REPORT NO. 47
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COMMUNICABLE DISEASE CEN

SALMONELLA

SURVEILLANCE

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For the Month of February 1966

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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 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.

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I. SUMMARY

During February, 1,149 isolations of salmonella from humans were reported. The average number of isolations per week (287) represented a decrease of 96 from January, 1966 and 51 from February, 1965. While the decrease during February followed the expected pattern, it dropped to the lowest number recorded for any one month since the same period during 1963 (See Figure 1).

A total of 522 nonhuman recoveries were reported during February, representing a decrease of 3 from January.

II. REPORTS OF ISOLATIONS FROM THE STATES

A. Human

The seven most frequently reported serotypes during February were:

Rank	Serotype	Number	Per Cent	Rank Last Month
1	S. typhi-murium and S. typhi-murium var. copenhagen	286	24.9	1
2	S. infantis	111	9.7	3
3	S. newport	81	7.0	5
4	S. heidelberg	78	6.8	4
5	S. enteritidis	68	5.9	2
6	S. typhi	47	4.1	7
7	S. saint-paul	46	4.0	8
	Total	717	62.4	
	Total (all serotypes)	1,149		

During February, 63 different serotypes were reported. The seven most common accounted for 62.4 per cent of all isolations.

Salmonella infantis, which normally accounts for approximately 6 per cent of all isolations from humans, accounted for 9.7 per cent (111 isolations) during February - significantly greater than expected based on past experience (See CURRENT INVESTIGATIONS). None of the other seven most common serotypes demonstrated a significant departure from what would be expected. See Tables I and II for the numbers and regional distribution of other serotypes.

The age and sex distribution (Table III) was consistent with past experience. During February, 221 persons (19.2 per cent), reported as harboring salmonellae, had other members of their families simultaneously infected. This too was consistent with past experience.

B. Nonhuman

There were 522 isolations of salmonella from nonhuman sources reported during February, 3 less than January. Fifty-one serotypes were represented among these isolations, which were from 31 different states.

The seven most frequently reported serotypes were:

Rank	Serotype	Predominant Source and No.	No.	Per Cent	Rank Last Month
1	S. typhi-murium, S. typhi-murium var. copenhagen	Chickens (33) Bovines (21) and Turkeys (20)	115	22.0	1
2	S. heidelberg	Turkeys (31)	46	8.8	3
3	S. oranienburg	Turtles (17)	33	6.3	9
4	S. saint-paul	Turkeys (19)	26	5.0	2
5	S. montevideo	Chickens (8) and bone meal and meat scraps (5)	25	4.8	11
6	S. senftenberg	Frozen eggs (13)	24	4.6	Not listed
7	S. anatum and S. thompson	Turkeys (7) Chickens (9) and Turtles and turtle water (10)	22	4.2	5 10
		Total	291	55.7	
		Total (all serotypes)	522		

The most prominent nonhuman sources of salmonella reported during February were: turkeys, 135 (25.9 per cent); chickens, 120 (23.0 per cent); frozen egg, 37 (7.1 per cent) and bovine, 28 (5.4 per cent).

III. CURRENT INVESTIGATIONS

A. Progress Report - Interstate Outbreak of Gastroenteritis Due to Salmonella new-brunswick. Compiled by the Salmonella Surveillance Unit from reports received from State and Territorial Laboratory Directors and Epidemiologists and the Laboratory Services Unit, Investigations Section, CDC.

On February 28, 1966, a special Salmonella new-brunswick alert was sent to all recipients of the Salmonella Surveillance Report. Intensive investigations have subsequently been made of all isolations of S. new-brunswick from human and nonhuman sources since initiation of the salmonella surveillance program in 1963. This information is summarized on the table on the following page:

Salmonella new-brunswick Isolations
1963 to Present

A. Human Isolations

Year	Total Isolations of Salmonellae	Total Isolations of S. new-brunswick
1963	18,469	6
1964	21,113	4
1965-66 (Jan.)	22,396	29

B. Nonhuman Sources (S. new-brunswick)

Year	Number of Isolations	Sources of Isolations
1963	9	Turkey - 7 Bovine - 1 Animal Feed - 1
1964	1	Laboratory rat
1965-66 (Jan.)	1	Dairy cow - 1

C. 1965 - 6 Cases

Total	29
Lost to follow-up	2
Secondary household cases	2
Residual group for study	25

D. Age Breakdown of Human Cases of S. new-brunswick.

Age(Years)	Expected Distribution Based on all salmonellae-1965	S. new-brunswick
Less than 1	4	12
1 - 4	6	2
5 - 9	3	1
10 - 19	2	2
20 - 29	2	1
30 - 39	2	1
40 - 49	1	0
50 - 59	1	2
60 - 69	1	1
70 +	1	1

The hypothesis of common source outbreak is based on the documentation of an approximately six-fold increase of a previously rare serotype. Age breakdown of the S. new-brunswick cases suggested a predilection for those under 1 year of age. Human cases of S. new-brunswick infection were reported from seventeen states scattered throughout the country. A study of the cases by month of onset revealed that the first confirmed cases occurred in April, 1965 with an average of one or two per month thereafter until a peak of seven in September, 1965 followed by a gradual decline. The last confirmed case was reported in January, 1966.

All 25 patients with documented S. new-brunswick infection during this period were interviewed for possible common sources. Consumption of instant non-fat dry milk was the only common source linking a significant number of the reported cases. Twenty of the twenty-five cases available for study had consumed this product immediately prior to their illness. In most instances the product was prepared by adding tap water; in no instance was the manner in which the product was prepared inconsistent with the hypothesis that this was the vehicle of infection. Of the 20 dried milk-associated cases, 11 had consumed only a single brand of the product prior to the illness, and 9 had purchased a variety of brands (range: 2 to 4 brands per person). Breakdown of the cases by brand is shown in the following table:

Brand	Group Using Single Brand Only	Group Using Multiple Brands
A	0	3
B	5	8
C	2	0
D	0	2
E	2	0
F	1	2
G	1	1
H	0	3
I	0	2
J	0	1
K	0	1

The hypothesis that powdered milk is the vehicle of infection is not necessarily vitiated by the fact that multiple brands are used in view of the fact that many producers draw on the same large suppliers of powdered milk, which is then further processed into the final commercial product. The association of 20 of the 25 cases (80 per cent) with consumption of powdered milk has a statistical significance in the range of .009.

