



# Bovine Leukosis Virus

## Background and Best Management Practices

### What is Bovine Leukosis?

Bovine leukosis is a disease of cattle caused by the bovine leukosis virus (BLV). This is a blood-borne disease; the virus survives in white blood cells, called lymphocytes. Only about 5% of the cows infected with BLV ever develop a clinical disease. When clinical disease does occur, the primary sign is the development of tumors (lymphosarcoma). These are typically found in one or more of the following



sites: the uterus, abomasum, heart, spinal canal, and/or lymphoid tissue behind the eye (which makes the eyeball protrude). Sometimes most, or all, internal lymph nodes enlarge and become readily apparent under the skin.

A few infected cows (10-20%) will develop a persistently elevated lymphocyte (white blood cell) count, but nothing else. Most infected cows, however, show no signs of the disease and the infection does not appear to affect their milk production or any other functions.

### Is infection with BLV very common?

Although the clinical disease is seldom seen, many cattle are infected with the virus. A 1996 national survey (NAHMS) found that 88.6% of the dairy herds surveyed and 43% of the cows in these herds are infected with BLV. Although infection levels were particularly high in the Southeast, herds in all areas of the country are significantly infected.

The disease is less prevalent in beef cattle. A 1997 NAHMS survey found 38.7% of participating herds were infected with BLV and 10.3% of the cows in these herds were infected. BLV infection does not occur naturally in other species.

### What are the economic impacts of BLV infection?

BLV causes significant losses within the cattle industry. A large Northeast slaughter plant, processing 350,000 cattle per year, condemns about 2000 carcasses per year due to lymphosarcoma. This represents approximately half of its total condemnations.



Within an individual herd, BLV can also cause serious losses, as demonstrated in the following examples:

- A herd with a high prevalence of BLV infections may experience significant losses resulting from a high number of clinical BLV cases that have no salvage value.
- The major bull studs will not buy BLV-positive bulls. Since many countries only import semen from studs that are entirely free of BLV, most studs protect their export market by only buying BLV-negative bulls.
- As the concern for BLV increases within the world market, it is more likely that cattle buyers will only purchase BLV-negative replacements.

### How is BLV infection diagnosed?

When an animal is in the clinical stages of leukosis, the disease is diagnosed by the presence of the previously described tumors and/or general lymph node enlargement. If clinical disease is not present, BLV infection is diagnosed by blood tests (AGID or ELISA) that detect the presence of BLV antibodies. Since BLV infection is for life, the presence of BLV antibodies is always diagnostic for infection with the virus.

### How does BLV spread?

Since this is a blood-borne disease, the virus spreads primarily by transferring blood or other body fluids with blood cells from infected animals to non-infected herdmates (horizontal transmission). This commonly happens as a result of the way we manage cattle. For example, blood (and BLV virus) is readily spread from animal to animal with blood con-

taminated needles and/or syringes, obstetrical sleeves, saw or gouge dehorning, tattoo pliers, ear taggers, hoof knives, nose tongs etc. and by feeding unpasteurized mastitic waste milk. The virus also appears to spread to a limited degree through animal to animal contact. It is likely that close contact allows the lymphocytes in nasal and ocular secretions from infected cattle to gain entry into susceptible animals via their mucous membranes.

Although insects are often suspected of being mechanical vectors of BLV, research evidence is lacking to show that they routinely play a major role in the spread of this disease.

Since there are lymphocytes in milk, BLV can spread by feeding whole milk and/or colostrum from infected cows to calves. Use of waste milk from cows that are persistently lymphocytic may play a major role in transmission on some farms; however, on most farms, this practice is not a major contributor to the prevalence of this disease.

*In utero* (vertical) transmission of BLV also occurs, but to a limited extent. Most references indicate that only about -10% of the calves from infected cows will be born infected with the virus. Again, cows with persistent lymphocytosis may be at greater risk for transmitting BLV *in utero*.

BLV is not spread in semen or embryos (if properly washed). However, if embryos are transferred to BLV infected recipients, some calves may be born infected due to *in utero* transmission.

