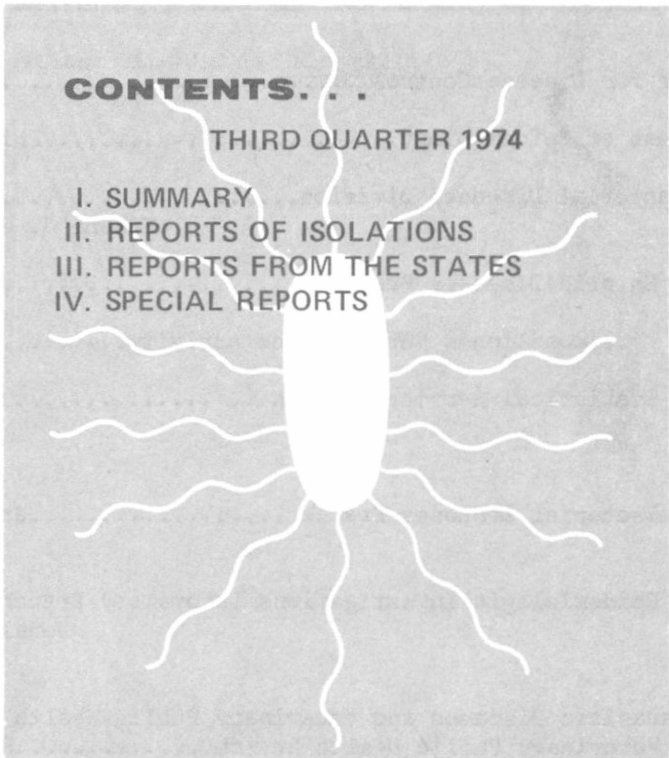
REPORT NO. 123
Third Quarter 1974
issued May 1975

CENTER FOR DISEASE CONTROL

SALMONELLA

SURVEILLANCE



CONTENTS. . .

THIRD QUARTER 1974

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE/PUBLIC HEALTH SERVICE

PREFACE

Summarized in this report is information received from state and city health departments, university and hospital laboratories, the U.S. Food and Drug Administration, and other pertinent sources, domestic and foreign. Much of the information is preliminary. It is intended primarily for the use of those with responsibility for disease control activities. Anyone desiring to quote this report should contact the original investigator for confirmation and interpretation.

Contributions to the Surveillance Report are most welcome. Please address:

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SUGGESTED CITATION

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TABLE OF CONTENTS

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NOTE

The data contained in the tables and summarized in sections I and II deal only with isolates reported to CDC by state and other reference laboratories. Extrapolation from these data to aspects of the total incidence of salmonellosis in the United States should be made only with caution, and references to the data should be appropriately qualified.

I. SUMMARY

In the third quarter of 1974, 7,166 isolations of salmonellae were reported from humans, an average of 551 isolations per week (Tables I, II, and V-A). This number represents an increase of 158 (40.2%) over the weekly average for the second quarter of 1974 and a decrease of 103 (15.8%) from the weekly average for the third quarter 1973. The average number of human isolations reported per week for each month and for the quarter are provided below for the last 3 years.

	1972	1973	1974
July	487	589	483
August	597	681	605
September	674	687	583
Third Quarter (monthly average)	587	654	557

Reports of 370 isolates of salmonella from nonhuman sources were received in the third quarter of 1974 (Tables III, IV, and V-B).

II. REPORTS OF ISOLATIONS

The 10 most frequently reported serotypes during the third quarter are listed below:

HUMAN				NONHUMAN		
Serotype	Number	Percent	Rank Last Quarter	Serotype	Number	Percent
typhimurium*	2,020	28.2	1	typhimurium*	82	22.2
newport	595	8.3	3	anatum	43	11.6
enteritidis	440	6.1	2	worthington	20	5.4
infantis	421	5.9	4	meleagridis	16	4.3
heidelberg	325	4.5	5	habana	12	3.2
agona	310	4.3	7	newport	11	3.0
saint-paul	257	3.6	6	infantis	10	2.7
manhattan	159	2.2	19	senftenberg	9	2.4
typhi	155	2.2	8	enteritidis	8	2.2
derby	150	2.1	11	bredeney	6	1.6
				london	6	1.6
Total	4,832	67.4			223	60.3
TOTAL (all serotypes)	7,166	100.0		TOTAL (all serotypes)	370	100.0
*Includes var. copenhagen	99	1.4		*Includes var. copenhagen	2	0.5

III. REPORTS FROM THE STATES

A. Reports of Salmonella Outbreaks Received in the Third Quarter, 1974

This table lists investigated outbreaks of salmonellosis reported to CDC from various sources. Definitions of cases and of numbers at risk are not uniform from report to report. This listing should not be considered comprehensive or representative of all outbreaks in the United States, as most outbreaks are probably not reported to CDC.

State	Month of Outbreak	Location	Serotype	Ill	At Risk	With Positive Cultures	Hospitalized	Deaths	Vehicle of Transmission	Comments
Pennsylvania	June	McSherrystown	*S. manhattan*	40	60	3-4	?	0	Chicken salad implicated	Wedding reception
Louisiana	June-July	Iberia Co.	*S. bredeney*	35		35			Chicken salad	Family picnic
Oklahoma										
Alaska	August	Juneau	*S. typhimurium*	32	1000	28	?	0	Water	Common source water contamination
Texas	July	Jefferson	*S. infantis*	50	400	50	3	1		
Indiana	August	Kokommo Co.	S. group D	30	50-75	?	20	0	? Homemade ice cream	Anniversary picnic at church
New York-Chicago	July	Chicago	*S. typhimurium*	3	50	7	2	0	? Roast beef on a train	Chef and 1 waiter culture positive
Louisiana	August	New Orleans	*S. typhimurium*	30	?	26			?	University cafeteria
Indiana	August	Howard Co.	*S. enteritidis*	?25	100	25	8	0	Homemade ice cream	Church supper (only food served)
New Hampshire	July	Gorham	S. group C	16	55	7	0	0	Bologna	

IV. SPECIAL REPORTS

A. Etiology of Diarrhea in Human Salmonellosis

The characterization of an enterotoxin produced by salmonella is discussed in 2 recently published studies. In the first study entitled "Pathophysiology of Salmonella Diarrhea in the Rhesus Monkey: Intestinal Transport Morphological and Bacteriologic Studies" by Rout, Formal, Dammin, and Giannella, appearing in Gastroenterology 67: 59-70, 1974, rhesus monkeys were fed 5 X 10^8 *Salmonella typhimurium* organisms following an overnight fast. Transport of water and electrolytes and bacteriologic and morphologic alterations in the small and large intestine were examined 48 to 72 hours after ingestion in salmonellae fed animals and in control monkeys fed sterile broth.

