Pregnancy Loss in Beef Cattle

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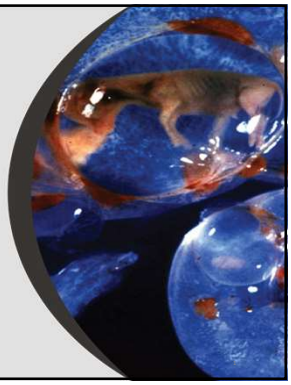
FL 2021



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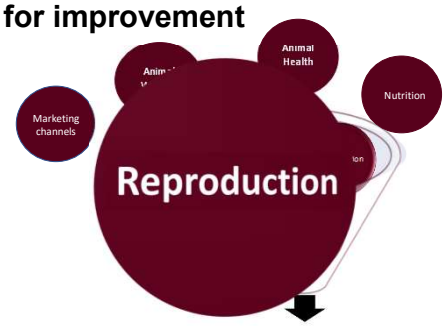
Areas for improvement



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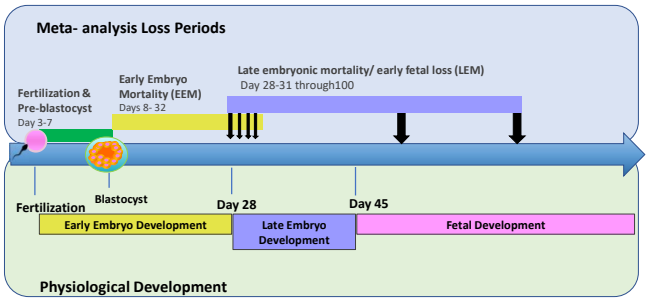
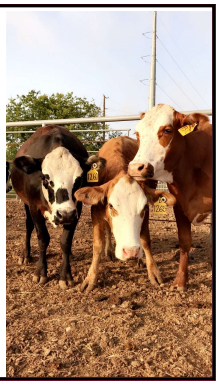
Increased efficiency

Periods of pregnancy development



Objective

To review available data and use a systematic review process to obtain an accurate prediction of embryonic failure during multiple periods of pregnancy development in beef cattle



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Selection criteria

Inclusion

- Cows or heifers of predominantly beef breeds
- Published after 1978
- Day of gestation of pregnancy diagnosis, subspecies, location, parity, and/or breeding method was listed

Exclusion

- Induced twinning
- Study treatments that were detrimental to pregnancy success
- First pregnancy diagnosis was after day 32 of gestation
- Animals of Holstein or other dairy breed origin

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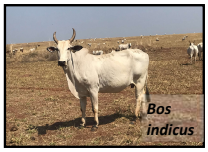
Moderators

Parity

Subspecies



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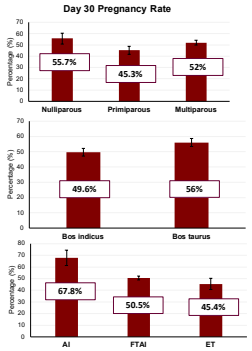
EARLY EMBRYONIC MORTAL

Overall Point Estimate: 47.9%

> 50,000 diagnostic records



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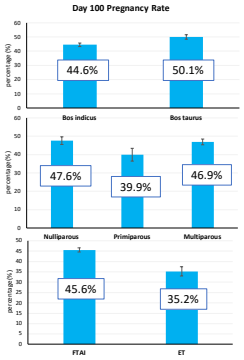
Late embryonic/early fetal mortality (%)

Pregnancy diagnosis between day 60 & 100 of gestation

Overall Point Estimate: 5.8%

> 30,000 diagnostic records



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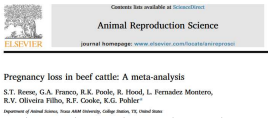
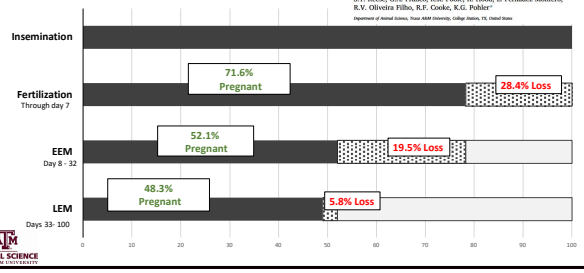
Pregnancy loss in beef cattle