Similarly, BLV is not spread in the semen from a healthy BLV-positive bull. However, if a BLV-positive, natural service sire has seminal vesiculitis or some other reproductive disease, infected lymphocytes resulting from this condition might contaminate the semen and subsequently infect



inseminated cattle.

#### **If BLV is not in my herd, how do I keep it out?**

This disease is easy to keep out of a non-infected herd. Simply test all incoming animals before they arrive on the farm and do not allow any BLV positive animals to enter the herd. Ideally these animals should be isolated upon arrival and retested between 45 – 90 days to ensure that none were incubating the disease when they came to the farm.



#### **If BLV is in my herd how do I keep it from spreading?**

To prevent the spread of BLV in a herd one must prevent the horizontal transfer of white blood cells from infected to non-infected animals. This is best accomplished by following the management practices outlined below. Keep in mind that once an animal is infected, it is infected for life.

- Where possible, separate the negative and positive animals into separate groups. This prevents contact between negatives and positives and it allows for handling of negatives before handling of positives. If BLV prevalence is low, visual identification of positive cows is recommended.
- Sterile, disposable needles must be used on only one animal and then discarded. Discard syringes contaminated with blood. Avoid contaminating multi-dose vials with blood by inserting only sterile needles and using syringes free of blood for withdrawing doses of drug or vaccine.
- Wash and disinfect any instruments potentially contaminated with blood. These include tattoo equipment, ear taggers, nose tongs, hoof knives, and castrating instruments. The primary goal of disinfecting is to disrupt the viability of any adhering BLV-infected lymphocytes, thereby causing the intracellular virus to become non-infectious.
- Use an electric dehorner rather than a gouge or saw. Both gouges and saws cause hemorrhaging, and since these instruments are difficult to clean, they are likely to drive blood into the next animal during the subsequent dehorning process.
- New disposable obstetrical sleeve must be used

for palpating each cow, or at the very least for each cow that was negative on the last test.

- Use artificial insemination. A bull in natural service could easily spread infected lymphocytes from positive to negative cows.
- Clean maternity pen after each calving or use a separate calving pen for each cow so that blood from a recently calved positive cow cannot infect other animals. Remove calves from their dams and raise in hutches or similar means of isolation. Do not allow calves from positive dams, to have contact with other animals until their infection status can be established. When valuable calves are from positive dams, collecting a serum sample prior to colostrum intake may well be worth the effort. If the sample is already positive, one can assume that the calf was infected *in utero*.
- Recommendations regarding the feeding of colostrum from positive versus negative cows are developed after reviewing the infection status of recently tested 6- to 8-month-old animals on the farm. If the prevalence of infection in these animals is low (near the level one would expect from *in utero* infection, the current colostrum feeding program is acceptable and is not a major contributor to the spread of BLV. If the adult herd has a very low prevalence of infection, it is best to feed only negative colostrum to all calves. This eliminates any possible risk of infection via colostrum and allows calves to be tested at a very early age to determine their infection status. In high prevalence herds (>60% BLV-positive) where calves are at greater risk for exposure to the virus, consider feeding frozen colostrum.

Freezing colostrum at household freezer temperatures should destroy the virus; yet provide the calf with BLV antibody to protect it from infection.



factor in the spread of BLV, the role of biting lice and mites in high prevalence herds is not

known.

### Is testing necessary to control BLV?

Although not necessary, herd testing for BLV can be very helpful for three reasons: 1) to determine which animals are infected, 2) to monitor overall progress toward control or eradication, and



3) to determine if and where horizontal transmission is occurring within a herd. Most herds on a program experience some horizontal BLV transmission even though the owners carry out all of the recommended management procedures. By frequent testing (every 6 months) one can determine if any new infections are still occurring, and if so, where these infections are most likely to develop as animals progress from calfhood to yearling heifers to milk cows. When the weak links in the program are identified through such testing, additional management changes can be implemented and subgroups can be tested to determine if these changes are effective.

