On-farm corn silage investigation

Multi-analysis on silage practices, silage quality and its effect on aerobic stability

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Objectives

■ Silage represents more than 50% of the dry matter intake with losses ranging from few to >20%

■ Very few available and practical on-farm methods to analyze silage quality
  ■ Corn Silage Investigation

■ Picture the current situation about farmer practices and their consequences
Material and method

- 2012 and 2013 seasons
  - Springs and summers (June - July)

- Corn silage on 149 dairy farms located in France, Italy and Greece
  - Different conditions
  - Different silage additives

- Investigation according to the standardized “CSI” method
Material and method

- Silage survey: CSI
- Silage management
  - Field to fork
- Silage quality
  - Temperature
  - pH
  - Density
  - Fermentation profile
Results

- Silos with high densities show lower temperature at the front face
  - Forage characteristics
  - Equipment
  - Method of packing
  - …

<table>
<thead>
<tr>
<th>Density</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low 209±47 kgDM/m3</td>
<td>25±4.7°C\textsuperscript{a}</td>
</tr>
<tr>
<td>High 238±48kg DM/m3</td>
<td>22±3.0°C\textsuperscript{b}</td>
</tr>
</tbody>
</table>

P<0.05
Results

- Bunker silos were significant cooler than drive over pile silos
  - More likely packed
  - Lower porosity

<table>
<thead>
<tr>
<th></th>
<th>Temperature</th>
<th>Mean density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pile silos</td>
<td>25±4°C a</td>
<td>184.6a</td>
</tr>
<tr>
<td>Bunker silos</td>
<td>24±3°C b</td>
<td>237.7b</td>
</tr>
</tbody>
</table>

P<0.05
Results

- Silage treatment and aerobic stability
  - *L. buchneri NCIMB40788* shows best aerobic stability, thus lower DM losses associated

<table>
<thead>
<tr>
<th></th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>26±3.4°C\textsuperscript{a}</td>
</tr>
<tr>
<td>Others</td>
<td>24±3.6°C\textsuperscript{a}</td>
</tr>
<tr>
<td><em>L. buchneri NCIMB 40788</em></td>
<td>22±2.7°C\textsuperscript{b}</td>
</tr>
</tbody>
</table>

*applied at 300 000cfu/g

\textbf{P<0.05}
Results

Fermentation profile

- L. buchneri NCIMB 40788 treatment gives greater concentration of acetic acid whilst no significant differences in pH or lactic acid.
- Higher acetic acid levels in silages give better aerobic stability.

<table>
<thead>
<tr>
<th></th>
<th>pH</th>
<th>Lactic acid</th>
<th>Acetic acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>3.85 ± 0.02</td>
<td>30.4 ± 2.62</td>
<td>11.1 ± 0.7 a</td>
</tr>
<tr>
<td>Others</td>
<td>3.83 ± 0.01</td>
<td>28.6 ± 4.70</td>
<td>18.7 ± 2.8 ab</td>
</tr>
<tr>
<td>LB 40788</td>
<td>3.80 ± 0.01</td>
<td>34.1 ± 3.47</td>
<td>21.2 ± 3.5 b</td>
</tr>
</tbody>
</table>

a, b differ when P<0.05
Results

- Front face management

  - Low speedout increases the challenge (<20cm/day)
    - Time x Exposure

  - Equipment and method for defacing
    - Upward or downward moves
Conclusions

- Good silage quality is highly related to the sum of each good silage practices
  - Farmers practices not always in line with the golden rules

- Appropriate silage inoculant has demonstrated its effect under various conditions

- Standardized method of analysis allows to detect margins of improvement
Thank you for your attention!
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