REPORT NO. 73
June 6, 1968

NATIONAL
COMMUNICABLE DISEASE CENTER

SALMONELLA

SURVEILLANCE

CONTENTS. . .

FOR THE MONTH OF APRIL 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

Attention: Chief, Salmonellosis Unit, Epidemiology Program

National Communicable Disease Center ..... David J. Sencer, M.D., Director

Epidemiology Program ..... Alexander D. Langmuir, M.D., Chief

Bacterial Diseases Section ..... Philip S. Brachman, M.D., Chief
John V. Bennett, M.D., Deputy Chief

Salmonellosis Unit ..... Steven A. Schroeder, M.D., Chief
Bernard R. Aserkoff, M.D.

Statistics Section ..... Ida L. Sherman, M.S., Acting Chief
Richard C. Arnold, B.S.
Theodore P. Feury, Jr., M.S.

Veterinary Public Health Section ..... James H. Steele, D.V.M., Chief

Epidemic Aid Laboratories Section ..... Philip S. Brachman, M.D., Acting Chief

Veterinary Public Health Laboratory Unit ..... George K. Morris, Ph.D.

Collaborators

Laboratory Program
Bacteriology Section
Enteric Bacteriology Unit ..... William H. Ewing, Ph.D., Chief

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I. SUMMARY

This issue of the Salmonella Surveillance Report includes a review of salmonellosis in Hawaii, reports of four outbreaks, and a review of foodborne disease for 1967.

In April 1968, 1,194 isolations of salmonellae were reported from humans, an average of 298 isolations per week (Tables I, II, and V-A). This number represents an increase of 26 (9.6 percent) over the weekly average of March 1968 and a decrease of 16 (5.1 percent) from the weekly average of April 1967.

Reports of 884 nonhuman isolations of salmonellae were received during April 1968 (Tables III, IV, and V-B).

II. REPORTS OF ISOLATIONS

The ten most frequently reported serotypes during April:

	HUMAN			NONHUMAN		
Serotype	Number	Percent	Rank Last Month	Serotype	Number	Percent
1 typhi-murium*	344	28.8	1	typhi-murium*	122	13.8
2 enteritidis	80	6.7	2	cubana	76	8.6
3 heidelberg	72	6.0	3	anatum	61	6.9
4 newport	69	5.8	7	heidelberg	55	6.2
5 saint-paul	53	4.4	4	infantis	49	5.5
6 typhi	50	4.2	5	montevideo	41	4.6
7 infantis	47	3.9	6	eimsbuettel	36	4.1
8 thompson	40	3.4	9	derby	31	3.5
9 blockley	39	3.3	8	saint-paul	30	3.4
10 bredeney	35	2.9	>10	thompson	30	3.4
Total	829	69.4		Total	531	60.1
TOTAL (all serotypes)	1194			TOTAL (all serotypes)	884	
*Includes var. copenhagen	18	1.5		*Includes var. copenhagen	29	3.3

III. CURRENT INVESTIGATIONS

NONE

IV. REPORTS FROM THE STATES

A. HAWAII

Epidemiologic Aspects of Salmonellosis in Hawaii -- Incidence and Sources of Human Infections

Reported by K. L. Gould, M.D., EIS Officer assigned to the Hawaii Department of Health, George Q. W. Ching, B.S., Supervisor, Medical Microbiology Section, Laboratories Branch, Hawaii Department of Health, and J. M. Gooch, D.V.M., M.P.H., Public Health Veterinarian, Communicable Disease Division, Hawaii Department of Health.

Since 1950, the incidence of salmonellosis in Hawaii has shown a steady rise. For the period 1963-1966, the reported incidence ranged from 70 to 80 cases per 100,000 population; in 1967 the incidence rose to 85.9 cases per 100,000 population, eight times the national average.

This high reported incidence may reflect a number of factors other than actual disease rate, including interest, quality and availability of laboratory facilities, and extent of case follow-up. Thus, the reported incidence may not be an accurate measure with which to compare the actual incidence of salmonellosis among the various states. To evaluate interest factors, the ratio of the number of enteric specimens submitted for laboratory examination to the annual incidence of cases of salmonellosis was computed for Hawaii and 47 other states.

In Hawaii for the years 1964-1966, the annual number of specimens for enteric diseases submitted to the state laboratory was 14.0 per 1,000 population, compared to a national figure of 1.5 per 1,000; the annual incidence of salmonellosis during these years was 73 per 100,000 for Hawaii compared to a national figure of 10 per 100,000. The ratio of incidence to number of enteric specimens submitted, called the "salmonellosis index" in the present study, suggests that the extent of salmonellosis in Hawaii may be slightly greater than that of the nation, but not seven times greater, as suggested by comparing reported incidence.

The reported incidence of salmonellosis in Hawaii for the years 1964-1966 was 1.9 times greater than the incidence for 1950-1952; whereas the number of specimens submitted to the laboratory increased only 1.1 times. The "salmonellosis index" in 1964-1966 was 1.7 times the index for 1950-1952. The same microbiology technician who performed isolation and serotyping in 1950 does these same procedures now employing the same techniques and media used at that time. These figures suggest that the increasing incidence in Hawaii represents a modest increase in disease not attributable to "improved" laboratory methods or greater interest factors.

In Hawaii for 1960-1966 the number of salmonellosis cases per month was highest in December and January and lowest in March, April, and May. The number of cases per month during the peak was twice that found during March to May. On the mainland the number of cases per month was greatest during September and October and was lowest during December, January, and February. This seasonal distribution of salmonellosis in Hawaii would not be expected on the basis of the constant subtropical climate without seasonal variation. Production of various food products such as beef, poultry, eggs, milk, feed grains did not vary with season for 1960-1966. However, for each of these years the number of hogs slaughtered in December was 50 percent higher than during the rest of the year. This peak of hog slaughter results from seasonal festivities and coincides with the peak prevalence of salmonellosis. In addition, the most common serotypes isolated from humans correlate best with serotypes isolated from hogs.

