Microbiological criteria and sampling plans: Not detected does not mean absence

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Consumers, management and government would like to have zero risk, but zero risk does not exist. Sometimes pathogens can be present in foods at dangerous levels. We try to prevent this by well-designed food safety management systems. In order to verify that all is under control, ingredients, process environment and end product can be sampled. But also this sampling is a stochastic process. Far from all food is tested and therefore contaminations might be missed. Levels that can be detected by realistic sampling plans are often much higher than what would be strived for to protect public health. Apart from the additional verification by sampling, the main foundation of food safety is in the control, for example by an inactivation process. But also after large reductions still small residual risks remain. Residual risk can be defined as the risk that remains even after a fully compliant food safety system has been implemented. As true "zero risk" is essentially unattainable, understanding and assessing the residual risks for different products is essential for the different actors involved in the food production system. Understanding residual risk is particularly critical as improved surveillance systems (e.g. facilitated by whole genome sequencing) can detect small outbreaks and potentially link cases to a product, even when they are consequences of residual risk rather than a noncompliant food safety system. Depending on the scale these risks are infinitively small (risk per serving) or can still be considerable (worldwide). Therefore, it is relevant to express risk on various scales.