Numerous microbiological studies of a variety of powdered milks are currently underway in the laboratories of CDC, various states, the Food and Drug Administration, and the Robert A. Taft Sanitary Engineering Center in Cincinnati, Ohio. Some of the results available to date are shown in the table on the following page:

RESULTS OF MICROBIOLOGIC EXAMINATION
OF VARIOUS BRANDS OF POWDERED MILK
(Through March 15, 1966)

Total Number of Samples	Average Total Plate Counts	Total Plate Counts on MacConkey Agar*	Salmonella
194	Usually 0 to 3000/gm	Usually no growth	1 isolation of S. anatum
	1 sample 8000/gm	Occasionally up to 1000/gm	
	1 sample 241,000/gm	(Probably aerobacter species)	

* Following enrichment

Additional epidemiologic and laboratory studies are presently underway. We solicit reports of microbiological examination of powdered milks in local and state laboratories. The epidemiologic data suggests that the vehicle that accounted for the common source outbreak of S. new-brunswick may no longer be in public circulation. The possibility of contamination of powdered milk with other salmonella serotypes should be kept in mind, and the epidemiologic evidence accumulated to date would warrant consideration of powdered milk as a possible vehicle of infection in cases of salmonellosis particularly those in the younger age group.

B. Salmonella infantis alert!

During the last week of February and the first two weeks of March, a significant increase in the number of S. infantis isolations from humans was noted by the Salmonella Surveillance Unit. No increase in any one state, indicating a localized common source outbreak, has been observed during this three week period. The number of isolates by state appears in the following table:

State	February 4th Week	March 1st Week	2nd Week	Total
Mass.	3		3	6
N.Y.	6	10	9	25
N.J.	3	1		4
Pa.		2	3	5
Ohio		2	1	3
Ind.			1	1
Ill.	2	2	1	5
Mich.	1	2	4	7
Wisc.		1		1
Mo.	1		2	3
Kans.		4	1	5
Md.	3	3	1	7
Va.	1	3	2	6
N.C.			2	2
Ga.	2			2
Fla.	2		1	3
Tenn.	1	1	2	4
La.	1	1		2
Tex.			1	1
Mont.			1	1
Colo.	2			2

Chart Cont'd

State	February 4th Week	March 1st Week	2nd Week	Total
Wash.			1	1
Ore.		3		3
Calif.	7		4	11
Hai.	5	5	1	11
U. S. Total	40	40	41	121

From the table, it can be seen that 25 states have reported one or more isolations of S. infantis during this period with New York accounting for 25 of the total of 121. The recoveries from New York alone do not account entirely for the unexpected increase. In addition, the increase is not believed to be related to a seasonal influence since February and March are usually low incidence months for the isolation of S. infantis.

The most likely explanation for the increase is a common vehicle of infection for individuals living in several states. For this reason, it is felt that food histories and dates of onset of illness on individuals found positive for S. infantis since the 3rd week in February should be obtained. Particular emphasis should be placed on items distributed nationwide such as commercially prepared foods.

Results of investigations should be sent to the Salmonella Surveillance Unit as soon as they are available by air mail or telephone so they can be collated with results from other states.

IV. REPORTS FROM THE STATES

Connecticut - Institutional Outbreak of Salmonella enteritidis Gastroenteritis. Reported by Barbara Christine, M.D., Epidemiologist, and James C. Hart, M.D., Chief, Division of Communicable Disease. Connecticut State Department of Public Health.

In January, 1966 an outbreak of salmonellosis occurred among elderly residents of a mental hospital in Connecticut. There were at least 41 patients with onset of illness between January 7 and January 14, 1966. Non-bloody diarrhea, fever, and dehydration were the major signs and symptoms. A diffuse hemorrhagic enterocolitis was demonstrated in at least one autopsy. A salmonella Group D organism subsequently identified as Salmonella enteritidis was isolated from a high percentage of the symptomatic cases. No other enteric pathogens were identified.

Epidemiologic investigation revealed that soft boiled eggs and egg nogs made from fresh eggs were served to a large percentage of the ill and elderly patients. Cultures were obtained from a variety of food sources in the kitchen but these were negative for salmonella. Environmental inspection of the food services revealed, however, evidence of several defects in good food handling technique including use of cracked cutting boards, improper storage of foods, and failure to protect food items during floor mopping procedures.

Since the elderly patients were receiving egg nogs made of raw eggs, it was felt that this was the most likely source of infection. No specimens of eggs used at the time of the outbreak could be obtained. Those samples taken about 10 days after the outbreak were negative for salmonella as were specimens of frozen eggs on hand in the kitchen.

As a result of this outbreak, the following recommendations were made:

1. Elimination of raw eggs in egg nogs and substitution of pasteurized egg nog mix.

2. Elimination of soft-cooked eggs from diets unless cooking was sufficient to solidify whites completely.

3. Defrosting of frozen eggs in refrigerator rather than at room temperature.

4. All food containers to be kept covered during cleaning of floors. No food preparation such as salad ingredients to be carried on during floor cleaning time. Wet vacuum of the floor to be used instead of mops wherever possible. All containers of food to be covered before being placed in a refrigerator and during transportation to serving areas.

V. SPECIAL REPORTS

The Salmonella Problem in the Poultry Industry.

Dr. J. E. Williams of the Southwest Poultry Research Laboratory, Athens, Georgia emphasized the following points at a recent Georgia Broiler Short Course held at the University of Georgia campus:

1. The adult flock carrier serves as the chief source of salmonella organisms in poultry.

2. Breeder flocks that experience acute outbreaks at a young age or known carriers of any age should not be used as a source of hatching eggs. Early flock disposal is the most desirable procedure to follow when outbreaks occur at a young age.

