A New Generation of Prebiotics

PreforPro®

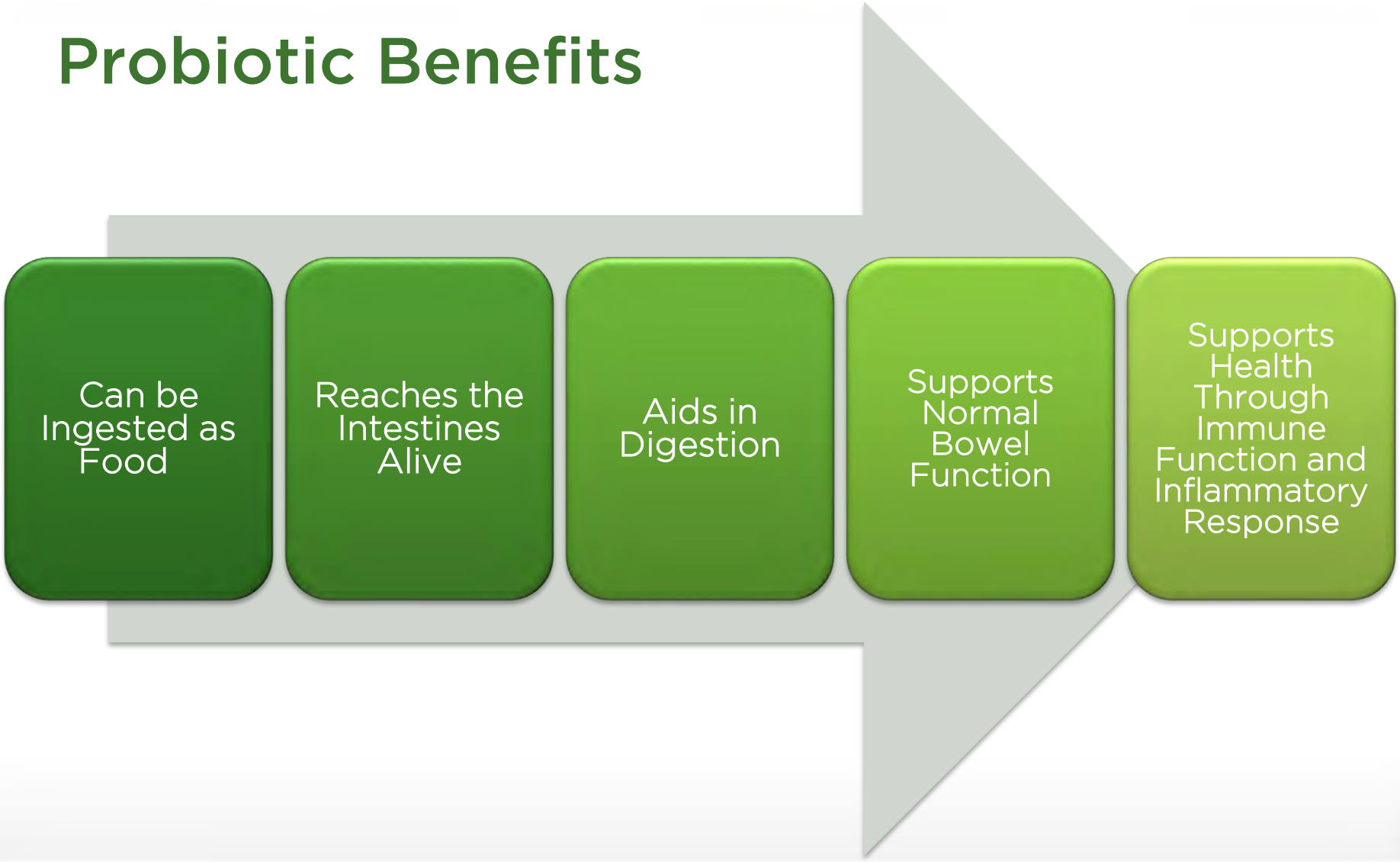
From concept to commercialization,
we add value at every step.®

DEERLAND Enzymes | DEERLAND Probiotics

A New Generation of Prebiotics

I. Probiotics
   I. Benefits and Popularity
   II. Good and Bad Bacteria
   III. Hurdles to Overcome
II. Overcoming the Hurdles
III. Prebiotics
   I. Benefits
   II. Examples
   III. Drawbacks
IV. Introduction of a Novel Prebiotic
   I. Testing and Results

