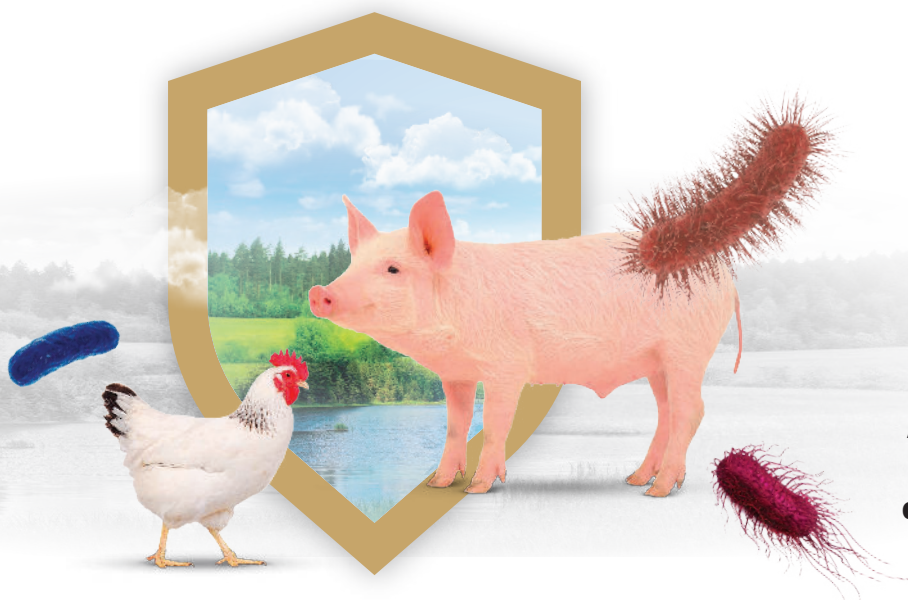




Endotoxin challenges in Asian animal production

Endotoxin's ability to induce strong inflammatory responses in animals can lead to serious health issues, including endotoxemia and compromised immunity. Without a proper mitigating strategy, endotoxins can compromise livestock health, reducing productivity and profitability.

Key factors provoke endotoxin risks

In Asia, mycotoxin contamination is a significant issue in livestock feed. For instance, 91.3% of pig feed samples in Taiwan contained multiple mycotoxins, with aflatoxin (AFB1), zearalenone (ZEN), fumonisins (FB1, FB2) and deoxynivalenol (DON) being the most frequent combination.

Similarly, 96.6% of feed samples in Thailand were contaminated, predominantly with ZEN, FB1, DON, and AFB1. In China, almost all pig, poultry, and cattle feed samples exhibited the presence of AFB1, DON, and ZEN, underscoring the prevalence of contamination across the region (Muñoz-Solano et al., 2024). Mycotoxins are known to disrupt the regulation of genes related to gut barrier function, which is crucial in preventing endotoxins from entering

the bloodstream.

The issue is exacerbated by intensive farming practices in Asia, especially in swine and poultry operations, where overcrowded conditions elevate bacterial load and stress. The warm, humid climate in Southeast Asia promotes the growth of Gram-negative bacteria, compromising the gut integrity of animals. This environment increases endotoxin exposure and allows endotoxins to enter the bloodstream, triggering systemic inflammation.

Studies show that during heat stress, both DON and FBs lead to a two-fold increase in 3-OH C14:0 levels (an endotoxin marker) and raise the translocation of endotoxins in broilers (Reisinger et al., 2024). Additionally, the overuse of bactericidal antibiotics contributes to the destruction of Gram-negative bacteria, releasing endotoxins into the animal's system. This exacerbates endotoxemia risk and reduces overall productivity.

Endotoxin risks for swine

Swine production in Asia, particularly in countries like China, Vietnam, and Thailand, is highly susceptible to endotoxin-related challenges due

ANAWACH PHUENGKASEM* writes that farm animals often face various biotoxins, such as mycotoxins (secondary metabolites of fungi that contaminate crops) and endotoxins. Endotoxins, harmful lipopolysaccharides (LPS) derived from the outer membrane of Gram-negative bacteria such as *Escherichia coli* and *Salmonella*, cause a significant challenge to animal production worldwide. The high-intensity farming systems, tropical climate, and increasing demand for animal protein in Southeast Asia contribute to the elevated presence and risks of endotoxins in poultry and swine production.

to the region's crowded farming conditions and tropical climate. Endotoxins are a major factor in post-weaning diarrhea (PWD), a common issue in piglets. Exposure to endotoxins during weaning increases gut permeability, leading to diarrhea, reduced growth rates, and poor survival rates.

Once endotoxins enter the bloodstream, they trigger an immune response, causing chronic inflammation, diverting energy from growth, and resulting in weight loss and poor production performance. Endotoxins also weaken the immune system, making pigs more vulnerable to co-infections like Porcine Reproductive and Respiratory Syndrome (PRRS) and Swine Influenza

Virus (SIV). These infections further deteriorate herd health, leading to higher morbidity and mortality rates.

