REPORT NO. 71
April 25, 1968

NATIONAL
COMMUNICABLE DISEASE CENTER

SALMONELLA

SURVEILLANCE

CONTENTS. . .

FOR THE MONTH OF FEBRUARY 1968

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE/PUBLIC HEALTH SERVICE
Bureau of Disease Prevention and Environmental Control

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

National Communicable Disease Center, Atlanta, Georgia 30333

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I. SUMMARY

This issue of the Salmonella Surveillance Report includes reports of three outbreaks, a preliminary study of salmonella contamination in broilers, a survey of dry milk plants, and a study of salmonellae in further processed turkey products.

In February 1968, 1,161 isolations of salmonellae were reported from humans, an average of 290 isolations per week (Tables I, II, and V-A). This number represents an increase of 18 (6.6 percent) over the weekly average of January 1968 and a decrease of 6 (2.0 percent) from the weekly average of February 1967.

Reports of 1,036 nonhuman isolations of salmonellae were received during February, an increase of 457 (78.9 percent) over January 1968 (Tables III, IV, and V-B). The marked increase in nonhuman isolations represents reports from January received too late to be included in the January issue.

II. REPORTS OF ISOLATIONS

The ten most frequently reported serotypes during February:

HUMAN				NONHUMAN		
Serotype	Number	Percent	Rank Last Month	Serotype	Number	Percent
typhi-murium*	308	26.5	1	anatum	118	11.4
saint-paul	99	8.5	3	typhi-murium*	102	9.8
heidelberg	85	7.3	2	cubana	67	6.5
enteritidis	73	6.3	6	saint-paul	60	5.8
infantis	69	5.9	4	montevideo	57	5.5
newport	60	5.2	5	heidelberg	50	4.8
derby	49	4.2	7	senftenberg	36	3.5
typhi	37	3.2	8	eimsbuettel	34	3.3
thompson	28	2.4	10	kentucky	33	3.2
oranienburg	26	2.2	> 10	newport	28	2.7
				oranienburg	28	2.7
Total	815	70.2		Total	597	57.6
TOTAL (all serotypes)	1161			TOTAL (all serotypes)	1036	
*including var. copenhagen	19	1.6		*including var. copenhagen	16	1.5

III. CURRENT INVESTIGATIONS

An Outbreak of Salmonellosis in a PHS Indian Hospital

Reported by Logan H. Roots, M.D., EIS Officer assigned to the New Mexico Department of Public Health, and Kenneth E. Quickel, Jr., M.D., Bacterial Diseases Section, Epidemiology Program, NCDC.

An increase in isolations of group B salmonella was reported from San Juan County, New Mexico, during August, September, and October 1967. Isolations were predominantly from pediatric patients at a Public Health Service Indian Hospital in Shiprock, New Mexico. The hospital, located on a large Navajo Indian reservation, contains 75 beds in four wards, including a 20-bed communicable disease ward, a pediatric ward, an adult medical-surgical ward, and a maternity ward.

Twenty-seven documented cases of group B salmonella infection occurred between January and October 1967 at the hospital. During this same period in 1966, only 5 isolations had been reported; no increase in isolates of other salmonella serotypes had been reported in 1967. The following criteria were used to classify the relation of these cases to hospitalization: 1) definitely hospital-acquired (DHA) -- first positive culture obtained more than 5 days after admission and after two or more negative cultures; 2) probably hospital-acquired (PHA) -- first positive culture obtained more than 5 days after admission and after one negative culture, or the first positive culture obtained from a patient who developed gastroenteritis after 5 days of hospitalization with no prior cultures; 3) community-acquired -- first positive culture obtained within 3 days of admission; 4) unknown.

Using these criteria, 16 cases were classified as hospital-acquired (11 DHA, 5 PHA), representing 0.6 percent of the 2,692 patients hospitalized between January and October. Of the remaining cases, 7 were classified as community-acquired and 4 as unknown. Of the hospital-acquired cases, 15 were 2 years of age or less and 1 was 16 years old. Thirteen hospital-acquired infections occurred on the communicable diseases ward, 2 on the pediatric ward, and 1 on the adult medical-surgical ward. No cases occurred in the obstetrical unit.

