Effects of a trainer cow on health, performance and behavior of newly weaned calves

D.J. Gibb, K.S. Schwarzkopf-Gensein, J.M. Stookey, T.A. McAllister and R.D. Wiedmeier
Objectives

- Determine if a mature, feedlot-adapted cow would influence feeding behavior, health or performance of newly weaned calves

Materials and methods

**Trial 1**

- 297 (258±17) kg Charolais and Hereford x Angus calves

- 12 No Cow               12 Trainer Cow
Materials and methods

**Trial 1**

- Vaccinated for IBR, PI3 and *Haemophilus somnus* on d 0
- Weight and rectal temperature
  - d 0, 3, 7, 14, 21 & 28
- Blood drawn on d 0, 3, & 7
  - (WBC) counts, neutrophil:lymphocyte ratios (N:L), and haptoglobin analysis

- Calf behavior
  - Calves observed at 10 min intervals from 0730 to 1730 on d 1, 2, 4, 5, & 6
  - % walking, lying, standing, or feeding was recorded
**Materials and methods**

**Trial 1**

- **Intakes**
  - average calf intakes estimated by:
    - pen intakes - avg. cow intake (determined following removal from the pen)/number of calves in the pen

- 60 mixed Charolias cross steer calves (269 ±17 kg)
  - 2 No Cow pens
  - 2 Trainer Cow pens
  - 15 hd/pen
**Materials and methods**

**Trial 2**

- Weights, RT, blood sampling, and behavioral observations as described for Trial 1
  - no haptoglobin analysis

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**Feeding Behaviour**

Transponder

Antenna
# Results – Dry Matter Intake, kg/d

## Trial 1

<table>
<thead>
<tr>
<th>days</th>
<th>0-3</th>
<th>4-7</th>
<th>8-14</th>
<th>15-21</th>
<th>22-28</th>
<th>0-28</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMI, kg</td>
<td>2.9&lt;sup&gt;e&lt;/sup&gt;</td>
<td>6.4&lt;sup&gt;c&lt;/sup&gt;</td>
<td>5.7&lt;sup&gt;d&lt;/sup&gt;</td>
<td>7.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.4&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.22</td>
</tr>
</tbody>
</table>

<sup>abcde</sup> means with unlike superscripts differ (<i>P</i>&lt;.05)

# Results – Average Daily Gain, kg/d

<table>
<thead>
<tr>
<th>days</th>
<th>0-3</th>
<th>0-7</th>
<th>0-14</th>
<th>0-21</th>
<th>0-28</th>
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</thead>
<tbody>
<tr>
<td>NC</td>
<td>.89&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.76</td>
<td>1.20</td>
<td>1.27</td>
<td>1.16</td>
</tr>
<tr>
<td>TC</td>
<td>-.89&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.39</td>
<td>1.40</td>
<td>1.22</td>
<td>1.19</td>
</tr>
<tr>
<td>SEM</td>
<td>.35</td>
<td>.22</td>
<td>.15</td>
<td>.74</td>
<td>.83</td>
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</tbody>
</table>

<sup>ab</sup> means in the same column with different superscripts differ (<i>P</i>&lt;.05)
### Results – Rectal Temperature

<table>
<thead>
<tr>
<th>days</th>
<th>0</th>
<th>3</th>
<th>7</th>
<th>14</th>
<th>21</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trail 1</td>
<td>39.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>39.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>39.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>39.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>38.9&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.05</td>
</tr>
<tr>
<td>Trail 2</td>
<td>38.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>38.7&lt;sup&gt;b&lt;/sup&gt;</td>
<td>38.9&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>39.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>39.0&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>.13</td>
</tr>
</tbody>
</table>

<sup>ab</sup> means in the same row with different superscripts differ (<i>P</i> < .05)

### Results - WBC counts, X 10<sup>9</sup>/L

<table>
<thead>
<tr>
<th>days</th>
<th>0</th>
<th>3</th>
<th>7</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9.7&lt;sup&gt;b&lt;/sup&gt;</td>
<td>10.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>9.8&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.26</td>
</tr>
</tbody>
</table>

<sup>ab</sup> means with different superscripts differ (<i>P</i> < .05)
### Results - N:L ratios

<table>
<thead>
<tr>
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<th>0</th>
<th>3</th>
<th>7</th>
<th>SEM</th>
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<tbody>
<tr>
<td>N:L</td>
<td>.33(^b)</td>
<td>.37(^b)</td>
<td>.41(^a)</td>
<td>.03</td>
</tr>
</tbody>
</table>

\(^{ab}\) means with different superscripts differ (\(P=.06\))

### Results - haptoglobin

<table>
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<th>3</th>
<th>7</th>
<th>SEM</th>
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</thead>
<tbody>
<tr>
<td>Haptoglobin, log(^4)</td>
<td>165(^c)</td>
<td>1521(^a)</td>
<td>904(^b)</td>
<td>104</td>
</tr>
</tbody>
</table>

\(^{abc}\) means with different superscripts differ (\(P<.001\))
**Morbidity rates, %**

