AAL-TR-66-4

AD636476

HUMAN ENTERIC PATHOGENS IN DOGS IN CENTRAL ALASKA: PART II

Capt Clifford E. Butler
SSgt Charles E. Busbee

May 1966

CLEARINGHOUSE
FOR FEDERAL SCIENTIFIC AND
TECHNICAL INFORMATION
Hardcopy | Microfiche
$1.00 | .50 | 14 pp
ARCHIVE COPY

ARCTIC AEROMEDICAL LABORATORY
AEROSPACE MEDICAL DIVISION
AIR FORCE SYSTEMS COMMAND
FORT WAINWRIGHT, ALASKA

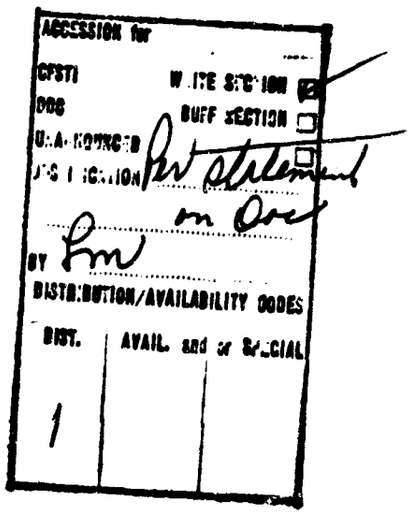
DDC
RECEIVED
AUG 11 1966

NOTICES

When US Government drawings, specifications, or other data are used for any purpose other than a definitely related government procurement operation, the government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Distribution of this document is unlimited.

This research was conducted in accordance with the "Principles of Laboratory Animal Care" of the National Society for Medical Research.



HUMAN ENTERIC PATHOGENS IN DOGS IN CENTRAL ALASKA: PART II

Capt Clifford E. Butler
SSgt Charles E. Busbee

FOREWORD

Research reported in this paper was done at the Arctic Aeromedical Laboratory, Arctic Pathoecology Branch, under Project 8241, Task 824101, from July 1965 to March 1966.

The authors wish to thank Dr. James C. Beckley, Veterinarian, Fairbanks, Alaska; Lt. Colonel Leon Johnson, Veterinarian, Fort Wainwright, Alaska; and Captain Richard C. Simmonds, DVM, USAF, Veterinarian, Arctic Aeromedical Laboratory, for their assistance and contributions to this study.

This technical report has been reviewed and is approved.

HORACE F. DRURY
Director of Research

ABSTRACT

A second year's survey of Salmonella and related enteric pathogens in dogs in Fairbanks, Alaska, shows that house pets within the city have a much higher incidence rate than do other groups of dogs in the area. Nine different species of Salmonella and four related Enterobacteriaceae were recovered. During the two years of study, 20 species of Salmonella have been recovered. Consideration of factors that constitute a dog's environment indicates that acquisition and dissemination of these pathogens are directly related to the animal's freedom of movement, particularly its access to refuse and garbage.

I

INTRODUCTION

In a study of potential reservoirs and vectors of human intestinal pathogens in Alaska (1) it was previously reported that 27% of the family pet dogs in Fairbanks, Alaska, were harboring potentially pathogenic members of the bacterial family Enterobacteriaceae, excluding Escherichia coli. In comparison, surveys of dogs in other states have shown 15.1% to be positive in Florida (2), 5.1% positive in Georgia (3) and 3.4% positive in Texas (4). Prior to the 1965 report the highest percentage recovered in Alaska dogs was 7% reported from a survey in Pt. Barrow (5).

A second year's survey was undertaken immediately following the first with several objectives in mind. The first objective was an attempt to duplicate this high rate of recovery, and the second was an attempt to determine if dogs which were in the same geographical location but were maintained in a more controlled manner also harbored this large percentage. As in the first study a close observation on the health of the animals was kept and the liaison with local State Department of Public Health Laboratory was continued so that the species recovered in human cases could be correlated with those recovered from dogs.

