Effect of zeolite A on the periparturient feed intake and mineral metabolism of dairy cows

M. Spolders1, P. Lebzien1, H. Grabherr1, M. Fürll2 and G. Flachowsky1

1) Institute of Animal Nutrition, Friedrich Loeffler Institut (FLI), Federal Research Institute for Animal Health, Bundesallee 50, 38116 Braunschweig
2) Large Animal Clinic for Internal Medicine, Faculty of Veterinary Medicine, An den Tierkliniken 11, 04103 Leipzig

Objectives
- subclinical hypocalcaemia is a common metabolic disorder of high yielding dairy cows
- different prevention strategies; the addition of zeolite A (calcium-binder) to the pre parturient ration is one of these
- each of this strategies could have negative side effects, also feeding of zeolite A
- The objectives of the presented experiments were to study the influence of different doses of zeolite A on feed intake and mineral metabolism, especially the incidence of hypocalcaemia.

Methods
Animals: 46 (Exp. I) resp. 78 pregnant dry Holstein cows (Exp. II)

Feeding: Total mixed ration: 48 % maize silage, 32 % grass silage and 20 % concentrate on dry matter (DM) basis

Day 28 to 15 a.p. all animals feeding without zeolite A supplementation
Day 14 to 0 a.p. addition of 0 or 90 g zeolite A/kg DM (Exp. I) or 0, 12, 23 and 43 g zeolite A/kg DM (Exp. II)
Zeolite A supplementation stopped with calving

Samples: Blood 28, 14 and 7 days before calving, on the day of calving and on days 1, 2 and 7 after calving

Analyses: Ca, Mg, P in blood serum

Results
High zeolite A doses (43 and 90 g/kg DM) reduced significantly total DM-, energy- and protein (nXP)- intake. This resulted in a significantly lower intake of minerals (calcium, magnesium and phosphorus; Table 1).

Table 1: Influence of different zeolite A doses on DM-, energy- and nXP-intake as well as mineral intake

<table>
<thead>
<tr>
<th>zeolite A dose (g/kg DM)</th>
<th>0</th>
<th>12</th>
<th>23</th>
<th>43</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM (kg/d)</td>
<td>11.4</td>
<td>10.9</td>
<td>9.5</td>
<td>7.3</td>
<td>6.2</td>
</tr>
<tr>
<td>Energy (MJ NEL/d)</td>
<td>61.4</td>
<td>60.7</td>
<td>56.5</td>
<td>43.9</td>
<td>31.2</td>
</tr>
<tr>
<td>nXP (g/d)</td>
<td>1339</td>
<td>1329</td>
<td>1224</td>
<td>928</td>
<td>732</td>
</tr>
<tr>
<td>Ca (g/d)</td>
<td>44.4</td>
<td>46.9</td>
<td>40.4</td>
<td>30.5</td>
<td>23.5</td>
</tr>
<tr>
<td>Mg (g/d)</td>
<td>25.0</td>
<td>26.5</td>
<td>23.1</td>
<td>17.4</td>
<td>13.3</td>
</tr>
<tr>
<td>P (g/d)</td>
<td>39.6</td>
<td>42.9</td>
<td>36.7</td>
<td>27.7</td>
<td>23.4</td>
</tr>
<tr>
<td>Zeolite A (g/d)</td>
<td>0</td>
<td>131</td>
<td>215</td>
<td>310</td>
<td>565</td>
</tr>
</tbody>
</table>

Recommendations of the GfE (2001): 53.5 MJ NEL/d, 1230 g nXP/d, 34 g Ca/d, 16 g Mg/d and 22 g P/d

- Feeding high zeolite A-doses had a stabilising effect on periparturient serum calcium concentration (> 2 mmol/l; Figure 1); the hypocalcaemia incidence is reduced significantly (Table 2)
- Low zeolite A dose of 12 g/kg DM had no preventive effect on the incidence of subclinical hypocalcaemia

Conclusion
A zeolite addition of 200-300 g per cow and day (20-30 g zeolite A/kg DM) seems to be the optimal dose for an effective prevention of subclinical hypocalcaemia in combination with only marginal negative side effects.