The salmonella-infected animals fell into 2 groups: those with mild diarrhea, defined as having at least 2 liquid bowel movements on each of 2 consecutive days, and those with severe diarrhea defined as having multiple copious watery bowel movements on each of 2 consecutive days. Monkeys with mild diarrhea experienced a marked decrease in net water and electrolyte absorption in jejunum and colon and a small decrease in the ileum. Monkeys with severe diarrhea had net secretion of water and electrolytes in ileum, jejunum, and colon.

Forty-eight to 72 hours after ingestion, control monkeys were found free of enteric pathogens while salmonellae were present in the jejunal, ileal, and colonic mucosa of all animals with diarrhea. Animals with mild diarrhea had minimal changes in jejunal morphology but striking changes in ileal morphology with edematous shortened crypts and invasion of the lamina propia by polymorphonuclear leukocytes. In animals with severe diarrhea, jejunal abnormalities were pronounced but ileal morphology was even more drastically changed with flattened vili and elongated crypts containing many microabscesses. All of the ill monkeys had a severe colitis with multifocal areas of microabscess formation and epithelial disruption.

The authors concluded that in salmonella infected monkeys, mild diarrhea may be the result of moderately decreased absorptive capacities of the jejunum and ileum compounded by an inability of the colon to reabsorb the fluid load presented to it. Severe diarrhea may result from massive secretion from the ileum, jejunum, and colon.

In previous work these authors reported that *S. typhimurium* must invade the epithelium of the rabbit ileum to induce fluid secretion but that invasion alone is not sufficient to cause secretion.[1] They showed that in isolated strips of salmonella-infected rabbit ileum fluid secretion is primarily the result of alterations in active ion transport processes.[2] As the salmonella infected ileum described in their recent paper behaves similarly to ileum exposed to cholera toxin, the authors hypothesize that the mechanism causing net secretion for jejunum, ileum and colon in experimental salmonellosis may be similar to the more well defined mechanism of ileal secretion in cholera (i.e. stimulation of intracellular adenyl cyclase). Because of this similarity the authors postulate the existence of a salmonella enterotoxin.

In the second paper, "Assay Characterization and Localization of An Enterotoxin Produced by Salmonella" by Koupal and Deibel in Infection and Immunity 11:14-22, 1975, methods devised by investigators of cholera and pathogenic *Escherichia coli* were used to characterize the properties of a salmonella enterotoxin. *Vibrio cholerae* elaborates a toxin which causes massive secretion in the small intestine; colonic mucosa is unaffected and diarrhea results because the volume of fluid secreted by the small intestine overwhelms the absorptive capacity of the colon. Pathogenic *E. coli* can cause disease by invading the large intestinal mucosa or by producing enterotoxins. One of the enterotoxins is called heat-stabile toxin (ST) and is inactivated after 30 minutes of boiling; the other, referred to as heat-labile toxin (LT) is destroyed at 60°C. LT and cholera toxin cause intestinal secretion by stimulating adenyl cyclase activity and subsequently elevating the intracellular concentrations of 3'5' cyclic monophosphate (cyclic AMP) in the intestinal mucosa resulting in changes in sodium and water flux across the intestinal lumen. Both cause readily identifiable morphologic changes in certain tissue culture systems such as mice adrenal tumor cells.[3,4] Stabile toxin (ST) is detected by its ability to cause fluid accumulation in the small intestine of infant suckling mice.[5]

Using these systems, Koupal and Deibel were able to characterize an enterotoxin found in broth cultures and cell-free supernatants of a strain of S. enteritidis (Table 1). This enterotoxin caused a positive response in suckling mice, a negative reaction in the adrenal cell, and was resistant to heating at 60°C, characteristics similar to ST of E. coli (Table 1). However, like LT and cholera toxin, the salmonella enterotoxin was inactivated by heating to 80°C. The authors concluded that a salmonella enterotoxin does exist and shares some similarities with the toxins found in cholera and toxin-producing E. coli.

Table 1

Comparison of Properties of Heat-Labile (LT) and Heat-Stabile (ST) Toxins of E. coli With the Enterotoxin of S. enteritidis (SE)

Enterotoxin	Assay Model: Suckling Mouse	Assay Model: Adrenal Cell	Heat Resistance: 60°C	Heat Resistance: 80°C	Heat Resistance: 100°C
LT	-	+	-	-	-
ST	+	-	+	+	+
SE	+	-	+	-	-

References

1. Giannella RA, Formal SB, Dammin GJ, et al: Pathogenesis of salmonellosis: Studies of fluid secretion, mucosal invasion and morphologic reaction in rabbit ileum. J Clin Invest 52:441-453, 1973

2. Fromm D, Giannella RA, Formal SB, et al: Active ion transport across isolated ileum invaded by salmonella. Gastroenterology 66:215-225, 1974

3. Donta ST, Moon HW, Whipp SC: Detection of heat-labile Escherichia coli enterotoxin with the use of adrenal cells in tissue culture. Science 183:334-336, 1974

4. Sack D, Sack R: Use of Y-I adrenal cell. Infect Immun 111:334-336, 1975

5. Dean AG, Ching YC, Williams RG, et al: Test for Escherichia coli enterotoxin using infant mice: Application in a study of diarrhea in children in Honolulu. J Infect Dis 125(4):407-411, 1972

B. Worldwide Trends in Salmonellosis. Reported by WHO, excerpted from the WHO Epidemiological Bulletin 51:421-429, 1974

The 1972 World Health Organization's salmonella surveillance program report published in 1974, while limited by the varied activities and interests of the national salmonella reference centers throughout the world, contains important information about outbreaks and worldwide trends in human salmonellosis.

