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Serologic Survey of Alaska Wildlife for Microbial Pathogens

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This is a progress report on continuing research. Information may be refined at a later date.

RESEARCH PROGRESS REPORT

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STUDY TITLE: Serologic Survey of Alaska Wildlife for Microbial Pathogens

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SUMMARY

During the past few years, it has become evident that the level of organization of both the serum samples and the 2 databases has declined. Therefore, the vast majority of effort during this reporting period was dedicated to improving aspects of the serum collection. Few sera were submitted to testing labs. There are no new results to report.

CONTENTS

BACKGROUND

There have been few documented instances of infectious diseases having a detectable effect on wildlife populations in Alaska. Brucellosis in caribou (*Rangifer tarandus*) and rabies in canids have been notable exceptions. In an effort to evaluate the disease status of various Alaskan wildlife populations, a serologic survey has been conducted throughout the state.

Disease surveys conducted by means of serologic tests have many advantages:

1 Blood samples are easy to collect.

2 It is not necessary to sacrifice animals to test for evidence of previous exposure to disease(s).

3 Periodic samples can be collected from the same animal(s) over an extended time frame, thus providing information on the timing of exposure.

4 Tests are relatively inexpensive.

5 A single sample can be tested for evidence of many different diseases, rather than requiring a specific tissue or organ for each disease of concern.

6 Sera are stable for a long time (under adequate storage conditions), thus providing the basis for a functional archive system which can be analyzed in the future.

7 If the sample size is adequate, it is possible to evaluate the status of an entire population in relation to a disease.

8 If populations are monitored over time, it is possible to determine changes in the disease status of the population.

9 Early warning of such changes in disease status of a population allows for the consideration of human intervention into the disease process at the most opportune time and place.

Within a living animal, antibody molecules are produced in response to invading disease agents. For certain agents, antibody may decay to undetectably low levels over a relatively short period (ca. several months). For other agents, antibody may be more long-lived and may

remain at detectable levels for many years. Furthermore, reexposure to the same disease agent usually causes an increase in the level of antibody in circulation. These factors all confound attempts to correlate the level of antibody in the serum to the date of exposure of the host to the agent.

Perhaps the most reasonable means of determining the time frame during which an animal has been exposed to an infectious disease agent is to periodically collect serum specimens from a specific animal. However, in most cases such periodic sampling schemes are not practical for free-ranging animals. Thus, determining the timing of exposure of either specific individuals or populations is difficult.

Test results for samples which have been collected during any particular year do not necessarily reflect the transmission pattern during that year. For example, animals with evidence of exposure may have been infected during previous years. However, analyzing such test results based upon the year in which the samples were collected may reveal long-term trends in the frequency of disease transmission. Although this approach of grouping samples according to the year in which they were collected may not be infallible, it serves a practical purpose and therefore has become an accepted technique for evaluating data. This sample grouping approach will be used throughout the discussion of the study.

Alaska Department of Fish and Game (ADF&G) has conducted serologic surveys since the early 1960s. During the early years such surveys were limited in the scope of disease agents and host species which were investigated. Over the past decade the survey has been extended to include more potential host species and more disease agents.

OBJECTIVE

The objective of this survey has been to monitor Alaskan wildlife populations for the occurrence of microbial disease agents which may have a detrimental effect upon the health of both individual animals and entire populations.

METHODS

Most blood samples were collected by ADF&G biologists who captured animals to meet objectives of other studies. Hunters collected and contributed samples from bison (*Bison bison*), caribou, Dall sheep (*Ovis dalli*), and Sitka blacktail deer (*Odocoileus hemionus sitkensis*).

Most blood samples were allowed to settle at ambient or refrigerated temperatures for 6 to 36 hours and then centrifuged. Sera were then removed by aspiration and dispensed in vials. Sera are kept frozen until the time of testing.

Minimum titers for all tests are established based upon natural or experimental infection of the species in question or of a domesticated species. Sera that met or exceeded these titers are considered to contain evidence of past infection by the agent in question.

Two types of potential qualitative errors should be considered in evaluating the significance of serologic survey results: 1) samples from animals which have in fact been infected by the disease agent in question may be incorrectly categorized as "negative" and 2) samples from animals which have never been exposed to an agent may be incorrectly deemed "positive." Explanations for the former include: 1) natural antibody decay over time, 2) antibody degradation due to improper handling of the specimen, 3) establishment of the threshold titer value at a level that is too high, 4) improper inspection or evaluation of the test, and 5) inaccuracies in recording data. Explanations for the latter include: 1) presence of "nonspecific" reacting substances in the sample, 2) improper inspection or evaluation of the test, and 3) inaccuracies in recording data. These disclaimers remain important during discussion of the test results.

RESULTS AND DISCUSSION

The efficiency and usefulness of both 1) large-scale sample collections and 2) large databases are affected by the degree of organization. During the past few years, the level of organization of the ADF&G serum collection has declined. This decline was due, in part, to the continued expansion of the collection. As knowledge of the program spreads, more biologists are submitting samples.

This growth has increased the value of the collection. However, it has also generated more technician-level work. In recent years, technical aspects of the job (labeling and organizing samples, entering data, etc.) have taken a secondary position to more professional aspects of the job (diagnoses, public information, formal writing, etc.). This lack of organization had begun to compromise the efficiency of the program.

Supervisors allocated wildlife technician time to help with the reorganization effort. However, the allocation was inadequate. A high school student also volunteered to help with the process. Once again, the time commitment fell short. Therefore, the author spent 30-40% of his time from September through February working on reorganization of the collection.

The budget allocation for FY98 was not adequate to conduct a large-scale survey. This budget constraint meshed with the need to focus more attention on reorganization of the collection. The anticipated budget increase in FY99 will allow resumption of a more active testing program.

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