57TH FLORIDA DAIRY
PRODUCTION CONFERENCE

Straughn IFAS Extension Professional Development Center
Gainesville, Florida November 2nd, 2023
WELCOME

On behalf of all the faculty of the University of Florida Department of Animal Sciences, welcome to the 57th Florida Dairy Production Conference.

The Florida Dairy Production Conference started in 1964 and aims to create a program which brings together some of the newest research, innovations, recommendations, and ideas for improving the sustainability and profitability of the Florida dairy industry.

The presented information provides practical take-home messages for dairy farmers and highlights emerging trends in the dairy industry. The conference strives to provide a friendly learning and sharing atmosphere with networking opportunities for our target audience of dairy owners and employees, allied dairy industry professionals, UF faculty, students, and dairy educators.

This year’s conference includes aspects of heat stress effects on dairy cattle, nutrition, uterine health, and employee training.

A full synopsis of the meeting and complete proceedings including links to recorded presentations can be found here: Florida Dairy Production Conference - Florida Dairy Extension - University of Florida, Institute of Food and Agricultural Sciences - UF/IFAS (ufl.edu)

Regards,

Izabella Toledo   Fernanda Batistel
José Santos      Geoffrey Dahl
Colleen Larson   Matti Moyer

The Organizing Committee
Schedule of Events

9:50 AM  Welcome and introduction. John Arthington, Chair, Department of Animal Sciences, University of Florida

Leticia Cassarotto Trevisan, Chair

10:00 AM  Beef on Dairy: A new look on beef. Dale Woerner, Department of Animal and Food Sciences, Texas Tech University

10:50 AM  Refreshment Break

11:10 AM  Impact and evaluation of heat stress on dairy cows. Sha Tao, Department of Animal Sciences, University of Georgia

12:00 PM  Lunch

Mariana Nehme Marinho, Chair

1:30 PM  Employee training & development: Considerations beyond the obvious. Robert Hagevort, Ag Science Center, New Mexico State University

2:20 PM  The economics of uterine diseases. Klibs Galvão, Department of Large Animal Clinical Sciences, University of Florida

3:10 PM  Refreshment Break

Daniel de Oliveira, Chair

3:30 PM  Nitrogen efficiency of Florida dairy herds: Potential performance indicator for dairy farms. Diwakar Vyas, Department of Animal Sciences, University of Florida

4:00 PM  Reducing water use to cool cows using “Smart” technologies. Geoffrey Dahl, Department of Animal Sciences, University of Florida

4:30 PM  Soil organic carbon stocks in Florida dairies. José Carlos Dubeux, Agronomy Department, University of Florida

5:00 PM  Reception
57th Florida Dairy Production Conference Sponsors

Silver

Florida Dairy Farmers
Avery LeFils
averyl@floridamilk.com

RD Life Sciences
Kevin Hayes
kevinh@rdlifesciences.com

Bronze

Zoetis
Jorge Filleda
jorge.filleda@zoetis.com

Diamond V
John Gilliand
jgilliand@diamondV.com

Alliance Dairies
Will Lloyd
will.lloyd@svfeeds.com
**Cattle Type Comparison**

**Conventional Beef Cattle**
- Quicker Growth Rate
- Gut Health
- Dressing Percent
- Muscle to Bone
- Steak Shape
- Lean Color

**Dairy Cattle**
- Genetic Consistency
- Oxidative Fiber Type
- Marbling
- External Leanness
- Tender
- Flavorful

---

**Where does the B x D crossbred fit?**

**Crossbred Beef x Dairy (B x D)**

**Conventional Beef Cattle**

**Fed Holstein Cattle**

---

**Dairy Cow Performance**

**DAIRY B**

<table>
<thead>
<tr>
<th>Item</th>
<th>All Dairy</th>
<th>B x D Dairy</th>
<th>LACT I</th>
<th>LACT II</th>
<th>LACT DIFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days open (previous lactation)</td>
<td>113</td>
<td>115</td>
<td>2</td>
<td>120</td>
<td>114</td>
</tr>
<tr>
<td>Times bred</td>
<td>2.0</td>
<td>1.9</td>
<td>0.0</td>
<td>2.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Gestation time, d</td>
<td>277</td>
<td>277</td>
<td>1</td>
<td>277</td>
<td>279</td>
</tr>
<tr>
<td>Total milk, lbs</td>
<td>30,294</td>
<td>31,526</td>
<td>1,232</td>
<td>27,390</td>
<td>29,436</td>
</tr>
<tr>
<td>Days in milk</td>
<td>337</td>
<td>344</td>
<td>7</td>
<td>336</td>
<td>341</td>
</tr>
<tr>
<td>Average daily milk, lbs /d</td>
<td>90</td>
<td>92</td>
<td>2</td>
<td>81</td>
<td>85</td>
</tr>
<tr>
<td>305-d MHE, lbs</td>
<td>28,886</td>
<td>27,874</td>
<td>-1,012</td>
<td>25,850</td>
<td>26,114</td>
</tr>
<tr>
<td>Peak daily milk, lbs</td>
<td>119</td>
<td>121</td>
<td>2</td>
<td>106</td>
<td>114</td>
</tr>
<tr>
<td>Days dry before freshening</td>
<td>48</td>
<td>48</td>
<td>0</td>
<td>48</td>
<td>48</td>
</tr>
</tbody>
</table>

Increased gestation time by breeding to beef semen (1-2 days)
Cows bred to beef semen were inherently less productive

