safmannan™

A Yeast-Derived Source of Mannanoligosaccharides and Beta-Glucans
Yeast Cell Wall

Mannanoligosaccharides of Saccharomyces cerevisiae

- Contains 19 - 24% mannan & 24 - 26% beta-glucan
- Contains no carriers and is extremely consistent
- Is water-dispersible (milk replacers)
- Research is available on binding of certain bacteria to the lining of the digestive tract
- Research is available on yeast cell wall and stimulation of the immune system
- Food grade product derived from primary S. cerevisiae yeast
- Produced in France under strict physical, microbial and chemical standards by Lesaffre company Bio-Springer
Yeast Cell Wall

Proposed Mode of Action

- Research shows D-mannose containing mannanoligosaccharides may bind to bacterial lectins, reducing colonization of the gut by enteropathogens such as salmonellae and E. Coli.

- Research shows that feeding MOS results in increased villus height in the small intestine that provides more surface area for nutrient absorption.
Lesaffre Research

(Dr. B. Gedek, Univ. of Munich, 1992)
Potential Binding

Mannanoligosaccharides

Lectin

Drug Lectin

Bacteria

Cell

CHO in the surface

(Saf Agri, 2001)

Advancing Animal Nutrition
Poultry Performance

Poultry Trial - Virginia Scientific

Design

- 1200 turkey hens, 30 per pen, 6 weeks, 10 reps
- MOS 1 @ 1 lb/ton
- MOS 2 @ 2 lb/ton

(Virginia Scientific, 2001)
Intestinal Villa (Santin, et. al., 2000)

- Duodenum
- Jejunum
- Ileum

a = without MOS
b = with a quality MOS

Advancing Animal Nutrition
Pig Performance

Swine Research - Kansas State University

- 168 pigs (13.2 lb./21 d), 6/pen, 5 wks, 7 reps
- MOS 1 @ 2 lb/ton
- MOS 2 @ 4 lb/ton

(Hancock, et. al., 2001)
Somatic Cell Counts in Lactating Holsteins
Comparing Yeast Culture and P-7

(Higginbotham, et. al., 2000)

(YC) 509
(P-7) 462.9

(P < 0.001)
MOS Source

- Be sure of the quality and consistency of the mannanoligosaccharide (MOS) source you use in your product
Research Results for Use of MOS in Mycotoxin Challenge

Evaluation of live yeast or MOS with mycotoxins Aflatoxin, Ochratoxin A and T-2 Toxin in chickens.

- Animals fed diets with 0.2% yeast, showed reduced effects of the mycotoxin challenge.
- Animals fed diets with 0.1% MOS showed amelioration of the negative effects on gain from mycotoxins.
- Animals fed yeast and MOS exhibited fewer pathogenic lesions.

(Marques, Rene - INIFAP, 2000)
Competitive Product Inconsistency

- 6 random samples were taken of the same competitive MOS product

<table>
<thead>
<tr>
<th>Location</th>
<th>Canada</th>
<th>IA</th>
<th>VA</th>
<th>SD</th>
<th>NC</th>
<th>MN</th>
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<tbody>
<tr>
<td>DM</td>
<td>96.5</td>
<td>95.8</td>
<td>96.9</td>
<td>95.3</td>
<td>95.3</td>
<td>95.1</td>
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<tr>
<td>Total N</td>
<td>3.4</td>
<td>3.3</td>
<td>3.9</td>
<td>4.6</td>
<td>4.5</td>
<td>3.7</td>
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<tr>
<td>Glucans</td>
<td>21.6</td>
<td>14.0</td>
<td>21.7</td>
<td>12.8</td>
<td>22.3</td>
<td>29.5</td>
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<tr>
<td>Mannans</td>
<td>5.2</td>
<td>20.3</td>
<td>12.5</td>
<td>2.6</td>
<td>6.9</td>
<td>8.6</td>
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</tbody>
</table>

- Products were obtained from different areas within the U.S. and Canada
• 3 samples from 3 different lots were obtained, since Safmannan™ is produced in only one location

<table>
<thead>
<tr>
<th></th>
<th>Lot # 3103</th>
<th>Lot # 3261</th>
<th>Lot # 2953</th>
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<tbody>
<tr>
<td>DM (%)</td>
<td>96.6</td>
<td>95.7</td>
<td>95.7</td>
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<tr>
<td>Total N (%)</td>
<td>3.1</td>
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<tr>
<td>Glucans (%)</td>
<td>24.3</td>
<td>27.4</td>
<td>26.1</td>
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<tr>
<td>Mannans (%)</td>
<td>21.0</td>
<td>19.8</td>
<td>20.5</td>
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# General Recommendations

<table>
<thead>
<tr>
<th>Specie</th>
<th>Safmannan</th>
<th>MOS</th>
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<tbody>
<tr>
<td>Dairy</td>
<td>5-10 g/h/d</td>
<td>10-20 g/h/d</td>
</tr>
<tr>
<td>Beef</td>
<td>5-10 g/h/d</td>
<td>10-20 g/h/d</td>
</tr>
<tr>
<td>Calves</td>
<td>2-5 g/h/d</td>
<td>5-10 g/h/d</td>
</tr>
<tr>
<td>Swine - Starters</td>
<td>2 lbs/t Complete Feed</td>
<td>4 lb/t Complete Feed</td>
</tr>
<tr>
<td>Swine - Growers</td>
<td>1 lb/t Complete Feed</td>
<td>2 lb/t Complete Feed</td>
</tr>
<tr>
<td>Turkeys</td>
<td>1 lb/t Complete Feed</td>
<td>2 lb/t Complete Feed</td>
</tr>
<tr>
<td>General Use</td>
<td>0.5 - 1 lb/t Complete Feed</td>
<td>1 -2 lb/t Complete Feed</td>
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</table>
safm Dannan Advantages

- More concentrated mannan and beta-glucan content
- Extremely consistent
- Pure yeast cell wall, no carrier
- Use at half the recommended inclusion rate of most competitive MOS products
- Produced by Lesaffre, world’s largest yeast manufacturer

Safm Dannan is consistent - Any order, Anywhere, Any time!