

The BAX® System SalQuant introduces new era of accurately quantifying *Salmonella* levels



Salmonella has long been a food safety hazard in poultry. To determine whether contamination exists in a facility, the poultry industry currently relies on prevalence testing using a variety of test methods to determine presence/absence and the Most Probable Number (MPN) method to estimate the level of *Salmonella* contamination. The MPN method is labor intensive, expensive and requires between 27 and 72 hours to obtain results. Results from the “Gold Standard” MPN utilizes statistical modeling with large 95% confidence intervals, thus reducing accuracy and precision when estimating levels of *Salmonella*.

The US Department of Agriculture (USDA) Food Safety Inspection Service (FSIS) has established performance standards for *Salmonella* prevalence to be between 7 to 25 percent in a poultry production facility depending on product type (broiler carcass,

turkey carcass, comminuted chicken and turkey and chicken parts). Processors, however, have been recording prevalence results that are higher than the standard, and are looking for alternatives to MPN to gain better insight into *Salmonella* load.

While MPN and prevalence data can provide an overall picture of contamination, prevalence cannot determine the degree of contamination and possible interactions between testing points, and MPN time-to-results are too slow to produce actionable information. Poultry processors have been seeking a more accurate, quantitative method to determine levels of *Salmonella*, as well as mapping *Salmonella* load throughout a facility. The BAX® System SalQuant method was developed to provide processors a route to quickly obtain accurate enumerations of *Salmonella* levels from grow houses to final product.

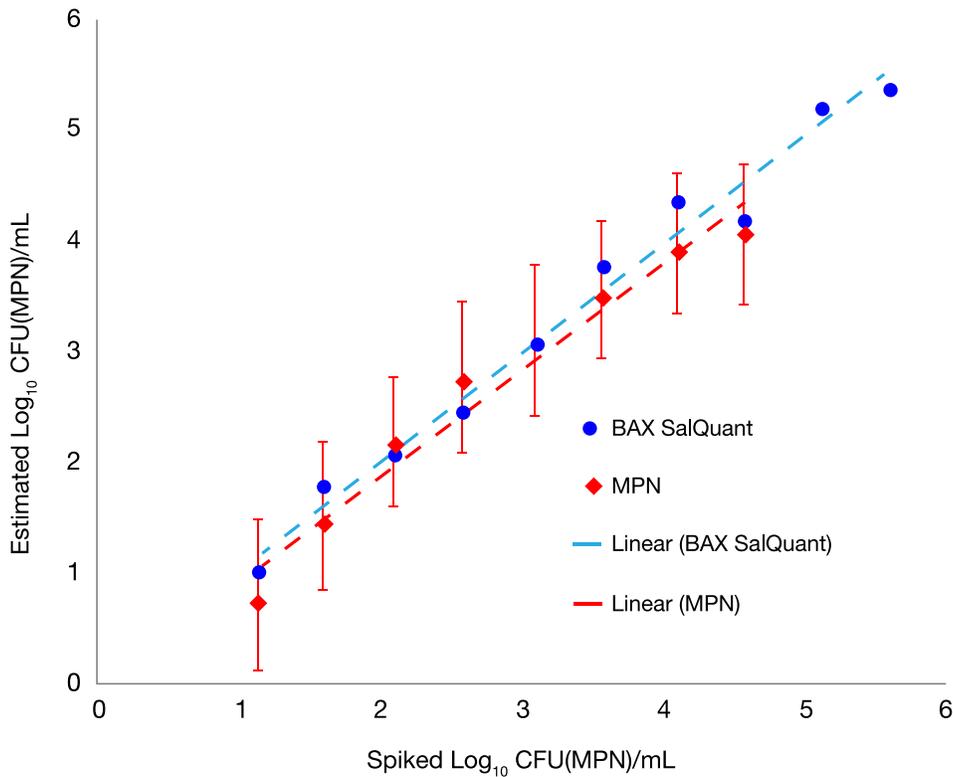
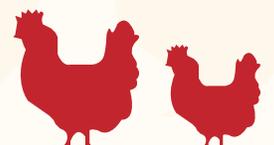


Figure 1.
The following figure helps illustrate the difference when estimating *Salmonella* using the MPN method versus the BAX® System SalQuant method.



The BAX® System SalQuant method uses the BAX® System Q7 and BAX® System Real Time (RT) PCR assay for *Salmonella* to performing RT-PCR on samples collected from a facility after a shortened enrichment period. Running samples on the Q7 generates cycle threshold (CT) values for positive samples, which can be used to quantify the number of colony-forming units (CFUs) in any sample. CT values are inversely related to amount of *Salmonella*. Therefore, lower CT values indicate a higher level of contamination, and data curves from these results can be computed to determine levels of contamination. Depending on the matrix being tested and desired enumerable range, sample preparation and enrichment, and on the BAX® PCR prep, this process only takes 2 – 14 hours. For illustrating data, the common logarithm (Log₁₀) is used frequently in science and engineering because it can calculate wide-ranging quantities on a simpler scope and avoids tedious multi-digit multiplication steps.



Getting more accurate results

Hygiena researchers, working with Texas Tech University and commercial poultry processors, have tested the SalQuant method throughout poultry live production (boot swabs, ceca, whole viscera packs, feed), processing environments (whole bird, parts, wings, and chicken skin rinsates), and final products (ground chicken and turkey). By listening to what industry partners need and utilizing academic research facilities, Hygiena developed SalQuant results and procedures, which are reliable and efficient for various laboratory facilities to accurately estimate *Salmonella*.

In an experiment with whole bird rinsates, the researchers used the linear relationship between CT values and Log_{10} CFU/mL levels of *Salmonella* to estimate various inoculation levels. A linear fit equation was developed to estimate Log_{10} CFU/mL of *Salmonella* and then directly compared to the known spike Log_{10} CFU/mL of *Salmonella* levels (Figure 2). The SalQuant method depicts a direct, precise linear relationship where CT values, generated from specific enrichment parameters per matrix, can calculate the level of contamination of *Salmonella*.

For the first time, the SalQuant method can provide data on contamination levels that is location-specific, more accurate and precise, and rapid than MPN. By combining the power of Real-Time PCR, the BAX[®] System Real-Time Assay for *Salmonella*, and multiple sampling locations throughout poultry production, processors can now quantify *Salmonella* to improve and verify sanitation and antimicrobial intervention processes, to meet more stringent regulatory and quality standards.

Now, processors can more quickly and confidently respond to increasing *Salmonella* contamination issues, allowing them to better focus their sanitation and antimicrobial interventions, saving money that otherwise would be used for wider interventions.

Hygiena developed SalQuant results and procedures, which are reliable and efficient for various laboratory facilities to accurately estimate *Salmonella*.



Figure 2.

