

PANTHERYX



Colostrum For Kids' Supplements





Introduction to Colostrum

CONFIDENTIAL





More Than Just A Mother's Love...

A Mother's Colostrum Prepares Her Baby For The World Around Her or Him

- Transfers immunity from mother to child
- Helps in the development of the immune and gut systems
- Strengthens the intestinal barrier to help keep pathogens out and improve digestion
- Supports healthy gut bacteria (probiotics) and reduces bad bacteria and viruses (pathogens)

The same holds true for all mammals, including dairy cows



Harnessing The Benefits of Colostrum for All Ages

Colostrum from dairy cows enables us to harness the benefit of colostrum across the lifespan



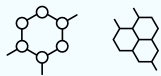
Completely natural product, produced by nature and meant to nurture



Calf receives all the colostrum it needs




Excess colostrum is collected and dried into a powder



Many bioactive components to provide an array of benefits

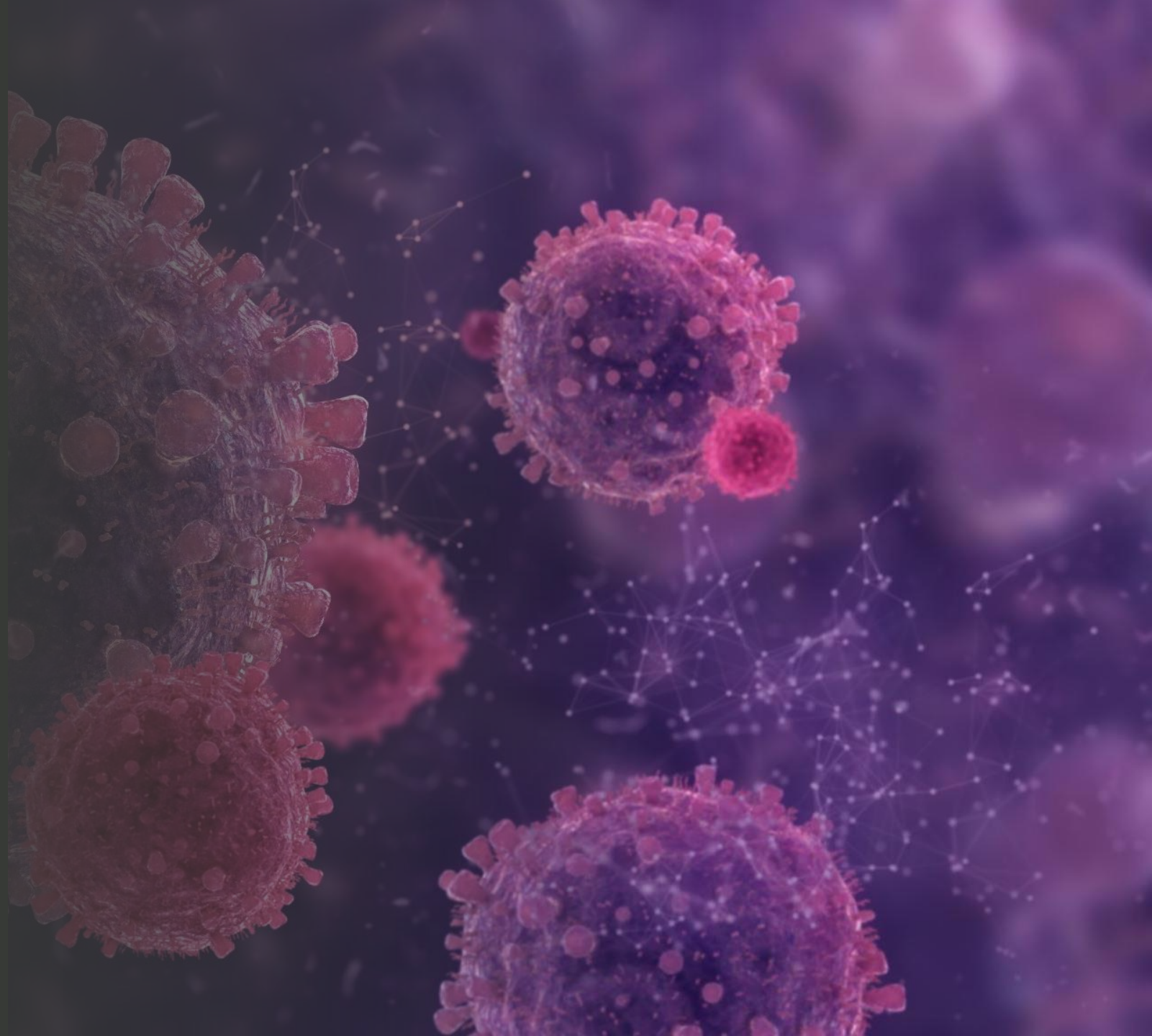


Supports immune and digestive health, sports nutrition and more



Activity of Bioactive Components

CONFIDENTIAL





Dairy Colostrum is a Powerhouse of Components

Unlike traditional prebiotics and probiotics....

Dairy Colostrum contains over

250

**Characterized
Functional
Beneficial
Bioactive Components**

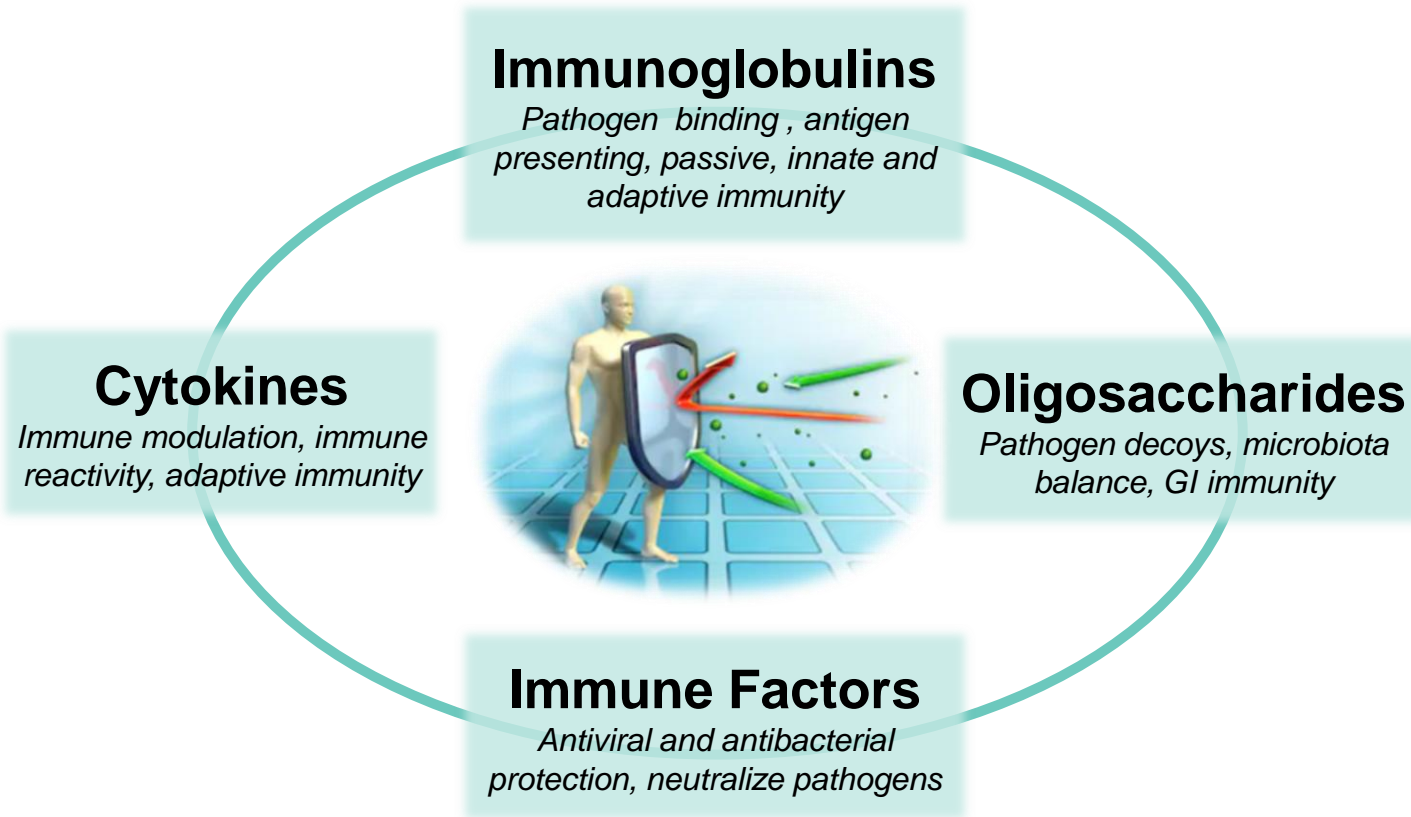
Including immunoglobulins, growth factors, oligosaccharides, immune factors, and more





