REPORT NO. 105
APRIL 1971

CENTER FOR DISEASE CONTROL

SALMONELLA

SURVEILLANCE

CONTENTS. . .

FOR THE MONTH OF DECEMBER 1970

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE/PUBLIC HEALTH SERVICE
Health Services and Mental Health Administration

PREFACE

Summarized in this report is information received from State and City Health Departments, university and hospital laboratories, the National Animal Disease Laboratory (USDA, ARS), Ames, Iowa, 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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I. SUMMARY

In December 1970, 2,158 isolations of salmonellae were reported from humans, an average of 432 isolations per week (Tables I, II, and V-A). This number represents a decrease of 91 (17.4 percent) from the weekly average of November 1970 and an increase of 28 (6.9 percent) over the weekly average of December 1969.

Reports of 1,029 nonhuman isolations of salmonellae were received during December 1970 (Tables II, IV, and V-B).

II. REPORTS OF ISOLATIONS

The ten most frequently reported serotypes during December:

	HUMAN				NONHUMAN		
	Serotype	Number	Percent	Rank Last Month	Serotype	Number	Percent
1	typhi-murium*	511	23.7	1	typhi-murium*	190	18.5
2	enteritidis	203	9.4	2	heidelberg	64	6.2
3	newport	135	6.3	3	senftenberg	55	5.3
4	heidelberg	126	5.8	4	saint-paul	51	5.0
5	infantis	115	5.3	5	schwarzengrund	48	4.7
6	saint-paul	96	4.4	6	infantis	46	4.5
7	java	65	3.0	7	thompson	41	4.0
8	thompson	63	2.9	8	reading	35	3.4
9	javiana	55	2.5	>10	anatum	32	3.1
10	derby	51	2.4	10	newport	31	3.0
	Total	1420	65.8		Total	593	57.6
	TOTAL (all serotypes)	2158			TOTAL (all serotypes)	1029	
	*Includes var. copenhagen	14	0.6		*Includes var. copenhagen	39	3.8

III. CURRENT INVESTIGATIONS

A. A Salmonella typhi-murium Outbreak Traced to Barbecue Pork - Tennessee

Reported by A. J. Mueller, M.D., Health Officer, and R. A. Rhodes, Chief Sanitarian, Jackson-Madison County Health Department; B. D. Hale, M.D., M.P.H., Health Officer, and George W. Wallace, Sanitarian, Hardeman County Health

Department; Mattie Pearl Henderson, Director, Jackson Branch Laboratory, Division of Laboratories, Tennessee Department of Public Health; and Andrew Taylor, Jr., M.D., EIS Officer, Enteric Diseases Section, Bacterial Diseases Branch, Epidemiology Program, CDC.

Approximately 24 hours after attending a local hunting club supper on December 22, 1970, in Jackson, Tennessee, 40 of 42 persons developed a syndrome characterized by fever (98 percent), diarrhea (98 percent), cramps (98 percent), nausea (92 percent), vomiting (70 percent) (Figure 1). Four individuals required hospitalization. Food specific attack rates implicated barbecue pork (Table 1), and Salmonella typhi-murium was isolated from leftover barbecue and from the stools of three ill individuals. The barbecue had been purchased approximately an hour prior to the supper from a local restaurant which barbecued its own pork shoulders in a metal pit behind the restaurant for approximately 24 hours each. Barbecued shoulders were then brought into the restaurant and placed on a small cutting board where the meat was pulled from the bone. The meat was then reheated on the grill and was kept warm in a metal pan on top of the grill until sold.

Eleven of 12 employees of a Jackson department store also became ill with febrile gastroenteritis after a party on December 24. Potato salad, barbecue, slaw, and baked beans had been obtained shortly before the meal from the same restaurant. Although no food remained, everyone who ate barbecue became ill and one person reported eating only barbecue. S. typhi-murium was recovered from the stool of one of the two persons hospitalized.

Twelve of 17 persons attending another Christmas Eve lunch in Jackson became ill with febrile gastroenteritis approximately 24 hours later (Figure 2). Food was obtained approximately 1 hour prior to being served from the same local restaurant, and although no food remained, food specific attack rates implicated the barbecue and/or the baked beans (Table 2). One person was hospitalized and a stool culture yielded S. typhi-murium.

On December 24 the restaurant prepared baked ham, turkey and dressing; turkey and ham were sliced on the cutting board previously used for barbecue. To keep it warm, sliced turkey was placed on top of the hot dressing, and then was transported by car to Middleton, Tennessee, approximately 40 miles from Jackson, where it was served at a Christmas Eve dinner. One hundred and forty-four of 165 persons became ill with febrile gastroenteritis and four were hospitalized. Although no food remained for culturing, food specific attack rates implicated the turkey and dressing (Table 3). In addition, S. typhi-murium was recovered from the stools of 15 patients.

A survey of the Jackson-Madison County Hospital on December 28 revealed 26 patients hospitalized with febrile gastroenteritis, all but one of whom had eaten barbecue obtained from the implicated restaurant approximately 24 hours prior to becoming ill. The remaining patient had eaten turkey at the Christmas Eve party in Middleton. Stool cultures obtained from these patients yielded 14 isolations of Salmonella typhi-murium. Fourteen of the hospitalized patients had become ill after eating barbecue served at the restaurant itself and had not attended any of the previously mentioned parties. Seven isolations of S. typhi-murium were obtained from stool cultures submitted by these patients. The first person ill had eaten barbecue at the restaurant on December 21 and had become ill with salmonellosis the next morning.

Two of the four food handlers at the implicated restaurant became ill, with onsets on December 22 and 24. S. typhi-murium was recovered from their stools as well as from a stool specimen submitted by a food handler who had remained asymptomatic. Environmental swabs obtained on December 30 after the restaurant had been cleaned were negative for salmonellae, as were remaining samples of barbecue sauce and raw turkey. However, samples of three remaining raw pork shoulders yielded S. typhi-murium.

All of the isolates of S. typhi-murium were similar in that they were not lysed by available phages. In addition, the antibiograms of the S. typhi-murium recovered from the raw pork shoulders, pork barbecue, the three food handlers, persons ill in each outbreak, and persons who ate only at the restaurant were the same. Additional samples of barbecue were cultured from other restaurants in the community and these were negative for salmonellae.