Limited, short-term surveys of animals and foods of animal origin in Hawaii have shown that 75 percent of hog intestines or viscera may be contaminated with this organism. Beef, poultry, eggs, and feed grains showed relatively little contamination. In Hawaii hog stomachs and intestines are sold to markets and then to individuals and restaurants as food items without heat or chemical processing. The intestines of every hog slaughtered are sold by meat markets, even during the peak slaughter season of December. These hog intestines are used by certain ethnic groups in soups and stews. These items are well cooked, but there is excellent opportunity for cross-contamination of equipment and other foods before being sold or cooked. The two ethnic groups which use these products most often have an incidence of salmonellosis twice that of other ethnic groups and twice the incidence expected on the basis of population distribution by race. Utilizing cases of pure or mixed racial extraction and comparing age, sex, and socioeconomic characteristics of cases in each ethnic group did not alter these conclusions.

In summary, these data suggest that the reported incidence of salmonellosis in Hawaii may be artificially high compared to national figures. Food and animal surveys, serotype patterns, seasonal distribution and racial attack rates are consistent with the hypothesis that hogs and hog products are probably one of the most important sources of salmonellosis in this state. Studies of processing, marketing, and consumer acceptance may permit the introduction of specific control measures, such as heat treatment or irradiation of intestines at appropriate points in the slaughtering process. Further studies are needed to define more clearly other possible reservoirs of salmonella, sources of infection in hogs, and the mechanisms of transmission into the community.

B. NEW JERSEY

An Outbreak of Salmonellosis Due to Beef

Reported by Ronald Altman, M.D., Acting Director, Division of Preventable Diseases, and Howard Rosenfeld, V.M.D., Division of Preventable Diseases, New Jersey Department of Health, Carl R. Ruch, M.D., Medical Director, Student Health Center, Rutgers University, and Charles M. Janeway, M.D., EIS Officer assigned to the New Jersey Department of Health.

Between February 5 and February 8, 1968, 73 students reported to the Rutgers University Student Health Center with febrile gastroenteritis, and 29 required admission to the infirmary. Fifteen of 20 stool cultures obtained from those hospitalized were positive for Salmonella derby. Informal interviews implicated the dinner meal served on February 4 at a single University dining hall as the suspect meal, and a more extensive epidemiologic study was then undertaken.

Interviews and questionnaires were completed by a total of 144 students, including 39 of the 73 students who had reported to the Student Health Center and 105 students interviewed at random in the suspect dining hall. Of those interviewed at random, 22 (21 percent) noted a diarrheal illness. Predominant symptoms included diarrhea (80 percent), abdominal pain (75 percent), chills (57 percent), fever (52 percent), headache (51 percent), and nausea (48 percent). Onset of symptoms occurred from 6 to 39 hours after the suspect evening meal with a median incubation time of 25 hours. Food histories definitely implicated the February 4 dinner as the source of the outbreak and suggested that a London broil flank steak was the specific vehicle. Samples of the London broil left over after the Sunday dinner were obtained for culture by the Food Science Department of Rutgers University and were positive for S. derby. Salmonella was not isolated from specimens of uncooked meat.

The beef used had been obtained frozen in 20-lb. cartons from a distributor on February 2. The steaks were removed from the cartons, placed on mobile racks under a fan to thaw, separated, and refrigerated until 3:00 PM on Sunday. The steaks were then broiled in

groups of 24 for about 10 minutes, leaving the center rare. The broiling operation continued for more than 2 hours, during which time the cooked steaks were held in a warming oven. The steaks were sliced just prior to serving between 4:00 and 6:30 PM.

An inspection of the dining hall kitchen revealed that steam stables for holding the food prior to serving were maintained at 120° F. In addition, kitchen utensils were not properly sanitized, and wooden cutting boards had deteriorated and could not be thoroughly cleaned. Stool specimens from four food handlers in the kitchen were positive for S. derby. All of these employees had had symptoms of gastroenteritis after having eaten the London broil either at Sunday dinner or in sandwiches the following day.

Discussion

An outbreak of salmonellosis occurred among students at Rutgers University between February 5 and 8, 1968. Applying the attack rate of 21 percent obtained in a random survey of students to the estimated 1,600 students who consumed the Sunday dinner, approximately 400 students had been ill as a result of the outbreak. Food histories implicated London broil served at February 4 supper as the vehicle of infection, and this was confirmed bacteriologically. The manner in which contamination of the meat occurred could not be completely answered. Although it is possible that the meat was contaminated prior to its receipt at the University, the lack of cases of gastroenteritis among students eating in three other dining halls where the same food was served suggests that contamination of the meat occurred within the kitchen. The meat was not adequately cooked. After cooking, it was held several hours at 120° F, a temperature which could have permitted the growth of bacteria.

To prevent further outbreaks from occurring, sanitary practices and food handling practices in the kitchen were reevaluated, and all discrepancies noted during the sanitary inspection were corrected.

C. PENNSYLVANIA

An Outbreak of Salmonellosis in a Ski Lodge

Reported by William D. Schrack, Jr., M.D., Director, and I. F. Gratch, M.D., Epidemiologist, Communicable Diseases Division, William J. Meyer, M.D., Assistant Medical Director, and Evan Rhiel, M.D., Region IV Office, Pennsylvania Department of Health, and Theodore H. Weinstein, M.D., EIS Officer assigned to the Pennsylvania Department of Health.

An outbreak of febrile gastroenteritis occurred among a group of high school students, their parents, and teachers in Cumberland County, Pennsylvania, on March 10 and 11, 1968. This group had visited a resort in western Pennsylvania the weekend of March 9 and 10. Of the 48 members of the group, 29 (60 percent) became ill. Major symptoms were diarrhea (79 percent), fever (66 percent), vomiting (62 percent), abdominal pain (55 percent), and prostration (24 percent). Eight persons sought medical attention and one person was hospitalized. Duration of illness was from 1 to 10 days with a mean of 2.8 days. Salmonella bredeney was isolated from stool cultures of 20 patients.

The group had eaten three meals at the resort cafeteria -- breakfast and dinner on March 9 and breakfast on March 10. Detailed food histories implicated turkey and turkey gravy served at dinner on March 9 as the vehicle of infection. Incubation periods of the illness ranged between 10 and 45 hours after dinner on March 9; the mean incubation period was 29 hours.

The resort lodge records showed that two other groups were at the lodge on the same weekend. In the first group of 40 persons who did not eat dinner at the lodge on March 9, no cases of gastroenteritis were reported. However, in the other group of 31 newspaper boys and their relatives who did eat dinner at the lodge on March 9, 19 people developed illness. Stool cultures from 13 of these 19 patients were positive for S. bredeney.

