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SEROLOGIC SURVEY FOR MICROBIAL PATHOGENS

By

Randall L. Zarnke

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PROGRESS REPORT (RESEARCH)

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Period Covered: 1 July 1983 through 30 June 1984
(Additional data collected April-June 1983)

SUMMARY

A serological survey of 7 wildlife species found throughout Alaska revealed strong evidence for 1 disease and lesser evidence for 2 other diseases. Parainfluenza 3 virus (PI3) antibody was found in 40 of 92 (43%) bison (Bison bison) sera. Bovine viral diarrhea virus (BVD) antibody was found in 3 of 95 (3%) bison, 2 of 20 (10%) caribou (Rangifer tarandus), and 2 of 32 (6%) muskox (Ovibos moschatus) sera. Infectious bovine rhinotracheitis virus (IBR) antibody was found in 1 of 95 (1%) bison and 3 of 20 (15%) caribou sera. No evidence of previous exposure to these 3 viruses was found in 44 Dall sheep (Ovis dalli), 22 moose (Alces alces), 18 mountain goat (Oreamnos americanus), or 9 Sitka black-tailed deer (Odocoileus hemionus sitkensis), nor was evidence of brucellosis or leptospirosis found in muskox, Dall sheep, or mountain goat.

Key words: Alaska, microbial pathogens, serological survey, wildlife.

CONTENTS

BACKGROUND

Alaska's ruminant wildlife species are largely free of serious infectious diseases, especially those diseases that are commonly associated with domestic livestock. Expansion of the agricultural industry has been proposed and may involve dramatic increases in movement of livestock into the State, as well as grazing of such animals in areas previously inhabited solely by wildlife. Such practices would increase the likelihood of introduction and spread of diseases in the wildlife species. In an effort to document the status of wildlife in relation to specific diseases, a serologic survey has been conducted on a continuing basis. All of the disease agents included in this survey have been detected in various species of North American wildlife by means of isolation or by serologic tests (Abdulla et al. 1962, Barrett and Chalmers 1975, Couvillion et al. 1981, Howe et al. 1966, Parks and England 1974, Thorsen and Henderson 1971, Thorsen et al. 1977).

OBJECTIVE

The objective of this study was to determine the prevalence of antibody to parainfluenza 3 virus (PI3), bovine viral diarrhea (BVD), and infectious bovine rhinotracheitis virus (IBR) in 7 species of wild ruminants found in Alaska, and prevalence of brucellosis and leptospirosis in 3 species.

PROCEDURES

Blood samples were collected from animals at locations indicated in Fig. 1. All bison (Bison bison) and muskox (Ovibos moschatus) specimens and 2 Sitka black-tailed deer (Odocoileus hemionus sitkensis) samples were from animals killed by hunters. All remaining samples were collected by Alaska Department of Fish and Game personnel during studies that entailed capture of free-ranging animals.

Six bison specimens were collected in 1975 and 1976. All other sera were gathered during the period from 1977-82. Blood samples were allowed to settle for 12-36 hours at ambient or refrigerated

temperatures. Sera were separated from clots by aspiration and frozen. All serologic tests were performed at the National Veterinary Services Laboratory (U.S. Department of Agriculture, Ames, Iowa).

Table 1 identifies the serologic test utilized for each etiologic agent. For all tests, minimum titers were established (Table 1) based upon natural or experimental infection of the host species in question or a selected domestic animal species. Sera that met or exceeded these titers were considered to contain evidence of past infection by the agent in question.

FINDINGS

The 3 viruses included in this survey are often grouped together for discussion purposes and referred to as the "bovine respiratory viruses." As this common name implies, these viruses often localize in the respiratory tract. However, they can also be found in the genital and/or gastrointestinal tracts. Wherever those viruses localize, they rarely cause disease that is severe enough to cause death. Symptoms are often most severe when the infection occurs in conjunction with other disease agents.

Although mortality may be low, morbidity within a population may be high. Symptoms may be severe enough to incapacitate an animal for several days. This decreases the animal's weight gain, makes it more susceptible to predation, and may influence the ability of a female to bear and/or raise young.

The high prevalence of PI3 antibody in the bison samples (Table 1) concurs with the findings of an early study on this herd (Zarnke 1983). There continues to be no evidence of respiratory infections in this closely observed herd. We plan to collect nasal swabs from hunter-killed animals during the 1984 hunting season and attempt to isolate the virus in question. If such attempts are successful, experimental infections should be performed in order to determine the effect of the disease on individual animals and thus on herd health.

Antibody to both BVD and IBR have been previously reported from caribou (Dieterich 1981, Zarnke 1983). This is apparently the 1st report of BVD antibody in muskox and bison and of IBR antibody in bison. In the absence of clinical signs of disease, the low prevalences reported here should not be considered as cause for alarm.

The negative data for the 2 bacterial diseases are not surprising and are interpreted as a favorable situation to be maintained. The data relating to Dall sheep (Ovis dalli) agree with previous findings (Zarnke 1983).