Probiotic Benefits

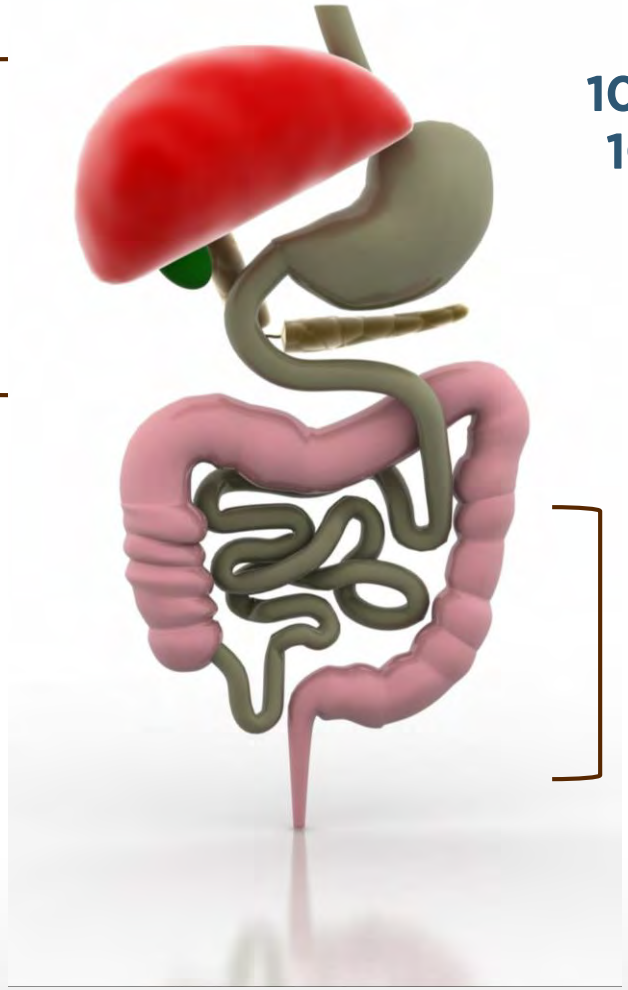


The Microbiome

Prevotella
Streptococcus
Veillonella

Helicobacter

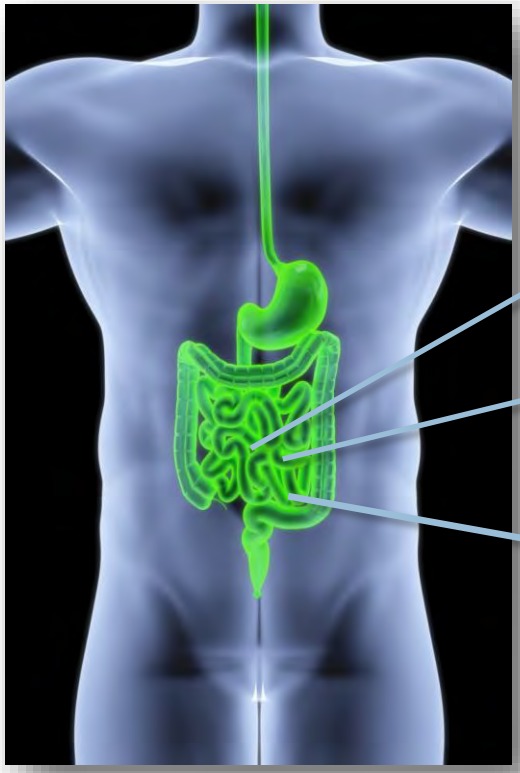
Enterococcus
Lactobacillus



100 trillion microorganisms...
10x amount of human cells!

Bacteroides
Bifidobacteria
Clostridia
Enterobacteria
Enterococcus
Escherichia
Eubacteria
Klebsiella
Lactobacillus
Peptococcus
Peptostreptococcus
Proteus
Ruminococcus
Staphylococcus
Streptococcus

A Constant Battle for Food & Space



LIMITED SPACE

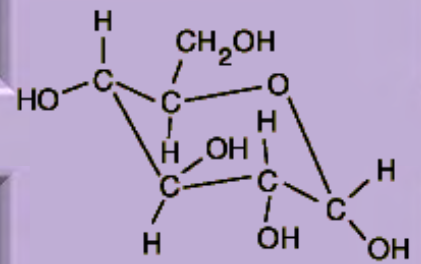
LIMITED RESOURCES

Shared vs. Unique Components of the Gut

Bacteria interact with many different things in their environment.

