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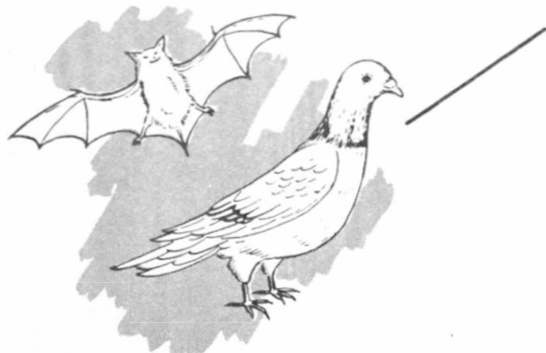
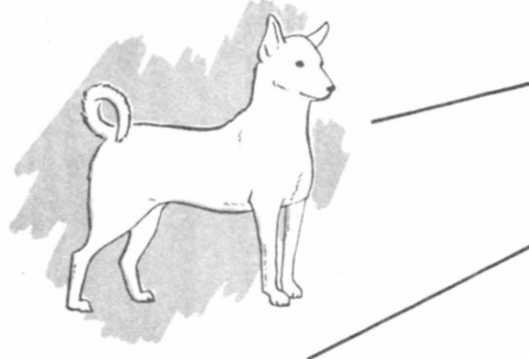
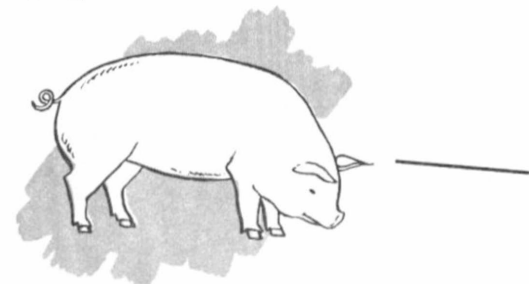
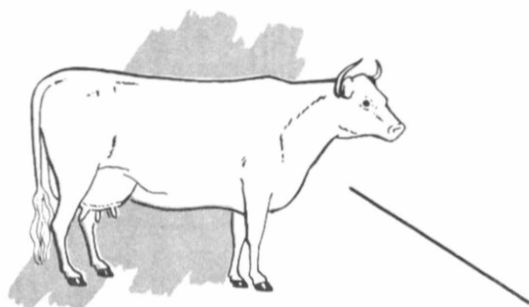


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U. S. DEPARTMENT OF  
HEALTH, EDUCATION, AND WELFARE  
PUBLIC HEALTH SERVICE

# PREFACE

Information reported to the National Office of Vital Statistics and to the Communicable Disease Center for the Morbidity and Mortality Weekly Report during the past 18 years and information accumulated by the Communicable Disease Center and the Walter Reed Army Institute of Research on leptospirosis in man in the United States during same period, is reviewed in this report. Reports of leptospirosis in domestic animals in the United States obtained by the U.S. Department of Agriculture during 1962 through 1964 are also summarized. Future issues on leptospirosis will be compiled as surveillance data becomes available. This report is intended primarily for the use of those with the responsibility of disease control activities. Anyone desiring to quote this report should verify the data at its original source for accuracy and interpretation.

Contributions to the Surveillance Report are most welcome. Please address to:

Chief, Veterinary Public Health Laboratory  
Communicable Disease Center  
Atlanta, Georgia 30333

Communicable Disease Center  
Epidemiology Branch  
Veterinary Public Health Section

David J. Sencer, M.D., Chief  
Alexander D. Langmuir, M.D., Chief  
James H. Steele, D.V.M., Chief

Report prepared by:

Veterinary Public Health Laboratory

Mildred M. Galton, Sc.M., Chief

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## I. INTRODUCTION

Human cases of leptospirosis reported in the United States from 1947 through 1964 were summarized in the Zoonoses Surveillance Report, Communicable Disease Center (CDC), September 1965.

Beginning with the 1965 report, available information on the occurrence of leptospirosis in man and domestic animals in the United States will be summarized annually.

