Case #10-30200

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**History:** Adult bovine bull

- Whole blood was submitted to KSU VDL for hemoparasite examination
  - Bloodwork performed by rDVM
    - Leukocytosis
    - $Hct_{spun}$ of 14% (reference interval 26-42%)
<table>
<thead>
<tr>
<th></th>
<th>Concentration</th>
<th>Reference interval</th>
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</thead>
<tbody>
<tr>
<td>RBC</td>
<td>2.13 M/µL</td>
<td>5.8 M/µL</td>
</tr>
<tr>
<td>Hgb</td>
<td>4.24 g/dL</td>
<td>8.5-14 g/dL</td>
</tr>
<tr>
<td>Hct (calculated)</td>
<td>11.4%</td>
<td>26-42%</td>
</tr>
<tr>
<td>MCV</td>
<td>53.9 fL</td>
<td>32-51 fL</td>
</tr>
<tr>
<td>MCH</td>
<td>19.9 pg</td>
<td>11-18 pg</td>
</tr>
<tr>
<td>MCHC</td>
<td>37.0 g/dL</td>
<td>33-37 g/dL</td>
</tr>
<tr>
<td>Platelets</td>
<td>clumped</td>
<td></td>
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<tr>
<td></td>
<td>Concentration</td>
<td>Reference interval</td>
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<tr>
<td>Corrected WBC</td>
<td>10.4 K/µL</td>
<td>4-12 K/µL</td>
</tr>
<tr>
<td>Seg. neutrophils</td>
<td>2.6 K/µL</td>
<td>1-5 K/µL</td>
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<tr>
<td>Band neutrophils</td>
<td>1.04 K/µL</td>
<td>0-0.2 K/µL</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>5.9 K/µL</td>
<td>2.5-7.5 K/µL</td>
</tr>
<tr>
<td>Monocytes</td>
<td>0.6 K/µL</td>
<td>0.025-0.85 K/µL</td>
</tr>
<tr>
<td>Eosinophils</td>
<td>0.2 K/µL</td>
<td>0-0.2 K/µL</td>
</tr>
<tr>
<td>Basophils</td>
<td>0 K/µL</td>
<td>0-0.2 K/µL</td>
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</tbody>
</table>
Platelet clumps
Basophilic stippling
Polychromatophil
Anaplasma marginale
Diagnostics

- Anaplasma cELISA: positive
Anaplasma marginale

- Rickettsial organism
- Affects ruminants
  - Cattle, bison, water buffalo, African antelopes, etc.
- Persistent infection/ carriers
- Calves are less susceptible
  - Persistently infected carriers
    - Splenectomized calves are susceptible to clinical disease
    - Often have more severe symptoms than older cattle
Transmission

- **Biological vectors**
  - **Ticks**
    - *Dermacentor, Rhipicephalus* and *Boophilus*

- **Mechanical vectors**
  - Lice, mosquitoes, biting flies
  - Needles, tattooing instruments, surgical instruments, dehorning equipment

- **Transplacental**
Life Cycle

Multiplication in several tick tissues (gut and salivary glands)

Boophilus spp.

Dermacentor spp.

Rhipicephalus spp.

Permission granted for viewing only on SEVPAC website
Extravascular hemolysis

- Clinical signs
  - Anemia
  - Icterus
  - Fever
  - Abortion
  - Weight loss
  - Lethargy
  - Death
A. marginale  

A. centrale  

Photo courtesy of Dr. Steven L. Stockham
Diagnostic Tools

- Western blot analysis
- PCR
- IFA
- cELISA
  - Monoclonal antibody ANAF16C1 to recombinant major surface protein 5

*Possible cross-reactivity of *Anaplasma* species when using IFA or cELISA?
Cross-reactivity with cELISA and IFA

• A 2005 study (Dreher, et al)
  ▫ Cross-reactivity with cELISA and IFA

• A 2007 study (Strik, et al)
  ▫ Cross-reactivity NOT observed with the cELISA
  ▫ Cross-reactivity observed with an indirect ELISA

• Cross-reactivity with *A. marginale* and *A. centrale* using the cELISA
Prevention and control

- Arthropod control
- Sanitation/ hygiene
- Antibiotics
- Vaccines
  - Live and killed vaccines available
  - Reduce or prevent clinical disease
  - Do not prevent persistent infection
References

Acknowledgments

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  ▫ Mal Hoover
• KSU Clinical Pathology Laboratory Staff
  ▫ Janice Muller
  ▫ Jill Newland
  ▫ Stephanie Ochoa
  ▫ Jessica Penner
• Dr. Dick Hesse

Questions?