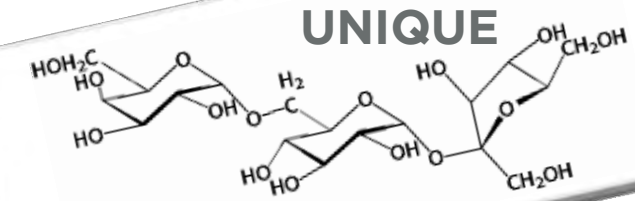
BAD Bacteria

SHARED



Glucose

UNIQUE

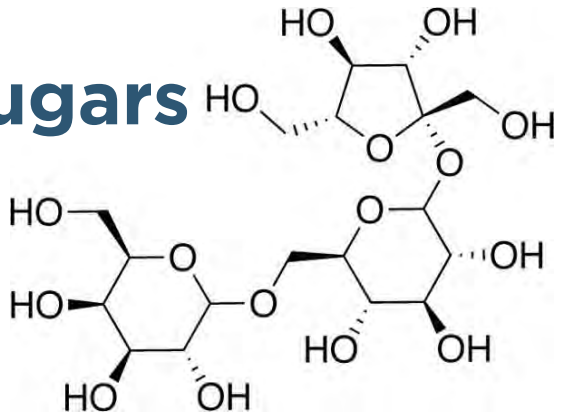


Raffinose

GOOD Bacteria

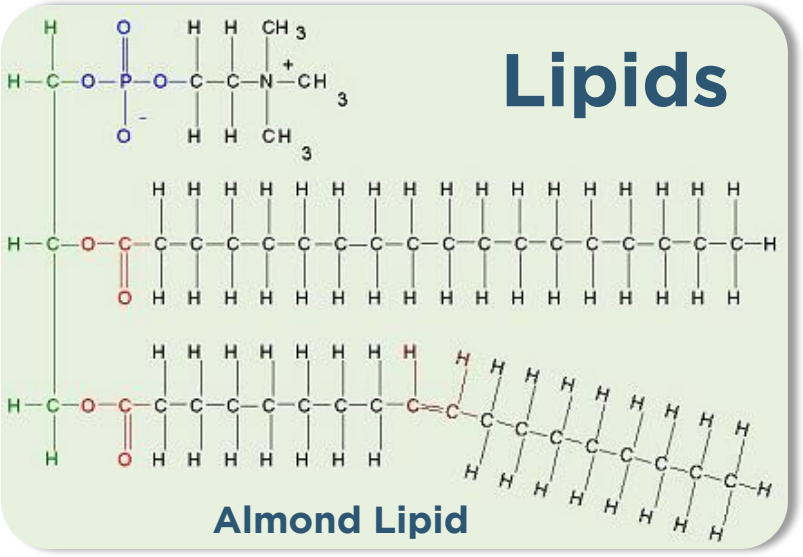
Examples of Unique Components

Sugars



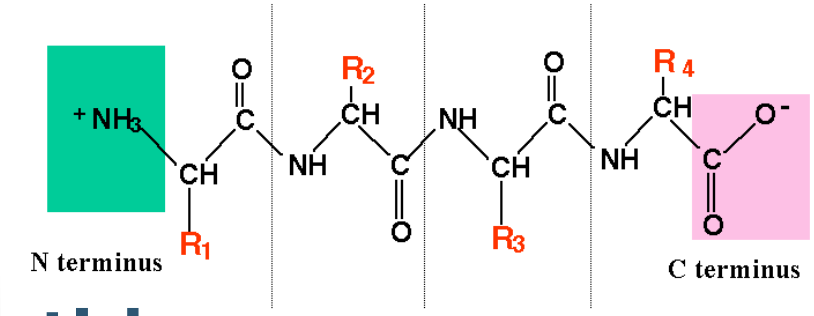
Raffinose

Lipids



Almond Lipid

Proteins/Peptides



Lactoferrin

What is a Prebiotic?

"non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon, and thus improves host health."

- Food and Drug Administration

Characteristics of Prebiotics

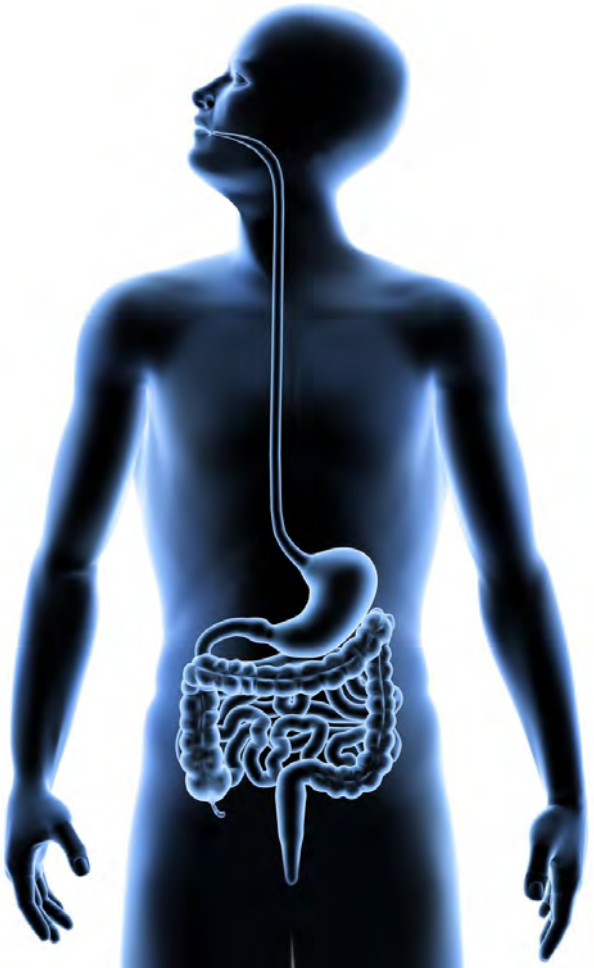
Prebiotics contained in foods or supplements are consumed.

Prebiotics are not digested in the stomach or small bowel.

Prebiotics selectively promote growth of "good" bacteria over "bad" bacteria.

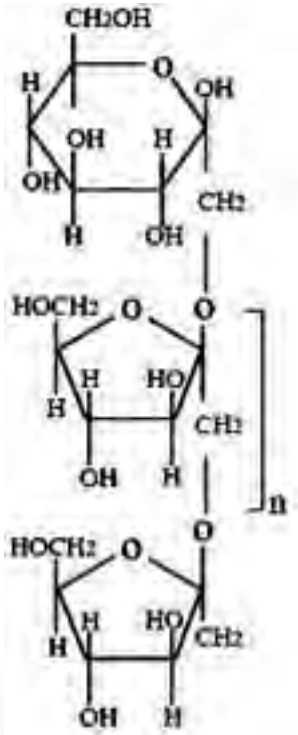
Prebiotics positively increase good bacteria flora in the GI tract

Increased beneficial bacteria in the small & large bowel support a variety of health effects