---

**Feedlot Growth**

<table>
<thead>
<tr>
<th>Item</th>
<th>B x D Steers</th>
<th>B x D Heifers</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pens</td>
<td>26</td>
<td>26</td>
<td>0.3</td>
</tr>
<tr>
<td>Total animal count</td>
<td>1,603</td>
<td>1,492</td>
<td>0.19</td>
</tr>
<tr>
<td>Initial BW, lbs</td>
<td>799</td>
<td>805</td>
<td>0.77</td>
</tr>
<tr>
<td>Final BW, lbs</td>
<td>1,329</td>
<td>1,342</td>
<td>0.57</td>
</tr>
<tr>
<td>Days on feed</td>
<td>157</td>
<td>166</td>
<td>0.16</td>
</tr>
<tr>
<td>ADG, lbs/d</td>
<td>3.5</td>
<td>3.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Feed gain</td>
<td>6.6</td>
<td>7.1</td>
<td>0.02</td>
</tr>
<tr>
<td>Dressing percentage</td>
<td>64.1</td>
<td>63.1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Choice or better, %</td>
<td>78.7</td>
<td>78.7</td>
<td>0.99</td>
</tr>
</tbody>
</table>

**Phenotype Expression**

- B x D Steers: 6
- B x D Heifers: 3
Estimated Carbon Footprint

<table>
<thead>
<tr>
<th>Item</th>
<th>Beef</th>
<th>B × D</th>
<th>Holstein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total CO₂e, kg</td>
<td>1386</td>
<td>1489</td>
<td>2255</td>
</tr>
<tr>
<td>Total CO₂e, kg/kg BW</td>
<td>2.3</td>
<td>2.4</td>
<td>3.6</td>
</tr>
<tr>
<td>Total CO₂e, kg/kg HCW</td>
<td>3.6</td>
<td>3.9</td>
<td>5.8</td>
</tr>
<tr>
<td>Total CO₂e, kg/kg BW gain</td>
<td>5.8</td>
<td>6.1</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Carcass Performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Eating Quality Study</th>
<th>Phenotype Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of carcasses</td>
<td>Native B × D Holstein</td>
<td>P-value</td>
</tr>
<tr>
<td></td>
<td>966</td>
<td>518</td>
</tr>
<tr>
<td>HCW, lbs</td>
<td>873†</td>
<td>867†</td>
</tr>
<tr>
<td>12th rib fat thickness,</td>
<td>0.51†</td>
<td>0.43†</td>
</tr>
<tr>
<td>in</td>
<td>13.8</td>
<td>14.3</td>
</tr>
<tr>
<td>Ribeye area, in²</td>
<td>14.3†</td>
<td>14.8†</td>
</tr>
<tr>
<td>KPH fat, %</td>
<td>3.6†</td>
<td>4.5†</td>
</tr>
<tr>
<td>USDA Yield Grade</td>
<td>3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Marbling score</td>
<td>44.3</td>
<td>48.1</td>
</tr>
</tbody>
</table>

Yield Grades

Distribution of USDA Yield Grades (Paired Feedlot Closeouts; N = 3,581)

<table>
<thead>
<tr>
<th>YG</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Distribution of USDA Yield Grades (Eating Quality Study; N = 2,419)

<table>
<thead>
<tr>
<th>YG</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Quality Grades

Distribution of USDA Quality Grades (Eating Quality Study; N = 2,419)

<table>
<thead>
<tr>
<th>Quality Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select</td>
<td>50</td>
</tr>
<tr>
<td>Low Choice</td>
<td>30</td>
</tr>
<tr>
<td>Prime</td>
<td>15</td>
</tr>
<tr>
<td>Best Choice</td>
<td>5</td>
</tr>
<tr>
<td>Prime</td>
<td>0</td>
</tr>
</tbody>
</table>

Distribution of USDA Quality Grades (B × D Phenotype Expression Study; N = 615)

<table>
<thead>
<tr>
<th>Quality Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select</td>
<td>50</td>
</tr>
<tr>
<td>Low Choice</td>
<td>30</td>
</tr>
<tr>
<td>Prime</td>
<td>15</td>
</tr>
<tr>
<td>Best Choice</td>
<td>5</td>
</tr>
<tr>
<td>Prime</td>
<td>0</td>
</tr>
</tbody>
</table>
Cattle Types & Eating Quality

- Conventional Beef Cattle
- Straightbred Dairy Cattle
- Crossbred Beef × Dairy (B × D) Cattle

Consumption:
- Increasing globally
- Nutritious protein with distinctive flavors, creating a differentiated marketspace

Previous Beef Quality & Palatability Research:
- Discredited the 1970’s War on Fat
- Sought out improvements for tenderness
- Established fat is valued for palatability
- Determined effects of fatty acids
- Improved the perception of fat in beef

Trained Sensory Evaluation

Panelists were trained twice daily (1 h each session) over 10 d on the following:

- Overall Tenderness
- Overall Juiciness
- Beef Flavor Identity
- Burntness
- Butteriness
- Fat-Like

Attributes were scored using a continuous 100 point scale:

- Liver-Like
- Metallic
- Oxidized
- Roasted
- Umami

- Overall Tenderness
- Overall Juiciness
- Beef Flavor Identity
- Browning
- Buttery
- Fat-Like

P < 0.01

N = 120

Adhikari et al. (2011)
Angus
- One of the first breeds to cross with imported wagyu – now commonly used
- Common within industry
- Previous research compares beef quality of Wagyu to Angus
- Increasing in popularity for crossbreeding (B × D)
- Crossbreeding with beef sires increases offspring value
- Known for marbling capabilities
- Increased perceived tenderness