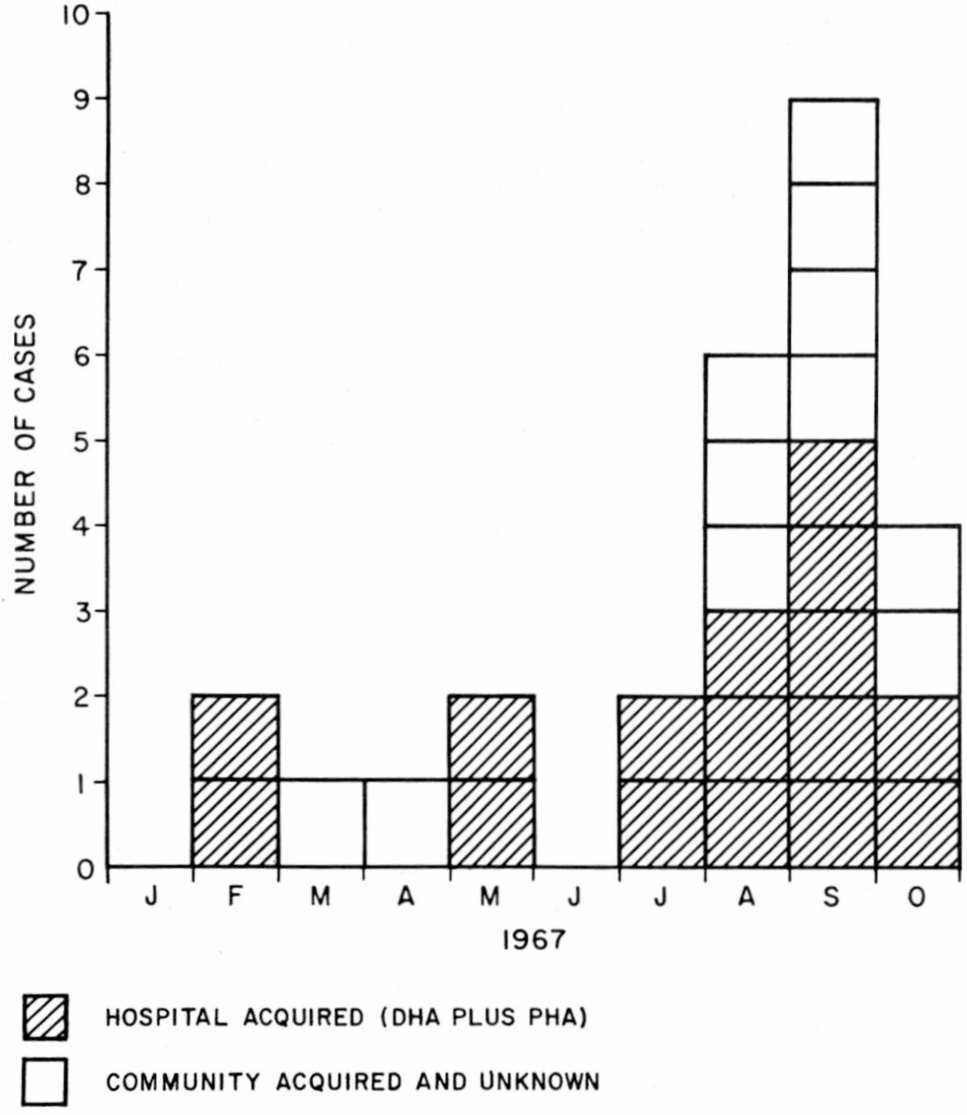
Salmonella infections were most frequently characterized by febrile gastroenteritis; however, 14 of the 16 hospital-acquired cases were admitted with gastroenteritis of other etiology, so that it was not always possible to determine the role that the salmonella infection later played in the patients' symptoms. Five cases were probably asymptomatic. The only fatal case occurred in a 4-month-old female admitted with gastroenteritis probably due to enteropathogenic Escherichia coli who later developed salmonella pneumonia and meningitis.

The first reported case occurred in February 1967, and further cases occurred sporadically. Twenty of the 27 cases occurred from August to October (see figure). No common vehicle, such as medications, food, or environmental factors, could be implicated as the source of the outbreak, and cross-infection seemed to be the most likely mode of spread.

The communicable diseases ward was overcrowded during the summer months, and isolation of patients with gastroenteritis was difficult. Patients who were not thought to be infectious were sometimes transferred to the pediatric ward. Although each room had hand-washing facilities, hand-washing was not always observed. A single examining room was available for patients on both the pediatric and communicable diseases ward, and all initial examinations and minor procedures were performed in this room. In a search for a possible carrier among the hospital personnel, a culture survey was performed. All who were cultured were negative.

Figure 1.

SALMONELLA GROUP B INFECTIONS
PHS INDIAN HOSPITAL, SHIPROCK, N. MEX.
JANUARY 1967 — OCTOBER 1967



Laboratory Investigation

Although salmonella group B was isolated from all 27 cases, only 16 of the original isolates were available for further serotyping and antibiograms. All these isolates were from cases occurring in August, September, and October. Of these, 13 were Salmonella typhi-murium var. copenhagen, and 3 were S. typhi-murium. Antibiograms revealed that the S. typhi-murium isolates were all susceptible to all antibiotics tested and that the S. typhi-murium var. copenhagen isolates were all resistant to sulfathiazole, streptomycin, ampicillin, and cephalothin. Both of these serotypes were isolated from patients hospitalized on the communicable diseases ward, and each serotype was isolated from cases of both hospital- and community-acquired illness.

Discussion

The epidemic pattern of this hospital-acquired outbreak of salmonellosis was that of a contact-spread outbreak. Cases occurred sporadically over a long period of time, and no common vehicle could be implicated. Since no carrier among the staff was identified, the patient population itself was the most likely source of salmonella infection. Both serotypes were isolated from patients with hospital- and community-acquired illnesses, suggesting that community-acquired cases may have introduced these strains. Many opportunities for spread of infections within the hospital were present: overcrowding, understaffing, and lack of sufficient facilities for adequate isolation of patients with communicable diseases. In an attempt to control the outbreak, the following measures were discussed: 1) improvement of aseptic techniques and isolation of infected patients, 2) isolation of all patients admitted with diarrhea until the etiology of the diarrhea is defined, 3) discharge of patients with salmonellosis as soon as medically indicated. However, cases have continued to occur, and further investigation is planned.

IV. REPORTS FROM THE STATES

A. WASHINGTON

Salmonella a Go-Go

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

In November 1967, an outbreak of salmonellosis involving 39 of 55 persons occurred following a Thanksgiving banquet given for employees, guests, and "go-go" dancers at a Seattle, Washington, restaurant. Onset of illness ranged from 9 to 73 hours after the meal, with a median of 41 hours. Predominant symptoms included diarrhea, cramps, vomiting, headache, fever, and chills. Illness lasted from 2 to 7 days, and no hospitalizations or deaths were reported. Salmonella saint-paul was recovered in stool cultures from 11 persons.

