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Welcome to the 19th annual KSU Beef Stocker Field Day. We appreciate your attendance and support of this educational event. We are fortunate to have assembled an outstanding list of presenters and topics that we believe are relevant to your bottom line.

As always, if you have any questions on the program or suggestions for future topics, please let us know. Our strength in delivering relevant information lies in working closely with you, our stakeholder.

Sincerely,

Dale A. Blasi, PhD
Extension Beef Specialist
Department of Animal Sciences and Industry
College of Agriculture

THANK YOU

We would like to express a special “THANK YOU” to Merck Animal Health for their support of today’s educational program and activities for the beef stocker segment. With their financial assistance, we are able to deliver the caliber of programming that today’s events have in store for you. Please take a moment to stop by their display to see the line of products that they have to offer.
Beef Stocker Field Day 2018  
September 20, 2018  
KSU Beef Stocker Unit

9:30 a.m.  Registration/Coffee

10:15 a.m.  Introductions

10:30 a.m.  **The Role of Stocker Producer Expectations in Cattle Buying Decisions**  
            Glenn Tonsor, Ph.D., Kansas State University

11:15 a.m.  **Producer Panel: Why Silage Fits in My Growing Diets**  
            Frank Harper, Sedgwick, Kansas  
            Gary Burgess, Wamego, Kansas  
            Gary Bacon, Minneapolis, Kansas  
            Keith Bolsen, Ph.D., Emeritus Professor, Kansas State University  
            Moderator: Wes Ishmael, Contributing Editor, BEEF Magazine

12:15 p.m.  Barbecue Brisket Lunch- View Posters

1:00 p.m.  **An Update on Pain Management in Cattle**  
            Hans Coetzee, DVM, Kansas State University

2:00 p.m.  **Quality Stocker Production Considerations**  
            Justin Sexten, Ph.D., Certified Angus Beef

2:45 p.m.  Break

3:00 p.m.  **The Tech Revolution, Wall Street, Baseball and the Cattle Industry**  
            Dane Kuper, CEO, Performance Livestock Analytics

3:45 p.m.  **Rethinking BRD Diagnosis**  
            Jason Nickell, DVM, Merck Animal Health

4:15 p.m.  **Livestock Theft in Kansas**  
            Kendal Lothman, Special Agent, Office of the Kansas Attorney General

4:45 p.m.  **Treatment Failures that are not BRD Related**  
            A.J. Tarpoff, DVM, Kansas State University

5:30 p.m.  Cutting Bull's Lament 2018
The Role of Stocker Producer Expectations in Cattle Buying Decisions

Glynn Tonsor, Ph.D.
Kansas State University

Beef Cattle Outlook & Role of Producer Expectations in Buying Decisions
Glynn T. Tonsor
Dept. of Agricultural Economics
Kansas State University
gtensor@ksu.edu
Twitter: @TonsorGlynn

Overarching Beef Industry Economic Outlook

➢ Supplies
— Commercial Beef Prod. Up, Increases Moderating
  • +6.4% in 2016
  • +3.8% in 2017
  • +3.3% in 2018 (?)
  • +1.7% in 2019 (?)
  • +0.8% in 2020 (?)
Overarching Beef Industry Economic Outlook

- Supplies
  - Commercial Beef Production Up, Increases Moderating

- Demand
  - Key to surprising prices in 2018

Demand Illustration: Q3.2018
- Production +2%
- Yearling Prices +1%
- Calf Prices +2%

*Exports are key & yet ongoing arena of uncertainty*

All-Fresh Beef Retail Demand Index
(Quarterly, Price-Index Approach, 1990=100)

Q2.2018: +0.4%
vs. Q2.2017

http://agmanager.info/livestock-meat/meat-demand
Demand is **NOT** Per Capita Consumption

### 2013 Beef Demand Determinants Study


---

### Assessing Beef Demand Determinants

Glynn T. Tonsor, Jayson L. Lusk, and Ted C. Schroeder

**Checkoff Program Update**
February 1, 2018

**Presentation at 2018 Cattle Industry Convention**
Phoenix, AZ

**Full Project Report**
MED. & LRG. #1 STEER CALF PRICES
500-600 Pounds, Southern Plains, Weekly

$ Per Cwt.

Oct 2018 Projections (as of 9/18/18):
Oct. 17: $181

Data Source: USDA-AMS
Livestock Marketing Information Center

AVERAGE CALF PRICES
500-600lb Steer Calves, Southern Plains

$ Per Cwt.

Oct CME FC +$8 since 8/18/18

Data Source: USDA-AMS, Compiled and Forecasts by LMIC
Livestock Marketing Information Center

ESTIMATED AVERAGE COW CALF COSTS
Total Cash Cost Plus Pasture Rent, Annual

$ Per Cow

Data Source: USDA & LMIC, Compiled by LMIC
Livestock Marketing Information Center
**ESTIMATED AVERAGE COW CALF RETURNS**

Returns Over Cash Cost (Includes Pasture Rent), Annual

- Oct CME FC +$8 since 8/18/18
- Update 2018 Return ~+$25
- $69
- $45
- $19

Data Source: USDA & LMIC, Compiled by LMIC
Livestock Marketing Information Center

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**US RANGE AND PASTURE CONDITION**

Percent Poor and Very Poor, Weekly

Data Source: USDA-NASS, Compiled & Analysis by LMIC
Livestock Marketing Information Center

---

**SOUTHERN PLAINS REGION RANGE AND PASTURE CONDITION**

Percent Poor and Very Poor, Weekly

Data Source: USDA-NASS, Compiled & Analysis by LMIC
Livestock Marketing Information Center
Western Region Range and Pasture Condition
Percent Poor and Very Poor, Weekly

Data Source: USDA-NASS, Complied & Analysis by LMIC
Livestock Marketing Information Center

G-NP-31 09/18/18

Great Plains Region Range and Pasture Condition
Percent Poor and Very Poor, Weekly

Data Source: USDA-NASS, Complied & Analysis by LMIC
Livestock Marketing Information Center

G-NP-32 09/18/18
CORNBELT REGION
RANGE AND PASTURE CONDITION
Percent Poor and Very Poor, Weekly

NORTHEAST REGION
RANGE AND PASTURE CONDITION
Percent Poor and Very Poor, Weekly

SOUTHEAST REGION
RANGE AND PASTURE CONDITION
Percent Poor and Very Poor, Weekly

Data Source: USDA-NASS, Compiled & Analysis by LMIC
Livestock Marketing Information Center
Economic Outlook Overview: Stockers


- Salina, KS 9/18/18 **Dry Lot Winter, 175 DOF Case:**
  - Buy 550 lb steer on 10/17/18 ($181)
  - Sell 725 lb steer on 04/10/19 ($161) (ADG 1.0)
  - VOG: $96/cwt
Economic Outlook Overview: Stockers

Salina, KS 9/18/18 Preconditioning, 35 DOF Case:
- Buy 550 lb steer on 10/17/18 ($181)
- Sell 600 lb steer on 11/21/18 ($172) {ADG 1.43}
  - VOG: $69/cwt
    - NOTE THIS DOES NOT REFLECT ANY “PRECONDITIONED” CLAIM PREMIUM

Salina, KS 9/18/18 Backgrounding, 100 DOF Case:
- Buy 550 lb steer on 10/17/18 ($181)
- Sell 800 lb steer on 01/30/19 ($152) {ADG 2.4}
  - VOG: $88/cwt

Salina, KS 9/18/18 Winter Grazing, 130 DOF Case:
- Buy 600 lb steer on 11/21/18 ($172)
- Sell 850 lb steer on 03/27/19 ($147) {ADG 2.0}
  - VOG: $87/cwt
Economic Outlook Overview: Stockers


- Salina, KS 9/18/18 Preconditioning + Winter Grazing, 165 DOF Case:
  - Buy 550 lb steer on 10/17/18 ($181)
  - Sell 850 lb steer on 03/20/19 ($147) [ADG 1.9]
  - VOG: $84/cwt

