

Progress Report on *Salmonella* Testing of Raw Meat and Poultry Products, 1998-2002

The Food Safety and Inspection Service (FSIS) issued the Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems; Final Rule on July 25, 1996: Federal Register, Vol. 61, No. 144, pp. 38805-38989 (http://www.fsis.usda.gov/OA/fr/haccp_rule.htm). 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 sets *Salmonella* performance standards that slaughter establishments and establishments that produce raw ground products should meet. These 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. FSIS verifies that establishments are meeting the standards by having federal inspection personnel collect randomly selected product samples and send them to FSIS laboratories for *Salmonella* analysis, according to procedures described in Appendix E of the PR/HACCP final rule: Federal Register, Vol. 61, No. 144, pp. 38917-38928 (http://www.fsis.usda.gov/OA/fr/haccp_rule.htm).

The *Salmonella* performance standards are based on the prevalence of *Salmonella* as determined from the agency's nationwide microbial baseline studies (<http://www.fsis.usda.gov/OPHS/baseline/contents.htm>) conducted before PR/HACCP was implemented. Raw products currently covered by performance standards 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 samples allowed in a set provides an 80% probability of an establishment passing when it is operating at the standard. An initial sample set or a set that follows a passed set is designated an "A" set; other codes (such as "B", "C", and "D") represent sample sets collected from establishments that are targeted for follow-up testing following a failed set. Code "A" sample sets are collected at randomly selected establishments.

The prevalence data reported here for *Salmonella* in raw meat and poultry products have certain limitations that restrict the range of valid statistical inferences. The PR/HACCP verification testing program is strictly regulatory in nature and was designed to track establishment performance rather than to estimate nationwide prevalence of *Salmonella* in products. Because the program is not statistically designed, different establishments may be sampled from year to year, confounding rigorous trend analyses. Furthermore, it is important to note that the prevalence estimates computed from the FSIS's pre-HACCP baseline studies and surveys were nationally representative because they were weighted on the basis of the production volume of the sampled establishments. In contrast, the PR/HACCP *Salmonella* prevalences from the regulatory testing program reported here represent unweighted test results from sampled establishments.

The data reported here are from code "A" sample sets. Presenting the "A" set data provides the most direct comparison to the baseline estimates that were used to establish the performance standards. *Salmonella* prevalence estimates are based on all

“A” set samples collected during the indicated year, with no consideration given as to whether a sample is part of a complete or an incomplete set. The prevalence estimate is the number of positive samples divided by the total number of samples analyzed, expressed as a percentage. The percentages of sample sets meeting the *Salmonella* performance standards are based on “A” sets that were completed during the specified year, as defined by the collection date of the last sample in the sample set.

This year, in the summary tables, a column is included for “size unknown” establishments. As PR/HACCP was implemented, establishments were asked to provide FSIS with “size” information (large, small, or very small). However, establishments have not been requested by the agency to update this information. In recent years, as additional establishments have applied for grants of inspection, there are more establishments with no size distinction. This year, to provide more complete information, FSIS has included these establishments in the “size unknown” (not reported to FSIS) category. In previous reports, the very few “size unknown” establishments were included with the very small establishments.

During the last year (CY 2002), *Salmonella* prevalence in all product categories with performance standards was lower than in agency baseline studies and surveys conducted before PR/HACCP implementation ([Table A1](#)). Differences in pre- versus post-HACCP *Salmonella* prevalence may reflect changes due to HACCP implementation. During 2002, both increases and decreases in prevalence from the previous year for specific product categories were observed. However overall, for all sizes of establishments combined, the CY 2002 *Salmonella* prevalence for broilers, market hogs, cows/bulls, steers/heifers, ground beef, and ground turkey decreased, as compared to CY 2001.

The *Salmonella* prevalence in ground chicken from all sizes of establishments combined increased 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. However, the CY 2002 overall level for ground chicken is still well below the baseline prevalence of 44.6%.

