Beef Cattle Reproductive Challenges in Florida

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A multi-year success scenario: dam pregnant at the beginning of breeding season year 2

A multi-year success scenario: heifer born at the beginning of calving season year 3

A multi-year success scenario: dam pregnant at the beginning of breeding season year 3
A multi-year success scenario: yearling heifer enters breeding season year 4 at 14.5 months of age

A multi-year success scenario: dam and yearling heifer pregnant at the beginning of breeding season year 4

A multi-year success scenario: 1st calf heifer enters breeding season year 5 at 26.5 months of age
A multi-year challenging scenario: dam pregnant at the end of breeding season year 2

A multi-year challenging scenario: heifer born at the end of calving season year 3

A multi-year challenging scenario: dam pregnant at the end of breeding season year 3
A multi-year challenging scenario: yearling heifer enters breeding season year 4 at 11.5 months of age

A multi-year challenging scenario: dam and yearling heifer pregnant at the end of breeding season year 4

A multi-year challenging scenario: 1st calf heifer enters breeding season year 5 at 23.5 months of age
Take home point:
1. Focus management and nutrition to increase probability of pregnancy at the beginning of the breeding season.
1. Delayed puberty

- Lack of basic knowledge of mechanisms
- Lack of tools to select (phenotypes easy to collect and genomic markers)
- Lack of tools to induce (protocols and devices)
- Lack of specialized bulls
- Cost to develop
- Cost to continue development after first calf
- Onset of breeding season considerations
Nelore, 20-22 months, 100% pre-pubertal

CL on D20:
Control: 0/8 (0%)
PI: 3/10 (30%)
UPI: 5/9 (55%)

Nelore, 23-26 months, 100% pre-pubertal

Impact of progesterone and estradiol treatment before the onset of the breeding period on reproductive performance of Bos indicus beef breeders


6/14/18

9
Impact of progesterone and estradiol treatment before the onset of the breeding period on reproductive performance of Nelore beef heifers

Nelore, 23-26 months, 100% pre-pubertal Pregnancy TAI:
Control: 79/298 (26.5%) UPI: 148/342 (43.3%) Nellore, 25 months, pre-pubertal, induction protocol: CIDR used previously 3x (27d total)

Effect of interval from induction of puberty to initiation of a timed AI protocol on pregnancy rate in Nelore heifers


<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days of cycle (d)</td>
<td>10-12</td>
<td>10-12</td>
<td>15-18</td>
<td>0.84</td>
</tr>
<tr>
<td>Pregnancy TAI</td>
<td>52.4%</td>
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<td>73.4%</td>
<td>0.15</td>
</tr>
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</tr>
</tbody>
</table>

1-12: interval of 12 days from the induction protocol to beginning of the TP; Group 13: interval of 15 days. Group is control of 0 days from the induction protocol to beginning of the TP protocol.
Pregnancy rates:

Pre-pubertal: 33.6% vs 44.2%

Pubertal: 41.1% vs 45.2%
Take home points:

1. Focus management and nutrition to increase probability of pregnancy at the beginning of the breeding season.
2. Pre-breeding season exposure to progesterone increases cyclicity at the beginning of the breeding season in heifers.

2. Delayed return to cyclicity after parturition exacerbated in first calf yearling heifers
   - Extremely delayed in Bos indicus
   - Limited knowledge of extent of Bos indicus influence
   - Progesterone is required to induce cyclicity and prevent short cycles
   - Strategies to stimulate follicle growth and expression of heat

There is a 30-45 days window to get a cow pregnant in a 90 day breeding season, to keep a 12 mo. calving interval
Take home points:

1. Focus management and nutrition to increase probability of pregnancy at the beginning of the breeding season.
2. Pre-breeding season exposure to progesterone increases cyclicity at the beginning of the breeding season in heifers and in cows.

3. Poor control of follicle growth and timing of ovulation
   - Limited knowledge of extent of Bos indicus influence
   - Limited pharmacologic tools
   - High labor cost
   - Poor fertility caused by ovulation of small follicle (insufficient E2 exposure)
   - Poor fertility caused by poorly timed ovulation
   - Poor fertility caused by not-skilled inseminator
   - Low availability of bulls (Brahman); good semen quality? Potential to improve breed?
   - Any use in natural breeding systems?
3. Poor control of follicle growth and timing of ovulation
   - Limited knowledge of extent of Bos indicus influence
   - Limited pharmacologic tools
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   - Poor fertility caused by ovulation of small follicle (insufficient E2 exposure)
   - Poor fertility caused by poorly timed ovulation
   - Poor fertility caused by not-skilled inseminator
   - Low availability of bulls (Brahman): good semen quality? Potential to improve breed?
   - Any use in natural breeding systems?