The high rate of recovery of this group of organisms from a single identifiable source other than human is important from a public health aspect and of interest because Fairbanks is located in a subarctic area.

In order to examine the factors or objectives, we sampled four different groups of dogs during the second survey. These four groups included 1) house pets kept within the city of Fairbanks, Alaska, 2) house pets on an adjacent military base, 3) kennel dogs in or near the city, and 4) military sentry dogs on duty in the area. Each group had distinctive factors in its environment that differed from the other groups. A generalized characteristic separation is shown in Table I.

II

METHODS

Dogs Sampled

A total of 190 samples were collected from 132 dogs. The number of cultures obtained from each group is shown in Table II. All family pet dogs from the city were cultured while the dogs were either outpatients or inpatients at the base veterinary clinic. Samples from the sentry dogs were collected either at the veterinary clinic or at their duty stations. Samples

TABLE I

Group Status of Dogs

Type of Dog	Freedom of Movement	Contact with Environment	Contact with People
House pet*	Unlimited	Unlimited	Unlimited
House pet**	Relatively unlimited	Relatively unlimited	Unlimited
Kennel	Limited	Moderately limited	Moderately limited
Sentry	Extremely limited	Extremely limited	Extremely limited

* Fairbanks ** Military Base

TABLE II

Cultures Obtained

Type of Dog	Number of Dogs Sampled By				Total Number of Dogs Sampled
	1 Culture	2 Cultures	3 Cultures	4 Cultures	
House pet*	25	3	1		29
House pet**	51	-	-	-	51
Kennel	25	-	-	-	25
Sentry	3	6	7	11	27
Totals	104	9	8	11	132

* Fairbanks ** Military Base

from the kennel dogs were collected at private kennels. With the exception of one kennel dog and one sentry dog, all were considered to be free from signs of an intestinal disease.

Dog Food Cultures

Samples of dog food were collected periodically from the city clinic and sentry dog supplies. Usually these samples were collected at the same time that rectal swabs were obtained from the dogs.

Sampling Techniques

All animal samples were collected by inserting a sterile cotton swab 4 to 8 cm into the rectum. The swab was placed in 0.5 ml of 1% peptone water. Inoculation to media was usually done within one hour after collection.

Cultural Techniques

Isolation and identification procedures were the same as those described by Butler and Herd (1). Particular emphasis was placed on the recovery of the organisms after enrichment in Selenite Broth (DIFCO).

The procedures as described by Galton (6) were employed for the examination of all dog food.

Confirmation of Salmonella

All Salmonella were sent to the Communicable Disease Center (CDC), Atlanta, Georgia, for confirmation. In some instances CDC had to identify the species because the authors were unable to obtain the specific antisera necessary for all species identification. Organisms other than Salmonella were identified by characteristics as described by Edwards and Ewing (7).

III

RESULTS

Answers to some of the questions raised during the first year's study were found in the results of this second survey. For example: This time 34% of the pet dogs in the city were found to be harboring human enteric pathogens; this compares to 27% during the first year. Fewer dogs in the city were sampled during the second survey but, as in the first year, positive

cultures were found each time samples were obtained from this group. Conversely, as shown in Table III, very few of the other three groups were found to be positive. In one group, family pets on the military base, no positive samples were found. This result indicates that in central Alaska maintenance and care of the animal has a definite effect on the animal's acquiring and disseminating these organisms. A summary of the species or groups is given in Table IV.

Correlative studies between species or groups recovered from human cases and those found in dogs in the area again failed to show any relationship. Four species of Salmonella including typhimurium, anatum, oranienberg and blockely were recovered from humans during the period of this second survey. Only S. oranienberg were recovered from both a dog and a human, and a relationship between the animal and human case could not be established in this instance. It appears that this lack of correlation between human and animal cases is due, for the most part, to an exiguity of human culture results. There was no shortage of human cases of gastroenteritis but there was a shortage of culture reports. The Salmonella anatum was responsible for an outbreak of gastroenteritis in students at the University of Alaska during this second survey but dogs were not incriminated or involved. An epidemiological report of this investigation is being prepared.