Decreases in *Salmonella* prevalence were seen between CY 2001 and CY 2002 for specific product categories from specific sizes of establishments. For example, in the previous progress report covering the four years of 1998 through 2001, the agency pointed out that very small broiler establishments were having difficulty meeting the existing performance standard. However, the *Salmonella* prevalence in code “A” broiler carcass samples from very small establishments decreased from 37.2% in CY 2001 to 8.4% in CY 2002, well below the 20% baseline prevalence. For very small establishments, the CY 2002 *Salmonella* prevalence decreased in all tested product categories, as compared to CY 2001. The CY 2002 *Salmonella* prevalence in both ground beef and ground turkey decreased for all sizes of establishments, as compared to CY 2001.

The results of five years of testing show that the majority of completed code “A” sample sets met the *Salmonella* performance standard ([Table A2](#)). There were relatively small changes from CY 2001 to CY 2002 in the overall percentages (all sizes of establishments) of code “A” sample sets meeting the performance standards. The percentage of market hog “A” sets that passed increased for large, small, and very small establishments in CY 2002, as compared to CY 2001. A notable observation is that the

percentage of broiler “A” sets that passed increased in very small establishments from 25.0% in CY 2001 to 62.5% in CY 2002. For large and small establishments, the percentage of sets passing either increased or remained about the same for all seven product categories.

Achieving a reduction in pathogens reduces the risk of illness. However, all segments of the food-production chain and consumers should continue to properly handle, cook, and store all meat, poultry, and other food products in order to guard against foodborne illness.

For More Information:

- Media – (202) 720-9113
- Congressional – (202) 720-3897
- Constituent – (202) 720-8594
- Consumer inquiries – Call USDA’s Meat and Poultry Hotline at 1-800-535-4555. In the Washington, DC, area, call (202) 720-3333. The TTY number is 1-800-256-7072.
- Technical inquires – Dr. Walter Hill, Office of Public Health and Science, Microbiology Division, (202) 690-6369.
- FSIS Web Site: <http://www.fsis.usda.gov>

Table A1

Prevalence^a of *Salmonella* in the PR/HACCP Verification Testing Program
By Calendar Year, 1998 - 2002

"A" Sets

		CY 2002									
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		Size Unknown Establishments		All Sizes Establishments	
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos
Broilers	20.0	6,247	10.9%	2,673	13.2%	263	8.4%	0		9,183	11.5%
Market Hog	8.7	1,639	2.5%	1,717	3.9%	4,015	3.2%	108	0.9%	7,479	3.2%
Cows/Bulls	2.7	547	0.5%	2,506	1.4%	1,361	2.5%	0		4,414	1.7%
Steer/Heif	1.0	1,775	0.2%	1,045	0.9%	1,735	0.1%	17	0.0%	4,572	0.3%
Grd Beef	7.5	740	2.8%	16,979	3.2%	13,187	1.7%	27	0.0%	30,933	2.6%
Grd Chick	44.6	106	23.6%	323	31.0%	0		0		429	29.1%
Grd Turkey	49.9	746	17.4%	289	18.3%	40	22.5%	0		1,075	17.9%

		CY 2001									
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		All Sizes Establishments			
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos
Broilers	20.0	5,879	9.7%	2,684	13.0%	392	37.2%	8,955	11.9%		
Market Hog	8.7	1,419	1.6%	1,385	3.5%	5,286	4.4%	8,090	3.8%		
Cows/Bulls	2.7	72	0.0%	1,045	1.3%	1,059	3.7%	2,176	2.4%		
Steer/Heif	1.0	58	0.0%	411	0.2%	1,226	0.8%	1,695	0.6%		
Grd Beef	7.5	691	3.6%	11,749	3.5%	11,803	2.1%	24,243	2.8%		
Grd Chick	44.6	90	26.7%	131	16.8%	41	12.2%	262	19.5%		
Grd Turkey	49.9	313	25.2%	144	27.1%	63	28.6%	520	26.2%		