Holstein
- Increasing in popularity for crossbreeding (B × D)
- Crossbreeding with beef sires increases offspring value
- Known for marbling capabilities
- Increased perceived tenderness

Estimated marginal means of instrumental tenderness measurements for striploin steaks (N = 120; n = 40), representing Wagyu × Holstein, Wagyu × Angus, and conventional USDA Prime

<table>
<thead>
<tr>
<th></th>
<th>Wagyu × Holstein</th>
<th>Wagyu × Angus</th>
<th>Prime</th>
<th>SEM*</th>
<th>P-Value 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slice Shear Force, kg</td>
<td>8.09</td>
<td>9.88</td>
<td>10.25</td>
<td>0.23</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Warner-Bratzler Shear Force, kg</td>
<td>1.70</td>
<td>2.05</td>
<td>2.13</td>
<td>0.04</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

**Estimated marginal means in the same row without a common superscript differ (P < 0.05)**

1. Standard error (largest) of the estimated marginal means
2. Observed significance levels for main effect of groups

*** WBSF values under 3.9 kg qualify for Certified Very Tender (ASTM, 2011)

Estimated marginal means of descriptive sensory attributes for striploin steaks (N = 120; n = 40), representing Wagyu × Holstein, Wagyu × Angus, and conventional USDA Prime

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Wagyu × Holstein</th>
<th>Wagyu × Angus</th>
<th>Prime</th>
<th>SEM 1</th>
<th>P-Value 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Tenderness</td>
<td>67.8 a</td>
<td>63.8 b</td>
<td>60.7  c</td>
<td>0.70  &lt; 0.01</td>
<td></td>
</tr>
<tr>
<td>Overall Juiciness</td>
<td>62.4 a</td>
<td>58.4 b</td>
<td>57.4  c</td>
<td>0.58  &lt; 0.01</td>
<td></td>
</tr>
<tr>
<td>Beef Flavor ID</td>
<td>56.8</td>
<td>56.8</td>
<td>55.4  &lt; 0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Browneid</td>
<td>54.9 a</td>
<td>54.9</td>
<td>53.0  &lt; 0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat-like</td>
<td>25.1</td>
<td>20.0</td>
<td>15.7  &lt; 0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buttery</td>
<td>56.8 a</td>
<td>56.3</td>
<td>55.4  &lt; 0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat-like</td>
<td>56.3 a</td>
<td>56.3</td>
<td>55.4  &lt; 0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buttery</td>
<td>56.3 a</td>
<td>56.3</td>
<td>55.4  &lt; 0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roasted</td>
<td>56.3 a</td>
<td>56.3</td>
<td>55.4  &lt; 0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver-Like</td>
<td>0.80</td>
<td>0.80</td>
<td>0.80  &lt; 0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metallic</td>
<td>0.80</td>
<td>0.80</td>
<td>0.80  &lt; 0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odor</td>
<td>0.13</td>
<td>0.10</td>
<td>0.10  &lt; 0.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Estimated marginal means in the same row without a common superscript differ (P < 0.05)
2. Observed significance levels for main effect of groups

* Crude Fat as a covariate value (P < 0.05)
** Recorded off-temperature as a covariate value (P < 0.05)
### Study Design

**Study 1: Beef- versus dairy-type**

- **6 pens of sires**
- **3 pens of heifers**

<table>
<thead>
<tr>
<th>Processing Time</th>
<th>Ave. (BW, lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrival</td>
<td>0, 777</td>
</tr>
<tr>
<td>Re-implant</td>
<td>104, 1,234</td>
</tr>
<tr>
<td>Harvest</td>
<td>160, 1,417</td>
</tr>
</tbody>
</table>

- **Grp 1**
- **Grp 2**
- **Grp 3**
- **Grp 4**

- Sire: Angus or SimAngus
- Dam: Holstein

### Phenotype Groups

**Study 1: Beef- versus dairy-type**

No difference ($P = 0.81$) in marbling score between phenotype groups (means ranged from 480 to 493).

No Effects

- Fully Dairy-type
- Partially Dairy-type
- Fully Beef-type
- Partially Beef-type

**Expression of Phenotype & Red Meat Yield**

**Steak Size & Shape**

- Native Beef
- Beef x Dairy
- Dairy
Muscling Considerations

<table>
<thead>
<tr>
<th>Trait</th>
<th>Fully Dairy-type</th>
<th>Partially Dairy-type</th>
<th>Fully Beef-type</th>
<th>Partially Beef-type</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live muscling score</td>
<td>2.8</td>
<td>3.0</td>
<td>3.6</td>
<td>3.8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Ribeye area, in.</td>
<td>13.2</td>
<td>13.3</td>
<td>13.8</td>
<td>13.5</td>
<td>0.00</td>
</tr>
<tr>
<td>Round muscling score</td>
<td>3.9</td>
<td>4.0</td>
<td>4.5</td>
<td>3.9</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Cattle Type on Carcass Yield and Value

Study Design

Study Design on Carcass Yield and Subprimal Cutout Value

Fabrication Techniques

Fabrication Techniques on Carcass Yield and Subprimal Cutout Value
### Carcass Yields

**Study 2: Carcass yields and subprimal cutout value**

- **Grp 4**
  - $n = 10$
- **Grp 3**
  - $n = 26$
- **Grp 2**
  - $n = 27$
- **Grp 1**
  - $n = 11$

#### Subprimal Cutout Value

**Study 2: Carcass yields and subprimal cutout value**

<table>
<thead>
<tr>
<th></th>
<th>Beef</th>
<th>B × D HY</th>
<th>B × D LY</th>
<th>Dairy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average</strong></td>
<td>2.97</td>
<td>7.59</td>
<td>4.92</td>
<td>7.74</td>
</tr>
</tbody>
</table>

*Means with different superscripts differ ($P \leq 0.05$).