Some additional results were obtained from this survey. Again, the presence of the organisms in dogs appears to be transitory. As shown in Table V, replicate cultures on some of the animals showed that the organisms were not excreted for extended periods. This transitory effect has been reported by other investigators (8, 9).

TABLE V

Replicate Positive Cultures

Dog	Dates of Cultures	Results
House pet	3 February 65	No pathogens recovered
	15 February 65	Salmonella cerro
	July 65	S. lexington
House pet	3 February 65	S. senftenberg
	15 February 65	S. minnesota
		S. senftenberg
Sentry	April 64	S. give
	June 64	Bethesda-Ballerup
	September 64	Bethesda-Ballerup
	April 65	No pathogens recovered

TABLE III

Distribution of Positive Cultures

Type of Dog	Number of Dogs Sampled	Number* Positive for			Totals
		Salmonella	Shigella	Potential Pathogens	
House pet**	29	7	-	3	10
House pet***	51	-	-	-	-
Kennel	25	-	-	1	1
Sentry	27	1	-	1	2

* Each animal is counted as positive only once, regardless of the number of positive repeat cultures obtained

** Fairbanks

*** Military Base

TABLE IV

Species or Groups Recovered

Salmonella	Group Recovered From	Related Organism	Group Recovered From
give	Sentry*	Bethesda-Ballerup	Sentry*, House pet
worthington	House pet	Arizona	House pet
senftenberg	House pet**	Alkalescens-Dispar	Kennel, Sentry
minnesota	House pet**	Hafnia	House pet
cerro	House pet+		
montevideo	House pet		
siegburg	House pet		
lexington	House pet+		
urbana	House pet		

* Same animal

** Same animal

+ Same animal

One very unusual result observed during this survey was the recovery of a Salmonella worthington in pure culture from one of the city pets. While this could be interpreted to mean that the dog was overwhelmingly infected, the animal was free of any signs of an intestinal disease. In reference to signs of disease in positive animals, this and other investigations (2, 8) indicate that very few dogs display signs of disease when this group of organisms is present. When disease signs are exhibited, however, they are usually similar to the gamut produced in humans.

All of the samples of commercial dog food were negative for enteric pathogens.

IV

DISCUSSION AND CONCLUSIONS

This second survey, in agreement with the previous one, indicates that Salmonella and related members of the Enterobacteriaceae family are present in a significant percentage of house pet dogs within the city of Fairbanks, Alaska. Combining the results of both years' studies it is shown that 37 of 123 pet dogs living within the city are harboring these pathogens. At the same time the organisms were found in only 1 of 100 kennel dogs, 2 of 27 sentry dogs and none of the pet dogs on the adjacent military base. It appears from these results that the city dogs have a unique factor or characteristic within their environment that would contribute toward this finding. The factors considered were food, water, soil, refuse, garbage and human contact. Geographically, the animals were all located within a small area. Through cultures, comparative studies and histories, a factor unique to the city pets was found. This was almost unlimited contact with refuse and garbage. In the city, refuse and garbage are placed in the standard garbage cans for pick-up. These containers are not animal-proof and are used as feeding stations by stray animals and family pets that are permitted to wander. The kennel dogs and sentry dogs were denied access to this source by virtue of their confinement, and on the military base all refuse and garbage are placed in large dumpsters that are animal-proof. All of the other factors considered could not be incriminated. This fact also closes the circle of transmission in this area since it means that the dog, an apparent transient reservoir, becomes an intermediate vector between humans. The actual number of cases of salmonellosis and other intestinal infections in humans in this area directly attributable to this method of dissemination is difficult to assess but there is a probability that it is much greater than in more moderate climates.

After this survey had been concluded, rectal swabs were obtained from 32 dogs at Pt. Barrow, Alaska. The specimens were taken between October 1965 and March 1966. One dog was found to be harboring a member of the

Bethesda-Ballerup group but all others were negative. None of the animals displayed signs of an intestinal disease and there has been no report of cases among the human population.