## II. HUMAN LEPTOSPIROSIS IN THE UNITED STATES

As in previous years, information on human cases was obtained from two sources. The first consists of 84 human cases reported to the CDC for the Morbidity and Mortality Weekly Report (MMWR) by state health departments. The only information available from these reports was the state and county of occurrence. The second source consists of 73 human cases that came to the attention of the CDC, WRAIR or a state health department laboratory. While some of these 73 cases may well have been reported to MMWR, many were not (table 1). Laboratory diagnosis of 47 of these 73 cases was confirmed at the CDC, 2 at WRAIR, 23 at state health department or university laboratories, and one at a Veterans Administration Hospital laboratory.

### A. Human Cases Reported to Morbidity and Mortality Weekly Reports, 1965:

The geographic distribution of 84 cases from the United States reported to MMWR during the past year is shown in Table 1 and Figure 1. Cases were recorded from 25 states and from all regions. Attack rates in states reporting cases ranged from a low of 0.006 to a high of 1.156 cases per 100,000 population. The two highest rates were in Idaho and Hawaii, with 1.156 and 1.125 respectively. Although the attack rate in Hawaii remained high compared to other states, a considerable decrease occurred in the overall attack rate of 17.3 cases per 100,000 population during the previous 3 years.

The 84 cases reported in 1965, represent a decrease from the total of 125 cases reported for 1964. However, more than one half of the cases reported in 1964 were from 2 outbreaks and only 8 of the reported cases in 1965 were known to be associated with an outbreak. This outbreak represents the first human cases of leptospirosis reported from Idaho. Dr. John A. Mather, State Epidemiologist, Idaho Department of Health, stated that these cases occurred following a 4th of July swimming party in a lake. The source of leptospiral contamination in the lake was believed to be water from an artesian well that flowed through a pasture before reaching the lake. Serologic evidence of leptospirosis was demonstrated in sera from the cattle on the pasture. Dr. Mather stated that although cases were reported by attending physicians, their investigation revealed at least 16 cases associated

with this outbreak. He is preparing a detailed report of the outbreak for publication.

B. Epidemiologic Data on 73 Cases in the United States:

1. Geographic distribution:

The distribution of the 73 cases by state is shown in table 1. All regions of the United States except the Mountain region are represented. One small family outbreak of 3 cases in Illinois is included in this series. No other outbreaks were reported in this series in 1965.

The great number of cases reported from Iowa and from California may be attributed to specific case finding studies in progress in those states. In Iowa, these studies are being conducted at the Institute of Agricultural Medicine, State University of Iowa by Dr. William McCulloch and associates, and in California by Dr. William Hubbert, CDC San Francisco Field Station and the State Health Department. Dr. Hubbert obtained 214 sera from patients with aseptic meningitis that were negative to a battery of viral antigens at the State Health Department Virus Laboratory. These samples were screened by the slide agglutination test in his laboratory and all positive sera sent to the Veterinary Public Health Laboratory, CDC, for titration by the microscopic agglutination test. A total of 7 cases were detected by this procedure. Dr. Hubbert also obtained 226 sera accumulated by California State Public Health Virus Laboratory, from patients with aseptic meningitis during 1961, 1963 and 1964. Titers of 1:100 or greater were demonstrated in sera from 11 patients; 6 in 1964, 4 in 1963 and 1 in 1961.

Information was also received on 3 cases that occurred during November and December 1964 but were reported too late to be included in the figures for 1964 (Zoonoses Surveillance Report No. 7). Two cases were in Hawaii and one in Louisiana. These cases are worthy of mention. At Charity Hospital, New Orleans, serotype canicola was isolated from blood and spinal fluid from a fatal case. The patient drove a tractor on a sugar cane farm. Titers of 1:800 and 1:1600, respectively, against icterohaemorrhagiae were demonstrated in sera from the 2 cases in Hawaii. Both of these patients worked on farms where rodents were plentiful.

