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CDC

NATIONAL
COMMUNICABLE DISEASE CENTER

SALMONELLA

SURVEILLANCE

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FOR THE MONTH OF JUNE

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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

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I. SUMMARY

This issue of the Salmonella Surveillance Report contains reports of two outbreaks of typhoid fever and a large epidemic following a banquet in Tennessee. In addition, a summary of the U.S. Department of Agriculture's testing program in dry milk plants is included.

In June 1967, 1,473 isolations of salmonellae were reported from humans, an average of 368 isolations per week (Tables I and II). This number represents an increase of 10 (2.8 percent) over the weekly average of May 1967 and a decrease of 57 (13.4 percent) from the weekly average of June 1966.

Reports of 550 nonhuman isolations of salmonellae were received during June, a decrease of 3 (0.5 percent) from May 1967 (Tables IV, V, and VI).

Dr. Bernard Aserkoff has joined the Salmonellosis Unit, replacing Dr. L. Ariel Thomson, who is now pursuing graduate studies at the University of Michigan in Ann Arbor.

II. REPORTS OF ISOLATIONS FROM THE STATES

A. HUMAN

The seven most frequently reported serotypes during June were:

Rank	Serotype	Number	Percent	Rank Last Month
1	*S. typhi-murium* and *S. typhi-murium var. copenhagen*	467	31.7	1
2	*S. heidelberg*	123	8.4	2
3	*S. enteritidis*	107	7.3	3
4	*S. newport*	101	6.9	7
5	*S. saint-paul*	76	5.2	Not listed
6	*S. typhi*	69	4.7	6
7	*S. infantis*	65	4.4	5
7	*S. montevideo*	65	4.4	Not listed
	Total	1073	72.8	
	Total (all serotypes)	1473		

The age and sex distribution is shown in Table III.

B. NONHUMAN

Thirty states reported nonhuman isolations of salmonellae, in which 59 different serotypes were represented.

The seven most frequently reported serotypes during June were:

Rank	Serotype	Predominant Source and Number	Number	Percent	Rank Last Month
1	S. typhi-murium and S. typhi-murium var. copenhagen	horses (16) and cattle (16)	79	14.4	1
2	S. tennessee	dry milk (46)	74	13.5	Not listed
3	S. montevideo	bone meal/meat scraps (13)	36	6.5	3
4	S. saint-paul	turkeys (23)	30	5.5	Not listed
5	S. anatum	(none)	27	4.9	6
6	S. derby	yeast (9)	25	4.5	Not listed
7	S. newington	dry milk (9)	24	4.4	Not listed
	Total		295	53.6	
	Total (all serotypes)		550		

The most prominent nonhuman sources of salmonellae reported during June were turkeys, 91 (16.5 percent); dry milk, 86 (15.6 percent); animal feed, 62 (11.3 percent); bone meal/meat scraps, 37 (6.7 percent); and eggs, 32 (5.8 percent).

III. CURRENT INVESTIGATIONS

Progress Report - Interstate Outbreak of Salmonellosis Related to Nonfat Dry Milk

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

The USDA has collected product and environmental samples from approximately 200 dry milk plants in 19 states and has examined these samples for the presence of salmonella. Results of examinations for the first 6 months of 1967 are listed below:

Month	Product Samples	No. Products Positive for Salmonella	Environmental Samples	No. Positive
January	567	5	187	17
February	480	7	364	27
March	823	8	166	22
April	824	7	341	25
May	421	2	247	15
June	200	2	170	15
Total	3315	34 (1.0%)	1475	121 (8.2%)

A total of 21 different serotypes were isolated.

EDITOR'S COMMENT: These data are quite similar to the results for the last 9 months of 1966. During that period (See SSR #57) 5,884 tests were run, with 1.0 percent of the product samples and 4.6 percent of the environmental samples containing salmonellae.

IV. REPORTS FROM THE STATES

A. CALIFORNIA

Typhoid Fever at Stanford University

Reported by Philip K. Condit, M.D., Chief, Bureau of Communicable Diseases, and Henry A. Renteln, M.D., Head, General Epidemiology Section, California State Department of Public Health; Mary Clark, M.D., Santa Clara County Health Department; Rodney Beard, M.D., Professor of Preventive Medicine, Stanford University; and John Bolton, M.D., EIS Officer assigned to the California State Department of Public Health.

An outbreak of 31 cases of typhoid fever occurred at Stanford University between May 10 and May 31, 1967. The outbreak involved 30 of the 72 members of one fraternity (including 4 championship swimmers) and one of the two fraternity-house cooks. Diagnosis was first made on a student who was admitted to the campus infirmary on May 19 with a history of fever and chills of 5 days' duration. An initial diagnosis of infectious mononucleosis was made, but the diagnosis of typhoid fever was established when routine agglutinations showed a high titer to typhoid H and a blood culture was positive for *Salmonella typhi*.

Subsequently, a total of 31 cases were confirmed. All but 3 of the patients - 2 fraternity members and the cook - were symptomatic; 20 were hospitalized. Typical symptoms were fever to 104° F, chills, weakness, backache, and headache. There were no complications or deaths. Stool cultures, blood cultures, or both, were positive for *S. typhi*, phage type B_1, from all but 1 of the patients, and he had a fourfold rise in antibody titer. No cases occurred among non-members of the fraternity.

The fraternity involved is 1 of 24 on the Stanford campus. Among its 51 active members and 21 pledges are several members of varsity football and swimming teams. Only 29 men live within the fraternity house itself, although many who live off campus eat regularly at the fraternity.