Concepts on protocols for the synchronization of ovulation in cattle: E2/P4-based protocol

Concepts on protocols for the synchronization of ovulation in cattle: OvSynch protocol
D0
Sincrogen new (1.0 g - P4)

2 mg EB

D8
500 µg cloprostenol

D7
Estrotect

D10
D14

Estrus detection

1.9
32.4
43.5
19.4
2.8

Proportion in estrus (%)

Days after P4 insert removal

0.9
25.0
51.9
12.0
8.3

Proportion Ovulated (%)

Days after P4 insert removal
3. Poor control of follicle growth and timing of ovulation

- Limited knowledge of extent of Bos indicus influence
- Limited pharmacologic tools
- High labor cost
- Poor fertility caused by ovulation of small follicle (insufficient E2 exposure)
- Poor fertility caused by poorly timed ovulation
- Poor fertility caused by not-skilled inseminator
- Low availability of bulls (Brahman): good semen quality? Potential to improve breed?
- Any use in natural breeding systems?

Diameter of the pre-ovulatory follicle is associated positively with P/TAI

<table>
<thead>
<tr>
<th>Follicle diameter at TAI</th>
<th>n=2388</th>
<th>27.5%</th>
<th>48.7%</th>
<th>57.9%</th>
<th>63.3%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;7.5mm</td>
<td>305</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5-11.0mm</td>
<td>705</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1-14.4mm</td>
<td>1118</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;14.9mm</td>
<td>270</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Diameter of the pre-ovulatory follicle is associated positively with P/TAI of ovulated cows

<table>
<thead>
<tr>
<th>Variable</th>
<th>Diameter of the largest follicle at TAI, mm</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;7.5</td>
<td>7.5-11</td>
</tr>
<tr>
<td>Ovulation rate, %</td>
<td>46.6 (344)</td>
<td>75.8 (1451)</td>
</tr>
<tr>
<td>Follicle diameter, mm</td>
<td>10.6 (7.1)</td>
<td>13.1 (7.3)</td>
</tr>
<tr>
<td>Fertility rate, %</td>
<td>53.6 (7.1)</td>
<td>55.1 (7.3)</td>
</tr>
</tbody>
</table>

*Table 2: Association between follicle diameter at timed artificial insemination (TAI) and the probabilities of ovulation, estrus, and pregnancy among cows that ovulated in a controlled environment.

The abbreviations are as in the text above (P<0.05).

* Pregnancy per AI only in cows that had ovulated in response to the TAI protocol.
Take home points:

1. Focus management and nutrition to increase probability of pregnancy at the beginning of the breeding season.
2. Pre-breeding season exposure to progesterone increases cyclicity at the beginning of the breeding season in heifers and in cows.
Timed artificial insemination early in the breeding season improves the reproductive performance of suckled beef cows

Manoel E.S. Filho 1, 2, 4, Luciano Peñaelho 3, Everson L. Reis 4, Tomás A.N.P.S. Reis 4, Klíbio N. Calzôlo 4, Pietro S. Ranselli 4

Table 1
Reproductive parameters in suckled beef cows subjected to four breeding programs during a 90 day breeding season (6).1

<table>
<thead>
<tr>
<th>Breeding strategy</th>
<th>Pregnancy during the 60 days of the BS*</th>
<th>Pregnancy during the BS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pregnancy Service per AI, S/N</td>
<td>Pregnancy Service per AI, S/N</td>
</tr>
<tr>
<td></td>
<td>45 days, End, S/N</td>
<td>45 days, End, S/N</td>
</tr>
<tr>
<td>IHVS-NS</td>
<td>30.7 (150) —</td>
<td>7.5 (150) —</td>
</tr>
<tr>
<td>AFU-ED</td>
<td>54.1 (148) 25.4 (67)</td>
<td>9.5 (148) 25.7 (67)</td>
</tr>
<tr>
<td>ELF-NS</td>
<td>54 (150) 510 (58)</td>
<td>23.8 (150) 550 (147)</td>
</tr>
<tr>
<td>NS</td>
<td>40 (150)</td>
<td>44.6 (140) 50 (140)</td>
</tr>
</tbody>
</table>

