considerations

- Inherent structural differences
- If we see mobility concerns are they a foot/hoof issue
- How animals are handled during processing, loading, and unloading
- Cattle size and feeding strategies
- Trucking
- Outdated facilities/flooring

Where are we today?

- “First, the lack of data on the frequency of cattle mobility issues gives us nothing to start with in terms of identifying the scope of the problem.” – Gary Vogel
- “Second, the causative factors had not been identified, so if we see a problem, how would we recommend to alleviate it?” – Gary Vogel
- “You manage the things that you measure, and when you manage it you’re going to prevent problems from happening.” – Temple Grandin

Beef Cattle Mobility Scoring System

<table>
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<tr>
<th>Score</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>‘Normal. Walks easily with no apparent lameness or change in gait’</td>
</tr>
<tr>
<td>2</td>
<td>‘Keeps up with normal cattle when the group is walking; will exhibit 1 or more of the following: stiffness, shortness of stride, or slight limp’</td>
</tr>
<tr>
<td>3</td>
<td>‘Lags behind normal cattle when the group is walking; will exhibit 1 or more of the following: obvious stiffness, difficulty taking steps, obvious limp, or exhibiting obvious discomfort’</td>
</tr>
<tr>
<td>4</td>
<td>‘Extremely reluctant to move even when encouraged by a handler’</td>
</tr>
</tbody>
</table>

Where are we at today?

- Elanco has collected mobility data on over 1 million head from 9 processing plants

Take Home

- Cattle mobility is a important component of cattle well-being.
- A mobility scoring system is currently the simplest most realistic method for use in commercial production.
- Cattle mobility is a complex, multi-faceted topic with many unknowns.
- The beef industry is committed to identifying baseline measurements for mobility, so issues can be identified and properly addressed.
Thank You

Oklahoma State University
➢ Dr. Michele Calvo-Lorenzo
➢ Dr. Clint Krehbiel
Texas Tech University
➢ Dr. Brad Johnson
➢ Dr. Ryan Rathmann
➢ Mr. Clay Burson
Merck Animal Health
Elanco Animal Health

Questions?

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