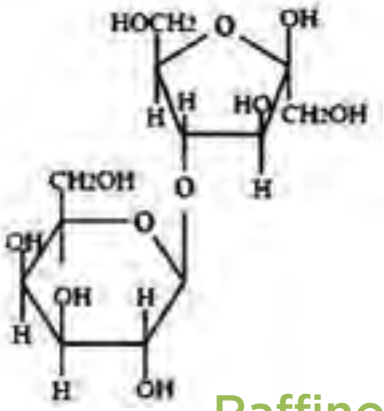


Common Polysaccharides as Prebiotics

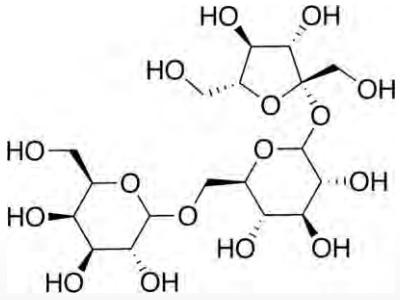
Inulin



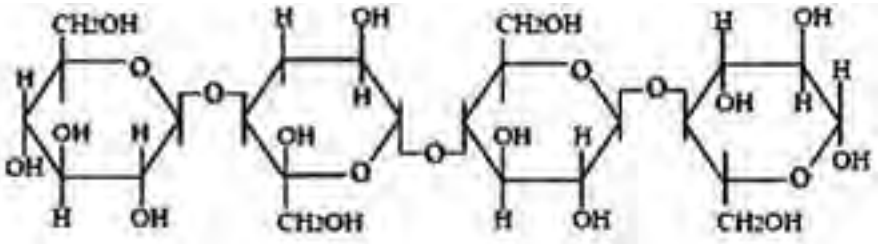
Lactulose



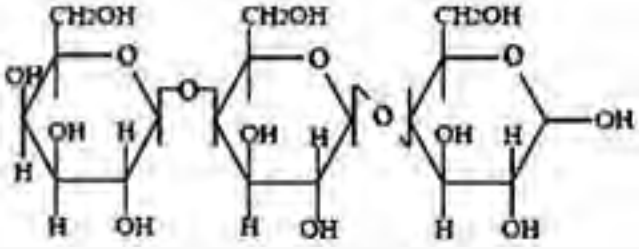
Raffinose



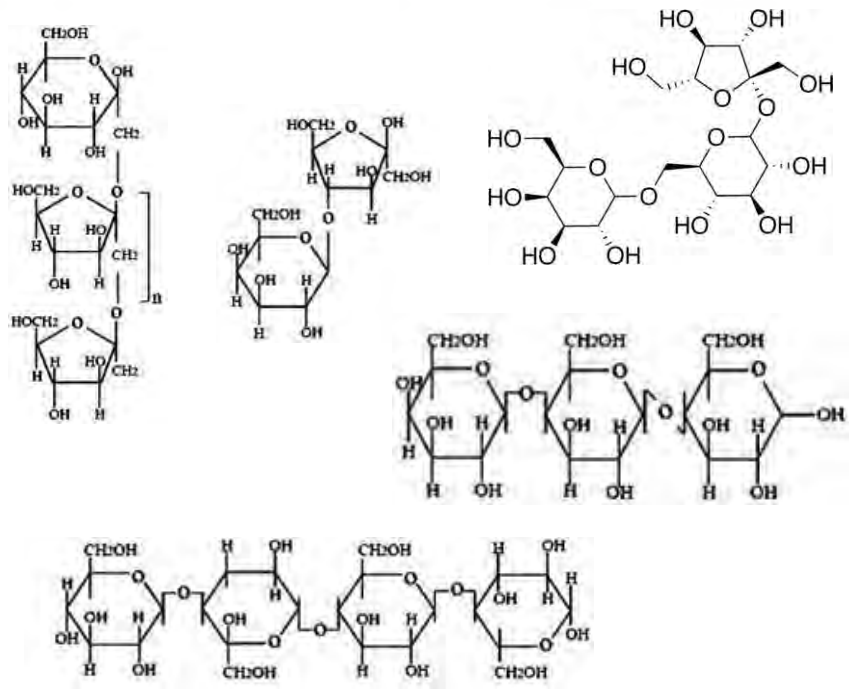
Xylooligosaccharides



Galactooligosaccharides



Drawbacks of Current Prebiotics



- Gas, bloating, discomfort
- Action depends on environmental composition
- Efficacy requires large doses
- Effect requires prolonged period of time
- Activity localized to large intestine
- Can increase growth of unwanted bacteria in the GI tract