**Subprimal Cutout Value Differences**

- **Beef vs. Dairy**
  - + $11.42$ per cwt
- **B × D HY vs. B × D LY**
  - + $9.71$ per cwt
- **Average B × D vs. Dairy**
  - + $11.19$ per cwt

**IMPORTANT!!**

**NOT ALL Beef × Dairy Crossbreds Have a Greater Subprimal Cutout Value than Beef Cattle**

### Liver Abscess Concerns

**Study 1: Beef versus dairy-type**

<table>
<thead>
<tr>
<th>Trait</th>
<th>No Liver Abscess</th>
<th>Liver Abscess</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cattle (%)</td>
<td>208 (18%)</td>
<td>44 (35%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Dressing percentage</td>
<td>61.2</td>
<td>62.9</td>
<td>0.67</td>
</tr>
<tr>
<td>Marbling scores1</td>
<td>491</td>
<td>490</td>
<td>0.79</td>
</tr>
</tbody>
</table>

1 Marbling scores: 0-99 = Small, 100 to 199 = Moderate, 200 to 299 = Average Choice

### Maximizing Value

**ENVIRONMENTAL SUSTAINABILITY**

**CARCASS YIELD & MARBLING**

**HIGH-QUALITY PRODUCT**

**CONSISTENCY**

**TRACEABILITY**
Beef × Dairy in the Literature

Expression of beef- versus dairy-type in crossbred beef and dairy cattle does not impact shape, eating quality, or color of strip loin steaks.

Blake A. Foraker, Bradley J. Johnson, Ryan J. Rathmann, Jerrad F. Legako, J. Chance Brooks, Markus F. Miller, and Dale R. Woerner

DOI: https://doi.org/10.22175/mmb.13926

Dale.Woerner@TTU.edu
Impact and Evaluation of Heat Stress on Dairy Cows

Sha Tao

Outline

1) Consequences of heat stress during lactation
2) Identifying heat stress
3) Heat abatement
4) Heat audit

Heat stress has negative impacts on dairy cattle at different stages of her life cycle

Experimental models to study heat stress in dairy cattle

- Seasonal effect
  - Summer vs. winter; summer vs. spring, etc.
  - Heat stress/photoperiod/forage availability/nutrition, etc.
  - Cannot account observed effects into heat stress only.

- Environmental chambers
  - Real heat stress trial
  - Compare with other models, the control group is critical.
  - Tight stall, behavioral responses could be different from those in free stall or on grazing platform
  - Cost is high, fewer facilities
Experimental models to study heat stress in dairy cattle

- Deprivation of evaporative cooling
  - Evaporative cooling + shade vs. shade only
  - All animals are exposed to similar environment, but cooling reduces body temperature.
  - Probably have better practical implications

Cooled Non-cooled

Physiological responses
- Increased body temperature

Consequences of heat stress

Ruiz-González et al., 2023

Physiological responses
- Increased body temperature
- Increased respiration rate

Weng and Tao, Unpublished

Chen et al., 2023
Behavioral responses
- Seasonal effects on standing time
  - Summer: 720 min
  - Winter: 626 min

Behavioral responses
- Increased standing time – With cooling provided - standing below fans and soakers

Behavioral responses
- Increased standing time – around water trough. What does that mean?
Behavioral responses

Sorting: Concentrate vs. Forage

Heat stressed lactating cows select for concentrates and sort against forage?

West JW, 1999

Sorting: Concentrate vs. Forage

Heat stressed lactating cows select for concentrates and sort against forage?

Miller-Cushon et al., 2019

Milk production reduces in summer
Milk production reduces at different stages of lactation

Milk fat (%) decreases during summer

Milk fat (%) is not impacted by heat stress in controlled studies

Milk protein (%) decreases during summer
Inconsistent impact of heat stress on milk protein (%)

Milk SCS increases during summer

Milk SCC unaltered in controlled studies

Seasonal effects on GA milk SCS (DHIA data from 2013-2015) – By farm size
Heat stress cows have greater increase in SCC following LPS induced mastitis

Chen et al., 2023

How to Identify Heat Stress

1) Environment

Temperature Humidity Index

Revised Temperature Humidity Index

0 - 120
How to Identify Heat Stress

2) Cow Rectal Temperature and Respiration Rate

Rectal Temperature > 38.5 °C (101.3 °F)

Respiration Rate > 45 breath/min

Ruiz-González et al., 2023

How to Cool Cows at High Ambient Temperature?

1) reduce solar radiation → shade

2) increase evaporative heat loss → water + forced ventilation
Sprinklers wet the cow, the dripping of water takes some heat out of the body; fans blow air to evaporate the water on the skin bringing heat out by evaporation.  