2. Seasonal distribution:

The distribution of 63 of the 73 cases by month of occurrence is given in figure 2. Forty-one (65 per cent) of these cases had onsets during the 5 months period from June through October with the highest occurrence in July and August. This is consistent with the findings reported for previous years.

3. Age and Sex:

The distribution of cases by age and sex is given in figure 3. Age was known on 60 of the 73 cases. Of these 60, 44 were between the ages of 10 and 49 with the highest number (15, 25 per cent) in the 40-49 year age group. Sixty-three (90 per cent) of the 70 cases in which sex was known were males.

4. Occupation:

Information as to occupation was available in 55 of the 73 cases (table 2). The occupation in 28 (51 per cent) of the cases involved direct contact with potentially infected animals in farming, abattoir work, or veterinary work.

#### 5. Place and Source of Infection:

The probable place of infection was determined in 44 of the 73 cases. An infecting source was known or suspected in 33 of the 73 cases (table 3). The greatest proportion of cases occurred on farms, in abattoirs, or in veterinary work (25 cases, 58 per cent). Ten (23 per cent) involved water contact either in the course of the patient's occupation or while swimming in contaminated ponds or streams. In contrast to previous years when 23 per cent occurred in the home, only 4 (11 per cent) occurred in the home in 1965.

Of the 33 cases in which an infecting source could be determined, the greatest proportion (21 cases, 64 per cent) involved contact with cattle or swine.

#### 6. Infecting Leptospiral Group or Serotype:

Leptospire were isolated from only one case. However, the culture was contaminated and leptospire were overgrown before they could be recovered for identification. The probable infecting serotype could be reasonably established by serologic findings supported by clinical and epidemiologic histories, in 54 of the 73 cases (74 per cent). Serologic evidence indicated that at least 10 different leptospiral serotypes were represented among the 54 cases (table 4).

The most frequently encountered types of infection in these 54 cases were pomona (22, 40.7 per cent), icterohaemorrhagiae (14, 25.9 per cent), and canicola (7, 13 per cent). Three cases were associated with grippityphosa, 2 with ballum, 2 with members of the autumnalis group and 2 with members of the hebdomadis group. The remaining 2 on which information was available were associated with australis and bataviae.

Of the 11 cases associated with the less frequently occurring serotypes, the probable place of exposure in 7 could be related to their occupations. Two of the 3 grippityphosa cases were farmers, and one of the ballum cases was a veterinarian. Of the 2 cases attributed to the members of the hebdomadis group, one was a veterinarian; the other an abattoir worker. One of the autumnalis group cases was a cattleman and he also butchered cattle. The one case attributed to bataviae probably was infected outside the country. She had been swimming in a river in Jamaica.

#### 7. Mortality:

Of 28 patients in which case outcome was recorded, 24 (86 per cent) recovered and 4 (14 per cent) died. These 4 cases were ages: 54, 61, 62, and 68.

The initial clinical diagnostic impressions were recorded in 25 (34 per cent) of the 73 cases. Of these, leptospirosis was suspected in only 3 (12 per cent) (table 5). Most frequently recorded impressions were hepatitis with 6 (24 per cent) and influenza with 4 (16 per cent).

### III. REPORTED DOMESTIC ANIMAL LEPTOSPIROSIS IN THE UNITED STATES

#### A. Source of Data:

Reports of leptospirosis in domestic animals in the United States were obtained from the United States Department of Agriculture, Agricultural Research Service, Animal Disease Eradication Division.

#### B. Geographic Distribution:

The same general regional distribution of infections was present in 1965 as appeared in the 1962-1964 period (table 6). The Central and South Atlantic regions reported the greatest number of infections in cattle, swine, and dogs. Forty-two states reported infections in cattle, 24 in swine, 16 in horses and 36 in dogs. No reports were obtained from 7 states.

There was a slight decrease in reported domestic animal leptospirosis in 1965 from the 1964 reports (table 7). This downward trend has been evident since 1962.