Food histories, obtained from 21 of the 55 persons who consumed the Thanksgiving Day meal, implicated turkey as the vehicle of infection. The turkeys were U.S. Department of Agriculture inspected grade A young turkeys obtained by the restaurant owner from a packer in Oregon. Five of them, weighing 27 to 28 pounds each, were stuffed and cooked in the restuarant kitchen at 400° F for 3 to 5 hours. A review of cooking time and temperatures indicated that the turkeys had been inadequately cooked, and several patients complained that the turkey meat on their plates appeared pink and rare. Unfortunately, samples of the turkey meat served were not available for laboratory examination. An uncooked turkey from the same lot stored in the restaurant freezer

was obtained for culture and was negative for salmonellae. Two employees involved in preparation of the turkey who had also consumed the meat had positive stool cultures for S. saint-paul, although they denied symptoms of gastroenteritis.

B. KENTUCKY

An Outbreak of Salmonellosis due to Smoked Ham

Reported by Calixto Hernandez, M.D., Director, Division of Epidemiology, Joseph Skaggs, D.V.M., Division of Epidemiology, and Joel Nitzkin, M.D., EIS Officer, Kentucky State Department of Health, and Mr. W. R. Sills, Administrative Assistant, Mason County Health Department.

In January 1968, an outbreak of febrile gastroenteritis involved 37 of 55 individuals who attended two banquets at a restaurant in Kentucky. On January 17, 12 of 17 became ill with symptoms of diarrhea, abdominal cramps, fever, chills, vomiting, and headache following a dinner meeting. On the next evening, following another banquet in the same restaurant, 25 of 38 became ill with similar symptoms. Onset of symptoms for the two groups ranged from 9 to 42 hours after the suspect meals, with a median onset of approximately 20 hours. Ten persons from the two groups were hospitalized as a result of the outbreak, with an average duration of hospitalization of 5.5 days. No deaths were reported. Stool cultures from 9 of 11 people who had been ill after the two banquets yielded Salmonella infantis.

Food items served at the two banquets were identical and included smoked ham, potatoes, peas, beans, cornbread, rolls, a salad, and cake. Since almost everyone had consumed all items on the menu, no single item could be implicated from food histories as the vehicle of infection. Samples of food served on January 18 were obtained for culture, and the ham was positive for S. infantis. An investigation of the manner of preparation of the ham was then undertaken.

The two hams served at the banquets were from the same packer and were labeled "ready-to-eat." However, according to directions on the label, the smoked hams, weighing 15-20 pounds, required 4-5 hours cooking at 300°. The ham served on January 17 had been cooked on January 11 for only 3 hours. After cooking, it was permitted to cool to room temperature before being refrigerated. Slices of this ham were served on several occasions prior to the banquet, but no other illness had been reported. The hams served on January 18 had been cooked in the same manner on January 15. Several other hams from this packer were obtained for culture and were negative for salmonellae. Environmental cultures from the kitchen area and stool specimens from all six restaurant employees were also negative for salmonellae. In reviewing restaurant practices, it was found that the hams had been sliced in the same area of the kitchen that raw poultry was handled.

EDITOR'S COMMENT: Ham has been reported only rarely as a source of infection in salmonella food poisoning. In 1961, Angelotti reported an outbreak of gastroenteritis due to S. infantis in which smoked ham was the vehicle of infection[1]. In 1962, VanHook reported an outbreak due to S. newport in which barbecued ham was the vehicle[2]. During the past 6 years, no further outbreaks related to ham have been reported to the Salmonellosis Unit. In the outbreak above, smoked ham was again a vehicle of infection, but how the ham became contaminated is not clear. Since several hams from the same packer were negative for salmonella, it is possible that contamination occurred within the restaurant. Although environmental samples from the kitchen area were negative for salmonellae, the hams were sliced in the same area of the kitchen where raw poultry was handled, and it is quite possible that hams became contaminated from this source. Another possibility to explain contamination would be from a carrier among the food handlers. However, no carrier could be identified in a stool culture survey.

References

1. Angelotti, R., Bailey, G. C., Foter, J., and Lewis, K. H.: Salmonella infantis isolated from ham in food poisoning incidence. Public Health Rep. 76:771-776, 1961.
2. VanHook, P.: Food poisoning following a Sunday school picnic. Salmonella Surveillance Report No. 6. Atlanta, Georgia, September 1962, p. 20.

V. SPECIAL REPORTS

A. Phage Types of Salmonella typhi-murium Isolated from Animals and Man

Reported by Kenneth W. Newell, M.D., WHO, Geneva; E. S. Anderson, M.D., Central Public Health Laboratory, London, England; and John B. Vaughn, D.V.M., Leslie P. Williams, Jr., D.V.M., Harry L. Helsdon, B.S., and Catherine A. Taylor, M.P.H., Department of Epidemiology, School of Public Health and Tropical Medicine, Tulane University, New Orleans, Louisiana.

Phage typing is a useful method for further identifying strains of Salmonella typhi-murium and a valuable epidemiologic marker in investigating outbreaks due to this organism. The authors phage typed strains of S. typhi-murium isolated from humans in Texas and Louisiana and strains from animals in 31 states. The results of this study are presented in the table below. A total of 85 different phage types were isolated from humans and 121 from animals. The 5 most common isolated from humans represented 48.5 percent of all strains studied, the 5 most common from animals, 55.0 percent. The close interrelationship between human and animal cases is demonstrated by the fact that the 4 phage types most frequently isolated from animals were also among the 5 most frequently isolated from man. Phage type 49 was most frequently isolated from both man and animals. (See table on page 7)

B. U.S. Food and Drug Administration Recall of Products Contaminated with Salmonellae, January 9 to March 18, 1968.

From January 9 to March 18, 1968, ten products were recalled by the U.S. Food and Drug Administration because of salmonella contamination. These products, including foods, animal feed, and drugs, are summarized in the table on page 8.