In tropical climates, heat stress amplifies the effects of endotoxin exposure, causing “leaky gut,” where endotoxins pass more easily into the bloodstream. This can lead to serious health issues, reduced growth, and, in extreme cases, endotoxin shock.

Endotoxin risks for poultry

Poultry farming in Asia is equally affected by endotoxin contamination, with significant risks to broilers and layers. Endotoxins disrupt gut health by increasing permeability in the gut lining and reducing nutrient absorption, leading to lower feed conversion ratios (FCR), poor weight gain in broilers, and decreased egg production in layers.

Chronic exposure to endotoxins, even at subclinical levels, heightens susceptibility to diseases such as necrotic enteritis, which in turn elevates mortality rates. Additionally, endotoxins heavily burden the immune system, making poultry more vulnerable to bacterial and viral infections. In regions where co-infections like avian influenza are common, endotoxin exposure can worsen the severity of disease outbreaks, further threatening poultry health and farm productivity.

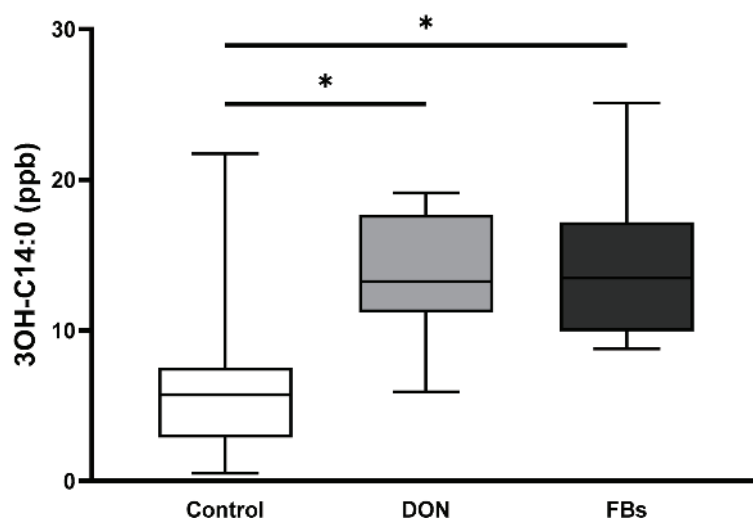
Mitigation strategies in animal production

Producers must adopt a comprehensive mitigation strategy to manage endotoxin risks, particularly in the challenging conditions found in Asia. This includes:

Endotoxin binding agents: One of the most effective ways to reduce endotoxin bioavailability is using adsorbents, such as Mycoraid from Patent Co. Mycoraid adsorbs endotoxins in the gut, preventing them from entering the bloodstream. It has been shown to significantly reduce inflammation and improve animal welfare. In trials, Mycoraid has demonstrated an adsorbing efficiency of 99% for *Pseudomonas aeruginosa*, 92% for *Escherichia coli*, and 75% for *Salmonella enterica* endotoxins.

Improved gut health: Enhancing gut health with probiotics, prebiotics, and dietary fibers can strengthen the gut barrier and reduce endotoxin translocation. This promotes a

Figure 1. The average plasma 3-OH C14:0 concentration (ng/mL) in broilers fed a control diet, a DON or a FB-contaminated for 25 days, followed by 10 hours of heat stress at 34°C on day 26. n = 12 animals/treatment. Results are shown as mean with standard deviation, and significant differences ($p < 0.05$) are marked by superscripts. (Reisinger et al., 2024).



healthier gut environment, reducing the risk of “leaky gut” and subsequent endotoxemia. Mycoraid contains specially selected bacterial strains that show a probiotic function, as well as yeast cell walls and plant extracts to support the immune system and liver.

Managing heat stress: Proper ventilation, cooling systems, and adjusting feeding schedules during hot periods can reduce the negative impact of heat stress on livestock, preventing the exacerbation of endotoxin-related issues.

Feed quality control: Regular testing for microbial contamination and ensuring high feed quality can minimize endotoxin exposure from contaminated feed. Using endotoxin-free feed ingredients and incorporating adsorbents can help safeguard animal health.

Mycoraid’s role in endotoxin mitigation

Mycoraid is an advanced mycotoxin solution that shows high efficacy against polar and less polar mycotoxins, including emerging mycotoxins and endotoxins. It adsorbs endotoxins in the gut, prevents systemic inflammation, and supports gut function, leading to improved feed efficiency, better growth rates, and lower mortality in livestock. In Asia, where environmental conditions and intensive farming practices increase endotoxin risks, Mycoraid offers a practical solution for producers seeking to protect their animals and

enhance production outcomes.

Conclusion

Endotoxins represent a serious and growing challenge in Asian animal production systems, particularly in swine and poultry operations. The combination of high stocking densities, tropical climates, and feed contamination contributes to the significant risk of endotoxemia, reduced growth rates, and increased mortality. By adopting mitigation strategies such as the use of Mycoraid, improving gut function, and managing heat stress, producers can effectively combat the detrimental effects of endotoxins, ensuring robust animals, enhanced productivity, and better profitability. ■

Reference:

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