

# Bovine leukemia virus in Michigan beef bulls

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## Introduction

Bovine leukemia virus (BLV) is a contagious retrovirus of cattle. Little is known about the prevalence, risk factors, or potential health impacts of BLV in beef cattle. Most cattle remain asymptomatic, but 30 to 40% will develop persistent leukocytosis. Fewer than 5% of infected cattle develop malignant lymphosarcoma, which in the US, is the most common neoplastic disease of cattle discovered at slaughter. Recent studies have suggested that BLV prevalence has increased dramatically, and has a previously unappreciated economic impact on the cattle industry. The objectives of this study were to determine the crude and age-specific prevalence of BLV among beef bulls in Michigan, assess the possible impact of BLV infection on bull fertility, and identify the major risk factors for BLV transmission among beef bulls.

## Materials and Methods

Beef bulls on which breeding soundness examinations (BSE) were performed as part of the Michigan State University Extension BSE program were enrolled in this study. The BSEs were performed in accordance with established protocols during the spring of 2009 and 2012, and included 363 bulls from 124 owners. Blood samples were collected and tested for antibodies against BLV by use of a commercially available antibody capture ELISA (IDEXX Leukosis Serum Screening Antibody Test, IDEXX Laboratories, Westbrook, Maine). For each of 197 bulls, an 8-question survey was administered to the manager at the time the BSE was conducted. The questions targeted previously identified risk factors for BLV. Bulls were categorized into 6 age groups and 6 breed groups for analysis. Statistical analysis was performed using SAS (SAS PC, Cary, NC) to test for the association between BLV infection and potential management risk factors, as well as each of the measures of fertility evaluated as part of the BSE.

## Results

The overall prevalence of bulls with antibodies against BLV was 24.7%. Age was significantly ( $P < 0.004$ )

and positively associated with BLV status, but breed was not associated with BLV status. The age-specific prevalence in beef bulls with antibodies against BLV ranged from 3.9% to 66.67%. Scrotal circumference (SC) was the only BSE variable measured that was associated with BLV status. Bulls that were seronegative for antibodies against BLV had an average SC of 38.87cm, whereas bulls that were seropositive for antibodies against BLV had an average SC of 41.71cm. Frequency of changing hypodermic needles was the only management risk factor evaluated that was associated with BLV status. None of the bulls managed by managers who changed hypodermic needles between every animal had antibodies against BLV, whereas 17.54% and 44% of bulls managed by managers who changed needles after approximately every 10 and 20 animals, respectively, were seropositive for antibodies against BLV.

## Significance

Approximately 25% of beef bulls presented for BSE in Michigan were seropositive for antibodies against BLV. Older bulls were more likely to be infected than were younger bulls. The high prevalence of bulls with antibodies against BLV in this study may be associated with the more frequent use of natural breeding within the beef industry, but further research is needed before this can be definitively concluded. On the basis of the BSE results, BLV status does not appear to have a significant impact on fertility. Results of this study agreed with other studies in that the re-use of hypodermic needles was significantly associated with an increased prevalence of antibodies against BLV. In addition, the dose-response identified in this study supports the theory that this association might be causal in nature, as does the biological plausibility that infected lymphocytes could be transferred via the immediate re-use of a hypodermic needle. Therefore, single-needle use protocols are recommended for an effective BLV control program.