### IV. SUMMARY

In this report, as in the previous report on leptospirosis in the United States issued in September 1965, data on the occurrence of human cases are reviewed from 2 sources. The first series consists of 84 cases reported to the MMWR by state health departments. Cases were recorded from 25 states and all regions. Attack rates ranged from a low of 0.006 to a high of 1.156 cases per 100,000 population. The second series consists of 73 cases which occurred during the same period but on which detailed laboratory and epidemiologic data were collected by the CDC, WRAIR, and several state health departments. In this series, the greatest proportion of cases (58 per cent) were associated with domestic animals, in abattoirs, on farms, or in veterinary work. Serologic findings indicated that infection was due to at least 10 leptospiral serotypes. Serotype pomona was the most frequently encountered, followed by icterohaemorrhagiae, canicola, and grippityphosa.

There was no significant change in the reports of leptospirosis in domestic animals according to data collected by the U. S. Department of Agriculture during 1965. The disease occurred in all regions and in 43 states. A total of 21,135 infections were reported in 1965 compared to 21,923 in 1964.



Table 1

Distribution of human cases of leptospirosis  
in the United States in 1965,  
by region and state

	Cases officially reported to CDC <sup>(a)</sup> for MMWR <sup>(b)</sup>		Cases detected serologically by CDC and WRAIR <sup>(c)</sup> or State Health Depts.
	No.	Rates per 100,000	
<b>NORTH EAST</b>			
Maine	1	.101	1
Massachusetts	2	.037	1
Connecticut			1
<b>MIDDLE ATLANTIC</b>			
New York	1	.006	1
New Jersey	3	.044	
Pennsylvania			2
<b>EAST NORTH CENTRAL</b>			
Ohio	7	.068	4
Illinois	5	.047	7
Michigan	2	.024	
Wisconsin			1
<b>WEST NORTH CENTRAL</b>			
Iowa	7	.254	11
Missouri			2
Kansas			2
<b>SOUTH ATLANTIC</b>			
Maryland	1	.028	
West Virginia	2	.110	
North Carolina	3	.061	1
South Carolina	1	.039	
Georgia	2	.046	1
Florida	2	.035	6
<b>EAST SOUTH CENTRAL</b>			
Tennessee	6	.156	1
Alabama	1	.029	
Mississippi	1	.043	1
<b>WEST SOUTH CENTRAL</b>			
Arkansas	2	.102	3
Louisiana	5	.142	5
Texas	5	.047	
<b>MOUNTAIN</b>			
Montana	1	.142	
Idaho	8	1.156	
<b>PACIFIC</b>			
Oregon	1	.053	
California	6	.032	13
Hawaii	8	1.125	9
<b>Total</b>			<b>73</b>