3. Flocks must be maintained in absolute quarantine to prevent introduction of infection from surrounding environment.

4. Confirm that feed is free and maintained free of salmonella organisms.

5. Reduce shell contamination by adequate, clean nesting, frequent gathering of eggs, and prompt fumigation.

6. Hatcheries must establish and enforce high standards of sanitation.

VI. INTERNATIONAL

A. Salmonellosis in Israel: Experience Through 1962.

Reported by W. Silberstein and Ch. B. Gerichter, Government Central Laboratories, (National Salmonella Center of Israel) Ministry of Health, Jerusalem

A steady decline in the reported cases of typhoid fever has been noted between 1949 and 1962 in Israel. In 1949 a total of 689 cases were reported (3.0 per 10,000 population) compared with a total of 304 cases in 1962 (1.5 per 10,000 population). Several factors are thought to be responsible for the decrease in typhoid in Israel including introduction of improved sanitary facilities in the houses, purification of water, and improvement in sewage disposal systems. E1 and A are the most frequent phage types occurring in Israel followed in order of frequency by C1, 40, 28, and F1. Typhoid fever is a mild disease in Israel compared with the classical accounts of this disease, and the case fatality rate is very low. Almost all cases are hospitalized and presumably over 90 per cent of the cases are reported to health authorities. In 1951 an attempt was made to vaccinate the population with TAB vaccine, however, it is thought that only one-third of the population has actually been vaccinated. Age-specific attack rates of typhoid cases shows that the highest rate is recorded in the age group from 1 - 9 years. Generally speaking, the annual incidence shows a decrease in the spring and a peaking in late summer.

In 1962 a total of 40 cases of paratyphoid fever were reported (0.2 per 10,000 population). The observation is made that paratyphoid fever is almost always a mild disease with a very low case fatality rate. The seasonal peak again occurs during the summer months and the age group most affected is under 1 year.

Experience with non-host adapted salmonella serotypes in Israel has been consistent with that seen in the United States and other countries. During the same period that typhoid and paratyphoid fevers have been decreasing, infections due to the other salmonella serotypes have been on the increase. In 1954, 475 cases of salmonellosis other than typhoid and paratyphoid were reported (3.1 per 10,000) in contrast to 914 cases in 1962 (4.5 per 10,000). The seven most common salmonella serotypes in Israel during 1949-1962 are shown on the table below:

Rank	Serotype	No. of Strains	Per Cent
1	S. typhi-murium	5,461	32.8
2	S. newport	1,497	9.0
3	S. braenderup	1,285	7.7
4	S. montevideo	996	6.0
5	S. enteritidis	953	5.7
6	S. emek	670	4.0
7	S. tennessee	535	3.2

B. Netherlands - Report of Isolations of Salmonellae From Human and Nonhuman Sources - Third Quarter of 1965.

Reported by E. H. Kampelmacher, D.V.M., Head, Zoonoses Laboratory, National Institute of Health, Utrecht, Netherlands.

During the third quarter of 1965 4,350 isolations of salmonellae were typed in the Zoonoses Laboratory for an increase of 1,075 (47.2 per cent) over the second quarter of 1965. Of the 3,350 recoveries made, 1,974 (58.9 per cent) represented primary isolations from human sources. The seven most frequently isolated serotypes from human sources are shown in the table below:

Rank	Serotype	No. of Isolations	Per Cent
1	S. typhi-murium	1,055	53.4
2	S. panama	303	15.3
3	S. stanley	237	12.0
4	S. oranienburg	111	5.6
5	S. bareilly	33	1.6
6	S. paratyphi B	26	1.1
7	S. bovis-morbificans	25	1.2
	Total	1,790	90.2

When compared with the most frequent serotypes for the previous quarter of 1965, the only significant change noted is that S. oranienburg has displaced S. newport in the seven most frequently isolated serotypes.

The most common nonhuman sources of salmonellae were: pigs, 466; cattle, 252; meat and meat products, 218; and sewage and surface water 118. Three salmonella serotypes were isolated for the first time in Belgium from nonhuman sources during this quarter. Salmonella bonaire was recovered from a calf; S. egusitoo was isolated from a snake; and S. hanover was isolated from a pig.

C. Belgium - Report of Isolations of Salmonellae From Human Sources During the Last Quarter of 1965. Reported by E. vanOye, M.D., Ministry of Public and Family Health, Brussels, Belgium.

A total of 521 isolations of salmonellae from human sources were reported in Belgium for the last quarter of 1965. The following table indicates the distribution of the most common serotypes.

Rank	Serotype	Number	Per Cent
1	S. typhi-murium	363	69.6
2	S. panama	55	10.5
3	S. brandenburg	38	7.2
4	S. bredeney	7	1.3

Salmonella kinondoni was isolated for the first time in Belgium during this quarter.

VII. FOOD AND FEED SURVEILLANCE

A. Salmonellae in Feed Substances Obtained in Washington State.

During the period from October 1964 to February 1966, 122 samples of 27 different types of animal feed or feed ingredients collected by the Division of Epidemiology of the Washington State Health Department has been examined in the Washington State Public Health Laboratories or the Veterinary Public Health Laboratory, Communicable Disease Center, for the presence of salmonellae. Seventeen (13.9 per cent) of these samples were positive. The sources and salmonellae serotypes recovered are shown in the following table:

	Feed or Feed Ingredient	Number Examined	Number Positive	Salmonella Serotypes or Groups Isolated
1.	Calf Feeds	14	1	S. worthington
2.	Cattle Feeds	32	6	S. typhi-murium S. eimsbuettel S. kentucky Salmonella group C_1 Salmonella group C_2
3.	Soybean Meals	1	0	
4.	Rabbit Feeds	2	0	
5.	Linseed Meals	3	0	
6.	Mineral Mixes	4	0	
7.	Cottonseed Meals	16	4	S. muenchen *S. goerlitz S. eimsbuettel S. cubana
8.	Molasses	1	0	
9.	Rolled or Ground Barley	3	0	
10.	Salt	1	0	
11.	Wheat Mill Run	2	0	
12.	Coconut Oil Meals	2	0	
13.	Dried Beet Pulp	1	0	
14.	Ground Oats	1	0	
15.	Ground Corn	1	0	
16.	Vitamin Supplement in Soybean Base	1	0	
17.	Dry Dog Food	1	0	
18.	Chicken Feeds	13	3	S. derby Salmonella group C_1 Salmonella group C_2
19.	Turkey Feeds	1	1	S. eimsbuettel
20.	Whale Meals	1	0	
21.	Meat Scrap Meals	8	0	
22.	Bone Meals	2	0	
23.	Meat and Bone Scrap Meals	5	2	S. blockley
24.	Fish Meals	2	0	
25.	Feather Meals	1	0	
26.	Alfalfa Feeds	1	0	
27.	Swine Feeds	2	0	
		122	17	13.9 per cent positive

*First isolation of this serotype in the United States.

