1. Feeding Principles
1. Feeding Principles

- Feed a safe and palatable concentrate pellet.
1. Feeding Principles

• Balance feed bunk based on VMS Herd Avg. Feed consumed.

Devices are just a Bridge
1. Feeding Principles

Configure all settings in the system

<table>
<thead>
<tr>
<th>Feed Station Number</th>
<th>Device Name</th>
<th>Device Type</th>
<th>Feed Station</th>
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<tbody>
<tr>
<td>8</td>
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<td>Active</td>
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<table>
<thead>
<tr>
<th>Feed Station Type</th>
<th>T2x2</th>
<th>Max ration per visit</th>
<th>Max ration To Start Dispenser</th>
<th>Dispensing Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.10 kg</td>
<td>0.10 kg</td>
<td></td>
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</tbody>
</table>

Device Description

Dispenser Name | Feed Storage | Feed Number | Feed Name | Group Name | Calibration Coefficient | Calibration Date | Calibration Time.Interval |
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
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<th></th>
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</tr>
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<tbody>
<tr>
<td>A1</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Feeding Principles

Computer feeding
VMS and/or FS
Feed bunk
The base
What do you feed at the feed bunk?

- Partial Mixed Ration
- Forage mixture
1. Partial Mixed Ration

1. Partial Mixed Rations with a high grain content.

2. Partial Mixed Rations with a low grain content.
1. PMR with a high grain content

- Almost a TMR feeding strategy.
- Avg. 4 lb/cow/day feed at the robot.
- Feed table range: 2-6 lb/cow/day.
- Max. per visit: 1 – 2 lb.
- Works best at:
  - Milk first pre – selection
  - Feed bunk + VMS

Guided flow:
- Stalls
- VMS
- Ration
- Stalls
1. PMR with a high grain content

“Candy” concept

All cows same ration

Virtual groups in a group, based on milk production
1. PMR with a high grain content

INDIVIDUAL COWS IN A GROUP

MIXED STRATEGIES: DIM +
Individual Milk production

15 – 100 DIM
> 101 DIM

6 Lb.
3 – 4.5 - 6 Lb.
1. PMR with a high grain content

1. Partial Mixed Rations
   - with a high grain content.
2. Partial Mixed Rations
   - with a low grain content.
2. PMR with a low grain content

- Strong focus on top dressing individuals or virtual groups, based on milk production and/or days in milk.
- Avg. 8-10 lb/cow/day feed at the robot.
- Feed table range: 4 – 16 lb/cow/day.
- Max. per visit: 2 – 4 lb.
- Works best at:
  - Free flow, Feed first and Milk first
  - Feed bunk + VMS

2. PMR with a low grain content

- Main motivator is:
2. PMR with a low grain content

“Candy” concept

VIRTUAL GROUPS IN A GROUP, BASED ON MILK PRODUCTION
2. PMR with a low grain content

INDIVIDUAL COWS IN A GROUP

MIXED STRATEGIES: DIM +
Individual Milk production

15 – 100 DIM
> 100 DIM

16 Lb.
4 - 16 Lb.
2. PMR with a low grain content

Goal: Consistency

Production Scenario:
- Avg. Milk production: 80 lb
- Avg. Milking/day: 3x
- Target 1st th./rd: 50 lb, 4x
- Target 2nd th./rd 90 lb, 3x
- Target 3rd th./rd: 70 lb, 2x

Settings:
- 21-100 DIM: Feed table based on DIM
- >100 DIM: Feed table based on MP
- Max. Available per visit: 4 lb
- Min. Ration Avail./cow/day: 8 lb
- Max. Ration Avail./cow/day: 16 lb
1. The base defines the strategy

1. Partial Mixed Ration

2. Forage mixture

2. Forage Mixture at the feed bunk.

- All grain goes through the VMS and feeding Stations.

- Avg. 14 – 20 lb/cow/day

- Feed table range: 8 – 22 lb/cow/day.

- Max. per visit: 4 lb.
  - Ex. Total ration avail: 22 pounds
  - Milkings per day: 3
  - Feed delivered by the VMS: 12 lb
  - Feed delivered by the FS: 10 lb
  - Total: 22 lb, delivered in 3 visits to VMS, and 3 visits to FS.
2. Forage Mixture at the feed bunk.