Bovine Colostrum is a Powerhouse of Components

Components Targeting the Immune System and Immune Threats



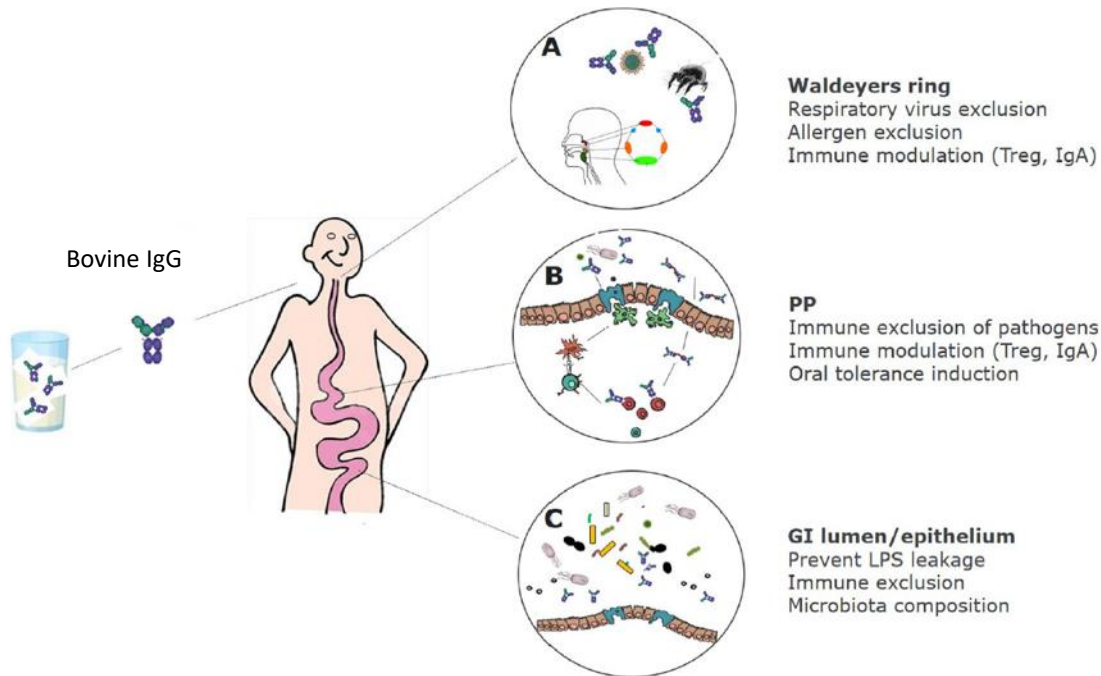
Working in Tandem with growth factors enhancing mucosal integrity & repair in the gut

- Help stimulate cell growth, cellular differentiation and cell maturation
- Act as signaling molecules between cells & regulate a variety of cellular responses
- Growth Factor categories include:
 - Epidermal Growth Factors (EGF)
 - Fibroblast Growth Factors (FGF)
 - Insulin-like Growth Factors (IGF-I, IGF-II)
 - Platelet-derived Growth Factors (PDGF)
 - Transforming Growth Factors (TGF α , TGF β)

Mechanisms of Action for Immunity

Immunoglobulins

Immunoglobulins have multiple actions along their journey down the oral and gastro-intestinal tract



Immunoglobulins can boost and modulate the immune system from several different angles

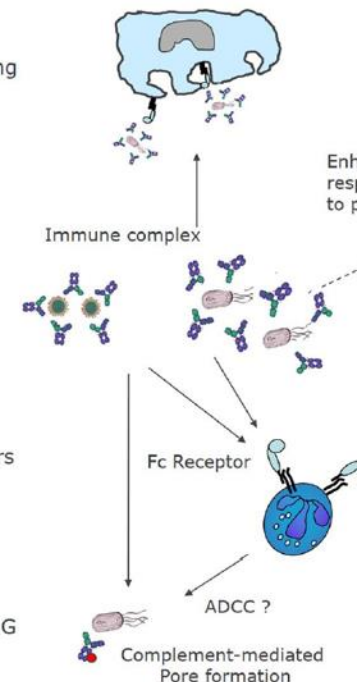
INNATE

Phagocytosis and killing of bacteria

Binding to pathogens
Neutralization

Binding to Fc Receptors

Potential other Mechanisms
Mediated by bovine IgG

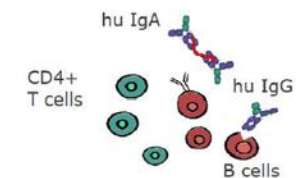


ADAPTIVE

Cytokine production
Antigen presentation

Enhancing T-cell and B-cell responses

Increased adaptive immunity

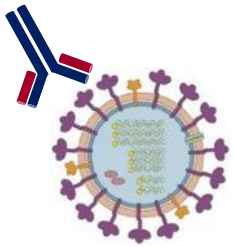




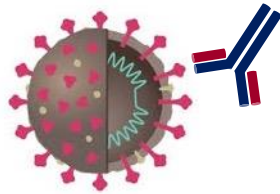
Activity for Immunity

Immunoglobulins

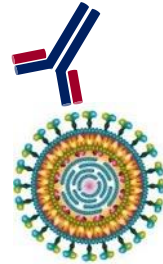
Bovine immunoglobulins have shown binding activity against a wide range of pathogens



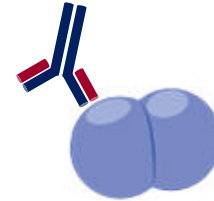
Influenza



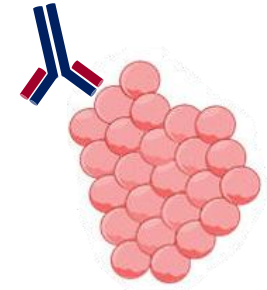
Coronaviruses



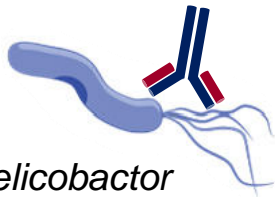
Rotavirus



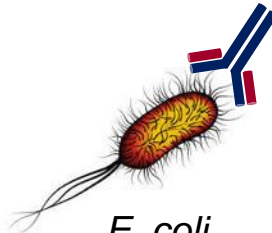
Streptococcus pneumoniae



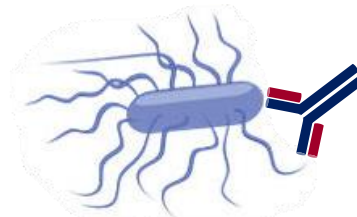
Staphylococcus



Helicobacter pylori



E. coli



Salmonella

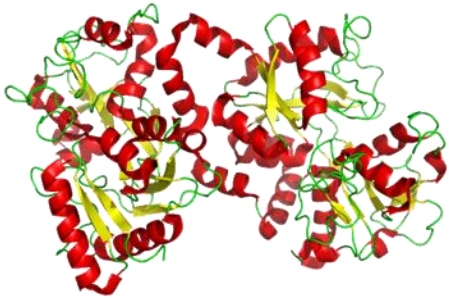
And others including:
Candida albicans, *Campylobacter*,
Cryptosporidium, *Pseudomonas*,
and *Enterobacter*



