

SDC 311 Annual Report for Georgia

Project No. SDC311 (Replacing S292) (Replaced by S1027)
Title: The Poultry Food System: A Farm to Table Model
Period Covered: 08-2005 to 09-2006
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Annual Meeting Dates: 09-Sep-2006

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Brief Summary of Meeting Minutes

Accomplishments

-Dr. Russell assisted a large scale poultry plant in developing a protocol for verification of its food safety and HACCP programs so that the plant could initiate processing. This plant had been shut down by the USDA for excessive *Salmonella* contamination for over 1 month at a cost of \$600,000/day. The total cost of the shutdown was \$21,000,000. Dr. Russell wrote a proposal to conduct testing to verify that the plant was able to meet the USDA guidelines based on a statistical model. The USDA allowed the plant to operate under these conditions. Because of this proposal and subsequent testing, 1,200 people were allowed to return to work and the company discontinued losing \$600,000/day. This company was unable, on its own, to convince the USDA to allow them to continue operation.

-Dr. Russell determined the causes of high *Salmonella* incidence at a poultry processing plant. This processing plant had received two strikes by the USDA for high *Salmonella* incidence. The prevalence of *Salmonella* was drastically lowered on finished carcasses and the plant was able to remain in compliance.

-Dr. Russell determined the cause of premature spoilage of broiler breast meat by the yeast *Debaryomyces hansenii* in a large poultry processing facility that air chills carcasses. Dr. Russell developed a program to eliminate the yeast from the feed of the birds, reducing the level on incoming carcasses and solving the problem.

-Dr. Russell constructed an experiment to prove to USDA-FSIS that a processor was able to adequately disinfect salvaged poultry parts. The experiment was conducted. Dr. Russell analyzed the data and submitted the report to USDA-FSIS, allowing the plant to sell salvaged poultry.

-Dr. Russell conducted in-plant trials with a novel scalding sanitizing agent. APC, *E. coli*, and *Salmonella* were significantly reduced on carcasses using this method. Moreover, since implementation of this technology, the plant has not observed one *Salmonella* positive carcass. Dr. Russell developed the protocol, conducted the experiments, and wrote the report that enabled the product to be approved by the USDA-FSIS for use in poultry facilities throughout the U.S.

-Dr. Russell conducted an in-plant trial using a novel chiller sanitizer. Shelf-life of processed carcasses was increased by 6 days. This processor will be able to save enormous amounts of money due to payouts on prematurely spoiled poultry products.

Impact Statements

Research at UGA demonstrates that *Salmonella* levels on fresh broiler chickens can be dramatically reduced in the scalding.

Situation: The USDA-Food Safety Inspection Service (FSIS) conducts routine *Salmonella* testing on broiler chicken carcasses in poultry plants throughout the U.S. An inspector samples 1 carcass per day of production for a total of 51 days. If 13 or more of the carcasses out of the 51 (23%) are positive for *Salmonella*, the plant receives a strike. If the plant receives three strikes, the plant is shutdown until the processor can prove to the USDA-FSIS that it is producing carcasses with less than 23% prevalence for *Salmonella*. Many major poultry processors are having difficulty achieving this standard. The reason is that the percentage of chickens entering the plant that are contaminated with *Salmonella* is, in some cases, very high. To correct this problem, the industry has been experimenting with various chemicals in the scalding water because this “common bath” within the plant can greatly contribute to cross-contamination from one carcass to another.

Response: Dr. Russell conducted a series of “in-plant” trials to determine if a novel sanitizer, called Tasker Blue, could be added to scalding water to reduce *Salmonella* prevalence on incoming carcasses. The scalding has proven over the years to be almost impossible to treat because of the high temperature of the water (causes gassing off of most chemicals) and because of the very high organic load within the water. Dr. Russell conducted in-plant trials for 7 weeks. Thirteen different flocks of birds were sampled and evaluated.