According to resort personnel, the frozen turkey breasts were cooked at 370° F on March 9, air-cooled for 1 hour, and then refrigerated overnight. The meat was reheated at 350° F just before serving and then sliced. The gravy was boiled just before serving. Although no food from the implicated meal was available for culture, cultures of frozen turkey breasts from one of two lots served at the meal yielded S. meleagridis. Stool cultures from five food handlers, none of whom had been ill, yielded S. bredeney.

EDITOR'S COMMENT: In summary, a total of 48 cases of salmonellosis due to S. bredeney occurred following a turkey dinner. Food histories implicated turkey and turkey gravy as the source of the outbreak, and although none of the food items were available for culture, turkey from the same lot as that served at the meal grew another salmonella serotype, S. meleagridis.

Although the exact method of salmonella contamination of the turkeys was not discovered, it seems most likely that the organisms originated in the turkeys rather than being introduced by a food handler. While the temperatures listed are sufficiently high to destroy salmonellae, it is doubtful that the meat itself actually reached the stated oven temperature. The fact that five food handlers were positive for S. bredeney would indicate that these individuals were victims, rather than causes of the outbreak.

D. OREGON

Family Outbreak Due to Salmonella typhi-murium

Reported by Jacob L. Pinnas, M.D., EIS Officer assigned to the Portland City Health Department.

Four members of a Portland family became ill with gastroenteritis following consumption of cooked pork sausage which had been prepared at home. Stool cultures of the family members were positive for Salmonella typhi-murium. The sausage had been prepared at home from a butchered hog and had been ground several days before consumption. Samples of the sausage obtained from the family freezer were positive for S. typhi-murium. It could not be determined whether the pork was contaminated before or after entering the house.

V. SPECIAL REPORTS

A. Summary of Foodborne Disease Outbreaks, U.S.A., 1967

Compiled from reports submitted to the Enteric Diseases Unit, Bacterial Diseases Section, Epidemiology Program, National Communicable Disease Center.

In 1967, 37 states reported outbreaks of foodborne diseases to NCDC. These surveillance data have been compiled in an effort to characterize and quantitate foodborne diseases, to study the types of vehicles and sources of contamination, and to suggest possible control measures.

Although the data collected did not include every foodborne outbreak in the United States, various trends and the predominance of certain etiologic agents became apparent. A total of 22,171 people were affected in the 273 reported foodborne disease outbreaks

in 1967 (Table 1). There were 15 associated deaths and 118 secondary cases. The etiology was confirmed in 160 of the 273 outbreaks (Table 2). Salmonella was the cause of most illness and accounted for 12,836 cases in 35 outbreaks. Beef, turkey, eggs and egg products, and milk were the vehicles most frequently responsible for salmonella outbreaks (Table 3). Clostridium perfringens caused illness in 3,493 people in 29 outbreaks. Beef was the most common vehicle in outbreaks caused by this organism. Staphylococcal food poisoning accounted for illness in 1,914 persons in 55 outbreaks in which beef, pork, fish, and vegetables were the most common vehicles.

When the data were studied to determine the locations of outbreaks, it was found that the largest number of outbreaks, 94, occurred at home, but the number of people involved was only 323 (Table 4). In contrast, outbreaks following banquets accounted for more than 50 percent of all reported illness with 11,373 people affected in 25 outbreaks. In 35 outbreaks 4,129 persons became ill after ingesting contaminated food served in schools. Food served at restaurants was responsible for 69 outbreaks in which 1,386 persons became ill.

Table 1

Etiology of Foodborne Illnesses Reported to NCDC, 1967

Etiology	Outbreaks*		Cases	
	Number	Percent	Number	Percent
Bacterial	111	40.7	17,056	76.9
S. typhi	3	1.1	51	0.2
Other salmonella	27	9.9	12,494	56.4
Shigella	6	2.2	547	2.5
C. perfringens	19	7.0	2,529	11.4
C. botulinum	2	0.7	5	0.0
Staphylococcus	32	11.7	1,339	6.0
Enteropathogenic E. coli	2	0.7	70	0.3
Brucella	20	7.3	21	0.1
Other bacterial				
Parasitic	38	14.0	47	0.2
Trichinella spiralis	37	13.6	42	0.2
Other parasites	1	0.4	5	0.0
Viral — Viral hepatitis	9	3.3	196	0.9
Chemical	2	0.7	10	0.0
Unknown**	113	41.3	4,862	22.0
Total	273	100.0	22,171	100.0

*Etiology proven or suspected on epidemiologic and/or clinical grounds.
**Includes all outbreaks in which no etiology was established or suggested.
All percentages less than 0.05 are represented as 0.0.

Table 2

Etiology of Confirmed and Unconfirmed Outbreaks and Cases of Foodborne Illness, 1967

Etiology	Outbreaks						Cases					
	Confirmed		Unconfirmed		Total		Confirmed		Unconfirmed		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Bacterial	111	40.7	54	19.8	165	60.4	17,056	76.9	2,027	9.1	19,083	86.1
S. typhi	3	1.1	2	0.7	5	1.8	51	0.2	3	0.0	54	0.2
Other salmonella	27	9.9	8	2.9	35	12.8	12,494	56.4	342	1.5	12,836	57.9
Shigella	6	2.2	1	0.4	7	2.6	547	2.5	40	0.2	587	2.6
C. perfringens	19	7.0	10	3.7	29	10.6	2,529	11.4	964	4.3	3,493	15.8
C. botulinum	2	0.7	1	0.4	3	1.1	5	0.0	1	0.0	6	0.0
Staphylococcus	32	11.7	23	8.4	55	20.1	1,339	6.0	575	2.6	1,914	8.6
Enteropathogenic E. coli	2	0.7	2	0.7	4	1.5	70	0.3	49	0.2	119	0.5
Brucella	20	7.3	2	0.7	22	8.1	21	0.1	2	0.0	23	0.1
Streptococcus			5	1.8	5	1.8			51	0.2	51	0.2
Parasitic	38	14.0	5	1.8	43	15.8	47	0.2	5	0.0	52	0.2
Trichinella spiralis	37	13.6	5	1.8	42	15.4	42	0.2	5	0.0	47	0.2
Other parasites	1	0.4			1	0.4	5	0.0			5	0.0
Viral — Viral hepatitis*	9	3.3			9	3.3	196	0.9			196	0.9
Chemical	2	0.7	4	1.5	6	2.2	10	0.0	22	0.1	32	0.1
Miscellaneous			8	2.9	8	2.9			928	4.2	928	4.2
Unknown	—	—	42	15.4	42	15.4	—	—	1,880	8.5	1,880	8.5
Total	160	58.6	113	41.4	273	100.0	17,309	78.1	4,862	21.9	22,171	100.0

*Hepatitis cases confirmed only clinically.