Activity for Immunity

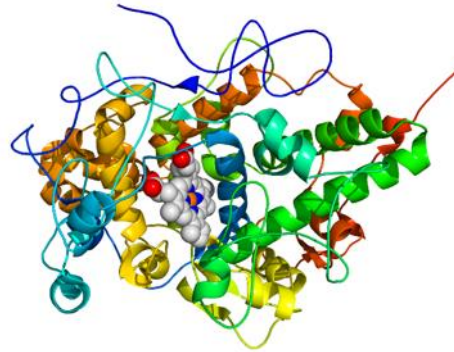
Immune Factors

Lactoferrin



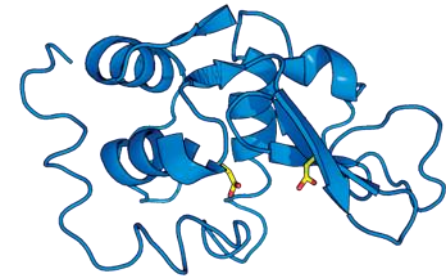
- Glycoprotein, antiviral and antibacterial
- Inhibits growth of E. coli, Salmonella, Listeria, Streptococcus, Giardia
- Blocks viruses from entering cells via binding cellular receptors or direct binding to viruses
- Antiviral against Rotavirus, RSV, herpes, Hepatitis B and C, HPV, HIV, and others

Lactoperoxidase



- Enzyme with antibacterial functions
- Toxic to a wide array of bacteria via production of reactive oxygen species including hydrogen peroxide
- Inhibits bacterial metabolism

Lysozyme



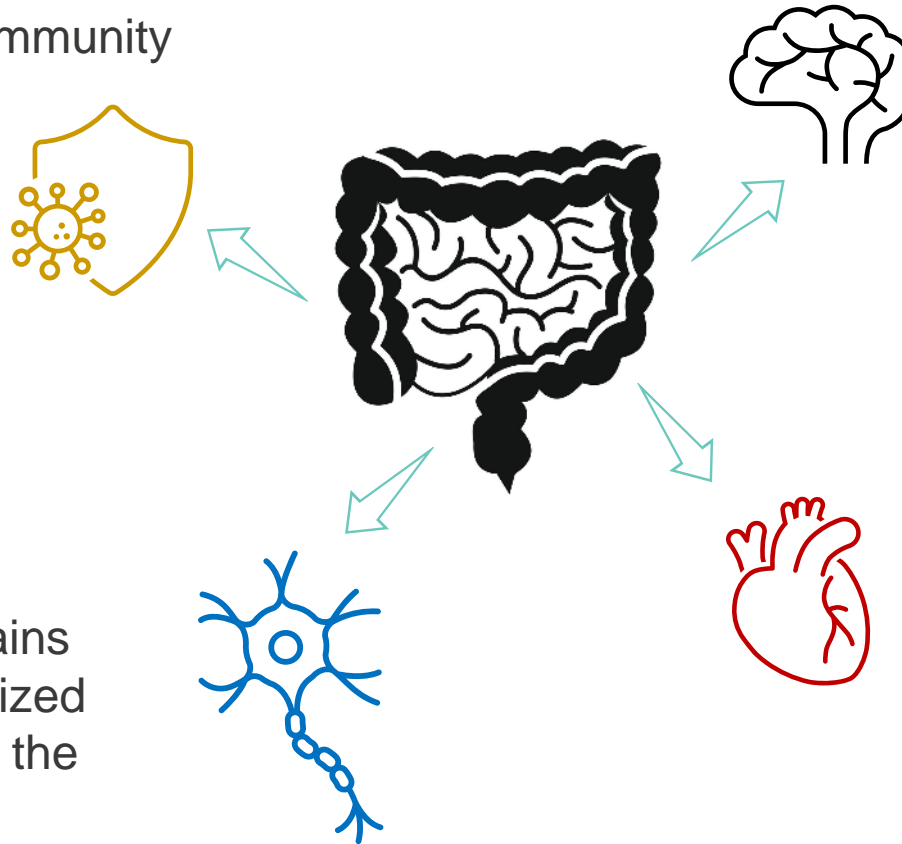
- Enzyme with antibacterial functions
- Utilizes bacterial cell wall as an enzymatic substrate causing bacterial cell lysis and death



The Health of Your Gut Impacts Your Entire Body

Immune – more than 70% of the immune system is in the gut which directly and indirectly impacts immunity outside the gut (whole body)

Brain – the gut communicates directly and indirectly with the brain and can affect brain inflammation, mood, and more



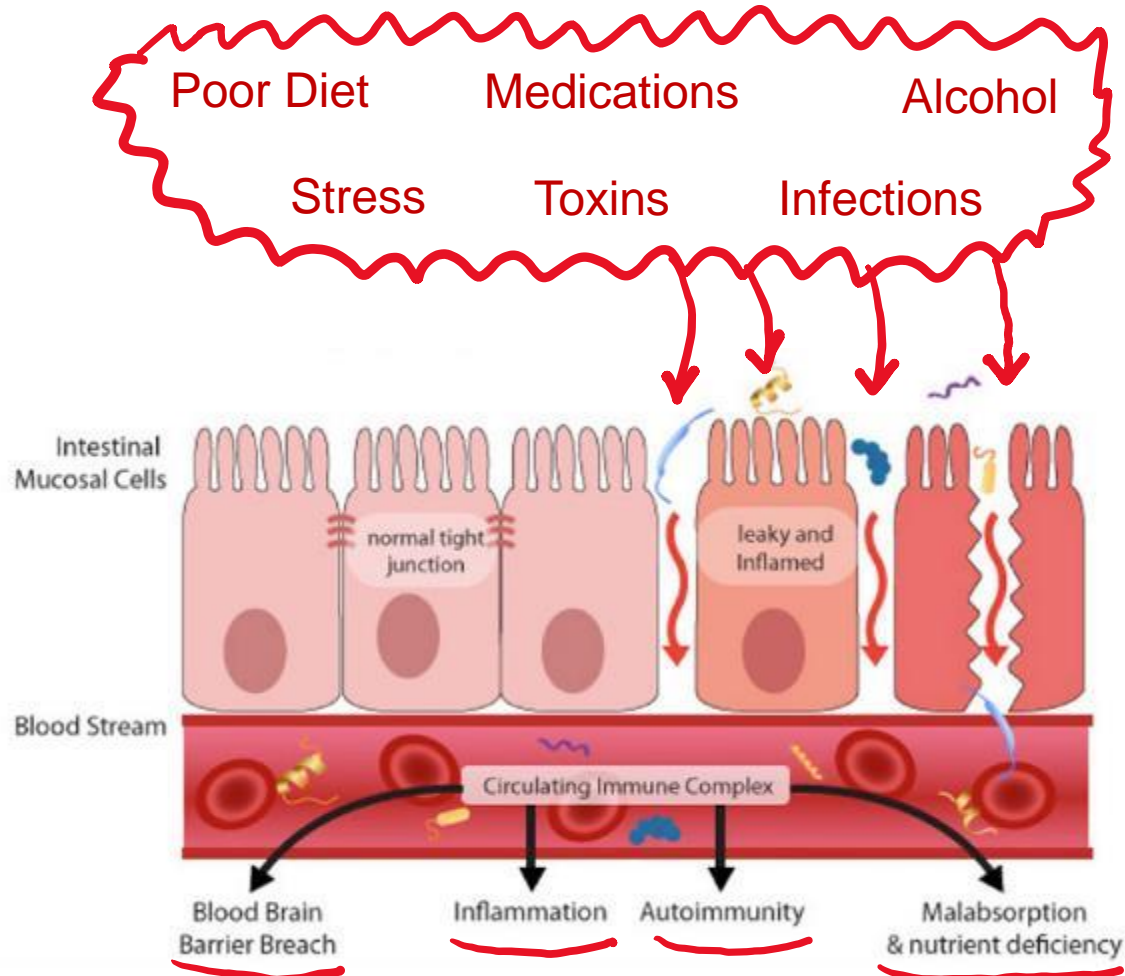
Nervous system – the gut contains 100-500 million neurons (specialized communication cells), more than the spinal cord, some call the gut a “**second brain**”

