Enzootic Bovine Leukosis
(Bovine Lymphosarcoma)

Robyn Elgie
OVC 2010
Outline

• Etiology
• Case report
  – History
  – Diagnostic results
  – Treatment/Control
  – Plan
• Implications
Etiology

- Primary mode of transmission is Horizontal
  - Infected lymphocytes in blood, milk, tumor tissue

- Vectors and Fomites can disseminate virus
  - Insects, Needles, Gouge Dehorners, Rectal sleeves

- Vertical transmission transplacentally
  - 4-8% of calves born to BLV-positives cows
  - Colostrum (Rare)
Etiology

• Exposure to BLV:
  1. Resist Infection
  2. Seroconvert: No lymphocytosis, No tumor
  3. Seroconvert: Lymphocytosis, Benign Hyperplasia
  4. Seroconvert: ±Lymphocytosis, Tumor/Malignant

• Expression of disease dependent on:
  1. Genetics
  2. Viral Load
  3. Immune Status
Etiology

• Subclinical infection is common
  – 40% prevalence in Canadian herds, 6-11% of cow population

• Clinical expression of lymphosarcoma is rare
  – 1% of BLV positive
  – Mortality rate can reach up to 5% due lymphosarcoma

• Common Predilection sites:
  – Peripheral Lymph Nodes, Heart, Abomasum, Uterus
Bovine Leukosis Virus

• Entry: New additions to the herd
  – Most common point of entry

• Closed Herd?
  – Insect vectors, iatrogenic
Lymphosarcoma - Clinical Signs

- **Most common:**
  - Decreased milk production
  - Reduced weight gain or weight loss
  - Inappetence
  - Enlarged lymph nodes

- **Less common:**
  - Pallor
  - Weakness
  - Bilateral exophthalmos
  - Diarrhea or constipation
  - Ataxia, Lameness
Case - Presentation

• **Signalment (Farm):**
  – Closed herd
  • Heifers, Feed mixer from other farm
  – Milking 133 head, Average DIM 209
  – Average 33 kg Milk/Cow/Day
  – Average butter fat of 3.9% and protein of 3.3%
  – Pregnancy rate is 16%, ranges from 15-18%
  – Cosynch for heat detection and breeding
  – Resynch with regular bi-weekly herd health
Case - Presentation

- **Vaccination:**

**Calves:**
- at 3-4 months and 10-12 months with Pyramid FP5 + Presponse® (Wyeth™) for BRSV, PI3, IBR and *M. haemolytica*

**Cows and Heifers:**
- Post-calving: Bovishield Gold FP5® (Pfizer™) for BRSV, BVD, IBR and PI3
- Dry off: J-VAC® (Merial™) for E. coli mastitis and Jencine® (Intervet Schering-Plough™) for E. coli, rotavirus, coronavirus and C. perfringens, each boostered 3 weeks prior to calving
Case - Presentation

- **Signalment (Animal):**
  - 4 year old second lactation Holstein, six months into gestation

- **History:**
  - Decreased milk production prior evening milking
  - Moved to hospital pen
  - Not treated with any medication
  - Vaccinated according to farm protocol
Case – Physical Exam

• **General Inspection:**
  – BCS 2.5, Inappetant
  – Enlarged prefemoral lymph nodes (20cm x 10cm)
  – Right hind limb lameness

• **Physical Exam:**
  – TPR normal, moderate rumen motility
  – Rectally:
    • fremitus, cotyledons, calf
    • Large inguinal lymph nodes (10cm x 5cm)
Enlarged lymph node
Case - Hypotheses

- Enzootic bovine leukemia (lymphosarcoma)
  - Primary/Working
- Generalized lymphadenopathy
- Abscessation

**Recommendation:**
- Cull
- Donated to OVC
## Case - Diagnostics

<table>
<thead>
<tr>
<th>Test: Bovine Leukosis Virus ELISA, 2 step (blvs): Per test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status: DONE</td>
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</table>

**Bovine leukemia virus - ELISA**

<table>
<thead>
<tr>
<th>Date</th>
<th>Author</th>
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<tbody>
<tr>
<td>2009-May-07</td>
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<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Parameter Description</th>
<th>Result</th>
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<tbody>
<tr>
<td>09-033396-000134 Serum</td>
<td>2.00RESULT</td>
<td><strong>POSITIVE</strong></td>
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</table>
Test: CBC, food animal, comprehensive with.

Status: DONE  Quantity Ordered: 1

Complete blood count, comprehensive
Date Authorized: 2009-May-06
Sample ID 341-1
Specimen Type Blood - EDTA

