Bovine Leukemia Virus Infection and Mastitis

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ABSTRACT
Adult dairy cows (226 head) in three herds were sampled both for bovine leukemia virus infection and for mastitis infection. A chi square analysis revealed no statistically significant association between the two types of infection.

INTRODUCTION
Bovine leukemia virus (BLV), a C-type leukemogenic virus, is considered the etiological agent of the adult, enzootic form of bovine lymphosarcoma (leukemia, malignant lymphoma), a fatal neoplastic disease, and persistent lymphocytosis, an apparently benign condition often associated with lymphosarcoma. Most BLV-infected cattle are asymptomatic virus carriers, i.e., do not develop lymphosarcoma or persistent lymphocytosis (2).

Infectious BLV and BLV-infected cells are in milk of the majority of infected cows (7). The virus has been detected in about 60% of herds and in more than 25% of dairy cattle examined in the United States (2). In addition to death losses from the disease, BLV infection poses a serious threat to the cattle industry because many countries require a BLV-negative test for importation of cattle and semen.

Because in cattle BLV invariably infects lymphocytes (11), i.e., cells of the immune system, the possibility has been raised that BLV infection may impair resistance of animals to other infectious diseases. Other leukemia viruses, such as feline leukemia virus (5), cause severe immunodepression.

Mastitis is probably the most common disease of dairy cattle. In one survey as many as 50% of cows were infected by one of the pathogens causing mastitis (10). Mastitis is the disease having the largest economic impact on the dairy industry (1, 6). Estimates of current losses to mastitis are $200 per cow per year (4). We describe a study designed to investigate the association between BLV infection and mastitis in dairy cows.

EXPERIMENTAL PROCEDURE
Adult cows, milking and dry, in three commercial dairy herds were sampled for mastitis, and blood samples were drawn for BLV testing. Two hundred twenty six cows were sampled; all were Holsteins.

Samples of milk were taken aseptically in sterile vials from each quarter and were cultured at the University of Pennsylvania Mastitis Laboratory. Isolation procedures were essentially those recommended by the National Mastitis Council (9). Each quarter sample was plated for primary isolation on blood agar. Genus of organism was identified by colony morphology or by biochemical tests and gram staining where necessary. *Streptococcus agalactiae* was distinguished from the nonagalactiae streptococci by the CAMP and esculin tests. Only coagulase positive staphylococci were considered pathogens.

Blood serum samples were examined for antibodies to the major internal BLV antigen by radioimmunoassay (8). Antibody to BLV in animals more than 10 mo old is a reliable indicator of active BLV infection (3).

RESULTS AND DISCUSSION
Seventy-five cows (33%) were positive for BLV infection, a finding consistent with published reports on the prevalence of BLV infection in dairy cattle. Fifty-two cows (23%) had cultures positive for mastitis, with infections in 78 quarters. Of those infected quarters, 41 (53%) were infected with streptococci, 31 (40%) with staphylococci, and 6 (7%) with less common pathogens (2 *Escherichia coli*; 2
TABLE 1. Infection with bovine leukemia virus (BLV) and mastitis infection (by cow).

<table>
<thead>
<tr>
<th></th>
<th>Cows mastitis positive</th>
<th>Cows mastitis negative</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows BLV positive</td>
<td>17</td>
<td>58</td>
<td>75</td>
</tr>
<tr>
<td>Cows BLV negative</td>
<td>35</td>
<td>116</td>
<td>151</td>
</tr>
<tr>
<td>Totals</td>
<td>52</td>
<td>174</td>
<td>226</td>
</tr>
<tr>
<td>$\chi^2 = .0074$</td>
<td></td>
<td>$P &gt; .9$</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 2. Infection with bovine leukemia virus (BLV) and mastitis infection (by quarter).

<table>
<thead>
<tr>
<th></th>
<th>Quarters mastitis positive</th>
<th>Quarters mastitis negative</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows BLV positive</td>
<td>23</td>
<td>277</td>
<td>300</td>
</tr>
<tr>
<td>Cows BLV negative</td>
<td>55</td>
<td>549</td>
<td>604</td>
</tr>
<tr>
<td>Totals</td>
<td>78</td>
<td>826</td>
<td>904</td>
</tr>
<tr>
<td>$\chi^2 = .53$</td>
<td></td>
<td>$P &gt; .4$</td>
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 pseudomonas, 1 actinomyces, 1 proteus). Only one of the quarters infected with streptococci was *Streptococcus agalactiae* as these herds were essentially *S. agalactiae* free.

Tables 1 and 2 summarize the results. Of cows positive for BLV infection 22.7% were positive for mastitis. Of cows negative for BLV infection 23.2% were positive for mastitis. Cows positive for BLV were infected in 7.7% of their quarters. Cows negative for BLV were infected in 9.1% of their quarters. We were unable to detect any association between bovine mastitis and bovine leukemia virus infection.

REFERENCES