Grouped-Housed Feeding Systems
How To Get It Right!

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Group Housing Facilities
• New designs
• Remodeled facilities
• Outdoors

Group Housing Challenges
• Ventilation
• Bedding
• Space availability
• Feeding systems

Group Housing & Feeding
• Gang feeders
• Automated feeders
• Ad-lib acidified

Gang Feeders
• Inexpensive
• Hygiene issues?
• Not ad-lib

Automatic Feeders
• Computerized-data
• Expensive
• Maintenance
• Not always ad-lib
Acidified Ad-lib Systems

- Basic or sophisticated.
- Milk replacer
- Whole milk (pasteurized or not)
- Chemical pasteurization (acid)

Group housing & feeding

Table 1. The pH Scale: Some Examples

<table>
<thead>
<tr>
<th>pH Value</th>
<th>mM Concentration</th>
<th>Relation to Pure Water</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100000 000</td>
<td>bitter acid</td>
<td>example</td>
</tr>
<tr>
<td>1</td>
<td>100 000</td>
<td>lemon juice, vinegar</td>
<td>example</td>
</tr>
<tr>
<td>2</td>
<td>10 000</td>
<td>orange, pomegranate</td>
<td>example</td>
</tr>
<tr>
<td>3</td>
<td>1 000</td>
<td>tomato, pear, asparagus</td>
<td>example</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>black coffee, banana</td>
<td>example</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>urine, milk</td>
<td>example</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>pure water</td>
<td>example</td>
</tr>
<tr>
<td>7</td>
<td>0.1</td>
<td>sea water, rain</td>
<td>example</td>
</tr>
<tr>
<td>8</td>
<td>0.01</td>
<td>milk, kefir</td>
<td>example</td>
</tr>
<tr>
<td>9</td>
<td>0.001</td>
<td>milk, kefir</td>
<td>example</td>
</tr>
<tr>
<td>10</td>
<td>0.0001</td>
<td>milk, kefir</td>
<td>example</td>
</tr>
<tr>
<td>11</td>
<td>0.00001</td>
<td>milk, kefir</td>
<td>example</td>
</tr>
<tr>
<td>12</td>
<td>0.000001</td>
<td>milk, kefir</td>
<td>example</td>
</tr>
</tbody>
</table>

Figure 1. Courtesy Valo Dairy, Finland
Source: N. Anderson
Group housing & ad-lib feeding

A seasonal set-up for acidified whole milk

Facility designed for grouped housing

Group housing & ad-lib feeding

Group housing & ad-lib feeding
Ad-lib & Group Housing Research Summaries

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Overview
• Late spring/summer 2011
• Three collaborating dairy farms (Lewis & Jefferson Counties)
• Objectives:
  1. Group vs. individual housing with ad-lib feeding.
  2. Citric vs. formic acid as a preservative for milk replacer.

Group vs. Individual
• Pasteurized/formic acid acidified whole milk
• Ad-lib feeding
• Group housing (8 calves/pen, 3 nipples/pen)
• Individual housing (clusters of 8-4x8 pens with solid sides, 1 nipple/calf)
• Alternating group and individual pen clusters within same barn.

Group vs. Individual Pens

<table>
<thead>
<tr>
<th></th>
<th>Group (n=40)</th>
<th>Individual (n=32)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG (lbs.) @ 50 days</td>
<td>1.51a</td>
<td>1.32b</td>
<td>0.01</td>
</tr>
<tr>
<td>Serum Total Protein</td>
<td>5.9a</td>
<td>5.9b</td>
<td>0.61</td>
</tr>
<tr>
<td>Birth weight (lbs.)</td>
<td>88.3a</td>
<td>89.4a</td>
<td>0.66</td>
</tr>
</tbody>
</table>
### Disease Events

<table>
<thead>
<tr>
<th>Event</th>
<th>Group (n=40)</th>
<th>Individual (n=32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scours</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total disease events</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

### Conclusions
- No apparent detrimental effects of group housing as compared to individual pens given similar nutrition.
- Disease events (scours, pneumonia) were negligible throughout study (1 case of pneumonia).

### Citric vs. Formic Acid
- 24/17 Citric acid acidified (commercial) milk replacer vs. 24/17 milk replacer acidified (on-farm) with formic acid.
- pH of 4.2 (Some issues with product pH for ~2 weeks)
- Two facilities.
- Identical feeding management within each farm.

### Citric vs. Formic Acid

<table>
<thead>
<tr>
<th></th>
<th>Citric acid (n=38)</th>
<th>Formic acid (n=35)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG (lbs.) @ 40 days</td>
<td>0.92ab</td>
<td>1.14b</td>
<td>0.03</td>
</tr>
<tr>
<td>Serum Total Protein</td>
<td>5.54a</td>
<td>5.35a</td>
<td>0.29</td>
</tr>
<tr>
<td>Birth weight (lbs.)</td>
<td>88a</td>
<td>95b</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Preliminary results

### Disease Events

<table>
<thead>
<tr>
<th>Event</th>
<th>Citric acid (n=43)</th>
<th>Formic acid (n=36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scours</td>
<td>3 (7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>7 (16.6%)</td>
<td>4 (11%)</td>
</tr>
<tr>
<td>Other</td>
<td>4 (9.5%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Death</td>
<td>5 (11.6%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Total disease/death events</td>
<td>19 (39.6%)</td>
<td>5 (13.8%)</td>
</tr>
</tbody>
</table>
Conclusions

• Statistically higher ADG in formic vs. citric groups.
• Subjectively, no apparent negative effects of citric vs. formic acid for the acidification of milk replacer. (Currently in use)
• Two week period of high pH and following disease make data analysis difficult for citric group.

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• Moserdale Dairy, LLC
• Beller Farms, LLC
• Ron Kuck- CCE Jefferson County
• Becca Harrison- CCE Summer intern

Practical Group Calf Feeding

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Moserdale Dairy, LLC

• 600 cows
• 60-65 calves on milk
• Milk replacer (24:24)
• 4 separate physical facilities (one specifically designed for calves). Does allow for all-in-all-out.
• 3% pre-weaning mortality
• ADG 1.8-2#/day
Why??

- Grow healthier calves
- Maximize rate of gain
- Reduce labor for feeding
...proper range pH 4.0 - 4.5

...temperature is important

> (75°F)

warm milk + acid =
cottage cheese

What about
intersuckling?
Questions?