In 1971 and 1972 large outbreaks of salmonellosis occurred in Yugoslavia, Finland, and France. In Yugoslavia in 1971, 69 cases of S. typhimurium infection were traced to an ice cream distributed in 1 village. In Helsinki, Finland, 300 cases of S. enteritidis infection were caused by a minced meat dish distributed to 40 canteen kitchens. Human cases of S. infantis infection that occurred throughout Finland in 1972 were found to be associated with a contaminated chicken feed that had caused widespread contamination of chicken and other poultry products. Another outbreak of salmonellosis caused by S. braenderup affecting 71 infants and 66 adults was caused by an asymptomatic nurse who apparently became a carrier while visiting an eastern Mediterranean country. The nurse prepared food in a Helsinki maternity clinic shortly after returning home. In 1971 a drug resistant strain of S. wien was imported into France from Algeria. The first infected patient was hospitalized in a pediatric hospital, and over the next several months widespread salmonellosis infection caused by S. wien spread throughout this hospital. S. wien is now endemic in France and was the most commonly reported isolate in 1974.

In 1972 S. typhimurium was the most frequently reported serotype by the majority of reporting countries. However, there were some exceptions: S. enteritidis was most commonly reported in Poland and Bulgaria, S. ordonez was the main serotype in Senegal, S. worthington was the most common serotype in Thailand where S. typhimurium took only fifth place, and S. orion was the most common serotype in Australia. S. heidelberg moved up in Bulgaria from third place in 1971 to second in 1972. S. panama remained very frequent in France. S. sofia, S. blockley, and S. emek continued to be very common in Israel. In Rumania S. blockley was isolated 629 times in 1972 compared with 31 in 1971; S. london, never isolated in Rumania before 1971, was isolated 371 times in 1972. Serotypes normally rare in Europe such as S. weltevreden and S. bareilly were often found in southern Asiatic countries including Burma, Malaysia and Thailand.

In 1972 extensive salmonella surveillance was done on various foods and environments. In Austria S. orion was isolated 19 times from fresh beef imported from a country in Oceania where this serotype has been frequently isolated from meat. In Denmark S. newport and S. enteritidis, the second and third most frequently isolated serotypes in man, were isolated from cattle, ducks, and geese. In France sausages and other processed meats were the most frequently reported contaminated foodstuffs. S. saint-paul, which has been isolated with increasing frequency from humans, was isolated most often from nonhuman sources including chickens, turkeys, beef, eggs, pigs, and sausages. In the Netherlands where there is systematic salmonella surveillance, a wide variety of nonhuman isolates were reported; 783 strains of salmonella were isolated from minced meat, 219 from the meat trade environment.

Several countries isolated salmonella from a variety of pets, wild birds, and animals. In Sweden, 143 strains of S. typhimurium were isolated from wild birds. The New Zealand Salmonella Surveillance Center noted that many lizards were infected with S. saint-paul; some of these lizards lived in human dwellings. In Thailand, 136 salmonella isolations were made from rats; the most common serotypes found were S. derby, S. lexington and S. weltevreden, all of which are common in man. Flies examined in the Netherlands were found to carry S. thompson, S. typhimurium, S. eimsbuettel, and S. good.

In summary, epidemiologic investigation in different countries revealed that salmonellae were responsible for outbreaks in hospitals, particularly in pediatric wards, and contamination of widely distributed foods. Outbreaks studied by careful epidemiologic investigation revealed contaminated meats, poultry, and eggs, as vehicles of infection. The most common serotype in all but 4 of 27 countries that reported isolations was S. typhimurium.

C. Clarification of Foodborne Salmonella derby Gastroenteritis in Trinidad, Salmonella Surveillance Report No. 122 - The second paragraph, page 4 should read:

In the early stages of the epidemic, bacteriology laboratories in Trinidad were only equipped to identify salmonella isolates by group; the majority of salmonellae were identified as group B. A single group B isolate from a chick yolk in December 1972 was identified by the Central Public Health Laboratory, Colindale, London as S. agona. Thirty-six out of 39 (92.3%) of the group B isolates from humans in 1973 were shown to be S. derby by Colindale and CDC. Early in the outbreak salmonella isolates from humans sent to the University of the West Indies, Kingston, Jamaica, were reported as S. agona; subsequently the Colindale laboratory examined one of these cultures and identified S. derby. S. derby is antigenically very similar to S. agona. The initial belief that S. agona was the responsible serotype suggested that poultry was the source of the epidemic (1). All group B isolates examined in Trinidad after mid-September 1973, when typing sera enabling differentiation of S. derby and S. agona was available, were S. derby.

