Critical aspects to maximize dairy farm profitability
Net margin of a dairy enterprise

Income

- Milk: >90%
- Animals
- Others

Cost

- Feed: >50%
- Labor: >15%
- Replace: >15%
- Other

Net return
Structure of costs on a dairy farm

Data from a farm in north Spain
Milk income over feed cost

\[ \text{IOFC} \]

\[ \text{(Milk)} \times \text{(Price)} \] - \[ \text{(Feed)} \times \text{(Cost)} \] = \text{Margin}

\[ \text{(Milk)} \times \text{(Price)} \] - \[ \frac{\text{Feed Price}}{\text{Feed Efficiency}} \]
40 kg di latte a €0,3/kg e €0,2/kg di alimenti

Margine sul costo degli alimenti

Efficienza dell'alimentazione

IOFC

$/cow/day

Feed Efficiency

1.1 1.3 1.5 1.7 1.9 2.1
BIG Costs make the difference

Feed

1. Better purchase of feeds
   - Nutritional grouping
2. Efficiency of use of protein
   - Formulation for maximum IOFC
   - ...

Replacements

- Control pf mortality of calves and heifers
- Fast growth of replacements
- Weight and height to first breeding
- Genomic selection of best animals
- ...

Other opportunities of improvement

3. Better decisions of replacement
4. Other important considerations
DairyMGT.info
The largest selection of dairy farm decision support tools

Large information
- Projects
- Publications
- Presentations
- Links

Heart of DairyMGT.info
Tools to Support Decision-Making
Many areas of dairy farm management

- Feed
- Replacements
- Reproduction
- Production
- Replacement
- Environment
- Finances
- Genetics
- Health
- ...

DairyMGT.info: Tools

>40 Decision Support Tools

A collection of the state-of-the-art and scientific-based dairy farm management decision support tools that are user-friendly, interactive, robust, visually attractive, and self-contained. These tools come with associated documentation and video demonstrations. Technical support on their application is also available upon request.
Better purchase of feeds

Better price of feeds
- Ideal to have feeds that provide better price per nutrient
- Cows require nutrients, not feeds

Feeds provide different amounts of nutrients
- Price per unit of:
  - Protein
  - Energy
  - Ecc.

How to know which feeds have better nutrient price?
- Estimate the price per nutrient in different feeds

Has to consider the wastage
- Different feeds have different levels of waste
Analyze the value per nutrient

An example of protein

How much cost the protein from alfalfa with respect to the one of soybean meal (SBM)?

<table>
<thead>
<tr>
<th>Feed</th>
<th>Protein</th>
<th>DM</th>
<th>€/Tm</th>
<th>€/Tm protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEED</td>
<td>%NUT</td>
<td>%DM</td>
<td>COST</td>
<td>(COST) ÷ (%NUT) ÷ (%DM)</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>18%</td>
<td>87%</td>
<td>220</td>
<td>1405</td>
</tr>
<tr>
<td>SBM</td>
<td>44%</td>
<td>89%</td>
<td>460</td>
<td>1175</td>
</tr>
</tbody>
</table>

Protein from alfalfa is 20% more expensive than the one from SBM!
<table>
<thead>
<tr>
<th>Feed</th>
<th>Protein</th>
<th>DM</th>
<th>€/Tm</th>
<th>€/Tm protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBM</td>
<td>44%</td>
<td>89%</td>
<td>460</td>
<td>1175</td>
</tr>
</tbody>
</table>

**Efficiency of conversion**

- 22%: 5341
- 26%: 4519
- 35%: 3357
Perform your own analysis with multiple feeds and multiple nutrients

- Use FeedVal v 6.0
- Provides you the ACTUAL value of feeds according to nutrient composition and market prices