---

Economic Outlook Overview: Stockers

Historical Margin Perspective

BUY/SELL MARGINS
5. Plains, Mar. 7-800 lb. Steer as % of Nov. 5-600 lb. Steer

MED. & LRG. #1 FEEDER STEER PRICES
700-800 Pounds, Southern Plains, Weekly

Data Source: USDA-AMS, Compiled and Analysis by LMIC Livestock Marketing Information Center
Economic Outlook Overview: Feedlots

- 2017 was better than anticipated
- 2018 has been rougher
  - Q4 return prospects have improved

### SLAUGHTER STEER PRICES
5 Market Weighted Average, Weekly

Data Source: USDA-AMS
Livestock Marketing Information Center

### Historical and Projected Kansas Feedlot Net Returns
(as of 9/11/18')
(http://www.agmanager.info/livestock/marketing/outlook/newsletters/FinishingReturns/default.asp)

July 18’: -$84/steer

<table>
<thead>
<tr>
<th>Coseout</th>
<th>Net Return</th>
<th>Feed Price</th>
<th>Breakeven FDR**</th>
<th>Feed Price</th>
<th>Breakeven FDR**</th>
<th>Feed Price</th>
<th>Breakeven FDR**</th>
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<td>89.06</td>
<td>120.61</td>
<td>117.91</td>
<td>126.80</td>
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<td>Nov-18</td>
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<td>Mar-19</td>
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<td>95.17</td>
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<td>125.64</td>
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<td>Apr-19</td>
<td>68.24</td>
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<td>May-19</td>
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<td>82.96</td>
<td>121.99</td>
<td>117.35</td>
<td>126.80</td>
<td>117.35</td>
<td>126.80</td>
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Representative Barometer for Trends in Profitability

CME LC

+5% since 9/11/18
### Quarterly Forecasts (LMIC: 9/17/18)

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<thead>
<tr>
<th>Year</th>
<th>Quarter</th>
<th>Comm't % Chg. from</th>
<th>Average % Chg. from</th>
<th>Comm't % Chg. from</th>
<th>% Chg. from</th>
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<td></td>
<td></td>
<td>Slaughter Year Ago</td>
<td>Dressed Weight Year Ago</td>
<td>Production Year Ago</td>
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<td>820.8</td>
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<td>6,465.9</td>
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<td>789.2</td>
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<td>IV</td>
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<td>822.6</td>
<td>0.6</td>
<td>7,317.7</td>
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<td></td>
<td>Year</td>
<td>33,124.0</td>
<td>817.0</td>
<td>0.4</td>
<td>27,063.8</td>
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<tr>
<td>2019</td>
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<td>7,892.2</td>
<td>825.7</td>
<td>0.6</td>
<td>6,517.9</td>
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<td>807.7</td>
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<td>6,868.2</td>
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<td>III</td>
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<td>1.2</td>
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<td>IV</td>
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<td>Year</td>
<td>33,409.0</td>
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<td>0.9</td>
<td>27,536.0</td>
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<tr>
<td>2020</td>
<td>I</td>
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<td>820.6</td>
<td>0.5</td>
<td>6,680.1</td>
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<td>0.5</td>
<td>27,763.0</td>
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### Quarterly Forecasts (LMIC: 9/17/18)

<table>
<thead>
<tr>
<th>Year</th>
<th>Quarter</th>
<th>Live Strt % Chg. from</th>
<th>Feeder Steer Price 5-Mkt Avg Year Ago</th>
<th>Southern Plains 7-800#</th>
<th>5-600#</th>
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<tr>
<td>2018</td>
<td>I</td>
<td>125.60</td>
<td>148.73</td>
<td>180.01</td>
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<tr>
<td></td>
<td>III</td>
<td>116.72</td>
<td>-12.1</td>
<td>144.52</td>
<td>170.11</td>
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<tr>
<td></td>
<td>IV</td>
<td>111-112</td>
<td>-9.9</td>
<td>154-155</td>
<td>168-169</td>
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<td></td>
<td></td>
<td>155-157</td>
<td>-1.6</td>
<td>146-151</td>
<td>162-166</td>
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<tr>
<td></td>
<td>Year</td>
<td>117-118</td>
<td>-3.3</td>
<td>149-150</td>
<td>170-172</td>
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<tr>
<td>2019</td>
<td>I</td>
<td>119-122</td>
<td>-4.1</td>
<td>147-151</td>
<td>168-172</td>
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<td>III</td>
<td>116-120</td>
<td>1.1</td>
<td>148-153</td>
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<tr>
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<td>III</td>
<td>108-113</td>
<td>-0.9</td>
<td>145-151</td>
<td>169-174</td>
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<tr>
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<td>IV</td>
<td>113-119</td>
<td>0.0</td>
<td>145-154</td>
<td>166-173</td>
</tr>
<tr>
<td></td>
<td>Year</td>
<td>114-118</td>
<td>-3.3</td>
<td>147-151</td>
<td>168-174</td>
</tr>
<tr>
<td>2020</td>
<td>I</td>
<td>118-125</td>
<td>0.8</td>
<td>145-155</td>
<td>171-180</td>
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<tr>
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<td>116-124</td>
<td>1.7</td>
<td>147-158</td>
<td>174-184</td>
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<td>3.6</td>
<td>147-159</td>
<td>173-185</td>
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<td>114-124</td>
<td>2.6</td>
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<td>169-181</td>
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<tr>
<td></td>
<td>Year</td>
<td>117-121</td>
<td>2.6</td>
<td>148-168</td>
<td>173-181</td>
</tr>
</tbody>
</table>

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For more detailed information, please refer to the historical and projected Kansas feedlot net returns as of 9/11/18 at [http://www.agmanager.info/livestock/marketing/outlook/newsletters/FinishingReturns/default.asp](http://www.agmanager.info/livestock/marketing/outlook/newsletters/FinishingReturns/default.asp).
Trade Context Update

**US BEEF AND VEAL EXPORTS**
Carcass Weight, Annual

Data Source: USDA-ERS & USDA-FAS, Compiled and Forecasts by LMIC
Livestock Marketing Information Center

**US BEEF AND VEAL EXPORTS**
As a Percentage of Production, Carcass Weight, Annual

Data Source: USDA-ERS & USDA-FAS, Compiled and Forecasts by LMIC
Livestock Marketing Information Center
US BEEF AND VEAL IMPORTS
Carcass Weight, Annual

Data Source: USDA-ERS & USDA-FAS, Compiled and Forecasts by LMIC
Livestock Marketing Information Center

US BEEF AND VEAL IMPORTS
As a Percentage of Production, Carcass Weight, Annual

Data Source: USDA-ERS & USDA-FAS, Compiled and Forecasts by LMIC
Livestock Marketing Information Center

Kansas State University Department of Agricultural Economics Extension Publication
03/26/2018

Concentration of U.S. Red Meat Exports

U.S. Beef and Pork Exports (Volume-Based), Annual Herfindahl-Hirschman Index

Source: USDA-ERS & USDA-FAS, bureau calculations
USDA Long-Term projections


<table>
<thead>
<tr>
<th>Per capita meat consumption, retail weight</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2027</th>
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<tr>
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<tr>
<td>Beef</td>
<td>55.6</td>
<td>57.3</td>
<td>59.2</td>
<td>60.9</td>
<td>60.9</td>
<td>59.0</td>
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<td>Pork</td>
<td>50.1</td>
<td>50.4</td>
<td>52.1</td>
<td>52.2</td>
<td>51.9</td>
<td>52.0</td>
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<tr>
<td>Total red meat</td>
<td>107.0</td>
<td>109.0</td>
<td>112.6</td>
<td>114.4</td>
<td>114.1</td>
<td>112.2</td>
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<td>Broilers</td>
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<td>91.0</td>
<td>91.8</td>
<td>91.6</td>
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<td>Total poultry</td>
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<td>108.8</td>
<td>109.6</td>
<td>109.2</td>
<td>109.9</td>
<td>109.3</td>
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<tr>
<td>Red meat &amp; poultry</td>
<td>214.8</td>
<td>217.8</td>
<td>222.2</td>
<td>223.8</td>
<td>224.0</td>
<td>221.5</td>
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USDA Long-Term projections