Pregnancy loss in beef cattle: A meta-analysis

S.T. Reese, G.A. Franco, R.K. Poole, R. Hood, L. Fernadez Montero, R.V. Oliveira Filho, R.F. Cooke, K.G. Pohler*
Department of Animal Science, Texas A&M University, College Station, TX, United States



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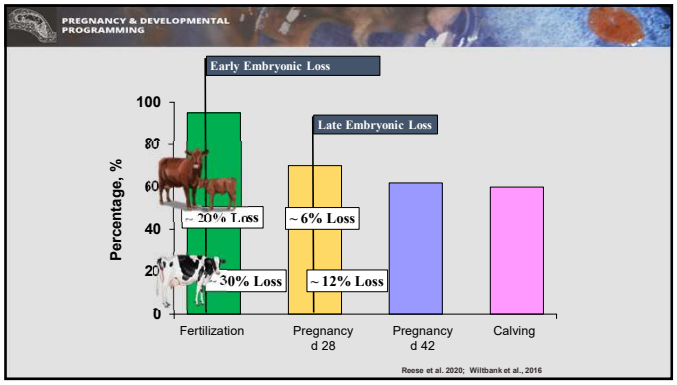
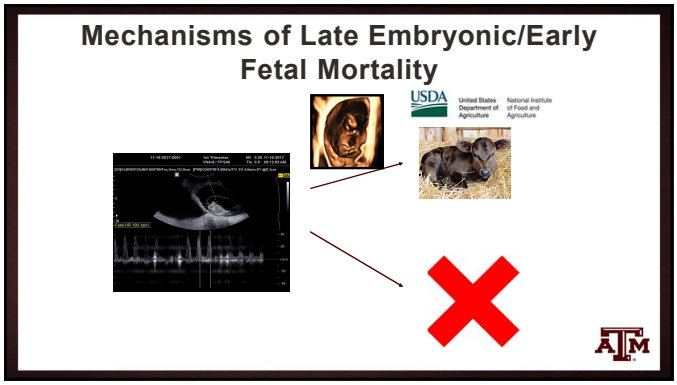

PREGNANCY & DEVELOPMENTAL PROGRAMMING
Early Embryonic Loss
Late Embryonic Loss
Percentage, %
100
80
60
40
20
0
~ 20% Loss
~ 30% Loss
~ 6% Loss
~ 12% Loss
Fertilization
Pregnancy d 28
Pregnancy d 42
Calving
Reese et al. 2020; Wiltbank et al., 2016


Mechanisms of Late Embryonic/Early Fetal Mortality
USDA
United States Department of Agriculture
National Institute of Food and Agriculture


Why it matters?
Bred TAI (baseline)
Early Embryo Loss
Late Embryo Loss
Never Calved
Day of Calving
0
21
60
N/A
Weaning Weight (age * 2lbs/day)
550 lbs
508 lbs (-42)
430 lbs (-120)
0 lbs (-550)
Calf Value (weight* $1.60/lb)
$880
$812 (- $68)
$688 (- $192)
$0 (- $880)
They all cost the same to maintain!

What controls pregnancy loss?

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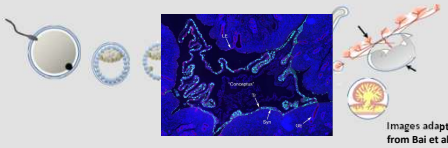
Parental contribution to pregnancy loss – focus of studies