TABLE I COMMON SALMONELLAE REPORTED FROM HUMAN SOURCES, THIRD QUARTER, 1974

SEROTYPE	GEOGRAPHIC DIVISION AND REPORTING CENTER																															
	NEW ENGLAND						MIDDLE ATLANTIC					EAST NORTH CENTRAL					WEST NORTH CENTRAL							SOUTH ATLANTIC								
	ME	NH	VT	MAS	RI	CON	NYA	NYB	NYC	NJ	PA	OHI	IND	ILL	MIC	WIS	MIN	IOW	MO	ND	SD	NEB	KAN	DEL	MD	DC	VA	WVA	NC	SC	GA	FLA
anatum				2		1		5	7	6	7			7	1	4		1		1			1		2				2	1	7	
bareilly	1													8		2	2						4				2					
blockley				6		3		4	4	3	7	1		2	1	6	2	1	3				2	3	5		3		1	3	3	1
braenderup				1				2	2				1	5		1									1					1	2	
bredeney				1		1			1	2	4		1	6	1	1		2	1						1	1	1		1			
chester										2	4			2		2									1		2					
cholerae-suis v kun												1		1															1			
cubana										1																						
derby			1	5		1		5	4	7	9	5	2	8	13								1	1	8				1		8	4
enteritidis			4	62	3	14	1	23	12	4	34	17	23	66	18	12	8	5	3	2			10	1	23	1	6	2	14	1	8	2
give				1							1								1											1	2	
heidelberg	6		1	24	4	5		12	7	13	15	7	9	31	19	15	1		2	1			2		15		11	1	12	2	11	1
indiana										2	2			4	1		1								3						3	
infantis	1			7		6		13	7	32	25	10	1	40	26	15	3		6	2	1		10		16	1	8		10	1	6	4
java				1				1			3	2	2	4	3	3	5	1	1				3		1				2		4	1
javiana				1						1				2	2			1	2				2	1			1			2	7	16
litchfield									1	1	3			2		2			2				1				4		2		2	1
livingstone																															1	
manhattan	1		1	3				7	4	11	29	4		16	10	8	1	3	1				1	1	13		3	1	6		2	
miami																														1	3	5
mississippi															2				3										1		13	
montevideo				3			1	2	1	7	11	4	4	5	3	3		1					9		3		4		1	1	1	2
muenchen				2		1		6	1	3	7	2	1	3	6	2			3				4		2		2	1	2	3	9	2
newington											1			2																		
newport	1			16		6		10	4	15	10	7	3	23	6	9	5	7	14				9		5		4	1	17	10	53	10
oranienburg				8		1				6	2	3		5	3			1	1		1		3		2		1			1	3	
panama				2		1			3	7		2		2		2	3								1		2		1		5	
paratyphi B						1		2				1	1		3												3				1	
reading				1					1	1	2			2	4			1											1		4	
saint-paul				14		9		6	8	23	11	9		16	17	11	4	1	3	3			1		15		5	1	8		7	
san-diego				3				2	3					2	7	2									1		1			1		
schwarzengrund				3		1				1	2	1		1			1										1		3			
senftenberg				1				1		3	1			3	1				1										1			
tennessee														3											1					2	1	
thompson				8		1		4	3	9	6	1		14	7	6	4		1	2	1		2		6	1	2		3		2	1
typhi	2			3		1	4	3	8	3	3	4		6	4	1		1	3				1	1	2	1			5	2	1	5
typhimurium	19		3	111	10	56	2	41	23	76	130	52	16	111	85	97	45	20	51	4	8		33	9	47	1	52	2	42	17	87	10
typhimurium v cop	1			5		4				20					22		1	6					5									
weltevreden																																
worthington				1																												
TOTAL	32	–	10	295	17	113	8	149	104	259	329	133	64	402	265	204	86	52	102	15	11	–	104	17	174	6	118	9	137	50	256	65
ALL OTHER*	1	16	3	33	17	11	119	36	15	37	31	8	7	61	35	24	7	21	11	–	–	8	15	1	48	14	17	3	34	10	40	10
TOTAL	**33**	**16**	**13**	**328**	**34**	**124**	**127**	**185**	**119**	**296**	**360**	**141**	**71**	**463**	**300**	**228**	**93**	**73**	**113**	**15**	**11**	**8**	**119**	**18**	**222**	**20**	**135**	**12**	**171**	**60**	**296**	**75**

NOTE: NYA-New York, Albany; NYB-Beth Israel Hospital; NYC-New York City.
Beth Israel Hospital is a reference laboratory and this quarter serotyped a total of 238 cultures.

*See Table II.