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>RUP %</th>
<th>RDP %</th>
<th>NEI3x Mcal/lb</th>
<th>peNDF %</th>
<th>DM %</th>
<th>Unit</th>
<th>Price* $/Unit</th>
<th>Predicted Value $/Unit</th>
<th>Actual Price as % of Predicted Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelled Corn</td>
<td>4.5</td>
<td>4.5</td>
<td>0.91</td>
<td>0</td>
<td>86</td>
<td>kg</td>
<td>0.15</td>
<td>0.197/kg</td>
<td>76</td>
</tr>
<tr>
<td>Soybean Meal 48%</td>
<td>21</td>
<td>33</td>
<td>1</td>
<td>0</td>
<td>89</td>
<td>kg</td>
<td>0.38</td>
<td>0.411/kg</td>
<td>92</td>
</tr>
<tr>
<td>Soybean Meal 44%</td>
<td>17.5</td>
<td>32.5</td>
<td>0.97</td>
<td>0</td>
<td>89</td>
<td>kg</td>
<td>0.36</td>
<td>0.374/kg</td>
<td>96</td>
</tr>
<tr>
<td>Soybean Meal, expeller</td>
<td>30</td>
<td>16</td>
<td>1.09</td>
<td>0</td>
<td>92</td>
<td>kg</td>
<td>0.496/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soybeans, raw</td>
<td>12</td>
<td>28</td>
<td>1.25</td>
<td>0</td>
<td>87</td>
<td>kg</td>
<td>0.35</td>
<td>0.358/kg</td>
<td>98</td>
</tr>
<tr>
<td>Soybeans, heated</td>
<td>22</td>
<td>21</td>
<td>1.24</td>
<td>0</td>
<td>92</td>
<td>kg</td>
<td>0.457/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good Quality Hay</td>
<td>6</td>
<td>14</td>
<td>0.6</td>
<td>35</td>
<td>87</td>
<td>kg</td>
<td>0.19</td>
<td>0.170/kg</td>
<td>112</td>
</tr>
<tr>
<td>Poor Quality Hay</td>
<td>4.8</td>
<td>11.2</td>
<td>0.5</td>
<td>50</td>
<td>87</td>
<td>kg</td>
<td>0.10</td>
<td>0.137/kg</td>
<td>73</td>
</tr>
<tr>
<td>Corn Silage</td>
<td>2.8</td>
<td>4.2</td>
<td>0.67</td>
<td>30</td>
<td>35</td>
<td>kg</td>
<td>0.04</td>
<td>0.056/kg</td>
<td>71</td>
</tr>
<tr>
<td>Earlage/Snaplage</td>
<td>3.6</td>
<td>5.4</td>
<td>0.82</td>
<td>0</td>
<td>60</td>
<td>kg</td>
<td>0.123/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distillers Dried Grains</td>
<td>15</td>
<td>15</td>
<td>0.9</td>
<td>0</td>
<td>89</td>
<td>kg</td>
<td>0.15</td>
<td>0.312/kg</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>3.6</td>
<td>5.4</td>
<td>0.95</td>
<td>0</td>
<td>70</td>
<td>kg</td>
<td>0.161/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>2.06</td>
<td>0</td>
<td>99</td>
<td>kg</td>
<td>0.54</td>
<td>0.395/kg</td>
<td>137</td>
</tr>
<tr>
<td></td>
<td>76</td>
<td>19</td>
<td>1.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>287</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+30 years of experience in Wisconsin

Algorithms similar to the ones used in St. Pierre and Glamocic, 2000. JDS 83:1402 1411.
FeedVal v6.0

Acquire the best feeds in September 2015. All in $/Tm with market prices for Midwest (USA).