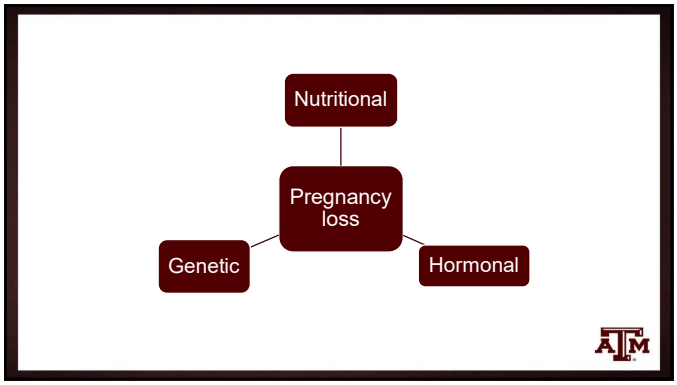
Images adapted from Bai et al., 2013

CONTRIBUTION TO PREGNANCY LOSS

♂ ♀

Pohler et al., 2021

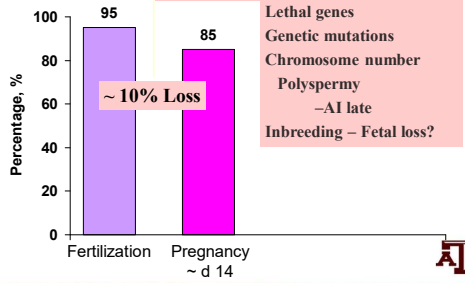
Maternal driven pregnancy loss

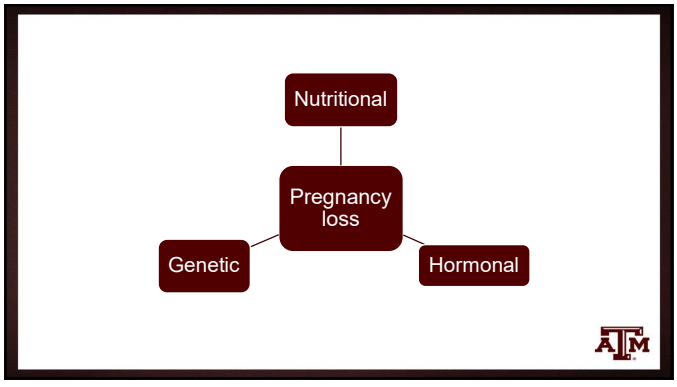


Genetic losses

Genetic Abnormalities:

- Lethal genes
- Genetic mutations
- Chromosome number
  - Polyspermy
    - –AI late
- Inbreeding – Fetal loss?

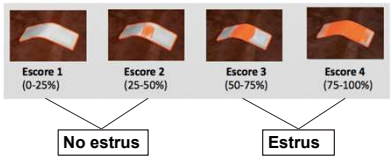




Estrus prior to TAI

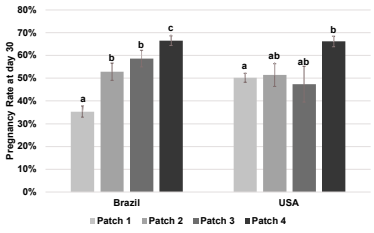
Patch score from 0 to 4

- 0 lost patch



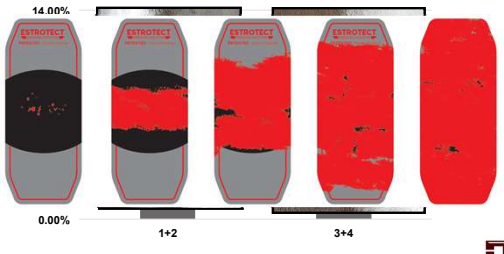
Pohler et al., 2016

Estrus and pregnancy rate

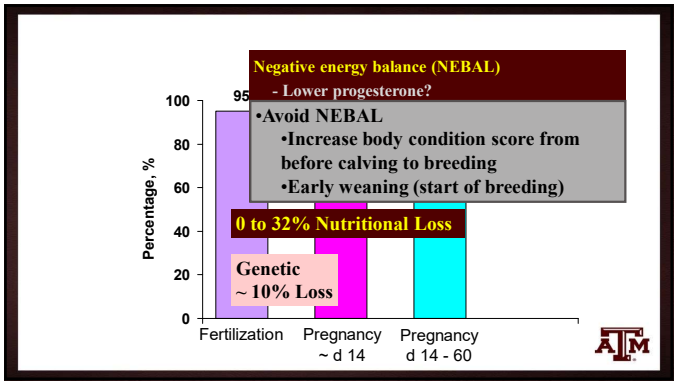


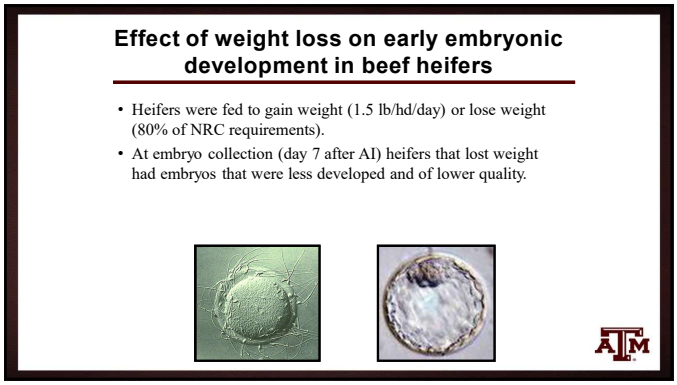
Adapted from Franco et al. (2018a) and Speckhart et al. (2018).