GEOGRAPHIC DIVISION AND REPORTING CENTER																					TOTAL	% OF TOTAL	CUMULATIVE TOTAL	% OF CUMULATIVE TOTAL	SEROTYPE
EAST S. CENTRAL				WEST S. CENTRAL				MOUNTAIN								PACIFIC									
KY	TEN	ALA	MIS	ARK	LA	OKL	TEX	MON	IDA	WYO	COL	NM	ARI	UTA	NEV	WAS	ORE	CAL	ALK	HAW					
1	1				4		12						8			1	3	10		3	98	1.4	234	1.3	*anatum*
	1	1		2	1	1					1			2			1	2			31	0.4	65	0.4	*bareilly*
	2				3		5						1	1				4		1	81	1.1	234	1.3	*blockley*
					1		1														18	0.3	59	0.3	*braenderup*
					31		4				2		1					7		2	72	1.0	139	0.8	*bredeney*
	1												4				1	2	1		22	0.3	61	0.3	*chester*
																					3	0.0	18	0.1	*cholerae-suis v kun*
													1					2		1	5	0.1	18	0.1	*cubana*
	2	3	4	1	1	1	22				1					1		23		8	150	2.1	374	2.1	*derby*
3	4	5		1	2	1	6		1		1		2		1	1	6	19		8	440	6.1	1,104	6.2	*enteritidis*
					4		10													1	21	0.3	48	0.3	*give*
1	6	3	3	1	8	1	7				1		7	1	1	6	2	43	2	5	325	4.5	874	4.9	*heidelberg*
	1				7		1											2			27	0.4	54	0.3	*indiana*
1	4	5		6	11	3	72				4		6	2	2	4	9	34	1	6	421	5.9	1,008	5.7	*infantis*
	5	3	4		5	1					1				3		2	2		2	65	0.9	169	1.0	*java*
	4	3	4	20	15	1	55				1		3		1		1	1			147	2.1	283	1.6	*javiana*
	1	1			2		2							1				2			30	0.4	72	0.4	*litchfield*
																		4		1	6	0.1	17	0.1	*livingstone*
				1	14		1										1	13		3	159	2.2	273	1.5	*manhattan*
		1																			10	0.1	38	0.2	*miami*
	8	2	2		23		3											1			58	0.8	99	0.6	*mississippi*
	2	3					5				3		3		1	4	2	19		2	110	1.5	266	1.5	*montevideo*
	2	6	3	2	11	1	11						12			1	1	5			117	1.6	233	1.3	*muenchen*
				2			1						2					3			11	0.2	34	0.2	*newington*
1	6	12	4	41	46	4	142				11		11	1	1	4	2	49	1	14	595	8.3	1,205	6.8	*newport*
	1			2	9	5	39				4		5			1	1	14			122	1.7	282	1.6	*oranienburg*
					1		5						1			1		4		29	72	1.0	215	1.2	*panama*
							2				1		1					3			19	0.3	60	0.3	*paratyphi B*
				1			1								1	1	1	1			23	0.3	57	0.3	*reading*
1	5	2			21	3	13				2		10			4	6	15		3	257	3.6	687	3.9	*saint-paul*
	1				1		5						1			2		12			44	0.6	111	0.6	*san-diego*
					4		1											11			30	0.4	50	0.3	*schwarzengrund*
					2	1	4									1		1			21	0.3	78	0.4	*senftenberg*
	1															1		4			13	0.2	48	0.3	*tennessee*
	1	1	1	7	3	5	12							2		2		6	5	1	130	1.8	307	1.7	*thompson*
1	7		3	9	10	1	7					2	1			4	2	40	1	3	155	2.2	418	2.4	*typhi*
22	53	24	14	25	70	27	103	4	3		40		22	7	3	45	6	176	10	7	1,921	26.8	5,216	29.3	*typhimurium*
3	3				2	6	2		7		3		1		2		6				99	1.4	254	1.4	*typhimurium v cop*
													1							45	46	0.6	107	0.6	*weltevreden*
																		4			5	0.1	32	0.2	*worthington*
34	122	75	42	121	312	62	554	4	11	–	76	2	104	17	16	84	53	538	21	145	5,979	83.4	14,901	83.8	TOTAL
1	16	15	4	23	62	7	83	5	1	8	5	55	19	5	2	13	4	99	43	24	1,187		2,885		ALL OTHER*
35	**138**	**90**	**46**	**144**	**374**	**69**	**637**	**9**	**12**	**8**	**81**	**57**	**123**	**22**	**18**	**97**	**57**	**637**	**64**	**169**	**7,166**		**17,786**		**TOTAL**

TABLE II OTHER SALMONELLAE REPORTED FROM HUMAN SOURCES, THIRD QUARTER, 1974

SEROTYPE	REPORTING CENTER																										
	ALA	ALK	ARI	ARK	CAL	COL	CON	DEL	DC	FLA	GA	HAW	IDA	ILL	IND	IOW	KAN	KY	LA	ME	MD	MAS	MIC	MIN	MIS	MO	MON
aberdeen					2																						
adelaide					3																						
agona	8		10	4	29		6				14	1		37	3	8	3		26		34	4	18	4		5	
alachua					1																2	2					
albany														1													
amager														1													
amsterdam					1																						
atlanta																										1	
austin																											
belem																											
berta			2	1																		2	2		2		
binza																											
bornum																						3					
bovis-morbificans					2									2								7					
brandenburg					2																						
cairo																											
california					1												3					1				1	
cambridge					1																						
carrau																											
cerro					1						1	2					1										
cholerae-suis																											
clackamas																											
concord																											
daytona																		1									
decator																											
denver																											
drypool				2	2									2			2		1								
dublin			1		4																	1					
duesseldorf			1																								
durban																						1					
eastbourne																											
eimsbuettel																											
eastbourne																											
florida										1																	
gaminara										1									3								
gatow																											
gatuni																											
georgia																	1										
grumpensis														1					1								
habana											1			1													
hartford					1					2				3					1								
hofit					1																						
hvittingfoss						1																					
ibadan				7																							
inverness																			1								
irumu																											
johannesburg											1								1		1	2	1				
kentucky					4			1						1						1	1						
kikoma																											
kottbus					3		1				1			1								1	1			2	
lexington																											
lille											1																
loma-linda																											
london	2			1	16		3				2			4		1	1		8		7	2	3				
luciana	1										1																
madelia	1																										
manila																											
meleagridis												7		1									1				
minnesota																			1			1					
mission																											
moscow																										1	
muenster										1		1			3											1	
new-brunswick					1														1								
new-mexico			1																								
nienstedten					1																1						
norwich			2	6	1						1								3			2		1	2		
ohio					8									2													
oritamerin			1													2											
oslo					2							8										1					
paratyphi A					4							1		1													
pensacola	1										2																
poona	1		1	1						3												1	1				
richmond																											
rostock																											
rubislaw	1			1															2					1			
san-juan																											
saphra																			2								
siegburg					2						2								1		1		1				
simsbury																											
singapore												3															
stanley														1			3		1			1	3				
taksony					1									1													
tallahasee															1												
uganda							1				1																
urbana																			1				2				
usumbura										1																	
uzaramo											1											1					
victoria																											
virchow												1									1						
weslaco																	1										
yoff											1																
TOTAL	15	–	19	23	94	1	11	1	–	9	30	24	–	60	7	11	15	1	54	1	48	33	33	6	4	11	–
NOT TYPED*	–	43	–	–	5	4	–	–	14	1	10	–	1	1	–	10	–	–	8	–	–	–	2	1	–	–	5
TOTAL	**15**	**43**	**19**	**23**	**99**	**5**	**11**	**1**	**14**	**10**	**40**	**24**	**1**	**61**	**7**	**21**	**15**	**1**	**62**	**1**	**48**	**33**	**35**	**7**	**4**	**11**	**5**

Cumulative totals include isolation of all serotypes (except those listed in table I) reported this year.
*See Table V-A.