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PREPARED BY:

Randall L. Zarnke
Game Biologist II

APPROVED BY:

W. Lewis Pamplin, Jr./98
Director, Division of Game

Steven R. Peterson/98
Research Chief, Division of Game

SUBMITTED BY:

Wayne L. Regelin
Regional Research Coordinator

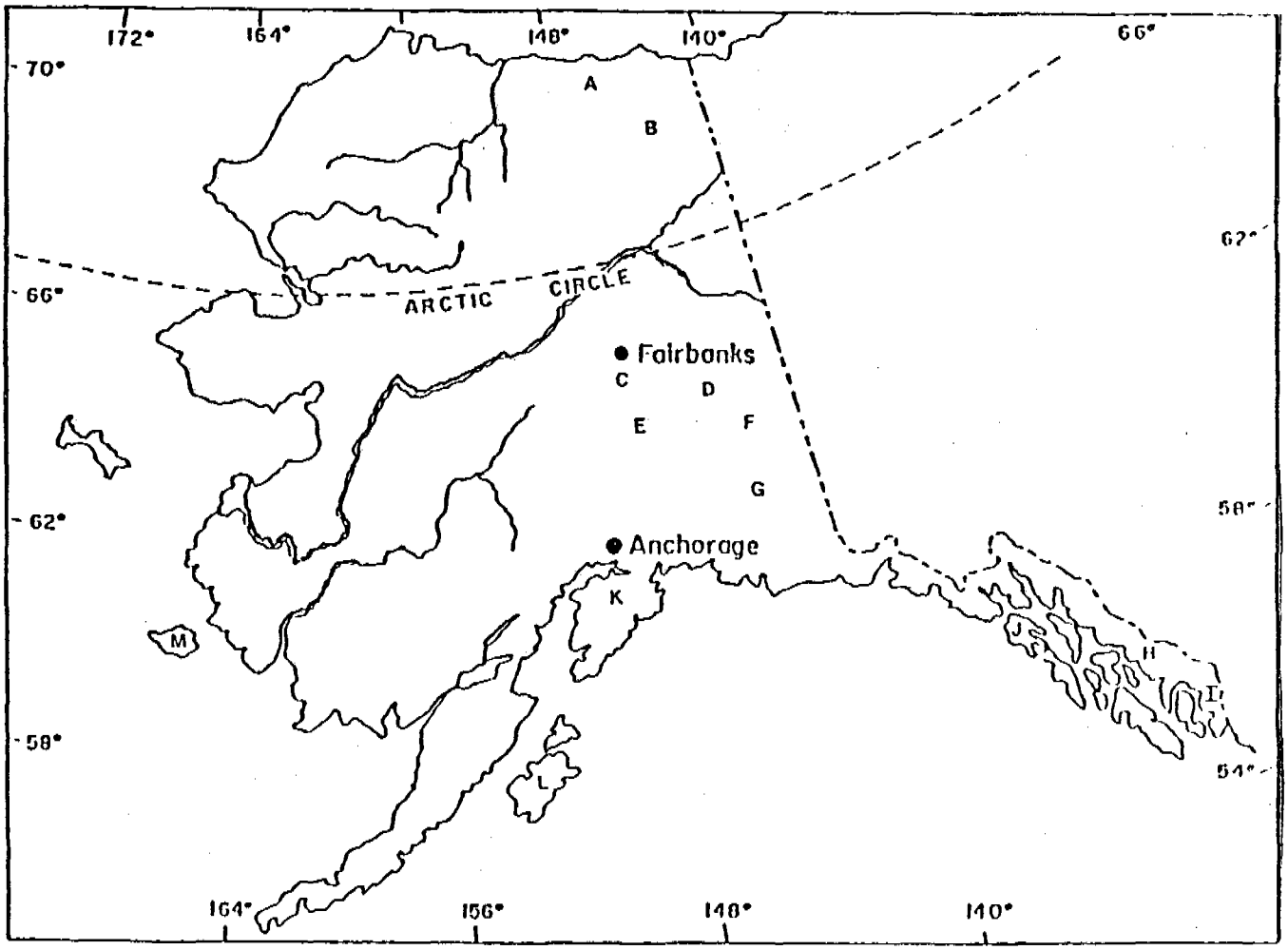

Fig. 1. Locations at which blood samples were collected. A = caribou (N = 4); B = caribou (N = 8); C = moose (N = 5), caribou (N = 8); D = bison (N = 90); E = Dall sheep (N = 19); F = Dall sheep (N = 9); G = Dall sheep (N = 3), bison (N = 5); H = moose (N = 17); I = mountain goat (N = 18); J = Sitka black-tailed deer (N = 7); K = Dall sheep (N = 12); L = Sitka black-tailed deer (N = 2); and M = muskox (N = 32).

Table 1. Serum antibody prevalence in 7 Alaskan wildlife ruminants for 3 viruses and 2 bacteria.

Serologic test	Bison	Caribou	Muskox	Dall sheep	Moose	Mountain goat	Sitka black-tailed deer
Parainfluenza 3 HI-8[a]	40/92[b]	0/17	0/29	0/40	0/22	0/18	0/9
Bovine viral diarrhea SN-16	3/95	2/20	2/32	0/43	0/22	0/18	0/9
Infectious bovine rhinotracheitis SN-16	1/95	3/20	0/32	0/43	0/22	0/18	0/9
Leptospira spp. MAT-10	PR[c]	PR	0/27	0/41	PR	0/18	PR
Brucella spp. BAPA-(±)	PR	PR	0/21	0/38	PR	0/18	PR

[a] Name of test: HI = hemogglutination inhibition; SN = serum neutralization; MAT = microscopic agglutination test; BAPA = *Brucella* tube test. Numbers indicate minimum titer necessary to be considered as evidence of past infection. (±)

[b] Number positive/number tested.

[c] PR = test results previously reported. See Zarnke, R. L. 1983. Serologic survey for microbial pathogens. Fed. Aid in Wildl. Rest. Proj. W-22-1, Job 18.5. Alaska Dep. Fish and Game. Juneau.