C. Recent Articles on Salmonellosis

A bibliography of recent articles on salmonellosis of interest both to public health workers and the food industry will be published at regular intervals in the Salmonella Surveillance Report. The bibliography is obtained by reviewing Current Contents (Life Sciences), a weekly journal listing table of contents of foreign and domestic scientific journals, and from other sources. The following articles and a book on Salmonellosis have been published within the last several months.

1. Allred, J. N., Walker, J. W., Beal, V. C., Jr., and Germaine, F. W.: A survey to determine the salmonella contamination rate in livestock and poultry feeds. J. Amer. Vet. Med. Ass. 151:1857-1861, 1967.

2. Bryan, F. L., Ayres, J. C., and Kraft, A. C.: Salmonellae associated with further processed turkey products. Appl. Microbiol. 16:1-9, 1968.

3. Heard, T. W., Jennett, N. E., Linton, A. H.: The control and eradication of salmonellosis in a closed pig herd. Vet. Record 82:92-99, 1968.

(continued on page 9)

Phage Types of Salmonella typhi-murium Isolated from Animals and Man

Rank	Man			All Animals			Bovine		Chicken		Turkey	
	Phage Type	No. Isolations	Percent Total	Phage Type	No. Isolations	Percent Total	Phage Type	No. Isolations	Phage Type	No. Isolations	Phage Type	No. Isolations
1	49	249	16.3	49	219	33.5	49	123	49	27	6	22
2	2	222	14.6	2	49	7.5	6	11	2	14	49	12
3	12	112	7.3	6	47	7.2	2	9	74	12	2	9
4	6	103	6.8	10	24	3.7	12	5	17	12	10	9
5	10	53	3.5	17	21	3.2	124	5	10	8	3	4
Other phage types		640	42.0		226	34.6		25		45		22
Untypable		145	9.5		68	10.4		25		10		17
TOTAL		1,524			654			203		128		95

U.S. Food and Drug Administration Weekly Recall List, Summary of Products Contaminated with Salmonellae, Week Ending January 15 through Week Ending March 18, 1968

Week Ending	Name, Label, Form	Manufacturer, Distributor	Lot No.	Use	Depth of Recall	Product Distribution	Serotype
1/15	80% hydrolyzed feather meal	Triangle E By-Products Co.	entire shipment	animal feed	wholesale	W. Va.	S. manila S. eimsbuettel S. bredeney S. tennessee S. oranienburg S. new-brunswick S. cubana
	Triango-55% -- meat and feather meal -- and MSBH	Triangle E By-Products Co.	entire shipment	animal feed	wholesale	W. Va.	S. heidelberg S. anatum S. oranienburg S. montevideo S. binza S. bareilly S. georgia S. rubislaw S. infantis
1/29	egg white solids	Pillsbury Foods Co.	234-7 326-7	food	wholesale	Ohio	S. montevideo S. thompson
2/5	egg yolk solids	Nebraska Egg & Poultry Co.	DO-532 DO-533 DO-535 DO-536	food	wholesale	Iowa, Ind.	not typed
2/12	powdered pepsin	Cudahy Laboratories	1805 1808	over-the-counter drug	wholesale	Ill.	S. give S. poona
2/19	egg yolk solids, pasteurized	Mid-Central Egg Products Co., Inc.	188-7	food	wholesale	Neb.	S. infantis
	egg yolk, dry, pasteurized	Mid-Central Egg Products Co., Inc.	I, J, L, M, T	food	manufacturer, user	East Greenville, Pa.	not typed
	Mogold egg solids	Monarch Egg Corp.	10-8	food	manufacturer, user	Denison, Texas	not typed
3/1	Vet-Vi-Min	Bryant Pharmaceutical Corp.	7H107A 7J206 7J207	veterinary	veterinarians	Calif.	S. lexington S. worthington S. schwarzengrund S. heidelberg S. cubana S. cerro (or) S. siegburg

4. Kelterborn, E.: Salmonella Species. Dr. W. Junk, Publishers, The Hague, The Netherlands, 1967. This book is a 535-page reference book written principally in German and referencing each salmonella serotype alphabetically by place of initial isolation and number and source of isolations from various countries.

5. Prost, E., and Riemann, H.: Food-borne salmonellosis, in Annual Review of Microbiology, ed. by Clifton, E. Palo Alto, 1967, pp. 495-528.

6. Robertson, R. P., Wahab, M.F.A., and Raasch, F. O.: Chloramphenicol and ampicillin in salmonella enteric fever. New Engl. J. Med. 278:171-176, 1968.

VI. INTERNATIONAL

A. Salmonellosis in Australia - 1967

Reported by Dr. Kevin Anderson, Salmonella Reference Laboratory, Adelaide, South Australia.

In Australia during 1967, 1,800 salmonella isolates from all sources were submitted to the Salmonella Reference Laboratory for serotyping. The five most common serotypes, representing 50.8 percent of total isolations are listed below.

