Understanding the Basics of Repro Physiology for Successful Reproductive Management

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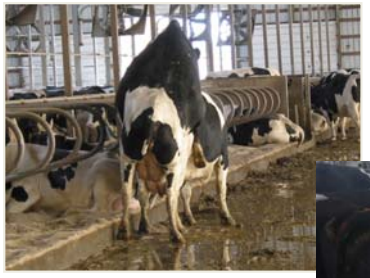
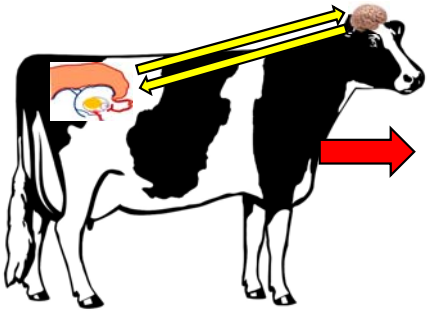
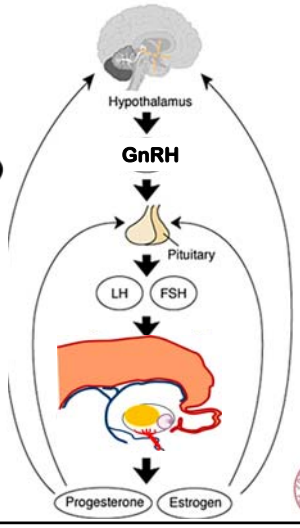
Understanding Physiology Can Help with Daily Farm Operation

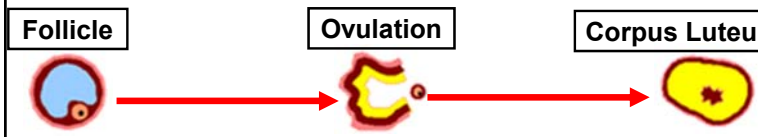


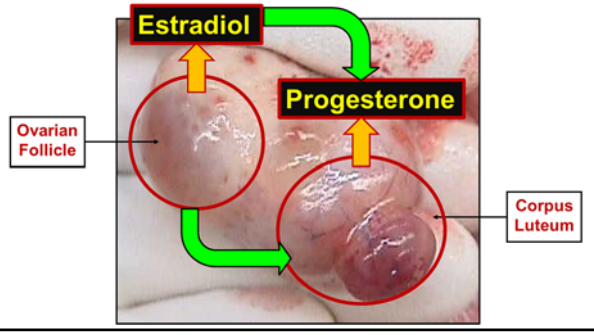
Hypothalamic-Pituitary-Ovarian Axis



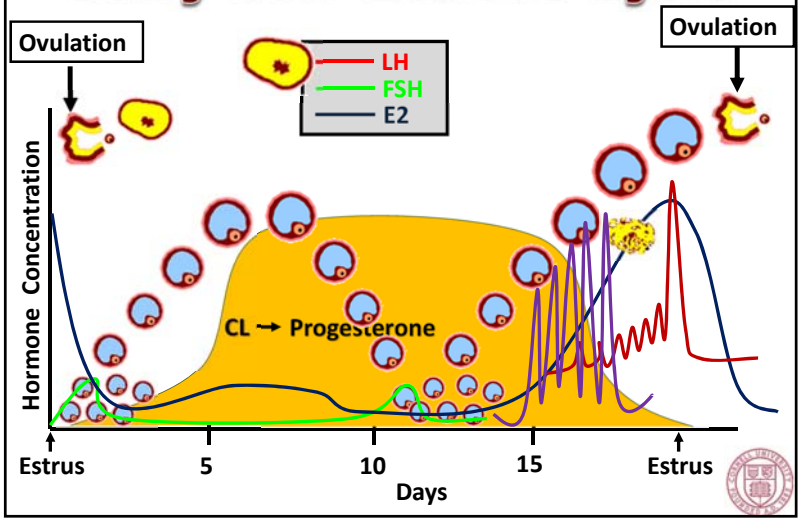


Ovarian Structures





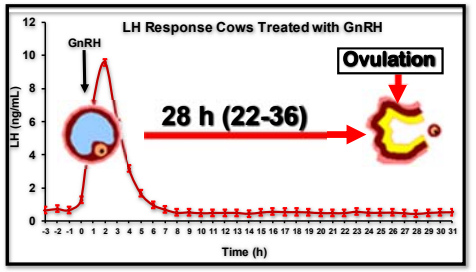
Dairy Cow Estrous Cycle



Endocrine Control of the Estrous Cycle

- Hypothalamic hormones
  - Gonadotropin releasing hormone (GnRH)