V

SUMMARY

A second year's survey of Salmonella and related enteric pathogens in dogs in Fairbanks, Alaska, shows that house pet dogs within the city have a much higher incidence rate than do other groups of dogs in the area. During the second survey nine different species of Salmonella and four related Enterobacteriaceae were recovered. A total of 20 species of Salmonella have been recovered during two years of study. A consideration of the factors that constitute a dog's environment indicates that the acquisition and dissemination of these pathogens are directly related to the animal's freedom of movement and particularly its access to refuse and garbage.

REFERENCES

1. Butler, C. E. and B. R. Herd. "Human enteric pathogens in dogs in central Alaska." J. Infect. Dis., 115:233-236, 1965.

2. Mackel, D. C., M. M. Galton, H. Gray, and A. V. Hardy. "Salmonellosis in dogs. IV. Prevalence in normal dogs and their contacts." J. Infect. Dis., 91:15-18, 1952.

3. Stewart, W. H. and T. DeCapito. "Salmonellosis in man and animals in southwest Georgia." Amer. J. Trop. Med., 2:273-278, 1953.

4. Watt, J. and T. DeCapito. "The frequency and distribution of Salmonella types isolated from man and animals in Hidalgo County, Texas." Amer. J. Hyg., 51:343-352, 1950.

5. Cullison, J. W. and T.R.A. Davis. "The isolation of enteric pathogens at Barrow, Alaska." U.S.Armed Forces Med. J., 8:534-538, 1957.

6. Galton, M. M. "Laboratory procedures for the isolation of Salmonella from human and animal food products." Proc. 65th Annual Meeting of the U. S. Livestock Sanit. Ass., 434-440, 1961.

7. Edwards, P. R. and W. H. Ewing. Identification of Enterobacteriaceae. Minneapolis, Burgess Publishing Co., 1962.

8. Galton, M. M., J. E. Scatterday, and A. V. Hardy. "Salmonellosis in dogs. I. Bacteriological, epidemiological and clinical considerations." J. Infect. Dis., 91:1-5, 1952.

9. Floyd, T. M. "Salmonellosis in dogs. A review of the literature." J. Egypt. Public Health Ass., 29:4-18, 1954.

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1 ORIGINATING ACTIVITY (Corporate author) Arctic Aeromedical Laboratory Ft. Wainwright, Alaska	2a REPORT SECURITY CLASSIFICATION UNCLASSIFIED 2b GROUP n/a

3 REPORT TITLE
HUMAN ENTERIC PATHOGENS IN DOGS IN CENTRAL ALASKA
PART II

4 DESCRIPTIVE NOTES *(Type of report and inclusive dates)*
Part II. July 1965 - March 1966

5 AUTHOR(S) *(Last name, first name, initial)*
Butler, Capt Clifford E. and SSgt Charles E. Busbee

6 REPORT DATE	7a TOTAL NO. OF PAGES	7b NO. OF REFS
May 1966	20	9

8a CONTRACT OR GRANT NO. b PROJECT NO. Project 8241 c. Task 824101 d.	9a ORIGINATOR'S REPORT NUMBER(S) None 9b OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)* AAL-TR-66-4

10 AVAILABILITY/LIMITATION NOTICES
Distribution of this document is unlimited.

11 SUPPLEMENTARY NOTES	12 SPONSORING MILITARY ACTIVITY
	Arctic Aeromedical Laboratory Ft. Wainwright, Alaska

13 ABSTRACT A second year's survey of Salmonella and related enteric pathogens in dogs in Fairbanks, Alaska, shows that house pets within the city have a much higher incidence rate than do other groups of dogs in the area. Nine different species of Salmonella and four related Enterobacteriaceae were recovered. During the two years of study, 20 species of Salmonella have been recovered. Consideration of factors that constitute a dog's environment indicates that acquisition and dissemination of these pathogens are directly related to the animal's freedom of movement, particularly its access to refuse and garbage.