Heart – beneficial microbiota can affect things like good cholesterol (HDL) levels



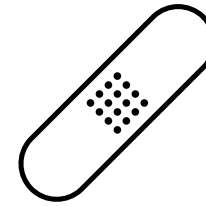
Colostrum Growth Factors Can Help Heal The Gut

A Permeable (Leaky) Gut is Caused By Many Factors



Colostrum Contains Growth Factors

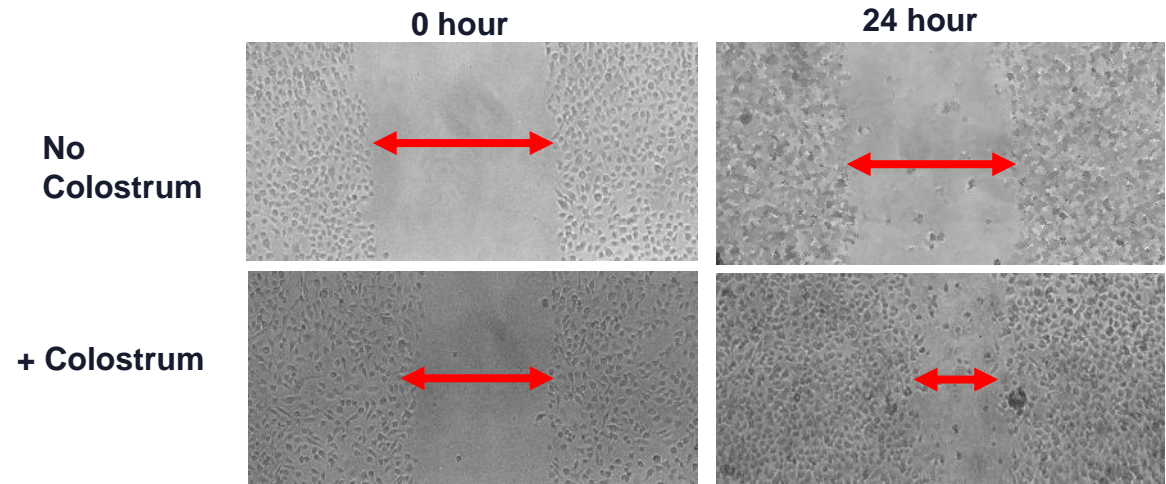
Can help protect and heal the intestinal barrier



EGF – Epidermal Growth Factor

IGF – Insulin-Like Growth Factor
and more...

Study: Colostrum from dairy cows speeds up closure of a wound in an intestinal cell model



Playford and Weiser. Nutrients (2021).13(1):265



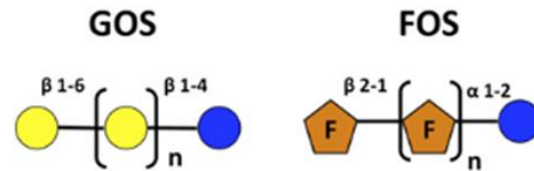
Colostrum Oligosaccharides Can Act as Prebiotics

Traditional Prebiotics

Simple structure, have health benefits, but can have side effects (discomfort)

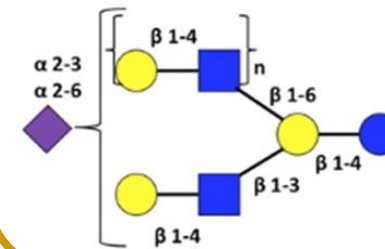
Traditional Prebiotics

Galacto- and Fructo-oligosaccharides



CCO

Cow Colostrum Oligosaccharides



Cow Colostrum Oligosaccharides

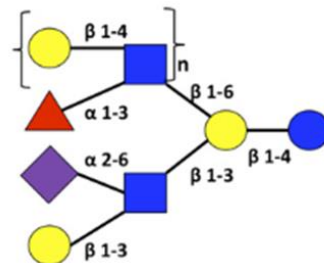
Complex oligosaccharides that have similarities to Human Milk Oligosaccharides (HMO)

Human Milk Oligosaccharides

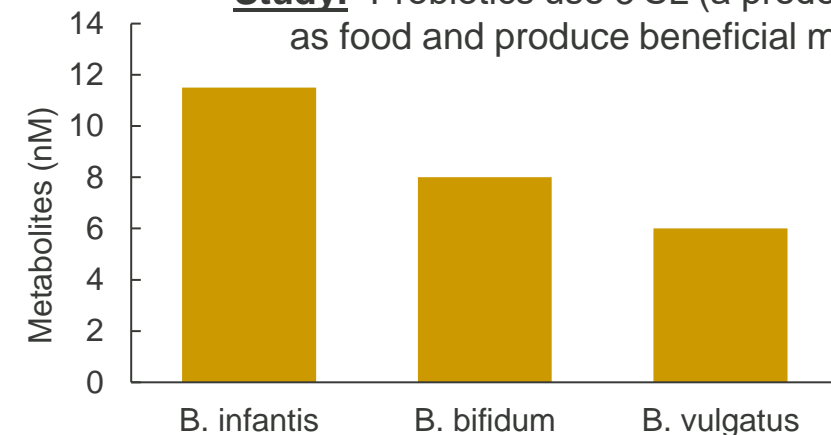
Complex structures that feed beneficial microbes in the infant gut (like *Bifidobacterium infantis*)

HMO

Human Milk Oligosaccharides



Study: Probiotics use 3'SL (a predominant CCO) as food and produce beneficial metabolites



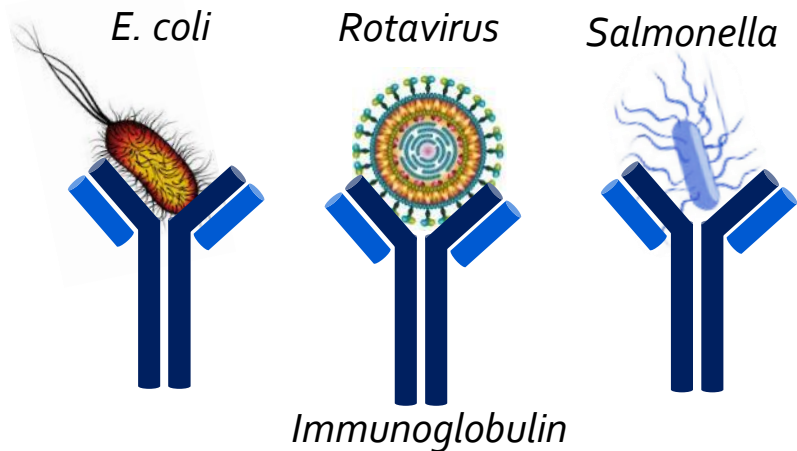
Moon, J. S., et al. J. Func. Foods 21 (2016): 497-506



Colostrum Immunoglobulins Improve Intestine Environment

Colostrum Immunoglobulins

Can bind to pathogens in the intestine



Reducing likelihood of infection



Allowing probiotics to have more resources (food)

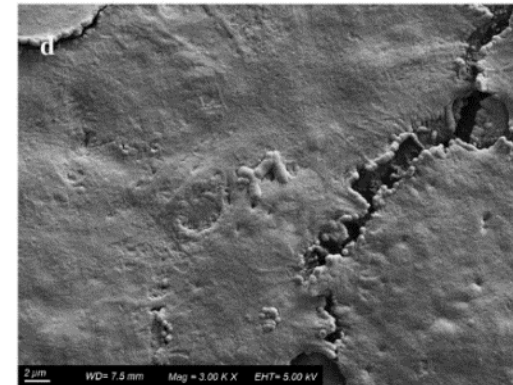


Helping to establish a good balance of bacteria

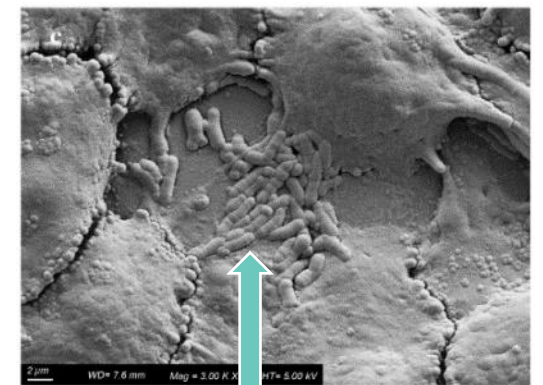
Colostrum Immunoglobulins

Can help probiotics adhere to the intestinal wall

Control



+ Immunoglobulin



Probiotic attached
to intestinal cells



They likely support more successful
colonization of probiotics

Morrin ST, et al. *AMB Express*, 2020: 10(1), 1-10.



