Title: Development of an Immunomagnetic Chemiluminescent Assay for Quantitative Detection of *Salmonella* in Poultry Products

Abstract:

Introduction:

Salmonella-contaminated poultry products pose significant risks of causing food poisoning. There is an urgent need for rapid and efficient methods to identify contaminated products, preventing outbreaks of foodborne illnesses. Traditional *Salmonella* detection methods involve time-consuming and labor-intensive steps. Implementing testing tools suitable for processing and production settings would empower industry stakeholders to ensure a safer food supply.

Purpose:

The objective of this study was to develop an Immunomagnetic Chemiluminescent Assay (IMCA) for the rapid detection and quantification of *S*. Typhimurium in poultry products.

Methods:

A workflow was developed for the quantitative determination of *Salmonella* analysis of ground chicken products. Antibody-coupled immunomagnetic microbeads were utilized to capture and concentrate *S*. Typhimurium in the samples. Biotin-conjugated antibody and avidin-horseradish peroxidase conjugate were employed to bind the captured *S*. Typhimurium, initiating a chemiluminescence reaction catalyzed by the bacterium-bound peroxidase. The light intensity was measured in Relative Luminescence Units (RLU) using a portable luminometer.

Results:

Ground chicken samples contaminated with varying levels of *S*. Typhimurium (ranging from 0 to 1.0×10^4 CFU/g) were assessed, and the results were compared. The assay demonstrated high sensitivity, providing reliable results within a 2-hour timeframe. The light intensity (RLU) exhibited a log-linear correlation with the concentration of *S*. Typhimurium in the range of 6.8×10^1 to 3.1×10^4 CFU/g, with an R^2 value of 0.9976. The detection limit for *S*. Typhimurium, as low as 1 CFU/g in ground chicken, was achieved following a 6-hour enrichment protocol.

Significance:

The findings indicate the potential for further development of IMCA into compact, portable measuring devices for convenient preliminary screening tests. These devices could enable the timely and cost-effective tracing of specific contamination sources along processing and distribution lines.