SURVEY PEGASUS SCIENCE 2025

Mycotoxicological contamination of corn in Latin America

Predictions by NIRS

PEGASUS SCIENCE

MYCOTOXICOLOGICAL CONTAMINATION OF CORN IN LATIN AMERICA - YEAR 2025

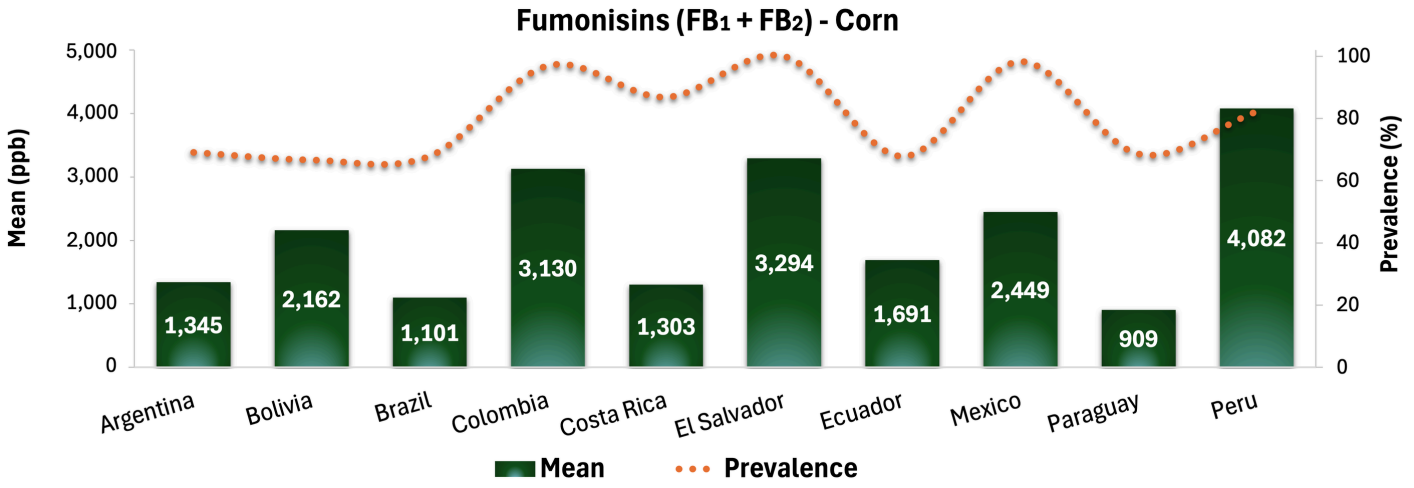
Corn is one of the most widely cultivated cereals worldwide and plays a crucial role in animal nutrition due to its high nutritional value. However, this grain is susceptible to contamination by **fungi** capable of producing **mycotoxins** - toxic substances that may occur throughout the corn production chain, from the field to the final stages of processing, and may therefore be present in animal diets. The **toxic** and **immunosuppressive** effects caused by mycotoxins are well documented, and grain contamination with these compounds can have serious impacts on animal health and productivity, resulting in significant economic losses. For this reason, **mycotoxin monitoring** in corn is essential to ensure **effective decision-making**, which can be achieved through the use of **ultra-fast tools** that deliver **immediate** and **reliable** results.

In this context, **near-infrared spectroscopy** (**NIRS**) has been widely adopted in the animal production industry to support **Mycotoxin Risk** management. In this report, **Pegasus Science** presents the main results of **mycotoxin contamination** predictions in corn marketed across **ten Latin American countries**, generated using **NIRS technology** throughout **2025**. In **Brazil**, a comparative study was also conducted among the country's five regions: **South**, **Southeast**, **Midwest**, **North**, **and Northeast**.

