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Recommended Citation
Thompson, Jerry; Geiner, Thomas; and Van Gelder, Gary (1963) "Bovine Lymphosarcoma," Iowa State University Veterinarian: Vol. 26 : Iss. 3 , Article 2.
Available at: https://lib.dr.iastate.edu/iowastate_veterinarian/vol26/iss3/2

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Bovine Lymphosarcoma

Jerry Thompson, Thomas Greiner*
Gary Van Gelder**

GENERAL

Lymphosarcoma is a disease that was first recognized about 100 years ago (1871) by Leisering in Germany.

Lymphosarcoma is a neoplastic proliferation of lymphoid tissue which results in diffuse infiltration of organs or formation of discrete solid tumor masses. These are locally destructive and invasive. The process probably spreads by metastasis and, in time, becomes widely disseminated. Some animals develop leukemic peripheral blood along with massive bone marrow involvement. In many other animals the blood and marrow appear normal throughout the course of the disease. (9)

The common clinical picture is one of emaciation, pallor, a history of progressive weight loss, and decreased milk production. Enlargement of palpable lymph nodes is an outstanding feature.

Bendixen has suggested three clinical groups: (1) animals in which the prominent signs are lymph node enlargement, (2) animals in which the internal organs are particularly involved, and (3) animals in which the skin and associated lymph nodes are involved.

The matter of nomenclature is somewhat puzzling due to the many names used to describe the various types or stages of bovine lymphosarcoma. Monlux used lymphoma for the benign tumor and lymphosarcoma or malignant lymphoma for its malignant counterpart. Listed as subgroups were follicular lymphoma, lymphoblastoma, lymphocytoma, and reticular cell sarcoma.

In one report only two out of sixty-one cases were benign, so perhaps we can conclude that the more commonly used terms of malignant lymphoma and lymphosarcoma by the veterinarian in the field is basically correct in describing "bovine lymphosarcoma."

Bovine lymphosarcoma appears to be a widespread disease affecting cattle of all ages without regard for sex or breed. There is a relationship between the age of the animal and the frequency of lymphosarcoma. The mean age affected is 5.5 years with a range of 1-17 years. The period between five and eight years is the most common age for lymphosarcoma to occur. Lymphosarcoma has been noted in calves less than one year of age as in the preceding case. A few rare cases have been found in bovine fetuses.

CLINICAL SIGNS

Bovine lymphosarcoma or malignant lymphoma may mimic primary heart, renal, respiratory, nervous, or gastrointestinal disease. Lymph node enlargement (adenopathy) is seen in 90% of all cases. (9)

The heart lesions are manifested as an early congestive heart failure. It is said that heart failure may be the cause of death when the disease is allowed to run its full course.

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** Credit is given to Mr. Van Gelder for the literature review.

Issue, No. 3, 1964
The respiratory distress, usually dyspnea, is caused by adenopathy of the bronchial, mediastinal and cervical lymph nodes leading to constriction of the trachea and/or larynx due to pressure.

The examination of the urinary system often reveals one or more of the following: moderate elevation of BUN, low urine specific gravity, tenesmus, and hematuria.

Nervous signs are usually caused by compression of the spinal cord or spinal nerves.

Exophthalmos is usually the result of a rapidly growing retrolobar tumor mass.

Occasionally lymphosarcomatous nodules can be found in the skin.

LABORATORY FINDINGS

The blood urea nitrogen (BUN) levels vary considerably, depending on the extent of urinary involvement. In a survey of fifteen cases the BUN varied from 32-175 mg per cent. The potassium, chloride, calcium, and magnesium blood levels were found to be of no significance. The serum alkaline phosphatase, ketone content, and sedimentation rate remained normal.

The typical hematology and lesions found on necropsy, will be included in a subsequent discussion of a clinical case of lymphosarcoma.

INFECTIOUS NATURE OF BOVINE LYMPHOSARCOMA

Bottger (1956) stated that the disease may remain in a herd for over twenty years, in spite of the purchase of new bulls for breeding. Unrelated animals introduced into an affected herd may develop the disease; also many herds remain free from the disease in spite of close blood relationships with affected herds. Bottger concluded that neoplastic bovine leukemia is not simply a hereditary disease and that there must be a causal agent, which is stimulated by environmental factors.

