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## The microbiome: a central driver of livestock health

*The gastro-intestinal microbiome is pivotal for animal health, resilience and performance. Across all species, a balanced microbial ecosystem underpins nutrient digestion, energy supply, immune system capacities and overall performance. Disruptions (dysbiosis) in this ecosystem, whether due to dietary imbalances, pathogenic challenges or inflammation, can compromise feed efficiency, growth and reproduction as well as disease resistance. Optimizing microbiome function therefore requires a coordinated, versatile strategy that integrates feed composition, targeted feed additives and preventive interventions to maintain microbial diversity and functional stability.*

A&P Nutrition's solution-driven portfolio is designed to proactively manage these risks, offering targeted interventions that stabilize the microbiome, enhance gut integrity, and support long-term sustainability.

### Promoting overall microbiome balance and stability

A healthy microbiome fundamentally depends on the availability of suitable substrates for microbial fermentation. This highlights the importance of functional sources of dietary fiber. High-quality supplements such as eubiotic lignocellulose provide both fermentable substrate for microbial short chain fatty acid (SCFA) production and physical support of the gastro-intestinal epithelium. SCFAs, particularly butyrate, serve as energy source for intestinal epithelial cells, thus maintaining the gut barrier function and modulating metabolic and immunological processes. Slowly fermentable fiber ensures the promotion of a healthy microbiome throughout the hindgut and leads to consistent improvements of well-being and performance across species.

As shown in several studies, supplementation of diets with the eubiotic lignocellulose OPTICELL results in a beneficial shift in the intestinal microbiota which encourages the synthesis of SCFAs and particularly butyrate (Fig. 1).

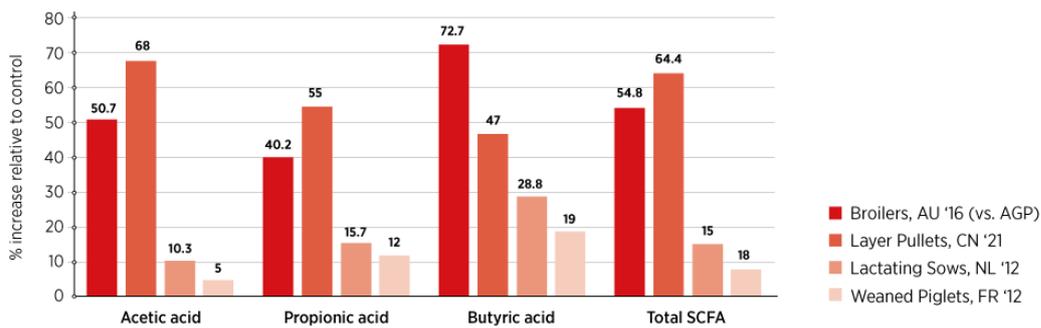


Figure 1. Effect of eubiotic lignocellulose on intestinal SCFA production in the hindgut of sows, piglets, layers and broilers

### Targeted microbiome support

Disruptions in microbiome integrity can increase the risk of overgrowth of various undesired, pathogenic microbes. In pig production *Lawsonia intracellularis*, *Clostridium* spp. or *Brachyspira hyodysenteriae*, among others, cause significant intestinal challenges and ultimately result in performance losses and diarrhea.

Interventions that stabilize the microbial environment can help to mitigate these effects. DYSGUARD-S specifically targets these challenges, helping to preserve gut functionality and epithelial health even under challenged conditions. With this premix of standardized phytochemical substances the intestinal microbiota is affirmed, reducing the negative impacts of specific pathogens and maintaining performance and health (Fig. 2). In this trial there was a significant ( $p < 0.001$ ) decline in *Lawsonia intracellularis* levels over the 7-week trial period.