PreforPro®

Introducing PreforPro®

A PROBIOTIC-ENHANCING PREBIOTIC

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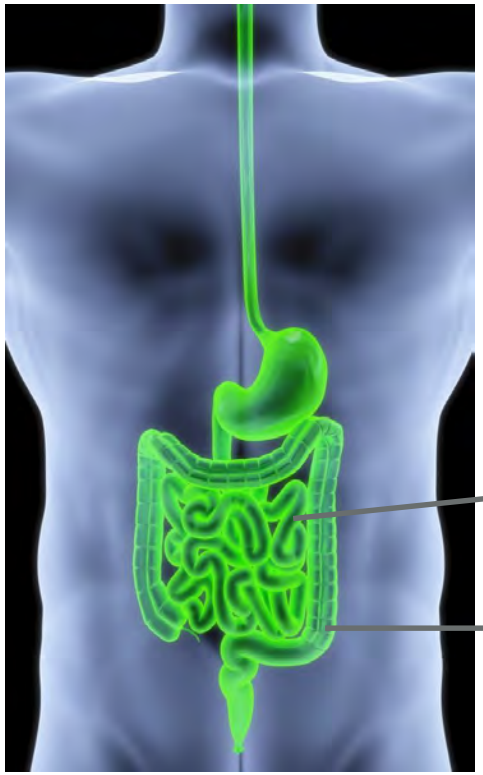
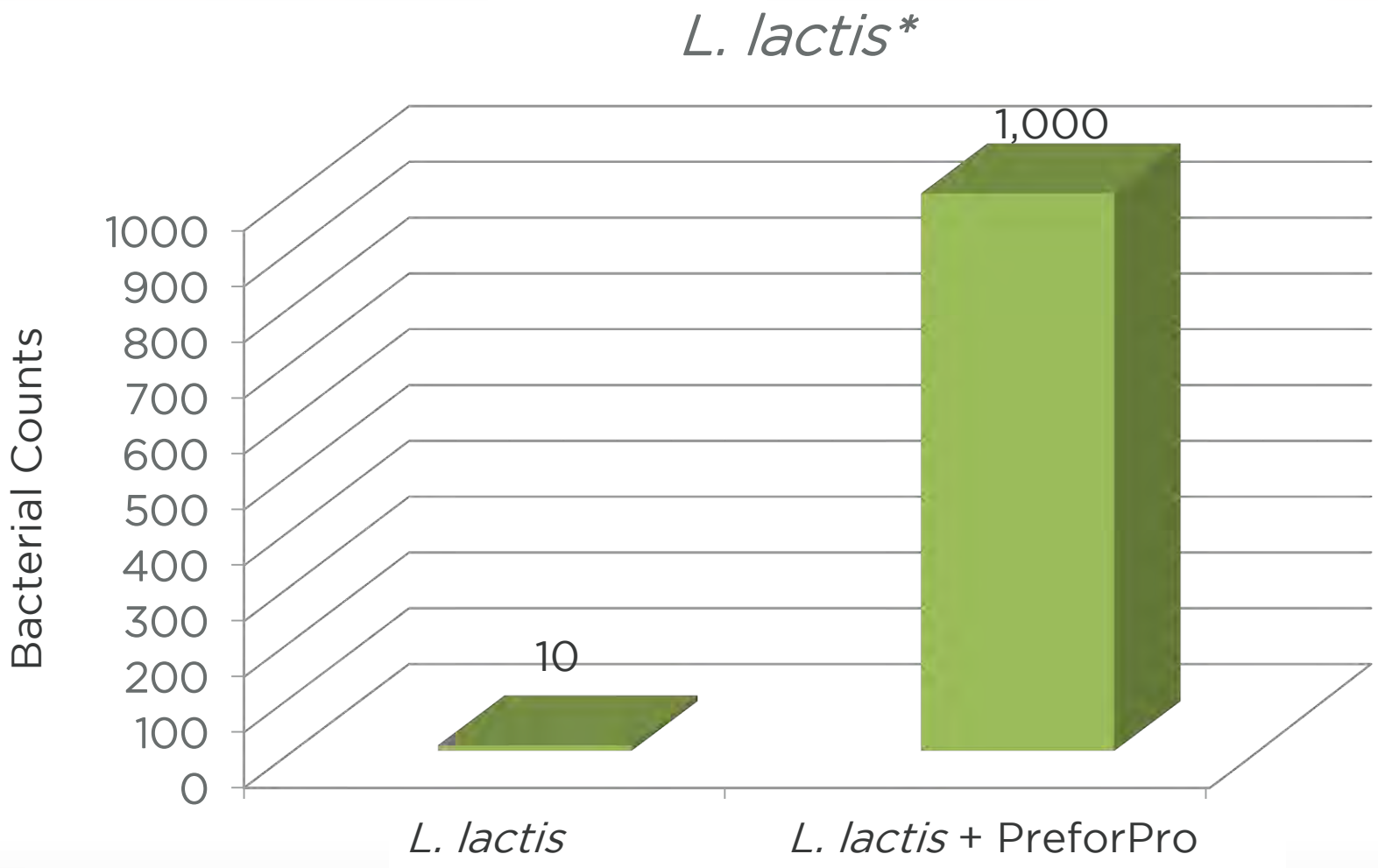
Finding Sources

