Representative Sampling for Food and Feed Materials: A Critical Need for Food/Feed Safety – Special Edition Section of Journal AOAC International

K.H. Esbensen[a], C.Paoletti[b] , N. Thiex[c]
[a]Owner, Consultant KHE Consulting, Copenhagen, DK khe.consult@gmail.com
[b]European Food Safety Authority, Parma, IT, Claudia.PAOLETTI@efsa.europa.eu
[c]Thiex Laboratory Solutions, LLC, Brookings South Dakota, USA Nancy.Thiex@gmail.com

Technically, sampling of food and feed is the process of selecting a small mass from a larger quantity of material for the purpose of performing a measurement, quantitative or qualitative, on the selected portion and making valid inferences with respect to the entire target mass (Decision Unit). It is too often simply assumed (without justification) that the representativeness and integrity of the sampled material is a given, and consequently also erroneously assumed that the measurement results obtained can be used to make reliable inferences about the target. This is a seriously mistaken assumption.

Sampling of food and feed materials is performed for a number of reasons at various stages of an integrated food safety system, including but not limited to, premarketing risk assessment, process control in a food/feed manufacturing environment, first responder investigations to foodborne disease outbreaks, and regulatory compliance (agencies/programs performing monitoring or surveillance of food or feed products in support of food safety surveillance of food or feed products in support of food safety regulations.

While sampling situations are diverse, and for many the immediate thought is that specific sampling procedures probably should be tied in with the specific nature of the products or processes being sampled, a singular, unified approach can in fact address all situations and products, aiming for a fit-for-purpose (fit-for-decision) representative sampling process.

The target audience includes food/feed protection personnel, e.g., field sampling operators, academic and industrial scientists, laboratory personnel, companies, organizations, regulatory bodies, and agencies that are responsible for sampling, as well as their project leaders, project managers, quality mangers, supervisors, and directors who are responsible for business and other decisions of economic and societal importance. In the United States alone there are an estimated 45,000 federal, state, and local food/feed regulatory personnel, not including industry or laboratory personnel. With a conservative estimate of 50-75% of them involved in sampling activities, the target audience forms a very sizable body in the United States as well as worldwide. For the world at large, the relevant numbers are exorbitant. There is much to do …

And there is here a powerful carry-over effect beyond food and feed sampling. The general principles presented apply to any-and-all materials (lots, DUs) with similar heterogeneity characteristics as those in the food, feed, and environmental sciences. Perhaps paradoxical at first view, sampling of heterogeneous materials is in a sense a matrix-independent endeavour, only the material heterogeneity counts[2-5]. In this sense ref. 1: "Representative Sampling for Food and Feed Materials", Special Guest Editor Section Journal of AOAC International, vol. 98, No. 2 (2015) constitutes a general introductory mini-text book for representative sampling[1].

1. DOI: 10.5740/joaocint.SGE_Esbensen_intro [OPEN ACCESS]
2. K.H. Esbensen, "Materials properties: heterogeneity and appropriate sampling modes", J. AOAC Int. 98(2), 269–274 (2015). https://doi.org/10.5740/jaoacint.14-234
3. K.H. Esbensen, Introduction to the Theory and Practice of Sampling. IM Publications Open (2020). https://doi.org/10.1255/978-1-906715-29-8
4. F.F. Pitard, Theory of Sampling and Sampling Practice, 3rd Edn. CRC Press (2019). https://doi.org/10.1201/9781351105934
5. DS3077, Representative Sampling—Horizontal Standard. Danish Standards (2013). http://www.ds.dk

doi: https://doi.org/10.1255/tosf.180