Understanding and diagnosing pregnancy loss

Gregg A. Hanzlicek, DVM, PAS, PhD
Kansas State Veterinary Diagnostic Laboratory
College of Veterinary Medicine
Kansas State University
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

Average pregnancy rate

Gestation (days)

Ealy, et al: 2019
&
Reese, et al. 2020
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
- BVDV I and II
- Neospora
- Nutritional: protein/trace-mineral/vitamin/energy deficiencies
Infectious cause

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Early</th>
<th>Mid</th>
<th>Late</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBR</td>
<td>⭐</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BVDV</td>
<td>⭐</td>
<td></td>
<td></td>
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<tr>
<td>Lepto</td>
<td>⭐</td>
<td></td>
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<tr>
<td>Vibrio</td>
<td>⭐</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trich</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neospora</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Vaccination program should include

[Logo] Kansas State Veterinary Diagnostic Laboratory
2020 KSVDL abortion results

% of non-negative submissions

- Staph aureus: 3.1%
- Salmonella: 3.1%
- Listeria: 3.1%
- Lepto: 3.1%
- Injury: 3.1%
- Fungal: 6.3%
- Developmental: 3.1%
- IBR: 6.3%
- Bacillus: 3.1%
- Nitrate: 9.4%
- Neospora: 28.1%
- BVD: 28.1%

3 with histo
2018 Bovine Abortion Case Results

- BVD: 9.4
- E. coli: 3.8
- IBR: 25
- M. bovis: 1.9
- Vit A: 1.9
- Vit E: 3.8
- Anaplasmosis: 5.7
- Arcanobacterium: 1.9
- Campylobacter: 1.9
- Mannheimia: 1.9
- Mold: 1.9
- Neospora: 21
- Nitrate: 5.7
- Salmonella: 5.7
- Selenium deficiency: 1.9
- Trace mineral: 1.9
- Trueperella: 5.7

53 cases with a definitive diagnosis.
Diagnosing pregnancy loss
Pregnancy histograms can be helpful......
% Pregnant by breeding season period

- 1st: 67%
- 2nd: 23%
- 3rd: 8%
- Open: 4%

Ideal

21 breeding periods
% Pregnant by breeding season period

Neighbor’s bulls got into the pasture during the second 21 day period. He and several other bulls tested positive for Trich.
% Pregnant by breeding season period

Multiple bulls in a single pasture infected with Trich at turnout

21 breeding periods

1st: 14%
2nd: 12%
3rd: 21%
Open: 53%
What happened?

5 bulls in the pasture
3 treated for foot rot 2 weeks after turnout
Treated once and recovered
What happened—similar to last graph

85% of the herd with body condition score under 3 at bull turnout...and 90 day breeding season
Other diagnostics
Normal appearance of aborted bovine fetus
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)

Entire fetus AND sections of placenta 
  OR

All fetal tissues except intestines
Abortion diagnostic success

One fetus submitted

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

Submit more than one aborted fetus/placenta

~1.5 X more likely to result in diagnosis
Increasing abortion diagnostic success

Placenta included
(several sections)

4X times more likely to result in a 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 blood test?
# 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>28</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
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
Prevention
Pregnancy loss prevention

Biosecurity

minimize:

exposure to disease strains

exposure to large amounts = overwhelm immunity

Vaccination program

IBR, BVDI, BVDII, Lepto, Campylobacter
Pregnancy loss prevention

Nutrition

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

Test forages

Formulate appropriate diet
Thank you

Gregg A. Hanzlicek
785-532-4853
gahanz@vet.k-state.edu