<table>
<thead>
<tr>
<th>Per capita meat consumption, retail weight</th>
<th>2019</th>
<th>2020</th>
<th>2027</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
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</tr>
<tr>
<td>Beef</td>
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<tr>
<td>Pork</td>
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<tr>
<td>Total red meat</td>
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<td></td>
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<tr>
<td>Total poultry</td>
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<tr>
<td>Red meat &amp; poultry</td>
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<tr>
<td><strong>Note:</strong> Totals may not add due to rounding.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Year | Total Red Meat & Poultry |
-----|-------------------------|
1995 | 201.0 |
2000 | 214.4 |
2005 | 223.7 |
2010 | 207.5 |
2014 | 200.1 |

2019 would be highest for beef since 2009.
USDA Long-Term projections

Per capita meat consumption, retail weight

<table>
<thead>
<tr>
<th>Item</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2027</th>
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<td>Beef</td>
<td>55.6</td>
<td>57.3</td>
<td>59.2</td>
<td>60.9</td>
<td>60.9</td>
<td>59.0</td>
</tr>
<tr>
<td>Pork</td>
<td>50.1</td>
<td>50.4</td>
<td>52.1</td>
<td>52.2</td>
<td>51.9</td>
<td>52.0</td>
</tr>
<tr>
<td>Total red meat</td>
<td>107.7</td>
<td>109.7</td>
<td>112.3</td>
<td>114.4</td>
<td>114.1</td>
<td>112.0</td>
</tr>
<tr>
<td>Broilers</td>
<td>89.8</td>
<td>91.0</td>
<td>91.8</td>
<td>91.8</td>
<td>92.4</td>
<td>92.2</td>
</tr>
<tr>
<td>Total poultry</td>
<td>107.6</td>
<td>108.8</td>
<td>109.6</td>
<td>109.2</td>
<td>109.9</td>
<td>109.3</td>
</tr>
<tr>
<td>Red meat &amp; poultry</td>
<td>214.6</td>
<td>217.8</td>
<td>222.2</td>
<td>223.8</td>
<td>224.0</td>
<td>221.5</td>
</tr>
</tbody>
</table>

Note: Totals may not add due to rounding.

Projections INCLUDE trade dependency, PRESUME no China pork tariffs, etc.

Wrap-Up

• Broad Profitability Outlook
  
  ➢ Cow-calf:
    • Converging toward Long-Term Levels
    • Situation Better than Expected, Hope Demand's Role is Recognized!
  
  ➢ Stocker:
    • Margins vary widely across situations
      – Drought/feasibility impact likely substantial for many attendees
  
  ➢ Feedlot:
    • 2017 offered notable equity recovery
    • Q4 2018 has improved

Wrap-Up

• Broad Profitability Outlook
  
  ➢ Supply side factors are “well established”
  
  ➢ Demand factors are key and uncertain
    ➢ What will be beef (and meat broadly) export situation?
    ➢ When will next U.S. recession occur?
Stocker Research of Note: 
Producer Expectations in Cattle Buying
• Suppose in OCT a producer could buy 1 of 3 lots of calves with a planned FEB sale:

Probability | ADG 1 | ADG 2 | ADG 3 |
------------|-------|-------|-------|
20%         | <1.5  | <1.7  | <1.9  |
60%         | 1.5-2.3| 1.7-2.5| 1.9-2.7|
20%         | >2.3  | >2.5  | >2.7  |

Journal article available online:  

Stocker Research of Note: 
Producer Expectations in Cattle Buying
• Mean Willingness to Pay (Fall 2014):
  – $42/cwt more for ADG2 than ADG1
  – $1.77/lb for each of the additional 24 lbs
  – $26/cwt more for ADG3 than ADG2
  – $1.08/lb for each of the additional 24 lbs
  ▪️ Loss aversion exist:
    ➢ Producers value "avoiding a bad situation" more than "improving upon a good situation."

Stocker Research of Note: 
Producer Expectations in Cattle Buying
• Average experiences buying OCT calves & sell in FEB
  – Avg ADG across all lots/group over past 10 years: 1.9
  – Worst ADG across all lots/group over past 10 years: 1.2
  – Best ADG across all lots/group over past 10 years: 2.5

• How do past experiences influence buying decisions of individual stocker operators?
**Stocker Research of Note:**
**Producer Expectations in Cattle Buying**

• If potential buyers view available cattle superior to their best personal experience:
  
  – Producers will NOT pay premium for higher-ADG cattle

  • *Producers have to “see it to believe it” before they will pay-up for high-quality cattle*

• Implications
  
  – Helps explain “similar cattle” having differing prices in different markets

  – Sellers of high-performing cattle need to find markets comprised of buyers with corresponding experience

• Implications
  
  – Which came first, the chicken or the egg???
    • University trials/field days may provide this “experience” indirectly
    
    • Information on past performance (genetics etc.) has value in reducing risk to possible buyers & perhaps can substitute
More information available at:

![AgManager.info](image)

This presentation will be available in PDF format at:
http://www.agmanager.info/contributors/tonsor

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Professor
Dept. of Agricultural Economics
Kansas State University
Email: gtonsor@ksu.edu
Twitter: @TonsorGlynn

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AgManager.info website is a comprehensive source of information, analysis, and decision-making tools for agricultural producers, agribusinesses, and others. The site serves as a clearinghouse for applied outreach information emanating from the Department of Agricultural Economics at Kansas State University. It was created by combining departmental and faculty sites as well as creating new features based on the AgManager.info site. The goal of this coordination is to improve the organization of web-based material and allow greater access for agricultural producers and other clientele.

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http://www.agmanager.info/about/contact-agmanagerinfo
An Update on Pain Management in Cattle

Hans Coetzee, DVM
Kansas State University

An update on pain mitigation in cattle

Hans Coetzee BVSc, PhD, DACVCP, DACAW, DECAWSL
Professor and Head, Anatomy and Physiology
Kansas State University

What are we going to discuss today?

• Why is pain management in beef cattle important?
• What are the challenges associated with managing pain in beef cattle?
• What options are available for managing pain in cattle (and do they work?)
1. Why is pain management important?

- Economics
- Ethics
- Sustainable Agriculture

How do issues (BST, GMO, AMR, Pain) factor into consumer purchasing decisions?

<table>
<thead>
<tr>
<th>Attitude</th>
<th>Don’t Care</th>
<th>Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unaware</td>
<td>😞</td>
<td>😊</td>
</tr>
<tr>
<td>Aware</td>
<td>😞</td>
<td>😊</td>
</tr>
</tbody>
</table>

How is this relevant to pain management?

- Don’t Care
- Care

Unaware

Aware

http://www.globalanimalpartnership.org/for-retailers/consumer-support-for-animal-welfare

PETA says Ryan Gosling wants dehorning abolished!
How did food processors and retailers respond to this?

Progress! Dannon Works to End Dehorning of Calves

Real Dail's Farms in Indiana, a Kroger supplier and one of the nation's largest dairy farms with 28,000 cows, is phasing out bull-killing. About a quarter of its modern cows are barren, due to the use of bulls with the polled gene. CeCe Cly, director, said it began to do so after genetics in polled bulls improved and there was proof that good Replacement stock are not being used.

How have food processors and retailers responded to this?

 Tyson Fresh Meats, Inc. January 3, 2015

Wal-Mart's Push on Animal Welfare Hailed as Game Changer

Take Home Message

Pain management is becoming necessary component of sustainable beef production
2. Why is managing pain in livestock challenging?