In summary, four outbreaks of salmonellosis were traced to food supplied by a single restaurant. Two hundred and seven of 236 persons were ill and 11 were hospitalized. An estimated 300 additional persons in the Jackson community became ill after eating barbecue at the restaurant and 19 were hospitalized. There were no deaths.

Epidemiologic data suggested that the cutting board may have been contaminated by the raw pork as early as December 21. The cutting board apparently remained contaminated through December 24, and it probably served as a source of salmonellae to the turkey and the barbecued pork. Improper handling and storage of the cooked meat permitted survival and replication of the salmonellae.

Figure 1 CASES OF GASTROENTERITIS, BY ONSET, FOLLOWING EVENING MEAL, DEC. 22, 1970, JACKSON, TENNESSEE

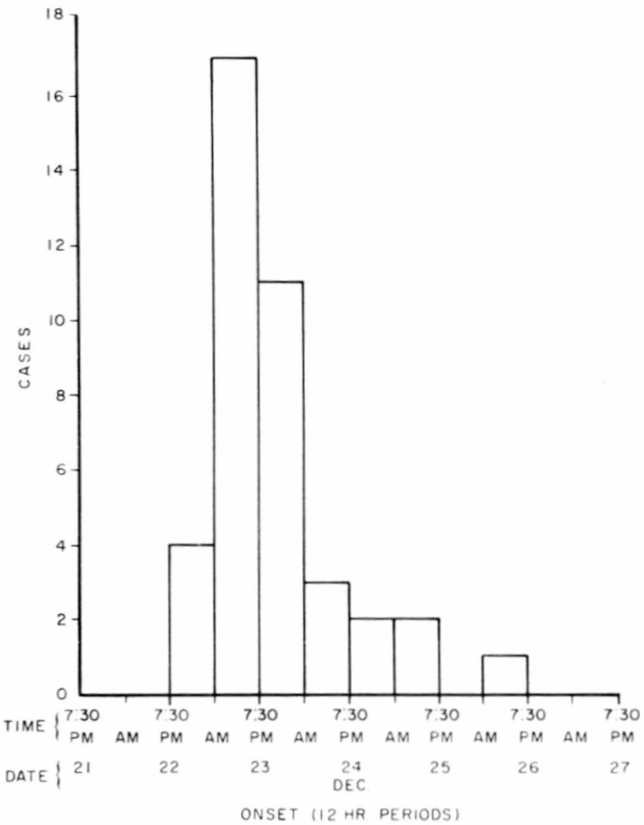

Figure 2 CASES OF GASTROENTERITIS, BY ONSET, FOLLOWING NOON MEAL, DEC. 24, 1970, JACKSON, TENNESSEE

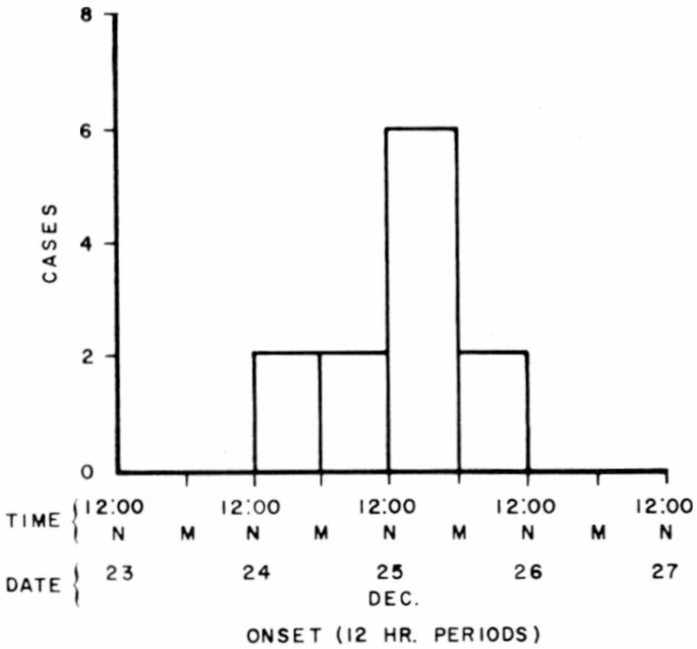

Table 1 - Food Specific Attack Rates, Hunting Club, Jackson, Tennessee, December 22, 1970

	ATE				DID NOT EAT			
Food	Ill	Not Ill	Total	Attack Rate (%)	Ill	Not Ill	Total	Attack Rate (%)
Baked Beans	35	2	37	95	5	0	5	100
Barbecued Pork	40	1	41	98	0	1	1	0
Light Bread	32	1	33	97	8	1	9	89
Pound Cake	17	0	17	100	23	2	25	92
Peach Halves	24	1	25	92	16	1	17	94
Chocolate Cake	21	0	21	100	19	2	21	90
Potato Salad	30	1	31	97	10	1	11	91
Slaw	29	1	30	97	11	1	12	92
Pecan Pie	2	0	2	100	38	2	40	95

Table 2 - Food Specific Attack Rates, Jackson Utilities Party, December 24, 1970

	ATE				DID NOT EAT			
Food	Ill	Not Ill	Total	Attack Rate (%)	Ill	Not Ill	Total	Attack Rate (%)
Baked Beans	12	5	17	70	0	0	0	0
Barbecued Pork	12	5	17	70	0	0	0	0
Light Bread	8	4	12	67	4	1	5	80
Pound Cake	0	0	0	0	12	5	17	70
Peach Halves	0	0	0	0	12	5	17	70
Chocolate Cake	1	0	1	100	11	5	16	68
Potato Salad	7	5	12	58	5	0	5	100
Slaw	9	4	13	69	3	1	4	75
Pecan Pie	10	4	14	71	1	1	2	50