Control LH synthesis and release



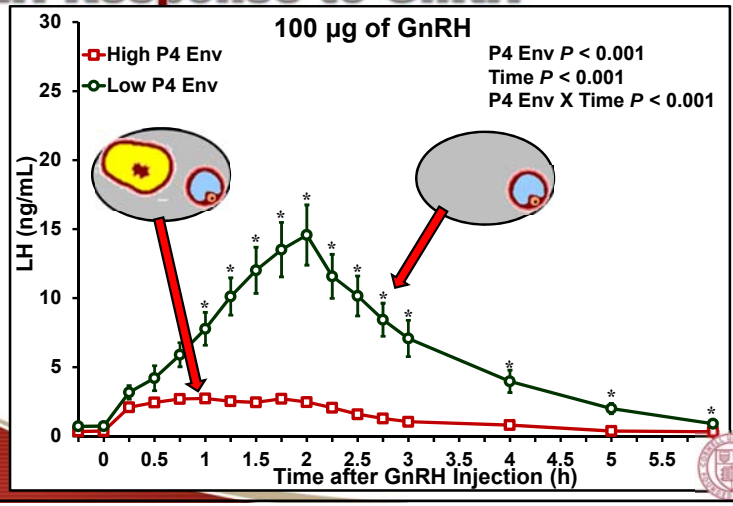
Endocrine Control of the Estrous Cycle

- Hypothalamic hormones
  - Gonadotropin releasing hormone (GnRH)

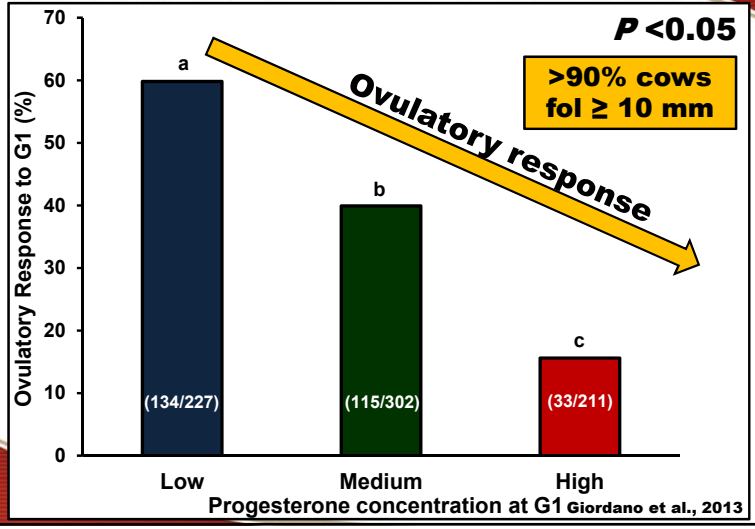
Control LH synthesis and release

1. Regular dose is 100 µg (2 cc or 1 cc)
1. Treatment with GnRH in pregnant cows neither detrimental nor beneficial for current pregnancy
2. Greatest detriment to GnRH function is progesterone level