1. Pain recognition is difficult in stoic species
2. Until recently, no compounds were specifically approved by FDA for analgesic use in cattle in the U.S.
   - Banamine® Transdermal is only labeled for pain associated with foot rot
   - Analgesia for dehorning and castration is still ELDU under AMIDUCA
3. Time delay between drug administration and onset of activity (e.g., local anesthesia)
4. Inconvenient routes of drug administration (IV)
5. Short drug elimination half-lives necessitate frequent drug administration
6. Cost of drugs and meat/milk withhold periods

Implications of extra label drug use (ELDU) for pain management

- ELDU is permitted only by or under the supervision of a veterinarian.
- ELDU is allowed only for FDA approved animal and human drugs.
- A valid Veterinarian/Client/Patient Relationship is a prerequisite for all ELDU.
- ELDU for therapeutic purposes only (animal's health is suffering or threatened). Not drugs for production use.
- ELDU is not permitted if it results in a violative food residue, or any residue which may present a risk to public health.


Top 10 Residue Violations

Dairy Cows (FY 2017)

<table>
<thead>
<tr>
<th>Residue Name</th>
<th>COWS - DAIRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desfuroylstreptomycin</td>
<td>179</td>
</tr>
<tr>
<td>Penicillin</td>
<td>95</td>
</tr>
<tr>
<td>Sulfadimethoxine</td>
<td>51</td>
</tr>
<tr>
<td>Flumixin</td>
<td>27</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>25</td>
</tr>
<tr>
<td>Sulfanilamide</td>
<td>17</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>9</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>6</td>
</tr>
<tr>
<td>Dihydrostreptomycin</td>
<td>6</td>
</tr>
<tr>
<td>Melamin</td>
<td>6</td>
</tr>
</tbody>
</table>

In the absence of an approval, there is a ZERO TOLERANCE for meloxicam residues in tissues in the USA.
Why is there only 1 analgesic drug approval?
Until recently there were no analgesic drugs labeled for pain relief in livestock in the USA

VI. LABELING
2. Pain
“We (FDA) recommend that this indication be based on the control of clinical signs of pain associated with a disease. We encourage the use of validated methods of pain assessment in the target species”.

FDA Guideline No. 123
DEVELOPMENT OF TARGET ANIMAL SAFETY AND EFFECTIVENESS DATA TO SUPPORT APPROVAL OF NSAIDS FOR USE IN ANIMALS
Banamine® TD approved in July 2017 for relief of footrot pain in cattle

So how do we know if it hurts?
Not all of these are “validated methods of pain assessment”
6 week old calves

Electroencephalography (EEG)
Performing painful production practices earlier in life minimizes the neuroendocrine response to a painful procedure.

**Thermography**

- Detects thermographic differences associated with changes in cutaneous perfusion
- Pain causes alterations in sympathetic tone
  - Results in changes in superficial vascular blood supply.
  - Gives rise to quantifiable changes in localized body temperature
Take Home Message

Surgical castration without pain management hurts!

Validation of Pain Assessment Tools

- Sensitive and specific to pain vs. stress?
- Robust and repeatable?
- Usefulness for determining clinical field effectiveness
- Does it work in the field like it works in the lab?
- Can the study be reconstructed using the raw data?
What are potentially “validated methods of pain assessment” in livestock

- Electrodermal Activity
- Chute Exit Speed
- Growth & Performance
- Accelerometers
- Behavior & Location in a pen
- Heart Rate Determination
- Plasma Cortisol
- Plasma Substance P
- EEG
- Thermography
- Algometers (MNT) (Canada)
- Pressure mat analysis (USA)

Endpoint: Algometers

- Assess pressure tolerance at the surgical site
- Electronic measurement of force applied
- Greater the force applied, the less pain experienced
- Potentially useful for field sites

Pressure Mats

- Walkway with two sensor mats in series
- Computer software allows real-time recording of all phases of stride
  ‣ duration of stride,
  ‣ length of stride,
  ‣ force throughout the stride,
  ‣ force distribution, and
  ‣ moment of inertia.
- This allows complete characterization of how much weight is being carried on each foot
3. What can we do to reduce pain? The 4 S’s

1. Suppress (Prevent Pain)
   → Polled Genetics
   → Sexed Semen
2. Substitute (Use alternative)
   → Paste vs. Cautery dehorning
   → Perform in young vs. older animal
3. Soothe (Analgesia)
   → Preemptive vs. Existing Pain
4. Supplement
   → Multimodal analgesia

Analgesic drug options

- Local anesthetics → Lidocaine
- Non-steroidal Anti-inflammatory Drugs (NSAIDs) → Aspirin → Flunixin meglumine → Meloxicam
- Sedative analgesics → Xylazine
- Dissociative Anesthetics → Ketamine
- Opioids → Butorphanol
- Anti-epileptics → Gabapentin

Acute Incisional Pain
Inflammatory Pain
Chemical Restraint
Chronic Pain
How do we manage acute pain?

Local Anesthetics

- Inhibit the transmission of nerve impulses along the nerve.
- Reversible loss of sensation.
- Lidocaine has a fairly rapid onset of activity (2 to 5 minutes) and an intermediate duration of action (90 minutes).
- Administer 5 – 10 mL under frontal ridge ½ way between horn and eye.

Can lidocaine injection be made less painful?

- 10:1 ratio of 2% lidocaine with 8.4% sodium bicarbonate.
- Bicarb reduces pain of lidocaine injection (McKay et al., 1987).
- Bicarb may enhance analgesia (Curatolo et al., 1998).
- Bicarb may decrease time of onset of nerve block (Sinnott et al., 2000).
- Bicarb may decrease duration of block (Sinnott et al., 2000).

1 ml Bicarb to 10 ml Lidocaine
Pro's and cons of local anesthesia

**Pros**
- Inexpensive
- Reduces procedural pain
- Reduces risk of injury to both the operator and the calf
- Reduces stress

**Cons**
- Takes 2 – 5 minutes to take effect
- Requires some training to administer
- The effect only lasts for a few hours after which the pain returns

**Take Home Message**
1 mL of 8.4% sodium bicarbonate added to 10 mL lidocaine will reduce the pain of injection and may reduce the time to onset of the block.
A spike in cortisol (stress hormone) occurs after local anesthesia wears off post-dehorning.

Only local anesthesia

Local anesthetic alone does not provide adequate analgesia.

NSAID with bovine data available in the U.S.

<table>
<thead>
<tr>
<th>Drug Approved Species</th>
<th>Indications</th>
<th>Dose</th>
<th>T ½</th>
<th>Withhold period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flunixin meglumine (Merck®)</td>
<td>Cattle, horses and pigs</td>
<td>Antipyretic, Anti-inflammatory. BRD and mastitis</td>
<td>3.3 mg/kg</td>
<td>3-8 h meat: 4 days (IV), 8 d (topical) milk: 36 h (IV)</td>
</tr>
<tr>
<td>Phenylbutazone</td>
<td>Horses and dogs</td>
<td>Anti-inflammatory</td>
<td>4 mg/kg</td>
<td>40 – 55 h not approved in cattle in the USA</td>
</tr>
<tr>
<td>Ketoprofen (Merial®)</td>
<td>Horses and dogs</td>
<td>Anti-inflammatory</td>
<td>1.5 mg/kg IV, IM</td>
<td>0.42 h not approved in cattle in the USA</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Horses and Cattle</td>
<td>Reduct of fever, relief of minor muscle aches and joint pain</td>
<td>50 – 100 mg/kg PO Oral</td>
<td>F &lt; 20% (IV salicylate) 0.5 h no formal FDA approval, not for use in lactating cattle</td>
</tr>
<tr>
<td>Carprofen (Zoeitis®)</td>
<td>EU approval in cattle Dogs</td>
<td>Adjunctive therapy of acute respiratory disease and mastitis</td>
<td>1.4 mg/kg bodyweight IV or SC Oral Tablets</td>
<td>Age Dependent &lt;10 weeks: 49.7 hours EU- 21 days (Meat), 0 days (Milk)</td>
</tr>
<tr>
<td>Meloxicam (Boehringer Ingelheim®)</td>
<td>EU and Canadian approval in cattle Dogs and cats</td>
<td>Adjunctive for BRD, diarrhea and acute mastitis</td>
<td>0.5 IV, SC</td>
<td>Oral F = 100% 27 hours (Range: 19.97 – 43.29 hours) not approved in cattle in the USA 15 days EU and 20 days Canada. FARAD 21 days (Meat)</td>
</tr>
<tr>
<td>Firocoxib (Merial®)</td>
<td>Dogs and horses</td>
<td>Anti-inflammatory</td>
<td>0.5 mg/kg PO Oral</td>
<td>F = 98.4% 18.8 hours (Range: 14.2 – 25.5 hours) not approved in cattle in the USA or EU.</td>
</tr>
</tbody>
</table>
A transdermal flunixin meglumine formulation was recently approved. Administered topically for systemic absorption at 1 mL/15 kg bodyweight. Approved for reduction of fever in BRD and pain relief for footrot in the EU, Canada and now the USA.