DD FORM 1 JAN 64 1473

UNCLASSIFIED
Security Classification

UNCLASSIFIED
Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Salmonella Enterobacteriaceae Alaska Dogs						

INSTRUCTIONS

1. ORIGINATING ACTIVITY: Enter the name and address of the contractor, subcontractor, grantee, Department of Defense activity or other organization *(corporate author)* issuing the report.

2*a*. REPORT SECURITY CLASSIFICATION: Enter the overall security classification of the report. Indicate whether "Restricted Data" is included. Marking is to be in accordance with appropriate security regulations.

2*b*. GROUP: Automatic downgrading is specified in DoD Directive 5200.10 and Armed Forces Industrial Manual. Enter the group number. Also, when applicable, show that optional markings have been used for Group 3 and Group 4 as authorized.

3. REPORT TITLE: Enter the complete report title in all capital letters. Titles in all cases should be unclassified. If a meaningful title cannot be selected without classification, show title classification in all capitals in parenthesis immediately following the title.

4. DESCRIPTIVE NOTES: If appropriate, enter the type of report, e.g., interim, progress, summary, annual, or final. Give the inclusive dates when a specific reporting period is covered.

5. AUTHOR(S): Enter the name(s) of author(s) as shown on or in the report. Enter last name, first name, middle initial. If military, show rank and branch of service. The name of the principal author is an absolute minimum requirement.

6. REPORT DATE: Enter the date of the report as day, month, year; or month, year. If more than one date appears on the report, use date of publication.

7*a*. TOTAL NUMBER OF PAGES: The total page count should follow normal pagination procedures, i.e., enter the number of pages containing information.

7*b*. NUMBER OF REFERENCES: Enter the total number of references cited in the report.

8*a*. CONTRACT OR GRANT NUMBER: If appropriate, enter the applicable number of the contract or grant under which the report was written.

8*b*, 8*c*, & 8*d*. PROJECT NUMBER: Enter the appropriate military department identification, such as project number, subproject number, system numbers, task number, etc.

9*a*. ORIGINATOR'S REPORT NUMBER(S): Enter the official report number by which the document will be identified and controlled by the originating activity. This number must be unique to this report.

9*b*. OTHER REPORT NUMBER(S): If the report has been assigned any other report numbers *(either by the originator or by the sponsor)*, also enter this number(s).

10. AVAILABILITY/LIMITATION NOTICES: Enter any limitations on further dissemination of the report, other than those imposed by security classification, using standard statements such as:

(1) "Qualified requesters may obtain copies of this report from DDC."

(2) "Foreign announcement and dissemination of this report by DDC is not authorized."

(3) "U. S. Government agencies may obtain copies of this report directly from DDC. Other qualified DDC users shall request through _____."

(4) "U. S. military agencies may obtain copies of this report directly from DDC. Other qualified users shall request through _____."

(5) "All distribution of this report is controlled. Qualified DDC users shall request through _____."

If the report has been furnished to the Office of Technical Services, Department of Commerce, for sale to the public, indicate this fact and enter the price, if known.

11. SUPPLEMENTARY NOTES: Use for additional explanatory notes.

12. SPONSORING MILITARY ACTIVITY: Enter the name of the departmental project office or laboratory sponsoring *(paying for)* the research and development. Include address.

13. ABSTRACT: Enter an abstract giving a brief and factual summary of the document indicative of the report, even though it may also appear elsewhere in the body of the technical report. If additional space is required, a continuation sheet shall be attached.

It is highly desirable that the abstract of classified reports be unclassified. Each paragraph of the abstract shall end with an indication of the military security classification of the information in the paragraph, represented as *(TS)*, *(S)*, *(C)*, *or (U)*.

There is no limitation on the length of the abstract. However, the suggested length is from 150 to 225 words.

14. KEY WORDS: Key words are technically meaningful terms or short phrases that characterize a report and may be used as index entries for cataloging the report. Key words must be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location, may be used as key words but will be followed by an indication of technical context. The assignment of links, rules, and weights is optional.

3973-66

UNCLASSIFIED
Security Classification