



## MONTHLY MORBIDITY REPORT

### EPIDEMIOLOGY

### PUBLIC HEALTH STATISTICS

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## FOOD-BORNE ATTACK IN RAPIDES PARISH

### I. INTRODUCTION

In the late afternoon of August 22 we received word from the regional sanitarian that a large number of prisoners at Work Training Facility North in Pineville, Louisiana developed acute gastrointestinal symptoms following consumption of sack lunches on August 21st. Forty-one inmates were seen at the camp's medical station; seven of these required treatment in a local hospital emergency room.

### II. OUTBREAK

Of 500 total inmates, approximately 86 were assigned to 13 work crews and given sack lunches. On August 21 between 6 and 7:00 a.m. a member of each crew picked up the appropriate number of lunches from the kitchen; it was left to the discretion of each crew whether the bags were kept cool prior to consumption.

Lunches consisted of sliced ham, salami, and cheese wrapped separately, along with bread, apples, oranges, mayonnaise (jars or packets), and mustard (packets). The lunches were consumed between 11:00 a.m. and noon; Kool-Aide was also provided. Vomiting and diarrhea generally followed between four and five hours later.

### III. BACKGROUND

The Work Training Facility North is part of Camp Beauregard, an army base in central

Louisiana. The facility has its own kitchen and cafeteria, where food is prepared for the inmates. There is also a canteen for those preferring to buy pre-packaged food.

Most of the inmates eat in the cafeteria for their noon meal, but those assigned to outlying work sites are frequently given sack lunches. The meat in the sack lunches is often left over from the noon meal served in the cafeteria the preceding day.

### IV. EPIDEMIOLOGIC INVESTIGATION

**METHODS** - A food Consumption Questionnaire was distributed to all inmates assigned sack lunches on August 21. Data included age, crew, symptoms, onset and duration of symptoms, types and quantity of food consumed from the sack lunch and two preceding meals, and method of keeping lunch cool (if any) prior to consumption. The questionnaires were administered August 23 and 24.

**RESULTS** - Eighty-six inmates were assigned sack lunches, 70 completed questionnaires, and 66 ate sack lunches (the remaining four didn't eat lunch or ate elsewhere). A case was defined as any person with two of the following symptoms occurring after 11:00 a.m. on August 21: nausea, vomiting, diarrhea, or subjective fever.

Fifty cases were identified, and they were all among the 66 inmates having eaten sack



lunches. The crude attack rate was thus 75.8% among those consuming the lunches. The symptoms among the fifty cases were as follows: diarrhea 43 (86%), vomiting 37 (74%), nausea 36 (72%), and subjective fever 13 (26%).

The incubation period varied from 30 minutes to 15 hours, with a mean of 4.75 hours. Duration of vomiting ranged from 30 minutes to 48 hours, with a mean of 11.6 hours. Duration of diarrhea was significantly longer, varying from 30 minutes to sixty hours, with a mean of 27.8 hours.

Analysis of food histories appears in Table A. The sliced ham was clearly incriminated, with an attack rate of 78.1% among those eating it, and 0% among those not eating it ( $p = .056$  using Fisher's exact test). Mean slices of ham consumed among cases was 2.1, and among noncases 2.8. Methods of keeping sack lunches from time of collection to consumption among cases were as follows: ice chest 21 (42%), refrigerator 15 (30%), left at room temperature 10 (20%), grilling 1 (2%), and uncertain 3 (6%). Attack rates between crews is difficult to compare as over half of the crews were comprised of four or fewer inmates. (See Table B). Road Crew #2 had by far the lowest attack rate (14.3%), followed by U.S. Forestry (57.1%). The latter may be artificially low as two Forestry inmates who denied illness but did report diarrhea were counted as noncases.

## V. LAB INVESTIGATION

**METHODS** - Ten stool specimens were collected August 23 and 24, and multiple food items saved from the sack lunch and two preceding meals were collected August 23. Nasopharyngeal cultures were obtained from four kitchen workers August 24. All saved food samples were on covered paper plates in the refrigerator on our arrival. Samples were placed in specimen jars,

refrigerated overnight, and transported on ice to New Orleans August 24 where they were refrigerated until culturing at the Louisiana State Health Department on August 26.

**RESULTS** - Three stool cultures and one nasopharyngeal culture grew Staph aureus. Quantitative estimates were not made. Culture of the ham yielded low staphylococcal counts of 1600 organisms/gm. (only 35 gms of ham were available for culture). All stool cultures were negative for *Campylobacter*, *Vibrio*, *Salmonella*, and *Shigella*.

Phage-typing revealed uniformity between the ham and one stool culture; lysis occurred with type 94 only. The other two stool cultures showed identical lysis by phage types 3A, 3C, 55, and 71. The nasopharyngeal culture was lysed by phages 53, 54, 75, 77, 84, and 85.

## VI. ENVIRONMENTAL INVESTIGATION

**METHODS** - The kitchen was inspected and four of five workers were interviewed, including two who directly handled the ham.

