

**CHARACTERIZATION OF ANTHRAX OCCURRENCE IN NORTH
DAKOTA: DETERMINANTS, MANAGEMENT STRATEGIES, AND
ECONOMIC IMPACTS**

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By

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ABSTRACT

Ndiva Mongoh, Mafany, Ph.D., Program of Natural Resources Management, College of Graduate and Interdisciplinary Studies, North Dakota State University, September 2007. Characterization of Anthrax Occurrence in North Dakota: Determinants, Management Strategies, and Economic Impacts. Major Professor: Dr. Margaret L. Khaita.

The 2005 anthrax outbreak in North Dakota was the largest anthrax epizootic in the records of the state. Over 243 animal cases were identified by diagnosis at the Veterinary Diagnostic Laboratory at North Dakota State University, Fargo. The cases were clustered mainly around the eastern region of the state, specifically in 16 counties. The study had 4 objectives. The first objective was to characterize an outbreak of anthrax among animals in North Dakota in 2005 and to determine characteristics and clinical signs associated with the disease. The second objective was to identify risk factors associated with the anthrax outbreak of 2005 in animals in North Dakota. The third objective was to evaluate the economic impact of anthrax occurrence in North Dakota cattle. The fourth objective was to review the control strategies currently used in management of anthrax in livestock and to examine the implication and perception of these strategies to producers in North Dakota.

Anthrax cases were defined as animals with typical clinical signs and positive results of laboratory culture and/or Polymerase Chain Reaction methods. Data for the study were obtained from the state Veterinary Diagnostic Laboratory records, the state veterinarian's office, and questionnaires mailed to producers in the state. We used a case series design, a case-control design, a theoretical analysis of the economic impact, and a review of anthrax management practices in the state to answer the above objectives, respectively.

We found that animals affected, clinical signs, and final outcome were consistent with a natural anthrax outbreak. We also identified factors that were significantly different

between case and control premises, or factors that significantly predicted anthrax occurrences. These predictors were vaccination status, use of antibiotics during an outbreak, and the period of vaccine administration. The cost of the anthrax outbreak was found using economic impact analysis and it was estimated at USD\$653,092.80. Also, the main reason behind government intervention during the outbreak in the state was to assist producers and veterinarians and to provide assurance to the public. Finally, we outlined control strategies for animals before an anthrax outbreak which include vaccination, movement control of animals, and prophylactic chemotherapy; during an anthrax outbreak which include vaccination, therapeutic chemotherapy, quarantine, and reservoir elimination; and after an outbreak which include disposal of infected animal carcasses, disinfection, and decontamination. These strategies were addressed within the context of the control strategies used by animal producers in North Dakota.