<table>
<thead>
<tr>
<th>Feed</th>
<th>Market price</th>
<th>Estimated price</th>
<th>% of the estimated</th>
<th>Rank from 26</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>$150</td>
<td>$198</td>
<td>76%</td>
<td>7</td>
</tr>
<tr>
<td>SBM</td>
<td>$360</td>
<td>$375</td>
<td>96%</td>
<td>13</td>
</tr>
<tr>
<td>Wheat</td>
<td>$200</td>
<td>$191</td>
<td>105%</td>
<td>19</td>
</tr>
<tr>
<td>Cotton seed</td>
<td>$340</td>
<td>$236</td>
<td>144%</td>
<td>26</td>
</tr>
</tbody>
</table>

% Estimate: \( \frac{\text{Market price}}{\text{Estimated price}} \times 100 \)

Therefore: Less % is better.
FeedVal v6.0

Summary

Estimates the price of feeds based on
- Nutrient content
- Referee feeds
- Market price

Help decisions regarding:
- Purchase feed
- Diet formulation
- Use of feeds

Supports:
- Less costs of feeds
- Greatest IOFC and profitability
Nutritional grouping: +TMR

Logic

Use of only one diet for all lactating (e.g., 1 TMR):
- All cows receive same diet
- High diets are preferred
- Cows with lower production or requirements are heavily over-fed

Feed efficiency improves with multiple groups:
- Saving costs of nutrients
- Less cows under or over fed
- Less environmental concerns
- Greater IOFC
Strategies for grouping

Depends on the farm and herd

Needed individual requirements:
- Energy (NEL)
- Protein (CP)
- Dry matter intake (DMI)

Number and states of cows
- Total cows in production
- States of the cows

Characteristics of the farm
- Capacity of handle different groups
Criteria to group the cows
Several criteria, some are better

Days in milk (DIM)
- Based on state during lactation: early, medium, late, ...

Milk corrected by fat (protein)
- Based on production level: high, medium, low, ...

Milk and BW
- Function of production and weight

Cluster
- Seems the most EFFICIENT
Strategies of grouping tool
Analyzes the value of GROUPING

Grouping Strategies for Feeding Lactating Dairy Cattle
V.E. Cabrera, UW-Madison Dairy Science

- Milk price
- Nutrient costs
- Data from the farm
- ID, LACT, DIM, MILK, FAT, BW
Analysis of 30 farms in Wisconsin

Data collected at cow level

Consistent prices for all
- Milk: $0.35/kg
- CP: 0.32/kg
- NEL: 0.1174/Mcal

1 group vs. 3 groups
- Groups of same size

Criteria for grouping
- Cluster

BW estimated based on
- 1° Lactation: 500 kg
- >1° Lactation: 590 kg
Nutritional groups on 30 farms
Cluster grouping in Wisconsin

<table>
<thead>
<tr>
<th>Size of farms (n=30)</th>
<th>1 group</th>
<th>3 groups</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>&lt;200</td>
<td>697</td>
<td>1,059</td>
</tr>
<tr>
<td>Avg</td>
<td>788</td>
<td>2,311</td>
<td>2,707</td>
</tr>
<tr>
<td>Max</td>
<td>&gt;1,000</td>
<td>2,967</td>
<td>3,285</td>
</tr>
</tbody>
</table>

**Income over feed cost (IOFC) $/cow/year**

- **Improvement ($/cow/year)**
  - Range 7% to 52%
  - Average = $396
  - Range = $161 to $580

Cabrera et al., 2012 (Four-State Management and Nutrition Proceedings)
Valuation of grouping published

