

# Precision Glycans for Poultry: Advancing Gut Health Beyond Antibiotics

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# Targeted Nutrition for Poultry Gut Health

**Precision glycans are specially designed carbohydrates that selectively nourish specific beneficial microbes in the gut. Unlike traditional prebiotics, which broadly stimulate many good bacteria, precision glycans are designed to target and modulate particular microbial functions—delivering focused support for poultry gut health and performance.**

- **Precision glycans are a custom nutritional signal for the microbiome:** Precision glycans are structurally tailored to selectively nourish beneficial microbes (such as bifidobacteria, lactobacilli) and inhibit harmful bacteria, enhancing gut health, nutrient utilization, and immune function
- **Microbiome managed precisely:** Symphiome™, is a first-of-its-kind microbiome metabolic modulator precisely designed to harness the power of the microbiome by modulating specific functional pathways to enhance the nutritional health and performance of poultry
- **Consistent, research-backed benefits in animal protein production:** Multiple trials in broilers and layers show that precision glycans improve growth performance, feed efficiency, gut integrity, resilience under stress, and reduce mortality, becoming viable alternatives to antibiotics

## How do precision glycans work?

Precision glycans, a subset of specialized carbohydrates, are a new category of innovative feed additives stemming from leading research in the field of microbiota modulation. Designed with a high degree of specificity, they interact with microbial species or strains within the gut microbiome, influencing their growth and activity to benefit the host.

The gut microbiota (a complex community of microorganisms residing in the digestive tract) plays a crucial role in animal health, affecting processes such as digestion, immune function, and overall health. The composition and activity of these microbial communities can be influenced by various factors, including diet, management, pathogen challenges and environment.

## Precision glycans offer a targeted approach to modulating the microbiota

Unlike broad-spectrum prebiotics, which promote the growth of a wide range of beneficial bacteria, precision glycans are designed to selectively enhance specific

metabolism pathways in microbial populations.

This selectivity is achieved through the unique structural features of glycans, which can be tailored to match the carbohydrate-binding proteins of cell wall receptors of the bacteria.

One of the primary mechanisms through which precision glycans modulate the microbiota is by serving as a selective food source for beneficial bacteria. For example, certain bifidobacteria and lactobacilli strains can utilize specific glycans more efficiently than other microbes.

**Precision glycans can promote the growth of beneficial bacteria, enhancing their positive effects on the host and inhibiting the growth of pathogenic bacteria.**

This targeted inhibition can help maintain a balanced microbiota and prevent dysbiosis, a condition characterized by an imbalance in the microbial community that is often associated with disease.

## Manage microbiomes better

Symphiome™ is the first generation of a novel precision biotic from DSM-Firmenich. Symphiome™ is made of precisely engineered glycan chains that modulate the microbiome to boost beneficial short-chain fatty acids like butyrate and propionate, improve nitrogen metabolism, and reduce harmful byproducts such as ammonia.

**Research has demonstrated that precision glycans can have a range of beneficial effects on health.**

**For instance, they can enhance the production of short-chain fatty acids such as butyrate, which are important for maintaining gut health and have anti-inflammatory properties.**

Moreover, precision glycans can strengthen the gut barrier function, and reduce the risk of leaky gut syndrome and associated systemic inflammation.

Precision glycans represent an exciting tool for microbiota modulation, offering a targeted and efficient approach to promoting gut health. By selectively enhancing beneficial microbes and inhibiting harmful

ones, these specialized carbohydrates have the potential to support balanced microbiota, contributing to overall health and well-being, with the potential to reduce reliance on antibiotics.

### Production benefits demonstrated in trials

Recent research shows that precision glycans, or glycan-based precision biotics consistently enhance gut health, performance, and resilience in poultry. For example, Bortoluzzi *et al.* (2025) demonstrated that precision glycans supplementation in broilers

under necrotic enteritis reduced mortality from 5.5% to 0.5%, while improving live weight gain and microbiome diversity. Similarly, Petranyi *et al.* (2025) found that laying hens in commercial environments experienced better feed conversion, increased egg production, and improved gut health, including higher goblet cell counts and reduced dysbiosis. Commercial-scale trials, such as Lobo *et al.* (2024), confirmed these benefits, showing enhanced growth, feed efficiency, and disease resistance alongside increased short chain fatty acid production.

### Symphio™ reduce Necrotic Enteritis lesion score and FCR points for broilers under *Eimeria* and *C. perfringens* challenge

