Understanding and diagnosing pregnancy loss

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Pregnancy loss definitions

Early embryonic death (EED)
less than 42 days gestation

Abortion
42 days to gestation term (280 days)

Stillborn vs. weak calf syndrome
check lung tissue for signs of breathing
2” X 2” lung tissue in water
floats = at least one breath taken
Pregnancy losses are “normal” in all species

Mares, Ewes, Cows, Pig, Mice, Rats, Poultry, Turtles, Humans
1960 to 2020

Pregnancy loss in beef cows: two studies

Most loss by 30-60 days

Early embryonic death

Unlikely to notice fetus or placenta

Return to estrus for rebreed

Estrus interval 30+ days indication of EED

42 day fetus

~ 1 finger diameter

Early embryonic death

Causes:

Developmental issues

BVDV
Lepto
Neospora
Human induced; e.g. Lutalyse®
Abortion: 42 days to term

May or may not notice fetus
  mouse size = 60 days
  rat size = 90 days

Usually will return to estrus within a few days to weeks
  Trich and Campy?

Abortion causes

Bacteria: many species
Mold: silage, hay, cubes, cake
Toxins: nitrate
Vaccine: IBR (MLV unvaccinated, pregnant animals)
IBR: field exposure
Lepto: carriers, wildlife
BVDV I and II: not in every herd, neighbors, wildlife
Neospora
Nutritional: protein/trace-mineral/vitamin/energy deficiencies
### 2019 KSVDL abortion results

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>% of submissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staph aureus</td>
<td>3</td>
</tr>
<tr>
<td>Salmonella</td>
<td>3</td>
</tr>
<tr>
<td>Listeria</td>
<td>3</td>
</tr>
<tr>
<td>Lepto</td>
<td>3</td>
</tr>
<tr>
<td>Fungal</td>
<td>6</td>
</tr>
<tr>
<td>Developmental</td>
<td>3</td>
</tr>
<tr>
<td>IBR</td>
<td>6</td>
</tr>
<tr>
<td>Bacillus</td>
<td>3</td>
</tr>
<tr>
<td>Nitrate</td>
<td>9</td>
</tr>
<tr>
<td>Neospora</td>
<td>28??</td>
</tr>
<tr>
<td>BVD</td>
<td>28</td>
</tr>
</tbody>
</table>

### 2018 Bovine Abortion Case Results

<table>
<thead>
<tr>
<th>Condition</th>
<th>% of submissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>UVD</td>
<td>9.4</td>
</tr>
<tr>
<td>E. coli</td>
<td>3.8</td>
</tr>
<tr>
<td>IBR</td>
<td>25</td>
</tr>
<tr>
<td>M. bovis</td>
<td>5.7</td>
</tr>
<tr>
<td>Vit A</td>
<td>1.9</td>
</tr>
<tr>
<td>Vit E</td>
<td>1.9</td>
</tr>
<tr>
<td>anaplasmosis</td>
<td>3.8</td>
</tr>
<tr>
<td>acanthobacterium</td>
<td>5.7</td>
</tr>
<tr>
<td>campylobacter</td>
<td>1.9</td>
</tr>
<tr>
<td>marthemia</td>
<td>1.9</td>
</tr>
<tr>
<td>nocardia</td>
<td>1.9</td>
</tr>
<tr>
<td>neospora</td>
<td>5.7</td>
</tr>
<tr>
<td>nitrate</td>
<td>5.7</td>
</tr>
<tr>
<td>salmonella</td>
<td>1.9</td>
</tr>
<tr>
<td>selenium deficiency</td>
<td>5.7</td>
</tr>
<tr>
<td>trace mineral</td>
<td>1.9</td>
</tr>
<tr>
<td>trueperella</td>
<td>5.7</td>
</tr>
</tbody>
</table>

53 cases with a definitive diagnosis
Diagnosing pregnancy loss

Samples

Early embryonic loss

Serum samples from dams to rule-out
IBR, BVD, Lepto titers
Protein metabolites (BUN/MUN)
Best diagnostic samples

