ADDAA
Advanced Dairying in Austria
Programme: COMET – Competence Centers for Excellent Technologies
Programme line: K-Project
COMET-subprojekt, duration and project type:
ADDAA, 09/2014 – 08/2017, multi-firm

Identification of a phytogenic product to minimize metabolic disorders in the rumen of dairy cows

Modern dairy cows are typically fed high concentrate amounts to fulfill their high nutrient requirements. This increases the risk of rumen fermentation disorders with negative consequences on health and productivity. In this project a feed additive based on phytogenic substances was identified, which was able to improve the ability of cows to tolerate high concentrate levels. In this regard, cows that received the phytogenic feed additive showed improved rumen health as well as ruminating activity, thereby being indicative of enhanced animal welfare.

Feeding of modern dairy cows
Dairy cows are able to convert human-inedible fibrous plant material into high-quality animal products by nature. However, due to continuously aiming towards increasing milk performance in recent decades, the necessity of including high amounts of energy-rich concentrates in the diet formulation for dairy cows increased, to fulfil their nutrient requirements.

The intake of high amounts of rapidly degradable concentrates enhances the risk of rumen fermentation disorders. An elevated production of short chain fatty acids in the rumen subsequently leads to a drop in ruminal pH. A pH below 6.0 for more than 5-6 h per day is considered to be indicative of subacute ruminal acidosis (SARA). This metabolic disorder has become a severe and prevalent health disorder in modern milk production systems.

Therefore, feeding strategies are needed to mitigate the risk of subacute ruminal acidosis in cows fed large amounts of concentrates.

Feed additives derived from plants
A plant-based feed additive has been developed to support feed intake, digestion and feed conversion. A product based on herbs, spices, essential oils and non-volatile extracts was added to a conventional concentrate mixture and evaluated in an experiment with dairy cows.

The cows were fed a pure forage diet for one week (baseline), followed by a step-wise increase in the concentrate level over six days until the diet consisted of 65% concentrates. This level was kept constant for one week (SARA 1). Thereafter, the cows were switched back to a pure forage feeding for one week. After a two-day increase in the concentrate level up to 65%, this level was kept constant for two weeks (SARA 2).

The ruminal pH was continuously measured throughout the trial and the chewing activity was determined in the baseline, SARA 1 and SARA 2.
Impact and effects

Figure 1 shows the time duration of the ruminal pH below the SARA-threshold of 6.0. The increase in the concentrate level caused a pH decline. Interestingly, cows fed concentrates supplemented with the phytogenic additive, spent less time below the threshold of pH 6.0.

Furthermore, enhanced ruminating activity can be indicative of increased animal welfare. In conclusion, cows that received the phytogenic additive were less prone to the negative consequences of high concentrate feeding.

Further on, cows that received the phytogenic additive, spent more time ruminating (Fig. 2). This was especially pronounced during periods when most severe pH drops occurred (SARA 1).

The increased ruminating time might be one explanation for the protective effect of the phytogenic product, as a higher production of saliva enables a more stable ruminal pH.

The phytogenic feed additive can be an effective tool to support rumination, hence subsequently reduce the risk of rumen fermentation disorders in the practice and to enhance animal welfare in high-producing dairy cows. Moreover, positive economic effects for the farmers are expected, as the problems associated with subacute ruminal acidosis often cause substantial financial losses to the dairy business.

kontakt und informationen
K-Project ADDA
Vetmeduni Vienna
Institut für Milchhygiene,
Veterinärplatz 1, 1210 Wien, Austria

project coordination
Univ.-Prof. Dr.med.vet. Martin Wagner
T +43 1 25077-3500
Martin.Wagner@vetmeduni.ac.at
www.vetmeduni.ac.at/adda/

Project partners

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institute of Animal Nutrition and Functional Plant Compounds, Vetmeduni Vienna</td>
<td>Austria</td>
</tr>
<tr>
<td>BIOMIN Holding GmbH</td>
<td>Austria</td>
</tr>
<tr>
<td>Institute of Milk Hygiene</td>
<td>Austria</td>
</tr>
</tbody>
</table>