

Reducing Free Milk Glycan Monomers Generated by the Neonate Gut Microbiota Eliminates Colonization by Dysbiotic Microbiome Members

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ABSTRACT

Researchers at the University of California, Davis have developed a method to prevent and treat enteric pathogenic bacterial infections in nursing mammals by reducing milk glycan monomers in the gut through targeted probiotic administration.

FULL DESCRIPTION

This technology addresses the prevention and treatment of enteric infections in nursing non-human mammals by limiting the availability of milk glycans and milk glycan degradation products, such as sialic acid, which serve as critical carbon sources for pathogenic bacteria like Enterobacteriaceae and Clostridiaceae. The method employs administration of specific probiotic microorganisms, notably Lactobacillus and Bifidobacterium species, which consume these glycans or their monomers, thereby reducing pathogen colonization and associated diseases such as piglet scour or diarrhea. The approach also includes the possible use of prebiotics to promote colonization of these beneficial microbes in the neonate gut, offering a targeted, antibiotic-free strategy to control harmful pathogens.

APPLICATIONS

- ▶ Veterinary probiotics to prevent and manage neonatal diarrhea and colibacillosis in swine and bovine industries.
- ▶ Feed additives containing Lactobacillus and Bifidobacterium strains for improved gut health and disease resistance in livestock.
- ▶ Products combining probiotics with prebiotic glycans to enhance gut colonization and pathogen suppression.
- ▶ Animal husbandry protocols aimed at reducing use of antibiotics and improving sustainable livestock production.
- ▶ Diagnostic and therapeutic interventions for managing enteric dysbiosis in neonatal non-human mammals.
- ▶ Potential adaptation for other nursing mammals in agriculture (e.g., sheep, goats) and possibly for companion animals.

FEATURES/BENEFITS

- ▶ Selectively reduces enteric pathogens by limiting their nutritional niche, avoiding broad-spectrum antibiotics.
- ▶ Utilizes natural or probiotic microorganisms (Lactobacillus and Bifidobacterium species) to competitively consume milk glycan monomers.

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OTHER INFORMATION

KEYWORDS

bifidobacterium,
 enterobacteriaceae,
 lactobacillus, milk
 glycans, neonate gut,
 pathogen reduction,
 piglet diarrhea,
 probiotics, sialic acid,
 veterinary therapeutics

CATEGORIZED AS

- ▶ **Agriculture & Animal Science**
 - ▶ Animal Science
 - ▶ Nutraceuticals
- ▶ **Biotechnology**
 - ▶ Food
 - ▶ Health
- ▶ **Veterinary**
 - ▶ Large Animal

- Applies to a wide range of nursing mammals, including swine and bovine species.
- Reduces diarrheal diseases without disrupting beneficial microbiota.
- Remains compatible with antibiotics or serves as a prophylactic alternative.
- Improves animal health, growth, and economic outcomes by mitigating enteric infections.
- Incorporates prebiotic substrates to enhance probiotic colonization and effectiveness.
- Simplifies administration via oral delivery in live or lyophilized form for feed or water supplementation.
- Prevents excess growth of enteric pathogens like Enterobacteriaceae and Clostridiaceae in neonatal guts, reducing diarrhea and mortality.
- Introduces selective pathogen reduction by targeting gut carbon sources.
- Addresses antibiotic resistance and the limited efficacy of existing antibiotic or vaccine-based treatments for neonatal diarrheal diseases.
- Mitigates economic losses in livestock due to diseases such as piglet scour from pathogenic colonization.
- Enables selective targeting of toxigenic bacterial strains within the gut microbiome.

RELATED CASES

2015-193-0, 2009-110-0, 2012-346-0, 2013-877-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,633,461	04/25/2023	2012-346
United States Of America	Issued Patent	11,285,182	03/29/2022	2015-193
United States Of America	Issued Patent	11,000,576	05/11/2021	2012-346
United States Of America	Issued Patent	10,780,136	09/22/2020	2015-193
United States Of America	Issued Patent	10,688,160	06/23/2020	2012-346
United States Of America	Issued Patent	10,639,357	05/05/2020	2012-346
United States Of America	Issued Patent	10,471,134	11/12/2019	2012-346
United States Of America	Issued Patent	10,350,249	07/16/2019	2015-193
United States Of America	Issued Patent	10,165,788	01/01/2019	2013-877
United States Of America	Issued Patent	10,071,142	09/11/2018	2012-346
United States Of America	Issued Patent	9,327,016	05/03/2016	2012-346
United States Of America	Issued Patent	8,425,930	04/23/2013	2009-110

RELATED TECHNOLOGIES

- [Glycoprotein Cleaving Enzyme Isolated from Bifidobacteria](#)
- [Prebiotic Oligosaccharides](#)
- [Additional Glycosyl Hydrolase is Critical to Bacteria’s Ability to Consume HMOs](#)

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- [Prebiotic Oligosaccharides](#)
- [Bifidobacterial Probiotics for Nursing and Weaning](#)
- [Additional Glycosyl Hydrolase is Critical to Bacteria’s Ability to Consume HMOs](#)
- [Bifidobacterial Probiotic Supplements for Infants](#)
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