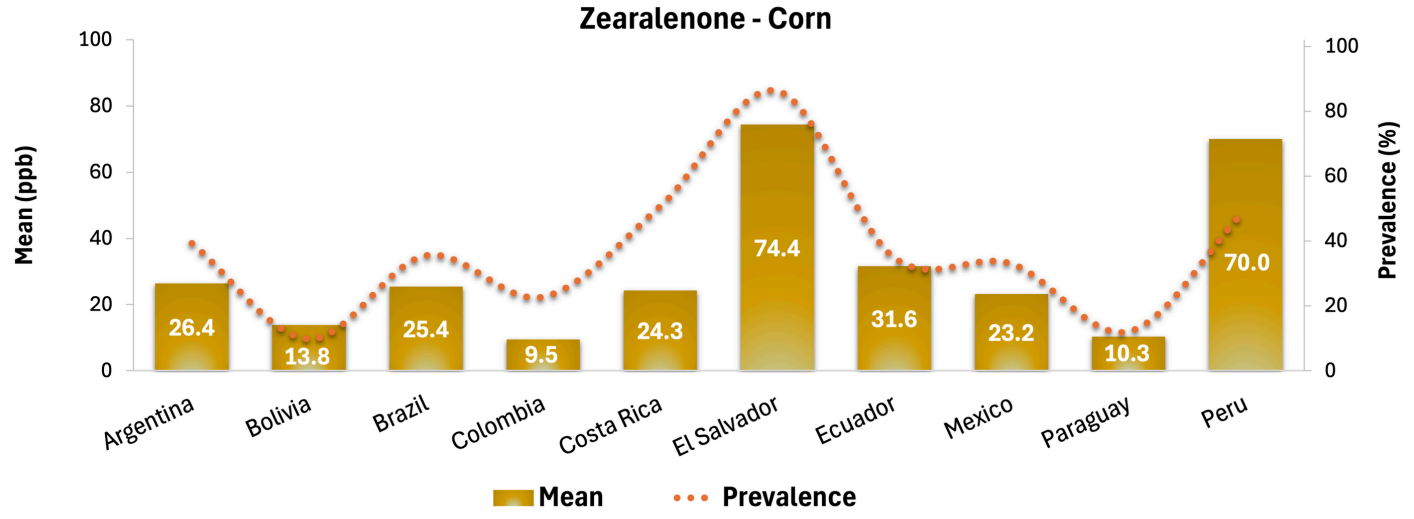
Methodology

Throughout **2025**, a total of **22,645** spectra were predicted, each corresponding to a corn sample. The spectra were submitted through the **Olimpo Platform**, a web-based service developed by **Pegasus Science** and connected to **50 different NIRS** instruments located in laboratories and industrial facilities across **Latin America**. The spectra were obtained from corn samples commercially traded in the following countries: **Argentina (n = 685), Bolivia (n = 52), Brazil (n = 20,463), Colombia (n = 63), Costa Rica (n = 160), El Salvador (n = 150), Ecuador (n = 115), Mexico (n = 180), Paraguay (n = 409), and Peru (n = 368)**. Each sample was previously ground, homogenized, and subsequently analyzed using a NIRS instrument. The spectra were then uploaded to the **Olimpo Platform**, where samples were predicted for the presence and concentration of **fumonisins B_1 and B_2 (FBs), aflatoxin B_1 (AFB_1), deoxynivalenol (DON), and zearalenone (ZEN)**, totaling **105,255 analyses**. The limits of quantification (LOQ, expressed in µg/kg or ppb) for FB_1, FB_2, AFB_1, DON, and ZEN were 200, 200, 5, 250, and 30, respectively.