<table>
<thead>
<tr>
<th>Reference</th>
<th>T¹</th>
<th>G²</th>
<th>Difference in income over feed cost ($/cow per yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith et al., 1978</td>
<td>F</td>
<td>DIM</td>
<td>3-TMR - 1-TMR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3-TMR - 2-TMR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-TMR - 1-TMR</td>
</tr>
<tr>
<td>+30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cassel et al., 1984</td>
<td>F</td>
<td>DIM</td>
<td>3-TMR - 1-TMR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3-TMR - 2-TMR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2-TMR - 1-TMR</td>
</tr>
<tr>
<td>-117⁴</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Williams and Oltenacu, 1992</td>
<td>S</td>
<td>C</td>
<td>3-TMR &gt; 2-TMR &gt; 1-TMR net revenue³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Østergaard et al., 1996</td>
<td>S</td>
<td>DIM/M</td>
<td>3-TMR &gt; 2-TMR &gt; 1-TMR net revenue³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St-Pierre and Thraen, 1999</td>
<td>S</td>
<td>C</td>
<td>3-TMR - 1-TMR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3-TMR - 2-TMR</td>
</tr>
<tr>
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<td>2-TMR - 1-TMR</td>
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<tr>
<td>+33</td>
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<td></td>
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<tr>
<td>+44</td>
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<td></td>
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<tr>
<td>+44</td>
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<tr>
<td>Earleywine, 2001</td>
<td>S</td>
<td>DIM</td>
<td>3-TMR - 1-TMR</td>
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<td></td>
<td></td>
<td></td>
<td>3-TMR - 2-TMR</td>
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<td>+44</td>
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<tr>
<td>+38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabrera et al., 2012</td>
<td>S</td>
<td>NE_L</td>
<td>3-TMR - 1-TMR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3-TMR - 2-TMR</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>2-TMR - 1-TMR</td>
</tr>
<tr>
<td>+396</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabrera and Kalantari, 2014</td>
<td>S</td>
<td>NE_L</td>
<td>3-TMR - 1-TMR</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>3-TMR - 2-TMR</td>
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<td></td>
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<td></td>
<td>2-TMR - 1-TMR</td>
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<tr>
<td>+46</td>
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<td></td>
</tr>
<tr>
<td>+25</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>+21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kalantari et al., 2015⁰</td>
<td>S</td>
<td>C</td>
<td>3-TMR - 1-TMR</td>
</tr>
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<td>+46</td>
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<td>+8</td>
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<tr>
<td>+39</td>
<td></td>
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</tr>
</tbody>
</table>

Cabrera and Kalantari, 2015 (accepted 13 September 2015, JDS)
Grouping strategies

Summary:

Opportunity to improve efficiency of nutrition
Considering that each group is more homogeneous in requirement

Diets are closer to requirements
Less costs of nutrients and therefore higher IOFC

Better productivity
It is probably to improve productivity

Additional benefits
• ↓ environmental concerns
• ↑ health conditions
Economic value of a cow

Knowing its value is critical for decision-making
- Base for important decisions

Use a tool like “economic value of a dairy cow”
- Estimates the long-term net return of a cow (with respect to a potential replacement)

Knowing the value of all cows in the herd is crucial
- Decisions of replacement
- Optimize individual management according to value
Graph of the net return of a cow (blue), with respect to a replacement (red). Difference of the long term of the cow and the replacement values becomes the economic value of a dairy cow.

Cow Value = $627

Net return = $1,969/cow per year
Parameters can be defined directly in the yellow cells
Results are immediate!

For example, $627 (green cell) is the value of the cow and $1,969/year is the average net return of cow in the herd.
Tool economic value of a cow

Summary

Better profitability
Knowing the value of each cow allows to do more individual decisions: E.g., which animal to breed first and with what semen or if to treat an animal

Fundamental optimal decisions
keep or replace animals

Better efficiency of the herd
Over time, best animals will be selected in the herd

Additional usage
• Average net return of a cow responds to management parameters
4. **Other FUNDAMENTAL considerations for profitability**

Maximize the IOFC
- Not the production

Efficiency of the use of nutrients
- Specifically the use of protein in diet

Management of the information
- Up-to-date, rigorous record keeping, ...

Use of “benchmarking”
- Compare against the past and other similar farms

Investment in training
- Managers using the best technology
Maximum production is not always the most profitable

+0.22 kg milk
+1.42% Protein
-0.06 IOFC

Estimates with tool income over feed supplement cost (DairyMGT.info), that uses functions from NRC (2001) Milk = f(RUP, RDP).
Systematic comparisons
“benchmarking”

Why the big differences

Estimated with the Dairy Extension IOFC tool (DairyMGT.info)

Cabrera et al., 2010. (Four-State Management and Nutrition Proceedings)
Thanks
DairyMGT.info