- Works best at:
  - Feed first:
    - Stalls
    - Feed bunk
    - SSG: If milking permission granted: Feed at the VMS
    - SSG: If milking permission not granted: Feed at the FS, located in a feeding pen between SSG and Stalls.
    - Stalls
  - Free flow
  - Milk first

- Main motivator is:

Concentrate feed at:

- VMS
- Feeding Stations:
  2 FS / 60 Cows
2. Forage Mixture at the feed bunk.

VIRTUAL GROUPS IN A GROUP, BASED ON MILK PRODUCTION

2. Forage Mixture at the feed bunk.

INDIVIDUAL COWS IN A GROUP
2. Forage Mixture at the feed bunk.

MIXED STRATEGIES: DIM +
Individual Milk production

15 – 100 DIM

> 101 DIM

22 Lb.

4 - 22 Lb.

2. Forage Mixture at the feed bunk.

<table>
<thead>
<tr>
<th>Concentration (lb)</th>
<th>Milk Production (lb)</th>
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<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
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<td>5</td>
<td>6</td>
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<tr>
<td>6</td>
<td>7</td>
</tr>
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<td>7</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

Production Scenario:
- Avg. Milk production: 80 lbs
- Avg. Milking/day: 3x
- Target 1st third: 90 lb, 4x
- Target 2nd third: 90 lb, 3x
- Target 3rd third: 70 lb, 2x

Settings:
- 21-100 DIM: Flat feed table based on DIM
- >100 DIM: Feed table based on MP
- Max. Available per visit: 8 lb
- Min. Ration Avg./cow/day: 16 lb
- Max. Ration Avg./cow/day: 24 lb
# Example an AMS Barn Diet

