L-LYSINE, FEED GRADE 54.6%

APPEARANCE
Light brown granulate
Bulk density: 650 kg/m3 +/– 10%
Angle of repose: 25°
Particle size distribution min. 90% 300–1600 μm
Solubility: Dispersible

NUTRITIONAL MATRIX
The following are typical values, and might be subject to natural variation.

Additional amino acids from the biomass

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lys</td>
<td>0.50%</td>
<td>Met</td>
</tr>
<tr>
<td>Met+Cys</td>
<td>0.16%</td>
<td>Thr</td>
</tr>
<tr>
<td>Trp</td>
<td>0.04%</td>
<td>Arg</td>
</tr>
<tr>
<td>Val</td>
<td>0.37%</td>
<td>Ile</td>
</tr>
<tr>
<td>Leu</td>
<td>0.49%</td>
<td></td>
</tr>
</tbody>
</table>

Specified values

<table>
<thead>
<tr>
<th></th>
<th>Assay: lysine (min. (%))</th>
<th>54.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture content:</td>
<td>max. (%)</td>
<td>5.0</td>
</tr>
</tbody>
</table>

MOLECULAR DATA
Molecular formula L-lysine sulphate: [C₆H₁₄N₂O₃]₂•H₂SO₄
Molecular weight L-lysine sulphate: 390.4 g / mol

PRODUCTION
Biolys® is produced by a fermentation process. Major parts of the production process are patented.

USE
Biolys® serves for the adequate supply of the essential amino acid lysine. Additionally it contains nutritionally valuable co-products from the fermentation process.

NUTRITIONAL MATRIX

<table>
<thead>
<tr>
<th></th>
<th>Lysine</th>
<th>Digestibility</th>
<th>Crude protein (N x 6.25)</th>
<th>Phosphorus (total)</th>
<th>Energy DE swine</th>
<th>Energy ME swine</th>
<th>Energy NE swine</th>
<th>Energy ME poultry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>54.6%</td>
<td>100%</td>
<td>80%</td>
<td>0.11%</td>
<td>17.41</td>
<td>16.54</td>
<td>12.41</td>
<td>15.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[MJ/kg]</td>
<td>[kcal/kg]</td>
<td>[MJ/kg]</td>
<td>[kcal/kg]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4,158</td>
<td>3,951</td>
<td>2,964</td>
<td>3,794</td>
</tr>
</tbody>
</table>
PROCESSING
Biolys® can be processed in feeds by any technical procedure. It is stable during pelleting and other hydrothermal treatments up to 130°C. With respect to dosing accuracy, its lysine content of approx. 55% is particularly advantageous to achieve homogeneous distribution at low supplementation rates.

STORAGE AND STABILITY
Biolys® should be kept cool and dry in unopened original packaging. Storage conditions of 5° – 30°C and 20–75% rel. humidity are recommended. Under these conditions its active content is guaranteed for 2 years from the manufacturing date. The manufacturing date is part of the lot number on the package label.

PACKAGING
Valve type paper bag, multiwall, 25 kg net.
Bulk bag/FIBC, 500–1000 kg net.
Bulk silo truck.

REGULATORY AFFAIRS
CAS-No. (L-lysine) 60343-69-3
Customs tariff number: 230990

Biolys® is approved for use in all animal species according to European Feed Law, as well as by many other countries and for swine and poultry by the FDA. It is labeled accordingly.

Biolys® is not subject to dangerous goods regulations.

SAFETY AND ENVIRONMENT
Biolys® can be handled safely.

According to EU chemicals legislation, it is non-toxic, and, if correctly handled, it does not irritate the skin and mucous membranes. Skin sensitization has never been reported, and is unlikely to occur. Accordingly, it is not classified as a hazardous chemical. The usual regulations for safety and hygiene should be followed.

For additional information, please contact us directly.

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10/2017