**PRODUCT SPECIFICATIONS**

**1. FORMULATION**

HEMICELL®-D: β-mannanase, 390 million units/kg, guaranteed minimum
HEMICELL®-L: dark-brown solution; β-mannanase, 720 million units/liter, guaranteed minimum

**2. DOSAGE**

HEMICELL®-D: 200 g/metric ton
Not thermo stable, for use in mash feed only.

HEMICELL®-L: 110 ml/metric ton
Not thermo stable. Apply to the cool pelleted feed with a suitable spray system. Dilute with water so 1.0 liter is sprayed per metric ton.

**3. PACKAGING**

25 kg bags HEMICELL®-D
208 l drums HEMICELL®-L

**4. STORAGE**

Store HEMICELL products dry and cool. Avoid prolonged exposure to temperatures above 25°C.

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The only EU registered β-mannanase

**INTRODUCTION**

HEMICELL® is a patented fermentation product of Bacillus lentes. The key ingredient in HEMICELL® is an endo-1,4-β-mannanase, which degrades high molecular weight soluble β-galactomannan fibers (also called β-mannan) into mannose oligosaccharides (MOS).

**BIOLOGICAL EFFECTS**

HEMICELL® improves the performance of monogastric animals by efficiently degrading soluble β-galacto-mannan soluble fibers into smaller mannose oligosaccharides (MOS) that can’t provoke an immune response.

### Hemicell degrades β-Mannan in feed

- Reduced superfluous immune provocation
- Fewer nutrients wasted on immune reactions
- Less demand on the immune system
- Anabolic activity gains priority over catabolic activity
- Higher production of digestive enzymes
- Better feed digestibility and nutrient utilization
- More net energy in feed
- Improved Animal Performance
- Better health

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HEMICELL® feed enzyme is the registered trademark of ChemGen Corp. HEMICELL® and its use are protected by U.S. Patents 5,429,828; 5,476,775, Europe Patent: EP 0531 437, China Patent: ZL96107126.5, MADE IN AMERICA.

EU registration number: 4a3

**FOR MORE INFORMATION:**

VITAMEX N.V.  •  Booiebos 5  • B-9031 DRONGEN - BELGIUM
Tel.: +32 (0) 9 280 29 71  •  Fax: +32 (0) 9 282 34 27
E-mail: info@vitamex.com  •  www.vitamex.com

Complies with KB of February, 8, 1999 (BS 21.04.99) and MB of February, 12, 1999 (BS 21.04.99) concerning trade and use of substances destined for animal feeding.
All vegetable feed ingredients contain β-mannan fibers as part of the hemicellulose fraction, and soybean meal is the main source of β-mannan in most feeds for monogastric animals. Soluble β-mannan, or β-galactomannan, is a potent anti-nutritional factor, able to provoke a futile response of the innate immune system. During the past decade it has been documented that the relatively low levels of 0.2-0.4% β-galactomannan, found in most swine and poultry feeds, can result in significant performance losses.

β-mannan has been shown to:
- Waste nutrients by provoking a production of cytokines and acute phase proteins.
- Reduce the level of IGF-1 (insulin-like growth factor 1).
- Interfere with insulin secretion.
- Reduce the efficiency of nutrient deposition for growth / production.
- Reduce the rate of glucose absorption.
- Reduced water absorption, resulting in higher fecal moisture levels.

**HEMICELL®** degrades β-mannan in feed and, thus, reverses its negative impact on animal performance. **HEMICELL®** is most effective in diets that are rich in soybean meal, sunflower meal, rapeseed meal, sesame meal, palm kernel meal, copra meal and guar meal.

### BENEFITS

1. **HEMICELL® IMPROVES NUTRIENT UTILIZATION**

- Energy by 80-150 Kcal ME/kg feed;
- Improves the amino acid digestibility by 1.5-2.3 %

The matrix values for **HEMICELL®** were developed from digestibility experiments and confirmed by animal growth trials. Using them to formulate **HEMICELL®** into the diets offers the best opportunity to reduce feed cost without loss of performance. **HEMICELL®** as an ingredient provides the opportunity to save nutrients (energy and amino acids).

Results from pen trials and field trials demonstrate the nutritional benefits. The typical trial results are shown in figure 1 in broilers. Tens of millions of commercial poultry have been successfully produced in US, Latin America and Asia following this practice.

![Figure 1: Effect of HEMICELL® on 0-45 day broiler performance (Parc Institute, USA).](image)

<table>
<thead>
<tr>
<th>Age (days)</th>
<th>Control</th>
<th>HEMICELL®</th>
<th>Improvement %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broilers 1</td>
<td>21</td>
<td>11.4</td>
<td>9.93</td>
</tr>
<tr>
<td>Broilers 2</td>
<td>49</td>
<td>13.4</td>
<td>11.3</td>
</tr>
<tr>
<td>Broilers 3</td>
<td>54</td>
<td>11.6</td>
<td>9.2</td>
</tr>
<tr>
<td>Peking Ducks 4</td>
<td>42</td>
<td>14.1</td>
<td>12.3</td>
</tr>
</tbody>
</table>

**HEMICELL®** reduces variability, measured as coefficient of variation (CV) of individual body weight, by most acutely improving the performance of the smallest animals in the population. The typical nature of the improvement on flock uniformity by **HEMICELL®** is graphically represented in figure 2.

The typical results summarized from many studies in different regions in table 1 shows that **HEMICELL®** reduces CV of body weight by 12 to 26%. Improved uniformity increases process yield, carcass quality and productivity of broilers, breeders and layers.

### 3. HEALTH

Studies have shown that the benefits from **HEMICELL®** increase significantly when the animals are subject to challenges from enteric diseases including Necrotic enteritis and coccidiosis. The magnitude of the effect depends on both the β-mannan content in the feed and the severity of the disease challenge.

In pen and field trials, **HEMICELL®** has been shown to:
- reduce mortality;
- improve growth performance;
- reduce coccidial lesion scores in broilers;
- reduce wet feces in poultry;
- increase IGF-1 secretion in broilers.

Meta-analysis results from four EU studies in broilers in which the recommended dose of **HEMICELL®** feed enzyme was fed resulted in these effects in 42 days (figure 3):
- 4.2% increase in weight gain (P<0.0001)
- 3.6% improvement in feed conversion ratio (7.0 points; P<0.0004), and
- 7.5% improvement in EPEF (P<0.0001).

**HEMICELL®** improves body weight uniformity

- Broilers - 15-17 %
- Ducks - 12 %
- Turkeys - 25-40 %

![Figure 3: Effect of HEMICELL® on broiler performance (meta analysis from 4 EU efficacy studies).](image)