**Keys** – 1. Wet the skin, not the hair; 2. combined with fans.

**Wind speed is key over volume**

**Maintain at least 5 mph AT THE COW LEVEL** is critical

**How to Cool Cows at High Ambient Temperature?**

1. Wet the skin, not the hair; 2. combined with fans.

**Water + forced ventilation**

**Wind speed is key over volume**

**Maintain at least 5 mph AT THE COW LEVEL** is critical
Wind Speed (m/s)
1 m/s = 2.24 mile/h

Cow level: close and far of fan
- Standing at feed line
- Lying down at bedding
Measurement time: 30 seconds
Max: Maximum
AVG: Average
Minimal speed: > 2.23 m/s (5 mile/h)

Where to Cool?
1) Holding pen
Heat sink, first priority

2.1) Early and Mid lactating cows
Improve milk, repro and health

2.2) Dry and close-up cows
Increase milk production in next lactation

2.3) Late lactating cows
Increase milk production

3) Calf and heifer?
Future producer, cooling should be considered

How to evaluate cooling facility?
Heat audit:
- Evaluate the cooling facility
- Continuous measurement of body temperature over a day
- Measurements of environment will facilitate interpretation.
- Facilitate management decision
Measure of Environment

1. Local weather station and airport

2. Measure on farms
   - Hobos
   - Wind meter

Measure of Vaginal Temperature

Confinement herd - Vaginal temperature
Conclusions

1) Intensive cooling is critical for dairy farms
2) Cooling needs to be applied to both lactating and dry cows
3) Heat audit is the best way to evaluate the effectiveness of your heat abatement facility

Thank you!!!
Dr. Robert Hagevoort

• Professor & Extension Dairy Specialist
  - New Mexico State University
• BS Tropical Animal Nutrition
• MS Range Nutrition
• PhD Animal Nutrition
• Focus
  - 15 years private dairy consulting experience
  - 17 years Extension Dairy Specialist
  - Regulatory and environmental issues
  - Dairy workforce training & safety
  - U.S. Dairy Education & Training Consortium

Dr. David Douphrate

Associate Professor - Texas A&M University
Physical therapist
Business administration
Doctorate in occupational health and safety
Since 2003:
• Worker health and safety
• Workplace productivity and efficiency
• Safety management and leadership
• Dairy industry
  • 12 states
  • 75+ dairy farms and owners
  • 3000+ dairy workers
Any Ag producer I talk to considers this their no. 1 issue:

1. Employee management
2. ...
3. ....
4. ......

And within Employee Management these are the 2 major pieces:

a. Employee performance
b. Employee turnover

Today’s realities:

• Facilities continue to increase in size (number of animals), a worldwide trend
• Larger facilities employ more people
• Employees are not just family labor anymore – hired labor
• Employees usually from different cultural/linguistic backgrounds (foreign born)
• Employment often not based on skills
• Limited/unknown education/training pertaining to position
• May not be familiar working with/around calves/heifers
• We have an industry which suffers from “growing pains”
• Employee management is considered the number 1, 2, and 3 issue...

What does that mean for owners & management?

• Owners and managers are now people managers, not calf managers
• Yet they were raised to be calf managers
• They went to school to learn about dairy/farm management (tech skills)
• Where did they learn how to manage people? (soft skills)
• What about their personality types (Briggs Meyers)?
  • Introverts vs. Extroverts
  • Sensing vs. INtuitive
  • Thinking vs. Feeling
  • Judging vs. Perceiving
Looking down the road:

• Fewer employees – but higher tech skills....
• High level of specialization at each position
• Define: what are those higher tech skills?
• Who will be teaching and training these folks on these skillsets?
• Understand: “manual labor” does not equate “low skill labor”
• Manual vs automation?

More and more specialization at each position...
Who is training & educating these highly specialized people?
More and more specialization at each position...
Who is training & educating these highly specialized people?

Training Challenges

- Low-literacy, non-English speaking workforce
- High employee turnover rate
- Increasing task diversification & specialization on dairies and calf ranches
- Minimization of disruption of operations
- Historical focus on animal performance, not worker performance
- Limited to no internet connectivity
- Limited computer/IT resources

What we have learned:
Dairy Safety Awareness Training

<table>
<thead>
<tr>
<th>Country of Origin (%)</th>
<th>Mexico</th>
<th>Guatemala</th>
<th>United States</th>
<th>Honduras</th>
<th>El Salvador</th>
<th>Colombia</th>
<th>Puerto Rico</th>
<th>Peru</th>
<th>Cuba</th>
<th>Netherlands</th>
<th>China</th>
<th>Nicaragua</th>
<th>Portugal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1,256 (88.6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>182 (11.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>34.4 (12.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job position (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milker</td>
<td>489 (34.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeder</td>
<td>67 (4.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>862 (60.8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of experience</td>
<td>7.4 (9.1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest education level achieved (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Education</td>
<td>83 (6.1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary School</td>
<td>385 (26.2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle School</td>
<td>334 (24.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>391 (26.6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher Education</td>
<td>174 (12.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Gender (%)
- Male 1,256 (88.6)
- Female 182 (11.4)
Age
- Mean 34.4

Country of Origin (%)
- Mexico 716 (52.4)
- Guatemala 316 (22.7)
- United States 251 (18.4)
- Honduras 25 (1.8)
- El Salvador 27 (2.0)
- Colombia 9 (0.7)
- Puerto Rico 8 (0.6)
- Peru 2 (0.2)
- Cuba 2 (0.2)
- Netherlands 2 (0.2)
- China 1 (0.1)
- Nicaragua 1 (0.1)
- Portugal 1 (0.1)

Highest education level achieved (%)
- No Education 83 (6.1)
- Elementary School 385 (26.2)
- Middle School 334 (24.4)
- High School 391 (26.6)
- Higher Education 174 (12.7)

General findings and observations:

- Large majority no longer coming from an Ag-background
- Large majority no experience working with large animals or equipment
- 60% of employees 5th grade level education or below
- Shift in typical workforce make-up to more Central Americans
  - different culture (indigenous (Mayan) vs. Hispanic)
  - different language (K’iche vs. Spanish)
  - different body stature/build