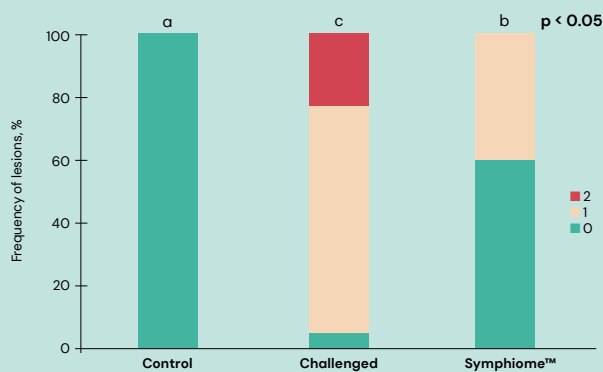
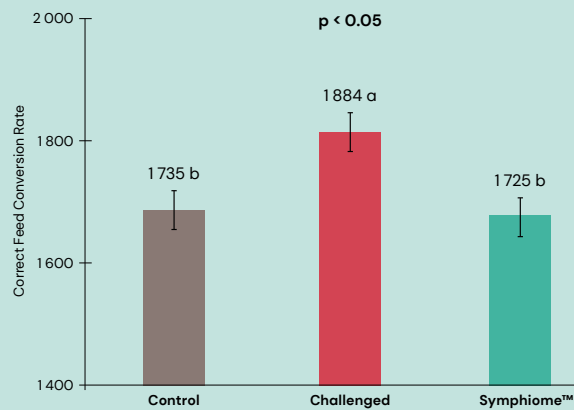
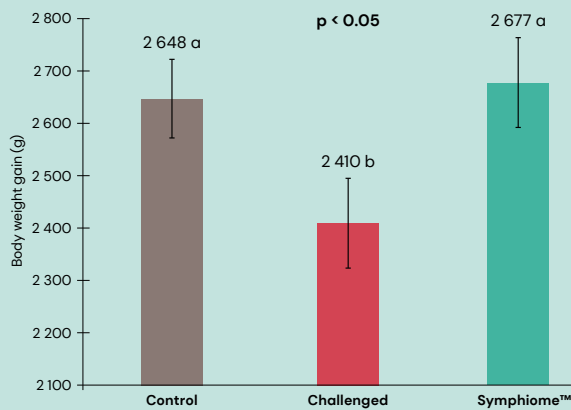
Cobb 500 males, 600 chickens (3 trt x 8 repl x 25 birds per cage)

Diet based on corn and soybean meal

Initial d 1 – 14, Growth d 15 – 28, Final d 29 – 42

- Treatment Groups:**
1. Control
  2. Control challenged: *Eimeria maxima* on d 14 and *Clostridium perfringens* challenge (1x10<sup>8</sup> CFU/bird) on days 19, 20 and 21
  3. Challenged + 0.9 kg/MT of Symphio™

**Parameters:**  
 Growth Performance  
 Frequency of Necrotic Enteritis injuries



Mortality due to necrotic enteritis:  
**Challenge: = 5.5%**  
**Symphio = 0.5%**  
**Resilience to enteric challenges**

Bortoluzzi *et al.*, 2025

## Symphio™ improves performance in layers

**Species:** Layers

**Country:** Australia

**Objective:**

Examine the impact of Symphio™ on intestinal health in commercial layer hens, with a focal point on disease resistance, animal welfare, performance and sustainability.

**Trial details:**

**Animals:** 40,000 HyLine brown laying hens, 16 – 72 weeks of age

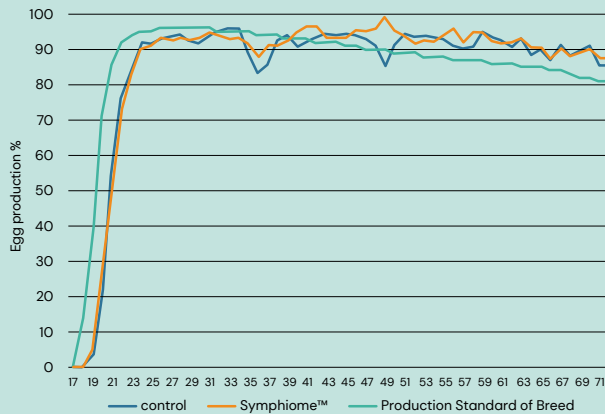
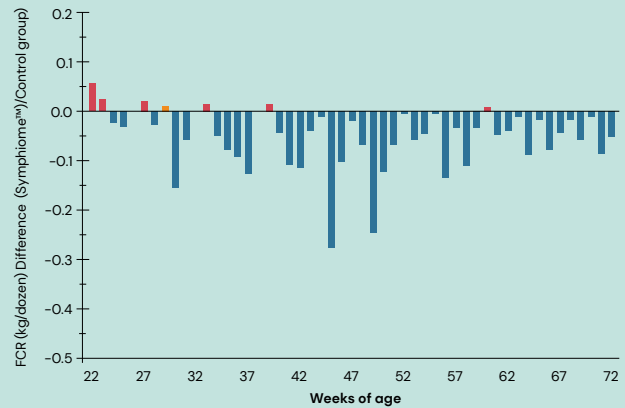
**Basal diet\*:** Sorghum, wheat, SBM

**Experimental:** 2 treatments. Commercial free-range system; Birgds from same flock → 20,000 layers in each group

**Treatments:**

- T1 Control
- T2 Symphio™ (900 g/MT)

**Parameters measured:** Performance indicators, gut scoring, microbiota



- Symphio™ had a significant lower cumulated mortality, 0.36% lower compared to control ( $P < 0.0001$ ).
- Rise in mortality from 40 weeks until 50 weeks: smothering randomly occurring per week.
- Hen-housed eggs (HHE) were significantly higher in Symphio™: 3.55 more HHE at the end of the trial.
- Cumulative FCR: (-) 9 points feed kg/dozen eggs and (-) 15 FCR points feed kg/egg kg in Symphio™.