(a) CDC = Communicable Disease Center

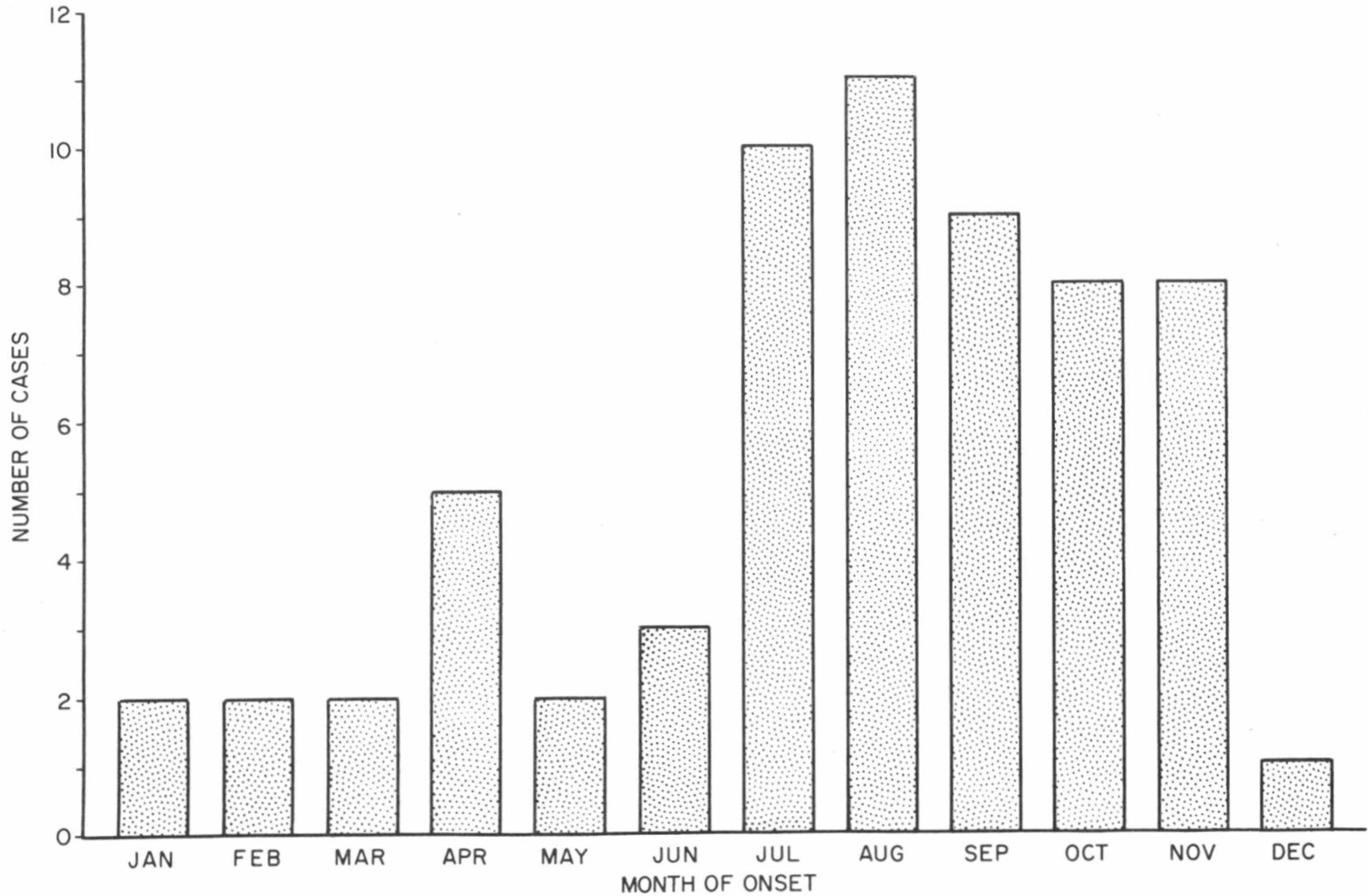
(b) MMWR = Morbidity and Mortality Weekly Reports

(c) WRAIR = Walter Reed Army Institute of Research



Figure 2.