3 cultures, 3 languages, 3 statures...
Do you really know who works for you?
- What is your workforce make up?
- Do you know how many of your employees read or write?
- And at what level is their reading comprehension?
- How do your employees communicate amongst themselves? What languages?
- Who does the translating, and what are their competency levels?
- Are your training materials adjusted to that level and in those languages?
- What materials do you use: written – audio – video?
- Do you evaluate the training effectiveness or just deliver and check the box?
- What do you know about the cultures in your workplace?
- Do you know the difference between the Latino/Hispanic and the indigenous Mayan cultures?
- Were you even aware of the differences between these cultures?
- What are the consequences for male/female dynamics in your workplace?
- What is hiding under the surface of cultures and languages, out of your sight?
- What does all of this mean for productivity, results and performance metrics?

Still wondering why employee management is considered the number 1, 2 and 3 issue on dairy facilities?
In Extension we do lots of different dairy training activities....

Problem with these kind of training activities:
How effective are these kinds of class settings?

In Extension we do lots of different dairy training activities....

Same class, 20 minutes later.....

Need for more dairy training tools!

Need for more effective training tools!

• Written (paper) SOP’s are not learning tools! (=procedural tools)
• Reading comprehension
• Comprehension retention
• Adult learners - Visual learners!
• Paper instruction is soooo antiquated!
• We can do better, more efficient and more effective!

Paper Standard Operating Procedures
Translating SOP’s to Video-SOP’s

Translations & Voiceover

2014-15 Dairy Safety Training: m-learning

Training Documentation

- Takes app. 1.5 hrs.
- Individual training
- Interactive, with questions in vignettes
- Workers receive a certificate
- Owner receives a training report
Training Effectiveness (level 1 & 2)

<table>
<thead>
<tr>
<th>Level one (n=1,435)</th>
<th>Very good (%)</th>
<th>Good (%)</th>
<th>Bad (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. Was it easy to use the iPad?</td>
<td>90.3</td>
<td>7.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Q2. Did you like watching the training videos on the iPad?</td>
<td>95.2</td>
<td>4.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Q3. Were the test questions easy to understand?</td>
<td>83.9</td>
<td>15.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Q4. How did you like the atmosphere of the training?</td>
<td>94.6</td>
<td>4.9</td>
<td>0.4</td>
</tr>
<tr>
<td>Q5. Did you learn new ideas and techniques (something new)?</td>
<td>89.3</td>
<td>9.3</td>
<td>1.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level two (n=1,435)</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>74.2 (15.3)</td>
</tr>
<tr>
<td>Post-test</td>
<td>92.5 (9.6)</td>
</tr>
</tbody>
</table>

Training Effectiveness (level 3)

<table>
<thead>
<tr>
<th>Level three (n=88)</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. Did you take the Dairy Safety Training using this iPad tablet?</td>
<td>98.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Q2. Have you applied safety techniques that you learned from the safety training?</td>
<td>95.4</td>
<td>4.6</td>
</tr>
<tr>
<td>Q3. Have you taken steps to prevent any injuries or accidents involving yourself or coworkers because of this safety training?</td>
<td>97.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Q4. Have you observed any safety issues at work?</td>
<td>34.5</td>
<td>65.5</td>
</tr>
<tr>
<td>Q5. Did you report any safety issues to your coworkers or supervisor? (if answered “yes” to Q4.)</td>
<td>90.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Q6. As compared to before the safety training, do you think you have performed your job in a safer manner?</td>
<td>100.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Dairy Safety Awareness Training: m-learning

- Susan Harwood (DOL) Training Grant
  Mobile platform learning (m-learning):

  - Effectiveness evaluation (Kirkpatrick model):
    - Level 1: 1,487 employees 41 farms: NM, TX, KS, CO, NY
    - Level 2: avg. pre-test score 73% and the avg. post-test score 94%
    - Employees receive certificate
    - Dairy receives letter certifying who attended, scores pre/post
    - Level 3: evaluating impacts (3-6 mos.) indicate changing safety behavior
Safe Animal Handling Training 2017

Findings and observations from animal handling training:
- Large majority have no experience working with large animals or equipment
- Many employees know little about animal senses (sight, hearing, smell, etc.)
- Many employees have wrong perceptions about how to act around animals
- Even seasoned workers who may know the “what” may not know the “why”
- Experienced workers appreciate the validation of their skills
- Owners/managers can make a great impact by reinforcing how important animal handling skills are to them
- Many owners/managers take this awareness training to build on and practice concepts with workers

From Classroom to Live Training

Return demonstrations of handling concepts like flight zone, Point of Balance, herding instincts, etc.

In short, where does all of this put you?

Challenges:
- Labor is the number one challenge in ALL business of more than 1 employee
- Managing people is far more difficult than managing cows
- Most owners/managers are at a total disadvantage: they are great cow managers
- Even your personality might not be helpful to become a good manager/coach/CEO
- Recent changes in our labor force put these labor challenges on steroids
- To boot: a generation which doesn’t want to do physical challenging work
What about some tips on where to start:

What I see successful operators do:

• They know the metrics, first and foremost... - informed management decisions
• Get out of their comfort zone and purposely focus more on leading people
• If that is not in their personality: hire somebody excellent to help do that
• Get to understand who their audience is: get to know who really works for you
• Get to understand what would make workers more successful in their jobs
• Be a clear communicator of what expectations are (by whatever means)
• Demonstrate leadership and excellence: it starts at the top and trickles down
• Don’t forget to be human for the humans that work on your facilities....
The Economics of Uterine Diseases

Klibs N. Galvão
College of Veterinary Medicine
University of Florida
galvaok@ufl.edu

Considerations

• Highly prevalent; 25%; range from 10 to 50%.
• Affect animal welfare.
• Decrease milk yield.
• Decrease fertility; decease CR and increase PL.
• Increased culling; died or sold.

