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The effect of enrichment broth and temperature on the recovery of *Salmonella*

Statement of the Problem: No single enrichment broth or temperature is used consistently throughout the research, regulatory or industry laboratories for the detection of *Salmonella*. This lack of a single methodology leads to confusion and possible bias both for and against *Salmonella* serotypes. The objective was to evaluate four selective enrichment broths [selenite cystine (SC), tetrathionate Hajna (TT), GN broth (GN) and Rappaport-Vassialiadis (RV)] at two temperatures (37°C and 42°C) to determine the best for growth of four *Salmonella* serovars.

Methodology: Four *Salmonella* serovars [Enteritidis (SE), Heidelberg (SH), Kentucky (SK) and Typhimurium (ST)] were inoculated individually (101 cfu) into duplicate tubes containing 10 mL of each of four enrichment broths at each temperature. After overnight enrichment, serial dilutions were plated onto brilliant green sulfa (BGS) agar plates for enumeration. Counts were made and recorded after 24 h incubation. Three replicates were conducted.

Conclusion & Significance: All four enrichment broths were significantly ($P<0.05$) more effective for recovery at 37°C than at 42°C. When incubated at 37°C, recovery in SC was $\log_{10}$ 4.4, 7.7, 7.6 and 7.5 for SE, SH, SK and ST, respectively; recovery in GN was $\log_{10}$ 8.2, 8.4, 8.5 and 8.4 for SE, SH, SK and ST, respectively; recovery in TT was $\log_{10}$ 6.9, 7.6, 8.1, and 7.3 for SE, SH, SK and ST, respectively; and recovery in RV was $\log_{10}$ 8.1, 8.2, 8.2 and 7.9 for SE, SH, SK and ST respectively. At 37°C, significant differences were observed between TT/GN; TT/RV; SC/GN; and SC/RV and none observed between SC/TT or GN/RV. At 42°C, no significant difference was observed between three broths (SC, TT and RV) when *Salmonella* was recovered. Recovery of *Salmonella* strains can unintentionally be biased by on the incubation temperature or the enrichment broth selected simply because of laboratory preference or regulatory protocol.

Recent publications

1. Cosby D E, N A Cox and M E Berrang (2016) Ecometric evaluation of *Salmonella* selective enrichment broths to suppress background microflora. Poultry Sci. 95(E-Suppl 1):161-162.
2. Cosby D E, N A Cox and M E Berrang (2016) Growth of *Salmonella* in four enrichment broths at 37 or 42°C. Poultry Sci. 95(E-Suppl 1):161.
3. Cox N A, K E Richardson, D E Cosby, M E Berrang, N Holcombe and C Weller (2017) The effect of environmental poultry samples on the pH of typical pre-enrichment and enrichment media following incubation. J. Appl. Poult. Res., 27(1):112-115.
4. Richardson K E, N A Cox, D E Cosby, M E Berrang and L DeRome (2017) Acid tolerance of dry-stressed *Salmonella*. Poult. Sci. 96(E-Suppl. 1):312.
5. Richardson K E, N A Cox, D E Cosby and M E Berrang (2017) Impact of desiccation and heat exposure stress on *Salmonella* tolerance to acidic conditions. J. Environ. Sci. and Health, Part B., 53(2):141-144.

Biography

Douglas E Cosby received his PhD in Food Science from University of Georgia (2012). His expertise is in the research and development of intervention strategies to reduce or eliminate *Salmonella*, *Campylobacter*, *Listeria*, and *Clostridium* species from poultry and poultry products on farm and in the processing plant. He has worked at the US Department of Agriculture, Agriculture Research Service for the past 30 years and serves an Adjunct Assistant Graduate Professor at the University of Georgia, Department of Food Science and Technology. His current research is aimed at preventing and/or reducing enteropathogenic *salmonella* and *campylobacter* on poultry and poultry products by preventing the colonization of poultry through the use of biosecurity and/or feed additives in live poultry and through the mechanical removal of enteropathogenic bacteria and/or the use of gras chemicals to reduce or eliminate the bacteria.

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