TABLE II–Continued

REPORTING CENTER																								TOTAL	CUML-TOTAL	SEROTYPE
NEB	NEV	NH	NJ	NM	NYA	NYB	NYC	NC	OHI	OKL	ORE	PA	RI	SC	TEN	TEX	UTA	VT	VA	WAS	WVA	WIC	WYO			
																								2	3	*aberdeen*
																								3	6	*adelaide*
	1		11			15	10	12		2		6		3	7	7	1		11	3		7		310	729	*agona*
			3			5						2							1			2		18	26	*alachua*
												2							1					4	21	*albany*
																								1	3	*amager*
																								1	3	*amsterdam*
																								1	2	*atlanta*
																1								1	1	*austin*
								1																1	1	*belem*
																1								10	16	*berta*
			1						1						1	1								4	8	*binza*
																								3	4	*bornum*
			1				1					9				1								23	42	*bovis-morbificans*
																								2	11	*brandenburg*
										1														1	2	*cairo*
			1																					7	16	*california*
																								1	1	*cambridge*
								1																1	2	*carrau*
						1																		6	17	*cerro*
									1			1												2	12	*cholerae-suis*
											2													2	2	*clackamas*
																			1					1	1	*concord*
																								1	1	*daytona*
																			1					1	1	*decatur*
																2								2	2	*denver*
																								9	13	*drypool*
	1																1							8	35	*dublin*
								7	1															9	20	*duesseldorf*
																								1	1	*durban*
																			1					1	109	*eastbourne*
															1					1				2	5	*eimsbuettel*
																					1			1	1	*eastbourne*
																								1	1	*florida*
														1		3								8	23	*gaminara*
																1								1	1	*gatow*
																				1				1	1	*gatuni*
																								1	3	*georgia*
																								2	3	*grumpensis*
																1								3	14	*habana*
												1												8	15	*hartford*
																								1	1	*hofit*
																								1	3	*hvittingfoss*
														1		6								14	18	*ibadan*
																								1	4	*inverness*
								1																1	1	*irumu*
								3	2			1		1	2									15	28	*johannesburg*
						1																		9	26	*kentucky*
														1										1	1	*kikoma*
			1									1												12	33	*kottbus*
																2								2	3	*lexington*
																								1	1	*lille*
																1								1	2	*loma-linda*
			7			2		2		1		4			3	4						1		74	183	*london*
																								2	5	*luciana*
																								1	3	*madelia*
										1														1	1	*manila*
							1																	10	16	*meleagridis*
								1								1								4	14	*minnesota*
								2																2	3	*mission*
																								1	1	*moscow*
			1					1								1								9	25	*muenster*
																								2	3	*new-brunswick*
																								1	1	*new-mexico*
																								2	2	*nienstedten*
								1				1			1	6								27	44	*norwich*
									1			1				4						1		17	26	*ohio*
																								3	9	*oritamerin*
			1			4																		16	30	*oslo*
						1						1												8	22	*paratyphi A*
								1						1										5	8	*pensacola*
			1			3		1	1	1						1				5				21	63	*poona*
							1																	1	1	*richmond*
																1								1	1	*rostock*
										1						3								9	30	*rubislaw*
							1																	1	2	*san-juan*
																13								15	17	*saphra*
			5				1		1							13			1					28	53	*siegburg*
						1																		1	5	*simsbury*
																								3	4	*singapore*
																								9	20	*stanley*
																								2	2	*taksony*
			1											1										3	3	*tallahassee*
																2								4	12	*uganda*
												1												4	11	*urbana*
																								1	1	*usumbura*
																								2	3	*uzaramo*
																					2			2	2	*victoria*
																								2	6	*virchow*
																								1	3	*weslaco*
																								1	1	*yoff*
–	2	–	34	–	–	33	15	34	8	7	2	31	–	9	15	76	2	–	17	10	3	11	–	820	1,988	TOTAL
8	–	16	3	55	119	3	–	–	–	–	2	–	17	1	1	7	3	3	–	3	–	13	8	367	897	NOT TYPED*
8	**2**	**16**	**37**	**55**	**119**	**36**	**15**	**34**	**8**	**7**	**4**	**31**	**17**	**10**	**16**	**83**	**5**	**3**	**17**	**13**	**3**	**24**	**8**	**1,187**	**2,885**	**TOTAL**

TABLE III COMMON SALMONELLAE REPORTED FROM NONHUMAN SOURCES, THIRD QUARTER, 1974

SEROTYPE	DOMESTIC ANIMALS AND THEIR ENVIRONMENT							ANIMAL FEEDS			
	CHICKENS	TURKEYS	SWINE	CATTLE	HORSES	OTHER	SUBTOTAL	TANKAGE	VEGETABLE PROTEIN	OTHER	SUBTOTAL
anatum			4	14			18				–
bareilly						1	1	2			2
blockley							–				–
braenderup							–				–
bredeney							–	4			4
chester						1	1				–
cholerae-suis v kun							–				–
cubana							–				–
derby							–				–
enteritidis			1	4		1	6				–
give						1	1				–
heidelberg	1						1				–
indiana		1					1				–
infantis	1			1		4	6				–
java							–				–
javiana							–				–
litchfield							–				–
livingstone							–	1			1
manhattan						1	1				–
miami							–				–
mississippi							–				–
montevideo							–			1	1
muenchen		2					2				–
newington							–				–
newport				3		1	4				–
oranienburg					1		1				–
panama						1	1				–
paratyphi B							–				–
reading							–				–
saint-paul					1	1	2				–
san-diego					1		1				–
schwarzengrund							–				–
senftenberg						1	1	4	3		7
tennessee						1	1				–
thompson							–				–
typhi							–				–
typhimurium			2	36	5	4	47	1			1
typhimurium v cop							–				–
weltevreden						1	1				–
worthington				1			1	19			19
TOTAL	2	3	7	59	8	19	98	31	3	1	35
ALL OTHER*	–	–	16	8	–	17	41	5	–	1	6
TOTAL	**2**	**3**	**23**	**67**	**8**	**36**	**139**	**36**	**3**	**2**	**41**

*See Table IV.