All our studies were conducted independent of industry support.

Transdermal vs. IV Pharmacokinetics

- Time to maximum levels 2.14 h
- Maximum concentration 1.17 µg/ml
- Time for 50% drug lost 6.42 h
- Mean Residence Time 8.36 h
- Mean Absorption Time 3.82 h
- Bioavailability 48%

“It’s so easy you can administer it with one hand tied behind you back.” Dr. Mike Klenkhez, PhD Candidate
Does it work?  
For how long?

Take home:
Suppression of PGE2 via COX-2 for 48 hours  
Anti-inflammatory effects for 48 hours

Effect of Age on Transdermal Pharmacokinetics
- Flunixin was absorbed faster in younger calves
- Flunixin tended to be eliminated slower in older calves
- 13.2 hours in older calves compared to 9.5 hours for younger calves ($p = 0.1$)
- Flunixin remained in the body longer in older calves (9.1h vs. 15.7h ($p=0.006$))

Does pain have an effect on drug behavior?
- Flunixin was eliminated slower in calves subjected to a painful procedure (dehorning).
- 10.09 hours compared to 7.16 hours for the control group ($p = 0.0202$)
- Inflammatory mediators were significantly lower in the pain group at 48 ($p = 0.0092$) and 72 hours ($p = 0.0287$).
**Flunixin Transdermal Clinical Studies**

No significant difference between flunixin-treated and control calves after dehorning without LA.

**Surgical castration without LA (9 month old calves)**

Significant reduction in cortisol between flunixin-treated and control calves after surgical castration without LA.

**Algometer Outcomes after Dehorning without Local Anesthetic**

Calves treated with FTD tolerated more force at the control site at 48 h.

**Impact of FTD on lameness outcomes**

Flunixin-treated cows tolerated significantly more pressure than control cows after lameness induction.

Flunixin-treated cows and significantly smaller difference in claw temperature between the lame and sound claw after lameness induction.

Cows received 3 topical doses of flunixin once a day for 3 days after lameness induction with amphotericin B.
Impact of FTD on lameness scores

Cows received 3 topical doses of flunixin once a day for 3 days after lameness induction with amphotericin B

A study examining Banamine Transdermal at arrival

- 384 cattle arrived from Tennessee to KSU Stocker Unit in Manhattan, KS in 4 truck loads over 10 days in October 2017
- 199 bulls and 185 steers
- Distributed by arrival weight
- 12 calves /pen (6 castrated bulls and 6 steers) over 32 pens

Materials and Methods

- Pens were randomly assigned to treatments within lot as follows:
  - **Group 1**: Calves received Zuprevo 18% (Tildipirosin, Merck Animal Health) at 4 mg/kg (1 mL/100 lb.) body weight as metaphylaxis for BRD
  - **Group 2**: Calves received Zuprevo 18% at 4 mg/kg (1 mL/100 lb.) in combination with Banamine Transdermal at 3.33 mg flunixin/kg bodyweight (equivalent to 1 mL/15 kg bodyweight).
- Treatments were administered at the time of processing, approximately 12-24 h after arrival at the feedlot.
Outcome Variables

• Individual animal weights by lot and treatment were recorded on day 0, day 14 and day 63.
• **Pen Weights** were recorded weekly
• **Visual analog scale (VAS)** assessment was conducted by two trained evaluators blinded to treatment allocations
  ➞ 3 calves received as steers and 3 calves received as bulls and castrated on arrival/pen.
  ➞ VAS assessments were taken every 12 hours starting 12 hours after being processed onto the study for 6 days.

Visual Analog Scale (VAS) Measurements

• Continuous vs. ordinal scale
• Allows for traditional statistics
• Does not confine you to only 4 scores
• Less bias
• More objective.

Outcome Variables

• **Accelerometers** were placed on 40 animals (10 per study lot) on the day of enrollment.
• Accelerometers were placed on the left rear legs.
• Steps, standing up and lying bouts, and motion index data was collected via accelerometers.
BRD Diagnosis

• Animals were observed twice daily for signs of BRD
• Rectal temperature and a clinical illness score (CIS) were recorded such that a CIS of
  • 1; is a normal healthy animal,
  • 2; slightly ill with mild depression or gauntee,
  • 3; moderately ill demonstrating severe depression/labored breathing/nasal or ocular discharge, and
  • 4; severely ill and near death showing minimal response to human approach.

BRD Treatment

• Animals pulled from the pen with a rectal temperature ≥ 40 °C and demonstrating a CIS ≥ 2 were treated following label instructions with the following compounds:
  • 1st Treatment: Florfenicol (Nuflor, Merck Animal Health, Madison, NJ) administered at 6 ml/100 lbs BW. (3 day PTI)
  • 2nd Treatment: Enrofloxacin (Baytril 100®; Bayer Animal Health) at a dose of 5.7 mL per 100 lb BW. (3 day PTI)
  • 3rd Treatment: Oxytetracycline (300 PRO LA; Norbrook Animal Health) at 4.5 mL/100 lbs. at which time animals will be considered chronic and will be removed from the trial.

Results
Surgical castration occurred 48 h prior to video.

Which pen received Transdermal Flunixin at castration?

Placebo-treated calves showed more pain behaviors to 48 h.

No significant difference in motion index.
Growth and Performance

![Graph showing growth and performance](image)

No statistically significant difference in mean pen weights.

### Take Home Messages

- Topical flunixin is convenient to administer
- Topical flunixin appears to last up to 48 h after a single dose
- Topical flunixin is effective at mitigating many of the negative physiological and behavioral effects of castration, dehorning and lameness

### Table

<table>
<thead>
<tr>
<th>Lot #</th>
<th>Zuprevo and Banamine</th>
<th>Zuprevo Only</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>244</td>
<td>7.29%</td>
<td>11.45%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17.1</td>
<td>14.8</td>
<td></td>
</tr>
<tr>
<td>245</td>
<td>23.96%</td>
<td>17.71%</td>
<td>P = 0.85</td>
</tr>
<tr>
<td></td>
<td>8.4</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>246</td>
<td>33.33%</td>
<td>30.21%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.3</td>
<td>12.4</td>
<td></td>
</tr>
<tr>
<td>247</td>
<td>31.25%</td>
<td>19.79%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.1</td>
<td>9.6</td>
<td></td>
</tr>
<tr>
<td>SEM</td>
<td>2.9</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.9</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.9</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.7</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>SEM</td>
<td>1.7</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Pro’s and cons of NSALDs

**Pros**
- Inexpensive
- Reduces inflammatory pain ➔ long acting
- Reduces stress
- Reduces impact of painful procedure on animal behavior

**Cons**
- ELDU requires veterinary oversight
- Meat withhold periods must be observed
- Most effective when administered with local anesthesia

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Final Thoughts

Scientists should recognize that, when research findings related to animal welfare are equivocal or remain unsettled, the question of how animals ought to be cared for and treated will then shift to the realms of ethics and social values

