

# PATHKINEX UPDATE

## There's no such thing as clean corn!

A new PathKinex™ study reveals that even visibly clean feed can harbor high levels of mycotoxin-producing fungi.

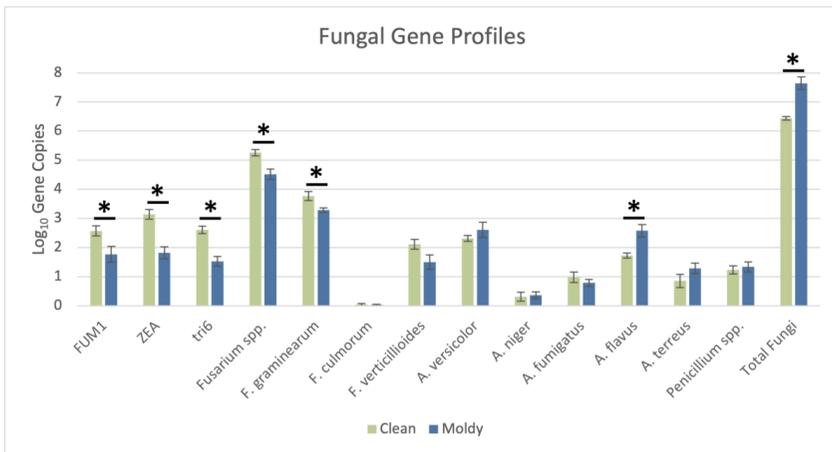


Fungal contamination of feed can lead to the production of detrimental mycotoxins that cause performance and reproductive inefficiencies in livestock, including decreased weight gain, intestinal tract inflammation, and liver damage.<sup>1</sup> The addition of other stressors, such as coinfection with pathogens or weaning transition, can amplify the impact of fungal and mycotoxin contamination.

## Fungal Profiles Differ in Clean vs. Moldy Feed

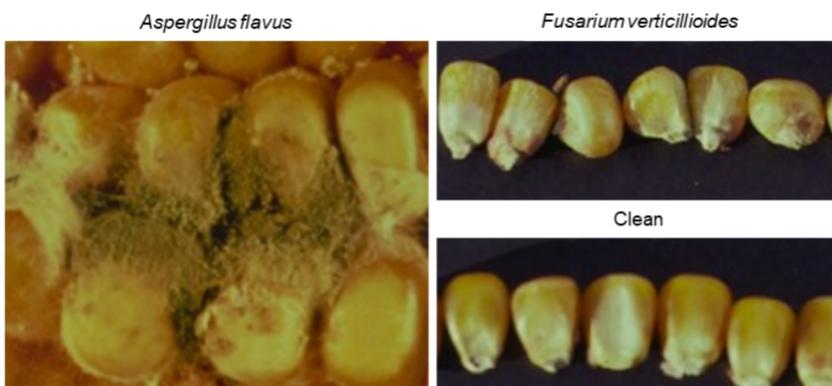
United Animal Health and MDG continue to explore the prevalence of fungi and mycotoxins (fungal metabolites) in feed and their impact on animal health. A pilot study was conducted where swine feed samples were collected from 7 different producers across Ohio, Indiana, and North Carolina (22 total; 14 moldy, 8 clean). Importantly, surveillance results can be extrapolated to other livestock species due to similarities in feed ingredients. Quantitative PCR was performed to examine the fungal populations, revealing a variety of mycotoxin-producing fungi were present across all regions.

Overall, visibly clean samples had significantly higher levels of *Fusarium* gene markers, including those for mycotoxin synthesis (**Figure 1**). Conversely, *Aspergillus flavus* and the total fungi gene marker were significantly elevated in feed that appeared moldy.



**Figure 1.** Average gene quantities across producers for visibly clean vs. moldy feed samples. The FUM1 gene is responsible for fumonisin synthesis, ZEA for zearalenone, and trif6 for vomitoxin. \*denotes significance of  $p < 0.05$ .