It was initially felt that potato salad prepared by the cook and served at a luau on May 6 was the vehicle of infection. However, further investigation showed that only 25 of 109 persons who attended the party became ill. These illnesses affected only fraternity members, and none of the 50 women guests became ill. Furthermore, the attack rate was as high for members who did not attend the party as for those who did.

Inspection of the fraternity house showed a low level of sanitation. The campus health officer reported that inspections of the fraternity kitchen had resulted in unfavorable reports on many previous occasions. Although the conditions were initially corrected, disorder soon returned. The kitchen is located directly below one of the second-floor bathrooms. In the past this toilet has overflowed into the kitchen below, and the kitchen ceiling shows buckling from previous water damage.

During a water fight on May 2, the second floor fire hose burst, flooding the kitchen (via the bathroom) with 2 to 3 inches of unchlorinated lake water from the Searsville-Felt system. This system drains directly from Searsville Lake and pipes unchlorinated water around the campus to hydrants and outside tops. It is not potable water, and although students have been warned to refrain from drinking it, the practice is not uncommon.

Examination of the ill group disclosed that 30 of the 31 patients ate their meals at the fraternity. Attack rates were proportional to the frequency with which meals were taken at the fraternity.

Ate at Fraternity	Total	No. Ill	Attack Rate
Regularly	48	27	56.3%
Occasionally	18	3	16.7%
Never	6	0	0.0%

The highest attack rate was in the group of 13 student food handlers, 10 of whom (76.9 percent) were ill.

The disease seemed to have emanated from the fraternity kitchen, but the source of the epidemic was unclear. In the 6 weeks before the epidemic, at least 7 fraternity members traveled in areas where typhoid fever is endemic. A group of 4 students visited Mexico in March, where 1 became ill with diarrhea, fever, chills, and weakness and was treated with tetracycline. No cultures were taken at that time. Three of these 4 students are now positive for S. typhi, including the 1 who had been ill in Mexico. He was employed as a hasher in the fraternity kitchen and is 1 of the 3 cases who have remained asymptomatic. Another group of 3 students journeyed to Lima, Peru, following the AAU swimming meet in Dallas in April. While there, 1 of the boys developed diarrhea which persisted for a week and ended several days after his return to the fraternity house. He later became ill with typhoid.

The cooks, who were employed in September 1966, gave no history of typhoid fever or foreign travel and had never been identified as typhoid carriers. Neither had been ill before the outbreak.

Control measures included closing the fraternity kitchen, forbidding men with positive cultures to either swim or serve as food handlers until their cultures have become negative, and vaccinating all members with typhoid vaccine. The school year ended in early June, and all members have departed for their respective homes.

EDITOR'S COMMENT: This is the largest reported outbreak of typhoid fever in this country in at least the past 5 years. While the disease was obviously spread by the fraternity kitchen, the actual source and vehicle of contamination remain unknown. The multiple possible sources of contamination include the leaking toilets directly over the kitchen, the students who had traveled to foreign areas just before the outbreak, unchlorinated water from Searsville Lake, and the fraternity house cook.

B. COLORADO

Typhoid Fever in Colorado

Reported by C. S. Mollohan, M.D., Chief, Epidemiology Section, Colorado State Department of Public Health, and Gordon Reid, M.D., EIS Officer assigned to the Colorado State Department of Public Health.

An outbreak of typhoid fever involving 11 persons, all distant relatives, has been traced to a luncheon served in San Acacia, Colorado, on February 3, 1967, which was attended by 55 persons. The index case was a 22-year-old male who developed chills, headache, tachypnea, and malaise on February 20, 1967. Diagnosis was made after a blood culture showed Salmonella typhi. Ten additional cases with similar but less severe symptoms occurred in the next 2 weeks; 8 were confirmed by isolation of S. typhi from the blood, and the remaining 2 cases were confirmed serologically. Nine of the 11 cases occurred in children or adolescents.

Food histories were attempted, but none of the patients could recall the specific items consumed. All food served had been prepared by 5 persons attending the luncheon. Water had been obtained from a private well, and water samples taken 6 weeks after the luncheon were negative for bacterial growth. Stool cultures were obtained from the persons involved in preparing the food and their families, and from close

contacts of the cases. Only 1 asymptomatic person was found to be carrying S. typhi. This was a 61-year-old diabetic woman who lived next door to the home where the luncheon was held and who had helped with preparations for the luncheon. She recalled having had typhoid fever in 1932. Despite two courses of treatment with chloramphenicol, she has remained positive for S. typhi. Follow-up stool specimens on all symptomatic cases have thus far been negative.

Control measures consisted of immunization of close contacts of patients with typhoid vaccine and surveillance of these persons for development of symptoms suggestive of typhoid fever. To date there have been no subsequent cases of typhoid fever in Colorado.

C. TENNESSEE

Outbreak of Salmonella typhi-murium Traced to a Banquet

Reported by Cecil B. Tucker, M.D., Director, Division of Preventable Diseases, Tennessee State Department of Public Health, and William Cook, M.D., Health Officer, Maury County Health Department.

An outbreak of gastroenteritis involving over 200 members of an international service organization occurred following a banquet held in Columbia, Tennessee, on April 10, 1967. The dinner was served to about 602 members, wives, and guests. Beginning approximately 6 hours after the banquet, many persons became ill with gastroenteritis, and several were hospitalized.