TABLE III–Continued

WILD ANIMALS AND BIRDS	REPTILES AND ENVIRON-MENT	HUMAN DIETARY ITEMS: EGGS AND PRODUCTS	POULTRY	RED MEAT	DAIRY PRODUCTS	OTHER	SUBTOTAL	MISCEL-LA-NEOUS	TOTAL	CUMU-LATIVE TOTAL	SEROTYPE
13	1				6	2	8	3	43	100	*anatum*
							–		3	12	*bareilly*
							–		–	3	*blockley*
							–		–	18	*braenderup*
	1					1	1		6	15	*bredeney*
							–		1	4	*chester*
							–		–	55	*cholerae-suis v kun*
							–		–	9	*cubana*
				1			1	1	2	32	*derby*
1				1			1		8	32	*enteritidis*
							–		1	14	*give*
1				1			1		3	48	*heidelberg*
2							–		3	9	*indiana*
2				1			1	1	10	50	*infantis*
			1			2	3		3	23	*java*
							–		–	3	*javiana*
	1						–		1	10	*litchfield*
							–		1	11	*livingstone*
				1			1		2	25	*manhattan*
							–		–	1	*miami*
							–		–	–	*mississippi*
	1						–		2	69	*montevideo*
	1						–		3	14	*muenchen*
1							–	1	2	7	*newington*
6							–	1	11	69	*newport*
	1						–	2	4	36	*oranienburg*
							–	2	3	8	*panama*
1				1			1		2	10	*paratyphi B*
	1						–		1	13	*reading*
1				2			2		5	39	*saint-paul*
							–		1	24	*san-diego*
							–		–	3	*schwarzengrund*
				1			1		9	37	*senftenberg*
							–		1	21	*tennessee*
	2		2				2		4	21	*thompson*
							–	1	1	1	*typhi*
9	3			6	1	3	10	10	80	523	*typhimurium*
1							–	1	2	104	*typhimurium v cop*
							–		1	4	*weltevreden*
							–		20	57	*worthington*
38	12	–	3	15	7	8	33	23	239	1,534	TOTAL
21	16	–	1	7	–	4	12	35	131	516	ALL OTHER*
59	**28**	**–**	**4**	**22**	**7**	**12**	**45**	**58**	**370**	**2,050**	**TOTAL**

TABLE IV OTHER SALMONELLAE REPORTED FROM NONHUMAN SOURCES, THIRD QUARTER, 1974

SEROTYPE	DOMESTIC ANIMALS AND THEIR ENVIRONMENT							AMIMAL FEEDS			
	CHICKENS	TURKEYS	SWINE	CATTLE	HORSES	OTHER	SUBTOTAL	TANKAGE	VEGETABLE PROTEIN	OTHER	SUBTOTAL
agona							–				–
albany							–				–
california							–				–
carrau							–				–
djugu							–				–
dublin				4			4				–
eimsbuettel						4	4				–
florida							–				–
gaminara						2	2				–
good							–				–
habana						1	1				–
inverness							–				–
jangwani							–				–
kiambu							–				–
london							–				–
madelia							–				–
meleagridis			13				13				–
monschaui						1	1				–
ohio							–				–
orion							–			1	1
oslo						3	3				–
poona						2	2				–
pullorum						1	1				–
rubislaw							–				–
siegburg							–				–
sundsvall							–				–
tosamanga							–				–
uganda							–				–
urbana							–				–
waycross							–				–
weslaco						2	2				–
TOTAL	–	–	13	4	–	16	33	–	–	1	1
NOT TYPED*	–	–	3	4	–	1	8	5	–	–	5
TOTAL	**–**	**–**	**16**	**8**	**–**	**17**	**41**	**5**	**–**	**1**	**6**

*See Table V-B.

TABLE IV–Continued

WILD ANIMALS AND BIRDS	REPTILES AND ENVIRON-MENT	HUMAN DIETARY ITEMS: EGGS AND PRODUCTS	POULTRY	RED MEAT	DAIRY PRODUCTS	OTHER	SUBTOTAL	MISCEL-LA-NEOUS	TOTAL	CUMU-LATIVE TOTAL	SEROTYPE
2				1			1	1	4	26	*agona*
				2			2		2	7	*albany*
			1			1	2		2	11	*california*
	1						–		1	2	*carrau*
	1						–		1	1	*djugu*
							–		4	29	*dublin*
							–		4	7	*eimsbuettel*
							–	1	1	1	*florida*
						2	2		4	6	*gaminara*
1							–		1	1	*good*
11							–		12	35	*habana*
							–	1	1	1	*inverness*
	2						–		2	2	*jangwani*
	1						–		1	1	*kiambu*
3	1						–	2	6	16	*london*
						1	1		1	10	*madelia*
							–	3	16	21	*meleagridis*
							–		1	2	*monschaui*
1							–		1	2	*ohio*
							–		1	5	*orion*
	1						–		4	7	*oslo*
	1						–		3	18	*poona*
							–		1	14	*pullorum*
1							–		1	9	*rubislaw*
2							–		2	10	*siegburg*
	1						–		1	1	*sundsvall*
	1						–		1	1	*tosamanga*
				1			1		1	3	*uganda*
	2						–		2	20	*urbana*
	1						–		1	1	*waycross*
							–		2	2	*weslaco*
21	13	–	1	4	–	4	9	8	85	410	TOTAL
–	3	–	–	3	–	–	3	27	46	106	NOT TYPED*
21	**16**	**–**	**1**	**7**	**–**	**4**	**12**	**35**	**131**	**516**	**TOTAL**