Table 3

Vehicles Associated with Foodborne Illness by Etiology, 1967
(Confirmed Outbreaks/Unconfirmed Outbreaks)

Etiology	Vehicle													
	Turkey	Chicken	Egg	Milk	Beef	Pork	Other Meat	Vege-table	Fruit	Shell-fish	Other Fish	Water	Other	Unknown
S. typhi												1/2		2
Other salmonella	3/3*	1/0	2/1	2/1	4/1*	1/1	0/1*	0/2		0/1	2/0		0/1	8
Shigella												0/2	1/1	3
C. perfringens	1/0*	3/0*			9/5*	0/1	2/0*				1/0		2/0	5
C. botulinum								1/1			1/0			
Staphylococcus[1]	3/1*	1/0	1/1	4/1	9/0	6/1	4/0	6/0		4/0	5/0		7/2	6
Enteropathogenic *E. coli*												2/1		1
Brucella				0/16			0/6							
Streptococcus	1/0						0/1*	1/0			1/0			1
Trichinella spiralis					0/2	0/40								
Other parasites												1/0		
Viral hepatitis									0/1	1/0		1/4	0/1	1
Chemical													1/3	2
Miscellaneous					1/0				1/0			1/0	0/4	1
Unknown[2]	0/4	0/2	___	___	0/6*	0/1	0/2	___	___	0/3	0/1	0/1	0/7	14
Total	8/8	5/2	3/2	6/18	23/14	7/44	6/10	8/5	1/1	5/4	10/1	6/10	11/19	44

[1]Five outbreaks with two vehicles; one outbreak with three vehicles.
[2]One outbreak with two vehicles.
*Includes some outbreaks due to meat and/or gravy and/or dressing.

Table 4

Place of Acquisition of All Foodborne Illness by Etiology, 1967

Etiology	Place of Acquisition								
	Home	Restaurant	Banquet	School	Store	Medical Institution	Other	Unknown	Total
S. typhi	3			1			1		5
Other salmonella	10	9	5	6	1		4		35
Shigella		1		2		1	3		7
C. perfringens	1	9	10	6			2	1	29
C. botulinum	3								3
Staphylococcus	10	23	2	6	6	1	6	1	55
Enteropathogenic E. coli	2						2		4
Brucella	15						7		22
Streptococcus		1	1	1		1		1	5
Trichinella spiralis	31	10					1		42
Other parasites	1								1
Viral hepatitis	5	3		1					9
Chemical	3	3							6
Miscellaneous	5		1			1	1		8
Unknown	5	10	6	12	3	1	2	3	42
Total outbreaks	94	69	25	35	10	5	29	6	273
Number of Persons Ill	323	1,386	11,373	4,129	282	335	4,026	317	22,171

B. Recent Articles on Salmonellosis

Several articles on salmonellae of interest to those in public health and in the food industry have been published in the last several months and are listed in the bibliography below.

1. Busta, F. F., and Speck, M. L.: Antimicrobial effect of cocoa on salmonellae. Appl. Microbiol. 16:424-425, 1968.

2. Collins, R. N., Treger, M. D., Goldsby, J. B., Boring, J. R., Coohon, D. B., and Barr, R. N.: Interstate outbreak of S. new-brunswick infection traced to powdered milk. JAMA 203:838-844, 1968.

3. Gangarosa, E. J., et al.: Epidemic of febrile gastroenteritis due to Salmonella java traced to smoked whitefish. Am. J. Pub. Hlth. 58:114-121, 1968.

4. Goodchild, W. M., and Tucker, J. F.: Salmonellae in British wild birds and their transfer to domestic wild fowl. Brit. Vet. J. 124:95-101, 1968.

5. Lennington, K. R.: Status report on salmonellae. FDA Papers 2:9-11, 1968.

6. Schroeder, S. A.: What the sanitarian should know about salmonellae and staphylococci in milk and milk products. J. Milk and Food Tech. 30:376-380, 1967.

7. Tucker, J. F., and Gordon, R. F.: The incidence of salmonellae in poultry packing stations. Brit. Vet. J. 124:102-109, 1968.

C. U.S. Food and Drug Administration Recall of Products Contaminated with Salmonellae, March 19 to May 13, 1968.

From March 19 to May 13, 1968, three products were recalled by the U.S. Food and Drug Administration because of contamination with salmonellae. These products are listed below.

U.S. Food and Drug Administration Weekly Recall List
Summary of Products Contaminated with Salmonellae
Week Ending March 25 through Week Ending May 13, 1968

Week Ending	Name, Label, Form	Manufacturer, Distributor	Lot No.	Use	Depth of Recall	Product Distribution	Serotype
4/1	Hygrade's 50% Meat & Bone Meal	Hygrade Food Products Corp.	---	Veterinary	Wholesale	Ind., Ohio, Mich.	Numerous serogroups--types not available
	Hygrade's 60% Digester Tankage	Hygrade Food Products Corp.	---	Veterinary	Wholesale	Ind., Ohio, Mich.	Numerous serogroups--types not available
5/6	Hallmark unflavored edible gelatin	Stein, Hall & Co. (Distr.)	68009 68009-1 810768 810689	Food	Manufacturer	Boston, Chicago, Philadelphia	*S. newington* & C_1

VI. INTERNATIONAL

A. NETHERLANDS

Salmonellosis in the Netherlands -- 1967

Reported by the National Salmonella Center, The Netherlands.

During 1967, a total of 6,179 isolations of salmonellae from human sources and 4,441 isolations from nonhuman sources were reported from the National Salmonella Center, The Netherlands. The five most frequently isolated serotypes are listed in Table 1. In Table 2, the sources of salmonella isolations are presented. Cattle and swine were the most common documented nonhuman sources.