Results

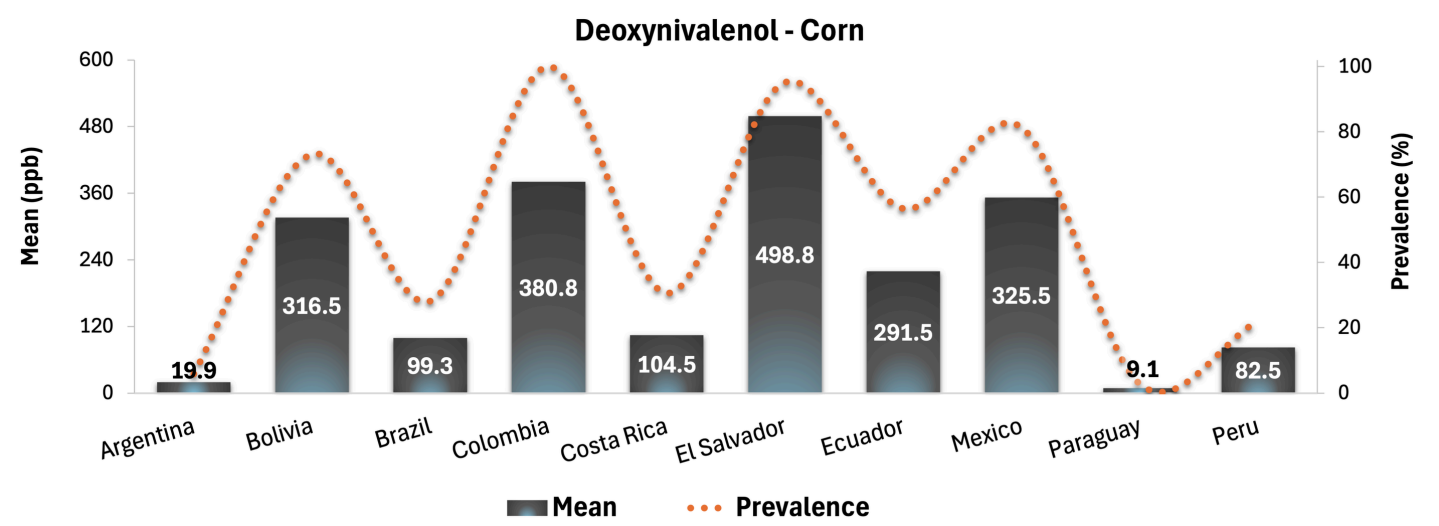


FBs were the **most prevalent** mycotoxins in Latin America, being detected in **68.9%** of the samples. FB concentrations ranged from **<LOQ** to **13,223 ppb**. The overall mean concentration in **2025** was **1,190 ppb**, while the mean concentration among positive samples was **1,728 ppb**. **Paraguay** showed the lowest mean FB level (**909 ppb**), whereas **Peru** exhibited the highest mean contamination (**4,082 ppb**), with a **difference** of **more** than **3,000 ppb** between the two countries. In general, a high prevalence of FBs in corn samples is expected in Latin America, as the regional climate favors the growth of *Fusarium* species, which are responsible for the production of these mycotoxins. However, a decrease in the prevalence of FBs was observed compared with the **Survey Pegasus Science 2024**, in which FBs were detected in **82%** of corn samples from Latin America.

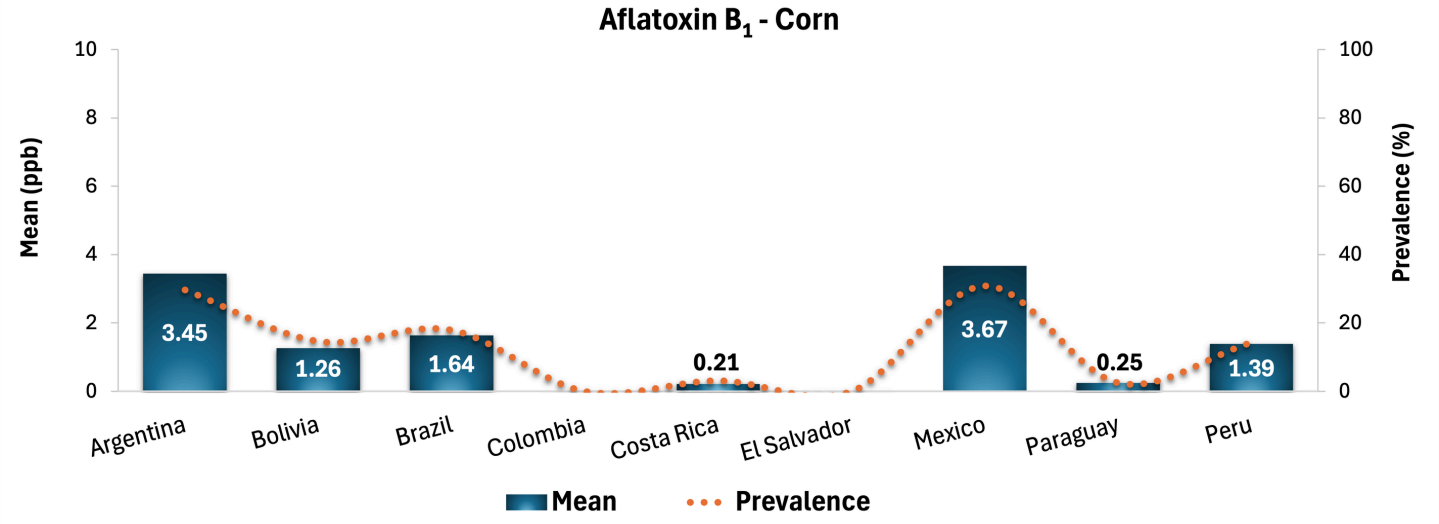


ZEN was the second most prevalent mycotoxin, detected in **35.7%** of the predicted samples. The overall mean concentration and the mean concentration among positive samples were **26.1** and **73.1 ppb**, respectively. ZEN concentrations in the samples ranged from **<LOQ** to **598 ppb**. Colombia showed the lowest mean ZEN level (**9.5 ppb**), while **El Salvador** and **Peru** recorded the highest mean contamination levels (**74.4** and **70.0 ppb**, respectively). Historically, both the

prevalence and mean contamination levels of ZEN in corn have been low. However, in recent years, a significant increase in both contamination levels and prevalence of this mycotoxin has been observed in Latin America.