Papparella, (1959) obtained a virus from bovine lymphosarcoma tissue, passed it serially in embryonating chicken eggs, and reproduced leukemic signs in guinea pigs and mice. He has obtained electron micrographs of the virus which was isolated from chicken embryos and found it to be 135 millimicrons in diameter.

The apparent infectious nature of the disease has led to a control program, in Denmark, with successful results.

Another factor which adds to the confusion is a report by Gaetze et al. in which they state that bovine leukemia has a so-called hyperplastic, lymphocytic pre-stage that can be determined by blood examination. Cattle may remain in pre-stage for a short period, for several months, years or even a life time. At any time, the pre-stage may change into a fatal tumorous form in a small percentage of the affected animals.

There is ample evidence to indicate an inherited susceptibility to the disease. In a herd of 80 purebred Jersey cows there were five cases of lymphosarcoma, and all individuals involved were related by at least two common ancestors. In one instance lymphosarcoma appeared in two daughters of one cow and in a daughter of one of the affected daughters. Statistical analysis showed that it was unlikely that this was a chance occurrence.

It seems probable that bovine lymphosarcoma depends upon a genetically linked factor as well as the presence of an infective agent.

CLINICAL CASE OF BOVINE LYMPHOSARCOMA

HISTORY

This case concerns a ten month old heifer of mixed breeding. The owner reported that the heifer ran a chronic fever, was anorexic, but would drink water in normal amounts.

CLINICAL SIGNS

The heifer entered the clinic March 10, 1964. The physical examination revealed a temperature of 101.3°F., the animal exhibited depression, average to poor condition, a gaunt abdomen, and no gross deformities. The respiratory rate was markedly accelerated, (100/minute), and was quite shallow. The pulse rate was moderately elevated, (82/minute). Rumination was slow, (1/minute), and on auscultation there was little evidence of in-
testinal action. The hair coat was thick and rough; pediculosis was diagnosed. The mammae were examined and found to contain multiple small nodules. The prefemoral and prescapular lymph nodes were found to be enlarged on palpation. On rectal palpation the iliac lymph nodes were also found to be enlarged.

A tentative diagnosis of lymphosarcoma was made on the basis of diffuse enlargement of palpable lymph nodes and the dyspnea.

On March 14, the temperature was elevated to 107.0° F. and a seropurulent nasal discharge was observed. The following two days, the temperature decreased to 104.0° F., the nasal seropurulent discharge continued. The animal died on March 16, 1964.

Leukemia became more marked as the disease progressed. The production of the neutrophils and eosinophils was markedly decreased, with a marked increase in the production of lymphocytes.

Lymphocytosis is not always present in lymphosarcoma. When present it is usually marked. In this case the lymphocytes comprised 98% of the total leukocytes, compared to the normal of approximately 60%.

**HEMATOLOGY**

<table>
<thead>
<tr>
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<th>Mar. 11</th>
<th>Mar. 13</th>
<th>Mar. 16</th>
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<tbody>
<tr>
<td>Hemoglobin (gm. per 100 cc.)</td>
<td>10.74</td>
<td>8.51</td>
<td>8.51</td>
</tr>
<tr>
<td>R.B.C. (mil. per c. mm.)</td>
<td>7,220,000</td>
<td>. .</td>
<td>. .</td>
</tr>
<tr>
<td>W.B.C. (thousands per c. mm.)</td>
<td>12,500</td>
<td>16,540</td>
<td>18,000</td>
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<tr>
<td>Eosinophils</td>
<td>100</td>
<td>. .</td>
<td>100</td>
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<tr>
<td>Band Neutrophils</td>
<td>500</td>
<td>400</td>
<td>400</td>
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<tr>
<td>Seg. neutrophils</td>
<td>200</td>
<td>700</td>
<td>100</td>
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<tr>
<td>Lymphocytes</td>
<td>11,700</td>
<td>15,400</td>
<td>17,400</td>
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The type cells were located around the peribronchial lymph follicles in the lung and germinal centers of the spleen. Focal accumulations of these cells occurred in the interstitial tissue of the kidney and the portal triad areas of the liver. Neoplastic cells also filled the hepatic sinusoids.

CONCLUSION

This heifer was quite typical of a case of lymphosarcoma. The disease, once apparent, terminated quite rapidly. There is no completely curative therapy and death is the result.

BIBLIOGRAPHY


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