Table 1

The Five Most Frequently Isolated Serotypes
from Human and Nonhuman Sources, The Netherlands, 1967

HUMAN				NONHUMAN			
Rank	Serotype	Number	Percent of Total	Rank	Serotype	Number	Percent of Total
1	typhi-murium*	3950	63.9	1	dublin	1626	36.6
2	panama	548	8.9	2	typhi-murium*	1179	26.5
3	stanley	460	7.4	3	bredeney	208	4.7
4	infantis	215	3.5	4	panama	150	3.4
5	newport	87	1.4	5	anatum	79	1.8
				5	infantis	79	1.8
	Total	5260	85.1		Total	3321	74.8
	TOTAL (all serotypes)	6179			TOTAL (all serotypes)	4441	
	*including var. copenhagen	381	6.2		*including var. copenhagen	323	7.3

Table 2

Salmonella Isolations by Source

Source	Number	Percent
Man	6,179	58.2
Human food	566	5.3
Poultry	273	2.6
Cattle	1,566	14.7
Swine	802	7.6
Other domestic animals	274	2.6
Wild animals	493	4.6
Animal feed	143	1.3
Miscellaneous	324	3.0
TOTAL	10,620	99.9

B. CANADA

Salmonellosis from Powdered Milk

Reported by Dr. D. Severs, D.P.H., Chief Medical Health Officer, and Drs. P. Fardy and R. Butler, Public Health Laboratories, Department of Health, Newfoundland, Canada. Published in the Epidemiological Bulletin 12(3), March 1968, by the Epidemiology Division, Department of National Health and Welfare, Ottawa, Canada.

Twenty isolations of Salmonella newport from stool specimens were reported by the Newfoundland Public Health Laboratories during the period February 1 to March 20, 1968. A detailed investigation was carried out on all patients. The 20 persons, who came from 17 different households in St. John's district, gave a history of diarrhea and vomiting; 5 preschool children and 2 adults had required hospitalization. At least 12 other persons in the families of confirmed cases of S. newport infection gave a history of diarrhea and vomiting.

All the families had purchased and consumed a particular brand of powdered skim milk. Opened 3-lb. boxes of milk, all with the same batch number, were obtained from three of the homes and were positive for S. newport. Powdered milk from eight unopened 3-lb. boxes with the same batch number as that taken from the homes of infected persons were purchased in St. John's supermarkets and were also positive for S. newport.

EDITOR'S COMMENT: Canadian officials report that to the best of their knowledge this brand of powdered milk is not distributed in the United States.

VII. FOOD AND FEED SURVEILLANCE

U.S. Food and Drug Administration -- A Summary of Product Analysis for Salmonellae, April 1, 1967-April 1, 1968

From April 1, 1967, to April 1, 1968, the U.S. Food and Drug Administration analyzed 5,263 food samples for the presence of salmonellae. The results of this program are presented in the table on page 14. Of 31 different product categories tested, salmonellae were isolated from 22. Products most frequently contaminated were animal by-product feeds, turtle meat, frog legs, and eggs. It is important to recognize that these data do not necessarily represent a true national incidence of contamination of particular foods by salmonellae, since if a product is positive on initial sampling, intensive resampling of the product and plant environment is undertaken. However, it does indicate those product categories which are more likely to be contaminated with salmonellae and also demonstrates the wide potential for contamination of many different kinds of foods.

U.S. Food and Drug Administration Salmonella Examinations
April 1, 1967-April 1, 1968*

Product Category	No. of Samples	No. Positive for Salmonellae	Percent Positive
Eggs (dried, frozen, fresh broken)	628	118	18.8
Noodles, macaroni, etc.	112	9	8.0
Coconut and coconut products	187	7	3.7
Dry milk (NFDM, WDM)	607	39	6.4
Cheese (including starters, curd, curing, cured, soft cheese)	260	0	0.0
Other dairy products (casein, dry BM ice cream, etc.)	266	9	3.4
Cocoa, cocoa press cake, unsweetened liquor, etc.	219	3	1.4
Candy, chocolate coatings	508	23	4.5
Cream pies, cream-filled pastries	124	1	0.8
Bakery products (cookies, cakes, rolls, etc.)	73	1	1.4
Infant and invalid formulae	45	0	0.0
Dried yeast	127	11	8.7
Miscellaneous foods (starches, gums, spices, lecithin sugars, etc.)	317	7	2.2
Prepared, ready-to-eat foods	263	8	3.0
Fish, shrimp, and seafood	213	2	0.9
Nuts	165	3	1.8
Fruit (dried, frozen, etc.)	14	0	0.0
Beverages (tea, non-dairy drink bases)	17	0	0.0
Wheat, rice, and cereals	52	0	0.0
Turtle meat, frog legs	12	10	83.3
Pet food	42	5	11.9
Animal by-products for feed (meat scrap, fishmeal, etc.)	312	140	44.9
Drug substances of animal origin (glandular materials, enzymes, gelatin, etc.)	408	38	9.3
Drugs and dietary articles in dosage form (tablets, capsules, etc.)	184	22	12.0
Cosmetics	6	0	0.0
Colors	39	2	5.1
Non-food, drug, or cosmetic articles (drain cleaners, wooden spoons, etc.)	6	2	33.3
Oilseed	7	3	42.8
Meat products	2	0	0.0
Dry mixes	47	0	0.0
Vegetables, fresh and frozen	1	0	0.0
TOTAL	5,263	463	8.8

*Results cannot be interpreted as national incidence of salmonella in any particular product. During routine sampling when problems are encountered, intensive investigations are made at the plants involved and additional samples are obtained from problem foci.