Colostrum Can Support Probiotics

**Immunoglobulins
Growth Factors**



Help create ideal
intestinal environment

**Oligosaccharides
Glycoproteins**

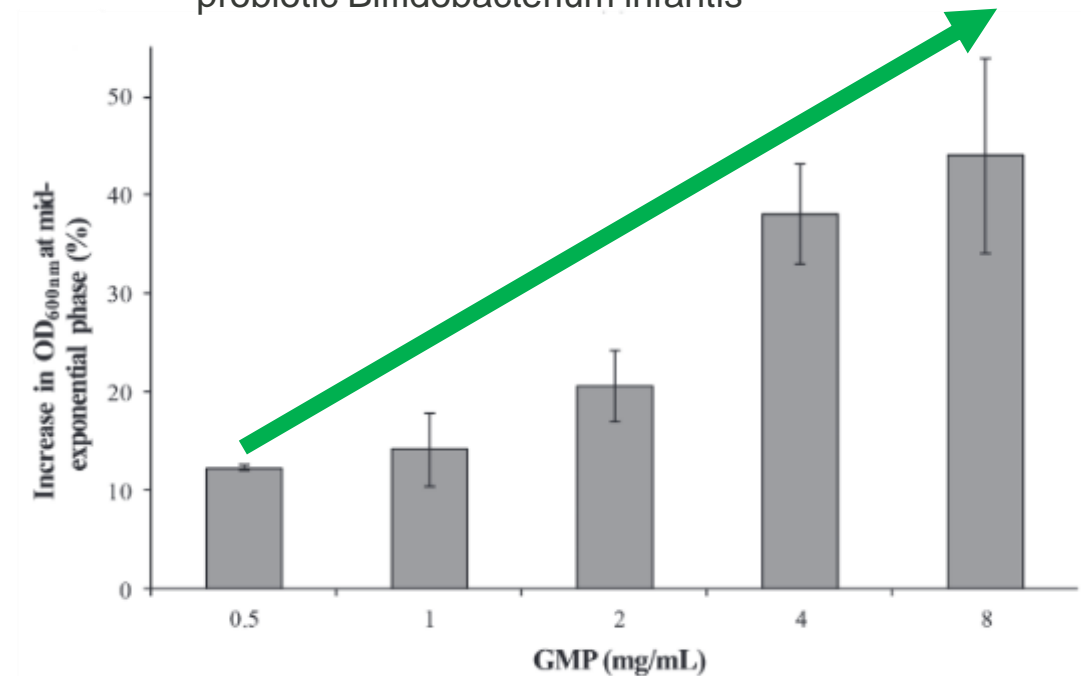


Help to feed and
promote probiotic growth

Study: Colostrum from dairy cows increases the growth of many different types of probiotic strains

Strain	Col OD _{max} [†]
<i>Pediococcus acidilactici</i> RBL39	↑
<i>Pediococcus acidilactici</i> R1001	↑
<i>Lactobacillus lactis</i> RBL22	↑
<i>Lactobacillus helveticus</i> R0052	↑
<i>Lactobacillus helveticus</i> R0389	↑
<i>Bacillus subtilis</i> R0179	NE
<i>Enterococcus faecium</i> R0026	↑
<i>Lactobacillus rhamnosus</i> R0011	↑
<i>Lactobacillus rhamnosus</i> GG	↑
<i>Lactobacillus rhamnosus</i> RW-9595M	↑
<i>Bifidobacterium lactis</i> BB12	↑
<i>Bifidobacterium longum</i> R0175	↑

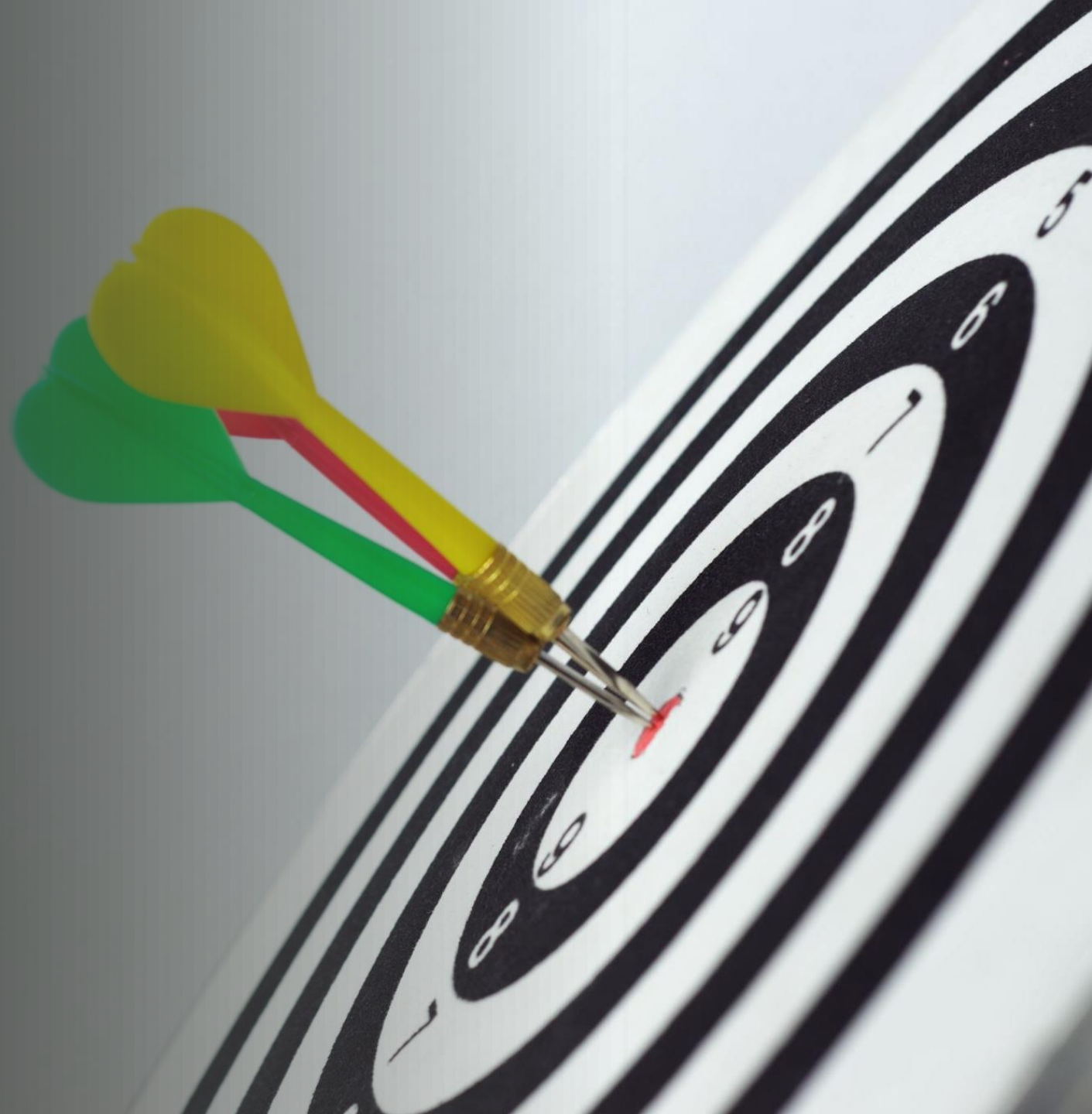
Study: Colostrum glycoprotein (GMP) promotes the growth of probiotic *Bifidobacterium infantis*



Champagne, C. P., et al. Can. J. Microbiol. 60.5 (2014): 287-295.