Table 3 - Food Specific Attack Rates, Middleton, Tennessee, December 24, 1970

	ATE				DID NOT EAT			
Food	Ill	Not Ill	Total	Attack Rate (%)	Ill	Not Ill	Total	Attack Rate (%)
Baked Ham	21	14	35	60	16	10	26	62
Turkey	36	11	47	76	2	13	15	13
Dressing	37	20	57	65	1	4	5	20
Gravy	23	9	32	72	15	15	30	50
Green Beans	24	13	37	65	14	11	25	56
Potato Salad	34	18	52	66	4	5	9	44
Cranberry Sauce	27	15	42	64	10	8	18	56
Pickles	19	14	33	58	20	10	30	67
Rolls	36	22	58	62	2	3	5	40
Banana Pudding	9	5	14	64	29	19	48	60

IV. REPORTS FROM THE STATES

A. Pet Turtle-Associated Salmonellosis - Connecticut

Reported by Thomas Armentano, R.S., Head Sanitarian, Meriden City Health Department; Arthur Bruce, M.S., and John Redys, M.S., Microbiologists, Division of Laboratory Services, James C. Hart, M.D., Director, Division of Preventable Diseases, Connecticut State Department of Health; and Steven H. Lamm, M.D., EIS Officer located at the Connecticut State Department of Health.

Between June 1 and October 31, 1970, 259 isolations of salmonellae from human sources were reported to the Division of Laboratory Services, Connecticut State Department of Health. To determine possible sources of infection, the state conducted a survey of those infected families (117) who could be contacted by telephone and in which one or more family members submitted stools that were positive for salmonella serotypes other than Salmonella typhi-murium. Families infected with S. typhi-murium had been eliminated from the survey because of this serotype's ubiquitous distribution. A total of 66 families (87 patients) could be contacted, and information was obtained from them regarding clinical course, food exposure, and association with animals.

Seventeen of the 66 families (26 percent) reported that they had had pet red-eared turtles (Pseudemys scripta-elegans) in their homes at the time of their illness. Included in these 17 families were 26 of the 87 patients (30 percent) who had submitted stools positive for salmonellae. Two other cases of salmonellosis which had not been previously reported were also discovered. Analysis of the data on the 28 patients showed no sex predilection, although 22 patients (79 percent) were less than 5 years old. Twenty-six patients were symptomatic, while two remained asymptomatic. Eight were hospitalized for a mean duration of 11.2 days. The salmonella serotypes isolated in these pet turtle-associated home outbreaks were S. saint-paul (5 families), S. litchfield (3 families), S. java and S. oranienburg (2 families each), and S. enteritidis, S. heidelberg, S. panama, S. poona, and S. urbana (1 family each).

The same salmonella serotypes that caused the human illnesses were cultured from turtle water in five of the 17 turtle-associated home outbreaks. Of the remaining 12 homes, three had turtles with specimens positive for other salmonella serotypes, and nine no longer had the turtles. The onset of illness in six of these 12 homes followed acquisition of a pet turtle by 2 weeks or less. A total of 11 out of 17 home outbreaks could be epidemiologically associated with pet turtles.

The turtles associated with three of the five home outbreaks of S. saint-paul came from the same farm in Louisiana, although through two distributors and three retailers. The turtles associated with the two S. oranienburg outbreaks came from the same source in Mississippi, through two distributors and two stores in different states. A distributor in Florida was the source of the turtles associated with the three S. litchfield outbreaks; retailers in two states were also involved. Finally, the turtles associated with the two outbreaks of S. java came through two retailers from the same farm in Louisiana.

A bacteriologic survey was conducted of turtle tank water from the 18 stores retailing pet turtles in Bridgeport, Bristol, and Meriden, Connecticut. Salmonellae were found in the water specimens from all stores.

B. A Salmonella thompson Outbreak Traced to Restaurant Cooks - Seattle, Washington

Reported by Herb W. Anderson, B.S., R.S., Environmental Epidemiologist, and Donald R. Peterson, M.D., M.P.H., Director of Epidemiology, Seattle-King County Department of Public Health.

A spaghetti birthday dinner served to eight women in a Seattle, Washington, restaurant on August 20, 1970, resulted in a Salmonella thompson outbreak. Five women experienced the onset of gastrointestinal symptoms including nausea (5), diarrhea (5), back pain (5), fever (4), headache (4), and vomiting (1), 12 to 34 hours after eating. The median incubation period was 24 hours. One patient was hospitalized for 2 days. Duration of acute symptoms ranged from 3 to 6 days; all five recovered.

The woman who was hospitalized reported the outbreak on August 24, when she learned that four others in the party had also become ill. Excepting the birthday party, the group had not met together for more than a month. All eight women submitted stool specimens to the Seattle-King County Health Department Laboratory. S. thompson was isolated only from the five women who had been ill.

Food specific attack rates (Table 1) indicated spaghetti with mushroom or meat sauce as the most likely vehicle. The sauce was served on every dish of spaghetti; therefore, a separate attack rate for spaghetti alone could not be calculated. The restaurant manager stated that approximately 1,000 persons were served spaghetti the same evening. He had received no other complaints of illness from customers.

The recently opened restaurant had modern equipment throughout. However, inspection revealed operational defects which may have caused salmonella contamination of food eaten by the women. Refrigerated raw meat and poultry were stored above and near open containers of ready-to-eat food. Cooks on the serving line were observed using their hands to prevent the spaghetti from sliding off the plates. There was no leftover food for laboratory analysis.

Twenty-two of 37 restaurant employees submitted stool specimens for culturing. S. thompson was isolated from three of the five cooks; all other employees tested were negative. The only common exposure the cooks had to each other was in the restaurant. Two of the salmonella-positive cooks had worked during the week the ladies ate at the restaurant. The cook who had served the spaghetti had experienced diarrhea while at work a few weeks earlier. There were no other employees who admitted symptoms of gastroenteritis during the preceding 2 months.

The infected cooks were prohibited from working in the restaurant kitchen until stool cultures were negative for salmonellae. The practice of using hands to keep spaghetti on plates was discontinued. Hand washing signs were posted in restrooms instructing all employees to wash their hands before returning to work. The raw and finished food products in the refrigerators were separated to eliminate possible cross-contamination.