Rank	Serotype	Number	Percent
1	S. typhi-murium	563	31.2
2	S. havana	116	6.4
3	S. oranienburg	83	4.6
4	S. chester	79	4.3
5	S. senftenberg	79	4.3

B. Salmonellosis in France - 1967

Reported by Drs. L. and S. LeMinor, Institut Pasteur, Paris, France.

Serotyping of salmonellae isolated in France is performed by the Institut Pasteur. The five most common serotypes from human and nonhuman sources in 1967 are listed below.

Human			Nonhuman		
Serotype	Number	Rank	Serotype	Number	Rank
S. panama	729	1	S. gallinarum-pullorum	94	1
S. typhi-murium	287	2	S. panama	79	2
S. oranienburg	119	3	S. typhi-murium	56	3
S. brandenburg	114	4	S. paratyphi B	31	4
S. typhi	67	5	S. newport	31	4

VII. FOOD AND FEED SURVEILLANCE

A. Sources of Salmonella Contamination in Broilers -- A Preliminary Report

Reported by George K. Morris, Ph.D., Carolyn Dunn, B.S., and Joy Wells, B.S., Epidemiological Services Laboratory Section, Epidemiology Program, NCDC.

The Epidemiological Services Laboratory Section of the Epidemiology Program, NCDC, and a large poultry concern have undertaken a study of sources of salmonella contamination in broilers. In the initial stage of this study, eight breeder flocks were examined. Fifty fecal swabs and three feed samples were cultured from each of the flocks. The results of these cultures are presented in the table below. Of a total of 402 fecal swabs, 31 (7.7 percent) were positive for salmonellae. Recovery from individual flocks ranged from 2.0 percent to 19.2 percent positive. Sixteen of the 24 feed samples were also positive.

A total of 13 different salmonella serotypes were isolated from the fecal swabs and 11 from the feed samples. Six serotypes were common to both sources. This correlation suggests the relationship between contaminated feeds and contamination in the flocks. Further studies to document spread of salmonellae from the breeder flock to the hatchery and to the broilers are now in progress.

Summary of Survey of Breeder Flocks

Source of Specimen	No. of Samples	No. Positive	Percent Positive	Serotype
Feces	402	31	7.7	S. heidelberg S. eimsbuettel S. montevideo S. oranienburg S. senftenberg S. thomasville S. anatum S. bredeney S. cerro S. poona S. saint-paul S. thompson E_2:neg
Feed	24	16	66.7	S. cerro S. oranienburg S. manila S. montevideo S. poona S. tennessee S. anatum S. cubana S. eimsbuettel S. minnesota S. lexington

B. Salmonella Surveillance Program of Dry Milk Plants

Reported by Mr. Harold E. Meister, Chief, Inspection and Grading Branch, U.S. Department of Agriculture.

The U.S. Department of Agriculture tested product and environmental samples from approximately 250 dry milk plants in 19 states during 1967 for the presence of salmonellae. The results of these tests are listed below. Of 12,047 product samples tested, 58 (0.5 percent) were positive for salmonellae and of 2,798 environmental samples, 209 (7.5 percent) were positive. A total of 28 difference serotypes were isolated.

Salmonella Surveillance of Dry Milk Plants

	Product Samples			Environmental Samples		
Month	No. Tested	No. Positive	Percent Positive	No. Tested	No. Positive	Percent Positive
January	567	5	0.9	177	17	9.6
February	480	7	1.5	364	27	7.4
March	823	8	1.0	166	22	13.2
April	824	7	0.8	341	25	7.3
May	1,021	2	0.2	247	15	6.1
June	800	2	0.2	170	15	8.8
July	1,536	2	0.1	218	12	5.5
August	2,468	7	0.3	348	16	4.6
September	961	6	0.6	182	13	7.1
October	1,218	9	0.7	301	29	9.6
November	643	0	0.0	150	6	4.0
December	706	3	0.4	134	12	9.0
	12,047	58	0.5	2,798	209	7.5

EDITOR'S COMMENT: The results obtained in this surveillance program for the first 6 months of 1967 were summarized previously in the Salmonella Surveillance Report No. 63. However, not all products sampled were included in this summary, resulting in a slightly higher incidence of positive samples than was actually found. The present report is a complete summary of the data for the entire year. These results show a reduction in product contamination compared with results for the last 9 months of 1966 (SSR #57). During that period, 1.0 percent of the 4,413 products tested and 4.6 percent of the 1,471 environmental samples tested were positive.

C. Salmonellae Associated with Further-Processed Turkey Products

Verbatim abstract of an article by Frank L. Bryan, John C. Ayres, and Allen A. Kraft published in Applied Microbiology, 16:1-9, January 1968.

"'Further-processed' turkey products, prepared from chilled, eviscerated, and thawed carcasses at two commercial turkey-processing plants, were evaluated for the presence of salmonellae. These organisms were isolated from swab samples from 12% of chilled, eviscerated turkey carcasses, 27% of finished products, and 24% of processing equipment. The same serotypes as those found throughout a plant on any one visit were recovered from 31% of rinse-samples taken from hands and gloves of processing personnel.

Salmonellae were found in samples taken on 37 of 48 visits; a greater number of recoveries were made on days when freshly killed turkeys were processed (87%) than when frozen-defrosted carcasses were processed (59%). The predominant serotype isolated from meat and environment usually changed from visit to visit. Salmonella san-diego and S. anatum were the most frequent among 23 serotypes recovered. Most of the isolated serotypes are commonly associated with turkeys and have been incriminated as causative agents of human salmonellosis. The implication is that further-processed turkey products, if inadequately cooked by the consumer and if improperly refrigerated between the time of manufacture and consumption, could directly transmit salmonellae. These same products might also contaminate other foods by introducing salmonellae into food-preparation areas."