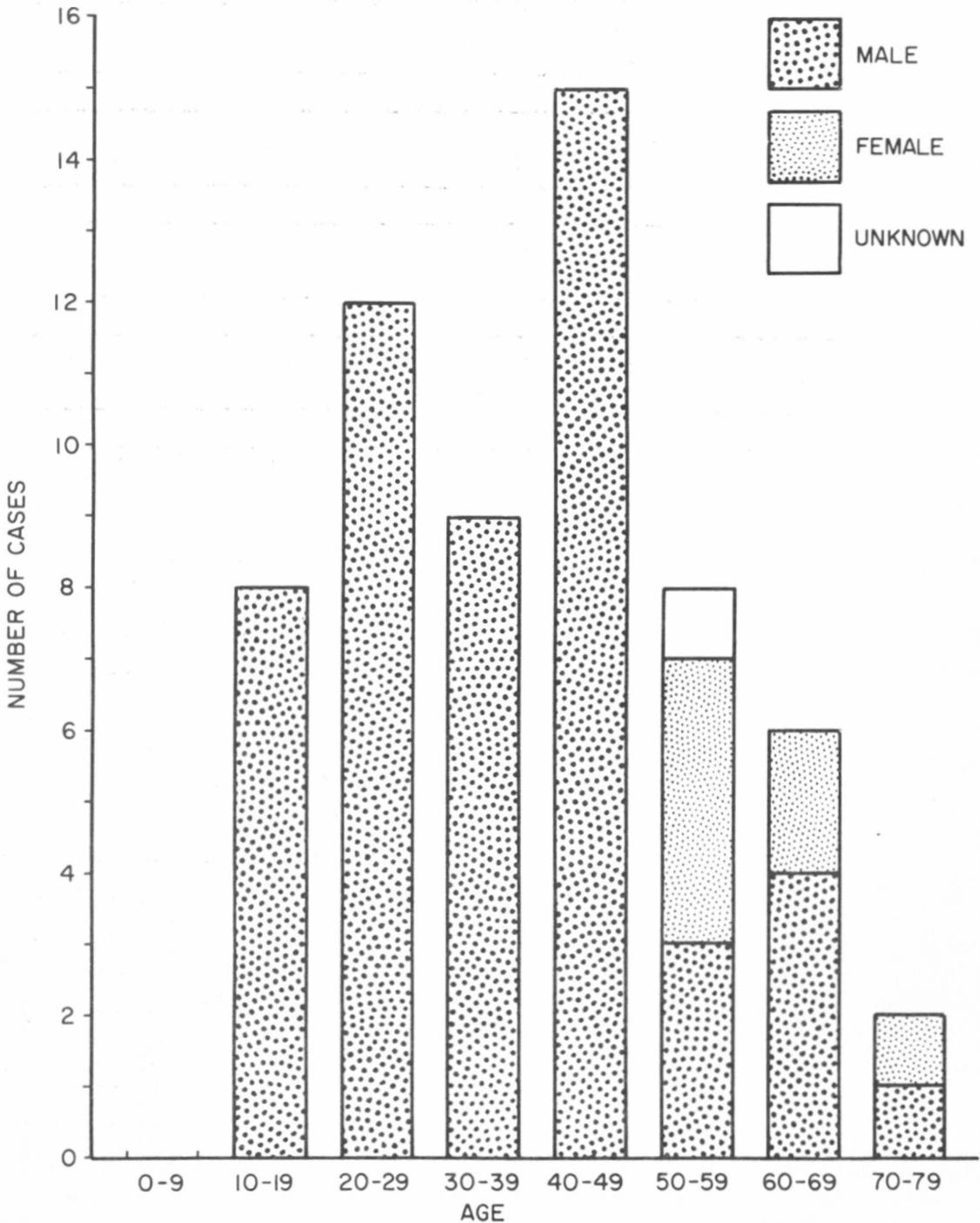
SEASONAL DISTRIBUTION OF 73 HUMAN LEPTOSPIROSIS CASES\*  
UNITED STATES, 1965



\* INCLUDES 10 CASES WITH UNKNOWN DATE OF ONSET.

*Figure 3.*

DISTRIBUTION OF 73 LEPTOSPIROSIS CASES\*  
BY AGE AND SEX, UNITED STATES, 1965



\* INCLUDES 11 MALE AND 2 SEX UNKNOWN CASES OF UNKNOWN AGE.

Table 2

Distribution of 73 Cases of Leptospirosis  
by Occupation, United States, 1965

	<u>No. of Cases</u>
Farmer	14
Abattoir	11
Fisherman	6
Veterinary Work	3
Children	5
Housewife	5
General Labor	3
Skilled Labor	2
Logging	2
Unemployed	2
Mental Patient	1
Nurse	1
Unknown	<u>18</u>
Total	73

Table 3

Distribution of 73 Cases of Leptospirosis  
by Place of Infection and by Probable  
Animal Source, United States, 1965

Place of Infection	Probable Animal Source				Unknown Source	Total
	Cattle or Swine	Dogs	Rodents	Other Animals		
Home		1	3			4
Water	3		1		6	10
Farm	6		4		1	11
Abattoir	11					11
Veterinary Work					3	3
Logging				1	1	2
Sewer					1	1
Gutter			1			1
Unknown	1	1			28	30
	21	2	9	1	40	73

