

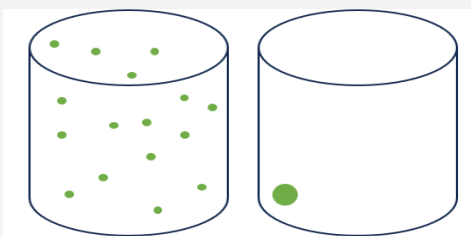


Slurry mixing: recipe for reliable results

February 2024

Introduction

In the dynamic landscape of food and feed analysis, ensuring the uninterrupted flow of production is a constant challenge for the food industry. Contaminants, often unevenly distributed within batches, present a risk to production continuity. At Primoris, we acknowledge the industry's imperative not just to request sample analyses but to utilize them as a crucial step in safeguarding production, meeting regulatory standards, and assuring product quality. That's why we want to emphasize the importance of sampling and sample preparation in obtaining accurate and reliable results.



Left: homogeneously distributed contaminants.

Right: Heterogeneously distributed contaminants.

Take mycotoxins, for instance, these invisible troublemakers formed by fungi growing on food are often found in only a few contaminated places inside the batch with concentrations in these 'hotspots' reaching alarming levels. Because of this, they can cause problems if not detected accurately. In a world where production downtime is not an option, getting the sampling process right and having results that are representative for the whole batch becomes crucial.

The challenge of homogeneity

Careful execution of the sampling process is essential. Equally important is the handling of the sample in the analytical laboratory. Achieving a homogeneous subsample from a heterogeneous contaminated sample continues to pose a challenge in the laboratory. For larger lot sizes, Regulation (EU) 2023/2782 describes that samples up to 10 kg have to be taken for the analysis of mycotoxins. Dry milling such large volumes causes numerous difficulties so this is where a technique known as "slurry mixing" comes to the forefront.

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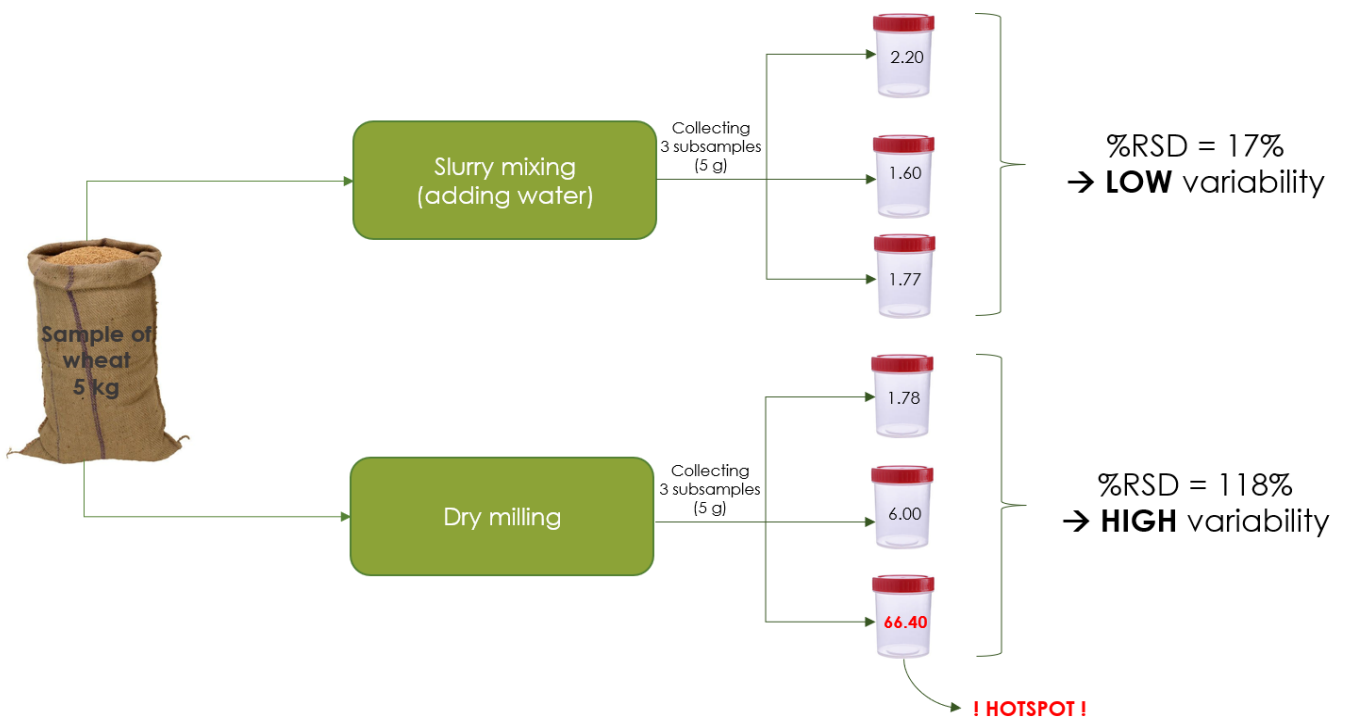
This approach involves mixing a large sample with water to form a slurry—a homogeneous mixture of liquid and solids. From this larger quantity, a small subsample is then taken for further analysis. Slurry mixing ensures smaller particles, promoting a more even distribution of heterogeneous distributed contaminants compared to traditional dry milling. This robust technique allows a representative subsample to be taken from a large, heterogeneous sample. In contrast with dry milling, which often creates a non-representative subsample. This creates a risk of missing hotspots, resulting in values that are too low for the entire batch, or solely sampling a hotspot, yielding values that are too high for the whole batch.