TABLE I. COMMON SALMONELLAE REPORTED FROM HUMAN SOURCES, FEBRUARY 1968

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											1	1			1	1												1		2	3
bareilly										1		2		1			1														
blockley				1		2				1	5	2		5				1							2						1
braenderup				1							1																	1			1
bredeney				1				1			3	2		1																	
chester																															
cholerae-suis v kun																											1				
cubana						1					1																				
derby				1				1	1	22	1	3		4	4	2									1					2	
enteritidis	1			4		2		2	1	5	16	6	2	10	7	2									2	1	1		4		4	2
give																1														1	
heidelberg				4				3	3	1	14	6	8	7	1				2				1	1	5		1		1		3	1
indiana						1					3				1										1						
infantis				2		2				1	6	4	2	4	2	2			3				3						2	4	6
java				2					4				1	2			1												2		4
javiana													9																		1
litchfield														2	1												1				1
livingstone				1								1																			
manhattan									2		1	1		1																	3
miami																														2	7
mississippi																															
montevideo								1	1		2																1			1	3
muenchen										1				1					1						1						1
newington														1																2	
newport								2	3	1		4	1	2	4	4	2										2		1		3	8
oranienburg						1				1		1				9			1												
panama									1	1															1						
paratyphi B								1				3		1											1						
reading																															
saint-paul						2		3	3	4	4	11		3	13	5	2		1				5		6				1		3	3
san-diego								1			5																				1
schwarzengrund																															
senftenberg																															
tennessee				1							1	1		1																	
thompson				1				3		6	2	4			1	1					1				2		2		2		
typhi				1		1					1	5		1					2						1		1		3		2	3
typhimurium		2		24			2	6	12	10	12	5	3	27	11	11	3	2	13				8	3	3	3	2	1	4		5	6
typhimurium v cop				2						2					3																
weltevreden																															
worthington														2																	
TOTAL	1	2	–	46	–	12	2	24	31	57	79	62	26	76	49	38	9	3	23	–	1	–	17	4	26	4	12	1	22	–	34	55
ALL OTHER*	–	3	–	2	–	–	18	1	1	–	1	1	–	6	3	–	–	1	–	3	–	–	1	1	–	11	3	–	2	–	–	8
TOTAL	**1**	**5**	**–**	**48**	**–**	**12**	**20**	**25**	**32**	**57**	**80**	**63**	**26**	**82**	**52**	**38**	**9**	**4**	**23**	**3**	**1**	**–**	**18**	**5**	**26**	**15**	**15**	**1**	**24**	**–**	**34**	**63**

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 66 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			12	1.0	35	1.4	*anatum*
																					5	0.4	10	0.4	*bareilly*
																	2	2			24	2.1	62	2.5	*blockley*
					1						1							1		1	8	0.7	21	0.8	*braenderup*
						1												1			10	0.9	20	0.8	*bredeney*
1									1												2	0.2	4	0.2	*chester*
																					1	0.1	5	0.2	*cholerae-suis v kun*
																					2	0.2	7	0.3	*cubana*
							2									1		2		2	49	4.2	89	3.5	*derby*
																		1			73	6.3	152	6.0	*enteritidis*
							1														3	0.3	9	0.4	*give*
3					5	1	3				2		1	3				4		1	85	7.3	181	7.2	*heidelberg*
																					6	0.5	7	0.3	*indiana*
3	2	3			1	1	2	2			1					1		6		4	69	5.9	155	6.1	*infantis*
				1														2			19	1.6	32	1.3	*java*
							2											2			14	1.2	35	1.4	*javiana*
																					5	0.4	10	0.4	*litchfield*
																		1			3	0.3	7	0.3	*livingstone*
																		1		2	11	0.9	22	0.9	*manhattan*
																					9	0.8	17	0.7	*miami*
					1																1	0.1	3	0.1	*mississippi*
					2													1			12	1.0	30	1.2	*montevideo*
																1		3			9	0.8	25	1.0	*muenchen*
																		3			6	0.5	8	0.3	*newington*
		3		1	1	2	1						1			1		6		7	60	5.2	142	5.6	*newport*
					1		8						2			1		1			26	2.2	54	2.1	*oranienburg*
	1	1					1						1			1		2		3	13	1.1	39	1.5	*panama*
							2									2					10	0.9	18	0.7	*paratyphi B*
		1																1			2	0.2	7	0.3	*reading*
		2			1					1				1		20		2		3	99	8.5	189	7.5	*saint-paul*
																		2			9	0.8	20	0.8	*san-diego*
						1			1											1	3	0.3	6	0.2	*schwarzengrund*
																		1			1	0.1	2	0.1	*senftenberg*
					1																5	0.4	9	0.4	*tennessee*
		1			1													1			28	2.4	63	2.5	*thompson*
1	1			2	1	3	2										1	5			37	3.2	77	3.1	*typhi*
2	2	2			6	2	15	2			4		2			17	4	47	2	4	289	24.9	661	26.2	*typhimurium*
				1	10				1												19	1.6	39	1.5	*typhimurium v cop*
																				5	5	0.4	12	0.5	*weltevreden*
																					2	0.2	6	0.2	*worthington*
10	6	13	–	5	32	11	39	4	3	1	8	–	8	4	–	45	7	99	2	33	1046	90.1	2290	90.8	TOTAL
–	–	1	6	2	1	2	5	–	–	–	–	25	1	–	–	3	–	3	–	–	115		233		ALL OTHER*
10	6	14	6	7	33	13	44	4	3	1	8	25	9	4	–	48	7	102	2	33	1161		2523		TOTAL