Table 1
Food Specific Attack Rates

Food	ATE				DID NOT EAT			
	Ill	Not Ill	Total	Attack Rate (%)	Ill	Not Ill	Total	Attack Rate(%)
Mushroom sauce on spaghetti	5	1	6	83	0	2	2	0
Meat sauce on spaghetti	5	2	7	71	0	1	1	0
Spaghetti with any sauces*	5	3	8	62	0	0	0	0
Parmesan cheese	3	1	4	75	2	2	4	50
Blue cheese dressing on tossed salad	4	1	5	80	1	2	3	33
Thousand island dressing on tossed salad	1	1	2	50	4	2	6	67
Garlic buttered bread	4	3	7	57	1	0	1	100
Spumoni ice cream	4	3	7	57	1	0	1	100
Wine	3	2	5	60	2	1	3	67
Water	2	0	2	100	3	3	6	50

*Cheese sauce on spaghetti eaten by one person not included in table.

V. SPECIAL REPORTS

A. Recent Articles on Salmonellosis

The following articles on salmonellosis of interest to public health workers have been published in recent months.

1. Summary of 1970 AAA avian salmonellosis workshop. Avian Dis 14:817, 1970

2. Bassily S, Farid Z, Lehman JSL, Kent DC, Sanborn WR, Hathout SD: Treatment of chronic urinary salmonella carriers. Trans Roy Soc Trop Med Hyg 64:723, June 1970

3. Harrington R Jr, Ellis EM: Comparison of two plating media for detection of salmonella from swine tissues. Appl Microbiol 20:851, 1970

4. Hawbecker D, Carpenter JA, Hamdy MK: Translocation and fate of ^{32}P-labeled salmonella in mice. Proc Soc Exp Biol Med 135:546, 1970

5. Hooper RS: The recovery of Salmonella dublin from rivers in Anglesey. Vet Rec 87:583, Nov 1970

6. Kahn AQ: Salmonella infections in dogs and cats in the Sudan. Brit Vet J 126:607, Nov 1970

7. Meinershager WA, Waldhalm DG, Frank FW: Salmonella dublin as a cause of diarrhea and abortion in ewes. Amer J Vet Res 31:1769, Oct 1970

8. Milone MA, Watson JA: Thermal inactivation of Salmonella senftenberg 775 W in poultry meat. Health Lab Sci 7:199, Oct 1970

9. Plenderleith RWJ: Salmonella indiana infection in a single suckling beef herd. Vet Rec 87:617, Nov 1970

10. Warren CPW: Arthritis associated with salmonella infections. Ann Rheum Dis 29:483, 1970

11. Winshell EB, Cherubin C, Winter J, Neu HC: Antibiotic resistance of salmonella in the eastern United States. In Antimicrobial Agents and Chemotherapy, Detroit, American Society for Microbiology, 1969, p. 86

B. Recalls of Products Contaminated with Salmonellae for Period January 20, 1971, to February 24, 1971 (reported by the U.S. Food and Drug Administration).

From January 20, 1971, to February 24, 1971, there were no products recalled by manufacturers and distributors because of salmonella contamination, as reported by the U. S. Food and Drug Administration.

C. Salmonella Surveillance Program of Dry Milk Plants

Reported by Mr. Edwin F. Garbe, Chief, Inspection and Grading Branch, Dairy Division, Consumer and Marketing Service, U. S. Department of Agriculture.

The U. S. Department of Agriculture tested products and environmental samples from 180 dry milk plants in 28 states during 1970 for the presence of salmonellae. The results of these tests are listed below. "Follow-up tests" were conducted at plants if an isolation was obtained. These results are not included.

Salmonella Surveillance of Dry Milk Plants

Routine Samples

	Product Samples			Environmental Samples		
Month	Number Tested	Number Positive	Percent Positive	Number Tested	Number Positive	Percent Positive
January	930	11	1.18	101	10	9.90
February	1,101	6	0.54	114	12	10.53
March	1,290	6	0.47	120	5	4.17
April	1,224	1	0.08	264	14	5.30
May	721	3	0.42	147	5	3.40
June	1,035	0	0.00	168	7	4.17
July	707	0	0.00	104	3	2.88
August	815	3	0.37	245	5	2.04
September	569	1	0.18	146	6	4.11
October	746	1	0.13	184	7	3.80
November	1,031	4	0.39	222	8	3.60
December	1,085	4	0.37	249	16	6.43
	11,254	40	0.36	2,064	98	4.75

D. Methods of Collecting and Culturing Environmental Samples for Salmonella

Reported by George K. Morris, Ph.D., Chief, Salmonella-Shigella Unit, Epidemiologic Services Laboratory Section, Bacterial Diseases Branch, Epidemiology Program, Center for Disease Control.

Investigations of the epidemiology of salmonellosis reveal that foods play an important part in the chain of infection. As a result, numerous methods for the isolation of salmonellae from both fecal specimens and food samples have been developed.

Since individuals excrete salmonellae in their feces for periods ranging from a few days to several months following an epidemic, most epidemics are documented by investigating the fecal excretion of salmonellae. The specific food source may be indicated by the epidemiologic data and confirmed by isolating the organism from the food. Very frequently, however, there is no food leftover for examination. In this case, or in the case of person-to-person spread as in hospital nurseries, for example, environmental samples can play an important role in documenting the source of the epidemic strain. Examples of environmental samples yielding salmonellae during epidemiologic investigations in which this laboratory has been involved in recent years are as follows: egg processing equipment, cutting board, sink, freezer floor, garbage cans, air samples, refrigerator handle, kitchen floor, sole of shoe, floor drain, rim of toilet bowl, air conditioner filter, knife, household pets, fish bowl water, and turtle bowl water.

Sampling method for surfaces: Surfaces may be conveniently sampled by swabbing the surface area thoroughly with a cotton-tipped swab. Prior to swabbing dry surfaces, the swab may be dipped in normal saline or enrichment broth. The swab should be inserted immediately after collection into a tube containing 10 ml of enrichment broth. The cotton-wrapped end of the swab is snapped off and dropped into the tube.

