Plant extracts for feed efficiency?

Phytonic feed additives are becoming more accepted as efficient solutions to improve feed efficiency.

By Jennifer Maurin*

The context of high volatility and increasing costs of raw materials, animal feed companies in the ruminant sector expect severe changes in market conditions. The current milk quota system of the European Union’s Common Agriculture Policy will end in 2015, and all European countries are already preparing by increasing milk production. The European Commission has increased progressively the national quota allocated to the member states, up to a total of 7% in 2014 (von 2007). EU dairy producers have reacted by increasing their milk production and becoming much more important players in the exportation of milk products to emerging countries, where demand is booming. The top 10 importers include China, Russia, Japan, India, Algeria and Brazil.

In this context of global change, the productivity of EU dairy herds will prevail to protect the earnings of all farmers in the sector.

Feed efficiency
Phytonic feed additives are becoming more and more accepted as efficient solutions to improve feed efficiency. The ability to achieve greater feed efficiency by improving genetics is not only limited today, whereas herd management and special feeding strategies still have big potential for improvement. Plant extracts now represent one of the most profitable, fastest and safest solutions to increase productivity of both dairy herds and beef cattle.

Geneva, Switzerland-based feed additive manufacturer Pancosma SA is focusing research into understanding the modes of action of these phytonic additives and to guarantee the repeatability of the results.

Rumen tuning
Specific micro-encapsulated blends of extracts from clove and cinnamon have been shown to have beneficial effects on rumen functions. The main effect of their supplementation is to optimize the energy output and the availability of amino acids. With total volatile fatty acid production remaining the same, the blends of plant extracts are able to shift the production in favor of propionate. Eugenol from cloves leads to increased propionate production, thus reducing the production of acetate and methane, which is synonymous with low energy losses to the environment (Figure 1). Energy extraction is highly interesting in primiparous animals, which need more inputs in order to start producing milk and also to assume their first calving. Effects on this category of fragile animals are of particular interest (Figure 2). The feeding behavior of ruminants is a key parameter directly determining milk production, which leads to ammonium production. It directly affects protein-mobilizing bacteria (Figure 2).

Feeding behavior
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The additive was supplemented through a total mixed ration at a dosage of 1 g per head per day, and the two different treatment groups were housed in two separate pens. Even if dry matter intake was not affected, the phytonic blends significantly improved milk yield without affecting protein or fat content, meaning that the higher production was not detrimental to milk quality (Table 1).

As a result, an 8% improvement in feed efficiency (reported as milk: feed ratio) was demonstrated. A difference was also noted for somatic cell counts. The effect on immune modulation being potentially mediated by plant extracts has been well documented in monogastric animals.

Bovine nutrition
When looking at concrete results in beef cattle production, the main effect of Pancosma’s blend is related to an improvement in daily weight gain and, subsequently, feed efficiency.

A meta-analysis (Table 2) combining 15 trials and more than 980 growing beef cattle in the U.S. found that without affecting dry matter intake, the plant extract blends were able to increase final bodyweight at slaughter.

Complementary studies also reported an improvement in carcass quality, with increases for hot carcass weight (5%) and longissimus muscle weight (5.8%).

Basic research
While ruminant nutritionists sometimes focus only on the rumen, Pancosma discovered recently that the lower gut plays a decisive role not only in feed efficiency but also in the health status and stress resistance of dairy cows. The company aims to use large-scale funding from fundamental research to improve animal performance by clearly identifying the mode of action of phytonutrients and the potential for new applications.

1. Effect of plant extracts fed to high-producing Holstein dairy cows in Israel

<table>
<thead>
<tr>
<th>Control</th>
<th>Plant extracts</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter intake (kg/day)</td>
<td>30.8</td>
<td>28.5</td>
</tr>
<tr>
<td>Milk production (kg/day)</td>
<td>39.4</td>
<td>42.2</td>
</tr>
<tr>
<td>Feed efficiency</td>
<td>1.74</td>
<td>1.89</td>
</tr>
<tr>
<td>Somatic cell count (1,000 cells/mL)</td>
<td>306.3</td>
<td>242.5</td>
</tr>
</tbody>
</table>

2. Effect of plant extract in beef cattle, meta-analysis of 15 trials

<table>
<thead>
<tr>
<th>Control</th>
<th>Plant extract</th>
<th>% difference</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily gain (kg/day)</td>
<td>1.551</td>
<td>1.544</td>
<td>2.8</td>
</tr>
<tr>
<td>Dry matter intake (kg/day)</td>
<td>7.173</td>
<td>7.189</td>
<td>9</td>
</tr>
<tr>
<td>Gain/Feed</td>
<td>21.34</td>
<td>21.90</td>
<td>9</td>
</tr>
</tbody>
</table>

In 60 seconds

Seedstock supplement: Hubbard Feeds Inc. announced the launch of its new vitamin and trace mineral nutrition supplement for seedstock cattle, termed “Platinum” fortification. The Hubbard Beef Platinum package is designed to optimize production in breeding stock, providing the essential nutrition levels needed to meet the demands for rapid growth and an enhanced immune function.

The new Hubbard Beef Platinum package involves our highest levels of organic copper, manganese, cobalt and zinc, along with select vitamins and trace minerals known to promote fertility and hoof strength.” Dan Herold, manager of Beef Nutrition & Tech Services at Hubbard Feeds, said. Financial certification will be available in several of the Hubbard treated beef supplements, including 46591 GainRite Platinum Grower Avalu 4 R900, 46601 STOCKMASTER Platinum 8 Avalu 4 and 45424 Brood Cow Platinum Avalu 4 R800.

Propylene blend: TechMix has introduced a new product for treating ketosis, Propylene Advantage, which combines propylene glycol with glycine. The company explained that glycine has been shown to enter the cow’s metabolic pathway much closer to glucose — which is required for synthesizing milk — than other glucose precursors. This metabolic efficiency can help more quickly ease demands on the liver for glucose production, making Propylene Advantage an effective prevention and recovery product for cows that are either potentially or clinically ketotic. Propylene Advantage is sold in liquid form in 1 gal. jugs and 55 gal. drums and can be administered to cattle in the same way as ordinary propylene glycol products. Propylene Advantage can also be used in calf units. It is manufactured in the U.S. and available through animal health distributors.