Effect of P4 on LH Response to GnRH

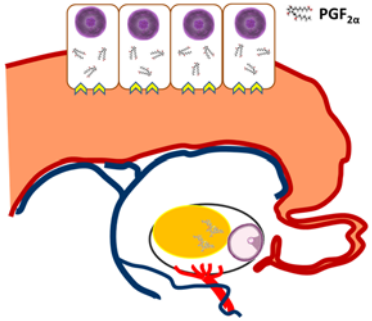


Effect of P4 on Ovulation



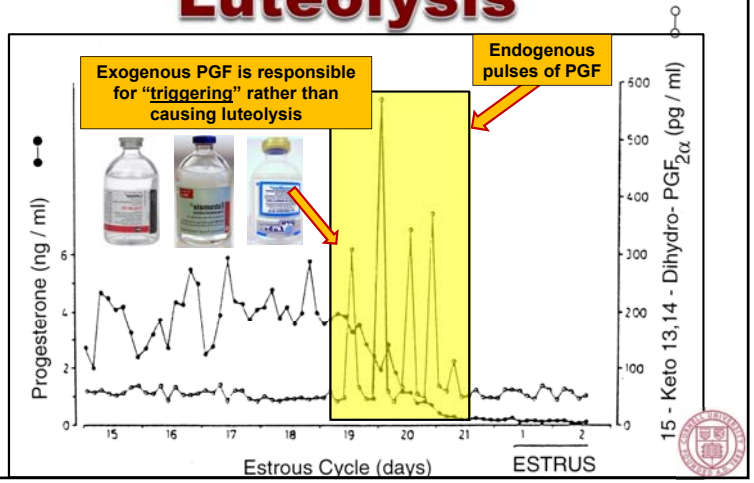
Endocrine Control of the Estrous Cycle

- Uterine hormones
  - Prostaglandin F2α (PGF)



Causes luteal regression

Induction of Luteolysis



Endocrine Control of the Estrous Cycle

Prostaglandin F2α (PGF)

- Natural form of PGF
  Dinoprost – 25 mg
  (5 cc or 2 cc)

- Synthetic form of PGF
  Cloprostenol – 500 µg
  (2 cc)

Causes luteal regression

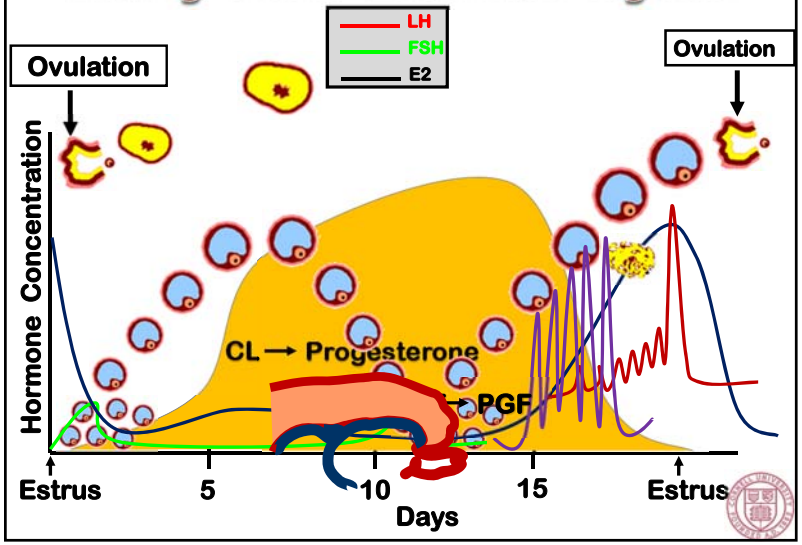
Ovarian Steroids – P4

Progesterone

- Main secretion of the CL

- **Multiple functions:**
  - Regulates gonadotropin (mostly LH) secretion
    - Blocks estrus and Ovulation
    - Promotes development of healthy (fertile oocyte/egg)

Dairy Cow Estrous Cycle



Successful Estrus Detection Based Programs for Heifers Depend More on Management than Biology

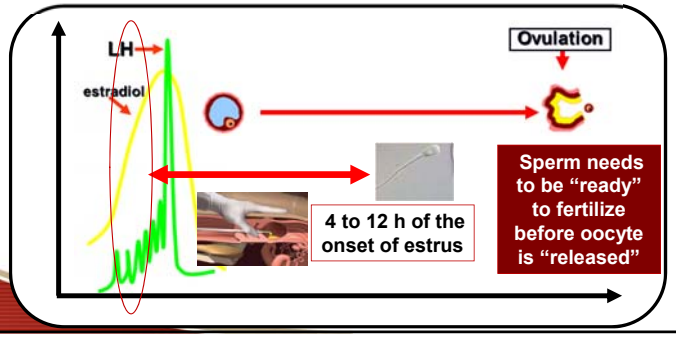
- Consistent and systematic implementation of estrus detection method
- Heifers DO NOT present same limitations to estrus expression as cows
  - No milk production
  - Less metabolically challenged
  - Fewer health issues
- Key factors for success
  - Good nutrition
  - Good health
  - Reasonable environmental conditions