Sampling method for bulk material: Bulk samples, such as residues from garbage cans and floor drains or pieces of filter from air conditioners, may be collected using sterile spatulas, tongue depressors, or scissors, in sterile plastic bags or by adding the sample directly to jars containing 100 ml of enrichment broth (10 to 30 gms of sample per 100 ml of broth). Bulk samples that are not added directly to enrichment broth should be held refrigerated if the sample is wet or damp, but may be held at room temperature if the sample is dry.

Sampling water: Water may be examined by filtering volumes of water up to 1 liter or more through a bacteriological filter. The filter membrane is then aseptically transferred to a tube containing 10 ml of enrichment broth. An alternate procedure is to add a volume of the water (e.g. 100 ml) to an equal volume of double strength enrichment broth.

Non-selective and selective enrichment media: Those samples in which the organisms have been submitted to adverse environmental conditions such as freezing, drying, heating, and high salt concentrations, or those samples in which the total microbial count is thought to be low should be cultured first in a non-selective broth (e.g., lactose broth or nutrient broth) for 48 hours and then subcultured (1 ml to 10 ml) to a selective enrichment broth (e.g., tetrathionate brilliant green broth or selenite broth). This secondary broth is streaked to plating media after 24 hours of incubation. Those samples in which the organisms have not been submitted to adverse environmental conditions or in which the total microbial flora is thought to be high should be cultured by adding the sample directly to selective enrichment broth. This selective enrichment broth is streaked to plating media after incubation for 24 and 48 hours. Plating media that are used by many workers for isolating salmonellae are brilliant green agar (with or without added sulfadiazine), bismuth sulfite agar, and SS agar. Some selective enrichment broths commonly used are tetrathionate broth, tetrathionate brilliant green broth, and selenite broth. Tetrathionate brilliant green broth has

been found to be a very suitable media for culturing environmental samples in this laboratory, because the samples can be held in this broth during transport to the laboratory, even up to several weeks, provided the initial cultures are subcultured (1 ml to 10 ml) to fresh tetrathionate brilliant green broth upon arrival in the laboratory. The secondary broth should be incubated for 24 hours before streaking onto plating media. The use of tetrathionate brilliant green broth has a disadvantage in that S. typhi and S. paratyphi A do not grow well in this media. S. cholerae-suis and S. abortus-ovis are not readily isolated with either tetrathionate or selenite broth, but may be isolated more readily by direct plating. Brilliant green MacConkey broth has been reported to be a good enrichment broth for S. cholerae-suis. Although the elevated incubation temperature of 43°C has been demonstrated to be superior to 37°C in some cases for the selective isolation of salmonellae, most workers in this country are still incubating both enrichment broths and plating media at 37°C.

E. Announcement of a Proposed Change in the Frequency of Salmonella Surveillance Reports

A proposal is now being considered which would change the frequency of distribution of the Salmonella Surveillance Report from monthly to quarterly. All of the surveillance data currently presented in the Salmonella Surveillance Report would, of course, continue to be included in future issues under the revised distribution schedule. We would welcome your comments or questions concerning this proposal.

VI. INTERNATIONAL

None

TABLE I. COMMON SALMONELLAE REPORTED FROM HUMAN SOURCES, DECEMBER, 1970

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						2	1			5	1				2										1	1
bareilly																														
blockley				4	1			3	4	4	1			2	3				4					1	2		1		1		1	
braenderup				3						1				1		2											3					
bredeney										1	1	1			1				2						4						1	
chester	1										1			3		1	1												1			
cholerae-suis v kun																													1			
cubana			1	2						2	2	3	1	4	4				1					1	4		2		1		1	1
derby								1	3	2	6	1		14	1				1				5		2		1		1		1	
enteritidis				10	1	7		3	22	9	29	4	1	16	12	8	1	1	10				3		6		6	1	7		7	1
give								1	1																1						2	
heidelberg				10		7		3	9	3	2	4		18	2	1	5	1	3						3		1		2		3	6
indiana										1	1			2															1		2	
infantis				4	1	3			1	9	7		1	9	7	3	3						2	1	4		3		2		2	2
java						2		7	6	3	14			1	1	2	2							2		1						3
javiana				2								1		1																	5	21
litchfield						1			2								2	1														2
livingstone																																
manhattan								1	4	3	1			3	2										1				2		1	1
miami										1																					2	10
mississippi																															1	
montevideo									1		2	2		2					1						3						2	2
muenchen			1			1					1			1	6	3	1						1				1				2	2
newington						1			1		1																					
newport				1				2	4		2	6	2	11	17	1	1		3				4	1							6	13
oranienburg									2		3			1	1	1									1				1		3	3
panama				1		1				1	3							1														
paratyphi B				2								3			6										3		1					
reading				6														1											2			
saint-paul				1		1		3	6	11	9	7		16	3	5	1		2						4		1		2		6	3
san-diego						2					1			2	4												1		1		5	
schwarzengrund								1	2																							
senftenberg				2					1	3	4			1	2										1							1
tennessee														1																		
thompson				6		1		2	2	1	2			5	3	2	2								3		3	1	2		1	7
typhi					1	1	1		4				1	2	1	3							2						4		2	1
typhimurium				19	3	14	4	6	17	9	22	8	6	51	13	21	11	3	17	4	1		19	3	15	1	12		13		18	19
typhimurium v cop				1		7				1					2																	
weltevreden																																
worthington													2	1																		
TOTAL	1	—	2	76	7	49	5	33	92	67	116	40	14	173	92	53	30	8	46	4	1	—	36	9	57	2	36	2	44	—	75	99
ALL OTHER*	—	9	—	3	—	1	32	3	7	3	3	—	—	6	5	5	—	—	5	—	—	3	1	—	11	10	2	—	5	8	11	4
TOTAL	1	9	2	79	7	50	37	36	99	70	119	40	14	179	97	58	30	8	51	4	1	3	37	9	68	12	38	2	49	8	86	103

Note: NYA – New York, Albany; NYB – Beth Israel Hospital; NYC – New York City. Beth Israel Hospital laboratory is a reference laboratory and this month serotyped a total of 68 cultures.

* See Table II.

