

Update on Bovine Leukosis

Bovine leukosis (also known as bovine leukemia, malignant lymphoma, lymphosarcoma, or lymphocytic leukemia) is a fatal cancer of cattle lymphocytes, a type of white blood cells (WBC). The disease is caused by bovine leukemia virus (BLV), a member of a family of viruses called retroviruses.

BLV is spread by the transfer of even small amounts of blood from infected cows to uninfected cows. It is common for large numbers of cows in a herd, especially dairy herds, to become infected. Infected cattle produce anti-BLV antibodies, and the detection of these antibodies in blood is the usual means by which the infection is diagnosed. Once cattle become BLV-infected, they remain infected for life. Importantly, however, infection does not equate with disease. Less than 5% of BLV-infected cattle ever develop bovine leukosis. In cattle that do develop disease, it usually does not occur until two to four years after infection.

There is no treatment for bovine leukosis and an effective vaccine to prevent BLV infection is not available. Test and slaughter of BLV-infected cattle, and replacement with uninfected cattle will eliminate the infection, but this is expensive and results in loss of valuable stock. Many European countries have eliminated BLV infection by test and slaughter, and will not allow importation of cattle, semen or embryos from BLV-infected herds, resulting in further economic loss to the US dairy industry.

The reasons for the unusual characteristics of this infectious disease remain incompletely understood: How does the virus escape the anti-BLV immune response and continue to replicate in infected cattle? Why do only certain infected cattle develop disease? Why does it take so long after infection for disease to occur? How does BLV cause infected lymphocytes to become cancerous? Research being performed at Colorado State University, is directed at answering some of these questions. It appears that normal factors that control and cause the cells to become cancerous, also control the replication of the virus. When BLV-infected lymphocytes are signaled by the body to perform normal functions, the virus uses the same signal to its own advantage and reproduces itself, leading to infection of additional cells. BLV may cause bovine leukosis not so much by causing increased proliferation of lymphocytes, but rather by interfering with normal mechanisms that cause cells to die. Thus, instead of the normal situation where as many new lymphocytes are produced as lymphocytes that die, bovine leukosis may develop because the cells fail to die and develop into tumors. Findings such as these provide new insights about BLV that hopefully will lead to an increased understanding of the infection and means to control or prevent bovine leukosis.