



Bovine Leukosis

**Gerald L. Stokka, Extension Beef
Veterinarian, Animal Sciences and Industry**

**John F. Smith, Extension Specialist,
Animal Sciences and Industry**

**John Shirley, Associate Professor,
Animal Sciences and Industry**

**Thomas R. Falkner, Extension Assistant,
Animal Sciences and Industry**

**Travis Van Anne, Veterinary Student,
College of Veterinary Medicine**

Bovine leukosis, bovine leukemia, lymphosarcoma, and malignant lymphoma are all names given to the retrovirus disease caused by bovine leukosis virus (BLV) in cattle. All of these terms refer to a neoplastic condition of tissues that affects lymph nodes and lymphocytes. True leukemias, in which the entire body is affected, are rare.

Bovine leukosis usually develops in organs or lymph nodes and is not expressed until adulthood.

Cattle with the adult (enzootic) form of bovine leukosis are usually 4 years of age or older, but the disease can occur as early as 2 years of age.

BLV cows may be culled because of poor milk production that, in some instances, results from poor appetite and weight loss. Poor appetite may be attributable to neoplastic growths in the pharyngeal area, which inhibit the ability to swallow.

Other signs of the disease vary. Affected cows may be diagnosed as having such problems as traumatic reticuloperitonitis / reticulopericarditis, abomasal problems, and spinal cord lesions, especially those affecting the rear legs.

Abortions and infertility also may occur if the uterus or other reproductive organs are affected.

Diagnosis and Transmission

Rectal palpation is the best diagnostic tool to locate internal tumors if peripheral lymph node enlargement or exophthalmos is not observed.

Using the agar gel immunodiffusion (AGID) test, BLV-infected cattle can be identified by testing sera for BLV antibodies. The virus often remains dormant in infected cows until they are stressed,

such as during extremely hot or cold weather, parturition, or illness. Clinical signs are apparent in BLV-infected cattle less than 1 percent of the time. However, the number of cows condemned at slaughter plants is on the rise, suggesting that the number of infected cows is increasing nationally.

The virus is usually transmitted through contact with the blood of an infected animal. Only 0.0005 milliliter of blood is needed for the virus to infect the lymphocytes of healthy animals.

BLV can spread through such procedures as infections, castration, dehorning, and rectal palpation, as well as through insect vectors, such as horseflies. Balling guns, or any instrument that comes in contact with cattle, should be sanitized properly after each use. Breeding by natural service may also be a source of infection because blood may be transferred during copulation.

The calves of infected dams become infected with the virus at birth about 5 percent of the time.

In addition, calves fed BLV-positive milk have a greater risk of contracting the infection. Cows with a high virus load and low antibody titer may transmit infection to their offspring, whereas cows exhibiting a low virus load and high antibody titer are more likely to transfer immunity to their offspring. This immunity is only temporary,



**Kansas State University
Agricultural Experiment Station and
Cooperative Extension Service**

however, as it results from colostral antibodies that last just a few months.

To date, little evidence exists that BLV is transmissible to humans. Pasteurization destroys the virus easily, and it can live only a few hours at room temperature outside of living cells.

Families that consumed raw milk containing the virus were studied and found to be free of BLV infection.

In addition, veterinarians and others who work closely with BLV-positive blood on a daily basis have not been infected.

Economic Losses

Breeders of purebreds suffer the biggest economic losses if their cattle are found to be BLV-positive. Many countries and U.S. companies will not accept animals or animal products infected with BLV. Heifers or semen may be rejected, resulting in a large monetary loss to the breeder. Some countries also require embryo-producing dams to be seronegative. The economic impact to commercial dairy producers includes treatment and diagnostic costs, reduced performance, on-farm death losses, condemned carcasses, and cost of replacements.

Prevalence in U.S. Dairies

The number of cows in the United States condemned at slaughter because of lymph node tumors (lymphosarcomas) tripled between 1975 and 1990 and is now nine times that of what Denmark was during the 1950s (before leukosis control and eradication programs had begun).

It has been suggested that less than 2 percent of infected cows will develop lymphosarcoma in a typical dairy operation each year.

The total number of U.S. animals infected with BLV has not been determined; however, in a study of the upper midwest states during the 1970s, approximately 20 percent of cows were estimated to be infected.

In 1984, some states, including Wisconsin (22.2 percent), Florida (47.7 percent), and Michigan (30 percent) reported the prevalence of BLV-infected dairy cattle. Beef cows had lower infection rates, ranging from 0.12 percent to 6.7 percent.

More recent information indicates that 89 percent of U.S. dairy operations contain BLV-positive cattle.