Table 4

Distribution of 73 Cases of Leptospirosis by Place of Infection  
and Presumptive Infecting Serotype, United States, 1965

Presumptive Infecting Serotype	Place of Infection									Total
	Home	Water	Farm	Abattoir	Veteri- nary Work	Logging	Sewer	Gutter	Unknown	
icterohaemorrhagiae	1	3	2						8	14
canicola	1		1	1		1			3	7
pomona		3	4	6	1				8	22
grippotyphosa			2			1				3
autumnalis group			1					1		2
hebdomadis group				1	1					2
australis									1	1
bataviae		1								1
ballum									2	2
Unknown	2	3	1	3	1		1		8	19
Total	4	10	11	11	3	2	1	1	30	73

Table 5

Distribution of 73 Cases of Leptospirosis  
by Initial Clinical Diagnostic Impression,  
United States, 1965

Initial Clinical Impression	Number of Cases
Hepatitis	6
Influenza	4
Leptospirosis	3
Chemical Poisoning	2
Infectious Mononucleosis	2
Adult Measles	1
Aseptic Meningitis	1
Brucellosis	1
Cerebrovascular Accident	1
Fever of Unknown Origin	1
Gall Stones	1
Pneumonia	1
Pyelonephritis	1
Unknown	<u>48</u>
Total	73



Table 6

Geographic Distribution of Reported Domestic Animal Leptospirosis  
According to Species, United States, 1965

	Number of Cases			
	Cattle	Swine	Horses	Dogs and Cats
NEW ENGLAND				
Maine	13			2
New Hampshire	4			2
Vermont	20		2	1
Massachusetts*				
Rhode Island*				
Connecticut	30			64
MIDDLE ATLANTIC				
New York	356		3	
New Jersey	1			
Pennsylvania	84	8		
EAST NORTH CENTRAL				
Ohio*				
Indiana	348	260	4	2
Michigan	92	14		281
Wisconsin	1362	28	2	8
WEST NORTH CENTRAL				
Minnesota	259	75		7
Iowa*				
Missouri	421	371		216
North Dakota	13			1
South Dakota	197	20		
Nebraska	65	38	3	83
Kansas	61	1		146
SOUTH ATLANTIC				
Delaware*				
Maryland	15	4		
Virginia	448	231	44	
West Virginia	281	1	1	211
North Carolina	8			430
South Carolina	400			29
Georgia	99	130	3	331
Florida	121			215
EAST SOUTH CENTRAL				
Kentucky	653	217	2	22
Tennessee	211	99		446
Alabama*				
Mississippi	106	5	17	353

Table 6 -- (Contd.)

	Number of Cases			
	Cattle	Swine	Horses	Dogs and Cats
WEST SOUTH CENTRAL				
Arkansas	2767	309	181	1503
Louisiana	159	3	27	242
Oklahoma	787	210	10	60
Texas	692	67	61	670
MOUNTAIN				
Montana	543		3	119
Idaho	61			6
Wyoming	25			2
Colorado	506			3
New Mexico	68			52
Arizona	122			541
Utah	10			16
Nevada	8			222
PACIFIC				
Washington	42	2	4	150
Oregon	356	300		56
California	38	1		
Alaska*				5
Hawaii	8	10		16
Total	11,851	2,404	367	6,513

\*Reports not available or inadequate

States not shown had no cases reported.

Table 7

Distribution of Reported Domestic Animal Leptospirosis  
by Month, 1965

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>Jun.</u>	<u>Jul.</u>	<u>Aug.</u>	<u>Sep.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Total</u>
Cattle	2209	1027	1161	419	872	674	1244	1143	660	759	710	973	11,851
Swine	348	232	356	41	34	68	250	357	126	188	187	217	2,404
Horses	20	16	19	23	25	52	46	77	34	22	23	10	367
Dogs	648	432	548	449	446	368	812	650	477	512	575	596	6,513
Total	3225	1707	2084	932	1377	1162	2352	2227	1297	1481	1495	1796	21,135