• What is the economic cost of these diseases?

Disease Prevalence in the First 60 DIM

11,711 postpartum dairy cows from 16 farms from 6 regions of the US.
Table 1. Productive, reproductive, and economic parameters according to disease status

<table>
<thead>
<tr>
<th>Item</th>
<th>Metritis ± SE</th>
<th>No Metritis ± SE</th>
<th>Diff</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk by 305 DIM, kg</td>
<td>9,463</td>
<td>10,277</td>
<td>-814</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Pregnant by 305 DIM, %</td>
<td>60</td>
<td>79</td>
<td>-19</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Calved by 345 DIM, %</td>
<td>33</td>
<td>24</td>
<td>9</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Sold, %</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0.98</td>
</tr>
<tr>
<td>Died, %</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Dry-matter intake, kg</td>
<td>5,770</td>
<td>6,227</td>
<td>-457</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Milk sales by 305 DIM, $/cow</td>
<td>3,738</td>
<td>4,059</td>
<td>-322</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Cow value, $/cow</td>
<td>328</td>
<td>257</td>
<td>71</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Residual cow value</td>
<td>979</td>
<td>1,085</td>
<td>-106</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Feeding cost by 305 DIM, $/cow</td>
<td>1,529</td>
<td>1,650</td>
<td>-121</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Replacement cost, $/cow</td>
<td>566</td>
<td>408</td>
<td>158</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Reproduction cost, $/cow</td>
<td>80</td>
<td>81</td>
<td>-1</td>
<td>0.45</td>
</tr>
<tr>
<td>Treatment cost, $/cow</td>
<td>118</td>
<td>158</td>
<td>40</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Gross profit, $/cow</td>
<td>2,562</td>
<td>3,173</td>
<td>-611</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

- Historical prices from 2008 to 2018
### Table 1: Herd description, milk loss and profit loss from metritis by herd.

<table>
<thead>
<tr>
<th>State-Herd</th>
<th>Region</th>
<th>Herd No</th>
<th>Metritis, %</th>
<th>Rolling herd Average, kg</th>
<th>Milk Loss, kg</th>
<th>Profit Loss, $/cow</th>
</tr>
</thead>
<tbody>
<tr>
<td>MN MW</td>
<td></td>
<td>29</td>
<td>16,260</td>
<td>407</td>
<td>352</td>
<td></td>
</tr>
<tr>
<td>OH-1 MW</td>
<td></td>
<td>15</td>
<td>13,140</td>
<td>2,213</td>
<td>948</td>
<td></td>
</tr>
<tr>
<td>OH-2 MW</td>
<td></td>
<td>19</td>
<td>10,585</td>
<td>625</td>
<td>392</td>
<td></td>
</tr>
<tr>
<td>OH-3 MW</td>
<td></td>
<td>21</td>
<td>12,775</td>
<td>666</td>
<td>462</td>
<td></td>
</tr>
<tr>
<td>WI-1 MW</td>
<td></td>
<td>19</td>
<td>14,618</td>
<td>821</td>
<td>461</td>
<td></td>
</tr>
<tr>
<td>WI-2 MW</td>
<td></td>
<td>17</td>
<td>14,964</td>
<td>345</td>
<td>217</td>
<td></td>
</tr>
<tr>
<td>NY-1 NE</td>
<td></td>
<td>22</td>
<td>14,267</td>
<td>811</td>
<td>395</td>
<td></td>
</tr>
<tr>
<td>NY-2 NE</td>
<td></td>
<td>17</td>
<td>14,764</td>
<td>778</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>NY-3 NE</td>
<td></td>
<td>25</td>
<td>13,769</td>
<td>884</td>
<td>442</td>
<td></td>
</tr>
<tr>
<td>NY-4 NE</td>
<td></td>
<td>22</td>
<td>13,271</td>
<td>1,175</td>
<td>759</td>
<td></td>
</tr>
<tr>
<td>FL SE</td>
<td></td>
<td>41</td>
<td>11,300</td>
<td>1965</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>CA-1 SW</td>
<td></td>
<td>43</td>
<td>12,500</td>
<td>662</td>
<td>279</td>
<td></td>
</tr>
<tr>
<td>CA-2 SW</td>
<td></td>
<td>21</td>
<td>12,300</td>
<td>682</td>
<td>246</td>
<td></td>
</tr>
<tr>
<td>CA-3 SW</td>
<td></td>
<td>24</td>
<td>13,100</td>
<td>759</td>
<td>374</td>
<td></td>
</tr>
<tr>
<td>TX-1 SW</td>
<td></td>
<td>24</td>
<td>8,635</td>
<td>965</td>
<td>594</td>
<td></td>
</tr>
<tr>
<td>TX-2 SW</td>
<td></td>
<td>37</td>
<td>9,348</td>
<td>333</td>
<td>156</td>
<td></td>
</tr>
<tr>
<td>TX-3 SW</td>
<td></td>
<td>23</td>
<td>9,348</td>
<td>333</td>
<td>156</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>25</td>
<td>12,849</td>
<td>814</td>
<td>511</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2: Effect of treatment on performance and economic outcomes.