Figure I

REPORTED HUMAN ISOLATIONS OF SALMONELLAE
IN THE UNITED STATES

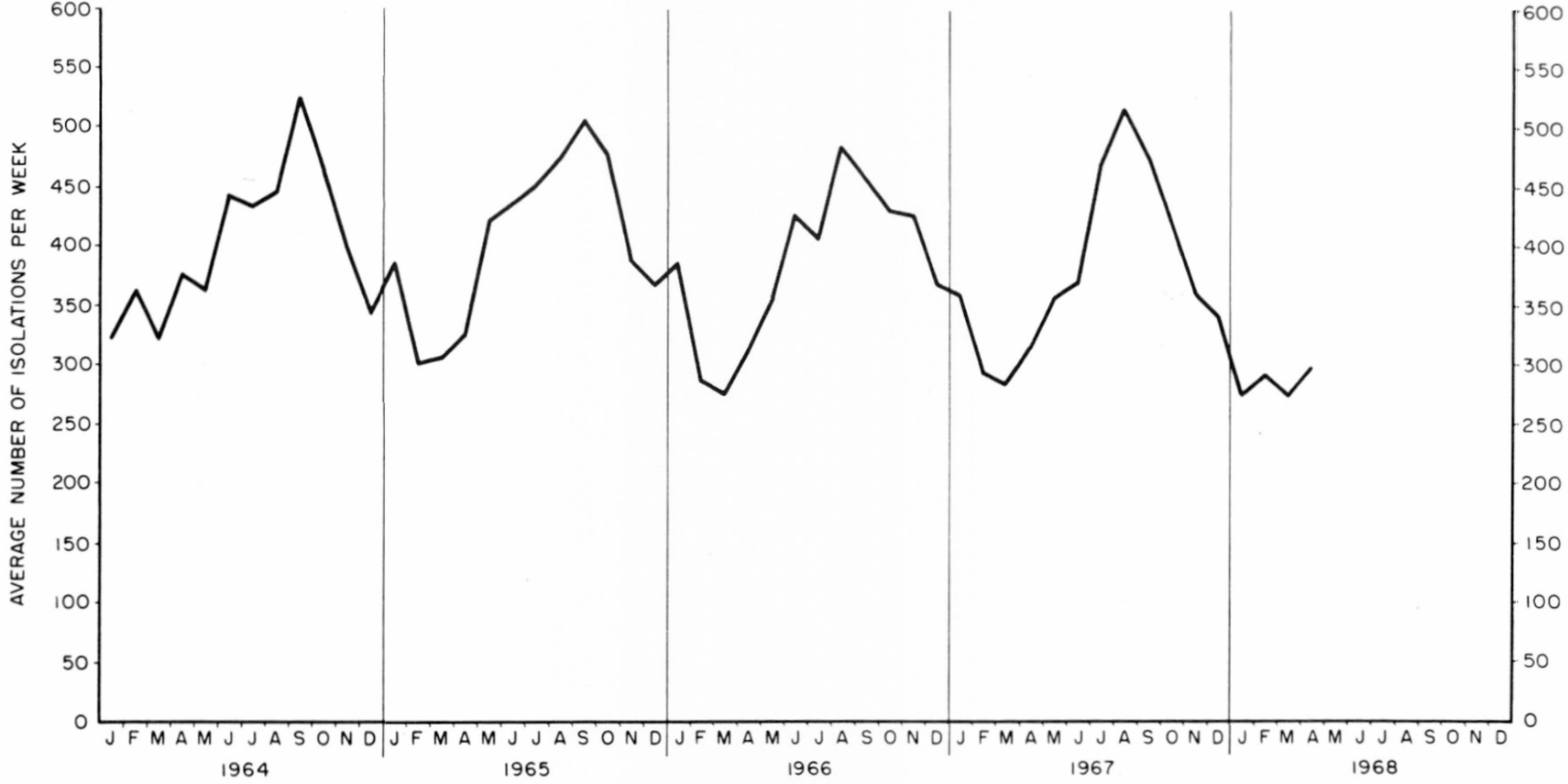

TABLE I. COMMON SALMONELLAE REPORTED FROM HUMAN SOURCES, APRIL 1968

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		1													2		1	
bareilly									1																		1					
blockley					1			1	1	1	3		2	3					1						1		1		2		2	2
braenderup											3						1															
bredeney								1			33																					
chester															2																	
cholerae-suis v kun																											1					
cubana																			1											1		
derby								2	2	1	2			2	2		1									1	2		4			1
enteritidis				10		2		6	9		11	7	1	7	1	2		1	4						3		4		4			
give														1																		
heidelberg				4				3	6	5	5	2	2	5	1								1	2	7	2	2		4		3	3
indiana																																
infantis				1		2	1	1	2	1	1	2		3	1	1			2				2			1	1		1		1	1
java				2	1				1	1	3																					8
javiana																																1
litchfield														2											1		1					
livingstone						2																										
manhattan											2	5		2	1	1									3				2			3
miami																																
mississippi																																
montevideo				1										2		2										1						
muenchen																									1		2		1			
newington																											1					
newport				2				12	16	2	2		1		2	5	2	2	1				1								1	8
oranienburg				2		3		1	1						1	2	1		1								1					2
panama						1								1				1						1								
paratyphi B				1											2				1													
reading				1																				1								
saint-paul				2		1			1	1	3	3		5	7		3		1						2		3		3		3	2
san-diego								3															1									
schwarzengrund																											1					
senftenberg				1										2											1							
tennessee				4										3		1											3		1			
thompson				2	1			5	7	2	2			1	3	1	1						2		1		4		2		1	1
typhi				1		1			1	1	2	2	1	3					1		2				1	1		1	1	2	2	3
typhimurium	1		1	12	1	4	1	22	27	17	6	12	4	27	21	3	2	2	6		3		3	1	12	3	5		13	1	6	19
typhimurium v cop	1			2		2				1					3																	
weltevreden																																
worthington																																
TOTAL	2	–	1	49	4	18	2	58	75	33	79	34	11	70	47	19	11	6	19	–	5	–	10	5	33	9	33	1	40	3	21	54
ALL OTHER*	–	3	–	–	–	2	39	1	–	1	2	–	1	6	6	2	1	–	1	–	–	–	–	–	–	20	1	–	2	–	–	8
TOTAL	**2**	**3**	**1**	**49**	**4**	**20**	**41**	**59**	**75**	**34**	**81**	**34**	**12**	**76**	**53**	**21**	**12**	**6**	**20**	**–**	**5**	**–**	**10**	**5**	**33**	**29**	**34**	**1**	**42**	**3**	**21**	**62**