Estrous Detection Aids can be Effective

- Tail-chalk/paint
- Estrous alert patches and Kamar
- Activity monitors

Timing of Ovulation and Insemination

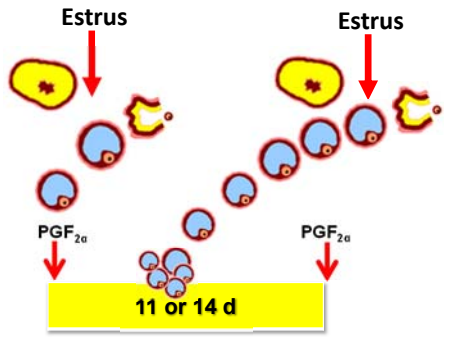
✓ **27.6 ± 5.4 h after the first standing event of estrus (Walker et al., 1996)**



Physiology of PGF Based Programs

PGF-based programs

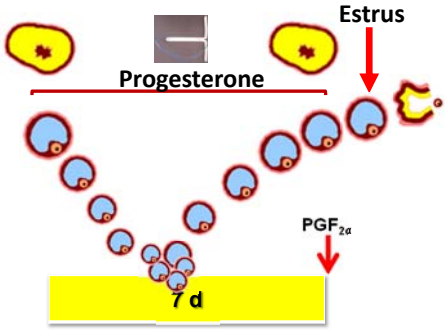
- Only effective in cyclic animals (CL present)
- Heifer expected to regress CL, show estrus, and ovulate
- Timing of ovulation not as tightly controlled



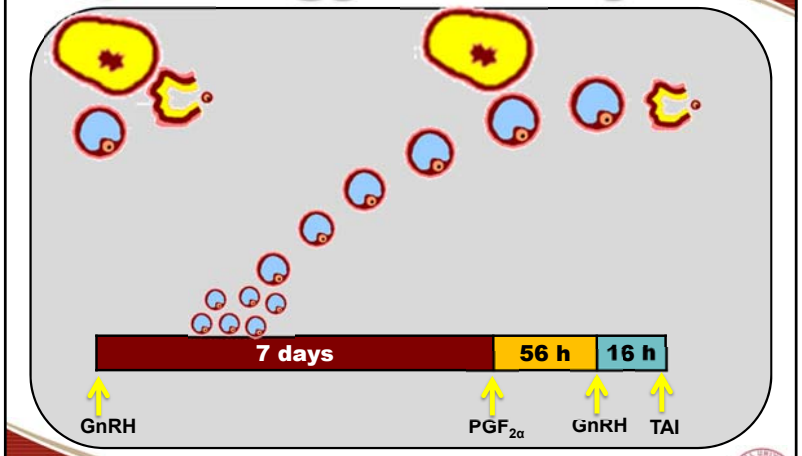
Progesterone Supplementation Based Programs

P4-based programs

- Only synchronizes estrus
- Progesterone blocks ovulation and may favor follicular wave turnover
- Heifer expected to regress CL, show estrus, and ovulate (unless GnRH is used at the end)

