Beta-mannans (β-mannans) are non-starch polysaccharide (NSP) fibers found in leguminous feed ingredients. The body's innate immune system recognizes β-mannans as an intruder because they have a similar molecular pattern to some pathogens. This triggers an innate immune response which consumes energy and nutrients. Even small amounts of β-mannans trigger the response. The presence of the β-mannan fibers can have the effect of reducing glucose absorption, insulin secretion, and increasing viscosity.

Enzyme mechanism
Enzymes are proteins produced by living organisms. They act as catalysts for many biochemical processes in the body. All animals use enzymes to digest feed. Each enzyme has a specific structural arrangement that binds with a specific substrate. Once bound, an enzyme breaks down certain substrates into component parts. Then, the enzyme moves on to repeat this action. A variety of factors affect enzymes, including pH and temperature.

Hemicell: A unique MOA
Some enzymes reduce fiber viscosity and improve performance via rate of passage. Others improve nutrient digestibility by "opening up" feed components the animal is unable to access on its own. These are considered energy-releasing enzymes. Hemicell is different. Hemicell is an energy-sparing enzyme.

The animal’s innate immune system perceives β-mannans as a Pathogen Associated Molecular Pattern (PAMP) and initiates a protective action: a Feed-Induced Immune Response (FIIR). This diverts energy away from growth (it also reduces nutrient absorption and lowers secretion of insulin) making it unavailable for growth.

Hemicell breaks down β-mannans so they don’t trigger a Feed-Induced Immune Response. Preventing this unneeded response enables the animal to direct more energy to growth and performance.

Implications for the food industry
- Global demand for animal nutrition and protein is growing, partly as emerging markets shift to higher-protein diets.
- Feed is the No. 1 input cost for food animal production, and energy is the most expensive component of feed.
- β-mannans in feed trigger an innate immune response (FIIR) that can consume up to 3% of total metabolizable energy, making it unavailable for growth.
- Hemicell breaks down β-mannans so they don’t trigger a Feed-Induced Immune Response. Preventing this unneeded response enables the animal to direct more energy to growth and performance.

Support services
- Liquid application systems designed, built and tested internally before installation.
- Professional, start-to-finish installation with minimal mill disturbance.
- State-of-the-art enzyme assay capability for monitoring customer feed enzyme levels.
### Hemicell product specifications for use in poultry feeds

<table>
<thead>
<tr>
<th>Hemicell form</th>
<th>Application</th>
<th>Active enzyme(s)</th>
<th>Storage conditions</th>
<th>Stability</th>
<th>Dosage per ton of complete feed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid</td>
<td>Pelleted feed (applied post-pellet)</td>
<td>Endo-1,4-ß-D-mannanase</td>
<td>≤ 24° C (75° F)</td>
<td>12 mos.</td>
<td>100 ml enzyme with 0.90 L water</td>
</tr>
<tr>
<td>Hemicell U†</td>
<td>Pelleted feed (applied post-pellet)</td>
<td>Endo-1,4-ß-D-mannanase; Endo-1,4-ß-D-xylanase</td>
<td>≤ 24° C (75° F)</td>
<td>12 mos.</td>
<td>100 ml enzyme with 0.90 L water</td>
</tr>
<tr>
<td>Hemicell HT**</td>
<td>(heat tolerance to pelleting temperatures of 190° F or 88° C)</td>
<td>Endo-1,4-ß-D-mannanase</td>
<td>≤ 24° C (75° F)</td>
<td>12 mos.</td>
<td>0.80 lbs.</td>
</tr>
<tr>
<td>Liquid</td>
<td>Pelleted feed (applied in mixer)</td>
<td>Endo-1,4-ß-D-mannanase</td>
<td>≤ 24° C (75° F)</td>
<td>9 mos.</td>
<td>100 ml enzyme</td>
</tr>
</tbody>
</table>

### Safety
- Hemicell is generally recognized as safe.
- Hemicell has no restrictions when used in combination with other feed ingredients.
- Hemicell does not require a withdrawal period.

### Guaranteed analysis
- **Hemicell** (liquid) ß-mannanase (*Bacillus lentus*) not less than 720 MU/L.
- **Hemicell U†** (liquid) ß-mannanase (*Bacillus lentus*) not less than 720 MU/L.; xylanase (*Trichoderma longibrachiatum*), not less than 400 MU/L.
- **Hemicell HT** (dry) ß-mannanase (EC 3.2.1.78) (from *Bacillus lentus*), not less than 72.5 MU/lb.
- **Hemicell HT** (liquid) ß-mannanase (EC 3.2.1.78) (from *Bacillus lentus*), not less than 590 MU/L.

*One unit of ß-mannanase activity is defined as the amount of enzyme which generates 0.72 microgram of reducing sugars per minute from a mannose-containing substrate at pH 7.5 and temperature of 104° F.*

*One unit of xylanase activity is defined as the amount of enzyme that liberates 0.72 microgram of reducing sugars (xylose equivalents) per minute from a xylan-containing substrate (birch wood xylan) at pH 5.5 and 104° F.*

**One unit of ß-mannanase activity is defined as the amount of enzyme which generates 0.72 microgram of reducing sugars per minute from a mannose-containing substrate at pH 7.0 and temperature of 104° F.*

### Global approvals
Hemicell is approved for poultry in most major global markets.

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


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