

# Michigan Dairy Review



<http://www.mdr.msu.edu>

## Bovine Leukosis Virus Update I: Prevalence, Economic Losses, and Management

*Bovine Leukosis Virus (BLV) can lead to losses that include increased heifer replacement costs, loss of income from condemned carcasses of cull cows, reduced fertility and decreased milk production. Larger herds are more likely to test positive for BLV. Common causes include shared syringes and, to a lesser extent, rectal palpation. The average annual cost in a 50% prevalence herd was nearly \$6,400 per 100 milking cows. This article offers an introduction on implementing a BLV management program, including how to test prevalence.*

Ron Erskine  
Lorraine Sordillo  
Dept. of Large Animal Clinical Sciences

Bovine leukosis is a cancerous disease caused by Bovine Leukosis Virus (BLV). This is a retrovirus that infects beef and dairy cattle, targeting lymphocytes, a type of white blood cell. These cells are part of the immune system. Infection with the virus most often does not cause any clinical signs, however, about 30% of the infected animals develop a lymphocytosis, or abnormal increase in lymphocytes in the blood. This is sometimes referred to as “leukemia” although it is different from most forms of human leukemia.

### Effects of BLV

The leukemia does not cause any clinically apparent change in most cows. It is estimated, however, that 1 to 5% of all infected cattle, not just leukemic cattle, develop malignant tumors known as “lymphosarcomas”. Typically, this is a disease of adult cattle, although a juvenile form of lymphosarcoma can occur in younger animals. Cattle showing these signs may display protruding eyeballs, weight loss, enlarged lymph nodes, gastrointestinal obstructions, paralysis in the hind limbs, and/or infertility because of tumors in the uterus.

Direct BLV losses to the dairy producer include increased replacement costs, loss of income from condemned carcasses of cull cows, and the inability to export cattle, semen and embryos to countries that maintain BLV control programs, such as the European Union. Further losses may include reduced reproductive efficiency and decreased milk production (1, 2).

BLV is primarily transmitted in the blood of infected cattle, but to a lesser extent may be transmitted in saliva, semen, and milk. Thus, management practices that result in direct exposure of blood of infected cows to uninfected cows may increase the prevalence of infection within a herd. The use of common needles, blood contaminated syringes, and drug

vials are the primary cause. Rectal palpation may also play a significant role. To a lesser degree, colostrums, cross-placental transmission, and perhaps flies are possible contributors to the spread of BLV.

Diagnosing BLV infected cattle can be done by simply testing serum for virus-specific antibodies. Care should be taken in interpreting positive results in young calves that are under six months as they may have positive antibodies from the dam through colostrum feeding. It is also difficult to predict which seropositive cows will eventually develop the lymphosarcoma form of the disease, although it is likely that cows that have developed a persistent leukemia are at greater risk. Therefore, testing serum to determine infected cows is not a useful tool in making culling decisions unless the cow is showing clinical signs consistent with lymphosarcoma, and has an elevated lymphocyte count in her blood.

### Prevalence

The USDA conducted studies of BLV in dairy cattle for 1996 and 2007 through the National Animal Health Monitoring System (NAHMS) (<<http://nahms.aphis.usda.gov>>). In 1996, over 1,000 dairy operations participated in the study. At least one BLV infected cow was found in 89% of the farms. Prevalence of infected cows within each herd varied widely, but an average of 40% of the cows were infected in the Midwest. Both the 1996 and 2007 study suggested that larger herds were more likely to test positive for infection, and have a higher percent of infected cows. The 2007 NAHMS study did not report individual animal infection prevalence within herds. However, on an anecdotal basis only, the authors have screened several herds in the course of research projects and have determined that BLV prevalence in Michigan dairies may be at least 70 to 80% of the cows. If this is representative of a wider number of herds, then there has been a near doubling in average herd prevalence since the 1996 NAHMS study. How could this be possible?

The Michigan dairy industry has undergone monumental changes in the last 12 years. One of the most profound changes has been an increase in average herd size. For many expanding herds, this has resulted in commingling of animals from different farm sources. Additionally, the use of drug and vaccine injections has intensified, particularly in light of estrous synchronization programs, so it is likely that many cows are receiving substantially more injections in their lifetime than a decade ago. Likewise, many herds have increased the number of palpation exams for pregnancy diagnosis. If the virus is shed in saliva, mixed rations in common feed bunks offer an opportunity for transmission and, finally, it is typical for cows to be moved between a variety of milking/feeding groups which can further increase the probability of exposures between infected and non-infected cows.