In-vitro Testing



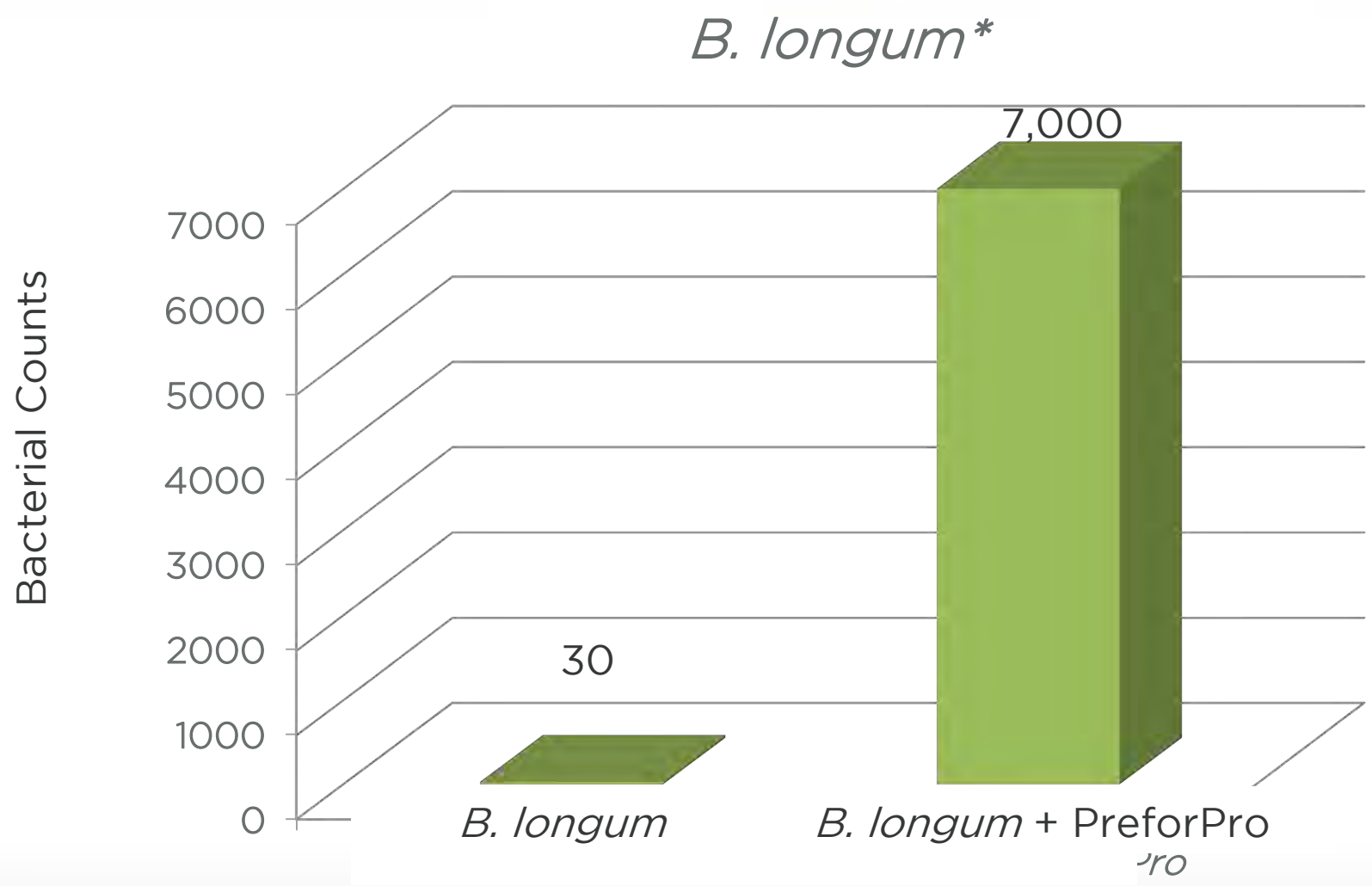
Experimental Setup

- Physiological Conditions of the Intestine:
  - Low O_2, pH7.0, 37°C
- Beneficial Bacteria + Undesirable Bacteria + PreforPro
- Bacterial Counts