O'Riordan, Noelle, et al. *Journal of dairy science* 101.8 (2018): 6730-6741.

Clinical Overview Summary: Children



CONFIDENTIAL



Immune Health

CONFIDENTIAL



Clinical Evidence: Immune Health



Upper Respiratory Tract Infections (URTI)

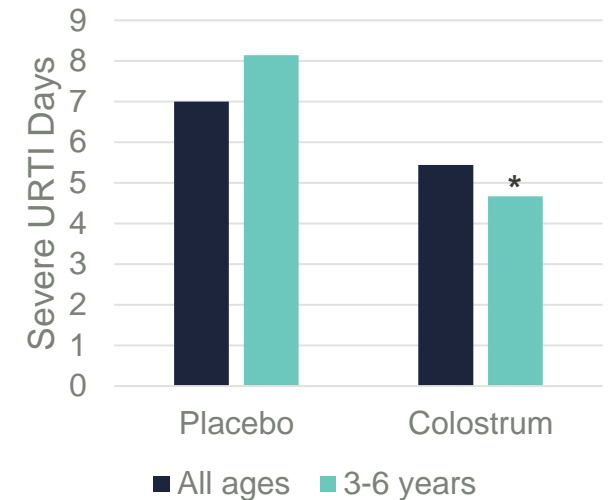
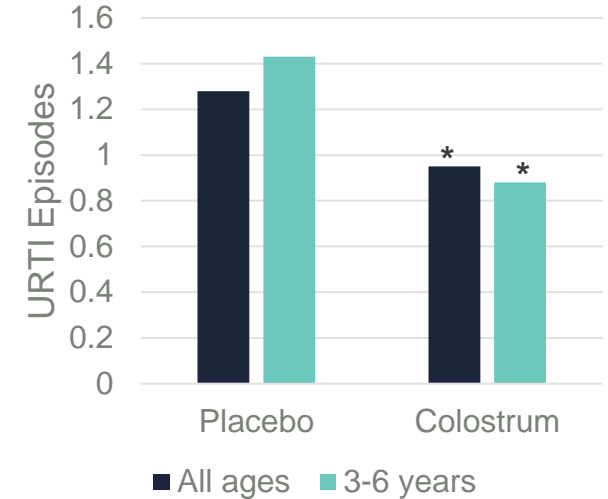
Study

- **Children 3 year to 9 years old**
- 195 participants
- Normal healthy children
- Double-blind, placebo controlled randomized trial
- Milk powder placebo
- **Received 500 mg bovine colostrum per day for 8 weeks**

Results

Compared to placebo controls:

- After 8 weeks consuming bovine colostrum
 - **Lower mean URTI episodes**
 - **Fewer days with severe URTI symptoms**



Clinical Evidence: Immune Health



Upper Respiratory Tract Infections (URTI) and Diarrhea

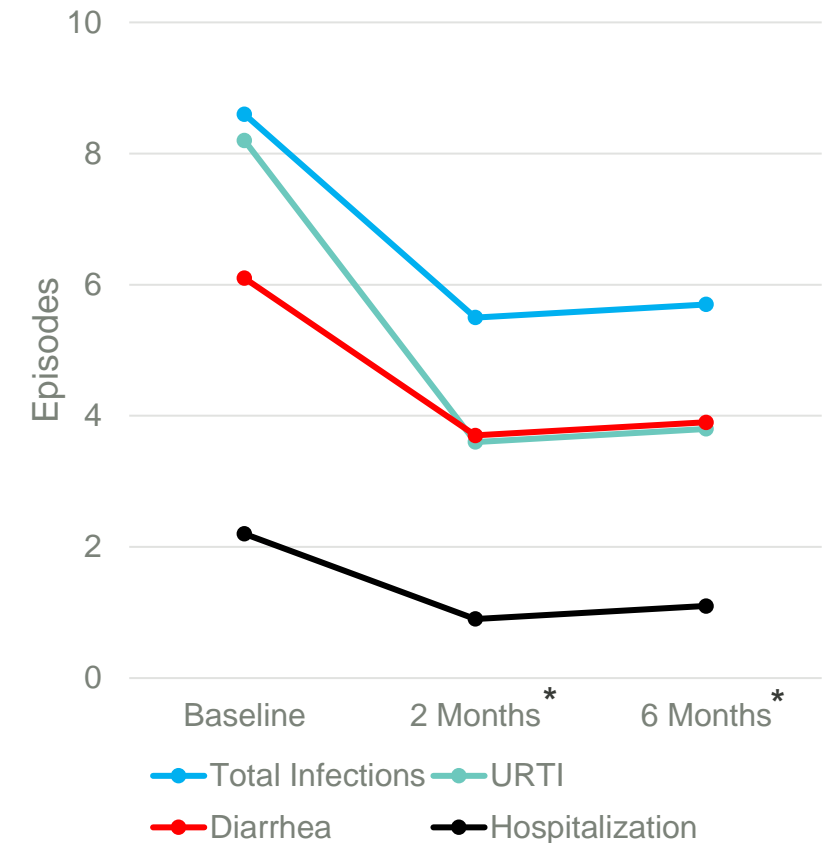
Study

- **Children 1 year to 6 years old**
- 160 participants
- Had recurrent URTI and/or diarrhea
- Open label, multicenter
- **Received bovine colostrum 3g (<2 y) or 6g (>2 y) per day for 6 months**

Results

Compared to intra-individual baseline:

- After 2 months consuming bovine colostrum
 - **Lower total infections**
 - **Lower URTI episodes**
 - **Lower diarrhea episodes**
 - **Less hospitalizations**
- After 6 months consuming bovine colostrum
 - **All measures still significantly lower No regression to baseline levels**



Clinical Evidence: Immune Health

Upper Respiratory Tract Infections (URTI) and Diarrhea

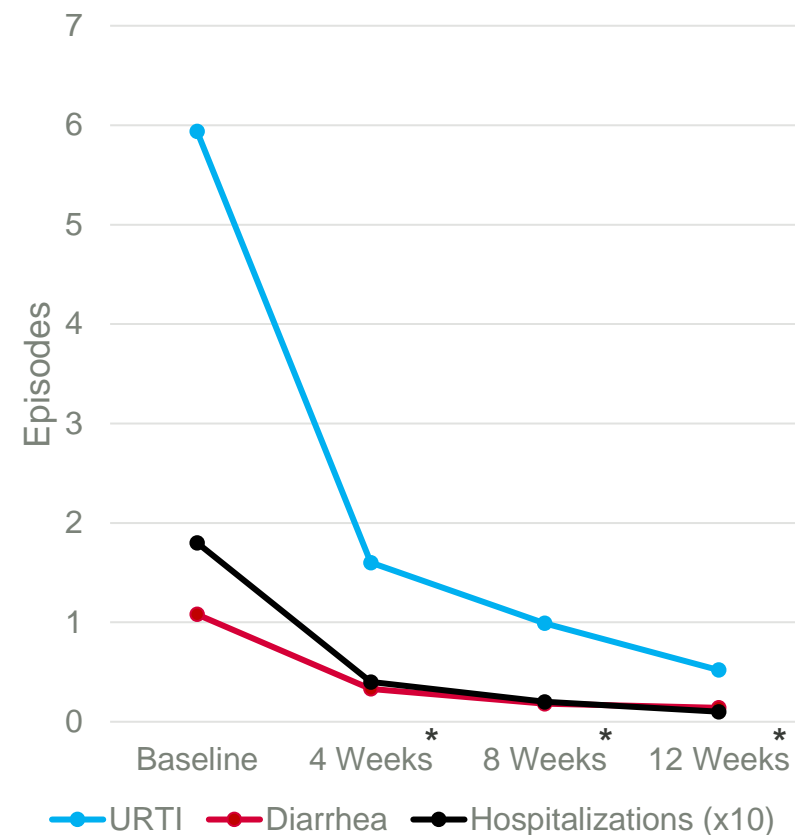
Study

- **Children 1 year to 8 years old**
- 605 participants
- Had recurrent URTI and/or diarrhea
- Open label, multicenter
- **Received 3g bovine colostrum per day for 12 weeks**