**RESULTS** - As a result of the discussion with various kitchen workers further details of the ham preparation were enumerated. On August 20, frozen hams were thawed and cooked in the early morning, then left in the ovens to cool from 7:30 a.m. to 9 a.m. The hams were then sliced by one food handler and left at room temperature until 11:00 a.m. when they were served in the cafeteria at the noon meal. There was a difference of opinion regarding the fate of the leftover sliced ham designated for sack lunches. Some felt it was refrigerated at 11:00 a.m.; others claimed it was returned to a room temperature oven until 4:00 p.m. when it was transferred to the refrigerator. The following morning at 3:00 a.m. a second food handler wrapped the sliced ham with salami and cheese in



preparing the sack lunches. Prepared lunches were refrigerated until 6:00 a.m. when they were collected by crew members.

Examination of the kitchen workers revealed no cutaneous lesions. Gloves were not worn during any of the preparation process. The kitchen appeared clean, and the temperature of the refrigerator was 48°F.

## VII. DISCUSSION

The sliced ham was the probable vehicle of this foodborne outbreak, and Staph aureus was the most likely responsible organism. This outbreak shared many of the epidemiologic characteristics of 131 staphylococcal food borne outbreaks recently reviewed by Holmberg and Blake at the CDC.<sup>1</sup> These outbreaks typically peak in August, and baked ham was the single most commonly implicated food. The above review revealed a mean incubation period of 4.4 hours, very close to the 4.75 hour period occurring in the present outbreak. Mean duration of illness was 20 hours, paralleling the durations of vomiting (11.6 hours) and diarrhea (27.8 hours) seen in this outbreak.

The ham implicated in the Pineville outbreak could have been contaminated either August 20 or 21. However, it seems more likely that inoculation and enterotoxin formation occurred on August 20, as the ham was left at room temperature undisputably for two hours, and possibly up to seven hours. Slicing also occurred on August 20; this has been cited by Riemann and Bryan as the most likely time of contamination.<sup>1</sup> Additionally, if the ham had been contaminated by the second food handler on the morning it was eaten, one might have expected to see some protection afforded by those crews using ice chests or refrigeration.

As is the case with many staphylococcal

foodborne outbreaks, culture results and even phage-typing do not immediately clarify the picture. Staphylococcal counts for the ham were low in the present case, but Holmberg and Blake have stressed the unreliability of quantitative counts as a diagnostic criteria.<sup>1</sup> The small amount of ham available or the unavoidable delay in plating may have falsely lowered the final counts in this case. Aside from uniformity between the ham and one stool culture, phage-typing was not particularly helpful in identifying the culpable organism. The FDA is currently testing all of the cultures for capability of enterotoxin production.

Of particular note is the substantially lower attack rate of crew #2. This crew was distinctive in that they had grilled their ham (20 slices) on an electric frying pan for 25 minutes, adding water when necessary to prevent scorching. Only one member of the eleven man crew purportedly became ill; thus grilling had a probable protective effect.

Staphylococcal enterotoxin is widely held as a remarkably heat stable protein. While this is generally true, it has been shown that the intensity and duration of heating necessary to reduce the enterotoxin to levels smaller than has been estimated to cause foodborne illness ( $<1.0 \mu\text{g/ml}$ ) varies considerably depending on the initial concentration and type of enterotoxin, as well as the type and pH of the medium used. Sophisticated studies have been performed controlling all of these variables.<sup>2</sup>

It is interesting that a fairly short duration of grilling may have largely inactivated the enterotoxin in the present situation. In 1973, Dangerfield heated enterotoxin A to 100°C for an equivalent period of time (twenty-five minutes) and found that there was no loss of enterotoxin toxicity on human volunteers.<sup>3</sup> The protection apparently conferred after grilling in the present outbreak probably reflects a much



higher core temperature achieved by direct contact of the ham slices on a hot surface. Unfortunately measuring this temperature requires the use of thermocoupling in a controlled environment.

The difficulty of reliably gauging grilling conditions may explain why there have been no studies using this heating method, as opposed to boiling, microwaving, and irradiating, whose effectiveness in inactivating enterotoxin have all been carefully tested. A higher vulnerability of enterotoxin to frying may explain the absence or marked paucity of outbreaks associated with recently fried foods, though the stability of enterotoxin despite boiling or baking is well-known. Certainly the effect of frying on enterotoxin stability deserves further study in a laboratory environment.

## RECOMMENDATIONS

Discussion with the kitchen workers re-

vealed a widespread belief that hot foods should be cooled to room temperature before refrigeration. The staff was instructed to transfer baked items directly from the oven to the refrigerator; the temperature of the latter needed to be turned down slightly to the required 7°C. It was also recommended that gloves be worn when food is directly handled, and that sack lunches be adequately cooled up to the time of consumption.

## REFERENCES:

1. Holmberg SD, Blake PA: Staphylococcal Food Poisoning in the United States. JAMA 1984; 251:487-489.
2. Riemann H. Bryan FL: Foodborne Infections and Intoxications 1979; 475-480
3. Dangerfield, H.G.: (1973) 73rd Annu. Meet. Am. Soc. Microbiol.