Dr. Stanley Curtis, Feedstuffs Oct. 2007

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Acknowledgements

- This research was funded by USDA National Institute of Food and Agriculture: Food Research Initiative Competitive Grant no. 2008-35204-1923 and 2013-67015-21332
- Merck Animal Health for supporting the Banamine Transdermal transport work
Quality Stocker Production Considerations

Justin Sexten, Ph.D.
Certified Angus Beef

Why quality is the focus

% Choice & Prime Grades by Packing Plant

Year

- Hedrick
- U.S. Avg.
- Iowa
- Texas
Why quality is the focus

Factors affecting quality

Factors affecting quality – Stocker
What stocker “treatments” carryover

- Placement weight
- Age
- ADG
- Nutrition
- Implant protocols
- Health challenges

For each day of age at feedyard entry

- Reduced DOF by 0.3 days \((R^2 = 0.52)\)
- Reduced feedyard gain by 0.79 lb \((R^2 = 0.19)\)
- Marbling score decreased by 0.31 \((R^2 = 0.04)\)
- HCW increased by 0.18 lb \((R^2 = 0.02)\)

For each 100 pounds gained prior to feedyard entry

- Reduced DOF by 9 days \((R^2 = 0.24)\)
- Reduced Gain:Feed by 0.009 lb \((R^2 = 0.17)\)
- Reduced feedyard gain by 35 lb \((R^2 = 0.12)\)
- HCW increased by 27 lb \((R^2 = 0.11)\)
- Marbling score was unaffected
**Nutrient source**

- Forage type and grazing system influence placement weight rather than a direct impact on feedyard performance.

- Meta-analysis (16 Exp) suggests carcass merit is not influenced by dietary starch level in backgrounding diets.

---

**Nutrient level**

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial BW, Lbs</td>
<td>450.2</td>
<td>409.7</td>
<td>612.3</td>
</tr>
<tr>
<td>Final BW, Lbs</td>
<td>763.7</td>
<td>509.9</td>
<td>991.2</td>
</tr>
<tr>
<td>ADG, Lbs / d</td>
<td>1.70</td>
<td>0.33</td>
<td>3.7</td>
</tr>
<tr>
<td>Marbling score</td>
<td>417</td>
<td>266</td>
<td>535</td>
</tr>
</tbody>
</table>

- Meta-analysis (29 Exp) suggests marbling score is not influenced by ADG during stocker phase.

---

**Normal bone, muscle & fat growth curves**

Adapted from Buggs et al., 1998.
Does the "stocker period" matter?

Pasture gain 1.9 Lbs / day

Carter et al., 2002

Nutrition timing

Entry

0 100 200 300 400 500 600 700 800 900 1000

Calf fed Restricted yearling Unrestricted yearling

Williamson et al., 2014

Nutrition timing

<table>
<thead>
<tr>
<th>Item</th>
<th>Calf</th>
<th>Restricted</th>
<th>Unrestricted</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing ADG, Lb /d</td>
<td>3.6a</td>
<td>1.6c</td>
<td>2.3b</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Marbling score*</td>
<td>604a</td>
<td>553b</td>
<td>577ab</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>% Choice</td>
<td>85.7</td>
<td>78.0</td>
<td>85.8</td>
<td>0.35</td>
</tr>
<tr>
<td>% Premium choice</td>
<td>84.9a</td>
<td>35.7c</td>
<td>55.0b</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

abc within row means lacking common superscript differ P < 0.05

* Marbling scale adjusted to 400 = small, 500 = modest for consistency

Williamson et al., 2014
How important is 40 units of marbling?

Average = 492
Standard deviation = 107

Marbling score, 400 = Small 00, 500 = Modest 00

Premium choice marbling distribution

Normal bone, muscle & fat growth curves

Adapted from Boggs et al., 1998
Implant timing

<table>
<thead>
<tr>
<th>Item</th>
<th>Feedyard</th>
<th>Stocker</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG, lb / day</td>
<td>2.35</td>
<td>2.64</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>HCW, Lbs</td>
<td>720</td>
<td>718</td>
<td>0.92</td>
</tr>
<tr>
<td>Back fat, inches</td>
<td>0.59</td>
<td>0.55</td>
<td>0.20</td>
</tr>
<tr>
<td>Marbling score</td>
<td>490</td>
<td>466</td>
<td>0.06</td>
</tr>
<tr>
<td>% Choice</td>
<td>86.1</td>
<td>80.3</td>
<td>0.25</td>
</tr>
<tr>
<td>% Premium choice</td>
<td>60.8</td>
<td>56.3</td>
<td>0.44</td>
</tr>
</tbody>
</table>

Williamson et al., 2014

Premise for changing implant programs

% Choice & Prime Grades by Packing Plant Location

Premise for changing implant programs

Marbling EPD on Angus base

Kuehn and Thallman, 2018
Considerations for increased implant duration or level

- Period length is key
  - Long term implants used in short term did not increase performance

- In calf-feds increasing implant potency earlier in the feeding period did not improve ADG and depressed quality grade

Farney and Corigan 2018; Hilscher et al., 2016; Oney et al., 2018

Health

- Single largest challenge to individual
  - Performance
  - Carcass merit

- Metaphalaxis
  - Production challenge
  - Consumer view

Consumer opposition to antibiotic use

Treatment

- Production benefit
  - Daily monitoring
  - Early diagnosis
  - Animal welfare
Consumer opposition to antibiotic use

*Prevention*

- Production benefit
  - Improved ADG and efficiency
  - Improved digestive health
- Environmental benefit
  - Greenhouse grass reduction
  - Efficient resource use

---

<table>
<thead>
<tr>
<th>Item</th>
<th>No Metaphylaxis</th>
<th>Metaphylaxis</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>All in ADG, lbs / d</td>
<td>3.2</td>
<td>3.4</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>BRD morbidity, %</td>
<td>14.3</td>
<td>3.9</td>
<td>0.02</td>
</tr>
<tr>
<td>BRD mortality, %</td>
<td>3.1</td>
<td>1.2</td>
<td>0.03</td>
</tr>
<tr>
<td>Marbling score</td>
<td>394</td>
<td>395</td>
<td>0.92</td>
</tr>
<tr>
<td>% Choice and Prime</td>
<td>47.2</td>
<td>47.1</td>
<td>0.74</td>
</tr>
</tbody>
</table>

Adapted from Tennant et al., 2014

---

Discount source per head compared to healthy cattle

- **Health**
- **Quality**

- $\$0$
- $\$-50$
- $\$-100$
- $\$-150$
- $\$-200$
- $\$-250$
- $\$-300$
- $\$-350$

4% of discounts due to health impact on quality grade

Over 80,000 head summary from the Iowa/10 County Steer Carcass Evaluation.
Opportunities to reduce antibiotic use

• Minimize transit stress
• Evaluate arrival procedures
• Optimize nutrition
• Consider alternatives
The Tech Revolution, Wall Street, Baseball and the Cattle Industry

Dane Kuper, CEO
Performance Livestock Analytics

World Population Clock

7.6 Billion People

http://www.worldometers.info/world-population/
CURRENT MARKET SITUATION

Volatile Market
Low Margins
Capital Intense

SMART TOILET

97%
Use smart devise while on the porcelain throne

Dane Kuper
CEO

PERFORMANCE LIVESTOCK ANALYTICS
More Connected Mobile Devices Than People

Global Connections by Technology, 2009-2017

- 8.6B connections
- 7.3B people

Connectivity is Expanding

Hunting/Gathering to Farming

Industrial Revolution

Green Revolution
WHY ARE WE NOW ENTERING INTO THE DATA REVOLUTION?

FASTER COMMUNICATION
COST OF DATA STORAGE DOWN 98% IN THE LAST 10 YEARS

SHOEBOX STORAGE

ACCESS TO INFORMATION FROM ANYWHERE AT ANYTIME
Power of Real-Time Data

Betting the Bottomline in Other Industries

Uber vs Taxi
GOOGLE ADS: TARGETED ADS

ESSENTIAL OILS 101

MAJOR LEAGUE BASEBALL

“People in both fields (Wall Street & Baseball) operate with beliefs and biases. To the extent you can eliminate both and replace them with data, you gain a clear advantage.”