Questionnaires inquiring about symptoms and food histories were completed by 412 persons who attended the banquet. Of the 412 persons, 147 (35.7 percent) became ill. Predominant symptoms were diarrhea (90 percent), abdominal cramps (84 percent), fever (66 percent), nausea (51 percent), and vomiting (21 percent). There was no difference in attack rates by age or sex. Incubation periods varied from 3 to 76 hours, with a median of 32.5 hours. Food histories on 18 different food items revealed no significant difference in attack rates between those eating and not eating the particular foods, except for potato salad. Of those consuming potato salad, 41.3 percent became ill, as compared to 25.7 percent of those who did not eat the salad ($P < 0.01$).

Stool specimens were collected within 72 hours of onset of illness from 5 persons attending the dinner. Salmonella typhi-murium var. copenhagen was isolated from 4 of these persons. Stool cultures on all food handlers were negative for salmonella.

The potato salad had been commercially prepared by an out-of-state company. It was packed in 3 1/8 pound cans and contained dehydrated potatoes, mayonnaise, vinegar, sugar, corn starch, corn syrup, green peppers, dehydrated onions, red pepper, salt, monosodium glutamate, water, and flavoring. The cans are autoclaved before shipment. The potato salad was not opened until the meal was served. The only food that remained at the time of investigation was unopened cans of potato salad. One can was examined and was negative for salmonella.

EDITOR'S COMMENT: Although food histories point to potato salad as the vehicle of contamination, no salmonellae were isolated from the one can examined. Since the product is autoclaved, contamination after the can was opened seems more likely as a source of the salmonella.

D. ILLINOIS

Survey of Animal By-Products

Reported by G. G. Jelly, D.V.M., Supervisor, Peoria Diagnostic Laboratory, and V. E. Peterson, Microbiologist, Division of Livestock Industry, Department of Agriculture, State of Illinois.

In January of 1967, a survey was made at an Illinois animal by-products plant to determine the amount of salmonella in its products. This plant is primarily a blending operation, and all shipments received have already been rendered. Approximately 70 percent of the shipments originated outside the state of Illinois. After arrival at the plant, the products are then ground and blended into a finished product. Ordinarily, no heat treatment is utilized.

Incoming shipments were sampled in order to determine where salmonella contamination was originating. Samples were obtained by the plant personnel at the rate of 2 samples per truck load and 4 samples per railroad car. The samples were obtained from within the shipment to minimize the chance of contamination from the transporting vehicle. The results of this sampling showed that 39.4 percent of 66 shipments and 21.5 percent of 186 samples were positive for salmonella.

Serotyping of isolates was done at the National Animal Disease Laboratory at Ames, Iowa, and a total of 21 different serotypes were isolated.

V. SPECIAL REPORTS

NONE

VI. INTERNATIONAL

NEW ZEALAND

Isolations of Salmonellae from Humans and Nonhumans, 1962 - 1966

Reported by J. D. Manning, M.D., M.C. Path., Dipl. Bact., Director, Department of Health, National Health Institute, Wellington.

A total of 850 human and 417 nonhuman isolations of salmonella have been identified at the National Health Institute in the 5 years from 1962 to 1966.

The five most common serotypes for humans and nonhumans are as follows.

	HUMAN		NONHUMAN	
Rank	Serotype	No. Isolations	Serotype	No. Isolations
1	S. typhi-murium and S. typhi-murium var. copenhagen	481	S. anatum	94
2	S. typhi	162	S. bovis-morbificans	79
3	S. anatum	62	S. derby	66
4	S. bovis-morbificans	54	S. typhi-murium and S. typhi-murium var. copenhagen	42
5	S. derby	54	S. newington	36

II. FOOD AND FEED SURVEILLANCE

Recommendations on "Destination of Salmonella Contaminated Foods and Feeds." Developed by a Committee of the World Association of Veterinary Food-Hygienists at the National Institute of Health, Bilthoven, Netherlands. Participants in the Conference represented 11 countries in Western Europe and North America and met on May 3-5, 1967.

. Salmonellosis is a serious public health problem on a world-wide scale, affecting millions of persons. It also creates important economic problems.

. National Salmonella Surveillance should be inaugurated as soon as possible in countries where it does not presently exist. The program should be a joint effort of public health and animal health services and coordinated with the WHO International Salmonella Surveillance Program.

. An internationally acceptable system of sampling and laboratory methodology for the isolation of salmonellae, suitable for all pertinent materials including foods and feeds, must be developed and tested collaboratively. Formal training for microbiologists in these procedures should be provided.

. A primary responsibility of the food and feed industries and of the relevant government agencies is to eliminate salmonellae from food and feed products generally known or suspected to be implicated in human and animal disease outbreaks.

. Reduction in the incidence of salmonellae requires better animal practices of which essential elements are improved animal husbandry, avoidance of overcrowding and movement of very young stock, and the control of the bacteriological condition of mixed feeds. In connection with these measures the control of salmonella infections in flocks and herds should be based on sound epidemiological investigations. In some countries success has been achieved with the use of salmonella controlled feed and preventive veterinary medical practices.

. Animals in transport and in lairages should not be overcrowded and should not be held for long periods. Lairages should be sanitary. To reduce contamination of meat products with salmonellae the following points are important in abattoirs and meat processing establishments: separation of "clean and unclean" departments, the maintenance of a high standard of cleanliness throughout the abattoir, proper lay-out of the killing and processing line, hygienic handling and processing of meat, and the provision of hygienic facilities for plant personnel.

. Public health education in meat and food hygiene should start in primary schools and continue in technical colleges. The aim should be to educate all food handlers and processors about methods for the prevention of salmonellosis. Consumers should be informed that foods of animal origin must be stored at temperatures that will prevent the growth of salmonellae before and after preparation and that raw products must be heated sufficiently to kill these organisms.