The increasing number of condemned carcasses suggests that the current management of dairy cows is not preventing additional BLV infections. Although BLV is not easily spread from animal to animal, increasing animal density per pen and exposure to blood increase the risk of transmission.

Calf management practices, such as gouge dehorning, ear tagging, and branding, can contaminate feed areas and other facilities with blood.

Multiple use of the same needle during routine vaccinations, use of unsterilized needles, and not changing gloves during insemination or pregnancy testing can also increase the number of BLV-positive animals.

Establishing an Elimination Program

Because no BLV vaccine is available, establishing new

management and veterinary practices is the key to controlling the disease (see Recommendations for Reducing BLV Transmission). The first step is blood testing, which allows BLV-positive animals to be identified and grouped separately.

The serologic test of animals younger than 6 months of age may show false-positive results because of the presence of colostral antibodies. Pregnant animals should be serotested at least 6 weeks before parturition to prevent false-negatives, which result from immunoglobulins shifting to colostrum.

Simply separating infected animals will reduce incidence when older BLV-positive cows are replaced by BLV-negative heifers.

Complete eradication programs should be implemented by dairies that sell heifers, embryos, or semen so they can achieve BLV-free status for their herds. Only one state, New York, has certification programs to identify BLV-free dairy herds.

Proposals for control include:

- Identifying sick animals through regular blood testing.
- Establishing practices and procedures to prevent the transfer of blood or other fluids from BLV-positive to BLV-negative animals.
- Isolating infected from noninfected animals.
- Increasing culling rates may also help to rid the herd of BLV-positive cows more quickly and to reduce exposure of healthy animals.

Recommendations for reducing BLV transmission

- Use only single-use disposable needles and palpation sleeves and then discard.
 - Thoroughly clean all surgical instruments that come into contact with blood, such as those for dehorning, castration, extra teat removal, tagging, and tattooing.
 - Disinfect instruments between uses.
 - Reduce numbers of biting insects
 - Test all cattle entering the herd for BLV, and isolate them for 30 to 60 days. Test again at the end of the isolation period.
 - Implement annual testing for all animals. A 3- to 4-month testing interval is preferred but may be impractical.
 - Use BLV-negative bulls or semen for all breedings.
 - Do not use colostrum or milk from BLV-positive cows. Feed calves milk replacer or pasteurized milk when BLV-free milk is not available.
 - Store intravenous tubing and needles in a disinfectant solution, such as chlorhexidine.
 - Cold sterilize calf delivery equipment between uses.
 - Do not use BLV-positive cows as recipients for embryo transfer. If a highly valuable donor is tested positive, implant embryos in BLV-negative cows and test the offspring of the donor to be sure they are BLV-free.
 - Remove extra teats, insert ear tags, and dehorn while calves are housed individually.
 - Use bloodless dehorning methods, such as electric, hot iron, or caustic paste.
 - Clean feed and water containers regularly to reduce blood contamination.
 - Perform all veterinary procedures on BLV-positive cows last.
 - Milk all BLV-positive cows last.
- Miller J: *Personal communication*, USDA, National Animal Disease Center, Ames, IA, 1996.
- Whittier D: *Programs can rid herds of bovine leukosis*. *Hoard's Dairyman* 138(8):405, 1990.
- Johnson R, Kaneene JB: *Bovine leukosis is caused by a virus*. *Hoard's Dairyman* 129(11):716-717, 1984.
- Smith B: *Large animal internal medicine*, ed 2. St Louis, Mosby-year book, 1996, p 1238.
- Howard T: *Is bovine leukosis out of control?* *Hoard's Dairyman* 137(14):571, 1992.
- Samagh BS, Kellar JA: *Seroepidemiological survey of bovine leukaemia virus infection in Canadian cattle*, in Straub OC (ed): *Current Topics in Veterinary Medicine and Animal Science*, Vol. 15, ____1980, pp 397-411.
- High prevalence of BLV in U.S. dairy herds*. USDA, APHIS, VS, NAHMS 228:197,1997.
- Johnson R, Kaneene JB: *Bovine leukemia virus. Part IV. Economic impact and control measures*. *Compend Contin Educ Pract Vet* 13(11):1727-1737, 1991.
- McGinnis CW: *Bovine leukosis control*. *Dairy briefs* (Cooperative Extension Service, University of New Hampshire) 32(1):8, 1987.

Brand names appearing in this publication are for identification purposes only. No endorsement is intended, nor is criticism implied of others not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Gerald L. Stokka, Robin Falkner, Patrick Bierman, *Bovine Leukosis*, Kansas State University, November 1998.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

EP-51

November 1998

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.