Michael Lewis, Moneyball
The Analog World is Getting Digitized

Digital Data is a Representation About a Real World Condition

CURRENT MARKET SITUATION

Volatile Market
Low Margins
Capital Intense

“Just 10% of trading is regular stock picking, JPMorgan estimates”
— CNBC
75% Due to market variation

Dr. Lee Schulz, Iowa State University

How can we use data and technology to become more competitive?

BUY CATTLE BASED ON DATA, NOT YOUR GRANDPA’S BIAS

- Data can tell us how a particular ranches cattle has performed
- Data can tell us our true cost of gain on steers vs heifers
- Data can tell us when is the optimal time to buy 500lb vs 850lbs
- Data can tell us we can bid more or that a bid is not worth the cattle on sale

Know your history
BE ALERTED WHEN TO PULL THE TRIGGER

- Should I take my cattle to 1450 or sell them at 1300lbs?
- When will my implant run out? Is there an ROI to do so?
- Do the markets allow me to lock a profit on this group?
- How do the markets work for these cattle in the auction ring?

Real-Time Information

BRING THE EXPERTS IN TO HELP

- Equip your nutritionist with the tools necessary to provide educated recommendations
- Alert your vet when health issues arise
- Be better prepared with your lender
- Spend more time what you love to do, and empower your advisors to better help

Connecting to Advisors

WE SHOULD NEVER ALLOW A NUTRITIONIST TO ASK US...

“How are the cattle doing?”
KNOW YOUR HISTORY
REAL-TIME ACCESS
CONNECTING TO ADVISERS

Dane Kuper
CEO
dane@cattlekrush.com
ARGENTINA

Economic Crisis
38 Pesos to $1 USD
41% Inflation Rate
60% Interest Rate
Feedyards are not full
Most beef consumed per capita
90% beef consumed locally
12 million slaughter per year

BRAZIL

4 Million on feed (3-5% in Feedlots)
160 million beef cattle
Slaughter 40 million head per year
$1.10 lb CARCASS
3 year old Nelhar bulls
“Brazilian Trump” Running for President
Rethinking BRD Diagnosis

Jason Nickell, DVM
Merck Animal Health

Agenda

- Precision Agriculture
- Challenges with current BRD diagnostic modalities
- Rethinking the current BRD diagnostic process
- Overview of the Whisper technology
- Practical application of Whisper in the feedyard hospital
Our Current Mission

Develop solutions to help our customers assess risk, detect diseases early and make treatment decisions through predictive analytics, leading to improved productivity and validated appropriate antibiotic usage.

Why...

Today, our customers are impacted by growing trends:

- **Judicious Antibiotic Use**: Tools to address increasing consumer concern with the use of antibiotics.
- **Labor Alternatives**: Tools to address the lack of skilled, consistent labor resources.
- **Health Outcome Insights**: Tools to support advising on herd outcome and trend efficiency.
- **Reduce Economic Impact/Improve Performance**: Solutions to decrease economic losses due to disease and improve performance.
Precision Agriculture

The row crop example

- Farming management concept based on observing, measuring and responding to inter and intra-field variability in crops.

- High-level of variability within a field
  - Soil type
  - Fertilizer and water needs
  - Yield predictability

Precision Agriculture

The row crop example

- Variable rate application
  - Water
  - Seed
  - Fertilizer

Maximize yield
Reduce input costs

Challenges with current BRD diagnostic modalities

Caregiver

Trust = willingness to convey weakness
Challenges with current BRD diagnostic modalities

Cattle Dx with BRD

True Positives + False Positives

False negatives (animals with BRD that go undiagnosed)

True Negatives

Rethinking the current BRD diagnostic process

BRD Diagnosis = BRD Detection + BRD Confirmation
Rethinking the current BRD diagnostic process

Onset of clinical signs...elevated body temperature for 12-136 hours
(Timsit et al 2011)

Questions
1. Are all calves that meet a BRD diagnosis at the same stage of disease?
2. Is rectal temperature, by itself, specific to BRD?

Automated stethoscope technology owned by Merck Animal Health

Sounds coming from chest are collected, evaluated, recorded and stored in a digital sound file

Generates a score that reflects the severity of BRD of the animal in the chute

Whisper-hospital: Research summary

- 5 studies performed in the last year
- What have we learned?
  - Lung health estimate
  - Prediction of death
  - Whisper + rectal temperature

1. Mild BRD
   - WS1, RT<104
2. Moderate BRD
   - WS1, RT>104 & WS2, RT<104
3. Severe BRD
   - WS2, RT>104
Whisper-hospital: Research summary

How is Whisper used in the field?

Disclaimer: This is completely anecdotal data provided to MAH by our existing Whisper customers

How is Whisper used in the field?

Application #1

- Reduction of BRD treatment costs
- Cattle observed with signs of mild BRD
  - Whisper score = 1
  - Rectal temperature < 104
- Treat with oxytetracycline or with nothing
  - Oxytetracycline: LA 200, Bio-Mycin 200, etc...

No perceived loss in performance compared to more expensive/potent antibiotics
How is Whisper used in the field?

Application #2
• Training of pen-riders
• Identify early signs of clinical disease
  • Calves receive treatment earlier in the disease process
  • Perceived improvement in overall calf health

How is Whisper used in the field?

Application #3
• Use the Whisper score distribution as a tool to assist in managing various aspects of the production system

Thank you!
Livestock Theft in Kansas
Kendal Lothman, Special Agent
Office of the Kansas Attorney General

K-State Beef Stocker 2018 Field Day
September 20th, 2018

Kendal Lothman

• Special Agent
• Assigned to Livestock and Brand Investigation Unit
• Great Bend, KS
Livestock and Brand Investigation Unit

- Created June 2014
- Joint coordination between Kansas Attorney General’s Office and Kansas Department of Agriculture
- Unit up and running November 2014

Our Main Mission

Assist Local Agencies with livestock investigations
- Felony livestock theft
- Felony livestock pharmaceutical theft
- Brand violations

Assist KS Department of Agriculture with animal health emergencies

How We Get Involved

- At the request of local agency
- At the request of state or federal agency
Case Load

- Have opened 113 cases in the last three and a half years
- 53 Counties
- Assisted 6 States
  - Kansas
  - Nebraska
  - Missouri
  - Oklahoma
  - Texas
  - Colorado

Average about 27 new cases each year

Livestock Investigations

Case Trends

- Thefts stay consistent whether markets up or down
- Increase in cases at the end of grazing season
Livestock in Kansas

- 2017 cattle inventory 6.4 million head
- Kansas ranked third in the nation
- Cattle VS Human 6.4 to 2.9
- Western Kansas has a large number of confined cattle (about 48% of inventory)
- East side has more cow calf operations
- Multi billion dollar industry

Identifying Cattle

- Branding
- Ear tags
- Tattoo
- DNA
- Unique markings

Branding

- Best way to identify livestock
- Can be seen from a distance
- Is hard to alter
- Cannot be removed
- Permanent return address
- Even if it is previous owners, brand can be used to ID the livestock.
- Rarely get cattle stolen that have freeze brand
Ear Tags

- Ranch tags are great when sorting from neighbors but are easily removed
- Official ID tags can be used to track
- If your cattle have official ID tags keep records
Livestock Markets

- Kansas has 43 livestock markets across the state
- Only 5 of those markets do brand inspections
- Those markets choose to check brands due to proximity to Colorado and West Nebraska that require brand inspection
- KDA Animal Health Division has 6 contract brand inspectors that work at those markets. They will occasionally do country cattle or horses that are moving directly to a brand state
Livestock Markets

- Livestock markets are an important key in detecting and catching the outlaws that steal livestock.