B. Dried Yeast Examined in Missouri.

In September 1965, there were two isolations of Salmonella california and one of S. thomasville from dried yeast reported from Missouri. Following this report, the Epidemiology Department of the Missouri Division of Health obtained samples of yeast powder and tablets in retail outlets, and examination for salmonellae was performed in the Missouri Public Health Laboratory. The following report was received from Mrs. Irma Adams, Director of the Laboratory. A total of 6 samples of powdered yeast, 8 bottles of yeast tablets and 1 of yeast chips were examined. There were 4 brands from 10 different supply houses. No salmonellae were isolated.

C. Modified Method for Examination of Non-Fat Dried Milk for Salmonellae.

Due to the recent epidemiologic association of human cases of Salmonella new-brunswick infection with non-fat dry milk, a recommended procedure for isolation of salmonellae from these products was worked out. This procedure, however, was not practical for processing large numbers of samples. After further study of this method and others (North, W. R., J. Bact. 80:861, 1960; Thatcher, F. S., Food and Drug Directorate, unpublished material, 1965), the following procedure has evolved:

1. Suspend 30 grams of milk powder in 100 ml. of sterile distilled water. Add brilliant green dye (1 ml. of a 0.1 per cent solution).

2. Incubate at 37°C. for 18 to 24 hours.

3. Streak one large loopful (5-6 mm in diameter) of incubated specimen onto a brilliant green agar plate containing 80 mg. sodium sulfadiazine per liter (BGS). Incubate BGS plates at 37°C. for 18 to 24 hours and examine for suspicious colonies.

4. At the same time as BGS plates are streaked, also transfer 10 ml. of specimen to 100 ml. of tetrathionate enrichment broth containing brilliant green dye (final concentration 1:100,000).

5. Incubate enrichment broth at 37°C. for 24 hours. Streak one loopful to a BGS plate. Incubate plates at 37°C. for 18 to 24 hours.

This procedure is satisfactory for recovery of small numbers of salmonellae from non-fat dried milk.

D. Abstract:

1. Enrichment Medium for Selection of Salmonellae from Fish Homogenate, by H. Raj. Abstracted from Applied Microbiology 14:12-20, 1966.

A selective enrichment medium was developed for the detection and enumeration of salmonellae in foods, particularly frozen seafoods. The medium contains the following ingredients: 0.4 per cent proteose peptone, 0.15 per cent yeast extract, 0.4 per cent dulcitol, 0.5 per cent sodium selenite, 0.125 per cent Na_2HPO_4, and 0.125 per cent KH_2PO_4 in distilled water. The medium was found

effective in recovery of as few as 2 cells per tube even in the presence of 10^4 concentrations of other bacteria in the specimen. The addition of a food sample, such as fish homogenate, did not appear to lower the sensitivity, selectivity and productivity of the medium. Of four plating media compared for ease of isolation (brilliant green agar, MacConkey's, SS and bismuth sulfite), brilliant green agar was the most satisfactory. Organisms which utilize dulcitol and produce H_2S, such as E. freundii, appeared as "false positives" and had to be ruled out by further screening steps.

2. Incidence of Salmonellae in Prepared and Packaged Foods, by N. Adinarayanan, V. D. Foltz, and F. McKinley. Abstracted from Journal of Infectious Diseases 115:19-26, 1965.

A variety of prepared packaged foods obtained at the consumer level were examined for the presence of salmonellae. A total of 247 samples of 23 different kinds of food were cultured and 17 were found contaminated with salmonellae. These included: cake mixes 5; cookie doughs 5; dinner rolls 4; cornbread mix 1; corn muffin mix 1; pizza dough 1. Salmonellae were recovered from 14 of 203 samples containing egg or some animal product and from 3 of 44 samples that contained neither of these products. The serotypes and their frequency of occurrence were as follows: S. tennessee 6; S. infantis 4; S. oranienburg 2; S. litchfield, S. miami, S. muenchen, S. newington and S. newport, 1 each.

Figure I.