Case study: ergot alkaloids

Let's dive into a real-world scenario, showcasing the impact of homogenization techniques, considering ergot alkaloids. These toxic compounds, arising

from the *Claviceps fungus* on specific cereal kernels, exhibit a highly heterogeneous distribution. Commission Regulation (EU) 2023/915 establishes maximum limits for ergot alkaloids in various cereals.

At Primoris, we have compared the analysis of ergot alkaloids for eight wheat samples using traditional dry mixing and slurry mixing of a large sample (5 kg). Our focus was not merely a scientific exercise but a means to ensure regulatory compliance without unnecessary complications. For this comparison, all samples were analyzed three times with our standard LC-MS/MS method. Our study indicates that when dry mixing a sample, the variability between analytical results is significantly higher compared to slurry mixing. Dry mixing poses a greater risk of subsampling a hot spot, leading to inaccurate reporting of ergot alkaloid concentrations and, in some cases, wrongful rejection of products.



Below: Comparison of variability of ergot alkaloid concentration (µg/kg): slurry mixing vs. dry milling (RSD = relative standard deviation)

For example, dry milling reported a concentration of 245 µg/kg ergot alkaloids, potentially leading to batch rejection due to a maximum limit set at 100 µg/kg. In contrast, slurry mixing revealed a true concentration of only 70 µg/kg, ensuring accurate reporting and avoiding unnecessary rejection. This case study underlines the critical role of slurry mixing in achieving greater homogeneity in large samples, significantly impacting the accuracy of mycotoxin testing.

Conclusion

In summary, our study illuminates a crucial aspect of the analysis of heterogeneously distributed

contaminants, emphasizing the significant advantages of slurry mixing over traditional dry milling. The comparison, demonstrated in the ergot alkaloid case study, underlines the pivotal role of slurry mixing in achieving greater homogeneity in large samples.

By adopting slurry mixing, the food industry gains a robust tool for consistently accurate results, reducing the risk of subsampling errors. It becomes an invaluable asset for enhancing confidence in meeting regulatory standards and ensuring the uninterrupted flow of production.

You can rely on us

This information sheet only provides a handful of examples, rendering it far from a complete overview of contamination sources. If you would like to find out more information on this topic and the analyses we offer, please do not hesitate to contact our customer care service.

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Quality and reliability of our analyses is key to us, which is why our in-house R&D team is continuously working to improve our existing methods as well as developing new relevant methods based on market trends. Furthermore, our pesticide analyses are **BELAC** accredited conform the requirements of the EN **ISO/IEC 17025:2017** standard. In addition, we have **various recognitions** to further ensure the quality and relevance of our analysis scope. Below just a selection of our current recognitions.

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