Livestock Theft

- Is a property crime
- Often resembles other property crimes
- Suspect may be the same
- Often leads back to drugs
- Rural locations
- Easy access, pens available
- Bait cattle

Livestock Theft

- Crime of opportunity
- Late at night or early morning
- Cattle at public market the next morning
- Only property crime that the suspect will get fair market value for stolen goods
- Cattle move quickly once at market
- At some point cattle will be gone permanently
- Time is of the essence
Outlaws

- Steal because they're lazy
- Take the path of least resistance
- What makes them the most money
- Scout out their targets / Do their home work
- Not worried about being efficient
- May have cattle experience / may not
  - Borrow / steal trailer and pickup
- Need money to support habits
  - Drugs / Rodeo / Gambling

Crime Scene

- Tire tracks
  - Dually or single axle pickup
  - Dual or single axle trailer
- Shoe prints
  - Number of persons
- Other prints
  - Horse tracks / 4 wheeler tracks / dog tracks
- Foreign objects that don’t belong
  - Cigarette butts
  - Water bottles, beer cans
  - Receipts
  - Blood

Crime Scene

- Baiting Material
  - Cow Cake / Alfalfa
- Distance from trailer tires to loading point
  - Size of the trailer
- Positioning of trailer to chute or alleyway
  - Type of door on trailer
- Contact points of trailer with fence
  - Paint transfer
KDA Missing /Stolen Livestock Report

- Distributed upon report of missing livestock
- Goes to markets, LEO, surrounding states
- Best way to get out information fast
- agriculture.ks.gov/missing livestock
- Instructions / forms / contact information
- List of missing livestock

Common factors

- Target 300-600 lbs: 10 head
- Baby calves: 1-2 head
- Cows: 5-6 head
- Bait cattle
- Stolen livestock taken to a market
- Will take what is accessible

Prevention of Livestock Theft

- Brand your cattle
- Lock your gates / deter access to property
- Check your cattle often
- Count your cattle weekly
- Keep records
- Pay attention to what your cattle are telling you
  - Spooky / bawling / dry cows / coming to truck
- Trail cameras good way to monitor rural property
Prevention of Livestock Theft

- Talk with neighbors
- If you see something suspicious report it
- If you think your cattle have been stolen, report immediately to law enforcement
- Preserve crime scene
- Timely reporting is essential to a successful investigation

Contract care

- Do your home work
- Get references
- ID cattle before delivery
- Hold the caretaker accountable
- Require reports on head count, deads, doctored cattle monthly
- Go inspect livestock / facilities / pastures

Confined Cattle
Confined Cattle

- Head count / In and out
- Death rate / type of cattle
- Track medicine use
- Pay attention to feed consumption
- Checks and balances
- Outlaw is usually a employee

Contact Information

Kendal Lothman
Special Agent
OFFICE OF THE KANSAS ATTORNEY GENERAL, DEREK SCHMIDT
Livestock and Brand Investigation Unit
Criminal Litigation Division
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Great Bend, KS 67530
620-752-1850 (Fax)
785-207-8733 (cell)
kendal.lothman@ag.ks.gov
Treatment Failures that are not BRD Related

A.J. Tarpoff, DVM
Kansas State University

KSU Beef Stocker Field Day

Treatment Failure. Was it really BRD?

Dr. A.J. Tarpoff
Beef Extension Veterinarian
Kansas State University
tarpoff@ksu.edu

2011 Feedlot NAHMS Data

Percent of Placements Affected by Disease Type

<table>
<thead>
<tr>
<th>Disease Type</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRD</td>
<td>9.0</td>
</tr>
<tr>
<td>AIP</td>
<td>3.1</td>
</tr>
<tr>
<td>Dig</td>
<td>1.2</td>
</tr>
<tr>
<td>Buller</td>
<td>0.7</td>
</tr>
<tr>
<td>Lame</td>
<td>1.8</td>
</tr>
<tr>
<td>CNS</td>
<td>0.4</td>
</tr>
</tbody>
</table>
Early Treatment=Success

- Do we have the right diagnosis?????
- Cattle are prey species
- Don’t show us all their symptoms
- Dopey looking calves?
  - BRD
  - Or is it something else?

Other Considerations

- Lameness
- Digestive issues

Lameness Estimates

- 16% of all treatments
- 5% of deaths
- 70% of railer slaughter

Griffen et al 1993
Lameness

• May be the biggest opportunity for improvement in the industry
• Significant losses
• Has been identified as a major point of focus, and as a welfare concern in all livestock industries
  – Beef- Fatigue cattle syndrome
  – Dairy
  – Swine
  – Poultry

Where is the lameness?

• Most studies agree
  – 70% or more of lameness stems from the foot!

Toe tip necrosis/toe abscesses
What causes toe abscesses?

- Predisposing factors include cattle temperament, handling, softening of the hoof due to moisture
  - Cattle fight to get to the middle of the group when threatened (or sorted)
  - The powerful hind legs are used to push as the cattle mill about
  - The toes of the feet (especially the rear feet) may be ground down enough for infection to set in
  - Standing long periods of time on concrete?
Diagnosing toe abscesses

- Can you tell the difference between a lower and an upper leg lameness?
  - Again, often hard to tell.
  - Walk to protect the toe
  - Does not always appear the same as other types of lameness
- Use hoof-testers to find the affected toe
- You may be able to pare down to the abscess with a hoof knife
- Most of the time you will need to take the tip of the toe off with hoof nippers to allow drainage

IDENTIFYING THE PROBLEM

- Pick Up The Foot
- Wash It
- Examine To Determine Cause of Lameness

TOE ABSCESS TREATMENT

- Tip Toe To Drain Abscess And Relieve Pressure
- DO NOT TRIM ENOUGH TO CAUSE BLEEDING
- May require extended therapy
TOE ABSCESS
PREVENTION

- Quiet/Calm Cattle Handling
- Provide Nonabrasive Footing In Alleys And Working Areas

Septic Arthritis

- May occur after initial respiratory disease
  - Histophilus somni
  - Mycoplasma bovis
- Routinely see lameness ~ 1 week + following treatment for BRD
  - Not Footrot!!
Treatment

- Remember, Mycoplasma does not have a cell wall
  - Penicillin and Ceftiofur are a poor choice
- Recovery takes extended periods of time
  - Bacteria gone, but inflammation remains

“Footrot”

- AKA
  - Infectious pododermatitis
  - Interdigital necrobacillosis
  - Interdigital phlegmon
- Not necessarily any animal carrying a leg
Footrot

- Fusobacterium necrophorum
- Begins with a skin abrasion
- Swelling surrounding the food
- Noticeable lameness
- SMELL!!!

Treatment

- Many labelled options
- Time of treatment critical in recovery
- Clubfoots seldom recover

Digestive Diseases
Coccidiosis

- Protozoal disease
- Primarily *Eimeria bovis* or *E. zuernii*
- Infection is present at some level in ≈100% of all cattle and/or their environment
- Fecal/oral transmission

Coccidiosis

- Most frequently seen between 1 month and 2 years of age — immunity gradually develops
- Incidence increased by stress or concurrent disease
  - Winter
  - Freshly weaned
  - Newly arrived stockers and feeders
  - Worms
  - BRD

Coccidiosis

- Bloody diarrhea — bright red blood
Prevention and Control

- Sanitation
- Reduce stress
- Treat before times of stress
  - Preventatives/Treatments:
    - Amprolium
    - Sulfas
    - Decoquinate
    - Monensin
    - Lasalocid

Acidosis

- Rapid grain consumption results in increased lactic acid production in the rumen
  - Lowers pH and acidifies the blood
  - Causes dehydration

Acidosis

- Over consumption
- Caused when animals are moved too rapidly to high concentrate, low roughage diet
- Ration is misformulated
- Cattle are misfed
- Rumen pH <5.0 for extended period
Acidosis

**Progression:**
- Depressed, slight foam around mouth
- Drunk staggers
- Bloated
- Projectile diarrhea
- Down
- Comatose
- Death
Sequela of acidosis

- Poorer performance
- Liver abscesses
- Founder

Metritis

- Aborted heifers
- Infection of the uterus
  - Depression
  - Fever
  - Off feed