

Decoding Mycotoxin Risks: Commitment to Swine Productivity

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Mycotoxin contamination in feed ingredients can have serious effects on swine performance and the economics of the business.

Produced by moulds, the prevalence of mycotoxins varies year-on-year, depending on growing and harvesting conditions, feed moisture, and management factors such as storage and transportation. Moulds can produce several mycotoxins and the individual raw materials making up the final ration can have many mycotoxins present. It is very uncommon to find just one mycotoxin type in a feedstuff. The synergistic effects between even low levels of mycotoxins can result in production losses or even signs of mycotoxicosis in some cases.

All pigs can be affected by mycotoxin-contaminated feeds. When contamination is high, several symptoms may be observed, such as reduced feed intake, dermal lesions, tail and ear necrosis and prolapses in growing pigs and reduced farrowing rates, higher still births, small litters and swollen vulvas in sows and gilts. Certain mycotoxins may also affect vaccine efficacy and interfere with the animal's acquired immunity, leaving it more susceptible to disease and infections. However, in most cases mycotoxins can impair performance without any clinical signs. Mycotoxin contamination and its impacts often go unseen.



In the complex field of animal nutrition, addressing mycotoxin challenges requires precision and expertise. Cargill has refined a comprehensive and holistic approach to mycotoxin risk management, which is aimed to support animal health and profitability.

Revealing the invisible threat with the help of the most comprehensive mycotoxin contamination database worldwide

Committed to evidence-based mycotoxin risk management, Cargill runs over 350,000 analyses annually from 145,000+ raw material samples across 150+ global feed plants, farms, and ingredient storage locations. This rigorous testing allowed us to build the world's largest and most comprehensive mycotoxin contamination database over the past eight years.

This extensive database is a powerful tool that enables us to accurately monitor mycotoxin distribution and contamination levels worldwide. This helps us to understand and address the unique challenges our customers face in different regions. In 2023, high Fumonisin and Deoxynivalenol levels were of concern for swine industry. Nursery segment is the most exposed to risk with 29% of the analysis exceeding Cargill performance risk thresholds* (Table 1).

Table 1: Total number and percentages of mycotoxin analyzes carried out in 2023 that exceed Cargill risk thresholds for sow, hog and nursery pigs; Cargill 2023 Mycotoxin Report

Toxin	Total Analyzes	% Analyzes Contaminated Above Sow Performance Threshold	% Analyzes Contaminated Above Hog Performance Threshold	% Analyzes Contaminated Above Nursery Performance Threshold
Aflatoxin	98,113	7%	7%	8%
Fumonisin	48,982	8%	31%	37%
Ochratoxin	16,437	2%	2%	2%
T-2 toxin	21,744	12%	5%	12%
Deoxynivalenol	119,118	26%	37%	61%
Zearalenone	56,690	19%	4%	8%
Total	361,084	15%	19%	29%

% Analyzes Above Cargill Performance Risk Threshold for Swine			
Severe Risk 75-100%	High Risk 50-74%	Moderate Risk 25-49%	Slight risk 0-24%

Compared to 2022, we observed an increase in Fumonisin, a slight decrease in Zearalenone (ZEN), while Deoxynivalenol (DON), Aflatoxin (AFL), Ochratoxin (OCHR) and T2 toxin (T2) levels have remained stable. Deoxynivalenol performance risk for nursery is the highest in China, Europe and North America while Fumonisin performance risk is the highest in Central and South America.

This highlights the substantial year-on-year and regional variability in contamination levels, emphasizing the imperative need for a dynamic control plan. Cargill's global mycotoxin analysis database can serve as an indispensable tool in navigating this variability, enabling producers to implement effective control measures tailored to their specific challenges.

Quantify the threat to adapt the best response

In many instances despite the absence of visible symptoms, mycotoxins may significantly impact animal health and performance. Recognizing the imperative need for proactive measures, Cargill has developed tools and solutions to empower swine producers in the battle against mycotoxins. Our in-house analyses and comprehensive mycotoxin database enable us to assess contamination levels, providing a critical foundation for informed decision-making. Understanding the nuanced impact of mycotoxin contaminations on animal performance and health is then paramount. To address this, Cargill analyzed over 120 scientific articles to develop the Mycotoxin Impact Calculator (MIC). Compiling this extensive data, we formulated equations that predict performance losses by mycotoxin and for each swine production class. The MIC, a science-based tool, assigns a precise figure to a previously vaguely defined problem, enabling informed decision-making and precise solutions to limit performance losses due to mycotoxins. In a recent swine trial, our MIC predicted a 10% performance loss when 2mg/kg (ppm) DON, 3mg/kg FUM and 0.6mg/kg ZEN

contaminated the feed. The calculator predicted that the drop in performance would be reduced to just 2.5% when Cargill anti-mycotoxin additive, was used. The trial confirmed these predictions, as piglet fed mycotoxin-contaminated feed lost 10.8% performance, and the addition of Cargill anti-mycotoxin additive supported a reduction in loss to 2%. This translates to a 1:4 return on investment, showcasing the effectiveness and accuracy of our calculator along with Cargill anti-mycotoxin additive in minimizing mycotoxin-induced performance losses.

Mitigating the threat with smart ingredient formulation

Mycotoxin risk identification and impact quantification are prerequisites to efficiently mitigate the risk using smart ingredient formulation. Where allowed by regulation, anti-mycotoxin agents can be used in formulation to reduce impact. Cargill Animal Nutrition and Health has developed various anti-mycotoxin agents leveraging the best binding technologies, mycotoxin deactivation and, health support ingredients*. In our ongoing commitment to advancing swine nutrition, we recognize the pervasive threat posed by mycotoxins, and are dedicating our resources to better understand and address the threat.

In a recent multi-contamination trial in piglets - one hundred and sixty barrows and gilts (6.8 ± 0.9 , 16 d post-weaning), we combined three mycotoxins identified as problematic in swine industry. The diet was contaminated with realistic high levels of DON (2ppm), FUM (3ppm) and ZEN (0.6ppm). The results were clear – these mycotoxins led to a 10.8% reduction in average daily gain and a 13.2% decrease in feed consumption after 2 weeks. To mitigate these adverse effects, we evaluated the effectiveness of Cargill anti-mycotoxin agent. Remarkably, we observed that the anti-mycotoxin agent significantly countered the negative impact on average daily gain and feed consumption.



Delving deeper into the study, we explored additional parameters, revealing that mycotoxins increased inflammation and oxidative stress. However, the inclusion of Cargill anti-mycotoxin agent successfully reduced it. As we continue to pioneer advancements in mycotoxin management, our commitment remains unwavering – to provide swine producers with cutting-edge solutions that truly make a difference.

Cargill excels in providing customers scientifically proven tools for high-performance support. The world-leading mycotoxin analysis database, Mycotoxin Impact Calculator, and demonstrated anti-mycotoxin additives form a robust arsenal. Cargill Animal Nutrition stands ready to guide clients in implementing precise, timely mycotoxin risk management plans, ensuring sustained health and financial performance in swine operations worldwide.

*Cargill's performance risk thresholds are based upon extensive in vivo research and equations that model performance loss determined by mycotoxin levels found in feed ingredients. Low \approx 0.5% performance loss; Medium \approx 1% performance loss; and High \approx 2% performance loss. They may be lower than thresholds set by government regulatory bodies. Local laws and regulations related to mycotoxins thresholds and binders vary, for example, mycotoxin binders are not available in the United States.