REPORTED HUMAN ISOLATIONS OF SALMONELLA
IN THE UNITED STATES

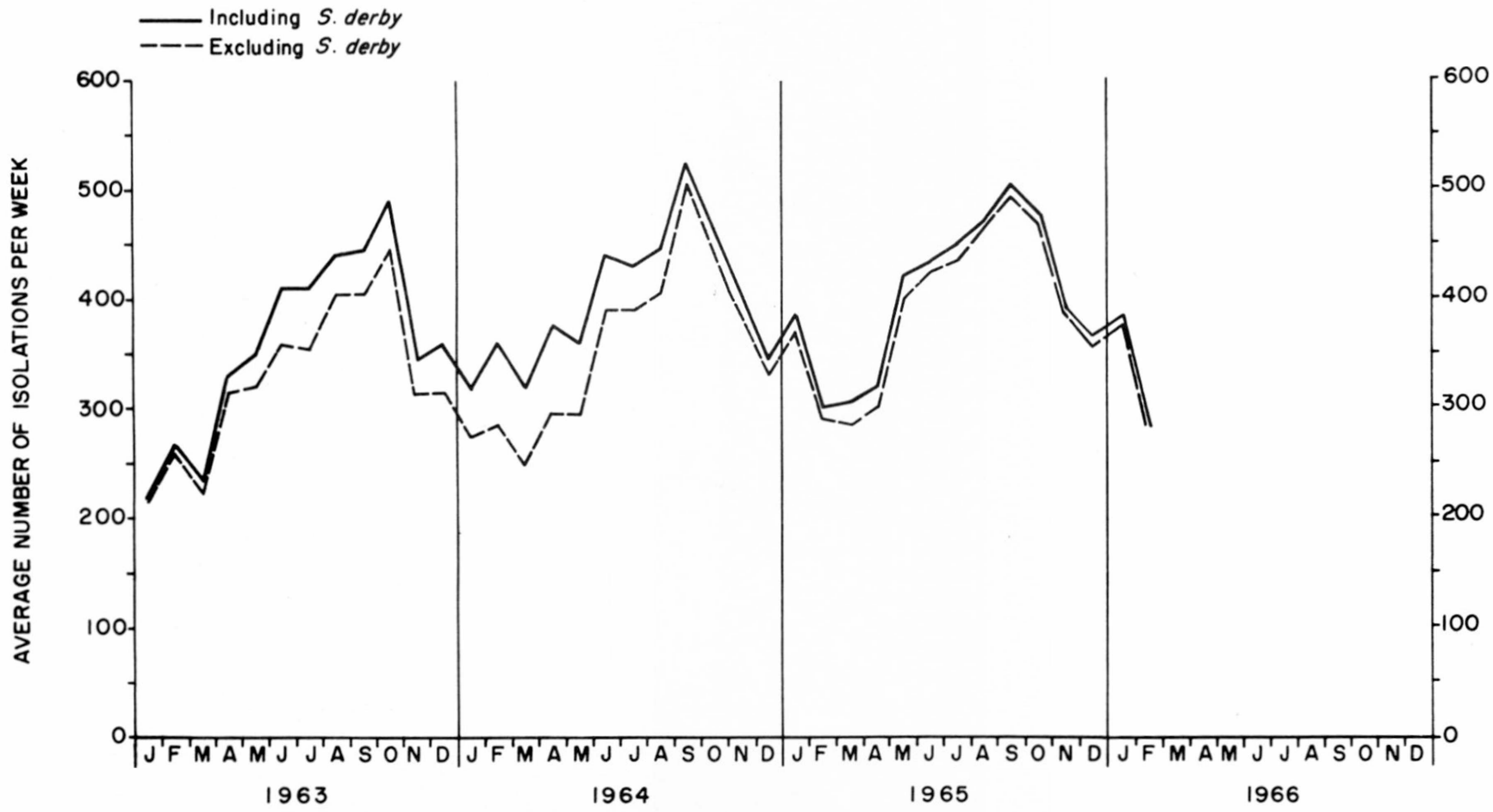

TABLE I

COMMON SALMONELLA SEROTYPES ISOLATED FROM HUMANS IN THE UNITED STATES DURING FEBRUARY, 1966

SEROTYPE	GEOGRAPHIC DIVISION AND REPORTING CENTER																													SEROTYPE
	NEW ENGLAND							MIDDLE ATLANTIC						EAST NORTH CENTRAL						WEST NORTH CENTRAL								SOUTH ATLANTIC								
	ME	NH	VT	MASS	RI	CONN	TOT	NY-A	NY-BI	NY-C	NJ	PA	TOT	OHIO	IND	ILL	MICH	WIS	TOT	MINN	IOWA	MO	ND	SD	NEBR	KAN	TOT	DEL	MD	DC	VA	WV	NC	SC	GA	FLA	TOT	
anatum				1			1	1					1	1			1		2				1				1		2					1	1	4	anatum
bareilly																		1	1																		bareilly
berta										1	1		2																								berta
blockley						1	1	2				1	3			5	1		6			2			1		3				2		3	1	6	blockley
bovis-morbificans								1					1																								bovis-morbificans
braenderup				2			2																														braenderup
bredeney				2			2									1			1																		bredeney
chester												1	1																								chester
cholerae-suis v kun																																					cholerae-suis v kun
cubana				8	1		9	1				2	3			1	3		4									1		1				1		3	cubana
derby				2			2					1	1			1		1	2												1				1	derby
enteritidis				1		2	3	6	2	2	1	7	18	1		14	1	9	25			1				1		1		3			8	1	13	enteritidis
give												2	2			1			1														1	1	2	give
heidelberg				6		1	7	4	2	3	4	3	16	1	3	3	6		13			1				1	2		4			1	2	3	10	heidelberg
indiana												1	1			1			1																	indiana
infantis				11		4	15	8	1	2	6	6	23	1	4	3	5	6	19			1				4	5		4		2		1	3	8	18	infantis
java								2				2	4			1			1							1	1										java
javiana						2	2	1				1	2													1	1									6	6	javiana
litchfield									1		2		3			1			1																		litchfield
livingstone									1				1																								livingstone
manhattan								1		1			2			1			1													3				3	manhattan
meleagridis																																					meleagridis
miami																																		2	7	9	miami
mississippi																																					mississippi
montevideo				1			1								1	1			2															1	6	7	montevideo
muenchen				1			1	2	1		1		4				2		2							1	1							2	2	muenchen
newington																													1							1	newington
newport						2	2	3		3	2	2	10	3		6	3	3	15	3	1	4					8					1			6	7	newport
oranienburg				6			6	3		1		1	5	1		1	1		3							9	9			2				3	5	oranienburg
panama									2	2	1		5	3	1	2			6																		panama
paratyphi B										1			1		1				1																		paratyphi B
poona									1				1																								poona
saint-paul				6			6	1	1	2	2		6	1	2		4		7							1	1							1	1	2	saint-paul
san-diego								1		1			2																								san-diego
schwarzengrund									1		1		2																						2	2	schwarzengrund
senftenberg																2		1	3																		senftenberg
tennessee				1			1									5			5									1							1	tennessee
thompson						1	1	1		1	1	5	8	3			3	2	8									1	1						2	thompson
typhi								2		1			3		1		1		2							1	1	1		4	1	3			6	15	typhi
typhi-murium	1		1	25		6	33	7	4	10	4	14	39	3	1	12	10	7	33	1		2	1	1	2	2	9	3	2	2	2	5		5	12	31	typhi-murium
typhi-murium v con	1						1				2		2																1							1	typhi-murium v con
urbana																																					urbana
weltevreden																																					weltevreden
worthington								1			1		2																								worthington
untypable, group B					1		1										2		2										4							4	untypable, group B
untypable, group C1					1		1																						1							1	untypable, group C1
untypable, group C2																																					untypable, group C2
untypable, group D																																					untypable, group D
untypable, group E																													1							1	untypable, group E
untypable or unknown		1					1											3	3										1				2			3	untypable or unknown
Total Common	2	1	1	73	3	19	99	48	17	31	29	49	174	18	14	60	45	33	170	4	1	11	2	1	3	21	43	-0-	14	16	14	4	15	3	28	66	160	Total Common
Total Uncommon							-0-	1					1			8	1	1	10	1		1					2			1				1	2	4	Total Uncommon
Total Grand	2	1	1	73	3	19	99	49	17	31	29	49	175	18	14	68	46	34	180	5	1	12	2	1	3	21	45	-0-	14	17	14	4	15	3	29	68	164	Grand Total

New York (A-Albany, B-Beth Israel Hospital, C-City)

The Beth-Israel Salmonella Typing Center in New York is a reference laboratory and processes many cultures from other states which are assigned to the respective states although reported by N.Y.-B.I. Beth Israel reported a total of 54 isolations for February.