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<tr>
<th>Test</th>
<th>Result</th>
<th>Interval</th>
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<tbody>
<tr>
<td>WBC</td>
<td>17.5 H x 10</td>
<td>5.05-13.3</td>
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<tr>
<td>RBC</td>
<td>5.1 x 10</td>
<td>4.9-7.5</td>
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<tr>
<td>Hb</td>
<td>89 g/L</td>
<td>84-120</td>
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<tr>
<td>HCT</td>
<td>0.23 L/L</td>
<td>0.21-0.30</td>
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<tr>
<td>MCV</td>
<td>46 fL</td>
<td>36-50</td>
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<tr>
<td>MCH</td>
<td>18 pg</td>
<td>14-19</td>
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<tr>
<td>MCHC</td>
<td>386 g/L</td>
<td>380-431</td>
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<tr>
<td>RDW</td>
<td>17.3 %</td>
<td>16-20</td>
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<td>Platelets</td>
<td>306 x 10</td>
<td>160-450</td>
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<tr>
<td>MEV</td>
<td>5.8 fL</td>
<td>4.6-7.4</td>
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<tr>
<td>T.S. Protein</td>
<td>71 g/L</td>
<td>60-80</td>
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<tr>
<td>Seg Neutrophil</td>
<td>4.38 x 10</td>
<td>1.7-6.0</td>
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<tr>
<td>Lymphocyte Count</td>
<td>8.23 H x 10</td>
<td>1.8-8.1</td>
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<tr>
<td>Monocyte Count</td>
<td>2.28 H x 10</td>
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<tr>
<td>Eosinophil Count</td>
<td>0.18 x 10</td>
<td>0.05-1.15</td>
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<tr>
<td>Immature Count</td>
<td>2.45 H x 10</td>
<td>0.0-0.0</td>
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<tr>
<td>Anisocytosis</td>
<td>Occasion</td>
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</tr>
<tr>
<td>Shift platelets</td>
<td>Occasion</td>
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Test: **Biochemistry profile: Bovine, Hitachi**

**Status:** DONE  
**Quantity Ordered:** I

**Biochemistry profile, bovine**

**Date Authorized:** 2009-May-06

**Sample ID:** 341-1  
**Specimen Type:** Serum

### Reference

<table>
<thead>
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<th>Test</th>
<th>Result</th>
<th>Interval</th>
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<tr>
<td>Calcium</td>
<td>2.30</td>
<td>mmol/L 2.10-2.80</td>
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<td>Phosphorus</td>
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<td>Na:K Ratio</td>
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<td>Total Protein</td>
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<td>Albumin</td>
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<td>Globulin</td>
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<td>A:G Ratio</td>
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<td>Urea</td>
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<td>Creatinine</td>
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<td>Glucose</td>
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<td>Cholesterol</td>
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<td>Total Bilirubin</td>
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<td>Conjugated</td>
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<td>Free Bilirubin</td>
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<td>Non-Esterified</td>
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<td>Haptoglobin</td>
<td>0.01</td>
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<tr>
<td>Calculated Osmo</td>
<td>280</td>
<td>mmol/L 276-306</td>
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Case - Diagnostics

- **Necropsy**
  - Left exophthalmus
  - **Lymph Nodes:** Cervical, Thoracic and Abdominal nodes markedly enlarged (up to 20cm by 15 cm by 15cm)
    - Finely mottled red and tan on cut surface and all nodes lacked normal architecture
  - **Heart and Kidney:** multiple small (1-3cm) randomly distributed, focal and coalescing nodules
  - **Bone Marrow:** multiple red foci of 1 cm diameter within a largely tan surface
  - **Pathologist’s tentative diagnosis:** Multicentric lymphoma involving cervical, thoracic and abdominal lymph nodes, heart and kidneys
Inguinal lymph node

Abomasum

Inguinal lymph node
Case - Diagnostics

• **Histology**
  – Compromised lymph node architecture with infiltration of neoplastic lymphocytes through medulla and cortex
  – Neoplastic lymphocytes also found kidneys, spleen, omentum, bone marrow and the atrial myocardium
  – Consistent with multicentric enzootic bovine leukemia
  – Liver revealed vacuolated hepatocytes, consistent with hepatic lipidosis
Case – Treatment & Prognosis

• There is **no** treatment

• BLV infection is life-long
  – Very few develop clinical disease (1%)

• Prognosis for clinical lymphosarcoma is grave

• Cull once clinical signs are apparent
Case

• How did this cow get infected?
  – Most common source is new additions
    • This is a CLOSED herd!
  – Vectors and Fomites
    • Farm located in a dairy dense area
  – Subclinical Infection
    • Always present but clinical disease just identified
Case - Plan

• Identify other positives

1. ELISA on bulk milk
   - Detect presence of infection in other animals

2. Pooled serum ELISA
   - If positive found, test each individual in that group
Case - Plan

• **Identified Positives**
  – Do not use colostrum
  – Clean pen after calving
  – Discontinue reuse of needles
  – Rectal last/change gloves

• **To Eliminate**
  – Close (or maintain) the herd
  – Do not rebreed positives
  – CULL at the end of lactation
Implications

• **Lymphosarcoma**
  – Lost milk production for current and subsequent lactations
  – Value of the calf, genetics
  – Cost of raising another replacement
  – Trade-restrictions

• **Subclinical**
  – Insidious economic losses
  – Decreased milk production
    • Prevalence of infection within the herd
  – Longer calving interval
  – Premature culling
Thank You!

- OABP and Pfizer™ Animal Health
- AHL
- Dr. Wayne Shewfelt and everyone at Tavistock Veterinarians
Questions

Cow poetry

Distant Hills
The distant hills call to me.
Their rolling waves seduce my heart.
Oh, how I want to graze in their lush valleys.
Oh, how I want to run down their green slopes.
Alas, I cannot.
Damn the electric fence!
Damn the electric fence!
Thank you.