. Selection of methods for the examination of food and feed samples should be based on comparative tests carried out internationally. If possible, sampling should be based upon statistical principles which will permit the expression of calculated limits of acceptance. Increasingly stringent criteria for rejection should be instituted. The limits of acceptance should be considered in relation to the following factors:

a. The importance of a particular product, considering the nutritional or economic priorities within the country concerned.
b. The national salmonella situation; for example, where the incidence of salmonellosis is low, limits of acceptability should be strict.

c. Specific epidemiological evidence that a particular product is especially dangerous.
d. Processed manufactured products which may be subject to recontamination should be more rigidly controlled than raw products.

9. Imports of essential food and feed products, when found to be contaminated with salmonellae, should be regularly examined until a decision is reached whether to:

a. discontinue importation from the country which does not show the necessary improvement in hygienic standards;
b. institute some obligatory form of treatment such as heating, pelleting, solvent extraction, or, when permitted, irradiation to prevent loss of food or feedstuffs and to facilitate distribution.

10. Certificates which guarantee that foods and feeds are free from salmonellae are misleading because in the present stage of the art of production and processing of certain foods and feeds, it is impossible to guarantee the absence of these organisms. Also, importing countries should not exert pressure on the authorities in exporting countries to issue such certificates. If, nevertheless, certificates relating to salmonellae are used, they should (1) describe the methods of processing, if any, that have been used to destroy these organisms and (2) give details of the techniques used for sampling and examination and the results obtained.

11. The effect of severe trade restrictions on the need for protein foods and on the food industry should be seriously considered. The world need for food increases annually with the expanding human population; hence, it is necessary to salvage food.

12. In view of the hazard of salmonellosis to patients and hospital populations, particular attention should be paid to proper procurement of safe foods and the highest standard of sanitation in the preparation and service of meals in hospitals. The same precautions should be taken in the preparation and service of food in nurseries, kindergartens, and homes for the aged.

13. The Salmonella Committee of the W.A.V.F.H. recommends to WHO/FAO that an expert advisory panel on salmonellosis be established to study and advise on this world problem.

TABLE I

COMMON SALMONELLA SEROTYPES ISOLATED FROM HUMANS IN THE UNITED STATES DURING JUNE, 1967

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	2	1		2			3														2		2	anatum
bareilly											2		2			1			1			1				1										bareilly
berta																														1		1			2	berta
blockley				9			9		1			2	3	1		2			3	1		2					3		1	1		1		4	3	10	blockley
braenderup										1	1		2									1				1										braenderup
bredeney																		2	2																	bredeney
chester																1			1													2		1		3	chester
cholerae-suis v.k.																																				cholerae-suis v.k.
cubana																	1		1																1	1	cubana
derby												2	2			2		1	3	1		3				1	5							4	1	5	derby
enteritidis				5		1	6		3	2	2	15	22	8	1	18	4	1	32	3						1	4		3	1	9		3	19		35	enteritidis
give																																			1	1	give
heidelberg				4		4	8		1	6	5	7	19	7	3	4	2		16	1	1	5				1	8		1		7		10		1	6	25	heidelberg
indiana												1	1																								indiana
infantis				7			7		1	1	1	1	4	1			4	5	10	1	2	1				1	5		1		1		1		5	8	infantis
java				2			2					3	3	6		1			7													1				1	java
javiana														2		1	1		4	2		1					3								10	10	javiana
kentucky																																				kentucky
litchfield										2			2	1					1											1		3		1		5	litchfield
livingstone														3		1			4	2							2		1							1	livingstone
manhattan														1		3	1		5							1	1						2	1	3	manhattan
meleagridis																																				meleagridis
miami																																			3	3	miami
mississippi																																		2		2	mississippi
montevideo				1		1	2		3	42		1	46		1	5	1		7							2	2			1				1		2	montevideo
muenchen				1		1	2		1		2	1	4	2				1	3			7					7								3	3	muenchen
newington																																				newington
newport	1		1				2		2	2	2	10	16	1		7	6		14		3	1				7	11	1			1	8	1	2	8	21	newport
oranienburg										1	1		2	1		2		2	5							1	1	2						4	1	7	oranienburg
panama									1				1			1			1	1	1						2										panama
paratyphi B				1			1							1					1																		paratyphi B
poona																																				poona
saint-paul				5		1	6		2	3	2	1	8	1		19	1	3	24	1	1	1					3		2		7		2	4	1	16	saint-paul
san-diego				4			4																						1				1			2	san-diego
schwarzengrund				1			1																														schwarzengrund
senftenberg																2			2																2	2	senftenberg
tennessee										1			1									1	1				2								1	1	tennessee
thompson						2	2		1	1			2	1		2	2		5											1				1		2	thompson
typhi								1	1	1		1	4		1				1	1						2	3		1		1		2		3		7	typhi
typhi-murium	1		1	38	1	5	46		11	12	19	27	69	18	9	26	12	12	77	4	4	15				11	34	1	7	1	9		12		10	16	56	typhi-murium
typhi-murium v.c.				8		2	10				5	3	8				4		4																		typhi-murium v.c.
urbana																																				urbana
weltevreden																																				weltevreden
worthington																														1					1	worthington
untypable group B		4			1		5																						3				1		4	untypable group B
untypable group C1																																				untypable group C1
untypable group C2																																				untypable group C2
untypable group D																													2						2	untypable group D
untypable group E																																				untypable group E
untypable or unknown																		1	1				2		1		3		1							1	untypable or unknown
TOTAL COMMON	2	4	2	87	2	17	114	1	29	75	42	76	223	56	15	100	39	28	238	18	12	39	3	0	1	28	101	4	18	9	40	8	40	0	62	63	244	TOTAL COMMON
TOTAL OTHER	0	0	0	2	2	0	4	0	1	1	0	0	2	0	1	0	0	1	2	2	0	2	0	0	0	0	4	0	0	0	0	0	1	0	5	0	6	TOTAL OTHER
GRAND TOTAL	2	4	2	89	4	17	118	1	30	76	42	76	225	56	16	100	39	29	240	20	12	41	3	0	1	28	105	4	18	9	40	8	41	0	67	63	250	GRAND TOTAL