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 128 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				
					2													1		2	14	1.2	61	1.3	*anatum*
																					2	0.2	19	0.4	*bareilly*
					4		1										2	11			39	3.3	132	2.7	*blockley*
																					4	0.3	42	0.9	*braenderup*
																		1			35	2.9	73	1.5	*bredeney*
																		3			5	0.4	16	0.3	*chester*
																					1	0.1	11	0.2	*cholerae-suis v kun*
					1		1														4	0.3	22	0.5	*cubana*
	1				2					1								2		5	31	2.6	138	2.9	*derby*
					2		3											3			80	6.7	311	6.5	*enteritidis*
																		2			3	0.3	15	0.3	*give*
2					1									6		1		4	1		72	6.0	328	6.8	*heidelberg*
																					–	–	7	0.1	*indiana*
	4				1		1		1		1						1	8		5	47	3.9	250	5.2	*infantis*
																					16	1.3	72	1.5	*java*
							2											1			4	0.3	42	0.9	*javiana*
	1																				5	0.4	19	0.4	*litchfield*
															1						3	0.3	13	0.3	*livingstone*
							1											2			22	1.8	61	1.3	*manhattan*
																					–	–	19	0.4	*miami*
																					–	–	4	0.1	*mississippi*
	1						2				3										12	1.0	54	1.1	*montevideo*
						1		1										3			9	0.8	44	0.9	*muenchen*
																	1	2			4	0.3	13	0.3	*newington*
	1	1					2										1	6		1	69	5.8	258	5.4	*newport*
							3														18	1.5	87	1.8	*oranienburg*
							1											1		2	8	0.7	58	1.2	*panama*
							1		1		1							1			8	0.7	37	0.8	*paratyphi B*
																1	1				4	0.3	12	0.2	*reading*
1					2		1									1	1	3		4	53	4.4	299	6.2	*saint-paul*
																		2			6	0.5	36	0.7	*san-diego*
																					1	0.1	9	0.2	*schwarzengrund*
																					4	0.3	9	0.2	*senftenberg*
																					12	1.0	26	0.5	*tennessee*
	1				1													2			40	3.4	131	2.7	*thompson*
4	5			3	1		2		1	1	1	1						5			50	4.2	181	3.8	*typhi*
	6	2			3	5	24	1			1			2		7	2	32		6	326	27.3	1252	26.1	*typhimurium*
									3						2	1	3				18	1.5	79	1.6	*typhimurium v cop*
																				18	18	1.5	31	0.6	*weltevreden*
																					–	–	7	0.1	*worthington*
7	20	3	–	3	20	6	45	2	6	2	7	1	–	8	3	11	12	95	1	43	1047	87.7	4278	89.0	TOTAL
–	–	–	2	7	2	1	6	–	–	–	–	29	–	–	–	–	–	3	–	1	147		527		ALL OTHER*
7	20	3	2	10	22	7	51	2	6	2	7	30	–	8	3	11	12	98	1	44	1194		4805		TOTAL

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

SEROTYPE	REPORTING CENTER																					
	ARK	CAL	CON	DC	FLA		HAW	ILL	IND	LA	MIC		MIN	MIS	MO	NH	NJ		NM	NYA	NYB	NC	OKL
aberdeen								1															
alachua		2																					
albany								3															
berta																						2	
california											5												
cholerae-suis				1																			
drypool										1													
dublin		1																					
habana					1																		
johannesburg															1								
kentucky													1										
lomita																					1		
luciana					2																		
muenster																							
nchanga								1															
oslo							1																
paratyphi A																	1						
poona					1			1		1	1												
pullorum					1																		
rubislaw					1																		
schoeneberg																							1
tallahassee					1																		
urbana									1														
TOTAL		–	3	–	1	7		1	6	1	2	6		1	–	1	–	1		–	–	1	2	1
NOT TYPED*		7	–	2	19	1		–	–	–	–	–		–	2	–	3	–		29	39	–	–	–
TOTAL		7	3	2	20	8		1	6	1	2	6		1	2	1	3	1		29	39	1	2	1

* See Table V-A

TABLE II – Continued

REPORTING CENTER														TOTAL	CUMULATIVE TOTAL	SEROTYPE
	PA	TEX	VA	WIS												
														1	1	*aberdeen*
														2	5	*alachua*
	1													4	10	*albany*
														2	8	*berta*
														5	11	*california*
														1	8	*cholerae-suis*
														1	4	*drypool*
														1	7	*dublin*
														1	5	*habana*
														1	1	*johannesburg*
														1	6	*kentucky*
														1	4	*lomita*
														2	2	*luciana*
	1													1	10	*muenster*
														1	3	*nchanga*
														1	3	*oslo*
														1	5	*paratyphi A*
				1										5	10	*poona*
														1	1	*pullorum*
														1	4	*rubislaw*
														1	1	*schoeneberg*
														1	1	*tallahassee*
														1	6	*urbana*
	2	–	–	1										37	161	TOTAL
	–	6	1	1										110	366	NOT TYPED*
	2	**6**	**1**	**2**										**147**	**527**	**TOTAL**

States not reporting an isolation not listed.

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

TABLE III. COMMON SALMONELLAE REPORTED FROM NONHUMAN SOURCES, APRIL 1968

SEROTYPE	DOMESTIC ANIMALS AND THEIR ENVIRONMENT							ANIMAL FEEDS			
	CHICKENS	TURKEYS	SWINE	CATTLE	HORSES	OTHER	SUBTOTAL	TANKAGE	VEGETABLE PROTEIN	OTHER	SUBTOTAL
anatum	3	6	5				14	26			26
bareilly	2	2					4			2	2
blockley	5						5				—
braenderup							—				—
bredeney	7	1					8	2		1	3
chester	1						1				—
cholerae-suis v kun			3				3				—
cubana							—	21		6	27
derby	3	3	19				25	5		1	6
enteritidis	5		3	2		2	12	1			1
give							—				—
heidelberg	34	10				3	47	1			1
indiana							—				—
infantis	11	2	19	2		2	36	7			7
java							—				—
javiana							—				—
litchfield							—				—
livingstone			1				1	8			8
manhattan						1	1				—
miami							—				—
mississippi							—				—
montevideo	4	2	1				7	16	1	6	23
muenchen		1	1				2				—
newington		1					1	1			1
newport			12	1		2	15				—
oranienburg							—	6		4	10
panama			6				6				—
paratyphi B							—				—
reading							—	1			1
saint-paul	11	10	1	2		1	25	3			3
san-diego		3				1	4				—
schwarzengrund		4					4			1	1
senftenberg		1				1	2	10		11	21
tennessee		1					1	4		3	7
thompson	20					3	23				—
typhi							—				—
typhimurium	19	11	10	20	5	10	75	3			3
typhimurium v cop	18	1		4		3	26	1			1
weltevreden			1				1				—
worthington	1	1					2	2		1	3
TOTAL	144	60	82	31	5	29	351	118	1	36	155
ALL OTHER*	10	18	1	3	—	25	57	45	—	32	77
TOTAL	**154**	**78**	**83**	**34**	**5**	**54**	**408**	**163**	**1**	**68**	**232**

