Could My Cow Have Cancer?

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Malignant Lymphosarcoma is the most common neoplastic (cancerous) disease identified in cattle slaughtered in the United States and largest single reason cattle are condemned during postmortem inspection. A 2009 report sites malignant lymphosarcoma for 13.5% of beef cattle condemnations and 26.9% of dairy carcass condemnations. So how do cows get cancer? A very common virus that lives in the blood in cattle is the bovine leukemia virus (BLV) which is actually the root cause of cancer. This virus routinely spreads through contact with blood from an infected animal. BLV can spread through procedures such as injections with used needles, surgical castration and/or dehorning, tattooing, rectal palpation with dirty sleeves, as well as through insect vectors such as horseflies. Calves may also be exposed during pregnancy or while nursing an infected dam. The good news is less than 2% of BLV-infected animals will go on to develop lymphosarcoma, a cancer affecting lymph nodes, multiple organs and white blood cells. BLV-infected animals are permanent carriers of the virus. The most common clinical signs include anorexia, weight loss and fever if the tumors are rapidly growing. Bovine leukosis is not considered transmissible to humans.

Although cancer in cattle is not treatable, the risk of spreading BLV can be substantially decreased with proper management procedures. Bovine leukemia virus (BLV) is a common viral infection in US cattle, with 39% of beef cow-calf herds and 83% of dairy herds containing BLV-infected cattle. In contrast, many European countries have successfully eradicated BLV from their herds. Cattle and sheep are thought to be the only species naturally susceptible, and prevalence rates are higher in dairy breeds than beef. The majority of affected animals are over 2 years old, but younger animals can develop sporadic forms of cancer (juvenile, thymic and cutaneous lymphoma) that are unrelated to the bovine leukemia virus.

Multiple, firm white tumors may be present in any organ on post-mortem examination. This tumor is lymphosarcoma in the abomasum. Photo courtesy of the UKVDL.
BLV-infected cattle have the disease known to veterinarians as “Enzootic Bovine Leukosis” or EBL. EBL has 3 distinct stages: asymptomatic (no visible symptoms), persistent lymphocytosis (PL), and finally the cancerous stage (leukemia or lymphoma). Persistent lymphocytosis is defined by an increase in total lymphocyte count three times above normal, and persisting for at least three months but with no type of cancerous lesions. PL is thought to occur in approximately 1/3 of all BLV-infected cattle. Recent research suggests BLV infection causes abnormal immune function but little is known regarding its specific effect on immunity and resistance to other infectious diseases. It definitely impairs milk production and cow longevity as infected cattle are often culled or die at an early age.

The final stage of Enzootic Bovine Leukosis is cancer, usually malignant lymphosarcoma. Only a small fraction of BLV-infected cattle, approximately 1-2 %, develop lymphosarcoma after an average incubation period of 7 years after infection with the virus. The sites most commonly affected by tumors are the heart, abomasum (true stomach), uterus, kidney, spinal cord, and the area behind the eyeball. Early signs include loss of appetite, weight loss, decreased milk production, fever, and enlarged lymph nodes. Some infected cattle will show no sign of the disease as approximately 5-20% of cases present as sudden death. Other clinical signs of disease are linked to the organ system affected by tumor metastasis and can include:

- Tumors in many parts of the body, which can appear as lumps under the skin. The most common presentation is that of enlarged lymph nodes which look like fist-size swellings in front of the shoulder, in the flank and other locations. This is often the earliest indicator of disease.
- Tumors in the heart can cause cardiovascular dysrhythmias, jugular vein distension, rapid heart rate or murmurs.
- Abomasal (stomach) tumors cause gastrointestinal problems digesting feed resulting in loss of appetite and weight, constipation or diarrhea, abomasal tympany or bloat, and slow gut motility.
- Retrobulbar tumors can cause bulging eyes, blindness and other ocular signs.
- Spinal tumors may cause rear limb weakness or paralysis. Neurological signs and lameness also sometimes occur due to local tumor growth.

How is BLV spread? Transmission of bovine leukemia virus is mainly horizontal from cow to cow. Routine cattle working procedures are an important route as they transfer contaminated blood between individuals on surgical equipment, needles and gloves. Rectal palpation without changing sleeves, the re-use of a single needle on multiple cows, dehorning, tattooing, and ear tagging without proper sanitation between animals are all are implicated in virus transmission. Biting flies and other blood-feeding insects are also proven modes of transmission. Direct transmission between animals in close contact occurs when virus-infected blood, fluids or tissues enter through small cuts in the skin. This includes using bulls for breeding because there is occasionally blood exchange due to minor penile or vaginal trauma. Vertical transmission from cows to baby calves during pregnancy or when nursing is much less common but the virus can pass via the placenta, during delivery and in colostrum.
How is BLV diagnosed? Blood testing is the first step to identify BLV-positive (infected) animals. An inexpensive ($4) serum ELISA test is available at the UK Veterinary Diagnostic Laboratory to detect antibodies to the virus. Once an animal is infected and tests positive, she will remain test positive for her lifetime. Testing can be done in animals over six months of age. Lymphosarcoma (the actual cancer) is best diagnosed through a biopsy of an affected lymph node.

What should a producer do with a BLV (+) animal?
The decision on what to do with a positive animal is best determined through consultation with the herd veterinarian, based on the specific goals of the individual farm. Implementation of a BLV control program depends largely on a comparison of the cost of the disease and the cost of preventing disease. Economic losses stem from the inability to sell cattle for export or as bull studs, condemnation of carcass at slaughter if tumors are present, and clinical disease/death loss. Recent research has shown lost milk production, higher culling rates, and immune system dysfunction also need to be considered. Seed stock producers and especially those who export internationally are more likely to aggressively pursue BLV-free herd status. Disease control is based on strict biosecurity that eliminates contact with infected blood, the most important measure for preventing the spread of BLV in cattle herds. Segregating or culling positive cattle, adding only BLV-negative cattle to the herd, making management changes to reduce transmission such as single-use needles/sleeves and disinfecting equipment between animals, and implementing an integrated pest management program will substantially reduce the risk of this and all other blood-borne diseases.

One Disease but with Many Names:
Enzootic Bovine Leukosis — Bovine Leukosis — EBL — BLV — BoLV — Bovine Leukemia — Lymphosarcoma — Sporadic Bovine Leukosis — Bovine Malignant Lymphoma