A science-based, research-proven probiotic for beef cattle:

- Improves stability and function of the GI tract
- Improves performance, including carcass weights and feed conversion
- Reduces the shedding of food-borne pathogens, such as *E. coli* O157:H7

**BOVAMINE® Defend** is the only product listed in the BIFSCO pre-harvest library as a product which has met the established requirements for listing.
Performance

From a summary of 14 well-controlled trials in the U.S., cattle fed **BOVAMINE® Defend** yielded heavier carcasses, had better average daily gains, and tended to have better feed-to-gain conversions (see Figures 1a and 1b below).

![Figure 1a: Hot Carcass Weight (lb)](image1)

**Figure 1a: Hot Carcass Weight (lb)**

<table>
<thead>
<tr>
<th></th>
<th>HCW</th>
<th>ADG</th>
<th>F:G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>838</td>
<td>3.76</td>
<td>5.86</td>
</tr>
<tr>
<td>BOVAMINE® Defend</td>
<td>843</td>
<td>3.83</td>
<td>5.78</td>
</tr>
</tbody>
</table>

**Effects of BOVAMINE® Defend on carcass weight, average daily gain (ADG), and feed:gain (F:G) ratio:**

- **HCW**:
  - Control: 843 lb
  - BOVAMINE® Defend: 849 lb
  - **p < 0.01**

- **ADG**:
  - Control: 3.76
  - BOVAMINE® Defend: 3.83
  - **p < 0.01**

- **F:G**:
  - Control: 5.86
  - BOVAMINE® Defend: 5.78
  - **p < 0.10**

Reduced shedding of pathogenic *E. coli*

Across 15 studies, cattle fed **BOVAMINE® Defend** were 45% less likely to shed *E. coli* O157:H7 in their manure compared to control animals – a significant reduction in prevalence (see Figure 2a). More importantly, among the fewer cattle that were shedding *E. coli* O157, there was a >90% reduction in the concentration of that pathogenic organism in their manure compared to samples from control animals – a significant reduction in concentration (see Figure 2b).

![Figure 2a: Reduced prevalence of positive samples](image2)

**Figure 2a: Reduced prevalence of positive samples**

<table>
<thead>
<tr>
<th></th>
<th>% positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>26.6</td>
</tr>
<tr>
<td>BOVAMINE® Defend</td>
<td>14.6</td>
</tr>
</tbody>
</table>

**Reduction in prevalence and concentration of *E. coli* O157:H7**

- **Prevalence**:
  - Control: 26.6%
  - BOVAMINE® Defend: 14.6%
  - **p < 0.05**

- **Concentration**:
  - Control: 10.0
  - BOVAMINE® Defend: 4.0
  - **p < 0.10**

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Reduced shedding of pathogenic *Salmonella*

In a well-controlled study, cattle fed BOVAMINE® Defend were 48% less likely ($p<0.10$) than control animals to shed *Salmonella* in their feces. Likewise, *Salmonella* was 68% less likely ($p<0.10$) to be shed in the feces or isolated on the hides of cattle fed BOVAMINE® Defend compared to control animals. Not only was there a reduced shedding of *Salmonella*, but the incidence of animals that had peripheral lymph nodes that were positive for *Salmonella* was also significantly reduced in the field and in a well-controlled trial (see Figures 3, 4 and 5). This reduces the risk of contamination of ground beef with this food-borne pathogen.

**Figure 2b: Reduced concentration in positive samples**

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>BOVAMINE® Defend</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID, 2007</td>
<td>3.17</td>
<td>0.90</td>
</tr>
<tr>
<td>ID, 2011</td>
<td>2.26</td>
<td>0.013</td>
</tr>
<tr>
<td>Commercial Trial, 2012</td>
<td>2.00</td>
<td>1.10</td>
</tr>
</tbody>
</table>

*p<0.01*

**Reduced prevalence of positive lymph nodes**

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>BOVAMINE® Defend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Trial, 2012</td>
<td>76.4</td>
<td>57.5</td>
</tr>
<tr>
<td>TTU, 2012</td>
<td>34.0</td>
<td>4.0</td>
</tr>
</tbody>
</table>

*p<0.01*  

**Concentration of *Salmonella* in lymph nodes**

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>BOVAMINE® Defend</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFU/g</td>
<td>794</td>
<td>79</td>
</tr>
</tbody>
</table>

*p<0.01*
**BOVAMINE® Defend** is available in two forms: standard and stabilized.

**Package:** Package sizes of standard product are: 10,000 head (500 g), 5000 head (1000 g), and 1000 head (2000 g). The feeding rates for these products are 50 mg/head/day, 200 mg/head/day, and 1 g/head/day, respectively. This product can be added directly to a TMR in the mixing device or via micro-ingredient applicator. Package sizes of stabilized product are: 9600 head (600 g) and 11,340 head (50 lb, 22.68 kg). The 9600 head package is designed for use in feed mills as a post-pellet application.

Application rate varies with targeted consumption rate. The 11,340 head package is designed for use in feed mills as a post-pellet application. It is fed at a rate of 2 g/head/day and can be added as part of a dry premix/VTM pack or directly to a TMR in a mixing device.

Proper feeding of any **BOVAMINE® Defend** product provides 2x10⁹ CFU of *Lactobacillus animalis* and *Propionibacterium freudenreichii* per head per day.

**Handling:** Standard **BOVAMINE® Defend** should be stored in a freezer. Place any unused contents in a sealed container and store in a freezer.

Stabilized **BOVAMINE® Defend** should be stored in a cool, dry area for maximum stability. Avoid leaving pouch open for extended periods of time. Place any unused contents in a sealed container. Avoid inhalation of dust. In case of inhalation, skin contact, or eye contact, rinse with water.

**Storage:** Standard **BOVAMINE® Defend** should be stored at -4°F (-20°C) in a commercial freezer. Stabilized **BOVAMINE® Defend** should be stored at 36-77°F (2-25°C) in a dry place. Shelf-life of **BOVAMINE® Defend** products is 12 months, when stored as specified.

**Figure 5: Concentration of Salmonella in lymph nodes - Commercial Trial Cattle**

![Figure showing the concentration of Salmonella in lymph nodes for commercial trial cattle.](image)

Control | **BOVAMINE® Defend**
---|---
12% shift

Fewer highly-infected lymph nodes in **BOVAMINE® Defend** treated cattle