(New York, A-Albany, BI-Beth Israel, 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 NY-BI. Beth-Israel reported a total of 103 isolations for June.

TABLE I (Continued)

SEROTYPE	GEOGRAPHIC DIVISION AND REPORTING CENTER																							June Total	% of June Total	1967 Jan.-June Total	% of 1967 Jan.-June Total	1966 Jan.-June Total	% of 1966 Jan.-June Total	SEROTYPE
	EAST SOUTH CENTRAL					WEST SOUTH CENTRAL					MOUNTAIN									PACIFIC						OTHER						
	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							4			4												10			10		22	1.5	149	1.7	146	1.7	anatum
bareilly							1			1																	5	0.3	27	0.3	20	0.2	bareilly
berta																											2	0.1	18	0.2	19	0.2	berta
blockley		1	1		2		1		1	2		2		1			2		5	2	2	3			7		44	3.0	276	3.2	319	3.6	blockley
braenderup		1			1																						4	0.3	38	0.4	46	0.5	braenderup
bredeney		1			1		1		1	2												3			3		8	0.5	53	0.6	57	0.6	bredeney
chester																											4	0.3	40	0.5	61	0.7	chester
cholerae-suis v.k.																											0	0.0	8	0.09	14	0.2	cholerae-suis v.k.
cubana									1	1																	3	0.2	36	0.4	87	1.0	cubana
derby																1			1			2		2	4		20	1.4	160	1.9	175	2.0	derby
enteritidis			1		1			2		2							2		2	1		2			3		107	7.3	482	5.6	578	6.5	enteritidis
give							1			1																	2	0.1	30	0.4	36	0.4	give
heidelberg		1			1		2		2	4						1	6		7	5	2	27		1	35		123	8.4	745	8.7	723	8.1	heidelberg
indiana																											1	0.07	23	0.3	42	0.5	indiana
infantis		2	2		4		2	1		3										1		18		5	24		65	4.4	421	4.9	726	8.2	infantis
java							4			4												5			5		22	1.5	140	1.6	200	2.3	java
javiana		1			1	1		1	9	11																	29	2.0	116	1.4	89	1.0	javiana
kentucky																											0	0.0	16	0.2	9	0.1	kentucky
litchfield																											8	0.5	36	0.4	28	0.3	litchfield
livingstone																						1			1		8	0.5	38	0.4	11	0.1	livingstone
manhattan		2			2																1	1		1	3		14	1.0	134	1.6	46	0.5	manhattan
meleagridis							1			1																	1	0.07	5	0.06	4	0.0	meleagridis
miami																											3	0.2	17	0.2	26	0.3	miami
mississippi							2		2	4																	6	0.4	24	0.3	21	0.2	mississippi
montevideo		1	1		2									2					2			2			2		65	4.4	210	2.5	145	1.6	montevideo
muenchen		1			1		2			2												1			1		23	1.6	106	1.2	90	1.0	muenchen
newington		1			1		1			1																	2	0.1	25	0.3	23	0.3	newington
newport		1			1	3	6		14	23				2					2	2		9			11		101	6.9	445	5.2	490	5.5	newport
oranienburg	1				1				2	2														1	1		19	1.3	170	2.0	208	2.3	oranienburg
panama		1			1															1				10	11		16	1.1	91	1.1	116	1.3	panama
paratyphi B									1	1										2	1				3		6	0.4	38	0.4	83	0.9	paratyphi B
poona																						1			1		1	0.07	19	0.2	18	0.2	poona
saint-paul		4			4		1			1				1					1	3	1	8		1	13		76	5.2	338	4.0	333	3.8	saint-paul
san-diego									1	1										1		2			3		10	0.7	101	1.2	55	0.6	san-diego
schwarzengrund									1	1										1		1			2		4	0.3	37	0.4	23	0.3	schwarzengrund
senftenberg							2			2																	6	0.4	26	0.3	23	0.3	senftenberg
tennessee												2							2								6	0.4	37	0.4	64	0.7	tennessee
thompson			1		1				1	1											2	1			3		16	1.1	147	1.7	254	2.9	thompson
typhi	4	1			5	6	1		1	8				1					1	1	5	34			40		69	4.7	335	3.9	335	3.8	typhi
typhi-murium	3	3	8	1	15	3	13	14	21	51				6			1	10	17	26		39		14	79		444	30.1	2568	30.0	2432	27.4	typhi-murium
typhi-murium v.c.																1			1								23	1.6	129	1.5	77	0.9	typhi-murium v.c.
urbana																											0	0.0	12	0.1	13	0.1	urbana
weltevreden																								7	7		7	0.5	40	0.5	16	0.2	weltevreden
worthington																						1		1	2		3	0.2	14	0.2	24	0.3	worthington
untypable group B			1	2	3	3				3					3				3			1	1		2		20	1.4	144	1.7	165	1.9	untypable group B
untypable group C1	1				1				1	1					1				1								3	0.2	96	1.1	54	0.6	untypable group C1
untypable group C2						2				2					2				2								4	0.3	20	0.2	14	0.2	untypable group C2
untypable group D																											2	0.1	22	0.3	22	0.3	untypable group D
untypable group E						1				1																	1	0.07	9	0.1	6	0.1	untypable group E
untypable or unknown				2	2				6	6																	13	0.9	74	0.9	40	0.5	untypable or unknown
TOTAL COMMON	9	22	15	5	51	19	45	18	65	147	0	4	0	13	6	3	11	10	47	46	14	172	1	43	276		1441	97.8	8285	96.9	8606	97.0	TOTAL COMMON
TOTAL OTHER	0	0	0	0	0	0	2	0	3	5	0	0	0	0	1	0	0	0	1	0	1	4	0	3	8		32	2.2	262	3.1	271	3.0	TOTAL OTHER
GRAND TOTAL	9	22	15	5	51	19	47	18	68	152	0	4	0	13	7	3	11	10	48	46	15	176	1	46	284		1473		8547		8877		GRAND TOTAL

