Feed additives for animal nutrition

Product Range

Bicarbonate Feed
Novafeed
Sodafeed
Cattle nutrition

Novacarb produces sodium bicarbonate which has been shown to have several benefits for cattle:

- Positive impact on feed consumption and milk production
- Sodium intake
- Anti-acidosis
- Optimal dietary electrolyte balance

SEQENS Mineral Specialties has also developed a new product — Novafeed. Novafeed is a buffer compound suitable for cattle feed that can effectively replace sodium bicarbonate without changing the ration formulation. Novafeed SA, an aromatized grade of this product, has been available for four years. Two field assessments of Novafeed and Novafeed SA were performed in 2014 and 2015 by European ruminant nutrition experts. The aim was to compare the two products to standard sodium bicarbonate (Bicarbonate Feed) in terms of palatability, feed consumption and performance (milk production) with high-producing dairy cows.

FIELD RESULTS

<table>
<thead>
<tr>
<th></th>
<th>BICARBONATE FEED</th>
<th>NOVAFEED / NOVAFEED SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTOMER SATISFACTION</td>
<td>Easy to use, storage in a cool, dry place</td>
<td>In a survey of 100 breeders, 100% were satisfied and 95% would recommend Novafeed SA</td>
</tr>
<tr>
<td>MILK PRODUCTION</td>
<td>Optimal</td>
<td>Optimal</td>
</tr>
<tr>
<td>DCAD*</td>
<td>+11,700 mEq/kg dry Bicarbonate Feed</td>
<td>+11,900 mEq/kg dry Novafeed</td>
</tr>
<tr>
<td>BUFFER CAPACITY (pH=6)</td>
<td>8,800 mEq/kg (in vitro, pH=6) ruminal pH with sub-acidosis periods (pH&lt; 6 about 8hr./day, bolus in vivo)</td>
<td>9,300 mEq/kg (in vitro, pH=6) No sub-acidosis period (bolus in vivo)</td>
</tr>
<tr>
<td>SODIUM CONTENT</td>
<td>27.2%</td>
<td>27.4%</td>
</tr>
<tr>
<td>PALATABILITY/FEED CONSUMPTION</td>
<td>Good</td>
<td>Equal or superior +10% feed consumption</td>
</tr>
</tbody>
</table>

*DCAD: Dietary Cation-Anion Difference

Recommendation:
DCAD = 300-350 mEq/kg (feed)
1% NaHCO3 in dry matter
In case of heat stress: 250-400 g NaHCO3/cow/day during heat stress and for the following 10 days

Good to know
Two proven solutions to prevent acidosis in dairy cows have been found.
The study found that the use of Novafeed and Novafeed SA in feed rations yielded results that were equal to or better than standard sodium bicarbonate.
Pig nutrition

Sodium bicarbonate has several benefits for swine:
- Improved DWG*
- Improved FCR*
- Reduced odour emissions

SEQENS Mineral Specialties performed a field study comparing improvements in DWG and FCR, and reductions in odour emissions.

The objective of this study was to examine four diets that differed in terms of their salt content to compare zootechnical and environmental performance. The study focused on four batches comprising 40 growing finishing pigs each.

The diet was fed ad libitum with two types of rations (bi-phase feeding) composed of wheat, barley and soymeal:
- A grower diet provided from the start of the fattening stage until about 65 kg live weight (LW)
- A finisher diet

One diet per batch
Reference: 4.5 kg of salt/T of feed
- Batch 1: 1 kg of salt and 5 kg of bicarbonate/T of feed
- Batch 2: 1 kg of salt and 4.3 kg of sodium sulphate/T of feed
- Batch 3: 1 kg of salt, 2.3 kg of bicarbonate and 2.3 kg of sodium sulphate/T of feed

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Average weight of the pigs when entering fattening stage: 28.0 +/- 1.4kg

Good performance for bicarbonate feed
- +2% average weight after 97 days
- -1% feed consumption
- Synergy with added of sodium sulphate

Identical ambient temperature, hygrometry and ventilation. Odour emissions decrease significantly when bicarbonate feed is present.
Poultry nutrition

The sodium bicarbonate produced by Seqens Mineral Specialties is known to have many benefits for poultry:

- Positive impact on feed intake
- Increased feed to weight ratio
- Better laying performances and eggshell quality
- Sodium intake
- Optimal dietary electrolyte balance

Good nutrition is the determining factor for bird performance, and this is also the greatest production cost.

Most diets contain corn for energy, soybean meal for protein, and vitamin and mineral supplements. Since protein is generally one of the most expensive feed ingredients, the industry uses targeted rations, reducing the amount of protein and increasing the amount of grains. This negatively impacts dietary electrolyte balance (DEB).

Potassium (K+) requirements are largely covered by the diet, so Na+ and Cl- are the main focus.

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What is DEB?

Sodium and chloride are extremely important for animal metabolism due to the role they play in regulating cellular osmotic pressure and acid base equilibrium (linked to blood pH). DEB is calculated by finding the difference between ingested and excreted ions, specifically Na+, Cl- and K+.

