The objective of this study was to evaluate the effects of administering a live culture of *Probiotics* are a promising alternative to improve food animal productivity and health. However, scientific

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Probiotics are a promising alternative to improve food animal productivity and health. However, scientific evidence that specific microbes can be used to benefit animal health and performance is limited. The objective of this study was to evaluate the effects of administering a live culture of *Faecalibacterium prausnitzii* to newborn dairy calves on subsequent growth, health, and fecal microbiome. A total of 554 Holstein heifers were assigned to one of two treatment groups: treated calves (FPTRT) and non treated calves (control). Treated calves received two oral doses of *F. prausnitzii*, one at treatment assignment (1st week) and another one week later. The FPTRT group presented significantly lower incidence of severe diarrhea (3.1%) compared with the control group (6.8%). Treated calves also had lower mortality rate associated with severe diarrhea (1.5%) compared to control calves (4.4%). Furthermore, FPTRT calves gained significantly more weight, 4.4 kg over the preweaning period, than controls calves. The relative abundance of *F. prausnitzii* in the fecal microbiota was significantly higher in the 3rd and 5th weeks of life of FPTRT calves than of the control calves, as revealed by sequencing of the 16S rRNA gene.

### Historical Timeline:

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Developed business plan, established milestones, &amp; performed mkt. research</td>
</tr>
<tr>
<td>2013</td>
<td>Signed exclusive global technology license with Cornell University (CTL)</td>
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<tr>
<td>2013</td>
<td>Signed LOI with Cornell for human market. Filed additional patents</td>
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<tr>
<td>2013</td>
<td>Q3-Q4: Created shelf stable formulation, process &amp; filed provisional patent</td>
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<tr>
<td>2014</td>
<td>Q3-Q4: Entered partnership discussions w/3 global animal health companies</td>
</tr>
<tr>
<td>2014</td>
<td>Q4: Launched angel investment round (convertible debt)</td>
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<tr>
<td>2015</td>
<td>US Patent allowed and two new filings with the US patent office</td>
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<tr>
<td>2016</td>
<td>Closed angel financing round</td>
</tr>
<tr>
<td>2016</td>
<td>Calf safety trial completed. Clinical field trial on 554 dairy calves initiated</td>
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<tr>
<td>2017</td>
<td>Additional safety trial on 30 newborn bull calves demonstrated no adverse reactions using FPF-4</td>
</tr>
<tr>
<td>2018</td>
<td>US Food and Drug Administration (FDA) approval for cattle use</td>
</tr>
</tbody>
</table>

### Large Addressable Markets:

- **$30 Billion - Global animal medicine & feed additives**
- **$35 Billion - Global probiotic market**
- **$1 Billion – US corporate spending on animal health R&D**
- **Massive Potential Markets for Bactana: Cattle, Swine, Poultry, Aquaculture, Companion, and Human**

### Additional Opportunities for FPS-4™

- **Swine & poultry disease prevention and control**
  - There are over 9 million adult horses and foals in the U.S. Many succumb to diarrhea and other diseases.
  - There are more than 120 million piglets and 8.54 billion broilers born each year in the U.S.
  - There are no proven cost effective treatments.

- **Human health**
  - There is evidence that FPS-4 based products may have benefits for human use: may aid in digestive health.
  - There are over 9 million adult horses and foals in the U.S. Many succumb to diarrhea and other diseases.
  - There are more than 120 million piglets and 8.54 billion broilers born each year in the U.S.

- **Additional Market Opportunities**
  - **Swine & poultry**
  - **Companion animals**
  - **Human health**

### OUR LEADERSHIP TEAM

- **Bactana Animal Health Contact Information**
  - John Kallassy | Chief Executive Officer | 203-716-1230 | john@Bactana.com

### The Business

The Problem We’re Solving:

It is accepted among the scientific community that antibiotic use in livestock is a major contributor to human resistance, posing a significant public health risk. Large animal health co’s have a declining innovation pipeline and are seeking new technologies to fill the gap created by declining antibiotic (and hormone) use.

Next Steps:

- Use our FPS-4 platform to develop product *Lifestyle Management Strategies* for multiple livestock species and multiple formulations. Expand global IP platform.
- Complete venture financing
- Develop commercial scale manufacturing & formulation
- Sign distribution and R&D collaborations— with partner(s) based on their strengths, product indication, species, and territory
- Refine global regulatory strategy and pursue approvals (likely through partners). Expand clinical trials to include new species.

Other Business Drivers:

- Strong IP Position, Cornell McGovern Center
- Client, in negotiations with Global Animal Health Distribution Partners.

Sample Market Opportunity

<table>
<thead>
<tr>
<th>Annual U.S. Beef &amp; Dairy Calf Market</th>
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<tbody>
<tr>
<td><strong>US Dairy Market Opportunity</strong></td>
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<tr>
<td><strong>L.S. Annual Dairy Calf Crop</strong></td>
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<tr>
<td><strong>FPF-4 Pro to Farmer (per Calf)</strong></td>
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<td><strong>Total Retail Market Potential</strong></td>
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- **Advisable Market N**
  - Distribution-Costs |
  - Estimated Revenue |
  - Cost of Goods |
  - Estimated Gross Profit |

- **$30 Billion - Global animal medicine & feed additives**
- **$35 Billion - Global probiotic market**
- **$1 Billion – US corporate spending on animal health R&D**
- **Massive Potential Markets for Bactana: Cattle, Swine, Poultry, Aquaculture, Companion, and Human**

### Additional Opportunities for FPS-4™

- Swine & Poultry Disease Prevention and Growth
  - There are more than 120 million piglets and 8.54 billion broilers born each year in the U.S.
  - Multi-billion dollar markets exist for a low-cost natural product proven to increase weight gain, reduce disease, and improve gut health.

- Companion Animal Anti-diarrheal
  - We estimate that 9 million dogs & cats are treated for diarrhea by veterinarians each year in the U.S. and many more pet owners treat their pets for diarrhea at home.

- Equine Anti-diarrheal
  - There are over 9 million adult horses and foals in the U.S. Many succumb to diarrhea and there are no proven cost effective treatments.

- Human Pharmaceutical / Supplement
  - There is evidence that FPS-4 based products may have benefits for human use: may aid in malmournished global indigent populations.