**Includes January late reports.

TABLE I (Continued)
COMMON SALMONELLA SEROTYPES ISOLATED FROM HUMANS IN THE UNITED STATES DURING **FEBRUARY, 1966

SEROTYPE	GEOGRAPHIC DIVISION AND REPORTING CENTER																							OTHER	TOTAL	% OF TOTAL	1966 CUM. TOTAL	% OF 1966 CUM. TOTAL	1965 CUM. TOTAL	% OF 1965 CUM. TOTAL	SEROTYPE
	EAST SOUTH CENTRAL					WEST SOUTH CENTRAL					MOUNTAIN									PACIFIC											
	KY	TENN	ALA	MISS	TOT	ARK	LA	OKLA	TEX	TOT	MONT	IDA	WYO	COLO	NM	ARI	UTAH	NEV	TOT	WASH	ORE	CAL	ALAS	HAI	TOT	VI						
anatum							6			6										2		3		3	8		23	2.0	56	2.1	37	1.4	anatum
bareilly							2			2												1			1		4	.3	8	.3	12		bareilly
berta			1		1		1			1																	4	.3	7	.3	8		berta
blockley							3			3										1		6	1		8		30	2.6	53	2.0	61	2.2	blockley
bovis-morbificans							1			1																	2	.2	2	.1			bovis-morbificans
braenderup									1	1										4	1	2			7		10	.9	25	.9	10		braenderup
bredeney							4		2	6												1		1	2		11	1.0	22	.8	14		bredeney
chester									1	1				1			1		2			3			3		7	.6	16	.6	21	0.8	chester
cholerae-suis v kun									1	1																	1	.1	5	.2	5		cholerae-suis v kun
cubana																						1			1		20	1.7	27	1.0	15		cubana
derby			1		1		3			3												2		5	7		17	1.5	52	1.9	97		derby
enteritidis		1			1				2	2												4		1	5		68	5.9	191	7.1	178	6.5	enteritidis
give							1		2	3																	8	.7	15	.6	19		give
heidelberg							4	1	1	6				2		1	1	1	5	1	2	14		2	19		78	6.8	182	6.8	215	7.9	heidelberg
indiana							1			1																	3	.3	12	.4	3		indiana
infantis		1			1	1	2	1		4				2					2	2	1	11		10	24		111	9.7	228	8.5	180	6.6	infantis
java																						1			1		7	.6	22	.8	26		java
javiana							8		6	14																	25	2.2	36	1.3	25		javiana
litchfield																											4	.3	9	.3	23		litchfield
livingstone																				1				1	2		3	.3	7	.3	4		livingstone
manhattan																								1	1		7	.6	16	.6	19		manhattan
meleagridis																																	meleagridis
miami									1	1																	10	.8	11	.4	15		miami
mississippi			1		1		1		1	2																	3	.3	8	.3	5		mississippi
montevideo						1	1			2				1					1	1				1	2		15	1.3	37	1.4	85	3.1	montevideo
muenchen								2	1	3												1			1		14	1.2	30	1.1	26		muenchen
newington																											1	.1	3	.1	6		newington
newport		1			1		5		14	19	1								1			10		8	18		81	7.1	163	6.1	123	4.5	newport
oranienburg							3		1	4												2			2		34	3.0	61	2.3	88	3.2	oranienburg
panama									1	1										1				1	2		14	1.2	26	1.0	23		panama
paratyphi B		1			1			1	1	2																	5	.4	19	.7	31	1.1	paratyphi B
poona																						3			3		4	.3	6	.2	9		poona
saint-paul						1	9		1	11											5	6		2	13		46	4.0	93	3.5	122	4.5	saint-paul
san-diego																				1		5			6		8	.7	15	.6	41		san-diego
schwarzengrund							1			1																	5	.4	11	.4	14		schwarzengrund
senftenberg							1		1	2																	5	.4	11	.4	10		senftenberg
tennessee							1			1				1					1	1					1		10	.9	18	.7	28	1.0	tennessee
thompson		1	3	1	5				1	1												3			3		28	2.4	96	3.6	56	2.0	thompson
typhi		2			2	2	2	1	6	11							3		3	1	1	12			14		51	4.4	108	4.0	140	5.1	typhi
typhi-murium	2	5	4	1	12	2	13	1	24	40	2			1	6		2		11	3	6	57		6	72		280	24.4	765	28.5	755	27.6	typhi-murium
typhi-murium v con urbana							2			2																	6	.5	13	.5	37		typhi-murium v con urbana
weltevreden																								1	1		1	.1	2	.1	6		weltevreden
worthington																				1				2	3		5	.4	7	.3	5		worthington
untypable, group B						1				1					5	1			6		2	2			4		18	1.6	44	1.6	29		untypable, group B
untypable, group C1									1	1					7				7		1				1		11	1.0	20	.8	17		untypable, group C1
untypable, group C2						2				2																	2	.2	6	.2	13		untypable, group C2
untypable, group D															1				1								1	.1	5	.2			untypable, group D
untypable, group E															1				1								2	.2	2	.1			untypable, group E
untypable or unknown																					1				1		8	.7	13	.5	14		untypable or unknown
Total Common	2	12	10	2	26	10	75	7	70	162	3	-0-	-0-	8	20	2	7	1	41	20	20	150	1	45	236		1,111	96.7	2,587	96.5			Total Common
Total Uncommon		1			1		8		3	11	1			1					2	2		3		2	7		38	3.3	93	3.5			Total Uncommon
Grand Total	2	13	10	2	27	10	83	7	73	173	4	-0-	-0-	9	20	2	7	1	43	22	20	153	1	47	243		1,149	100.0	2,680	100.0	2,736		Grand Total

(VI - Virgin Islands)

**Includes January late reports.

TABLE II
UNCOMMON SALMONELLA SEROTYPES ISOLATED FROM HUMANS DURING 1966

SEROTYPE	REPORTING CENTER																													
	ALA	ALAS	ARI	ARK	CALIF	COLO	CONN	DEL	DC	FLA	GA	HAI	IDA	ILL	IND	IOWA	KAN	KY	LA	ME	MD	MASS	MICH	MINN	MISS	MO	MONT	NEBR	NEV	NH	NJ	NM
abortus-bovis														2																		
alachua																			1													
austin																										1						
ball					2																											
bradford						1											1															
carrau																			3													
cerro												1		1																		
colorado																			1													
duesseldorf					1														2													
duisburg																																
eimsbuettel																																
gaminara																			1													
hartford										1																						
inverness																							1									
kentucky									1	1														1								
menston																	1															
minnesota																																
mission																																
mjimwema																																
molade																																
muenster										2				1																		
new-brunswick					1		2				1												1									
norwich				1						1																						
ohio					3																											
os																			2													
oslo					1							4																				
pullorum														9																		
reading					1									14													1					
rubislaw																			3													
seigburg					2																	1										
stanley														1																		
uzaramo																																
virchow																							1									
untypable G										1																						
untypable O					2																											
Total				1	13	1	2		1	6	1	5		28			2		13			1	3	1		1	1					