Abortion

1\textsuperscript{st} abortion of the year, diagnostics?
Probably not…but just in case
Save fetus and placenta
chilled (best not frozen)

Best: Entire fetus AND sections of placenta
OR
2\textsuperscript{nd} Best: All fetal tissues except intestines

Abortion diagnostic success

One fetus submitted

Definitive diagnosis = 30-50\% of the time
Increasing abortion diagnostic success

Placenta included
(several sections)

~3X times more likely to result in a diagnosis

Increasing abortion diagnostic success

Submit more than one aborted fetus/placenta

~1.5 X more likely to result in diagnosis
Diagnosing pregnancy loss: after preg check

Called pregnant, now open, no fetus, no placenta!!!

Stage of gestation when checked?
Losses are greater in early gestation
Checked at 45 days vs. 150 days

Confidence in palpation or ultrasound or test?

Pregnancy exam goal?
To find opens!
resynchronization
culling
other
## Pregnancy exam: accuracy

<table>
<thead>
<tr>
<th>Test method</th>
<th>Gestation (minimum days)</th>
<th>Days post calving</th>
<th>False negatives</th>
<th>False positives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectal palpation</td>
<td>30</td>
<td>-</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>25</td>
<td>-</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Blood/milk (IDEXX: PAG)*</td>
<td>25/28</td>
<td>60</td>
<td>0.7%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Blood/milk (Biopyrn: PSPB)*</td>
<td>25/28</td>
<td>73-92</td>
<td>1.0%</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

*Manufacturers’ advertised accuracy

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### Blood pregnancy test

100 cows tested using blood sample

All called pregnant

Reality: 95 are pregnant
5 are actually open
Late losses: no fetus/placenta

Pregnancy confirmed in fall
comfortable results were accurate

Now calving season, several confirmed open

No fetus or placenta available

Now what???

Confident they were pregnant

CAN'T eliminate all causes
for example: nutritional/genetic/toxic
lag time from diagnosis to finding open
available sample issues: limited

CAN eliminate the major infectious causes
Confident they were pregnant

Blood (serum) samples: 3-5 adults
target open animals
3 additional from pregnant animals are helpful

1 blood sample from 1 animal = difficult to interpret

Serum titers from now open cows

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Tag 3372</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBR</td>
<td>1:128</td>
</tr>
<tr>
<td>BVD I</td>
<td>1:2064</td>
</tr>
<tr>
<td>BVD II</td>
<td>1:512</td>
</tr>
<tr>
<td>Lepto hardjo bovis</td>
<td>1:400</td>
</tr>
</tbody>
</table>
Pregnancy loss prevention

Biosecurity
minimize:
exposure to disease strains
exposure to large amounts = overwhelm immunity

Vaccination program
IBR, BVDI, BVDII, Lepto, Campylobacter
Local veterinarians’ advice = best source

Nutrition
Immune system requires large amounts of protein, energy, minerals, vitamins

Test forages
Formulate appropriate diet
Summary

Pregnancy losses are “normal”
biological attrition

Most losses occur in the first 60 days of gestation

Prevention is important, but not complete
biosecurity, immunity, nutrition

Thank you!

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<table>
<thead>
<tr>
<th>Gestation age (days)</th>
<th>% Loss Low - High Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 - 10</td>
</tr>
<tr>
<td>8</td>
<td>25 - 30</td>
</tr>
<tr>
<td>14 - 28</td>
<td>5 - 10</td>
</tr>
<tr>
<td>29 - 42</td>
<td>5 - 10</td>
</tr>
<tr>
<td>43 - term</td>
<td>5 - 12</td>
</tr>
</tbody>
</table>


6-7% loss: 30 to 60 days
1-2% loss: greater than 60 days
GAH: unpublished

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**Diagnosing losses**

**EED**
most go unnoticed

**Abortions**
entire fetus and placenta important tissues

fetus and placenta not available = blood test can eliminate some diseases as causes