DON was detected in **28.3%** of the samples, making it the third most prevalent mycotoxin in this study. The prevalence of this mycotoxin was also **lower** than that reported in the **Survey Pegasus Science 2024**, in which DON was detected in **40%** of the samples. DON concentrations in the samples ranged from **<LOQ** to **974 ppb**. The overall mean concentration was **101.7 ppb**, while the mean concentration among positive samples was **358.8 ppb**. **Argentina** and **Paraguay** showed the lowest mean DON levels (**19.9** and **9.1 ppb**, respectively), whereas **El Salvador** and **Colombia** exhibited the highest mean concentrations (**498.8** and **380.8 ppb**, respectively). Similar to ZEN, this mycotoxin historically exhibited low prevalence in corn; however, in recent years, an increase in both its positivity rate and contamination levels has been observed.



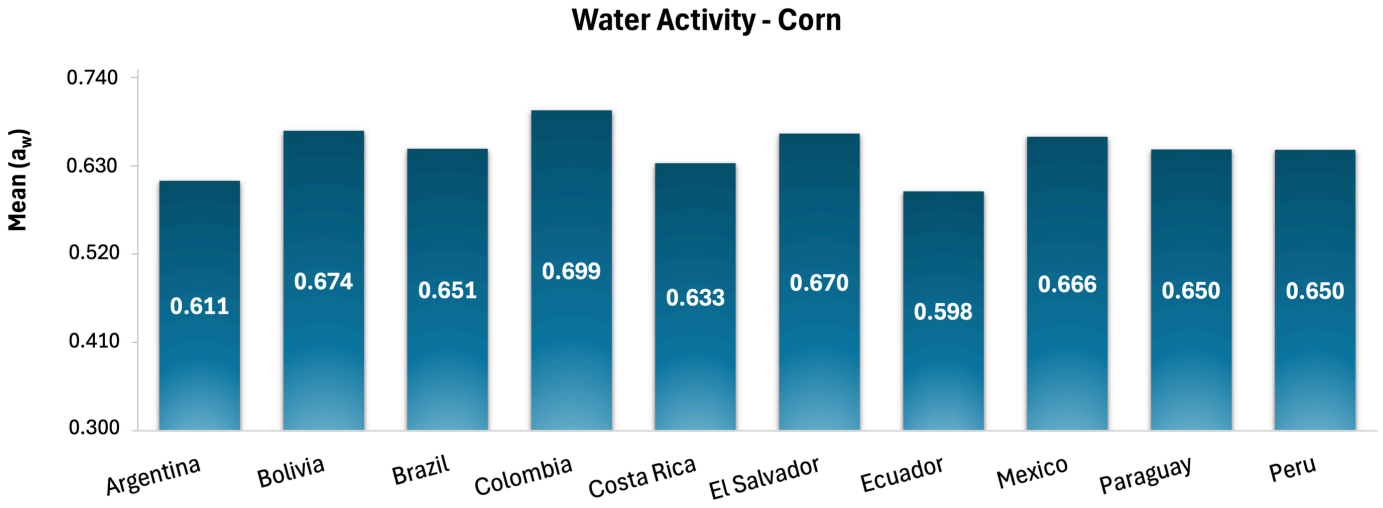
The overall mean concentration of **AFB_1** and the mean concentration among positive samples were **1.63** and **9.26 ppb**, respectively, making it the least prevalent mycotoxin in this survey (**17.7%**). AFB_1 concentrations in the samples ranged from **<LOQ** to **42.8 ppb**. This mycotoxin **was not detected** in any samples from **Colombia** or **El Salvador**, while **Mexico** and **Argentina** had the highest mean concentrations (**3.67** and **3.45 ppb**, respectively). In recent years, AFB_1 has exhibited lower contamination levels in corn, with no high prevalences or concentrations observed, likely due to improved control of processes that may lead to its occurrence, particularly grain storage.