Abbreviations: BS, breeding season; ED, estrus detection; NS, natural service; EI, timed AI.
Take home points:

1. Focus management and nutrition to increase probability of pregnancy at the beginning of the breeding season.
2. Pre-breeding season exposure to progesterone increases cyclicity at the beginning of the breeding season in heifers and in cows.
4. Apply reproductive technologies to increase proportion of pregnancies early in the breeding season, even in natural service systems.
4. Early and late embryonic mortality
- Associated with poor exposure to estradiol
- Associated with the ovulation of smaller follicles
- Associated with asynchronicity between embryo and uterus (caused by poor synchronization of ovulation of recipients)
- Possible incompatibility with a particular bull
- Opportunity for early detection, resynch and second AI before exposure to bull

4. Early and late embryonic mortality
- Associated with poor exposure to estradiol
- Associated with the ovulation of smaller follicles
- Associated with asynchronicity between embryo and uterus (caused by poor synchronization of ovulation of recipients)
- Possible incompatibility with a particular bull
- Opportunity for early detection, resynch and second AI before exposure to bull

Early Gestation Diagnostic in Cattle

Conceptus-Induced Changes in the Gene Expression of Blood Immune Cells and the Ultrasound-Accessed Luteal Function in Beef Cattle: How Early Can We Detect Pregnancy?1

Catherine Fialkoff,2,* Bruno T. Mignacca,3 Yassine N. Faiz,1 Monte R. França,1 Luciana A. Silva,1 and Mario Bredal3

1,2,3 Department of Animal Science, University of California, Davis, CA, USA

* Corresponding author: catherine.fialkoff@ucdavis.edu
Use of Early Gestation Diagnostic in re-synchronization strategies
Follicular dynamics of Nelore cows in response to different methods to synchronize the emergence of a new wave of follicle development 14 days post TAI

MV. MSc. Dr. Manoel Francisco de Sá Filho
MV. MSc. Romulo Germano de Rezende
MV. MSc Bruno Gonzales de Freitas
Prof. Dr. Pietro Sampaio Baruselli

Experimental design
Dispersion of wave emergence (Rezende et al., 2016, SBTE)

14 and 22 day resynch programs

14 and 22 day resynch programs
14 and 22 day resynch programs

Grupos Resincronização Dia 22 (n=125)

P/TAI

Dispositivo de P4

DG

DG

DG

DG

Dispositivo de P4

DG

DG

DG

Grupos Resincronização Dia 14 (n=125)

P/TAI

Dispositivo de P4

US Doppler

ECP (0.5 mg)

eCG (300 UI)

PGF (0.53 mg)

US Doppler

ECP (0.5 mg)

eCG (300 UI)

PGF (0.53 mg)

P/TAI, P/resynch Al, accumulated P/TAI (Penteado et al, 2016, SBTE)

D14  D22

54%  48%

55%  56%

74%  77%

P/TAI  P/resynch  Accumulated P/TAI

n=448

US upper

ECP (0.5 mg)

eCG (300 UI)

PGF (0.53 mg)

What is doppler efficiency?
**Take home points:**

1. Focus management and nutrition to increase probability of pregnancy at the beginning of the breeding season.
2. Pre-breeding season exposure to progesterone increases cyclicity at the beginning of the breeding season in heifers and in cows.
4. Apply reproductive technologies to increase proportion of pregnancies early in the breeding season, even in natural service systems.
5. Early preg check + resynch is a novel tool for increasing AI pregnancies early in the breeding season.
Decreasing from 9 to 7 days the permanence of progesterone inserts make possible their use up to 5 folds in suckled Nellore cows

<table>
<thead>
<tr>
<th>Details</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
<th>7th</th>
<th>8th</th>
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<tbody>
<tr>
<td>Weight gain</td>
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<td>500</td>
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<td>Initial weight</td>
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<td>500</td>
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<tr>
<td>Initial gravidity</td>
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<td>1</td>
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<td>1</td>
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<tr>
<td>Initial body condition</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
</tbody>
</table>

Thank you!