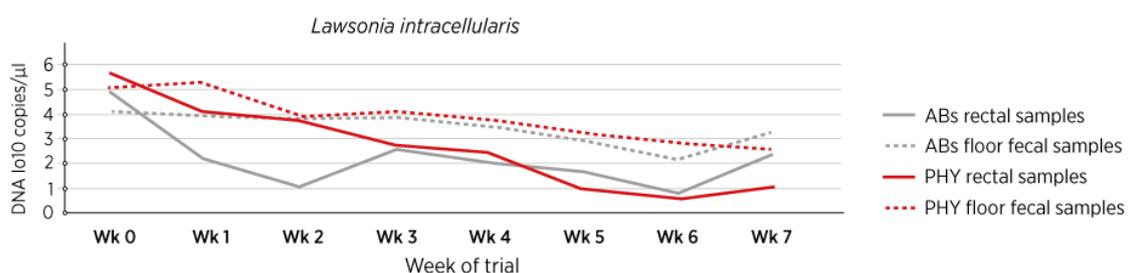


Figure 2. *Lawsonia intracellularis* levels in rectal swab and fecal floor samples from pigs either treated with tiamulin/lincomycin (ABs) or a phytochemical feed supplement (PHY, Dysguard-S, 2 kg/t) (Wu et al., 2025)

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## **Mycotoxin-induced microbiome disruption**

Feed raw materials and commercial diets often contain significant amounts of mycotoxins, which is a concern in terms of animal health, welfare and performance. Mycotoxins interfere with the microbial balance by selectively inhibiting beneficial bacteria and creating an environment favoring opportunistic pathogens. Mycotoxins can increase harmful gut bacteria in farm animals by disrupting the animals' intestinal health through multiple mechanisms. First, these fungal toxins damage the intestinal barrier (gut lining), making it more “leaky” and allowing pathogenic bacteria to penetrate or proliferate in the gut (Pierron et al., 2016). Second, many mycotoxins modulate the immune system in the gut – often suppressing or misdirecting local immune responses – which weakens the host’s ability to keep opportunistic bacteria in check (You et al., 2023). Third, mycotoxins directly disturb the composition of the gut microbiota, killing beneficial microbes and causing dysbiosis (microbial imbalance) that favors the overgrowth of harmful bacteria (Guerre, 2020). Together, this intestinal barrier damage, immune impairment, and microbial imbalance creates conditions in which pathogenic bacteria can thrive in animals exposed to mycotoxins. Beyond direct toxicity, mycotoxins alter fermentation, reduce SCFA production and trigger inflammatory processes that further destabilize microbial communities.

The latest innovation in mycotoxin management, MYCORAID, provides multilayered protection by combining adsorbing and detoxifying agents with hepatoprotective and immune-modulating elements. This not only reduces the systemic toxin load but also preserves microbial diversity, helping protect against long-term dysbiosis. Importantly, mycotoxin challenges often cause inflammatory conditions in the gut, further linking to the need for additional support against feed- and stress-induced inflammation. In a trial conducted in Greece (Tsiouris et al., 2021), broilers were challenged with aflatoxin B1 (AFB1) and ochratoxin A (OTA). Mycotoxin challenge induced a significant reduction in body weight and increase in FCR, histopathological changes, and increased the count of E. coli bacteria. These negative effects were alleviated using MYCORAID at 1 kg/t feed. By neutralizing mycotoxins and supporting gut welfare, MYCORAID helped maintain the integrity of the gut lining.

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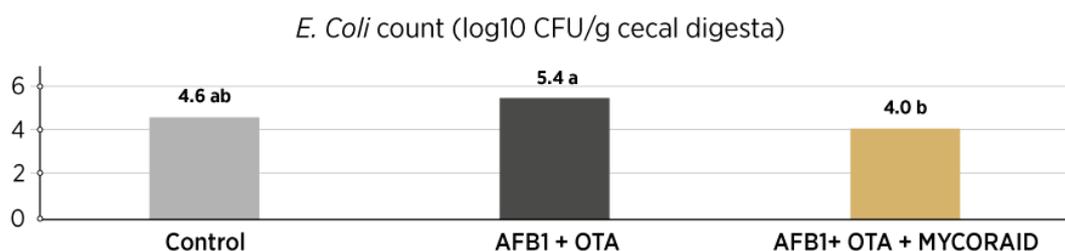


Figure 3. Multilayered mycotoxin management product counteracted the negative influence of mycotoxins on *E. coli* growth (Tsiouris et al., 2021)

### Inflammation and microbiome stability

Inflammation can be both a cause of and a consequence of microbiome disruption. Elevated pro-inflammatory cytokine levels and oxidative stress impair gut barrier integrity and create possibilities for opportunistic pathogens. Stressors such as feed change, mycotoxins or increased metabolic demand can both initiate and amplify these processes.