TABLE I – Continued

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	1		1									1	1	1		3	25	1.2	260	1.1	*anatum*
				1																	1	0.0	72	0.3	*bareilly*
		3					3				3							6		2	49	2.3	652	2.7	*blockley*
																					10	0.5	91	0.4	*braenderup*
											1							1		8	21	1.0	196	0.8	*bredeney*
		1											2					1	1		13	0.6	88	0.4	*chester*
		2																			3	0.1	24	0.1	*cholerae-suis v kun*
	3	2				2	1						2								40	1.9	167	0.7	*cubana*
					1		1											2		8	51	2.4	490	2.0	*derby*
	2	1	4		1	2	5		3		1		1	1		4	2	10		1	203	9.4	2500	10.3	*enteritidis*
					2												1	1			9	0.4	83	0.3	*give*
	2				1	1	3	2			5		3			1	1	21		3	126	5.8	1690	7.0	*heidelberg*
	2																				9	0.4	107	0.4	*indiana*
	1	7			9		7				2		4					12		9	115	5.3	1211	5.0	*infantis*
1	2				3						1						1	12		1	65	3.0	456	1.9	*java*
	1	1		2	7	1	10						1					2			55	2.5	418	1.7	*javiana*
					3		1											1			13	0.6	182	0.8	*litchfield*
																		1			1	0.0	30	0.1	*livingstone*
		1																4		3	27	1.3	337	1.4	*manhattan*
																					13	0.6	71	0.3	*miami*
					1																2	0.1	65	0.3	*mississippi*
		1					2						3					2			23	1.1	394	1.6	*montevideo*
	1												1					3			25	1.2	276	1.1	*muenchen*
																					3	0.1	48	0.2	*newington*
		2	1	2	6		20				1		3			1		22		3	135	6.3	1693	7.0	*newport*
		1			3		2						1			1		3		1	28	1.3	398	1.6	*oranienburg*
7		1			3		5											2		2	27	1.3	237	1.0	*panama*
							2									1				1	19	0.9	205	0.8	*paratyphi B*
											1		3			2	5	2			22	1.0	146	0.6	*reading*
					2		3										2	7		1	96	4.4	1155	4.8	*saint-paul*
		1																5			22	1.0	235	1.0	*san-diego*
							1											1			5	0.2	56	0.2	*schwarzengrund*
											1		1				1	3			21	1.0	86	0.4	*senftenberg*
											2					1		1			5	0.2	54	0.2	*tennessee*
		1			5		1	2						1		2		8			63	2.9	946	3.9	*thompson*
3																	2	11	1	1	41	1.9	532	2.2	*typhi*
1	6	4	6		5	4	19	3	1		8		6	2			4	76		23	497	23.0	5637	23.3	*typhimurium*
					2												1				14	0.6	272	1.1	*typhimurium v cop*
																				7	7	0.3	104	0.4	*weltevreden*
						1					1							1		3	9	0.4	59	0.2	*worthington*
12	21	29	11	6	55	11	87	7	4	–	27	–	31	4	–	14	21	222	2	80	1913	88.6	21723	89.7	TOTAL
–	6	2	10	3	13	2	35	–	–	3	–	8	5	–	–	1	2	8	3	7	245		2500		ALL OTHER*
12	27	31	21	9	68	13	122	7	4	3	27	8	36	4	–	15	23	230	5	87	2158		24223		TOTAL

TABLE II. OTHER SALMONELLAE REPORTED FROM HUMAN SOURCES, DECEMBER, 1970

SEROTYPE	REPORTING CENTER																					
	ALA	ALK	ARI	ARK	CAL	CON	DC	FLA	GA	HAW	ILL	KAN	LA	MD	MAS	MIC	MIS	MO	NEB	NH	NJ	NM	NYA
abortus-bovis									2														
adelaide																							
akanji																							
albany									1	1				8									
atlanta									1														
berta			1					2					3		1								
bonariensis																							
california			1						1														
cerro					2						1			1									
cholerae-suis																							
clifton																							
colorado										1													
dublin					1																		
duesseldorf																							
edinburg	1																						
eimsbuettel													3										
gaminara													1										
habana																1							
hamburg																							
hartford								1															
ibadan				1																			
inverness											1												
irumu																		2					
johannesburg			1								1												
kentucky					1				2		1		2										
kottbus														1									
lexington																							
loma-linda					1																		
lomita										1			1										
london											1					1							
lovelace					1																		
manchester																							
meleagridis									1														
minnesota			1		1									1		1							
muenster						1																	
norwich													1			1		1			1		
ohio																							
ordonez									1														
oslo										2													
paratyphi C																							
pomona																1							
poona			1										1								1		
richmond																		1					
rubislaw				2																			
rutgers																		1					
san-juan										1													
saphra																							
siegburg											1										1		
stanley																							
taksony												1											
tallahassee								1															
uganda									2														
urbana					1																		
westhampton													1										
TOTAL	1	—	5	3	8	1	—	4	11	6	6	1	13	11	1	5	—	5	—	—	3	—	—
NOT TYPED*	1	3	—	—	—	—	10	—	—	1	—	—	—	—	2	—	10	—	3	9	—	8	32
TOTAL	**2**	**3**	**5**	**3**	**8**	**1**	**10**	**4**	**11**	**7**	**6**	**1**	**13**	**11**	**3**	**5**	**10**	**5**	**3**	**9**	**3**	**8**	**32**

