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Use of flavors in Ruminants

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INTRODUCTION

Ruminants are very sensitive to food palatability, which is one of the main reasons why palatant additives, like flavors, had become very important in ruminant nutrition; they are nowadays included in a wide range of products: milk replacers, mineral premix, compound or concentrated feeds.

Their functional purpose is to provoke a sensory response that will stimulate the animal’s appetite for feed [1], ultimately improving feed intake and performance. Besides, they are also highly instrumental additives for the feed industry, as they allow the utilization of many agricultural by-products, cover variations in raw materials and create brand-identity aroma to the feed (marketing value).

CALVES

The intake of solid feed is vital to the calf for making the transition from a pre-ruminant to a functioning ruminant [2]. An early introduction to starter feed is key to achieve optimal rumen development and reduce weaning duration and costs.

Fathi et al. [3] evaluated the effects of a vanilla flavor in starter feeds on pre-weaning and post-weaning calf performance. The trial showed that calves fed flavored starter weighed more at the weaning and at the end of the experiment. Moreover, the pre-weaning average daily gains increased significantly (+21%, p<0.01) compared with calves fed unflavored starter. The starter consumption was also higher (+19%, p<0.02) and they met the weaning criteria at a younger age, they had 2 to 3 days shorter pre-weaning period (p<0.03).

DAIRY COWS

It is well known that dairy cows are very sensitive to changes in diet taste or flavor. Off-odors or bitter tastes could lead to low feed intakes, which will affect milk yields. Recover milk productions takes time and will impact farm performance.

Some studies indicate that older ruminants, such as dairy cows, have a preference for citric tastes and aroma [4]. The addition of flavors to the compound feed or total mixed rations (combined with a sweetener, if necessary) will ensure a homogeneous perception and mask possible changes of raw materials, unpalatant by-products and bitter tastes of vitamins or minerals.

In Robotic milking production systems, compound feed is usually offered in the milking box as an “attractant”. In this case the palatability of feed becomes especially important to enhance the attraction effect and achieve steady voluntary visits of the cows to the milking robots.
FEEDLOT BEEF CATTLE

The first stage of feedlot production systems is highly critical. Newly arrived calves suffer a lot of stress as a result of weaning, transportation, and handling. On top of that, they are introduced to a new source of food (roughage/concentrate). This situation often leads to low feed intake and higher disease incidence. Strategies to increase dry mater intake and nutrients may play an important role increasing feedlot performance [5]. Improve diet palatability is one of the recommended strategies to address the problem. Palatant additives like flavors are a cost effective option to improve diet palatability.

SHEEP AND GOATS

Like other ruminants, sheep and goats are very sensitive to concentrate palatability. Preference tests under standard conditions in goats showed that flavours of unpalatable raw materials like fats, rapeseed meal and urea can lower the palatability of compound concentrate feeds [6]. Morand-Fehr et al. performed a trial on lactating goats to understand whether diet palatability or feed preferences could influence the rate of intake; the study concluded that, with no physical presentation modifications, lower palatable diets strongly affected rates of intake [7].

Both sheep and goats have showed preference for feeds treated with different flavoring agents. Adding an appreciated flavor to small ruminant feeds will contribute to enhance preference and feed intake, especially when low palatable by-products are used.

CONCLUSION

We can conclude that the addition of flavors to ruminant diets is a useful tool to improve palatability, increase feed intake and performance parameters.

Recommended flavors for different ruminant species and stages

<table>
<thead>
<tr>
<th>Species</th>
<th>Period</th>
<th>Aromas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>Lactation</td>
<td>Milky, vanilla, butter</td>
</tr>
<tr>
<td></td>
<td>Initiation</td>
<td>Milky, vanilla, butter, orange, coconut</td>
</tr>
<tr>
<td></td>
<td>Grower, finisher</td>
<td>Orange, Citrics, anise, fenugreek, coconut, molasses, maple</td>
</tr>
<tr>
<td>Dairy cows</td>
<td>Lactation</td>
<td>Milky, vanilla, butter</td>
</tr>
<tr>
<td></td>
<td>Adults</td>
<td>Orange, Citrics, anise, fenugreek, coconut, molasses, maple</td>
</tr>
</tbody>
</table>

* Range of flavors recommended for use in ruminant diets

<table>
<thead>
<tr>
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<th>Aromas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goats &amp; Sheep</td>
<td>Lactation</td>
<td>Milky, vanilla, butter</td>
</tr>
<tr>
<td></td>
<td>Adults</td>
<td>Orange, Citrics, anise, fenugreek, coconut, molasses, maple</td>
</tr>
</tbody>
</table>

* Based on the reviewed literature and company knowledge
REFERENCES


