Artturi®
A portal for farmers and experts to improve grass silage production and utilization

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Artturi web service
• Acts as a portal which provides services and information connected to forage production, ensiling, feed evaluation and dairy cow feeding
• Using Artturi web service is free of charge and does not require registration
• Artturi® is a registered trade mark owned by the dairy company Valio Ltd. and MTT Agrifood Research Centre
• An editorial board containing members from both owner organisations, advisory service and farmers is responsible for the development of the service

The mission of Artturi
To increase the economical viability of dairy farms by improving the production and utilization of forages produced on-farm

Available in Internet at:
www.mtt.fi/artturi and www.agronet.fi/artturi

Consists of three components
• Forage production
  • Home page follows the annual cycle of forage production / use
• Feed analysis
• Library

The most common grass species in Finland are Timothy and Meadow fescue.
The D-value of this ley was 67%
Grass D-value declines on average by 0.5 %-units per day.

Forage harvest time information

- Forecast of grass D-value prior to the primary growth harvest
  - D-value = concentration of digestible organic matter in forage dry matter
  - Forecast is based on a grass growth model, which uses cumulative temperature and geographical location within Finland as input variables
  - The Finnish Meteorological Institute sends the national weather data daily to MTT for computing
  - The forecast is presented at the website:
    - As a national map
    - In numerical form for each municipality
    - "Today" and after 5 days
    - Separately for pure grass and red clover, and for mixed leys with clover content of 25, 50 and 75 %
    - Possible to get also as a SMS text message into mobile phones

SMS D-value alert

- Started in summer 2005
- Subscription done at Artturi web site
- The message is sent, when the D-value in the predetermined municipality declines below 74, 72 and/or 70 %
- The first message costs 5 € and additional messages 2 € each

Forage harvest time information

- Grass samples collected from practical farms
  - The samples are analysed immediately by NIRS and results presented at the website
  - Sampling also in the regrowth of grass for the second cut
  - Reports from the advisory personnel
  - "Virtual" feed analysis
    - During winter, a calculator produces the grass D-value afterwards based on harvest date, municipality and grass species
    - Can be used to demonstrate the differences between forage batches harvested at different times
Artturi Feed Analysis

- Feed analysis:
  - Gives feedback about forage production
  - Gives feedback about silage preservation
  - Forms the basis for ration formulation of dairy cows
  - Artturi website operates as the user interface
  - Description of analyses and their prices
  - How to take and send the sample, print the cover letter
  - How to interpret the results

Methods for Feed Analysis

- Fermentation quality of silage:
  - pH, lactic acid, volatile fatty acids, ammonia N
  - Electrometric titration of silage press juice
- Nutritional composition:
  - Dry matter, crude protein, neutral detergent fibre, sugars, D-value, metabolizable energy, AAT, PBV
  - NIRs
- Mineral analysis:
  - Ca, P, K by XRF method
  - Ca, P, K, Mg, Na, Cu, Zn, Mn by IPC method

Statistics of silage analyses in North Savolax

<table>
<thead>
<tr>
<th>Analysis Type</th>
<th>Primary growth</th>
<th>Regrowth</th>
<th>All</th>
<th>Whole country</th>
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</thead>
<tbody>
<tr>
<td>Number of samples</td>
<td>1750</td>
<td>1305</td>
<td>3191</td>
<td>22423</td>
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<tr>
<td>Amm N (% in total N)</td>
<td>5.1</td>
<td>4.2</td>
<td>4.6</td>
<td>4.3</td>
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<tr>
<td>Lactic+formic acids (g/kg DM)</td>
<td>48</td>
<td>47</td>
<td>47</td>
<td>44</td>
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<tr>
<td>VFA (g/kg DM)</td>
<td>12</td>
<td>11</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Soluble N (% in total N)</td>
<td>12</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Sugars (g/kg DM)</td>
<td>58</td>
<td>60</td>
<td>60</td>
<td>58</td>
</tr>
<tr>
<td>Dry matter (%)</td>
<td>31.2</td>
<td>30.1</td>
<td>30.7</td>
<td>30.7</td>
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<tr>
<td>Crude protein (% in DM)</td>
<td>14.6</td>
<td>14.2</td>
<td>14.5</td>
<td>14.9</td>
</tr>
<tr>
<td>Fibre (NDF, % in DM)</td>
<td>56.6</td>
<td>53.3</td>
<td>55.1</td>
<td>54.9</td>
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<tr>
<td>D-value (% in DM)</td>
<td>9.6</td>
<td>6.7</td>
<td>6.8</td>
<td>6.8</td>
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<tr>
<td>Silage intake index</td>
<td>102</td>
<td>99</td>
<td>101</td>
<td>100</td>
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</tbody>
</table>

Advisory material in the Library

- Compact overview of different subjects related to forage production and utilization
  - Slide shows
  - PDF articles
  - Links to relevant websites
  - Flexible tool to distribute material to farmers and other users

Future development

- A channel to distributed research results directly to use
- Non-commercial
  - Positive feedback from the farmers
  - Adequate resources for maintenance and development is a challenge
- Flexible structure, new services under preparation
  - Estimates of forage yield, regrowth development
  - Tools to evaluate strategies for forage production and feeding (nutrient balances, economics...)

Price, €

<table>
<thead>
<tr>
<th>Analysis Type</th>
<th>Price</th>
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<tbody>
<tr>
<td>Feed analysis package</td>
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<tr>
<td>Silage (CP, NDF, D-value, DM, fermentation quality, feed values)</td>
<td>15.54</td>
</tr>
<tr>
<td>Harvest time sample (DM, CP, D-value, NDF)</td>
<td>10.42</td>
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<tr>
<td>Silage raw material / hay (CP, NDF, D-value, feed values)</td>
<td>7.77</td>
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<td>Grazed grass sample (DM, CP, D-value, NDF, feed values)</td>
<td>10.42</td>
</tr>
<tr>
<td>Moist grain (DM, CP, fibre, feed values)</td>
<td>7.77</td>
</tr>
<tr>
<td>Grain (CP, DM, volume weight, feed values)</td>
<td>7.77</td>
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<tr>
<td>Macro mineral analysis (Ca, P, K)</td>
<td>7.50</td>
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<tr>
<td>Macro + trace mineral analysis (Ca, P, K, Mg, Na, Cu, Mn, Zn, Fe)</td>
<td>21.21</td>
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