Wood lignans are a new technology supporting a stable, physiological microbiota under such conditions. By minimizing the impacts of inflammation and oxidative stress and preserving the barrier functionality it ensures that the beneficial effects of other feed supplements such as those described above are not undermined by systemic or local inflammatory processes. Wood lignans can function as a unifying layer of support, sustaining nutrient efficiency across species, as shown in a recent broiler trial (Figure 4).

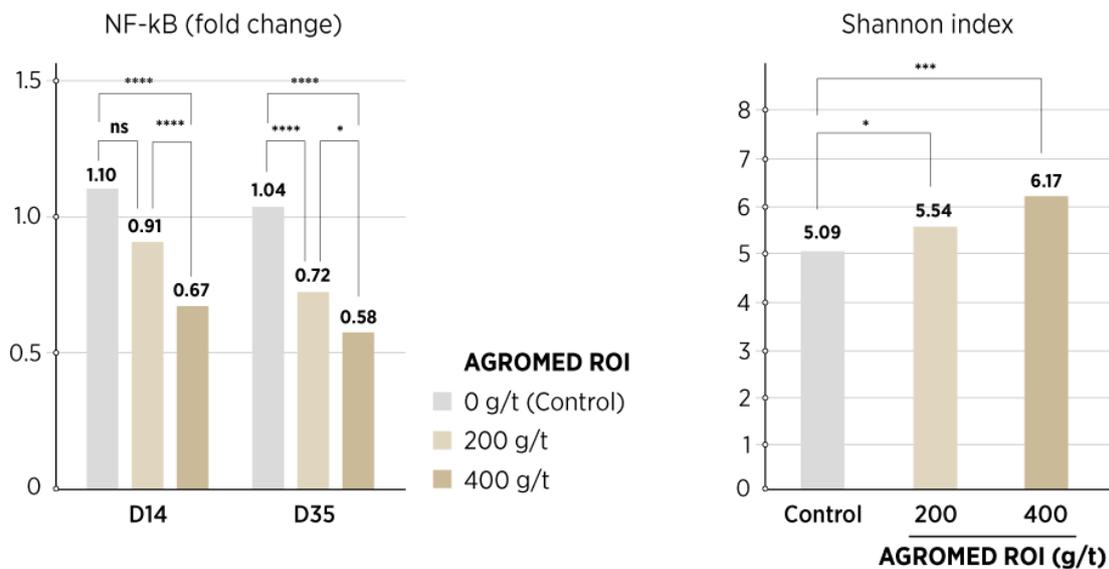


Figure 4. Intestinal inflammation (NF-kB) and cecal microbial alpha-diversity as influenced by dietary wood lignan supplementation (AGROMED ROI) (Yongyuth et al., 2025). Significant differences \*(p<0.05), \*\*\*(p<0.001)

Wood lignans increased the Shannon diversity index, reflecting both higher microbial richness and a more even distribution of microbial taxa. This improvement in microbial balance was accompanied by reduced NF-kB activation, suggesting lower intestinal inflammation.

Each of the dietary strategies described herein can be implemented alone or in combination to achieve the greatest possible support of the intestinal microbiome.

## **Conclusions: a new era in animal nutrition**

The intestinal microbiome is a key driver of livestock health and productivity, yet in commercial practice there are threats continuously present. The presented framework illustrates how specific dietary factors can support the integrity of the microbiome, focusing on stability, diversity, pathogen-targeted support, multilayered support in mycotoxin management, and anti-inflammatory compounds.

## **A&P Nutrition: improving animal performance through microbiome mastery**

A&P Nutrition, the newly unified brand born from the strategic alliance of PATENT CO. and agromed under the RWA (Raiffeisen Ware Austria) umbrella, is redefining the future of animal nutrition. With decades of expertise now consolidated into a single, robust portfolio, A&P Nutrition is committed to delivering nature-inspired, scientifically validated solutions that address the most pressing challenges in animal health and performance.

As global agriculture faces mounting pressures - from disease threats and regulatory shifts to sustainability demands - A&P Nutrition emerges as a bold, science-led partner for the future. Our unified brand represents more than a merger of expertise; it's a commitment to customer-oriented innovation, where every solution is designed to meet real-world challenges with precision, safety, and speed. Improving animal performance is not just our slogan - it's a promise.

By addressing external factors before they become challenges and providing advanced solutions to resolve the threats quickly and efficiently, A&P Nutrition benefits animal farming businesses by increasing their productivity while maintaining cost efficiency.

## References

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