### Economic Losses

The NAHMS study determined that herds with BLV produced \$59 less in annual production per cow, or 3% less milk, than non-BLV herds (1). However, this figure can vary depending on the prevalence of infection within a herd, and herds with a higher prevalence of infection are likely to sustain greater economic losses. In a Virginia study, the average cost of a case of lymphosarcoma was over \$400, and in a herd with 50% of cows seropositive, the rate of lymphosarcoma was about 2 cases per 300 milking cows (Rhodes et al, 2003). The average annual cost in a 50% prevalence herd was nearly \$6,400 per 100 milking cows.

### Management

Given the high prevalence of BLV infection in most herds, and the relatively benign nature of infection in most cows, it would not be economical to test and cull positive cows. Before

starting a BLV management program, a herd should have an estimate of the prevalence of infected cows within the herd. Serum samples from a representative number of cows (25% for small herds, between 5 to 10% for larger herds) should be collected and submitted for testing. Another method that dairy managers can use to estimate the cost of the disease in their herd is the number of cows that are condemned each year because of lymphosarcoma. This information is reported by federal veterinarians to the seller of the cattle, but is easier to attain for herds that take their own cattle directly to market. It is likely that some lymphosarcoma cows go undiagnosed on many farms, presenting as a poorly performing cow, or one that won't get up. A thorough examination by a veterinarian, including a blood count and differential, augmented by a field necropsy, may help identify losses from "unknown" BLV cows.

Dairy producers have to balance efficiency of labor with benefits gained from any management practice. Following are key management practices that are proposed to reduce the prevalence of BLV in a herd:

- Use separate needles and discarding syringes that have been contaminated with blood. This includes maintaining a "clean" needle in a multiuse drug vial.
- Identify BLV positive cows and change palpation sleeves after examining a BLV positive cow and before examining a negative cow.
- Feed colostrums and milk from BLV negative cows only. Alternatively, feed milk replacer rather than milk, and pasteurize colostrum.
- Use electric or gas "burning" dehorning equipment rather than gouging equipment.
- Clean all tattoo and ear tag equipment before each use.
- When practical, separate BLV positive animals from BLV negative animals. This may be difficult on most farms.

In a report from Virginia, a dairy herd that followed the above guidelines (but did no segregation or culling of BLV infected cattle) for two years reduced their prevalence throughout all ages of heifers before calving and reduced an initial prevalence of 44% to 17% (3). The MSU Dairy followed a similar program for nearly ten years (including segregation), and decreased their prevalence from 55% in lactating cattle to 35%, and currently have less than 10% BLV positive heifers. In the Virginia study, the cost to benefit ratio of the test and manage program was better than 3:1, or \$3 gained for every \$1 spent (2).

### Summary

Almost all U.S. dairy herds, including those in Michigan, have BLV. However, the prevalence of infected cows varies from herd to herd. In a herd with few BLV infections, the cost of testing cows and managing an active BLV eradication may seem expensive; however, the prevalence of infection is rising in many herds, and in some, may be greater than 90% of the cows. Depending on losses from lymphosarcoma cows, and the prevalence of BLV infected cows, some herds may want to reconsider the cost of controlling this disease. The goal is usually not to eradicate BLV (unless the herd actively participates in the sale of stock and genetic material) but to reduce the prevalence to a more economically viable level.

### References

1. Ott S. et al. 2003. Association between bovine-leukosis virus seroprevalence and herd-level productivity on US dairy farms. *Prev Vet Med* 61:249-262.
2. Rhodes J. et al. 2003. Economic implications of bovine leukemia virus infection in mid-Atlantic dairy herds. *J Am Vet Med Assoc* 223:346-352.
3. Sprecher D. et al. 1991. Possible effect of altered management practices on seroprevalence of bovine leukemia virus in heifers of a dairy herd with a history of high prevalence of infection. *J Am Vet Med Assoc* 199:585-588.