		CY 2000									
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		All Sizes Establishments			
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos
Broilers	20.0	7,175	7.5%	2,821	13.0%	61	18.0%	10,057	9.1%		
Market Hog	8.7	1,919	4.1%	2,144	7.7%	1,107	7.2%	5,170	6.2%		
Cows/Bulls	2.7	173	0.6%	1,593	2.1%	229	3.5%	1,995	2.2%		
Steer/Heif	1.0	222	0.0%	693	0.6%	177	0.0%	1,092	0.4%		
Grd Beef	7.5	1,373	5.4%	21,065	3.4%	10,406	2.7%	32,844	3.3%		
Grd Chick	44.6	169	12.4%	233	15.0%	12	8.3%	414	13.8%		
Grd Turkey	49.9	1,173	26.5%	377	23.3%	1	0.0%	1,551	25.7%		

		CY 1999							
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		All Sizes Establishments	
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos
Broilers	20.0	4,530	9.3%	2,238	15.6%	0		6,768	11.4%
Market Hog	8.7	973	1.8%	950	18.0%	0		1,923	9.8%
Cows/Bulls	2.7	116	0.9%	1,405	2.3%	0		1,521	2.2%
Steer/Heif	1.0	272	0.4%	510	0.2%	0		782	0.3%
Grd Beef	7.5	765	6.7%	15,610	4.2%	0		16,375	4.3%
Grd Chick	44.6	125	15.2%	172	16.9%	0		297	16.2%
Grd Turkey	49.9	759	33.1%	291	27.8%	0		1,050	31.6%

		CY 1998							
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		All Sizes Establishments	
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos
Broilers	20.0	5,645	10.8%	14	7.1%	0		5,659	10.8%
Market Hog	8.7	1,390	5.8%	0		0		1,390	5.8%
Cows/Bulls	2.7	58	0.0%	121	1.7%	0		179	1.1%
Steer/Heif	1.0	214	0.0%	0		0		214	0.0%
Grd Beef	7.5	1,125	4.9%	171	16.4%	0		1,296	6.4%
Grd Chick	44.6	24	4.2%	0		0		24	4.2%
Grd Turkey	49.9	591	36.5%	0		0		591	36.5%

		All Years 1998 - 2002									
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		Size Unknown Establishments		All Sizes Establishments	
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos
Broilers	20.0	29,476	9.6%	10,430	13.6%	716	25.0%	0		40,622	10.9%
Market Hog	8.7	7,340	3.3%	6,196	7.3%	10,408	4.3%	108	0.9%	24,052	4.7%
Cows/Bulls	2.7	966	0.5%	6,670	1.8%	2,649	3.1%	0		10,285	2.0%
Steer/Heif	1.0	2,541	0.2%	2,659	0.6%	3,138	0.4%	17	0.0%	8,355	0.4%
Grd Beef	7.5	4,694	4.8%	65,574	3.6%	35,396	2.1%	27	0.0%	105,691	3.2%
Grd Chick	44.6	514	17.5%	859	21.7%	53	11.3%	0		1,426	19.8%
Grd Turkey	49.9	3,582	27.6%	1,101	23.7%	104	26.0%	0		4,787	26.6%

^a Prevalence estimates include all samples collected during the indicated calendar year.

Table A2

Percent of Sample Sets Meeting the *Salmonella* Performance Standards^b
By Calendar Year, 1998 - 2002

"A" Sets

		CY 2002									
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		Size Unknown Establishments		All Sizes Establishments	
		# Sets	% Pass	# Sets	% Pass	# Sets	% Pass	# Sets	% Pass	# Sets	% Pass
Broilers	20.0	124	90.3%	54	87.0%	8	62.5%	0		186	88.2%
Market Hog	8.7	30	100.0%	33	100.0%	95	93.7%	1	100.0%	159	96.2%
Cows/Bulls	2.7	9	88.9%	42	85.7%	17	76.5%	0		68	83.8%
Steer/Heif	1.0	18	100.0%	11	90.9%	13	76.9%	0		42	90.5%
Grd Beef	7.5	14	92.9%	354	92.7%	262	97.7%	2	100.0%	632	94.8%
Grd Chick	44.6	2	100.0%	6	83.3%	0		0		8	87.5%
Grd Turkey	49.9	14	100.0%	4	100.0%	0		0		18	100.0%