TABLE A

ITEM	ATE				DID NOT EAT			
	ILL	WELL	TOTAL	A.R.	ILL	WELL	TOTAL	A.R.
Baked Ham	50	14	64	78.1%	0	2	2	0%
Salami	23	10	33	69.7%	27	6	33	81.8%
Cheese	26	9	35	74.2%	24	7	31	77.4%
Mayonnaise	24	9	33	72.7%	26	7	33	78.8%
Red Beans/Rice	19	14	33	57.6%	30	3	33	90.1%
Cereal/Milk	33	12	45	73.3%	17	4	21	80.0%

A.R. = Attack Rate

TABLE B

CREW NAME	TOTAL NUMBERS	RESPONDED	RESPONDED AND ATE SACK LUNCH	CASES
Range	20	17	17	15
Road Crew #1	12	10	9	8
Road Crew #2	11	7	7	1
U.S. Forestry	10	9	7	4
Road Crew #3	8	6	6	6
U.S. Marshalls	6	6	6	6
Parish Barn	4	3	3	3
Steel Mill	4	3	2	1
Fire Station	4	4	4	4
199th	3	2	2	2
DMT	2	1	1	0
Post Security	1	1	1	0
Dog Pound	1	1	1	0

# SELECTED REPORTABLE DISEASES (By Place of Residence)

STATE AND PARISH TOTALS	VACCINE PREVENTABLE DISEASES					ASEPTIC MENINGITIS	HEPATITIS A AND UNSPECIFIED**	HEPATITIS B	LEGIONELLOSIS	MALARIA**	MENINGOCOCCAL INFECTIONS	SHIGELLOSIS	TUBERCULOSIS, PULMONARY	TYPHOID FEVER	OTHER SALMONELLOSIS	UNDERNUTRITION SEVERE	GONORRHEA	SYPHILIS, PRIMARY AND SECONDARY	RABIES IN ANIMALS (PARISH TOTALS CUMULATIVE, 1985 )
	MEASLES	RUBELLA*	MUMPS	PERTUSSIS	TETANUS														
REPORTED MORBIDITY AUGUST, 1985																			
TOTAL TO DATE 1984	8	0	0	4	1	40	255	236	1	7	50	57	196	1	116	12	17467	814	44
TOTAL TO DATE 1985	42	0	2	10	0	46	125	151	3	1	24	23	237	0	128	3	14757	710	12
TOTAL THIS MONTH	0	0	0	2	0	5	28	31	1	0	0	3	67	0	30	0	2145	93	0
ACADIA																			
ALLEN																			
ASCENSION															1			1	
ASSUMPTION																			
AVOYELLES																			3
BEAUREGARD																			
BIENVILLE																			
BOSSIER							3	1				1							
CADDO						1	10						2				272	5	
CALCASIEU							1						1		2		70	3	
CALDWELL													3						
CAMERON																			
CATAHOULA																			
CLAIBORNE																			
CONCORDIA																			
DESOTO								2							1				1
EAST BATON ROUGE								1					6		2		141	11	2
EAST CARROLL							3						1				7		
EAST FELICIANA																			
EVANGELINE							1						1						1
FRANKLIN																			
GRANT									1										
IBERIA																			
IBERVILLE																			
JACKSON													1						
JEFFERSON				1		1		7					9				107	2	
JEFFERSON DAVIS							1												
LAFAYETTE								1					1				59	3	
LAFOURCHE						1	2										26	1	
LASALLE																			
LINCOLN								3											
LIVINGSTON															1				
MADISON													1						
MOREHOUSE													2						
NATCHITOCHE							2						1						
ORLEANS						1	3	12					15		4		870	30	
OUACHITA							1						11				130	3	1
PLAQUEMINES																			
POINTE COUPEE																			
RAPIDES													1				95	5	4
RED RIVER																			
RICHLAND																			
SABINE																			
ST. BERNARD															2				
ST. CHARLES																			
ST. HELENA																			
ST. JAMES																			
ST. JOHN																			
ST. LANDRY													1				25	1	
ST. MARTIN								1					1				4		
ST. MARY													1				13	1	
ST. TAMMANY				1											3		5		
TANGIPAHOA								1									17	1	
TENSAS																	2	1	
TERREBONNE						1		1							9		70	1	
UNION																			
VERMILION							1					2			2		6		
VERNON																	31	2	
WASHINGTON								1				1	2				1		
WEBSTER													2				13		
WEST BATON ROUGE													1				1	2	
WEST CARROLL																			
WEST FELICIANA																			
WINN													1				4	3	
OUT OF STATE																	1		

\* Includes Rubella, Congenital Syndrome.

\*\* Includes 18 cases of Hepatitis Non A, and Non B.

\*\*\* Acquired outside United States unless otherwise stated.

From January 1, 1985 - August 31, 1985 the following cases were also reported:

2-Amebiasis; 1-Brucellosis; 1-Coccidioidomycosis; 2-Reye Syndrome; 1 Rocky Mountain Spotted Fever.



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