TABLE II. OTHER SALMONELLAE REPORTED FROM HUMAN SOURCES, FEBRUARY 1968

SEROTYPE	REPORTING CENTER																					
	ALA	ARI	ARK	CAL	DEL		DC	FLA	ILL	IOW	KAN		LA	MAS	MIC	MIS	NH		NM	NYA	NYB	NYC	NC
accra																							
adelaide									1														
albany													1										
berta								2															
binza				1																			
brandenburg										1													
california															2								
carrau								1															
cholerae-suis	1																						
drypool									1														
eastbourne														1									
gaminara				1				1															
habana																					1		
hartford								2															
kentucky																						1	
lindenburg											1												
minnesota									1														
muenster								2						1									1
norwich		1																					
ohio									1														
paratyphi A					1																		
poona																							1
portsmouth																							
siegburg									1														
TOTAL	1	1	–	2	1		–	8	5	1	1		1	2	2	–	–		–	–	1	1	2
NOT TYPED*	–	–	2	1	–		11	–	1	–	–		–	–	1	6	3		25	18	–	–	–
TOTAL	**1**	**1**	**2**	**3**	**1**		**11**	**8**	**6**	**1**	**1**		**1**	**2**	**3**	**6**	**3**		**25**	**18**	**1**	**1**	**2**

* See Table V-A

TABLE II – Continued

REPORTING CENTER													TOTAL	CUMULATIVE TOTAL	SEROTYPE
	ND	OHI	OKL	PA	TEX		VA	WAS							
			1										1	1	*accra*
													1	1	*adelaide*
				1									2	4	*albany*
							1						3	5	*berta*
													1	1	*binza*
													1	1	*brandenburg*
								1					3	6	*california*
													1	1	*carrau*
													1	2	*cholerae-suis*
													1	1	*drypool*
													1	1	*eastbourne*
													2	3	*gaminara*
								2					3	3	*habana*
													2	5	*hartford*
													1	2	*kentucky*
													1	1	*lindenburg*
													1	3	*minnesota*
													4	6	*muenster*
													1	1	*norwich*
													1	1	*ohio*
		1											2	3	*paratyphi A*
													1	2	*poona*
							1						1	1	*portsmouth*
													1	1	*siegburg*
	–	1	1	1	–		2	3					37	75	TOTAL
	3	–	1	–	5		1	–					78	158	NOT TYPED*
	3	**1**	**2**	**1**	**5**		**3**	**3**					**115**	**233**	**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, FEBRUARY 1968

SEROTYPE	DOMESTIC ANIMALS AND THEIR ENVIRONMENT							ANIMAL FEEDS			
	CHICKENS	TURKEYS	SWINE	CATTLE	HORSES	OTHER	SUBTOTAL	TANKAGE	VEGETABLE PROTEIN	OTHER	SUBTOTAL
anatum	21	2	1	17	1		42	9	15	3	27
bareilly							—	1		6	7
blockley	3	2				1	6				—
braenderup	2						2				—
bredeney	3	4				1	8			2	2
chester	2	6					8				—
cholerae-suis v kun	3		9				12				—
cubana	22	15					37	9		3	12
derby		1	1				2	2		4	6
enteritidis	15		2	3		1	21	1			1
give							—	1			1
heidelberg	24	5	3			1	33	4	1	10	15
indiana							—				—
infantis	10		1	1			12	3		1	4
java							—				—
javiana				1		1	2				—
litchfield						1	1				—
livingstone	1						1	9		1	10
manhattan							—				—
miami	1			2		2	5				—
mississippi							—				—
montevideo	17		7			3	27			19	19
muenchen			1				1	1			1
newington			2				2			4	4
newport	19			2			21	6			6
oranienburg	16		2				18	1		4	5
panama							—				—
paratyphi B							—				—
reading	2	1					3				—
saint-paul	29	18	6				53	3			3
san-diego	1	3					4				—
schwarzengrund	1	3	1				5	3			3
senftenberg	3	1					4	11		16	27
tennessee			7			1	8			2	2
thompson	6	2				1	9			1	1
typhi							—				—
typhimurium	16	7	10	16	2	8	59	5			5
typhimurium v cop	6			5	1		12				—
weltevreden							—				—
worthington							—	2		3	5
TOTAL	223	70	53	47	4	21	418	71	16	79	166
ALL OTHER*	45	31	7	9	—	4	96	49	2	50	101
TOTAL	**268**	**101**	**60**	**56**	**4**	**25**	**514**	**120**	**18**	**129**	**267**