*See Table V-A

TABLE II – Continued

REPORTING CENTER														TOTAL	CUMULATIVE TOTAL	SEROTYPE
NYB	NYC	NC	OKL	ORE	PA	SC	TEN	TEX	VA	WAS	WIS	WYO				
														2	2	*abortus-bovis*
								1						1	5	*adelaide*
								1						1	1	*akanji*
											1			11	30	*albany*
														1	17	*atlanta*
							1			1				9	70	*berta*
					1									1	1	*bonariensis*
														2	31	*california*
	1													4	22	*cerro*
														1	10	*cholerae-suis*
		1												1	1	*clifton*
														1	1	*colorado*
														1	8	*dublin*
								2						2	15	*duesseldorf*
														1	1	*edinburg*
		1												4	21	*eimsbuettel*
														1	17	*gaminara*
														1	6	*habana*
								1						1	1	*hamburg*
														1	24	*hartford*
														1	8	*ibadan*
														1	6	*inverness*
														2	10	*irumu*
														2	7	*johannesburg*
							1	2						9	54	*kentucky*
2	3	1							1					8	53	*kottbus*
		1												1	5	*lexington*
														1	4	*loma-linda*
								1						3	20	*lomita*
					1		1							4	27	*london*
								1						1	1	*lovelace*
														1	6	*manchester*
														1	26	*meleagridis*
	1	1												4	33	*minnesota*
														3	25	*muenster*
					1									4	21	*norwich*
							1							1	8	*ohio*
														2	12	*ordonez*
														2	27	*oslo*
								1						1	2	*paratyphi C*
								1						1	3	*pomona*
														4	93	*poona*
														1	3	*richmond*
								2						4	27	*rubislaw*
														1	2	*rutgers*
								1						1	2	*san-juan*
								5						1	15	*saphra*
											1			7	55	*siegburg*
														1	13	*stanley*
														1	4	*taksony*
														1	8	*tallahassee*
1							2	1	1					2	4	*uganda*
														6	58	*urbana*
														1	2	*westhampton*
3	5	5	–	–	3	–	6	20	2	1	2	–		131	1166	TOTAL
–	2	–	2	2	–	8	–	15	–	–	3	3		114	1334	NOT TYPED *
3	**7**	**5**	**2**	**2**	**3**	**8**	**6**	**35**	**2**	**1**	**5**	**3**		**245**	**2500**	**TOTAL**

Cumulative Totals include isolations of all serotypes (except those listed in Table I) reported this year.

TABLE III. COMMON SALMONELLAE REPORTED FROM NONHUMAN SOURCES, DECEMBER, 1970

SEROTYPE	DOMESTIC ANIMALS AND THEIR ENVIRONMENT							ANIMAL FEEDS			
	CHICKENS	TURKEYS	SWINE	CATTLE	HORSES	OTHER	SUBTOTAL	TANKAGE	VEGETABLE PROTEIN	OTHER	SUBTOTAL
anatum	2	6	1	1		1	11	7			7
bareilly							—				—
blockley	13	4				1	18				—
braenderup							—				—
bredeney		4					4			1	1
chester		1		1			2				—
cholerae-suis v kun			24				24				—
cubana							—	7			7
derby		3	3				6	1		2	3
enteritidis	6	1	1	1			9				—
give		1					1				—
heidelberg	5	38		2		3	48				—
indiana		1		1			2				—
infantis	23	11					34	2		3	5
java						1	1				—
javiana							—				—
litchfield	2						2				—
livingstone		1	6				7				—
manhattan	1		3				4				—
miami		1					1				—
mississippi							—				—
montevideo	8	4	1				13	6			6
muenchen	1						1				—
newington		1	1				2				—
newport	3	6	1	10	1		21	1			1
oranienburg	1						1	13		4	17
panama		1					1				—
paratyphi B							—				—
reading	1	33	1				35				—
saint-paul	10	33	2			1	46				—
san-diego		16					16				—
schwarzengrund		42					42	2		1	3
senftenberg	9	27					36	13		4	17
tennessee	1						1	7		1	8
thompson	11		1			1	13				—
typhi							—				—
typhimurium	16	28	6	59	6	21	136			1	1
typhimurium v cop	20			6	5	7	38				—
weltevreden							—				—
worthington	4	1					5	2			2
TOTAL	137	264	51	81	12	36	581	61	—	17	78
ALL OTHER*	35	18	7	11	1	6	78	34	—	17	51
TOTAL	**172**	**282**	**58**	**92**	**13**	**42**	**659**	**95**	**—**	**34**	**129**

* See Table IV

TABLE III – Continued

WILD ANIMALS AND BIRDS	REPTILES AND ENVIRONMENT	HUMAN DIETARY ITEMS						MISCELLANEOUS	TOTAL	CUMULATIVE TOTAL	SEROTYPE
		EGGS AND PRODUCTS	POULTRY	RED MEAT	DAIRY PRODUCTS	OTHER	SUBTOTAL				
		13		1			14		32	471	*anatum*
	1						–		1	40	*bareilly*
4			2			1	3	1	26	193	*blockley*
	3	3				1	4		7	34	*braenderup*
		1		1			2	3	10	129	*bredeney*
							–	4	6	54	*chester*
							–		24	298	*cholerae-suis v kun*
						1	1		8	143	*cubana*
						1	1	2	12	127	*derby*
1	1	1					1		12	142	*enteritidis*
				1			1		2	37	*give*
		2	12			2	16		64	805	*heidelberg*
							–		2	61	*indiana*
		4	1				5	2	46	394	*infantis*
3	5						–		9	40	*java*
	1						–		1	19	*javiana*
	5						–		7	22	*litchfield*
							–		7	63	*livingstone*
	2	2					2		8	46	*manhattan*
1							–		2	10	*miami*
							–		–	3	*mississippi*
	1	4				2	6		26	333	*montevideo*
1	3						–		5	54	*muenchen*
							–		2	28	*newington*
1	7						–	1	31	248	*newport*
	3	1				2	3		24	221	*oranienburg*
	1						–		2	11	*panama*
							–		–	2	*paratyphi B*
							–		35	106	*reading*
	4	1					1		51	502	*saint-paul*
							–		16	211	*san-diego*
						2	2	1	48	185	*schwarzengrund*
		1				1	2		55	318	*senftenberg*
	2						–	1	12	266	*tennessee*
1		19					19	8	41	317	*thompson*
							–		–	–	*typhi*
4	3	2		1		1	4	3	151	1374	*typhimurium*
1							–		39	242	*typhimurium v cop*
							–		–	2	*weltevreden*
							–		7	232	*worthington*
17	42	54	15	4	–	14	87	26	831	7783	TOTAL
7	21	22	–	–	–	12	34	7	198	1763	ALL OTHER*
24	**63**	**76**	**15**	**4**	**–**	**26**	**121**	**33**	**1029**	**9546**	**TOTAL**