<table>
<thead>
<tr>
<th>days</th>
<th>0</th>
<th>0-3</th>
<th>4-7</th>
<th>8-14</th>
<th>15-21</th>
<th>22-28</th>
<th>0-28</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.9</td>
<td>17.9</td>
<td>4.1</td>
<td>3.7</td>
<td>2.1</td>
<td>2.9</td>
<td>34.2</td>
<td>1.9</td>
</tr>
</tbody>
</table>

**Behavior observations**

<table>
<thead>
<tr>
<th></th>
<th>Standing</th>
<th>Walking</th>
<th>Eating</th>
<th>Lying</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>23.6(^a)</td>
<td>14.7</td>
<td>20.5</td>
<td>42.7</td>
</tr>
<tr>
<td>TC</td>
<td>25.4(^b)</td>
<td>16.7</td>
<td>19.5</td>
<td>38.0</td>
</tr>
<tr>
<td>SEM</td>
<td>.3</td>
<td>1.0</td>
<td>4.1</td>
<td>1.1</td>
</tr>
</tbody>
</table>

\(^{ab}\) means in the same column with different superscripts differ (\(P<.05\))
**Bunk attendance**

<table>
<thead>
<tr>
<th>Day</th>
<th>Frequency, visits/d</th>
<th>Duration, min/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>9.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>56.7&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>4-7</td>
<td>9.5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>95.5&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>8.14</td>
<td>12.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>115.9&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>15-21</td>
<td>12.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>108.9&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>22-28</td>
<td>10.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>87.5&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>SEM</td>
<td>.37</td>
<td>4.57</td>
</tr>
</tbody>
</table>

<sup>ab</sup> means in the same column with different superscripts differ (<i>P</i>&lt;0.05)

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**Bunk attendance by 4 h periods**

![Graph showing bunk attendance by 4 h periods for calves and cows on days 2 to 14 of the trial.](image)
Summary

- Trainer cows did not affect immune function or health of newly weaned calves
- ADG was negatively influenced by TC early in the trials but no difference detected by the end of the 28 d trials
- No difference in bunk attendance between TC and NC calves

Conclusion

- Negative effect of TC on ADG early in the trials as well as differences in times spent feeding for calves and TCs indicate that a TC may be an additional source of unfamiliarity and stress for newly weaned calves entering the feedlot
Competitive behaviour has been recognized for decades as a means for establishing a social structure in a group of cattle. However, little work exists in terms of how individual differences in competitive behaviour are related to feeding behaviour and intake.
Access to Resources

- Relationship between competition at bunk
  - Performance ?
  - Health ?

The objective of this study was to compare competitive interactions to feeding behaviour and intake of individual feedlot cattle.

Methods

- 45 feedlot heifers (520 ± 33 kg BW); 15 heifers per pen
- 3 GrowSafe™ pens / 2 tubs continuously monitored individual animal intake and feeding duration
- Competitive interactions occurring near the feed tubs were continuously monitored between 0800 and 2200
Methods

- Animals were considered successful if they displaced another animal and gained access to one or both of the feed tubs.

- The number of successful interactions was compared to total dry matter intake (DMI) and total time spent eating for each hour of the day.
**Competitive Behaviour** | **Outcome**
---|---
1. Contact | Successful
A. Food: Reactor moves and instigator eats or instigator prevents reactor from eating.
B. ACCESS: Reactor move and instigator gains access to feed, but does not eat.
C. Non-Food: Reactor does not move away from instigator. Both in non-food area.
2. Non-contact | Unsuccessful
A. Food: Instigator attempts to move reactor but is unsuccessful and does not feed.
B. ACCESS: Instigator has own feed tub and attempts to remove reactor from their own feed tub but is unsuccessful.
C. Non-Food: Reactor does not move away from instigator. Both in non-food area.
**Results**

- Positive significant relationships between
- #of successful interactions
- intake R2=0.43
- time spent eating R2=.34
- (p=0.0001) 24 h period

- Higher R2 values at the beginning and end of the diurnal feeding period indicate that successfulness is more important when motivation to feed is high
Results

- Individual animals develop a variety of methods for gaining access to feed, including:
  - Competitive interactions
  - Increased eating rates
  - Alternative eating times

Conclusions

- Competitive interactions at the feed bunk are related to increased intake and time spent eating; however, this relationship varies depending on the animal’s motivation for feed.