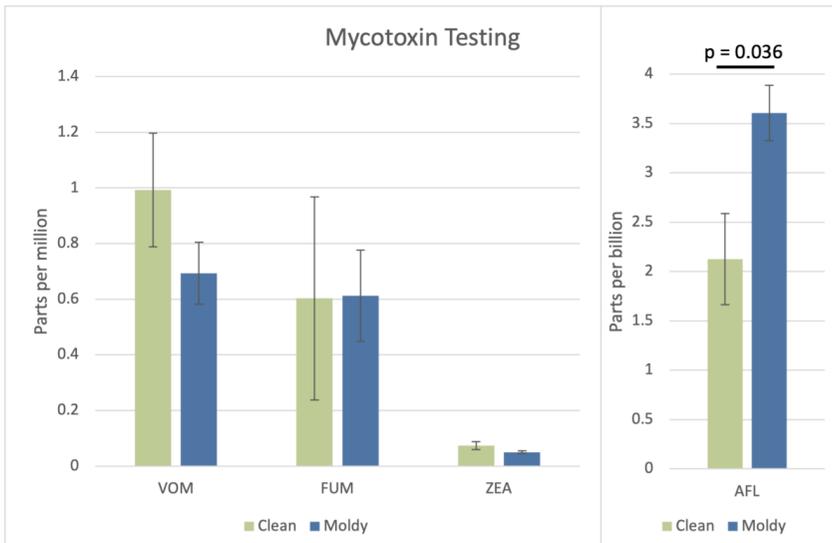
*Aspergillus* and *Penicillium* overgrow during feed storage and have a clearly visible powdery appearance while *Fusarium* contamination is often invisible (**Figure 2**).<sup>2,3</sup> Thus, moldy feed likely contains overgrowth of *Aspergillus* while feed that appears clean may still contain *Fusarium*, which is consistent with the gene profiles.



**Figure 2.** Appearance of powdery *Aspergillus* vs. *Fusarium* species on corn. Images obtained from NC State Extension: <https://corn.ces.ncsu.edu/mycotoxins-in-corn/>.

## Mycotoxin Testing Aligns with Gene Profiles

United Animal Health mycotoxin testing of these samples align with the fungal gene profiles. Both the *Aspergillus flavus* gene marker and the mycotoxin it produces, aflatoxin, were significantly elevated in moldy feed (**Figure 3**). Levels of zearalenone and vomitoxin were higher in clean samples, aligning with the elevation observed in their biosynthetic genes and in the *Fusarium* spp. markers associated with their production.



**Figure 3.** United Animal Health mycotoxin testing results. VOM, vomitoxin; FUM, fumonisin; ZEA, zearalenone; AFL, aflatoxin.

## Conclusion

The pilot study revealed that even visibly clean feed has been shown to harbor higher levels of some mycotoxin-producing fungi, along with higher quantities of mycotoxins, as compared to visibly moldy feed. Therefore, implementing a comprehensive plan to mitigate risks of fungal and mycotoxin contaminated feed should be considered to support and improve animal health.

## Respond to MDG

We enjoy hearing from you! We welcome your questions, comments, and suggestions on PathKinex™ updates. Please contact us at [AnimalAg@mdgbio.com](mailto:AnimalAg@mdgbio.com)



### References:

- Holanda et al. Mycotoxin occurrence, toxicity, and detoxifying agents in pig production with an emphasis on deoxynivalenol. *Toxins*, **2021**, 13, 171.
- Wambacq et al. Occurrence, prevention and remediation of toxigenic fungi and mycotoxins in silage: a review. *Journal of the Science of Food and Agriculture*, **2016**, 96, 7.
- West Virginia University Extension. *Corn Mold*. <https://extension.wvu.edu/lawn-gardening-pests/plant-disease/fruit-vegetable-diseases/corn-mold>