## Ingredient Detail

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Added Amount</th>
<th>% of As Fed</th>
<th>% of DM Fe</th>
<th>% of As Fed</th>
<th>% of DM Fe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn Silage 34DM</td>
<td>77,000</td>
<td>33.50</td>
<td>25.94</td>
<td>40.133</td>
<td>138.066</td>
</tr>
<tr>
<td>Rye Starch, 12% CP 35</td>
<td>12,000</td>
<td>54.80</td>
<td>1.76</td>
<td>10.777</td>
<td>215.540</td>
</tr>
<tr>
<td>Soybean Meal 80%</td>
<td>5,500</td>
<td>80.00</td>
<td>4.90</td>
<td>4.900</td>
<td>99.790</td>
</tr>
<tr>
<td>Corn, Ground Shelled 1</td>
<td>5,000</td>
<td>85.00</td>
<td>4.250</td>
<td>4.400</td>
<td>89.800</td>
</tr>
<tr>
<td>Canola Meal 43%</td>
<td>2,400</td>
<td>50.00</td>
<td>2.100</td>
<td>2.155</td>
<td>43.308</td>
</tr>
<tr>
<td>Cotoned Meat White</td>
<td>2,000</td>
<td>50.00</td>
<td>1.840</td>
<td>1.796</td>
<td>35.920</td>
</tr>
<tr>
<td>Beef Meal, Soybeans</td>
<td>2,000</td>
<td>50.00</td>
<td>1.840</td>
<td>1.796</td>
<td>35.920</td>
</tr>
<tr>
<td>Wheat Molds</td>
<td>1,000</td>
<td>50.00</td>
<td>0.880</td>
<td>0.888</td>
<td>17.960</td>
</tr>
<tr>
<td>Wheat Straw</td>
<td>0.750</td>
<td>50.00</td>
<td>0.757</td>
<td>0.757</td>
<td>15.471</td>
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<tr>
<td>Calcium Carbonate</td>
<td>0.750</td>
<td>50.00</td>
<td>0.743</td>
<td>0.674</td>
<td>13.471</td>
</tr>
<tr>
<td>Amino Plus</td>
<td>0.750</td>
<td>50.00</td>
<td>0.656</td>
<td>0.654</td>
<td>13.471</td>
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<tr>
<td>Molasses, Liquid</td>
<td>0.550</td>
<td>50.00</td>
<td>0.494</td>
<td>0.479</td>
<td>9.879</td>
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<tr>
<td>Sodium Bicarb</td>
<td>0.500</td>
<td>50.00</td>
<td>0.440</td>
<td>0.439</td>
<td>8.981</td>
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<tr>
<td>Salt</td>
<td>0.250</td>
<td>50.00</td>
<td>0.225</td>
<td>0.225</td>
<td>4.400</td>
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<tr>
<td>Sodium Sulfate</td>
<td>0.150</td>
<td>50.00</td>
<td>0.135</td>
<td>0.139</td>
<td>2.694</td>
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<tr>
<td>Urea</td>
<td>0.125</td>
<td>50.00</td>
<td>0.112</td>
<td>0.112</td>
<td>2.245</td>
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<tr>
<td>Bloodmeal</td>
<td>0.120</td>
<td>50.00</td>
<td>0.112</td>
<td>0.112</td>
<td>2.245</td>
</tr>
<tr>
<td>Choice White Citrate</td>
<td>0.100</td>
<td>50.00</td>
<td>0.096</td>
<td>0.096</td>
<td>1.926</td>
</tr>
<tr>
<td>OCAO Plus</td>
<td>0.100</td>
<td>50.00</td>
<td>0.096</td>
<td>0.096</td>
<td>1.926</td>
</tr>
<tr>
<td>Magnesium Oxide</td>
<td>0.100</td>
<td>50.00</td>
<td>0.096</td>
<td>0.096</td>
<td>1.926</td>
</tr>
<tr>
<td>UC1000 UC DAIRY TECH PHD</td>
<td>0.075</td>
<td>50.00</td>
<td>0.073</td>
<td>0.073</td>
<td>1.471</td>
</tr>
<tr>
<td>Vol E 20,000 RDLB</td>
<td>0.064</td>
<td>50.00</td>
<td>0.057</td>
<td>0.057</td>
<td>1.150</td>
</tr>
<tr>
<td>Molasses, Dry</td>
<td>0.040</td>
<td>50.00</td>
<td>0.036</td>
<td>0.036</td>
<td>0.718</td>
</tr>
<tr>
<td>Stannumine M</td>
<td>0.010</td>
<td>50.00</td>
<td>0.009</td>
<td>0.009</td>
<td>0.180</td>
</tr>
<tr>
<td>Minerals R</td>
<td>0.010</td>
<td>50.00</td>
<td>0.010</td>
<td>0.010</td>
<td>0.180</td>
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<tr>
<td>Rumensin 037 Prime</td>
<td>0.004</td>
<td>50.00</td>
<td>0.003</td>
<td>0.003</td>
<td>0.066</td>
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**Nutrient Analysis (DM %)**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>%</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>Crude Protein</td>
<td>17.144</td>
<td>19 Calcium</td>
</tr>
<tr>
<td>20 MP</td>
<td>11.334</td>
<td>20 Phosphorus</td>
</tr>
<tr>
<td>154 Lys/Met Ratio</td>
<td>3.697</td>
<td>21 Salt</td>
</tr>
<tr>
<td>233 Met/MET</td>
<td>0.200</td>
<td>22 Potassium</td>
</tr>
<tr>
<td>232 Met/LYS</td>
<td>0.773</td>
<td>23 Sulfur</td>
</tr>
<tr>
<td>156 MP Met NRC</td>
<td>0.075</td>
<td>24 Magnesium</td>
</tr>
<tr>
<td>137 MP lys NRC</td>
<td>0.266</td>
<td>25 Added Zinc</td>
</tr>
<tr>
<td>14 TN</td>
<td>73.796</td>
<td>27 Added Copper</td>
</tr>
<tr>
<td>3 RUP (SCP)</td>
<td>34.291</td>
<td>32 Sodium</td>
</tr>
<tr>
<td>4 RDP (SCP)</td>
<td>65.709</td>
<td>43 Ash</td>
</tr>
<tr>
<td>69 Peptide</td>
<td>1.748</td>
<td>44 Lipid</td>
</tr>
<tr>
<td>5 Sol (SCP)</td>
<td>25.956</td>
<td>33 Chloride</td>
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<tr>
<td>79 NDF</td>
<td>0.752</td>
<td>31 Added Selenium</td>
</tr>
<tr>
<td>41 Fat</td>
<td>4.073</td>
<td>151 Rumensin</td>
</tr>
<tr>
<td>126 PUFAs</td>
<td>1.811</td>
<td>16 Added Vit A</td>
</tr>
<tr>
<td>11 ADF</td>
<td>18.041</td>
<td>17 Added Vit D</td>
</tr>
<tr>
<td>12 NDF</td>
<td>31.601</td>
<td>18 Added Vit E</td>
</tr>
<tr>
<td>185 Forage NDF</td>
<td>24.874</td>
<td>26 Added Iodine</td>
</tr>
<tr>
<td>13 eNDF</td>
<td>28.296</td>
<td>28 Added Magnesium</td>
</tr>
<tr>
<td>49 NDF (NDFs)</td>
<td>57.735</td>
<td>29 Added Cobalt</td>
</tr>
<tr>
<td>116 NDF Digest</td>
<td>0.493</td>
<td>30 Added Iodine</td>
</tr>
<tr>
<td>47 Forage DM</td>
<td>61.487</td>
<td>225 Urea</td>
</tr>
<tr>
<td>100 NFC</td>
<td>39.307</td>
<td>133 N/S Ratio</td>
</tr>
<tr>
<td>37 D Cas (mg/kg)</td>
<td>31.155</td>
<td>42 Fiber</td>
</tr>
<tr>
<td>37 Sugar (non-starch)</td>
<td>3.667</td>
<td>175 RDP (SCP)</td>
</tr>
<tr>
<td>188 Starch (non-sugar)</td>
<td>26.278</td>
<td>152 NFC/RDP Ratio</td>
</tr>
<tr>
<td>124 alpha Carboxylate</td>
<td>27.530</td>
<td>130 K Ca Mg Ratio</td>
</tr>
</tbody>
</table>