- Observations of individual cattle eating patterns indicate that competition is more important for some animals than others; certain animals develop alternate coping strategies when presented with competitive feeding situations.
Objective Measures of Temperament in Beef Cattle

Objective measures of reactivity

Prediction of temperament

Regression values for automated scoring vs visual scoring n=28

<table>
<thead>
<tr>
<th></th>
<th>Visual scores</th>
<th>Stain gauge</th>
<th>Accelero-meter</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry</td>
<td>.56 (4)</td>
<td>.53 (5)</td>
<td>.65 (8)</td>
<td></td>
</tr>
<tr>
<td>Restr.</td>
<td>.31 (3)</td>
<td>.42 (5)</td>
<td>.76 (9)</td>
<td></td>
</tr>
<tr>
<td>Exit</td>
<td>.33 (3)</td>
<td>.62 (5)</td>
<td>.77 (7)</td>
<td></td>
</tr>
</tbody>
</table>
Descriptive statistics for growth and behavioural traits, and their relationship to beef tenderness as measured by WBSF

<table>
<thead>
<tr>
<th></th>
<th>Flight speed</th>
<th>Visual score</th>
<th>Flight zone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Entry</td>
<td>Restricted</td>
<td>Exit</td>
</tr>
<tr>
<td>January</td>
<td>0.760</td>
<td>0.462</td>
<td>0.637</td>
</tr>
<tr>
<td>February</td>
<td>0.189</td>
<td>0.067</td>
<td>0.900</td>
</tr>
<tr>
<td>March</td>
<td>0.977</td>
<td>0.020</td>
<td>0.994</td>
</tr>
<tr>
<td>May</td>
<td>0.613</td>
<td>0.074</td>
<td>0.941</td>
</tr>
<tr>
<td>July</td>
<td>0.321</td>
<td>0.042</td>
<td>0.744</td>
</tr>
</tbody>
</table>

Summary

- combining scoring methods – more accurate prediction
- What are we assessing?
- Must be easy to use for the industry
Determination of cow preference for forage types based on feeding behaviour and intake patterns

K.S. Schwartzkopf-Genswein, J. Baah, R. Silasi and T.A. McAllister

Preference?

- Free ranging herbivores can and do eat a diverse array of foods
- Cattle can select/prefer one food over another
- Cattle can distinguish between plant species and plant parts (Westoby, 1978; Atwood et al., 2002)
Why look at preference?

- In confinement choices are limited
- Preference depends on:
  - Experience
  - Nutritional needs based on metabolic status
  - May not be related to quality

Why look at preference?

- Determining preference by animal “type” may improve
  - Intake
  - Gain
  - Efficiency
  - Cost of production
  - Milk production
  - Fertility
**Objective**

- Determine preference of dry cows for different types of hay
- Based on feed intake, duration and frequency of feed attendance

**Methods**

- 32 non-lactating Holstein cows (518 kg BW)
- 32 d feeding trial
- Provided with dry cow ration
  - 80% barley silage:20% dry cow concentrate (DM basis)
- *Ad libitum* access to water
**Forage treatments**

- Timothy hay
- Sudangrass
- Oat hay

**Feeding**

- Fed once daily @ 0900 h
- Hay type offered in one of 3 feed tubs
- Location of feed type switched every 4 d
- Weighbacks collected at 0800 h daily
Measurements

- Bunk attendance
  - Frequency
  - Duration
- DM intake by individual cows at each tub
- Obtained over 32 d trial
- 24-h period before and after switch of forage type

Bunk attendance and intake

- Oat
- Timothy
- Sudangrass

P < 0.005
P = 0.06
**Effect of feed switch**

![Bar chart showing the effect of feed switch on duration, frequency of visits, and intake over two days.](chart)

**Cows vs heifers**

![Bar chart comparing cows and heifers on duration, frequency of visits, and intake.](chart)

- Cows vs heifers: P < 0.01
### Age x forage interactions

![Graph showing Age x forage interactions]

### Effect of tub location

<table>
<thead>
<tr>
<th>Location</th>
<th>Visits /d</th>
<th>Duration min/d</th>
<th>Intake kg/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tub 1</td>
<td>2.1+/ .22</td>
<td>16.2 +/ 2.2</td>
<td>1.4+/ .29</td>
</tr>
<tr>
<td>Tub 2</td>
<td>2.3+/ .22</td>
<td>16.3 +/ 2.1</td>
<td>1.3+/ .26</td>
</tr>
<tr>
<td>Tub 4</td>
<td>2.3+/ .22</td>
<td>20.7 +/ 2.2</td>
<td>1.7+/ .26</td>
</tr>
<tr>
<td>Tub 7</td>
<td>2.7+/ .21</td>
<td>18.9 +/ 2.0</td>
<td>1.8+/ .24</td>
</tr>
<tr>
<td>Tub 9</td>
<td>3.3+/ .20</td>
<td>22.1 +/ 1.9</td>
<td>2.6+/ .24</td>
</tr>
<tr>
<td>Tub 10</td>
<td>3.6+/ .20</td>
<td>27.1 +/ 1.9</td>
<td>2.0+/ .23</td>
</tr>
</tbody>
</table>

*P < .001
Conclusions

- Strong preference for Oat and Timothy over Sudangrass
- No clear preference between Oat and Timothy hay
- Variation in bale-to-bale quality
- Preference for bunk location

Conclusions

- Lack of feeding behaviour X switch day interaction
- Cows easily discriminate and select different forage types
- Performance?
- Relationship to nutritive value?
- Preference of individuals - skewing???
Industry application?

- Allow free choice access to feeds normally offered in a TMR?
- Impacts on performance and cost of feed?