NorFor - status and feed optimization

NØK 2010

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Outline

1. User activity and scientific status

2. Integrated feed evaluation and feeding strategies

3. Ration optimization. Examples of using NorFor
User status

- Denmark: low
- Iceland: moderate
- Norway: moderate
- Sweden: moderate/increasing

Why moderate activity?
- A new system. A new method of ration formulation
  - Advisors skilled in the art? A complex system
- Scientifically rooted
- Not integrated to adjacent computer programs
- Competition from other systems
Scientific status

- The system will be scientifically published in 2010
  - A detailed description of the system
  - Model Equations and computer optimization procedure
    - The NorFor system is the only worldwide feed evaluation system with a true non-linear feed optimizer
  - An evaluation of the system
Model evaluation. Milk protein production. Nordic experiments. 429 diets

\[ y = 0.9755x + 39.478 \]

\[ R^2 = 0.9342 \]

Volden et al.
Model evaluation. Forage intake. Icelandic experiments. Individual cows

Multiparous cows

\[ y = 0.9236x + 0.8516 \]

\[ R^2 = 0.8391 \]

\[ SEP = 0.52 \text{ kg} \]

Baldursdóttir, 2010
Feed evaluation and feeding strategies

- Ration formulation and optimization

- Alternative feeding strategies
  - Individual cows
  - Standard lactation curve
  - Partial mixed ration (PMR)
  - Total mixed ration (TMR)

- Goal: high feed efficiency
Feeding according to standard lactation curve

Concentrate levels

Kalving 60 dager 120 dager 147 dager 203 dager 305 dager

Styrt nedtrapping fra 120 dager

5 kg over planlagt avdrått
Planlagt avdrått
5 kg under planlagt avdrått

Concentrate level optimized from:
- Target milk production level
- Optimized forage or PMR intake
Feeding according to standard lactation curve. Body weight change

Herd no. 1

Calculated feed conversion: 1.56 kg ECM per kg DM

Savings: \( \approx 95.000 \text{ NOK} \)

2.800 NOK/cow/yr

Volden et al., 2009
Feeding according to standard lactation curve week 1-13. Body weight change
Feeding strategy and body weight change

![Graph showing body weight change over lactation weeks for Herd 1 and Herd 2.](image)
The feeding strategy is programmed in the herd management system.
NorFor ration optimization.
Example from a Norwegian herd

Optimization variables

**Possible variables: 84**

- Ration cost: 1
- Feed intake: 7
- Energy: 5
- Protein and amino acids: 13
- Nutrients: 6
- Rumen metabolism: 13
- Total tract digestibility: 5
- Chewing time: 1
- Minerals: 23
- Vitamins: 7
- Nitrogen excretion: 4

**NorFor standard**

1. Ration cost
2. Fill value (feed intake)
3. Energy balance
4. Energy intake
5. AAT balance
6. AAT/NEi
7. PBV
8. Fatty acids
9. Rumen impact factor (NDF degradation)
## NorFor ration optimization. Example TMR.

<table>
<thead>
<tr>
<th>Keenan</th>
<th>NorFor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Composition, % of DM</strong></td>
<td></td>
</tr>
<tr>
<td>Grass silage</td>
<td>50.0</td>
</tr>
<tr>
<td>Untreated straw</td>
<td>3.8</td>
</tr>
<tr>
<td>Wheat (rolled)</td>
<td>23.3</td>
</tr>
<tr>
<td>Dried beet pulp</td>
<td>2.7</td>
</tr>
<tr>
<td>Calcium fat</td>
<td>0.47</td>
</tr>
<tr>
<td>Protein supplement (soybean + maize gluten meal + Rape seed)</td>
<td>17.7</td>
</tr>
<tr>
<td>Rapeseed, Expro</td>
<td></td>
</tr>
<tr>
<td>Mineral + vitamins</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Chemical composition</strong></td>
<td></td>
</tr>
<tr>
<td>Crude protein, g/kg DM</td>
<td>181</td>
</tr>
<tr>
<td>Starch, g/kg DM</td>
<td>192</td>
</tr>
<tr>
<td>NDF, g/kg DM</td>
<td>345</td>
</tr>
<tr>
<td>Lysine:methionine:histidine</td>
<td></td>
</tr>
<tr>
<td>Ration cost, NOK/kg DM</td>
<td>1.81</td>
</tr>
</tbody>
</table>
NorFor ration optimization. Example TMR.

<table>
<thead>
<tr>
<th></th>
<th>Keenan</th>
<th>NorFor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target milk yield</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Expected feed intake, kg DM</td>
<td>21.2</td>
<td>19.7</td>
</tr>
<tr>
<td>Measured feed intake</td>
<td></td>
<td>19.2</td>
</tr>
<tr>
<td>Ration cost, NOK/cow/day</td>
<td>38.20</td>
<td>32.50</td>
</tr>
<tr>
<td>Savings, NOK/day. 36 cows</td>
<td>+205</td>
<td></td>
</tr>
<tr>
<td>Savings, NOK/cow/yr</td>
<td>2070</td>
<td></td>
</tr>
</tbody>
</table>

Production results in April and May 2010:
Average ECM: 28.6 kg/day
Fat: 4.10%
Protein: 3.53%.
Urea,mM:4.9 mM
Average days in milk:187
Experience by use of NorFor.
Nina and Inge Brekke

- NorFor and TINE OptiFôr used since the start in 2007
- The experience is very good.
  - utilise the system to formulate and control rations
  - Evaluate forage quality and production response
  - Used in combination with an economical evaluation program (EK)
    - Set target milk yield and seasonal feed planning
    - Use the system to understand changes in feeding responses

- Feeding strategy:
  - According to standard lactation curve after 90 days

- TINE OptiFôr (The Norwegian computer tool)
  - User friendly and easy to learn, although it is a complex system
Experience by use of NorFor.
Torill Midtkandal and Johan Øvreeide Godø

- NorFor and TINE OptiFôr used since the start in 2007
- The experience is very good.
  - utilise the system to formulate and control rations
  - Evaluate forage quality
  - Setting target forage quality
  - Using the program as a computer game

- After introduction of the system:
  - a very rapid change in production
    - Higher milk yield
    - Higher milk fat content

- An important planning tool when heading for higher milk yield

- TINE OptiFôr
  - User friendly and easy to learn
Conclusions

- The use of Norfor is moderate
- The test results are very good
- The system must be combined with efficient feeding strategies
- The system focus on feed costs and optimum ration formulation