TABLE II

UNCOMMON SALMONELLA SEROTYPES ISOLATED FROM HUMANS DURING JUNE, 1967

SEROTYPE	REPORTING CENTER																June Total	1967 Jan.-June Total	SEROTYPE
	Cal	Ga	Hai	Ind	La	Mass	Minn	Mo	NM	NY-BI	NY-C	NC	Ore	RI	Tex	Wisc			
atlanta		2															2	5	atlanta
brandenburg															1		1	1	brandenburg
concord							1										1	1	concord
eimsbuettel														1			1	14	eimsbuettel
hartford		2				1						1					4	12	hartford
ibadan															1		1	1	ibadan
irenea						1											1	1	irenea
irumu	1		1					1									3	7	irumu
johannesburg																1	1	9	johannesburg
lomita										1							1	2	lomita
london	1																1	3	london
luciana															1		1	1	luciana
madelia		1															1	4	madelia
minnesota				1													1	8	minnesota
mission			2														2	10	mission
muenster	1						1										2	14	muenster
norwich					1												1	9	norwich
reading	1										1		1				3	26	reading
rubislaw					1			1									2	13	rubislaw
untypable group A									1								1	1	untypable group A
untypable group I														1			1	1	untypable group I
TOTAL	4	5	3	1	2	2	2	2	1	1	1	1	1	2	3	1	32	264	TOTAL

TABLE III

Age and Sex Distribution of Individuals Reported as Harboring Salmonellae During June 1967

Age (Years)	Male	Female	Unknown	Total	Percent	Cumulative Percent
< 1	67	78	2	147	15.0	15.0
1 - 4	136	118	1	255	26.1	41.1
5 - 9	84	63	1	148	15.1	56.2
10 - 19	68	50	1	119	12.2	68.4
20 - 29	41	43		84	8.6	77.0
30 - 39	21	31	1	53	5.4	82.4
40 - 49	22	37		59	6.0	88.4
50 - 59	16	27		43	4.4	92.8
60 - 69	18	16		34	3.5	96.3
70 - 79	9	18		27	2.8	99.1
80 +	3	5	1	9	0.9	100.0
Subtotal	485	486	7	978		
Child (Unspec.)	9	5	3	17		
Adult (Unspec.)	7	11		18		
Unknown	228	193	39	460		
Total	729	695	49	1473		
Percent of Total	51.2	48.8				