Results

Compared to intra-individual baseline:

- **Reduction in number of URTI episodes**
 - 73% by week 4
 - 83% by week 8
 - 92% by week 12
- **Reduction in number of diarrhea episodes**
 - 70% by week 4
 - 83% by week 8
 - 87% by week 12
- **Reduction in number of hospitalizations**
 - 76% by week 4
 - 89% by week 8
 - 92% by week 12




* Significant difference $P < 0.05$ vs baseline

Patel K et al (2006). *Indian Journal of Pediatrics*, 73(7): 585-591



Developmental Growth



CONFIDENTIAL



Clinical Evidence: Developmental Growth

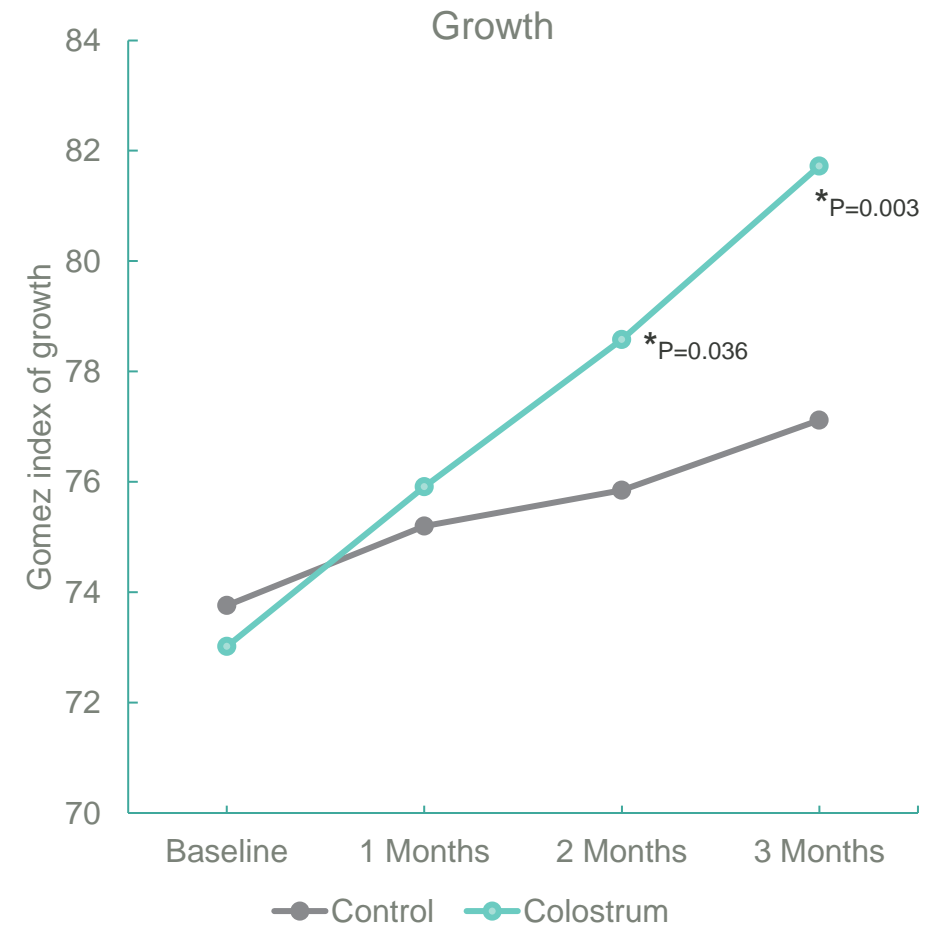
Study

- **Children 1 year to 10 years old**
- 120 participants
- Mild or moderate unexplained failure to thrive
- 85-95% of 50th percentile for height
- 60-90% of 50th percentile for weight
- Participant blinded, randomized trial
- **Half received 40 mg bovine colostrum per kg body weight daily for 3 months**

Results

Compared to control:

- After 2 months consuming bovine colostrum
 - **Faster growth rate**
- After 3 months consuming bovine colostrum
 - **Faster growth rate**





Digestive and Gut Health



CONFIDENTIAL



Clinical Evidence: Gut Health

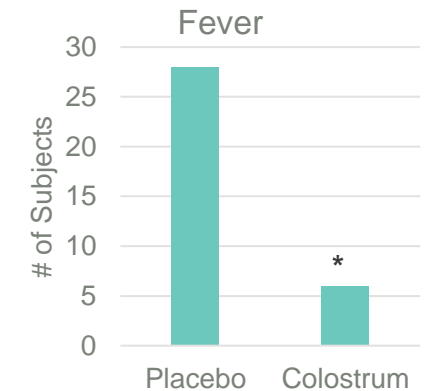
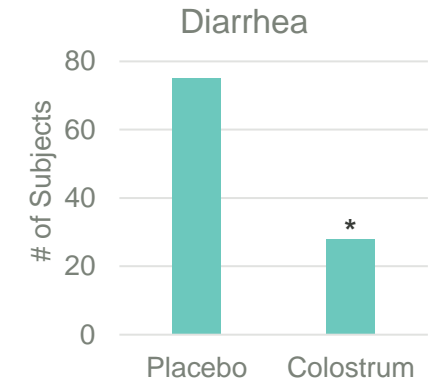
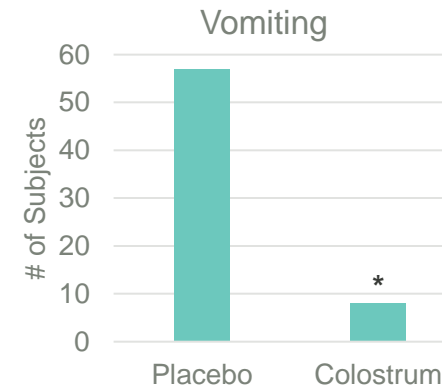
Acute Diarrhea

Study

- **Infants and toddlers age 6 to 24 months**
- 160 total subjects, 80 per group
- Double blind, randomized controlled trial
- Diagnosed with a case of acute diarrhea
- **All received 3g per day of bovine colostrum for 1 week**

Results

- After 48 hours of bovine colostrum, **the number of individuals with vomiting, diarrhea, and/or fever were significantly lower** than the placebo group
- Over the 1-week trial, bovine colostrum **significantly reduced the time to disappearance of all symptoms**



*P<0.001 vs placebo

Barakat et al (2020). Journal of Tropical Pediatrics, 66(1):46-55.



