Hemicell®

THE ENERGY-SPARING ENZYME

Nutritionist guide

Hemicell: A unique and patented enzyme that minimizes metabolizable energy loss caused by the Feed-Induced Immune Response (FIIR) from beta-mannans in soybean meal and other legumes.
Hemicell and the Feed-Induced Immune Response (FIIR)

**β-Mannans: The “problem component” in soybean meal**

Soybean meal remains an industry standard for supplying protein and energy to poultry. But soybean meal contains a “problem component”: Beta-mannans (β-galactomannans), which are found in legumes. Typical diets contain about 0.3% to 0.5% β-mannans.1-4

Even small amounts of β-mannans can reduce performance5-7 by stimulating a Feed-Induced Immune Response (FIIR).8-10

Here’s how it works: The animal’s immune system perceives β-mannans as a Pathogen Associated Molecular Pattern (PAMP) and initiates a protective measure:11-15 The Feed-Induced Immune Response (FIIR).

As much as 3% of total metabolizable energy can be lost to this counterproductive and unnecessary response8 — energy that could be directed toward growth.17-20 In poultry, this response also:

- Lowers glucose and insulin secretion21,22
- Reduces water and fat absorption6,23
- Reduces nitrogen retention24,25
- Increases gut viscosity, retarding nutrient absorption26,27

**Hemicell breaks down β-mannans to spare energy**

Most feed enzyme products are energy-releasing enzymes—they “open up” feed components the animal is unable to access on its own. Hemicell is different. It’s an energy-sparing enzyme. Hemicell works by breaking down β-mannans in soybean meal.16,26,28,29 The new product created does not trigger the innate immune response. By negating this Feed-Induced Immune Response (FIIR), Hemicell helps spare valuable energy for growth and performance.17-20

By reducing β-mannans in the feed, Hemicell helps to reduce the Feed-Induced Immune Response (FIIR), allowing nutrients to be available for:

- Feed efficiency30
- Weight gain31
- Amino acid digestibility32

**FIIR suppression**

The acute phase protein α 1-acid glycoprotein (AGP) provides an indication of innate immune system activation. Hemicell can reduce excessive stimulation of an innate immune response, as evidenced by lower serum AGP levels (see chart at right). By breaking down β-mannans that trigger an innate immune response, Hemicell improves performance (weight gain and feed efficiency).

**Hemicell & dietary energy**

When adding Hemicell to a diet, you can reduce dietary energy by 40 kcals/lb. (and lower costs) while maintaining similar performance.

Effect of enzymes on serum AGP level33

<table>
<thead>
<tr>
<th>Control</th>
<th>Hemicell</th>
<th>Enzyme</th>
<th>PIPLC</th>
<th>Amylase</th>
<th>Xylanase</th>
<th>β-glucanase</th>
</tr>
</thead>
<tbody>
<tr>
<td>163.6</td>
<td>130.5</td>
<td>180.0</td>
<td>191.1</td>
<td>159.4</td>
<td>186.6</td>
<td>175.5</td>
</tr>
</tbody>
</table>

Hemicell effect on immune response: The acute phase protein α 1-acid glycoprotein (AGP) is closely correlated to the stimulation of the immune system. Serum AGP levels demonstrate that Hemicell reduces immune stress better than some other enzymes.33
Poultry performance
Hemicell acts on the feed to minimize the effect of β-mannans. With fewer β-mannans in the feed, there is a reduced Feed-Induced Immune Response (FIIR) effect, thus, sparing energy to be available for growth and performance.17-20

Result30,31

Weight gain (0-42 days)

Study 1

<table>
<thead>
<tr>
<th>Diet</th>
<th>Basal A</th>
<th>Basal B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>5.42^a</td>
<td>5.59^a</td>
</tr>
<tr>
<td>Control + Hemicell</td>
<td>5.83^a</td>
<td>6.03^a</td>
</tr>
</tbody>
</table>

Study 2

<table>
<thead>
<tr>
<th>Diet</th>
<th>Basal A</th>
<th>Basal B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basal A Control</td>
<td>1.91^a</td>
<td>1.89^a</td>
</tr>
<tr>
<td>Basal A Control + Hemicell  100 ml</td>
<td>1.79^a</td>
<td>1.76^a</td>
</tr>
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Due to Hemicell's ability to break down β-mannans, results showed diets containing Hemicell had improved feed conversions compared to control diets.30,31

Feed conversion ratios (0-42 days)

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<td>1.85</td>
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<td>Control + Hemicell</td>
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Study 2

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<td>Basal A Control + Hemicell  100 ml</td>
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In response to breaking down β-mannans, Hemicell showed an improvement in weight-adjusted feed conversion compared to controls.30,31

Weight-adjusted feed conversion (WAFC) (0-42 days)

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Study 2

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In response to breaking down β-mannans, Hemicell showed an improvement in weight-adjusted feed conversion compared to controls.30,31

Values within each study with no common superscripts differ significantly (p<0.05).

Values for Study 1 are the means of 15 replicates (each of 40 birds at trial start).

Values for Study 2 are the means of 8 replicates (each of 40 birds).

* Study 1 control diets SBM % (SBM 48% crude protein):
  - starter control diet contained 41.03%; grower control diet contained 36.70%.

** Study 2 control diets SBM % (SBM 48% crude protein):
  - Basal A starter control diet contained 25.00%,
  - Basal A grower control diet contained 25.40%,
  - Basal A finisher control diet contained 15.40%,
  - Basal A withdrawal control diet contained 15.70%,
  - Basal B starter control diet contained 27.50%,
  - Basal B grower control diet contained 18.58%,
  - Basal B finisher control diet contained 15.57%,
  - Basal B withdrawal control diet contained 15.57%.

Study 1*,30

- Location: Roslin Nutrition Ltd., Scotland
- Date: September 2005
- Trial length: 42 days
- # of birds: 1,280

Study 2**,31

- Location: Roslin Nutrition Ltd., Scotland
- Date: November 2009
- Trial length: 42 days
- # of birds: 2,560
Hemicell use recommendations

Hemicell is a unique, patented enzyme produced by fermentation of *Bacillus licheniformis* bacteria. The active ingredient is *Endo-1,4-ß-D-mannanase*.

**Species:** Broilers, Layers, Turkeys

**When:** Hemicell is recommended for use in diets containing at least 12% (or more) soybean meal.

**Dosage:**

<table>
<thead>
<tr>
<th>Product form</th>
<th>Dosage</th>
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<tbody>
<tr>
<td>Hemicell (liquid)</td>
<td>100 ml enzyme with 0.90 L water</td>
</tr>
<tr>
<td>Hemicell U (liquid)</td>
<td>100 ml enzyme with 0.90 L water</td>
</tr>
<tr>
<td>Hemicell HT (dry)</td>
<td>0.80 lbs./ton</td>
</tr>
<tr>
<td>Hemicell HT (liquid)</td>
<td>100 ml enzyme</td>
</tr>
</tbody>
</table>

**Recommended use program:**

Use Hemicell in diets containing 12% SBM or higher

**Energy reduction (for high-energy diets):**

Improved performance allows for a reduction of dietary energy up to 40 kcals/lb.

**Use Hemicell in diets containing at least 12% soybean meal.**

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The label contains complete use information, including cautions and warnings. Always read, understand and follow the label and use directions.