TABLE V SALMONELLA REPORTED BY GROUP IDENTIFICATION ONLY THIRD QUARTER, 1974

A. HUMAN SOURCES

REPORTING CENTER	GROUP												TOTAL
	A	B	C	C1	C2	D	E	G	H	I	O	UNK	
ALASKA		31		2		9						1	43
CALIFORNIA				1		2						2	5
COLORADO			2				1					1	4
DISTRICT OF COLUMBIA		10				2						2	14
FLORIDA												1	1
GEORGIA												10	10
IDAHO				1									1
ILLINOIS												1	1
IOWA		4										6	10
LOUISIANA		5				1					1	1	8
MICHIGAN		1							1				2
MINNESOTA		1											1
MONTANA		4						1					5
NEBRASKA		7		1									8
NEW HAMPSHIRE		5		8		1						2	16
NEW JERSEY				1						1		1	3
NEW MEXICO		24		6	17	3	2	2	1				55
NEW YORK-A		76	1	11	8	17	1			4		1	119
NEW YORK-B1		2		1									3
OREGON		1		1									2
RHODE ISLAND		8				1	1					7	17
SOUTH CAROLINA				1									1
TENNESSEE		1											1
TEXAS		1			4	2							7
UTAH		1			2								3
VERMONT		1				1						1	3
WASHINGTON	1											2	3
WISCONSIN		3	1									9	13
WYOMING	1	5	2										8
TOTAL	**2**	**191**	**6**	**34**	**31**	**39**	**5**	**3**	**2**	**5**	**1**	**48**	**367**

B. NONHUMAN SOUCES

REPORTING CENTER	GROUP												TOTAL
	A	B	C	C1	C2	D	E	G	H	I	O	UNK	
DOMESTIC ANIMALS AND THEIR ENVIRONMENT		4		3								1	8
ANIMAL FEEDS				5									5
WILD ANIMALS AND BIRDS													–
REPTILES AND ENVIRONMENT				1				1		1			3
HUMAN DIETARY ITEMS		2		1									3
MISCELLANEOUS		19	1	2	1		4						27
TOTAL	**–**	**25**	**1**	**12**	**1**	**–**	**4**	**1**	**–**	**1**	**–**	**1**	**46**

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The State Epidemiologists are the key to all disease surveillance activities. They are responsible for collecting, interpreting, and transmitting data and epidemiologic information from their individual States. Their contributions to this report are gratefully acknowledged. In addition, valuable contributions are made by State Laboratory Directors; we are indebted to them for their valuable support.

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Illinois	Byron J. Francis, M.D.	Richard Morrissey, M.P.H.
Indiana	Richard D. Telle, M.D.	Josephine Van Fleet, M.D.
Iowa	Charles A. Herron, M.D.	W. J. Hausler, Jr., Ph.D.
Kansas	Don E. Wilcox, M.D.	Nicholas D. Duffett, Ph.D.
Kentucky	Calixto Hernandez, M.D.	B. F. Brown, M.D.
Louisiana	Charles T. Caraway, D.V.M.	George H. Hauser, M.D.
Maine	Peter J. Leadley, M.D.	Charles Okey, Ph.D.
Maryland	Lawrence B. Schonberger, M.D., Acting	Robert L. Cavenaugh, M.D.
Massachusetts	Nicholas J. Fiumara, M.D.	Morton A. Madoff, M.D.
Michigan	Norman S. Hayner, M.D.	Kenneth R. Wilcox, Jr., M.D.
Minnesota	Barry S. Levy, M.D., Acting	Henry Bauer, Ph.D.
Mississippi	Durward L. Blakey, M.D.	R. H. Andrews, M.S.
Missouri	H. Denny Donnell, Jr., M.D.	Elmer Spurrier, Dr.P.H.
Montana	Martin D. Skinner, M.D.	David B. Lackman, Ph.D.
Nebraska	Paul A. Stoesz, M.D.	Henry McConnell, Dr.P.H.
Nevada	William M. Edwards, M.D.	Paul Fugazzotto, Ph.D.
New Hampshire	Vladas Kaupas, M.D.	Robert A. Miliner, Dr.P.H.
New Jersey	Ronald Altman, M.D.	Martin Goldfield, M.D.
New Mexico	Charles F. von Reyn, M.D., Acting	Larry Gordon
New York State	Donald O. Lyman, M.D., Acting	Donald J. Dean, D.V.M.
New York City	John S. Marr, M.D.	Paul S. May, Ph.D.
North Carolina	Martin P. Hines, D.V.M.	Mrs. Mildred A. Kerbaugh
North Dakota	Kenneth Mosser	C. Patton Steele, B.S.
Ohio	Thomas Halpin, M.D.	Charles C. Croft, Sc.D.
Oklahoma	Stanley Ferguson, Ph.D.	William R. Schmieding, Ph.D.
Oregon	John A. Googins, M.D.	Gatlin R. Brandon, M.P.H.
Pennsylvania	W. D. Schrack, Jr., M.D.	James E. Prier, Ph.D.
Puerto Rico	Carlos T. Armstrong Ressy, M.D.	
Rhode Island	Michael P. Hudgins, M.D., Acting	Raymond G. Lundgren, Ph.D.
South Carolina	William B. Gamble, M.D.	Arthur F. DiSalvo, M.D.
South Dakota	Robert S. Westaby, M.D.	B. E. Diamond, M.S.
Tennessee	Robert H. Hutcheson, Jr., M.D.	M. Sam Sudman, Dr.P.H.
Texas	M. S. Dickerson, M.D.	Charles Sweet, Dr.P.H.
Utah	Taira Fukushima, M.D.	Russell S. Fraser, M.S.
Vermont	John Long, D.D.S.	Dymitry Pomar, D.V.M.
Virginia	Robert S. Jackson, M.D.	Frank W. Lambert, Ph.D.
Washington	Thieu Nghiem, M.D.	Jack Allard, Ph.D.
West Virginia	William L. Cooke, M.D.	John W. Brough, Dr.P.H.
Wisconsin	H. Grant Skinner, M.S.	S. L. Inhorn, M.D.
Wyoming	Herman S. Parish, M.D.	Donald T. Lee, Dr.P.H.