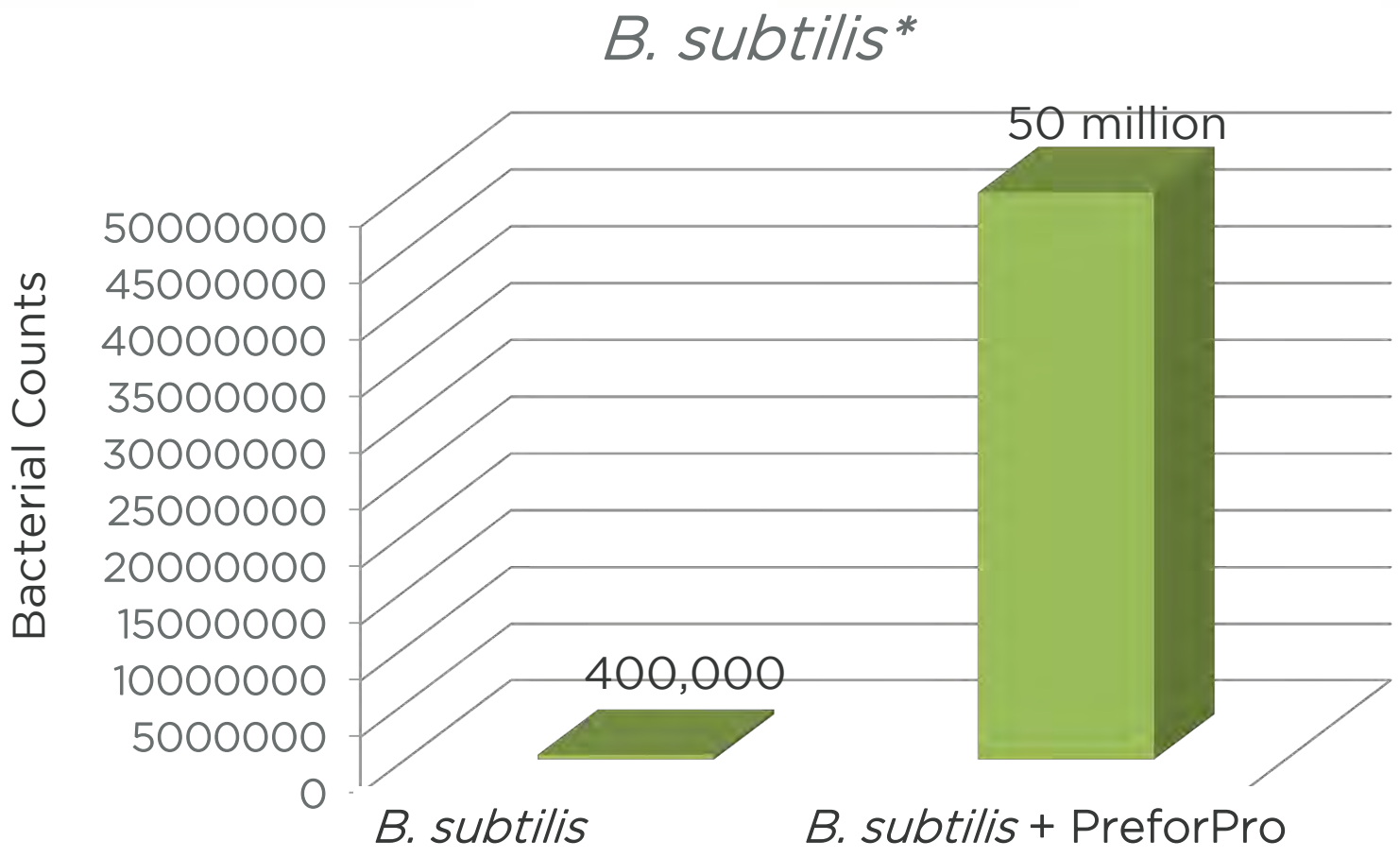
*Competing with *E.coli*

After 5 hours



*Competing with *E.coli*

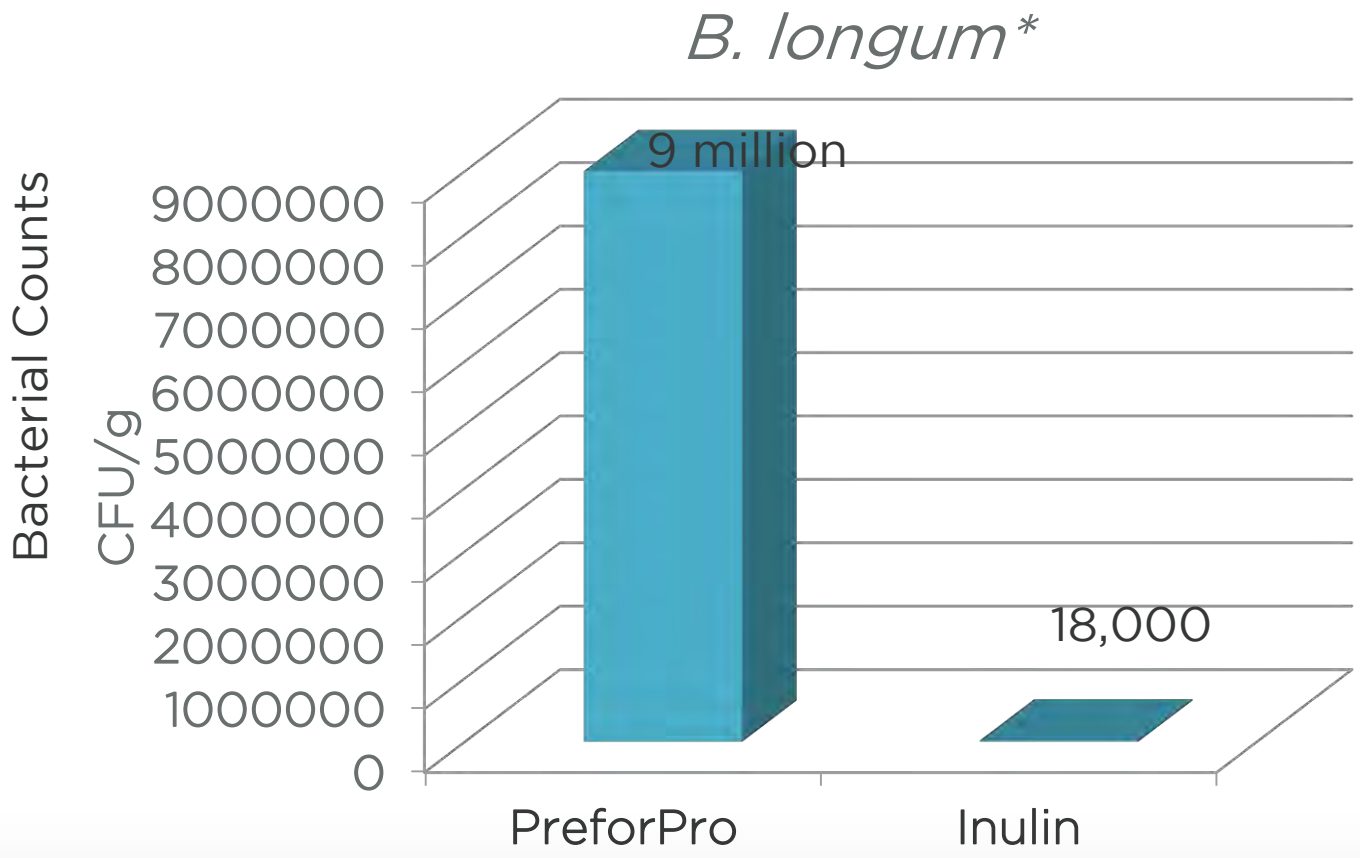
After 5 hours



*Competing with *E.coli*

After 5 hours

PreforPro vs. Inulin

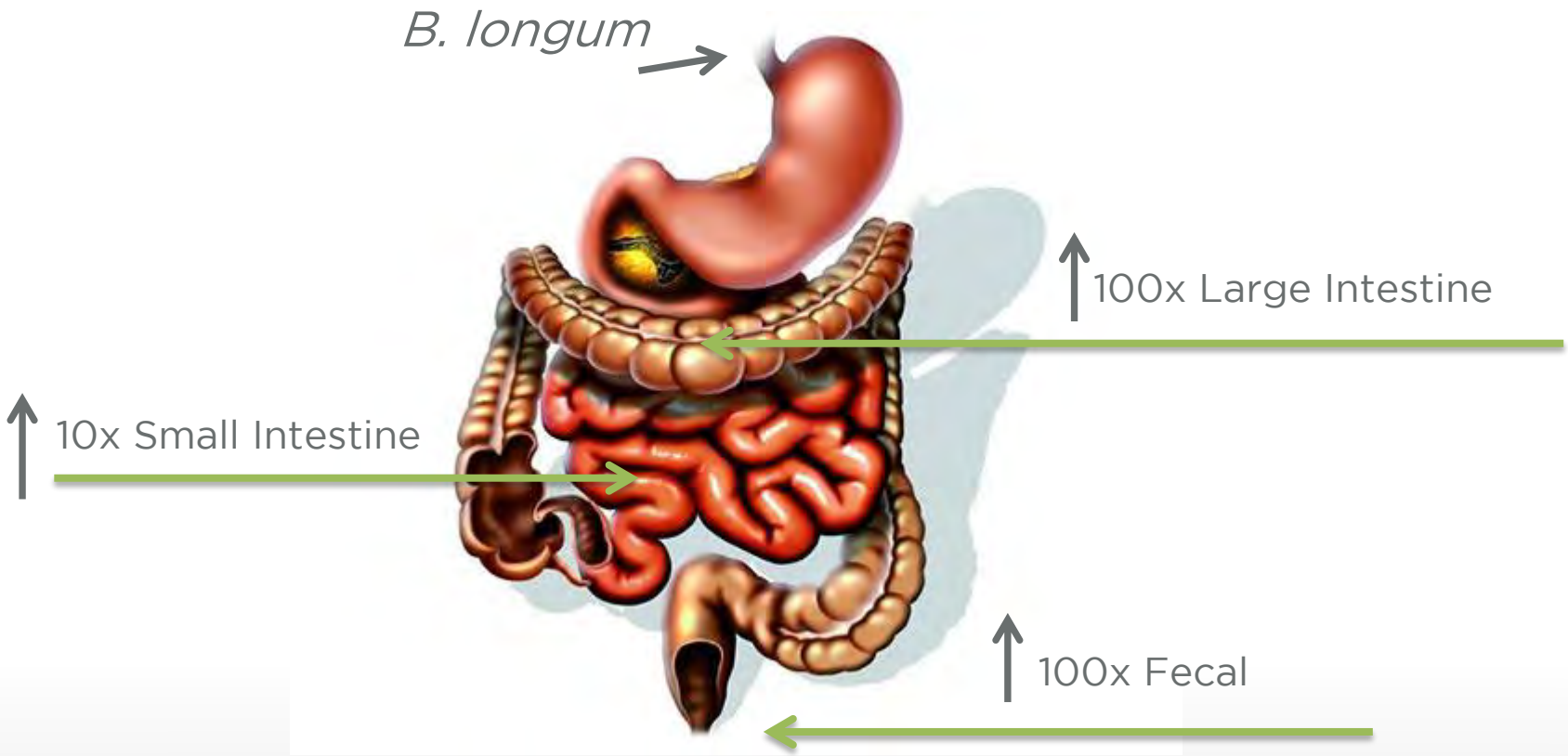


*Competing with *E.coli*

After 48 hours

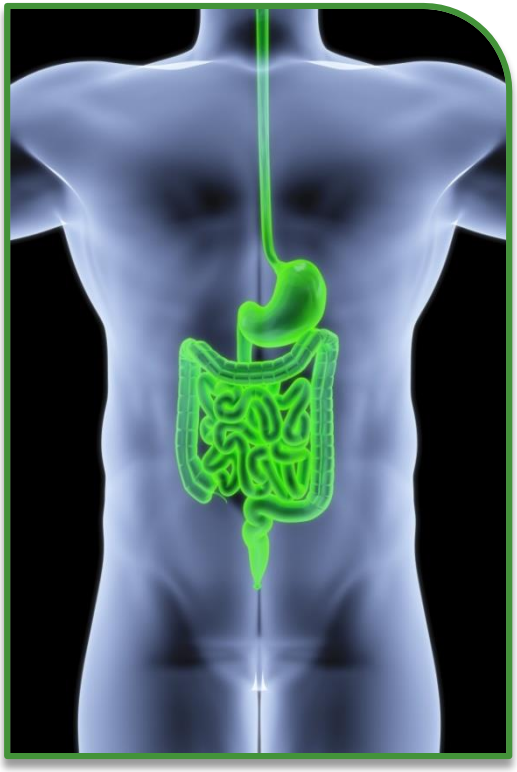
In-vivo Testing - PreforPro

The probiotic *B. longum*, competing with *E. coli*, after 24 hours



PreforPro Benefits

- Supports the proliferation of beneficial bacteria that comprise a healthy colon
- Does not promote the growth of unhealthy bacteria
- Promotes a healthy digestive tract and immune system



Research Conclusions

PREFORPRO

From concept to commercialization,
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Advantages Over Typical Prebiotics

PreforPro®

- Fermentation does not produce discomfort
- Independent of environmental conditions
- Effective in small doses
- Efficacious within hours
- Active in small and large intestine

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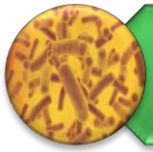
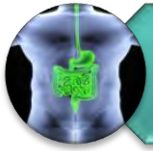
Characteristics of PreforPro


Common Component in Foods


Works with a Broad Spectrum of Probiotics


Works in Different GI Compartments

Non-GMO Project Verified

Vegetarian

GRAS


Efficacious in Small Quantities


No Allergen Labeling Required

No Preservatives Labeling Required


Does Not Cause Flatulence