TABLE IV
REPORTED NONHUMAN ISOLATES BY SEROTYPE AND SOURCE, *JUNE, 1967

SEROTYPE	chicken	turkey	pigeon	pheasant	avian	equine	bovine	ovine	porcine	canine	feline	lab mouse	lab rat	guinea pig	monkey	ape	mink	zoo animal, unknown	elk	fox	animal, unknown	eggs	egg yolk	frozen egg yolk	frozen egg	frozen egg albumin	powdered egg albumin	egg product	cracklings	meat, unknown	meat, dessert, unspecified	chocolate drink mix	candy	dry milk	milk	yeast	milk products	pet food, unknown	livestock feed	feather meal	bone meal/ meat scraps	animal feed, unknown	horse meat	feed, dry milk supplement	tankage	snake	lizard	drinking water	turtle water	hay water	animal waste	compost	milk drying plant environment	glandular material, unspecified	unknown	TOTAL	# MONTHS TOTAL	SEROTYPE
adelaide															1																																								1	1	adelaide
alachua																																	4																								5	87	alachua
anatum	1	2					4			4								1		2												3	2			1				3		1												27	230	anatum
barielly																																								4		1												5	23	barielly
berta							4																																															4	6	berta
binza																																	3								1													4	101	binza
blockley		9		2																																					1												1	13	52	blockley
braenderup										8																															1												9	41	braenderup
bredeney	1	1																																							2			1										5	89	bredeney
california																																							1														1	7	california
cerro																													1												3												4	38	cerro
chester	1	1																																														1					3	30	chester
cholerae-suis									1																																												1	4	cholerae-suis
cubana																																	4		1						1	3										3		12	157	cubana
derby		2							1													6																				1	3	2										1	25	321	derby
drypool																																										1												1	18	drypool
dublin							3																																															3	5	dublin
duisburg																																																							1	1	duisburg
eimsbuettel																																										1												12	106	eimsbuettel
gallinarum																								2																			1												2	7	gallinarum
gaminara										1																																												1	3	gaminara
grumpensis																																										1												1	3	grumpensis
halmstad																																										3												3	3	halmstad
hato																																										1												1	1	hato
heidelberg	1	14								1		2																															1												19	262	heidelberg
indiana																					2																																	2	9	indiana
infantis	5	2																				2	1											1								2								1				14	199	infantis
java																																																2						2	10	java
javiana																																											1												2	10	javiana
kentucky					1																																				1	1									1			4	40	kentucky
kottbus	1																																																				1	1	kottbus
lexington																																										1												1	12	lexington
livingstone																												4														3												7	46	livingstone
manhattan																																																						1	15	manhattan
minnesopolis																																	8																				1	8	29	minnesopolis
minnesota	1				2																																					3		1											7	29	minnesota
montevideo	3	11																									1						4								13	3		1										36	162	montevideo
muenchen																																																					7	8	62	muenchen
newington																										2						5	9								2	4											2	24	120	newington
newport										3		2	1																																								2	10	85	newport
oranienburg																						1						1	1																									1	5	101	oranienburg
orion																																		1								2	1											2	5	14	orion
paratyphi-B																																																					1	1	1	paratyphi-B
pullorum	3																																																				3	26	pullorum
putten															1																																							1	1	putten
reading	2	3																																																				13	66	reading
saint-paul	1	23	1						2					1								1																																	1	30	219	saint-paul
san-diego		5																																																				5	44	san-diego
saphra													1																																									1	1	saphra
schwarzengrund		3																																																				6	77	schwarzengrund
senftenburg		4																															2			1					1	1	7												17	127	senftenburg
tennessee		2																				22						2				1	46										1											1	74	155	tennessee
thomasville																																																						1	8	thomasville
thompson	2																								1																													1	4	85	thompson
typhi-murium	3	8	2		1	16	14	1	2		1			2		1	1		1							1				13			1	1							3								1				73	464	typhi-murium
typhi-murium v cop	1		2				2													1																																			6	88	typhi-murium v cop
typhi-suis									1																																												1	7	typhi-suis
westhampton		1																																																			1	14	westhampton
worthington																							2										2																					1	7	80	worthington
untypable group K																																																						4	7	untypable group K
untypable group O							1																																														1	3	untypable group O
unknown																																																						1	8	unknown
TOTAL	26	91	5	2	4	16	28	1	7	17	1	4	2	3	1	2	1	1	3	1	2	32	3	2	1	1	2	2	7	1	13	1	8	86	1	10	2	1	1	2	37	62	6	6	4	1	2	4	5	2	1	2	10	9	5	550	4,394	TOTAL

*Includes May late reports.

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

TABLE V

REPORTED NONHUMAN ISOLATES BY SEROTYPE AND STATE, *JUNE, 1967

SEROTYPE	ARIZ	CAL	CONN	DC	FLA	ILL	IND	IOWA	KAN	LA	MD	MASS	MICH	MINN	MISS	MO	NEB	NJ	NY-A	OHIO	OKLA	PA	SD	TENN	TEX	VA	WASH	WVA	WISC	WYO	TOTAL	6 MOS TOTAL	SEROTYPE
adelaide						1																									1	1	adelaide
alachua							4						1																		5	87	alachua
anatum	3	5		1		2		4	1					5		3						3									27	250	anatum
bareilly						3								1	1																5	23	barielly
berta	4																														4	6	berta
binza						3								1																	4	101	binza
blockley		11							1																1						13	52	blockley
braenderup								8							1																9	41	braenderup
bredeney										1				3		1															5	89	bredeney
california																								1							1	7	california
cerro					1	1	1							1																	4	38	cerro
chester			1			1	1																								3	30	chester
cholerae-suis																				1											1	4	cholerae-suis
cubana						3	4						2	1	1															1	12	157	cubana
derby	1			1		1			2				3					2		6											9	25	351	derby
drypool														1																	1	18	drypool
dublin		3																													3	5	dublin
duisburg																				1											1	1	duisburg
eimsbuettel						1		1					8																		12	106	eimsbuettel
gallinarum																						2									2	7	gallinarum
gaminara																									1						1	3	gaminara
grumpensis													1																		1	3	grumpensis
halmstad													3																		3	3	halmstad
hato										1																					1	1	hato
heidelberg		6					4			1			1	5		1									1						19	262	heidelberg
indiana																				2											2	9	indiana
infantis		6					2						1	2		2														1	14	199	infantis
java																				2											2	10	java
javiana														1											1						2	10	javiana
kentucky		2					1							1																	4	40	kentucky
kottbus		1																													1	1	kottbus
lexington							1																								1	12	lexington
livingstone													4							3											7	46	livingstone
manhattan		1																													1	15	manhattan
minneapolis																				8											8	29	minneapolis
minnesota													3		1	1				2											7	29	minnesota
montevideo		1				6	1	1		1				8	1	3	4	10													36	162	montevideo
muenchen		1								4									3												8	62	muenchen
newington						2			2				12			2	1					5									24	120	newington
newport						2			2				1									1			2			2			10	85	newport
oranienburg					1		1						1							1									1		5	101	oranienburg
orion						2								2	1																5	14	orion
paratyphi-B																											1				1	1	paratyphi-B
pullorum							2																						1		3	26	pullorum
putten		1																													1	1	putten
reading		1											8			4															13	61	reading
saint-paul		3					1	2				1		4		2		14							1				2		30	219	saint-paul
san-diego		4												1																	5	44	san-diego
saphra																									1						1	1	saphra
schwarzengrund		3														3															6	77	schwarzengrund
senftenburg						3	1						4	4	2	1						1							1		17	127	senftenburg
tennessee							1				26		3				20			22	1				1						74	155	tennessee
thomasville														1																	1	8	thomasville
thompson											1		1			1									1						4	85	thompson
typhi-murium	11	27				2	3		1			1	5			1			13		5			2		1			1	73	464	typhi-murium
typhi-murium v cop	4						1							1																	6	88	typhi-murium v cop
typhi-suis														1																	1	7	typhi-suis
westhampton																						1									1	14	westhampton
worthington						3	2						2																		7	80	worthington
untypable group K													3		1																4	7	untypable group K
untypable group O																1															1	3	untypable group O
unknown																								1							1	8	unknown
TOTAL	23	76	1	2	2	36	31	16	9	8	27	2	67	44	9	26	25	26	16	48	6	11	2	1	8	5	3	2	17	1	550	4,394	TOTAL