**IMPACT ON DEB**

<table>
<thead>
<tr>
<th>SODIUM DEFICIENCY</th>
<th>SODIUM SURPLUS</th>
<th>CHLORIDE DEFICIENCY</th>
<th>CHLORIDE SURPLUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased:</td>
<td>Increased:</td>
<td>Decreased:</td>
<td>Decreased:</td>
</tr>
<tr>
<td>feed intake</td>
<td>water consumption (=wet litters)</td>
<td>weight gain</td>
<td>feed consumption</td>
</tr>
<tr>
<td>weight gain</td>
<td></td>
<td>Increased:</td>
<td>growth</td>
</tr>
<tr>
<td>laying performance</td>
<td></td>
<td>performance</td>
<td>laying performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mortality</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>risk of tetany</td>
<td></td>
</tr>
</tbody>
</table>

Sodium bicarbonate and Novafeed: effective at supplying minerals
Impact on DEB:
NaHCO3 and Novafeed: sodium content around 27%
10g NaHCO3 or Novafeed/kg feed corresponds to 120 mEq/kg feed
Buffer effect; supplies HCO3-

Recommendation:
DEB = 250-300 mEq/kg (feed)
Replacing half of the sodium supplied NaCl by NaHCO3 = 3g NaHCO3/kg feed,
In the event of heat : 4-5 g NaHCO3/kg feed
Aquaculture

Ammonia must remain below toxic levels, but fish produce ammonia as a waste product. A nitrification process performed by bacteria is required to transform ammonia into nitrate. The drawback is that this produces acid and decreases the pH in water. This acid production inhibits bacterial function, including nitrification. When this occurs, ammonia accumulates to the point where the appetite and feeding responses of the fish are curtailed. This limits the daily feeding rate, feed conversion efficiency, and ultimately, yield. Furthermore, shrimp and fish are very sensitive to pH and there is a high risk of mortality if the pH < 7.

Bicarbonate Feed as pH buffer

Water pH can be adjusted with regular additions of sodium bicarbonate.

Recommendation: 0.25 kg sodium bicarbonate/kg feed

Sodium bicarbonate is not classified as a corrosive, unlike other reactants such as lime. In addition, sodium bicarbonate controls pH better than lime.

An Extensive Range of Animal Nutrition Products

NaHCO3 (EU Reg no. 242/2010) is classified as a feed additive. NaHCO3 is approved for use in organic farming (EU Reg no. 2092/91) and is used by producers of animal feed and vitamin and mineral supplements as an additive in animal rations.

<table>
<thead>
<tr>
<th>GRADE</th>
<th>AVERAGE DIAMETER d50, µm</th>
<th>SODIUM BICARBONATE (NaHCO₃) (%)</th>
<th>SODIUM CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicarbonate feed n</td>
<td>130</td>
<td>≥ 99.0</td>
<td>27.2</td>
</tr>
<tr>
<td>Bicarbonate feed (granular)</td>
<td>550</td>
<td>≥ 99.0</td>
<td>27.2</td>
</tr>
<tr>
<td>Novafeed</td>
<td>80</td>
<td>&gt;82.0</td>
<td>27.4</td>
</tr>
<tr>
<td>Novafeed SA (aromatized grade)</td>
<td>80</td>
<td>&gt;82.0</td>
<td>27.4</td>
</tr>
<tr>
<td>Sodafeed (sodium carbonate)</td>
<td>500</td>
<td>-</td>
<td>43.2</td>
</tr>
<tr>
<td>Sodium bicarbonate feed grade</td>
<td>Cumulative fraction retained&gt;1,000 µm ≤ 5%</td>
<td>≥ 99.0</td>
<td>27.2</td>
</tr>
</tbody>
</table>

3 Buffer minerals
- Bicarbonate Feed
- Novafeed
- Novafeed SA

1 Basic mineral
- Sodafeed
SEQENS Mineral Specialties: Responsiveness, reliability and quality

RESPONSIVENESS

SEQENS Mineral Specialties is producer of sodium-based mineral compounds. La Madelaine is headquartered in Lorraine in northeastern France and the other two production sites are based in Nogent-l’Artaud, near Paris and Singapore. These locations enable us to maintain a strong presence on the international markets for the food, animal feed, pharmaceutical, environmental protection, glass, laundry and detergent industries.

RELIABILITY

SEQENS Mineral Specialties is state-of-the-art companies with more than 300 motivated and well-trained employees. We have been passionate about quality and satisfying our customers’ needs since the launch of our industrial activities in 1855. SEQENS Mineral Specialties is subsidiarie of the international SEQENS Group.

QUALITY

SEQENS Mineral Specialties ISO 9001, ISO 14001, ISO 50001, and OHSA 18001 certified and a member of the worldwide Responsible Care® charter. We have implemented the HACCP methodology in all of our processes. Some of our products are also Kosher and Halal certified. Overall we strive to promote sustainable development in daily life.