<table>
<thead>
<tr>
<th>Item</th>
<th>UNT</th>
<th>EXD</th>
<th>NMET</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total milk yield by 300 DIM, kg</td>
<td>10,509</td>
<td>10,767</td>
<td>11,111</td>
<td>0.15</td>
</tr>
<tr>
<td>DMI, kg</td>
<td>6,246</td>
<td>6,302</td>
<td>6,559</td>
<td>0.18</td>
</tr>
<tr>
<td>Pregnant by 300 DIM, %</td>
<td>644</td>
<td>707</td>
<td>757</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Culled by 300 DIM, %</td>
<td>394</td>
<td>299</td>
<td>299</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Milk sales</td>
<td>4,107</td>
<td>4,303</td>
<td>4,642</td>
<td>0.16</td>
</tr>
<tr>
<td>Cow value, $/cow</td>
<td>206*</td>
<td>217*</td>
<td>213*</td>
<td>0.01</td>
</tr>
<tr>
<td>Residual cow value, $/cow</td>
<td>392*</td>
<td>1,630*</td>
<td>1,050*</td>
<td>0.01</td>
</tr>
<tr>
<td>Feeding costs by 300 DIM, $/cow</td>
<td>1,623</td>
<td>1,454</td>
<td>1,706</td>
<td>0.18</td>
</tr>
<tr>
<td>Replacement cost, $/cow</td>
<td>686*</td>
<td>512*</td>
<td>489*</td>
<td>0.01</td>
</tr>
<tr>
<td>Reproduction costs, $/cow</td>
<td>70*</td>
<td>64*</td>
<td>63*</td>
<td>0.10</td>
</tr>
<tr>
<td>Treatment cost by 600 DIM, $/cow</td>
<td>27*</td>
<td>152*</td>
<td>10*</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Gross profit, $/cow</td>
<td>2,800*</td>
<td>3,210*</td>
<td>3,420*</td>
<td>0.06</td>
</tr>
</tbody>
</table>
Ampicillin (Polyflex) is Also Effective

![Graph showing cure rates for Ampicillin vs Ceftiofur.]

Lima et al., 2014; JDS; Merenda et al., 2021; JDS

Ampicillin is More Economical

![Graph showing cost of feed calves and discarded cows for Ampicillin vs Ceftiofur.]

Lima et al., 2019; JDS

---

**Cost of Clinical Endometritis**

Table 3. Effect of treatment on performance and economic outcomes.

<table>
<thead>
<tr>
<th>Item</th>
<th>CE</th>
<th>No CE</th>
<th>Diff</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mlk by 305 DIM, kg</td>
<td>8,856</td>
<td>9,100</td>
<td>-244</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>DMW by 305 DIM, kg</td>
<td>5.679</td>
<td>5.786</td>
<td>-107</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Pregnant by 305 DIM, %</td>
<td>73</td>
<td>80</td>
<td>-7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Cured by 305 DIM, %</td>
<td>32</td>
<td>25</td>
<td>7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Milk sales, $/cow</td>
<td>4,208</td>
<td>4,427</td>
<td>-119</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Residual cow value, $/cow</td>
<td>1,098</td>
<td>1,200</td>
<td>-102</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Cow sales, $/cow</td>
<td>450</td>
<td>341</td>
<td>109</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Feed costs, $/cow</td>
<td>1,713</td>
<td>1,748</td>
<td>-32</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Replacement costs, $/cow</td>
<td>606</td>
<td>489</td>
<td>117</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Cost of reproduction, $/cow</td>
<td>77</td>
<td>69</td>
<td>8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Gross profit, $/cow</td>
<td>3,360</td>
<td>3,566</td>
<td>-206</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Ojeda et al., 2022; MSc Thesis

---

**Cost of Clinical Endometritis**

![Pie chart showing contribution to gross profit difference.]

Ojeda et al., 2022; MSc Thesis
Additive Effect of Metritis and CE

### Table 3. Effect of treatment on performance and economic outcomes.

<table>
<thead>
<tr>
<th>Item</th>
<th>MET</th>
<th>CE</th>
<th>MET+CE</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk by 305 DIM, kg</td>
<td>9.215</td>
<td>9.072</td>
<td>9.023</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>DMI by 305 DIM, kg</td>
<td>5.854</td>
<td>5.790</td>
<td>5.760</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Pregnant by 305 DIM, %</td>
<td>83</td>
<td>78</td>
<td>76</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Culled by 305 DIM, %</td>
<td>23</td>
<td>28</td>
<td>29</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Milk sales, $/cow</td>
<td>4,483</td>
<td>4,413</td>
<td>4,389</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Cow sales, $/cow</td>
<td>313</td>
<td>370</td>
<td>387</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Residual cow value, $/cow</td>
<td>1,227</td>
<td>1,166</td>
<td>1,144</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Fixed costs, $/cow</td>
<td>1,765</td>
<td>1,746</td>
<td>1,737</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Replacement costs, $/cow</td>
<td>446</td>
<td>528</td>
<td>555</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Cost of reproduction, $/cow</td>
<td>67</td>
<td>74</td>
<td>77</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Gross profit, $/cow</td>
<td>3,717</td>
<td>3,434</td>
<td>3,549</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

Conclusions

- Metritis is a prevalent and costly disease to the dairy industry. $500/case
- Antibiotic treatment of metritis is economical. The welfare and the increase in antibiotic resistance should also be taken into account when making treatment decisions.
- Clinical endometritis is also costly. $200/case
- Additive effect of metritis and clinical endometritis
Questions???