*Includes May late reports.

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

(NYA-New York - Albany)

TABLE VI
OTHER SEROTYPES REPORTED DURING 1967
FROM NONHUMAN SOURCES

SEROTYPE	MONTH(S)	REPORTING CENTER(S)	NUMBER OF ISOLATIONS
albany	Jan	Ky(2)	
	Feb	Ill(1)	
	Feb-Mar	Miss(15)	
	Mar	Ark(1)	
	Mar	Ohio(2)	21
amager	Mar	Ill	4
arkansas	Mar	La	1
berlin	May	Pa	1
canoga	Apr	Ind	1
carrau	Jan	La	1
champaign	Feb	Minn	1
cholerae-suis v kun	Jan-Mar	Ill(3)	
	Jan-Feb-Mar-Apr-May	Ind(12)	
	Feb-Mar	Iowa(3)	
	Feb	Mo(1)	
	Feb-Apr	Pa(2)	
	Mar	Ark(1)	
	Mar-May	Cal(2)	
	Mar	Miss(1)	25
corvallis	Jan-Feb	La	3
duesseldorf	Mar	Ohio(8)	
	Apr	Mich(1)	9
eastbourne	Jan	Minn	1
enteritidis	Jan-Feb-Mar-May	Cal(9)	
	Jan-Feb-Mar	Ind(9)	
	Mar	Ark(1)	
	Mar	Conn(1)	
	Mar-Apr	Pa(2)	
	Apr-May	Minn(6)	
	May	Ohio(1)	29
gatow	Apr	Wash(4)	
	May	Kan(1)	5
give	Jan-Mar	La(18)	
	Jan	Pa(1)	
	Feb	Iowa(2)	
	Feb	Minn(1)	
	Mar	Utah(2)	
	Mar	Ariz(1)	
	May	Cal(1)	
	May	Ill(1)	
	May	Wash(1)	28
habana	Apr	Fla	2
hartford	Jan	Hai	1
illinois	Apr	Minn	1
irumu	Apr	Hai	1
johannesburg	Jan	Utah(1)	
	May	Minn(3)	4
litchfield	Feb-Mar-May	Va	3
meleagridis	Jan-Mar	Ind(2)	
	Jan-Feb-Mar	La(3)	
	Feb	Hai(1)	
	Feb-Mar-Apr	Mo(4)	
	Mar	Cal(1)	
	Mar	DC(3)	
	Apr	Ark(1)	
	Apr	Ill(1)	
	Apr	Minn(1)	17
miami	Apr	Fla	1
mission	May	Ohio	1
mississippi	Feb	La	2
mokola	Feb	La	1

TABLE VI
OTHER SEROTYPES REPORTED DURING 1967
FROM NONHUMAN SOURCES (Continued)

SEROTYPE	MONTH(S)	REPORTING CENTER(S)	NUMBER OF ISOLATIONS
muenster	Jan	Ark(2)	
	Jan-Feb	La(4)	6
new-haw	Feb	Iowa(1)	
	Apr	Ill(1)	2
okerara	Feb	La	1
oslo	Feb	Fla	2
panama	Jan-Feb-Mar-Apr	Ark(40)	
	Feb	DC(1)	
	Mar	Mo(1)	42
pomona	Jan	La	1
poona	Jan	Fla(4)	
	Jan	Ill(1)	
	Jan-Apr	Neb(7)	
	Feb	Mo(1)	
	Apr	Mich(1)	14
redlands	Feb	La	1
rubislaw	Jan-Feb-Mar	La(3)	
	Apr	Kan(10)	
	Apr	Tex(1)	14
shubra	Feb	La	1
siegburg	Jan-Apr	Ill(7)	
	Jan	Minn(1)	
	Jan	Ohio(5)	
	Feb-Apr	Ind(2)	
	Feb	La(1)	
	Feb	Mo(1)	
	Feb-Mar	Utah(4)	
	Mar	Mich(1)	22
simsbury	Mar	Mo(1)	
	Apr	Kan(2)	3
stanley	Apr	La	1
taksony	Jan-Feb	Utah	2
tucson	Feb	Cal	1
tuindorp	Feb	Ill(1)	
	Apr	Cal(1)	2
urbana	Feb-May	Ill(2)	
	Feb	La(1)	
	Mar	Cal(2)	
	Mar	Conn(2)	
	May	Pa(1)	8
vejle	Feb	La	1
wichita	Feb	Utah	1
zanzibar	May	NJ	1
TOTAL			290

Figure 1.

REPORTED HUMAN ISOLATIONS OF SALMONELLAE
IN THE UNITED STATES