Results: Immediately after scalding, the carcasses that were positive for *Salmonella* on the control (non-treated) flocks averaged 35%. The carcasses that were positive for *Salmonella* for the flocks scalded in water treated with Tasker Blue averaged 3%. All of the control flocks were positive for *Salmonella* post-scalding, whereas when the scalding was treated with Tasker Blue, only 4 of 13 flocks had any *Salmonella* and the prevalence on those flocks was only 10%. Statistical analysis revealed that *Salmonella* prevalence was significantly ($P \leq 0.055$) reduced on carcasses in 8 of the 13 flocks that were sampled and *Salmonella* prevalence overall was reduced significantly ($P \leq 0.05$) across all flocks. The average percent reduction across all days of sampling was 32%. The results from this research indicate that use of Tasker Blue in the scalding may dramatically reduce the percentage of carcasses coming into the plant that are positive for *Salmonella*. Recently, microbial results from processing plants that have implemented this technology indicate that the *Salmonella* prevalence immediately went from 50% positive to 0% positive and remained as such while the system was being run. This technology should assist processors in meeting the *Salmonella* Performance Standard set by the USDA-FSIS.

Publications

A. Journal Articles

Russell, S. M. and S. Axtell, 2005. The effect of monochloramine versus chlorine on pathogenic, indicator, and spoilage bacteria associated with broiler chicken carcasses: a model, pilot scale, and industrial study. *Journal of Food Protection* 68(4):758-763.

Kim, C., Y. C. Hung, and S. M. Russell, 2005. Efficacy of electrolyzed (EO) water in the prevention and removal of fecal material attachment and its microbicidal effectiveness during simulated industrial poultry processing. *Poultry Science* 84:1778-1784.

Russell, S. M. and S. Axtell, 2005. The effect of monochloramine versus chlorine organoleptic qualities and formation of carcinogens. *Journal of Food Protection* 69(4):907-911.

B. Abstracts:

Russell, S. M., 2006. The effect of Tasker Blue on shelf-life of fresh broiler chicken carcasses. *Poultry Science* 85 (Suppl. 1): Poster M30, pg. 14.

Russell, S. M., 2006. The effect of Tasker Blue on aerobic plate counts and *Escherichia coli* counts on fresh broiler chicken carcasses. *Poultry Science* 85 (Suppl. 1): Abs. 130, pg. 61.

C. Books and Book Chapters:

D. Popular Trade Articles:

Russell, S. M. and B. Fairchild, 2005. Poultry production China's way. *Poultry USA*, Watt Publishing, pp. 26, 28, and 30.

Russell, S. M., 2004/2005. *Salmonella* and *Campylobacter*: A methods update. December/January *Food Safety Magazine*, vol. 10(6):28, 30, 32, 77, 78, 79, and 80.

Russell, S. M., 2005. Surmounting *Salmonella*. *Poultry Magazine*, October/November. Pp. 22-24.

Russell, S. M., 2005. New hurdles for water reuse. *Poultry USA Magazine*, Watt Publishing, pp.24, 26, 28, 30, 32, 34, and 35, August.

Russell, S. M., 2005. Verification of intervention strategies for reducing pathogenic and indicator bacteria on broiler carcasses: A case study. *Poultry USA Magazine*, Watt Publishing, pp. 40, 42, 44, 46, 48, 50, 52, 54, 55, 56, 58, 60, and 61, December.

Russell, S. M., 2006. White spots on breast, thigh meat causes concern. *Poultry Times*, June 19th.

Russell, S. M., 2006. Post-chill dip tanks are gaining popularity among processors. Poultry Times, June 19th.

E. Refereed Extension Bulletins:

Troubleshooting Salmonella in Poultry Processing Plants: Case Studies
<http://pubs.caes.uga.edu/caespubs/pubcd/B1310.htm>

Preventing Salmonella Colonization of Chickens
<http://pubs.caes.uga.edu/caespubs/pubcd/B1313.htm>

Solving Fecal Contamination Problems in the Processing Plant
<http://pubs.caes.uga.edu/caespubs/pubcd/C902.htm>

Water Reuse in Poultry Processing
<http://pubs.caes.uga.edu/caespubs/pubcd/C901.htm>