TABLE II (Continued)
UNCOMMON SALMONELLA SEROTYPES ISOLATED FROM HUMANS DURING 1966

REPORTING CENTER																					FEB. TOTAL	1966 CUM. TOTAL	MONTH LAST REPORTED	STATE LAST REPORTED	TOTAL PREVIOUSLY REPORTED TO SAL. SURV. UNIT 1962 - 1965	SEROTYPE
NY-A	NY-BI	NY-C	NC	ND	OHIO	OKLA	ORE	PA	RI	SC	SD	TENN	TEX	UTAH	VT	VA	VI	WASH	WV	WIS	WYO						
																							2	Jan. 66	Ill.	0	abortus-boris
																					1	1	Nov. 65	R.I.	21	alachua
																					1	1	*	*	0	austin
																						2	Jan. 66	Calif.	0	ball
																					1	2	Jan. 66	Kans.	2	bradford
																						3	Jan. 66	La.	12	carrau
													1								2	3	Jan. 66	Ill.	28	cerro
		1																			1	1	June 65	Hawaii	8	colorado
																					1	4	Jan. 66	Calif., La., N.Y.	7	duesseldorf
																		2			2	2	July 65	Ark.	1	duisburg
1												1									1	2	Jan. 66	Tenn.	3	eimsbuettel
																						1	Jan. 66	La.	20	gaminara
																					1	1	Nov. 65	Tex.	90	hartford
																					1	1	Nov. 65	Calif.	13	inverness
																					3	3	Nov. 65	Ala.	117	kentucky
																						1	Jan. 66	Kans.	14	menston
													1								1	1	Dec. 65	Calif.	40	minnesota
1												2										2	Jan. 66	Tenn.	7	mission
																						1	Jan. 66	N.Y.	0	mjimwema
																				1	1	1	*	*	0	molade
																						3	Jan. 66	Fla., Ill.	26	muenster
																					2	5	Jan. 66	Conn., Mich.	32	new-brunswick
												1									1	3	Jan. 66	Ark., Fla.	51	norwich
																					1	3	Jan. 66	Calif.	13	ohio
																					2	2	*	*	0	os
																					1	5	Jan. 66	Calif., Hai.	15	oslo
																						9	Jan. 66	Ill.	4	pullorum
																					9	16	Jan. 66	Calif., Ill.	102	reading
																					3	3	Dec. 65	La.	42	rubislaw
																						3	Jan. 66	Calif., Mass.	19	seigburg
																						1	Jan. 66	Ill.	26	stanley
													1								1	1	*	*	0	uzaramo
																						1	Jan. 66	Mich.	16	virchow
																						1	Jan. 66	Fla.		untypable G
																					1	2	Jan. 66	Calif.		untypable O
2		1										4	3					2		1		38	93				Total

*Not previously reported.

TABLE III

Age and Sex Distribution of 1,122 Isolations of Salmonellae Reported for February 1966

Age (Years)	Male	Female	Total	Per Cent	Cumulative Per Cent
Less than 1	97	54	151	19.5	19.5
1 - 4	118	105	223	28.9	48.4
5 - 9	48	46	94	12.2	60.6
10 - 19	30	42	72	9.3	69.9
20 - 29	10	26	36	4.7	74.6
30 - 39	21	25	46	6.0	80.6
40 - 49	17	31	48	6.2	86.8
50 - 59	14	29	43	5.6	92.4
60 - 69	10	25	35	4.5	96.9
70 - 79	6	9	15	1.9	98.8
80 +	2	7	9	1.2	100.0
Child (Unspec)	7	6	13		
Adult (Unspec)	4	6	10		
Unknown	160	167	327		
Total	544	578	1,122		
%	48.5	51.5			

TABLE IV
REPORTED NONHUMAN ISOLATES BY SEROTYPE AND SOURCE, *FEBRUARY, 1966

Serotype	chicken	turkey	guinea fowl	macaw	sparrow	linnet	equine	bovine	porcine	canine	feline	mouse	monkey	mink	ocelot	leopard	opossum	egg	egg yolk	powdered egg	frozen egg	frozen egg, albumen	egg product	headcheese	dried yeast	poultry meal	pet food, meat	pet food, unknown	bone meal/ meat scraps	animal feed, unknown	oats	tankage	turtle	turtle water	honeypot	unknown	Total	2 Mos. Total	Serotype
alachua		5																					1														6	7	alachua
anatum	2	7					1	3	2		1													2					2	2							22	56	anatum
berta	2																																				2	2	berta
binza	1	1																												1							3	5	binza
blockley	6	2																																			8	31	blockley
braenderup	4																				1																5	8	braenderup
bredeney	3																												1							4	8	bredeney
cerro	1																									1										2	10	cerro
chester		7																																	1	8	13	chester
cholerae-suis									1																											1	1	cholerae-suis
cholerae-suis v kun	1								12																											13	18	cholerae-suis v kun
cubana									1														1						1						1	4	7	cubana
derby		1																			1								1							3	33	derby
dublin								1																			1									2	10	dublin
eimsbuettel	3																							2					1	1		1				8	11	eimsbuettel
enteritidis		1							1																								2			4	15	enteritidis
gallinarum	2		2																																1	5	6	gallinarum
give	2	1																																	1	4	10	give
heidelberg	7	31							1				3											2						1					1	46	98	heidelberg
indiana	2																																1			3	10	indiana
infantis	9																				3	1								3						16	56	infantis
java																											1						1			2	7	java
kentucky		3																												1						4	5	kentucky
kottbus	1																																			1	1	kottbus
livingstone	1	1																												4					1	7	12	livingstone
manhattan	2	3																																1		6	10	manhattan
meleagridis		1					1																													2	4	meleagridis
miami																																		1	1	2	2	miami
montevideo	8	1																3			2								5	1				1	3	1	25	37	montevideo
muenchen		1						1	1						1																					4	4	muenchen
newington	6	1						2																	1										1		11	17	newington
newport		2										2																1									5	21	newport
ohio									1												7															8	8	ohio
oranienburg	1																	6		2	2								3	1			17			1	33	48	oranienburg
orion	2																																			2	7	orion
panama		2																																		2	2	panama
pollorum	2																																			2	12	pollorum
reading		1																																	1	2	2	reading
saint-paul	1	19																						4				1						1		26	80	saint-paul
san-diego		11																																		11	22	san-diego
schwarzengrund	1	8																	1				1						1							12	20	schwarzengrund
senftenberg	2	3							1												13					1			2	1					1	24	29	senftenberg
siegburg										1			1																							2	2	siegburg
simsbury																																			1	1	2	simsbury
taksony																																			1	1	1	taksony
tennessee	5	1																		1	2											1				10	20	tennessee
thompson	9	1																												1			5	5		1	22	36	thompson
typhi-murium	11	20		1	7	1	4	19	5	3	2		2			1	1	1			3	1					2	3					1		2	90	151	typhi-murium
typhi-murium v cop	22							2																		1										25	40	typhi-murium v cop
typhi-suis																																			1	1	1	typhi-suis
worthington	1																				3								3						1	8	8	worthington
untypable group I							1																													1	1	untypable group I
unknown																						1														1	1	unknown
Total	120	135	2	1	7	1	7	28	26	4	3	2	3	3	1	1	1	10	1	3	37	3	3	10	1	3	2	4	23	17	1	1	26	10	4	18	522	1,047	Total

