USEFUL INFORMATION ON MEAT PROCESSING REGULATIONS AND USE OF OZONE

Salmonella and Campylobacter:
Regulations and Strategies
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HACCP

• The Food Safety Inspection Service (FSIS) issued the pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems; Final Rule on July 25, 1996

• To verify that industry Pathogen Reduction/HACCP (PR/HACCP) systems are effective in controlling the contamination of raw meat and poultry products with disease causing bacteria, the PR/HACCP rule set Salmonella performance standards.

• Product specific limits on Salmonella became effective in large establishments on January 26, 1998; in small establishments on January 25, 1999; and in very small establishments on January 25, 2000.

• The Salmonella performance standards are based on the prevalence of Salmonella as determined from the agency's nationwide microbial baseline studies conducted before PR/HACCP was implemented

• Raw products currently covered by performance are carcasses of cows/bulls, steers/heifers, market hogs, and broilers; and ground beef, ground chicken, and ground turkey.

• The performance standards are expressed in terms of the maximum number of Salmonella positive samples that are allowed per sample set.

• The number of samples in a sample set varies by product and the maximum number of positive sample allowed in a set provides an 80% probability of an establishment passing when it is operating at the standard.

• Salmonella rates in all classes of products have decreased to levels well below F.S.I.S's hazard analysis and critical control point baseline prevalence estimates.

• 2003, 3.8 percent tested positive for Salmonella, as compared with 4.29 percent in 2002; 5.03 in 2001, 5.31 percent in 2000;7.26 percent in 1999; and 10.65 percent in 1998.

• Broilers – 12.8 percent compared to a standard of 20 percent.
• Market hogs – 2.5 percent compared to a standard of 8.7 percent
• Cows/bulls – 1.5 percent compared to a standard of 2.7 percent
• Steers/heifers – 0.4 percent compared to a standard of 1 percent
• Ground beef – 1.7 percent compared to a standard of 7.5 percent
• Ground chicken – 35.5 percent compared to a standard of 44.6 percent
• Ground turkey – 25.4 percent compared to a standard of 49.9 percent

• The Salmonella prevalence in ground chicken from all sizes of establishments combined increases from 19.5% in CY 2001 to 29.1 in CY 2002.

• This increase was due primarily to an increase in Salmonella prevalence for small establishments from 16.8% in CY 2001 to 31.0% in CY 2002.
• The CY 2002 overall level for ground chicken is still well below the baseline prevalence of 44.6%.

• (3) Noncompliance and establishment response. When FSIS determines that an establishment has not met the performance standards:
– (i) The establishment shall take immediate action to meet the standard.
– (ii) If the establishment fails to meet the standard on the next series of compliance tests for that product, the establishment shall reassess its HACCP plan for that product.

• (iii) Failure by the establishment to act in accordance with the paragraph (b) (3) (ii) of this section, or failure to meet the standard on the third consecutive series of FSIS- conducted tests for that product, constitutes failure to maintain sanitary conditions and failure to maintain adequate HACCP plan, in accordance with part 417 of this chapter, for that product, and will cause FSIS to suspend inspection services.
• Such suspension will remain in effect until the establishment submits to the FSIS Administrator or his/her designee satisfactory written assurance detailing the action taken to correct the HACCP system and, as appropriate, other measures taken by the establishment to reduce the prevalence of pathogens.

Poultry Interventions
• TSP 77%
• ASC 19%
• Pre-op Fog 4%
• pH 4%
• Ozone 4%

SUBSTANCE	PURPOSE/PRODUCT	AMOUNT	REFERENCE
Acidified Sodium chlorite Poultry	carcasses and parts; meat carcasses and parts, organs; processed, comminuted, or formed meat products	500 to 1200 ppm in combination with any GRAS acid at a level sufficient to achieve pH of 2.3 to 2.9 in accordance with 21 CFR	173.325
Lactoferrin	Beef carcass and parts	At up to 2 percent of water-based antimicrobial spray	GRAS Notice 000067
Nisin Preparation	Components on sauces prepared under FDA jurisdiction and used with fully cooked meat or poultry	No more than 600 ppm nisin where the meat or poultry does not exceed 50 percent of the product formulation	Acceptability determination
Ozone	All meat and all poultry products	in accordance with Good manufacturing Practice (GMP)	21 CFR 173.368
Trisodium Phosphate	Raw, unchilled poultry carcasses and giblets	8-12 percent solution applied by spraying for dipping giblets for up to 30 seconds. 8-12 percent solution within a temperature range of 65°F to 85°F applied by spraying or dripping for up to 15 seconds	Acceptability determination (per 21 CFR 182.1778)FSIS Directive 7120.1 Antimicrobials

• Research indicates activated lactoferrin removes more than 99% of harmful bacteria present on the surface of meat. Testing also shows activated lactoferrin inhibits growth of bacteria on sub-primal and whole-muscle, case-ready beef products by more
than 99% when held at room temperature for a 24 hour period.

• The genus Campylobacter consists of about 14 species, and the one of primary importance in foods is C. jejuni subsp.
jejuni.

• Specimens and percent positive for C.jejuni are as follows: chicken intestinal contents (39-83), swine feces (66-87), sheep feces (up to 73), swine intestinal contents (61), sheep carcasses (24), swine carcasses (22), eviscerated chicken (72-80), and eviscerated turkey (94)

• About 12% of fresh meats were positive but only 2.3% of the frozen, suggesting the lethal effects of freezing on the organism
(116). A higher percentage of chicken liers were positive (30% of fresh and 15% of frozen) than any of the other meats, which
included beef, pork, and lamb livers.

• Since the 1980's, Campylobacter jejuni/coli have been recognized as major caused of foodborne disease. Campylobacters have been associated with human disease through the consumption of contaminated raw milk and undercooked meat. Undercooked poultry products have been associated with the majority of sporadic cases.

• Reports of illness are going up as more states recognize that Campylobacter infections are a

public health concern, and as laboratory techniques for culturing and identifying the bacteria continue to be refined. Campylobacter is the most frequently isolated bacterium from persons with diarrhea (45%), Salmonella is second (30%), Shigella is third (17%), E.coli O157:H7 is forth (5%).

• These organisms were found on 29.7% of chicken samples, 4.2% of pork sausage, 3.6% of ground beef, and about 5.1% of 1800 red meats. Only C.coli was recovered from pork products. A higher incidence was noted in June and September (8.6%) than in December and March (4.5 and 3.9%, respectively)

• Next to Salmonella, Campylobacter remains one of the most important foodborne bacterial pathogens in the United States, where it is estimate that 2.5 million people suffer annually from campylobacteriosis illness.

• Total mean reductions in Camylobacter carcass rinse populations were log .76 cfu/ml following passage through the washers and chill tanks not employing TSP or ASC, versus log 1.53 cfu/ml for washer systems employing TSP or ASC.