Co-occurrence of mycotoxins in corn					
Co-occurrences	**Number of samples**	**Co-occurrence (%)**	**Mean 1st (ppb)**	**Mean 2nd (ppb)**	**Mean 3rd (ppb)**
FBs + ZEN	19,738	23.1	1,896	73.7	-
FBs + DON	20,517	20.4	2,029	367.3	-
DON + ZEN	20,593	14.0	365.3	98.1	-
FBs + AFB_1	19,650	13.6	1,781	9.11	-
FBs + DON + ZEN	19,458	8.8	2,007	377.4	96.2
ZEN + AFB_1	19,284	8.5	76.7	8.80	-
DON + AFB_1	20,118	7.9	379.7	9.50	-
FBs + DON + AFB_1	19,430	6.3	1,899	376.8	9.98
FBs + ZEN + AFB_1	18,594	6.3	1,768	72.0	8.94

1st Mean of the positive samples for the first mycotoxin, 2nd Mean of the positive samples for the second mycotoxin, 3rd Mean of the positive samples for the third mycotoxin

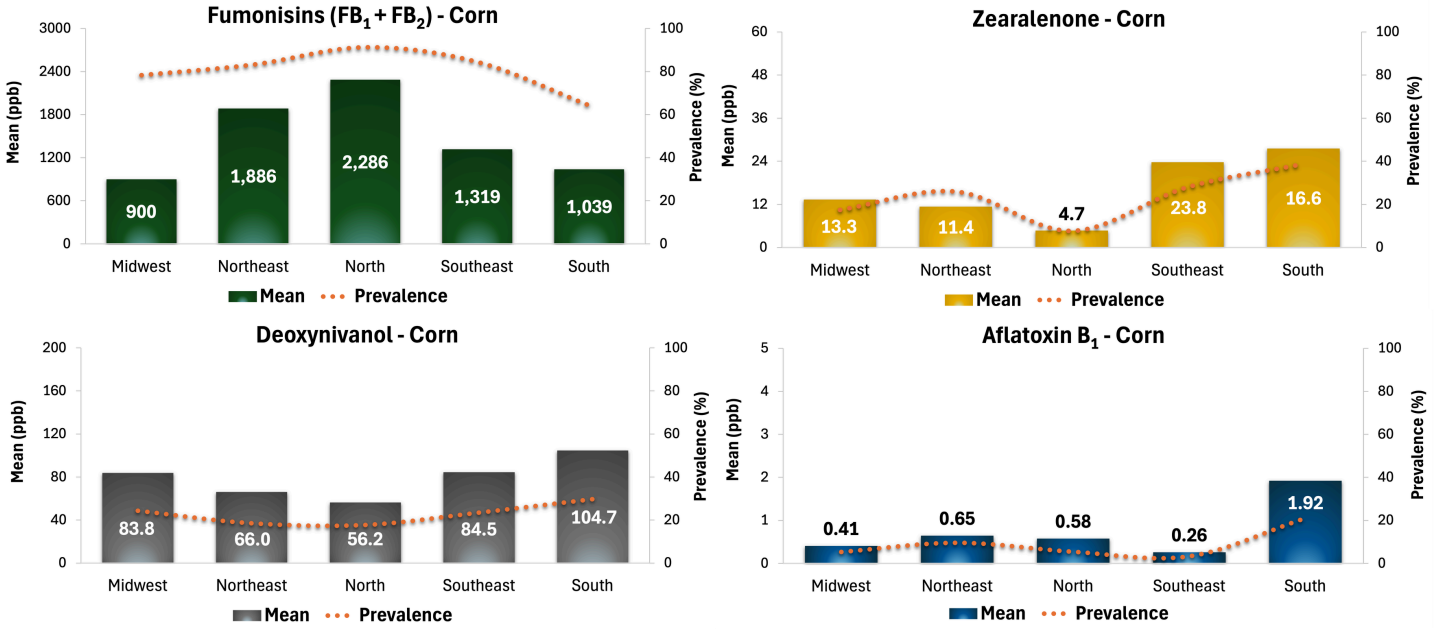
The simultaneous contamination of grains by different mycotoxins occurs because a single fungal genus can produce multiple types of mycotoxins, as well as due to the possibility that different genera may contaminate grains either simultaneously or at different stages of the production chain, affecting corn from the field through storage. The **co-occurrence** of mycotoxins within the same product may result in **additive** or **synergistic** effects. Therefore, this factor must be carefully considered when assessing mycotoxin-related risk.