*Includes January late reports

Source: National Disease Laboratory, Ames, Iowa, weekly Salmonella Reports from individual States and US-FDA-Division of Microbiology, Washington, D.C.

TABLE V

REPORTED NONHUMAN ISOLATES BY SEROTYPE AND STATE, *FEBRUARY, 1966

Serotype	Ala	Ark	Cal	Colo	Conn	Fla	Ga	Ill	Ind	Iowa	Kan	La	Md	Mich	Minn	Miss	Mo	Mont	Neb	NJ	NY-A	NC	ND	Ohio	Ore	Pa	Tenn	Tex	Utah	Wash	Wisc	Total	2 Mos. Total	Serotype
alachua															5											1						6	7	alachua
anatum	1	1	6	1		3		2	1					1	2		2													2		22	56	anatum
berta							2																									2	2	berta
binza			1					1	1																							3	5	binza
blockley			3						2																2						1	8	31	blockley
braenderup	1	3																										1				5	8	braenderup
bredeney	1					2		1																								4	8	bredeney
cerro								1								1																2	10	cerro
chester			4												3																1	8	13	chester
cholerae-suis			1																													1	1	cholerae-suis
cholerae-suis v kun	2		1			2			3							4						1										13	18	cholerae-suis v kun
cubana			1			1		1																		1						4	7	cubana
derby								1		1																			1			3	33	derby
dublin			2																													2	10	dublin
eimsbuettel							1		1						1	1	1					1								2		8	11	eimsbuettel
enteritidis				1									2		1																	4	15	enteritidis
gallinarum			1												1											2					1	5	6	gallinarum
give			4																													4	10	give
heidelberg			5				4	2		1					19	2									3			2		3	5	46	98	heidelberg
indiana									2			1																				3	10	indiana
infantis		1	1				2	3		3			1		1									3	1							16	56	infantis
java			1																							1						2	7	java
kentucky								1							3																	4	5	kentucky
kottbus							1																									1	1	kottbus
livingstone			3																					4								7	12	livingstone
manhattan		2	3										1																			6	10	manhattan
meleagridis			1																												1	2	4	meleagridis
miami			1																									1				2	2	miami
montevideo		1	5				4	1		2			1		6	1								3			1					25	37	montevideo
muenchen			1						2																			1				4	4	muenchen
newington			7			2		1							1					1												11	17	newington
newport			1							1					1						2											5	21	newport
ohio										7					1																	8	8	ohio
oranienburg			1				2	3			19		1											7								33	48	oranienburg
orion																															2	2	7	orion
panama																												2				2	2	panama
pollorum																			2													2	12	pollorum
reading			1																										1			2	2	reading
saint-paul			2							1					12									1	5					4	1	26	80	saint-paul
san-diego			10																				1									11	22	san-diego
schwarzengrund		1	8						1						1											1						12	20	schwarzengrund
senftenberg			2					2		7					4	2								1				6				24	29	senftenberg
siegburg														2																		2	2	siegburg
simsbury			1																													1	2	simsbury
taksony			1																													1	1	taksony
tennessee			5		1					2		1												1								10	20	tennessee
thompson		3	4				5		2				7						1													22	36	thompson
typhi-murium		6	21		4	4	1	4	5	1	1	1	1	12	10			1		3				2	10					1	2	90	151	typhi-murium
typhi-murium v cop		2					7		1				1	2	1	7	1							1		1					1	25	40	typhi-murium v cop
typhi-suis			1																													1	1	typhi-suis
worthington			1					3		3						1																8	8	worthington
untypable group I			1																													1	1	untypable group I
unknown			1																													1	1	unknown
Total	5	20	113	2	5	14	29	27	21	29	20	3	15	17	72	19	4	1	3	4	2	2	1	23	21	7	1	13	2	12	15	522	1,047	Total

*Includes January late reports.
NY-A - New York, Albany

Source: National Disease Laboratory, Ames, Iowa, weekly Salmonella Reports from individual States and US-FDA-Division of Microbiology, Washington, D.C.

TABLE V-A
OTHER SEROTYPES REPORTED DURING 1966
FROM NONHUMAN SOURCES

SEROTYPE	MONTH(S)	REPORTING CENTER(S)	NUMBER OF ISOLATIONS
amsterdam	Jan	Ohio	1
babelsberg	Jan	Ind	1
bovis-morbificans	Jan	Calif	1
bradford	Jan	NJ	1
california	Jan	Miss(1)	
	Jan	Tex(1)	2
eppendorf	Jan	NJ	1
hamilton	Jan	La	1
lexington	Jan	Calif	1
manila	Jan	Ind	1
minnesota	Jan	Calif	1
oslo	Jan	Calif	1
pharr	Jan	Mich	1
thomasville	Jan	Calif	1
tuebinger	Jan	Mich	1
typhi	Jan	Mo	1
Total			16