Clinical Evidence: Gut Health

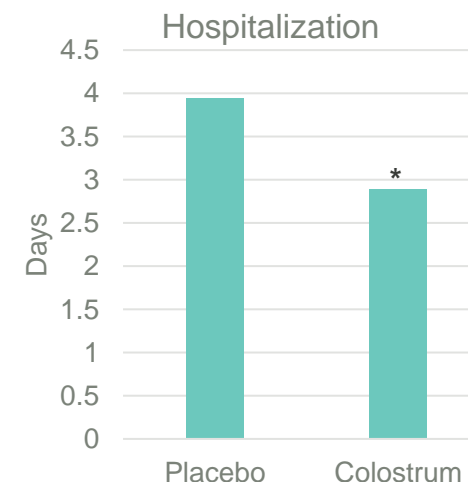
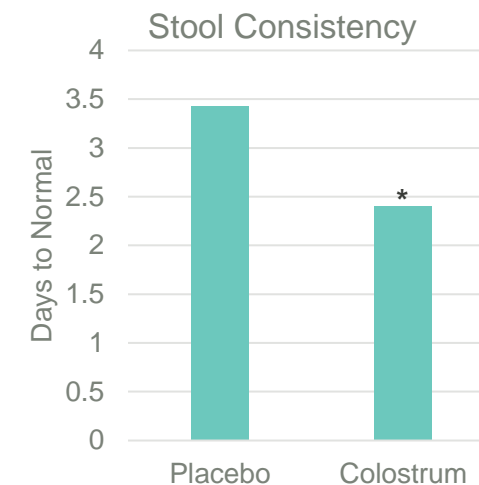
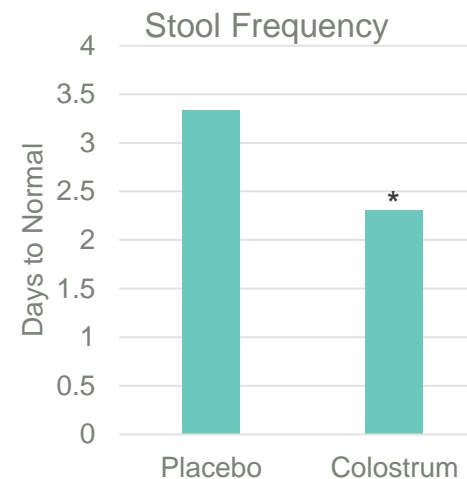
Acute Diarrhea

Study

- Infants and toddlers age 6 to 24 months (mean 10.9)
- 70 total subjects, 35 per group
- Diagnosed with a case of acute mild-intermediate diarrhea
- Double blind, randomized controlled trial
- All received 750 mg per day of bovine colostrum for 1 week

Results

- Infants and toddlers on bovine colostrum **recovered significantly faster from acute diarrhea as measured by stool frequency and stool consistency** compared to the placebo group
- Consumption of bovine colostrum **significantly reduced the overall hospital stay length** compared to the placebo group



Suwarba et al (2006). Paediatrica Indonesiana, 46(5-6):127-133

*P<0.001 vs placebo



Structure Function Claims

CONFIDENTIAL

A blurred image of a blue stethoscope resting on a reflective surface, with a vertical line separating the dark left side from the light right side.



Colostrum Immune Health Claims

Adult

- Supports the immune system.*
- Balances immune response, beneficial for sustaining good health.*
- Supports respiratory health.*
- Supports and helps regulate the body's natural immune responses.*
- Helps protect and nourish the gut where over 70% of the immune system resides.*

Children

- Helps support your child's immune system.*
- Supports your child's respiratory health.*
- Provides an added source of nutrition to support your child's immune defenses as they grow.*
- Is a comprehensive source of valuable proteins, fats, carbohydrates, vitamins, minerals, and immune factors & growth factors that support your child's immune system.*
- Helps protect, strengthen, and nourish your child's digestive tract where over 70% of the immune system resides.*

*This statement has not been approved by the Food and Drug Administration. This product is not intended to diagnose, cure, treat or prevent any disease.



Colostrum Digestive Health Claims

Adult

- Supports the gut's natural repair process, restoring normal function.*
- Helps relieve occasional digestive upsets as well as address the source by positively impacting the gut lining.*
- Supports gut lining integrity by positively impacting all five layers of the gut.*
- Helps the gut function better.*

Children

- Helps relieve occasional digestive upsets and soothe your child's tummy.*
- Helps your child's digestive system function better.*
- Provides an added source of nutrition to promote better digestive function as your child grows.*

*This statement has not been approved by the Food and Drug Administration. This product is not intended to diagnose, cure, treat or prevent any disease.



Concept Inspirations

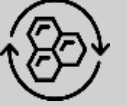


■ 1+ yrs old



Mix in Powder – Immune & Respiratory Health

- ✓ **USP:** Dual action Immune and Respiratory health
- ✓ **Ingredients:** bovine colostrum powder, milk protein concentrate, non-fat dry milk powder
- ✓ **Claims:**
 - Helps regulate children's immune response
 - Supports your child's respiratory health
- ✓ **Dosage:** 500mg – 1g



Immune Health



Powder

1yr+

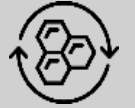


*Claim related to colostrum functionality. Products for Infants and Toddlers are highly regulated. Please consult with your independent legal, science, and regulatory professionals accordingly.



Mix In Powder Sachets – Immune & Digestive Health

- ✓ **USP:** Probiotics supplement with colostrum, for kids of all ages
- ✓ **Functional Ingredients:** colostrum powder, FOS, & probiotics blend
- ✓ **Claims:**
- ✓ Helps reduce occasional digestive upset
 - Supports digestive and immune system
- ✓ **Dosage:** 500mg colostrum/serving



Immune Health



Digestive Health

Powder Sachets

1yr+

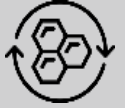


*Claim related to colostrum functionality. Products for Infants and Toddlers are highly regulated. Please consult with your independent legal, science, and regulatory professionals accordingly. Brand image is owned by UpSpring



Chewable Tablets – Immune & Digestive Health

- ✓ **USP:** Dual action Immune and Respiratory health
- ✓ **Ingredients:** bovine colostrum powder, milk-based powder, whole milk powder, maltodextrin, Immulox (permeate powder)
- ✓ **Claims:**
- ✓ Supports immunity, digestive health
 - Helps relieve occasional digestive upsets and soothe your child's tummy
 - Promotes healthy growth and development
- ✓ **Dosage:** 500mg – 1g, 1-2 tablets per day



Immune Health



Chewable Milk Tablets

1yr+



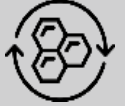
*Claim related to colostrum functionality. Products for Infants and Toddlers are highly regulated. Please consult with your independent legal, science, and regulatory professionals accordingly.

CONFIDENTIAL



Chewable Tablets – Immune & Digestive Health

- ✓ **USP:** Kid's chewable table with triple action
- ✓ **Functional Ingredients:** colostrum powder, Cal-D, and Lysine
- ✓ **Claims:** supports immune system, boosts the appetite, & promotes healthy bones
- ✓ **Dosage:**
 - 100mg colostrum (20% IgG)/tablet
 - chew 2 tablets, 1-2 times daily



Immune Health



Digestive Health



Growth

Chewable Milk Tablets

1yr+



*Claim related to colostrum and other ingredient functionality. Products for Infants and Toddlers are highly regulated. Please consult with your independent legal, science, and regulatory professionals accordingly. Bio-Life brand is owned by MEGA

CONFIDENTIAL

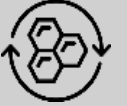


Milk Straws – Immune Health

- ✓ **USP:** Probiotics supplement with colostrum, for kids of all ages
- ✓ **Functional Ingredients:** colostrum powder, FOS, & probiotics blend
- ✓ **Claims:**
 - Supports immune system
- ✓ **Dosage:** 200mg colostrum/serving, 2 per day



Milk Straws



Immune Health



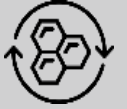
Digestive Health

1yr+



Yogurt Supplemented with Colostrum

- ✓ **USP:** a snack that supports digestion and immune system
- ✓ **Functional Ingredients:** colostrum, Immulox (permeate powder), and live culture
- ✓ **Claims:** supports gut health & immune system with live probiotics, and natural prebiotics, lactoferrin, and immunoglobulins IgG from colostrum
- ✓ **Recommended dosage:** 250mg of colostrum per serving, 2 servings per day colostrum/serving



Immune Health



Digestive Health

Flip in your toppings & supplements

1yr+



*Claim related to colostrum functionality. Products for Infants and Toddlers are highly regulated. Please consult with your independent legal, science, and regulatory professionals accordingly.

CONFIDENTIAL

PANTHERYX