TABLE IV. OTHER SALMONELLAE REPORTED FROM NONHUMAN SOURCES, DECEMBER, 1970

SEROTYPE	DOMESTIC ANIMALS AND THEIR ENVIRONMENT							ANIMAL FEEDS			
	CHICKENS	TURKEYS	SWINE	CATTLE	HORSES	OTHER	SUBTOTAL	TANKAGE	VEGETABLE PROTEIN	OTHER	SUBTOTAL
agona		1					1				–
alachua						1	1				–
albany	1	1					2				–
amager	2						2				–
berta	1						1				–
binza	1	1					2	3			3
bornum							–	4			4
california	1		1				2	2		1	3
carrau							–				–
cerro							–	1		1	2
cholerae-suis			5				5				–
drypool		1					1				–
dublin	1			11		1	13				–
duesseldorf		1					1				–
eimsbuettel	3	5					8	4		6	10
gallinarum		1					1				–
gaminara							–				–
habana							–	2			2
haddon							–	1			1
halmstad							–				–
hartford							–				–
illinois		1					1				–
johannesburg							–	1			1
kentucky	3	1					4	1			1
kottbus	4		1				5				–
lexington	1						1				–
london							–				–
manila							–	1		1	2
meleagridis							–	1			1
minneapolis							–			1	1
minnesota							–	3		1	4
molade							–				–
muenster	2					1	3				–
new-brunswick							–				–
norwich					1		1				–
ohio							–				–
ordonez						1	1				–
poona							–				–
pullorum	5						5				–
rubislaw		1					1				–
siegburg							–	8			8
simsbury	6						6				–
taksony						1	1	1			1
thomasville							–			6	6
urbana							–				–
TOTAL	31	14	7	11	1	5	69	33	–	17	50
NOT TYPED*	4	4	–	–	–	1	9	1	–	–	1
TOTAL	**35**	**18**	**7**	**11**	**1**	**6**	**78**	**34**	**–**	**17**	**51**

*See Table V-B

TABLE IV – Continued

WILD ANIMALS AND BIRDS	REPTILES AND ENVIRONMENT	HUMAN DIETARY ITEMS						MISCELLANEOUS	TOTAL	CUMULATIVE TOTAL	SEROTYPE
		EGGS AND PRODUCTS	POULTRY	RED MEAT	DAIRY PRODUCTS	OTHER	SUBTOTAL				
							–		1	5	*agona*
							–	1	2	22	*alachua*
							–		2	20	*albany*
							–		2	3	*amager*
	1						–		2	20	*berta*
							–		5	66	*binza*
							–		4	16	*bornum*
							–		5	41	*california*
1							–		1	13	*carrau*
		19				8	27		29	72	*cerro*
							–		5	23	*cholerae-suis*
							–		1	69	*drypool*
							–		13	92	*dublin*
							–		1	2	*duesseldorf*
							–		18	239	*eimsbuettel*
							–		1	7	*gallinarum*
1							–		1	1	*gaminara*
							–		2	9	*habana*
							–		1	1	*haddon*
						1	1		1	2	*halmstad*
2							–		2	14	*hartford*
							–		1	10	*illinois*
		1				1	2		3	20	*johannesburg*
		1					1		6	91	*kentucky*
							–		5	8	*kottbus*
							–		1	16	*lexington*
							–	1	1	7	*london*
							–		2	9	*manila*
							–		1	36	*meleagridis*
							–		1	4	*minneapolis*
							–		4	104	*minnesota*
1							–		1	1	*molade*
							–		3	31	*muenster*
							–	2	2	3	*new-brunswick*
							–		1	2	*norwich*
						2	2		2	22	*ohio*
							–		1	1	*ordonez*
2	8						–		10	24	*poona*
							–		5	59	*pullorum*
	3						–		4	13	*rubislaw*
							–		8	78	*siegburg*
							–		6	51	*simsbury*
							–		2	30	*taksony*
		1					1		7	76	*thomasville*
	5						–		5	33	*urbana*
7	17	22	–	–	–	12	34	4	181	1596	TOTAL
–	4	–	–	–	–	–	–	3	17	167	NOT TYPED*
7	**21**	**22**	**–**	**–**	**–**	**12**	**34**	**7**	**198**	**1763**	**TOTAL**

TABLE V. SALMONELLAE REPORTED BY GROUP IDENTIFICATION ONLY, DECEMBER, 1970

A. HUMAN SOURCES

REPORTING CENTER	GROUP														TOTAL
	B	C		C1	C2		D	E		E1	G		H	I	UNK	
ALABAMA															1	1
ALASKA	2			1												3
D.C.	8				1		1									10
HAWAII															1	1
MASSACHUSETTS													1		1	2
MISSISSIPPI	4	1			1		1	1			1				1	10
NEBRASKA	2						1									3
NEW HAMPSHIRE	2			2			2	2							1	9
NEW MEXICO	4			2	1		1									8
NEW YORK–A															32	32
NEW YORK–C		1		1												2
OKLAHOMA															2	2
OREGON				1											1	2
SOUTH CAROLINA	2				1										5	8
TEXAS	2			1	3		2	1			2				4	15
WISCONSIN	2														1	3
WYOMING															3	3
TOTAL	**28**	**2**		**8**	**7**		**8**	**4**		**–**	**3**		**1**	**–**	**53**	**114**

B. NONHUMAN SOURCES

SOURCES	GROUP														TOTAL
	B	C		C1	C2		D	E		E1	G		H	I	UNK	
DOMESTIC ANIMALS AND THEIR ENVIRONMENT	3									2					4	9
ANIMAL FEEDS															1	1
WILD ANIMALS AND BIRDS																–
REPTILES AND ENVIRONMENT	1													3		4
HUMAN DIETARY ITEMS																–
MISCELLANEOUS				1			1	1								3
TOTAL	**4**	**–**		**1**	**–**		**1**	**1**		**2**	**–**		**–**	**3**	**5**	**17**

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Key to all disease surveillance activities are the physicians who serve as State epidemiologists. They are responsible for collecting, interpreting, and transmitting data and epidemiological 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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