Estrus and pregnancy loss



Pohler et al., 2016


Negative energy balance (NEBAL)
- Lower progesterone?
•Avoid NEBAL
•Increase body condition score from before calving to breeding
•Early weaning (start of breeding)
0 to 32% Nutritional Loss
Genetic
~ 10% Loss
Percentage, %
100
80
60
40
20
0
95
Fertilization
Pregnancy ~ d 14
Pregnancy d 14 - 60


Effect of weight loss on early embryonic development in beef heifers
• Heifers were fed to gain weight (1.5 lb/hd/day) or lose weight (80% of NRC requirements).
• At embryo collection (day 7 after AI) heifers that lost weight had embryos that were less developed and of lower quality.


Paternal driven pregnancy loss

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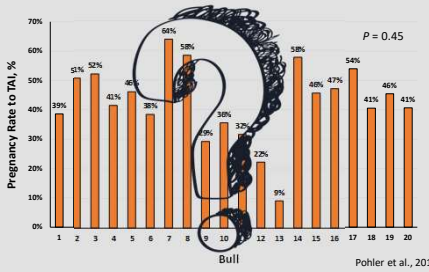
Variance in pregnancy rate by sire



Pohler et al., 2012

25

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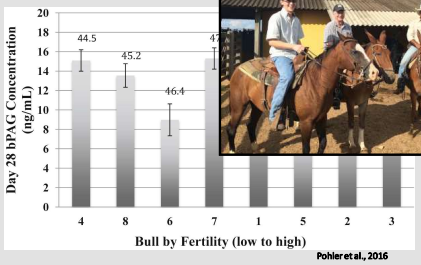
How it all started...



Pohler et al., 2016

26

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Sire contribution to pregnancy loss

Sire	EEM (%)	EEM Classification	LEM (%)	LEM Classification
1	3.7 ± 5.2	Low EEM	5.1 ± 4.0	Low LEM
2	20.0 ± 6.0	High EEM◄	3.4 ± 4.6	Low LEM
3	11.1 ± 4.0	High EEM◄	9.9 ± 3.5	High LEM♦
4	11.7 ± 4.6	High EEM◄	2.5 ± 3.9	Low LEM
5	10.5 ± 6.2	High EEM◄	3.3 ± 4.5	Low LEM
6	5.7 ± 4.6	Low EEM	12.6 ± 3.6	High LEM♦
7	2.8 ± 4.6	Low EEM	2.3 ± 3.7	Low LEM
8	3.0 ± 3.0	Low EEM	11.0 ± 3.4	High LEM♦

Franco et al, 2020

27

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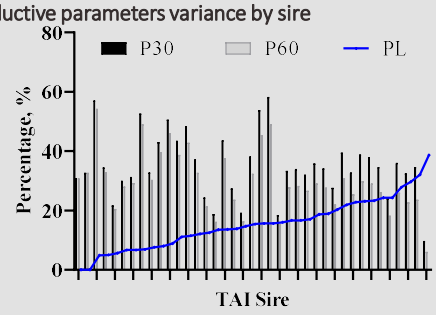
Reproductive parameters variance by sire



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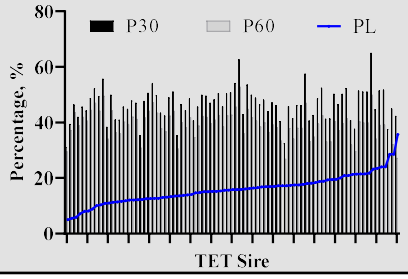
Reproductive parameters variance by sire



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Conclusion

- ✓ Pregnancy loss is normal through day 60 of gestation.
- ✓ Maternal contributions to pregnancy loss include genetics, nutrition and hormones.
- ✓ Paternal genetics seems to play a large role in late embryonic mortality.

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Acknowledgements

Faculty Collaboration

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✓ All graduate and undergraduate students
✓ All research station staff, especially Webb Fields and Kenton Krueger

TEXAS A&M UNIVERSITY Animal Science Areas of Excellence

TEXAS A&M AGRILIFE RESEARCH

USDA ARS

USDA United States Department of Agriculture National Institute of Food and Agriculture

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QUESTIONS?