Case Summary
- Lambing problem in Spanish Forks, Utah
- Drought kept herds on mountain pastures later into fall breeding season
- Rancher described the following in lambs:
  - Distorted upper jaw, cleft palate, and cyclopia
  - Motor-nerve paralysis
  - Surviving lambs had shortened legs

Possible Causes
- Two toxic plants were found on the pasture land
  - Veratrum sp. (commonly known as Corn Lily)
    - Contains 3 teratogenic alkaloids: jervine, cyclopamine, and cycloposine
    - Inhibits proteoglycan synthesis resulting in defective chondrogenesis
      - Results in head, trachea, and bone malformations
    - Cyclopamine and jervine inhibit Shh signaling during gastrulation-stage
  - Lupinus sp. (Lupine)

Teratogenic Effects of *Veratrum* sp.

<table>
<thead>
<tr>
<th>Day of Gestation</th>
<th>Effect</th>
</tr>
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<tbody>
<tr>
<td>14</td>
<td>cyclopia</td>
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<tr>
<td>17-18</td>
<td>motor-nerve paralysis of hind legs</td>
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<tr>
<td>12-30</td>
<td>cleft palate, harelip and brachygnathia</td>
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<tr>
<td>30-36</td>
<td>shortened legs from hypoplasia</td>
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Lupinus sp.
- Contains the toxic alkaloid anagyrine
- Ewes may be symptomatic with the following:
  - salivation, ataxia, seizures, and head-pressing
- The alkaloid is NOT teratogenic to sheep fetuses
- Causes "crooked calf syndrome" in cattle

Lupine Effects in Cattle
- Cow rumen metabolizes anagyrine resulting in a teratogenic derivative
  - Causes an immobilizing effect on fetus
  - Fetus malformations occur because the fetus remains in one position for a prolonged period
  - Occurs when exposure is 40-70 days in gestation

Diagnosis
- The symptoms that the rancher noted were indicative of the toxic Corn Lily
- The Lupine, while toxic to sheep, was not the underlying cause of the noted problem

Management Suggestions
- Keep ewes in their first trimester off the problematic pastures
- No treatment options are available

References