Descriptive Epidemiology of Bovine Tuberculosis in Michigan (1975-March 2010); Lessons Learned

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Introduction

Bovine tuberculosis (bTB), caused by the zoonotic agent *Mycobacterium bovis*, is a significant threat to Michigan livestock and wildlife. After the state was declared free of bTB in 1979, the disease re-emerged in wild white-tailed deer in 1994 and in cattle in 1998. The Michigan Bovine Tuberculosis Eradication Project was established in 1995. Partners in the project are the Michigan Department of Agriculture (MDA), Michigan Department of Natural Resources and Environment (MDNRE), USDA APHIS Veterinary Service, Michigan Department of Community Health, and Michigan State University. Tens of millions of dollars have been spent on the project. In cattle alone, $5.2 million is spent on herd testing annually. After 15 years of the project's eradication efforts, bTB remains a challenge. The purpose of this study was to conduct a descriptive epidemiological review of bTB in Michigan and to identify any information that may be useful in moving the project forward.

Materials and Methods

Descriptive epidemiological information on bTB in Michigan cattle and wildlife between 1975 and March 2010 were obtained. Information on bTB in cattle and captive deer herds were obtained from USDA APHIS Veterinary Services and MDA. Information on wild deer and other wildlife species were obtained from MDNRE.

Results

Cattle - Between 1998 and March 2010, there were 48 cattle herds found infected with bTB. Of these, six were herds that were originally depopulated and then found to be re-infected after repopulation. Geographically, bTB has been reported in seven out of 83 counties. These counties are Alpena (21), Alcona (12), Montmorency (4), Oscoda (3), Presque Isle (2), Antrim (3), and Emmet (3).

Annual whole-herd surveillance tests accounted for the detection of 80% of bTB infected cattle herds, tracing in/out of infected animal/herd(s) accounted for 18%, while self-reporting accounted for 2%. The bTB incidence in cattle herds peaked in 2001 at eight herds and has declined since then. Within the infected herds, majority of the bTB infected animals were raised on the farms while a lesser proportion were purchased into the herds. The predominant likely source of bTB infection is wildlife, mainly white-tailed deer.

Captive deer - The first incidence of bTB in captive deer herds in Michigan was reported in Presque Isle county in 1997. Subsequently, three other captive cervid herds were found in Montmorency county in 2006, 2008, and 2009.

Wildlife - Out of 97,796 white-tailed deer tested between 1975 and 2008, 631 were infected with bTB (0.65%). Among the bTB-infected deer, 37% were from Alpena, 28% from Alcona, 19% from Montmorency, 11% from Presque Isle, 2% from Oscoda, and 3% came from seven other counties. The disease has been found in other wildlife including elk, black bear, bobcat, coyote, opossum, raccoon, and red fox.

Significance

Despite an ongoing eradication program, bTB continues to be a significant problem in Michigan cattle and wildlife. The disease is primarily located in cattle and wild white-tailed deer located in the northern area of Michigan's lower peninsula.

At the county level, the number of cases of bTB in wild white-tailed deer and cattle are proportional, suggesting that infection in these two species is related. The lesson learned is the significance of wildlife and domestic animal interaction and the potential for disease spread between these populations. Management practices to reduce cattle and deer interactions could be useful in reducing cross-species transmission of bTB. Continued efforts to understand and mitigate the interaction between wildlife (specifically white-tailed deer) and cattle should be supported.

Another important lesson is that caudal-fold tuberculin testing of all test eligible cattle (whole-herd surveillance) is the primary way that bTB-infected herds are identified in Michigan. Unfortunately, this is an expensive method of screening and the development of less-expensive herd screening strategies would be beneficial.