Source: Homan M., 2012
Summary

What do you feed at the feed bunk?

PMR

High Grain PMR  
(“candy” at VMS)

Main motivator: PMR

Milk first pre-selection

Low Grain PMR

Main motivator: Concentrate

Free flow

Feed first

Milk first - PS

Forage Mixture

All grain fed through VMS + FS

Main motivator: Concentrate

Feed first

Free flow

Milk first - PS

Feed bunk

Bunk space Debate
Western dairy farmer, October 2.011 by Catherine Brown

- University of British Columbia: 27 inches/cow.
- Official dairy code of practice CA: 30 inches for fresh cows, 24 inches for rest of the herd.
- Robotic dairies with frequent feeding: Min. 17 inches/cow Dairy Logix – CA
- Study in Ireland: Min. 8 inches/cow if feed is always in front of the cow.

Dairyland initiative
University of Wisconsin 2.011
http://thedairylandinitiative.vetmed.wisc.edu

- 30 inch headlocks for transitions cows, 24 inch headlocks for the rest of the herd.
How to optimize feed bunk space?

- Increase feeding and push up frequency

  “The changes in distribution of feeding time resulted in cows having more equal access to feed throughout the day”

  “subordinate cows were not displaced as frequently when fed more often”

  “the amount of sorting of the feed was reduced by increasing the frequency of feed delivery from 1x to 2x. These results indicate that frequent delivery of feed improves access to feed for all cows, particularly during peak feeding periods when fresh feed is provided, and reduces the amount of feed sorting”

  Frequency of feed delivery affects the behavior of lactating dairy cows.


  DeVries TJ, von Keyserlingk MA, Beauchemin KA.

Feeding frequency:
More than 2X per day.
Evaluate sorting as a routine.

Automatic feeding systems

![Diagram of automatic feeding systems](attachment:image.png)
Head locks

- UBC research by Enders, 21% fewer feed bunk displacements with HL.
- A trend today is 27 – 29 inches per headlock instead of 24 inches, better cow comfort and space usage.

Feed Stalls

- Recent University of British Columbia research shows better Feed Bunk usage with feed stalls, means less Feed Bunk displacements, fewer long term health problems and less transition cow problems.
Thank you!