		CY 2001									
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		All Sizes Establishments			
		# Sets	% Pass	# Sets	% Pass	# Sets	% Pass	# Sets	% Pass	# Sets	% Pass
Broilers	20.0	117	94.0%	49	89.8%	4	25.0%			170	91.2%
Market Hog	8.7	25	96.0%	23	91.3%	49	77.6%			97	85.6%
Cows/Bulls	2.7	2	100.0%	15	93.3%	17	76.5%			34	85.3%
Steer/Heif	1.0	1	100.0%	8	100.0%	4	100.0%			13	100.0%
Grd Beef	7.5	13	92.3%	200	94.0%	213	97.2%			426	95.5%
Grd Chick	44.6	1	100.0%	4	100.0%	1	100.0%			6	100.0%
Grd Turkey	49.9	9	88.9%	6	100.0%	1	100.0%			16	93.8%

		CY 2000									
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		All Sizes Establishments			
		# Sets	% Pass	# Sets	% Pass	# Sets	% Pass	# Sets	% Pass	# Sets	% Pass
Broilers	20.0	137	96.4%	53	79.2%	0				190	91.6%
Market Hog	8.7	32	93.8%	34	70.6%	0				66	81.8%
Cows/Bulls	2.7	2	100.0%	30	83.3%	0				32	84.4%
Steer/Heif	1.0	3	100.0%	8	87.5%	0				11	90.9%
Grd Beef	7.5	27	81.5%	344	91.9%	75	90.7%			446	91.0%
Grd Chick	44.6	3	100.0%	2	100.0%	0				5	100.0%
Grd Turkey	49.9	15	93.3%	2	50.0%	0				17	88.2%

		CY 1999							
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		All Sizes Establishments	
		# Sets	% Pass	# Sets	% Pass	# Sets	% Pass	# Sets	% Pass
Broilers	20.0	111	91.0%	40	85.0%	0		151	89.4%
Market Hog	8.7	26	100.0%	12	50.0%	0		38	84.2%
Cows/Bulls	2.7	2	100.0%	17	76.5%	0		19	78.9%
Steer/Heif	1.0	3	100.0%	3	100.0%	0		6	100.0%
Grd Beef	7.5	21	85.7%	252	87.3%	0		273	87.2%
Grd Chick	44.6	2	100.0%	3	100.0%	0		5	100.0%
Grd Turkey	49.9	18	94.4%	5	80.0%	0		23	91.3%

		CY 1998							
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		All Sizes Establishments	
		# Sets	% Pass	# Sets	% Pass	# Sets	% Pass	# Sets	% Pass
Broilers	20.0	77	90.9%	0		0		77	90.9%
Market Hog	8.7	16	68.8%	0		0		16	68.8%
Cows/Bulls	2.7	1	100.0%	0		0		1	100.0%
Steer/Heif	1.0	1	100.0%	0		0		1	100.0%
Grd Beef	7.5	9	88.9%	0		0		9	88.9%
Grd Chick	44.6	0		0		0		0	
Grd Turkey	49.9	7	85.7%	0		0		7	85.7%

		All Years 1998 - 2002									
Product	Baseline Prevalence (%)	Large Establishments		Small Establishments		Very Small Establishments		Size Unknown Establishments		All Sizes Establishments	
		# Sets	% Pass	# Sets	% Pass	# Sets	% Pass	# Sets	% Pass	# Sets	% Pass
Broilers	20.0	566	92.8%	196	85.2%	12	50.0%	0		774	90.2%
Market Hog	8.7	129	93.8%	102	82.4%	144	88.2%	1	100.0%	376	88.6%
Cows/Bulls	2.7	16	93.8%	104	84.6%	34	76.5%	0		154	83.8%
Steer/Heif	1.0	26	100.0%	30	93.3%	17	82.4%	0		73	93.2%
Grd Beef	7.5	84	86.9%	1,150	91.5%	550	96.5%	2	100.0%	1,786	92.8%
Grd Chick	44.6	8	100.0%	15	93.3%	1	100.0%	0		24	95.8%
Grd Turkey	49.9	63	93.7%	17	88.2%	1	100.0%	0		81	92.6%

^b Includes sample sets that completed during the indicated calendar year (sample sets may have started during an earlier year).