* 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				
4				19	20	2	41	4	118	150	*anatum*
		1					1		8	8	*bareilly*
							–		6	32	*blockley*
		2					2		4	4	*braenderup*
	1	1		1			2		13	16	*bredeney*
							–		8	15	*chester*
1							–		13	24	*cholerae-suis v kun*
		8		4	2	1	15	3	67	78	*cubana*
1				1	5		6	1	16	30	*derby*
3							–		25	40	*enteritidis*
							–		1	5	*give*
2							–		50	153	*heidelberg*
							–		–	1	*indiana*
		2			6		8		24	45	*infantis*
	1						–		1	5	*java*
	2						–		4	4	*javiana*
							–		1	1	*litchfield*
							–	8	19	28	*livingstone*
							–		–	–	*manhattan*
							–		5	5	*miami*
							–		–	–	*mississippi*
3	1	3		4			7		57	84	*montevideo*
1	1			1			1		5	12	*muenchen*
1					5		5		12	17	*newington*
1							–		28	38	*newport*
	1			1	2		3	1	28	36	*oranienburg*
							–		–	3	*panama*
							–		–	1	*paratyphi B*
							–	4	7	10	*reading*
2	1					1	1		60	78	*saint-paul*
							–		4	6	*san-diego*
						4	4	1	13	16	*schwarzengrund*
					3	2	5		36	41	*senftenberg*
		9		2	3		14		24	38	*tennessee*
5	2	6					6		23	43	*thompson*
							–		–	–	*typhi*
15					1	1	2	5	86	160	*typhimurium*
3							–	1	16	37	*typhimurium v cop*
							–		–	–	*weltevreden*
						7	7	1	13	20	*worthington*
42	10	32	–	33	47	18	130	29	795	1284	TOTAL
7	1	11	–	5	10	5	31	5	241	331	ALL OTHER*
49	**11**	**43**	**–**	**38**	**57**	**23**	**161**	**34**	**1036**	**1615**	**TOTAL**

TABLE IV. OTHER SALMONELLAE REPORTED FROM NONHUMAN SOURCES, FEBRUARY 1968

SEROTYPE	DOMESTIC ANIMALS AND THEIR ENVIRONMENT							ANIMAL FEEDS			
	CHICKENS	TURKEYS	SWINE	CATTLE	HORSES	OTHER	SUBTOTAL	TANKAGE	VEGETABLE PROTEIN	OTHER	SUBTOTAL
alachua							–	2		1	3
amsterdam							–	5		3	8
bere							–	5			5
berta				1			1				–
binza	2						2			4	4
bolton							–				–
california		7					7	6			6
cerro	2		3	3		1	9	1		1	2
cholerae-suis			1				1				–
drypool							–			6	6
dublin				4			4				–
eimsbuettel	2	7					9	14		10	24
eppendorf							–				–
georgia							–			7	7
grumpensis	7						7				–
johannesburg						1	1				–
kentucky	8	15					23			4	4
kottbus	2						2				–
lexington							–			2	2
manila	1						1			1	1
meleagridis	7						7		2		2
minnesota							–	3		3	6
new-brunswick							–			1	1
orion							–	1			1
pullorum	2						2				–
rubislaw							–			1	1
siegburg	11						11			2	2
simsbury	1						1				–
taksony							–			1	1
thomasville							–	10		3	13
typhi-suis			2				2				–
urbana							–	1			1
westhampton		2					2				–
TOTAL	45	31	6	8	–	2	92	48	2	50	100
NOT TYPED*	–	–	1	1	–	2	4	1	–	–	1
TOTAL	**45**	**31**	**7**	**9**	**–**	**4**	**96**	**49**	**2**	**50**	**101**

*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					1	1	5	8	*alachua*
							–		8	8	*amsterdam*
							–		5	5	*bere*
							–		1	1	*berta*
1				1	6		7		14	17	*binza*
1							–		1	1	*bolton*
2		8					8		23	25	*california*
					1	1	2	1	14	30	*cerro*
							–		1	1	*cholerae-suis*
							–		6	7	*drypool*
							–		4	5	*dublin*
		1					1		34	38	*eimsbuettel*
							–	1	1	1	*eppendorf*
							–		7	7	*georgia*
							–		7	8	*grumpensis*
1							–		2	3	*johannesburg*
				2	2		4	2	33	40	*kentucky*
							–		2	5	*kottbus*
						2	2		4	7	*lexington*
							–		2	3	*manila*
							–		9	9	*meleagridis*
							–		6	7	*minnesota*
							–		1	2	*new-brunswick*
				1	1		2		3	4	*orion*
		1					1		3	7	*pullorum*
							–		1	1	*rubislaw*
							–		13	14	*siegburg*
						2	2		3	4	*simsbury*
							–		1	1	*taksony*
				1			1		14	16	*thomasville*
							–		2	2	*typhi-suis*
	1						–		2	3	*urbana*
							–		2	10	*westhampton*
5	1	11	–	5	10	5	31	5	234	320	TOTAL
2	–	–	–	–	–	–	–	–	7	11	NOT TYPED*
7	1	11	–	5	10	5	31	5	241	331	TOTAL

TABLE V. SALMONELLAE REPORTED BY GROUP IDENTIFICATION ONLY, FEBRUARY 1968

A. HUMAN SOURCES

REPORTING CENTER	GROUP													TOTAL
	B	C_1		C_2	D			E	H	J			UNK	
ARKANSAS	2													2
CALIFORNIA													1	1
D.C.	6			2	1								2	11
ILLINOIS	1													1
MICHIGAN		1												1
MISSISSIPPI	3			1									2	6
NEW HAMPSHIRE	2			1										3
NEW MEXICO	21	2		1					1					25
NEW YORK – A													18	18
NORTH DAKOTA													3	3
OKLAHOMA													1	1
TEXAS	3												2	5
VIRGINIA					1									1
TOTAL	38	3		5	2			–	1	–			29	78
VIRGIN ISLANDS					1			1						2

B. NONHUMAN SOURCES

SOURCES	GROUP													TOTAL
	B	C_1		C_2	D			E	H	J			UNK	
DOMESTIC ANIMALS AND THEIR ENVIRONMENT	3							1						4
ANIMAL FEEDS										1				1
WILD ANIMALS AND BIRDS	1												1	2
REPTILES AND ENVIRONMENT														–
HUMAN DIETARY ITEMS														–
MISCELLANEOUS														–
TOTAL	4	–		–	–			1	–	1			1	7