### If I wish to eradicate BLV, how long will it take?

The time frame to achieve BLV eradication varies from herd to herd, depending on the owner's ability to prevent horizontal transmission of the virus. In herds with only a few infected animals, owners often opt to cull all of the positives as soon as they are identified, thereby eradicating the disease almost immediately. On most farms, however, this approach is not feasible since the prevalence of BLV is too high to allow such culling. Progress in these more highly infected herds is achieved by reducing horizontal transmission, which in turn results in fewer and fewer new infections. While this approach takes longer and is quite variable, it can still lead to an entirely negative herd.

The following factors influence one's success in preventing new infections and the time required for a herd to become BLV free:

- *The initial herd prevalence of BLV infection.* The higher the initial prevalence, the harder it is to control horizontal transfer. In high-prevalence herds (60% to 80% infected), eradication is difficult and sometimes impossible, without actual separation of positives and negatives.

- *Level of priority and commitment given to eradication.* If only a few of the suggested management practices are adopted, progress toward eradication is usually slow at best. This is especially true if the initial prevalence of BLV infection is high.
- *Ability to raise only BLV-negative heifers.* Emphasis must be placed on developing a negative heifer herd. Eradication is not possible if BLV-positive heifers are continually raised and allowed to enter the milking herd, where they are a continuous source of infection.
- *Degree of crowding and resulting opportunities for animal-to-animal contact.* Infected lymphocytes carried in common discharges (nasal, ocular) may have a greater chance of infecting negative animals in crowded, high-contact herds.
- *Feasibility of separating positives and negatives.* While most herds can commingle positive and negative cows and still achieve progress toward eradication, some very high-prevalence herds will only progress when all positives and negatives are physically separated.
- *Priority given to culling BLV positives.* Valuable cows are often kept in the herd a long time. If these cows are infected, yet not culled, their presence continually provides opportunities to spread the disease.
- *Frequency of testing.* Since programs are tailored to the needs of each farm, and since progress toward eradication cannot be guaranteed, each herd must be tested on a regular basis to determine if the program is working as desired. Herd testing (6 months of age and older) is ideally done every 6 months. With this schedule one can identify the age group in which the majority of new infections occur. This is not possible if testing is done infrequently, such as every 2 years. Frequent testing also allows one to be more confident that a test-negative animal is still negative at a later date. The longer infected animals go unrecognized, the greater the risk of spreading their infection to negative herdmates.



### Can I get help in setting-up a BLV control program?

The New York State Cattle Health Assurance Program (NYSCHAP) offers a specific module to prevent and control BLV. This module is a structured program based on a series of "best management" practices. It is developed in conjunction with the base module of NYSCHAP and is implemented as a joint effort by the regional State Veterinarian (NYS Dept. of Ag and Markets) and local veterinarian. Together, they discuss with the farmer the important aspects of BLV prevention, they tour the farm to establish a risk assessment for BLV, they develop a farm management plan to control and prevent the disease, and they set up a system to continually monitor the success of the program.

All participants are recognized and identified by a certificate stating that their herd is enrolled in the NYS Cattle Health Assurance Program. This certificate serves as evidence to cattle buyers and consumers that animals, milk, and meat from this herd have a value-added component in the form of reduced risk for cattle diseases and foodborne pathogens.

### How to Enroll in NYSCHAP

To enroll in NYSCHAP, contact your herd veterinarian. They will then make arrangements with the regional field veterinarian from the Department of Agriculture and Markets. For additional information, contact one of the sources below:

- To enroll or contact a state field veterinarian, call NYS Division of Animal Industry at 518-457-3502
- For diagnostic testing services or information, call the Diagnostic Lab at Cornell University, 607-253-3900
- For mastitis testing or information, call Quality Milk Promotion Services at 607-255-8202
- For general information call the NYSCHAP coordinator, at 607-255-8202
- Visit the NYSCHAP website at:  
<http://nyschap.vet.cornell.edu>