Petranyi *et al.*, 2025

Overall, these studies highlight that precision glycans provide a targeted and reproducible approach to improve poultry health and productivity. By modulating specific microbial pathways, as seen in Bortoluzzi *et al.* (2024) where nitrogen metabolism and short chain fatty acid production were enhanced. In Blokker *et al.* (2022) villus structure and immune gene expression were improved, demonstrating precision biotics strengthen intestinal integrity, optimize nutrient utilization, and reduce harmful byproducts – making them a sustainable potential alternative to antibiotics.

## R&D study summaries

Peer-reviewed academic literature highlights the

<b>Bortoluzzi et al., 2025</b>	Evaluated glycan-based precision glycans in broilers under necrotic enteritis (NE) challenge	<ul style="list-style-type: none"> <li>• Improved body weight gain and feed conversion ratio</li> <li>• NE mortality reduced from 5.5% to 0.5%</li> <li>• Increased SCFA-producing bacteria and metabolic pathways</li> <li>• Restored microbiome diversity</li> </ul>	Precision glycans enhances microbiome resilience and performance under enteric stress.
<b>Petranyi et al., 2025</b>	Precision glycan supplementation: A strategy to improve performance and intestinal health of laying hens in high-stress commercial environments	<ul style="list-style-type: none"> <li>• Supplementation led to improved feed conversion, increased hen-housed egg production, reduced mortality (especially during smothering events), and enhanced gut health (e.g., increased goblet cell count and reduced dysbiosis)</li> <li>• Microbiota analysis revealed significant shifts in gut microbial composition and diversity, particularly in early and mid-lay stages.</li> </ul>	The study highlights the potential of precision glycans to support performance, resilience, and welfare in antibiotic-free, high-stress poultry systems.
<b>Bortoluzzi et al., 2024</b>	Assessed Precision glycans effects in broilers fed corn or wheat-based diets	<ul style="list-style-type: none"> <li>• Improved feed intake and FCR</li> <li>• Reduced blood uric acid</li> <li>• Increased MPMI and SCFA production</li> </ul>	Precision glycans improves nutrient utilization and gut health across different diet types
<b>Petranyi et al., 2024</b>	Precision glycans Long-term trial on laying hens in a free-range system	<ul style="list-style-type: none"> <li>• Increased egg production and reduced mortality</li> <li>• Enhanced goblet cell count and mucin production</li> <li>• Modulated microbiota favoring beneficial taxa</li> </ul>	Precision glycans support performance and welfare in high-stress, antibiotic-free systems
<b>Lobo et al., 2024</b>	Commercial-scale trial on broilers with precision glycan supplementation	<ul style="list-style-type: none"> <li>• Improved growth, FCR, and disease resistance</li> <li>• Increased beneficial microbiota and SCFA production.</li> <li>• Enhanced ileum morphology and liver health.</li> </ul>	Precision glycans improve gut health and resilience in commercial settings.
<b>Leone &amp; Ferrante, 2023</b>	Review of prebiotics and precision glycans as AGP alternatives	<ul style="list-style-type: none"> <li>• Prebiotics improve gut morphology and immunity</li> <li>• PBs reduce nitrogen excretion and ammonia emissions.</li> <li>• Consistent performance and welfare benefits</li> </ul>	Precision glycans are sustainable, effective alternatives to AGPs
<b>Blokker et al., 2022</b>	Precision glycans effects on intestinal health under enteric challenge.	<ul style="list-style-type: none"> <li>• Improved villus structure and goblet cell density</li> <li>• Modulated inflammatory and nutrient transport genes</li> <li>• Matched antibiotic performance in commercial trials</li> </ul>	Precision glycans supports intestinal integrity and immune modulation under stress
<b>Walsh et al., 2021</b>	Microbiome Metabolic Modulator Across Multiple Trials	<ul style="list-style-type: none"> <li>• Meta-analysis of several trials confirmed the consistent efficacy of a microbiome modulator in enhancing growth performance</li> </ul>	The modulator influenced cecal microbial gene expression, particularly in pathways related to amino acid synthesis and energy metabolism, validating its functional precision



### What's next?

**Across all studies, a consistent theme emerges: precision biotics glycans offer real opportunity for a post-antibiotic era strategy**

Unlike traditional probiotics or prebiotics, these compounds modulate specific microbial functions, leading to:

- Improved gut barrier integrity
- Enhanced nutrient utilization
- Reduced environmental impact
- Greater resilience to disease

Precision glycans represent a powerful, targeted approach to modulating the gut microbiome, promoting the growth of beneficial microbes while suppressing harmful ones.

**Research across multiple studies shows that precision glycans can enhance short-chain fatty acid production, improve gut barrier function, optimize nutrient utilization, and reduce harmful byproducts such as ammonia.**

With consistent benefits demonstrated in poultry performance, health, and resilience, precision glycans offer a sustainable, reproducible, and effective alternative to antibiotics, supporting overall animal well-being and productivity in modern production systems.



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