* 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				
				2	14	5	21		61	245	*anatum*
		1					1		7	15	*bareilly*
						1	1		6	46	*blockley*
						3	3		3	7	*braenderup*
	1						–		12	38	*bredeney*
				1			1		2	21	*chester*
							–		3	38	*cholerae-suis v kun*
		5		1	42		48	1	76	174	*cubana*
							–		31	77	*derby*
							–		13	64	*enteritidis*
4				1	5		6		10	19	*give*
		3		1			4	3	55	256	*heidelberg*
		1					1		1	4	*indiana*
1					4		4	1	49	114	*infantis*
	1						–		1	6	*java*
							–		–	4	*javiana*
							–		–	1	*litchfield*
		1					1		10	46	*livingstone*
							–		1	2	*manhattan*
							–		–	5	*miami*
							–		–	–	*mississippi*
				1	6	3	10	1	41	159	*montevideo*
							–		2	15	*muenchen*
					3		3		5	24	*newington*
2	1						–	2	20	66	*newport*
		5		1	4		10		20	69	*oranienburg*
							–	1	7	12	*panama*
1	1						–		2	3	*paratyphi B*
							–		1	12	*reading*
1				1			1		30	135	*saint-paul*
							–		4	13	*san-diego*
				1	1		2	11	18	36	*schwarzengrund*
		1			5		6		29	82	*senftenberg*
				1	6		7		15	59	*tennessee*
		1					1	6	30	87	*thompson*
							–				*typhi*
3		2		1			3	9	93	326	*typhimurium*
1					1		1		29	89	*typhimurium v cop*
							–		1	2	*weltevreden*
1					1		1	9	16	42	*worthington*
14	4	20	–	12	92	12	136	44	704	2413	TOTAL
12	4	3	1	3	15	–	22	8	180	605	ALL OTHER*
26	**8**	**23**	**1**	**15**	**107**	**12**	**158**	**52**	**884**	**3018**	**TOTAL**

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

SEROTYPE	DOMESTIC ANIMALS AND THEIR ENVIRONMENT							ANIMAL FEEDS			
	CHICKENS	TURKEYS	SWINE	CATTLE	HORSES	OTHER	SUBTOTAL	TANKAGE	VEGETABLE PROTEIN	OTHER	SUBTOTAL
alachua						1	1	4		2	6
berta	1						1				—
binza							—	5			5
califomia							—			1	1
cerro		1					1	2			2
chameleon							—				—
denver							—				—
dublin				3		1	4				—
eimsbuettel						1	1	13		17	30
gaminara						1	1				—
georgia							—			2	2
illinois							—	1			1
johannesburg	1						1	2		1	3
kentucky	3						3	5		1	6
lexington		1					1				—
manila							—			1	1
meleagridis		1					1	2			2
minnesota		13				10	23	2			2
muenster							—	2		2	4
new-brunswick							—				—
ohio							—			1	1
orion						1	1				—
oslo						1	1				—
poona							—				—
pullorum	2					3	5				—
rubislaw							—				—
siegburg							—	3			3
sundsvall							—			1	1
taksony	3						3				—
thomasville						6	6	1		1	2
typhi-suis			1				1				—
westhampton		1					1				—
TOTAL	10	17	1	3	—	25	56	42	—	30	72
NOT TYPED*	—	1	—	—	—	—	1	3	—	2	5
TOTAL	**10**	**18**	**1**	**3**	**—**	**25**	**57**	**45**	**—**	**32**	**77**

*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				
							–		7	16	*alachua*
							–		1	2	*berta*
					5		5		10	36	*binza*
			1				1		2	32	*califomia*
	1						–	2	6	42	*cerro*
	3						–		3	3	*chameleon*
2							–		2	2	*denver*
							–		4	10	*dublin*
		2			2		4	1	36	91	*eimsbuettel*
							–		1	1	*gaminara*
							–		2	9	*georgia*
							–		1	2	*illinois*
							–		4	10	*johannesburg*
				1	3		4		13	53	*kentucky*
							–	4	5	14	*lexington*
							–		1	6	*manila*
							–		3	13	*meleagridis*
							–		25	36	*minnesota*
		1					1		5	8	*muenster*
2							–		2	4	*new-brunswick*
							–		1	1	*ohio*
				2			2		3	7	*orion*
							–		1	1	*oslo*
					5		5		5	5	*poona*
							–		5	16	*pullorum*
8							–		8	14	*rubislaw*
							–		3	19	*siegburg*
							–		1	1	*sundsvall*
							–		3	4	*taksony*
							–		8	29	*thomasville*
							–		1	4	*typhi-suis*
							–		1	11	*westhampton*
12	4	3	1	3	15	–	22	7	173	582	TOTAL
–	–	–	–	–	–	–	–	1	7	23	NOT TYPED*
12	4	3	1	3	15	–	22	8	180	605	TOTAL

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

A. HUMAN SOURCES

REPORTING CENTER	GROUP														TOTAL
		B	C	C_1	C_2	D			E	E_3	E_4	G	UNK			
ARKANSAS		3		2	2											7
CONNECTICUT													2			2
D.C.		7	1	2	2	4					2		1			19
FLORIDA		1														1
MISSISSIPPI		2														2
NEW HAMPSHIRE		3														3
NEW MEXICO		21		4	1	1			2							29
NEW YORK – A													39			39
TEXAS		1											5			6
VIRGINIA						1										1
WISCONSIN													1			1
TOTAL		38	1	8	5	6			2	–	2	–	48			110

States not reporting an isolation not listed.

B. NONHUMAN SOURCES

SOURCES	GROUP														TOTAL
		B	C	C_1	C_2	D			E	E_3	E_4	G	UNK		
DOMESTIC ANIMALS AND THEIR ENVIRONMENT											1				1
ANIMAL FEEDS				1						1		1	2		5
WILD ANIMALS AND BIRDS															–
REPTILES AND ENVIRONMENT															–
HUMAN DIETARY ITEMS															–
MISCELLANEOUS													1		1
TOTAL		–	–	1	–	–			–	1	1	1	3		7