



The University of Georgia

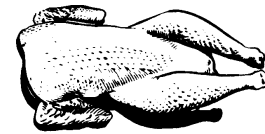
**Cooperative Extension Service**

College of Agricultural and Environmental Sciences / Athens, Georgia 30602-4356

---

---

JULY 2002



## *PROCESSING TIP . . .*

### **HOW IS *SALMONELLA* PREVALENCE AFFECTED BY VARIOUS PROCESSING STEPS PRE- VERSUS POST-HACCP?**

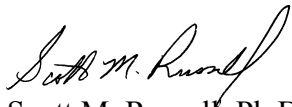
The answer to this question is that *Salmonella* prevalence on carcasses is affected by processing steps in the plant, and the effect depends upon how well each processing step is controlled. Prior to initiation of the Hazard Analysis and Critical Control Point (HACCP) Final Rule, Lillard (1990) studied Enterobacteriaceae numbers and *Salmonella* prevalence on broiler carcasses at six processing steps: 1) pre-scald (post neck cut), 2) post-scald, 3) post-pick, 4) post-evisceration (before final washer), 5) pre-chill (after final washer), and 6) post-chill. The author found that Enterobacteriaceae were reduced by 1.58 log<sub>10</sub> colony forming units (CFU)/mL and *Salmonella* prevalence decreased from 19 to 11.9% during scalding. During the picking process, no changes were observed in Enterobacteriaceae levels or *Salmonella* prevalence. Evisceration had no impact on Enterobacteriaceae levels, but increased *Salmonella* prevalence from 11.9 to 14.3%. Carcass washing with the inside/outside bird washer (IOBW) and final rinser decreased Enterobacteriaceae counts by 0.24 log<sub>10</sub> CFU/mL and had no impact on *Salmonella* prevalence. Chilling decreased Enterobacteriaceae levels by 0.61 log<sub>10</sub> CFU/mL and **increased *Salmonella* prevalence from 14.3 to 36.9%**. Lillard (1990) concluded that Enterobacteriaceae numbers decrease and *Salmonella* prevalence increases during processing. The author reported that cross-contamination in the chiller was responsible for the increase in *Salmonella* prevalence.

More recent reports in the scientific literature indicate that the scalding and chiller have little impact on bacterial levels or *Salmonella* prevalence on finished carcasses; however, evisceration can be a major source of contamination especially if the intestines are cut or torn (National Advisory Committee on Microbiological Criteria for Foods, 1997). Since the initiation of HACCP, numerous companies have had to work hard to implement intervention strategies in the processing plant to control *Salmonella* prevalence. This may be responsible for the decrease in cross-contamination during chilling. When working with various companies, I have observed significant reductions in

#### **PUTTING KNOWLEDGE TO WORK**

The University of Georgia and Ft. Valley State College, the U.S. Department of Agriculture and counties of the state cooperating.  
The Cooperative Extension service officers educational programs, assistance and materials to all people without regard to race, color, national origin, age, sex or disability  
An equal opportunity/affirmative action organization committed to a diverse work force.

*Salmonella* prevalence during processing. In a processing plant in which the scalding is operating correctly (counter-current, temperature greater than 123°F, no dead spots where foam collects, high overflow) significant reductions in *Salmonella* have been observed. Additionally, scalders that are clean and have low organic loads (low fecal caking on incoming birds, bird brushes prior to scald, proper bleed time to reduce blood in scalding, and high overflow) do not deposit a significant amount of organic material on the bird (contributes to organic material in the chiller) that will decrease the effect of chlorine later on in the process. When feed withdrawal is managed properly and evisceration machinery is adjusted correctly, very little fecal contamination occurs. Well-tuned chillers (proper pH, chlorine level, overflow, and counter-current flow) can be expected to reduce *Salmonella* prevalence by 50%. This disagrees with the study by Lillard (1990) and reflects the success of the steps taken in the past decade to reduce carcass contamination. These results are easily achievable by balancing the chiller appropriately. Experience indicates a well-tuned processing plant should be able to decrease *Salmonella* prevalence from 100% coming into the plant on live birds to less than 20% on finished product. This level of reduction has been achieved in three processing plants (three different companies). In most cases, birds coming into the plant are far lower than 100% contaminated, so the plant should be able to lower *Salmonella* prevalence to levels acceptable by the USDA-FSIS. If the prevalence of *Salmonella* is excessive on finished carcasses, attempt to decrease it by properly maintaining the scalding, eviscerator, and chiller. If these systems are operating well, *Salmonella* may be controlled.



Scott M. Russell, Ph.D.  
Extension Poultry Scientist

County Extension Coordinator/Agent

#### **References:**

- Lillard, H. S., 1990. The impact of commercial processing procedures on the bacterial contamination and cross-contamination of broiler carcasses. *J. Food Prot.* 53:202-204, 207.
- National Advisory Committee on Microbiological Criteria for Foods, 1997. Generic HACCP application in broiler slaughter and processing. *J. Food Prot.* 60:579-604.