In **2025**, the most prominent **co-occurrence** was observed between **FBs + ZEN**, which was detected in **23.1%** of the analyzed spectra. The second and third highest prevalences were found for **FBs + DON** and **DON + ZEN**, occurring in **20.4%** and **14.0%** of the samples, respectively. Co-occurrence of mycotoxins produced by different fungal genera was also observed, such as **FBs + AFB_1**, which occurred in **13.6%** of the predicted samples in 2025. In addition, the simultaneous occurrence of three mycotoxins, such as **FBs + DON + ZEN**, was observed in **8.8%** of the samples.



Throughout **2025**, **water activity (a_w)** values in the samples ranged from **0.449** to **0.916**, and the **mean a_w** observed in corn from Latin America was **0.650**. Country-level mean values ranged from **0.598** (**Ecuador**) to **0.699** (**Colombia**). In addition, **16.1%** of the predicted samples were **above** the limit considered safe (**>0.69**). Water activity is a key parameter when assessing the stability of any food, and **values above 0.69** indicate conditions that allow **fungal growth** and **mycotoxin production**. Therefore, **monitoring a_w** in corn is **essential** for improved **mycotoxin management** in feed mills, particularly during grain **storage**.

Results from Brazil - Comparison among the five regions



The graphs above present the mean concentrations and prevalences of mycotoxins across the **five regions of Brazil** throughout **2025**. **FBs** were the **most prevalent** mycotoxins in the country, being detected in **67.8%** of the samples. The overall annual mean concentration was **1,101 ppb**, while the mean concentration among positive samples was **1,624 ppb**. The **Midwest region** showed the lowest mean FBs level (**900 ppb**), whereas the **North region** exhibited the highest

mean concentration (**2,286 ppb**). A **slight increase** in both the mean contamination level and prevalence of this mycotoxin in Brazilian corn was observed compared with the **Survey Pegasus Science 2024**, in which **FBs** had a mean concentration of **873 ppb** and a prevalence of **62%**.

ZEN was the second most prevalent mycotoxin in Brazil, being detected in **35.2%** of the samples. The overall mean concentration and the mean concentration among positive samples were **25.2** and **71.6 ppb**, respectively. The **North region** presented the lowest mean ZEN level (**4.7 ppb**), while the **South region** showed the highest mean concentration (**27.6 ppb**). Regarding **DON**, this mycotoxin was present in **28.1%** of the samples predicted in Brazil, with an overall mean concentration of **99.0 ppb** and a mean concentration among positive samples of **352.2 ppb**. The **South region** showed the highest mean contamination level (**104.7 ppb**), whereas the **North region** exhibited the lowest (**56.2 ppb**). **AFB_1** was the least prevalent mycotoxin in the country (**17.9%**) throughout 2025. Its overall mean concentration was **1.63 ppb**, while the mean concentration among positive samples was **9.12 ppb**. The **South region** presented the highest mean AFB_1 level (**1.92 ppb**), whereas the **Southeast region** showed the lowest mean concentration (**0.26 ppb**).

Based on this survey, important differences in mycotoxin contamination were observed among the different Brazilian regions throughout **2025**. The **North region** stood out for the highest mean contamination levels and prevalence of **FBs**, while the **South region** showed higher mean concentrations and prevalences of **AFB_1**, **ZEN** and **DON**.

Conclusion

The **2025** findings reveal a trend that has been consistently observed in recent years, characterized by the high prevalence of **FBs** and an increase in both the prevalence and contamination levels of **ZEN** and **DON**, in addition to a moderate prevalence of **AFB_1**. Therefore, the use of **fast** and **highly reliable** diagnostic technologies is crucial factor in decision-making, enabling a more **accurate** and **cost-effective** management for the agribusiness sector. In this context, the use of **NIRS** for mycotoxin prediction provides rapid results, allowing the analysis of a **larger number of samples**, which in turn ensures greater **safety** and **precision** in ingredient utilization.

In addition to the average concentration and prevalence of each mycotoxin, other key factors must be considered in **Mycotoxin Risk** assessment, such as the **co-occurrence** of different mycotoxins, the specific sensitivity of each **animal species** according to **growing phases** and **sex**, as well as the environmental, sanitary, genetic, and nutritional factors to which the animals are exposed, all of which may significantly influence the magnitude of the risk.

Would you like to learn more about how to assess all these factors? Contact the **Pegasus Science** team to gain full access to our **ultra-fast Mycotoxin Risk management tool**, available in real time on the **Olimpo Platform**.

PEGASUS SCIENCE

Smart and real-time system for mycotoxin control

Contact Us:

+55 (55) 99641-3285
+55 (55) 99624-8358

www.pegasusscience.com

pegasus@pegasusscience.com

@pegasusscience

pegasus-science