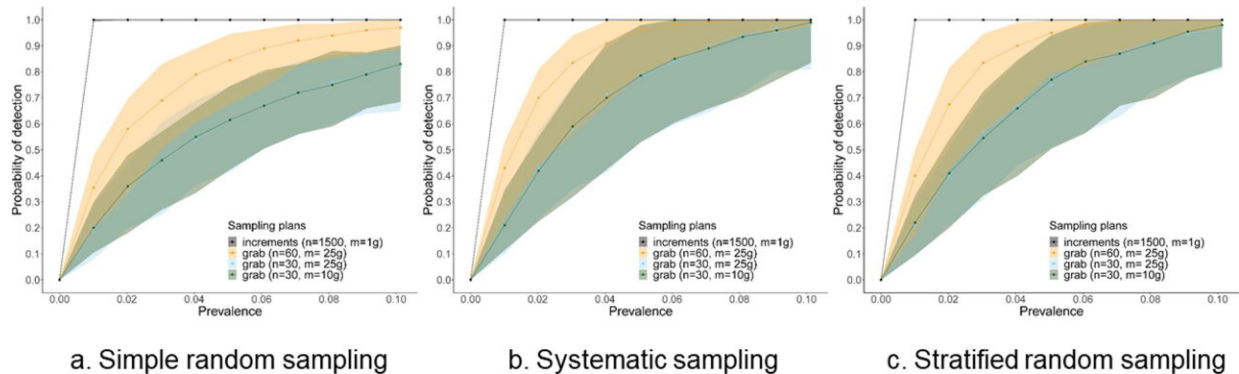


Study: Infant formula safety checks can be improved with stratified sampling

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Comparing the power of three different sampling patterns with the low-prevalence, high-level profile. The probability of detection is shown at 2.5th–97.5th percentile. The line with dots shows the median probability of detection from the simulation result. Every 1% prevalence was simulated and shown with dots. n = number of the sample, m = mass of each sample. Credit: *Journal of Food Protection* (2023). DOI: 10.1016/j.jfp.2023.100115

Producers of infant formula employ comprehensive food safety systems, including product testing to ensure those systems are working. A new study from the University of Illinois Urbana-Champaign finds that some testing methods are more powerful at catching contaminants than others.

Spacing out samples over time in a stratified sampling pattern is better at catching risky pathogens like *Cronobacter* than randomly sampling from

the product as it is being produced, the researchers found. Furthermore, while taking more samples of product generally increases the chance to catch the pathogen, there is a point after which it is unlikely to increase safety.

"Our findings show that existing sampling and testing guidance is powerful, at least for the one hazard profile our team had access to for the study," said project lead Matthew J. Stasiewicz, associate professor in the Department of Food Science and Human Nutrition (FSHN), part of the College of Agricultural, Consumer and Environmental Sciences at U. of I.

"However, this work also highlights the need for additional research and data sharing efforts into patterns of contamination in infant formula production, so that sampling and testing can be better matched to current needs," he stated.

Safety systems for infant formula production include control points like milk pasteurization and steps to prevent contamination such as sanitary facility design and regular cleaning and sanitation. Product testing is an additional tool that producers are using to verify safety, and it must be powerful enough to catch a major failure before a potentially risky product is released to customers.

The study, published in the *Journal of Food Protection*, was supported by the Institute for the Advancement of Food and Nutrition Sciences (IAFNS) Food Microbiology Committee. The researchers used computer models to simulate sampling and testing finished formula to gauge the power of current national and international guidelines for testing programs and suggest ways to do better.

The process was based on detecting a realistic hazard, defined by what was observed in samples from Cronobacter-contaminated batches

produced in Europe in the 2010s, the most current data available. The researchers found that safety plans with 30 or more grab samples had a very high probability of detecting hazards.

However, there was a point of diminishing returns, where very high sample numbers—like testing every can produced—would not be meaningfully more powerful. They concluded that systematic or stratified random sampling patterns are more effective than simple random sampling for bulk powder testing.

"In addition to analyzing relevant scenarios, we built a [web app](#) that allows industry stakeholders to simulate various sampling scenarios and gain a deeper understanding of the effectiveness of sampling plans specific to their plants. With this knowledge, producers can proactively address risks and optimize current [sampling](#) practices," said the study's lead author Minho Kim, a doctoral student in FSHN.

For parents who are concerned about their infants becoming ill from bacterial contamination of formula, the researchers advise they talk to their doctor about safer formula feeding.

For example, one way to further reduce bacteria in formula is using hot water during reconstitution and then cooling it to body temperature prior to feeding. This simple preventative measure can greatly reduce the risk from Cronobacter contamination according to an international risk assessment. However, steps like this require care to avoid the risk of children being burned by the heated bottles.

More information: Minho Kim et al, Simulation Evaluation of Power of Sampling Plans to Detect Cronobacter in Powdered Infant Formula Production, *Journal of Food Protection* (2023). [DOI: 10.1016/j.jfp.2023.100115](https://doi.org/10.1016/j.jfp.2023.100115)

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