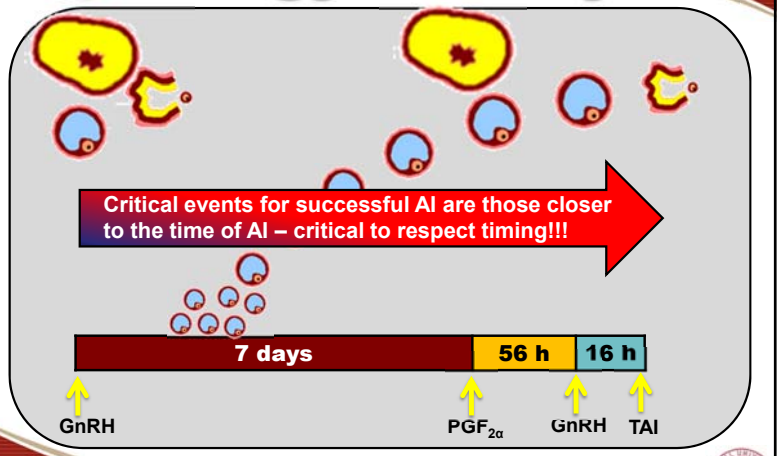


Physiology of Ovsynch

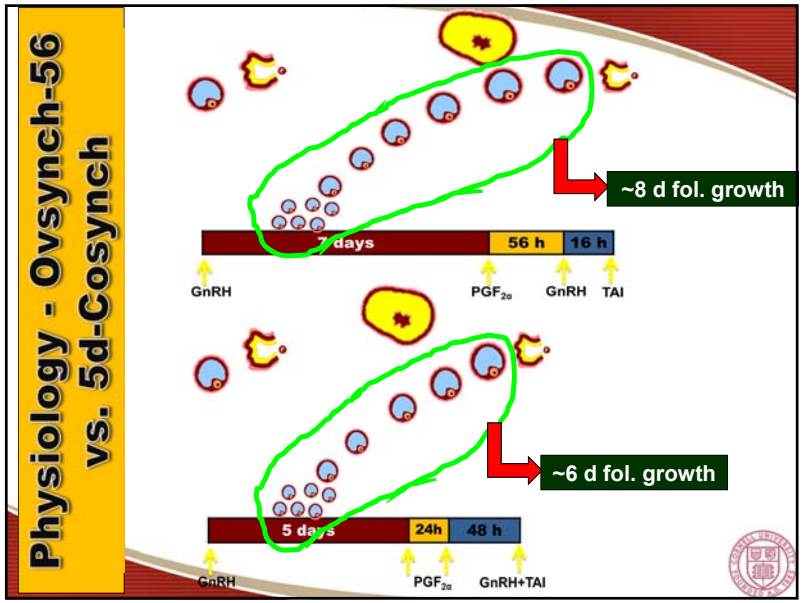


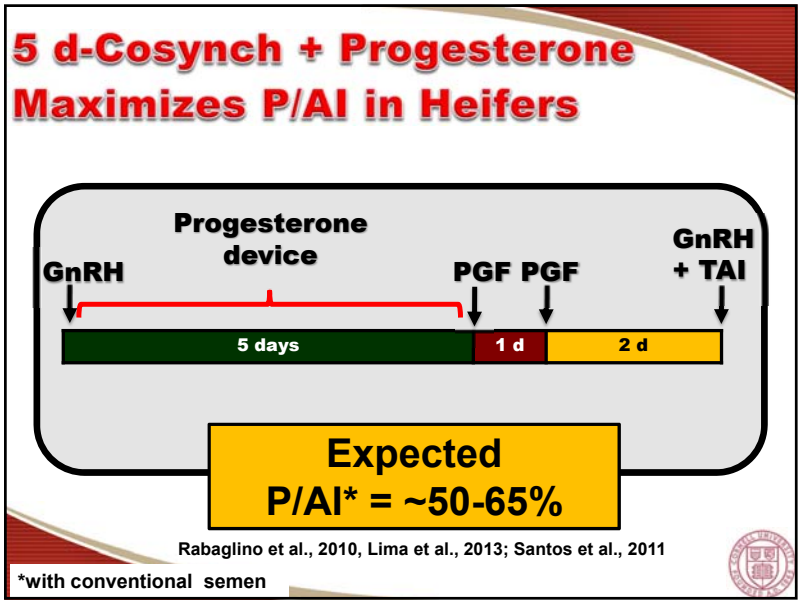
Pursley et al. 1995

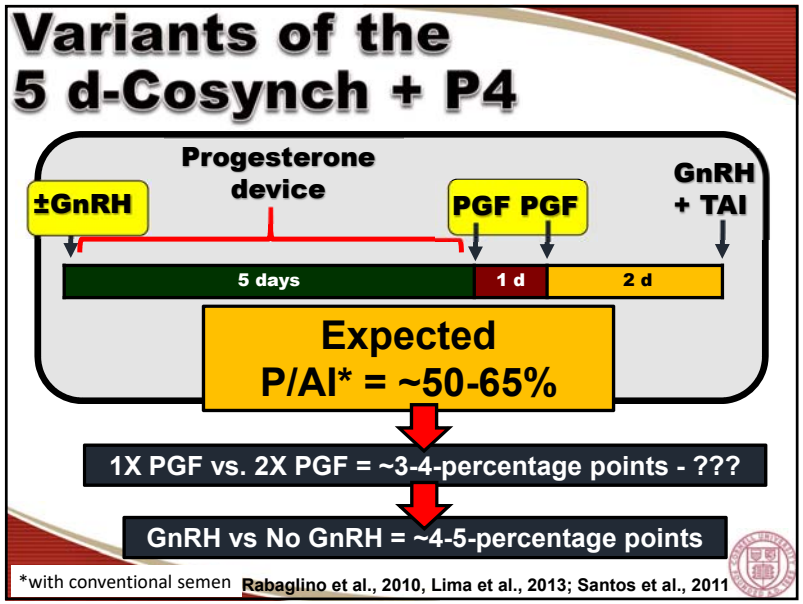
Physiology of Ovsynch

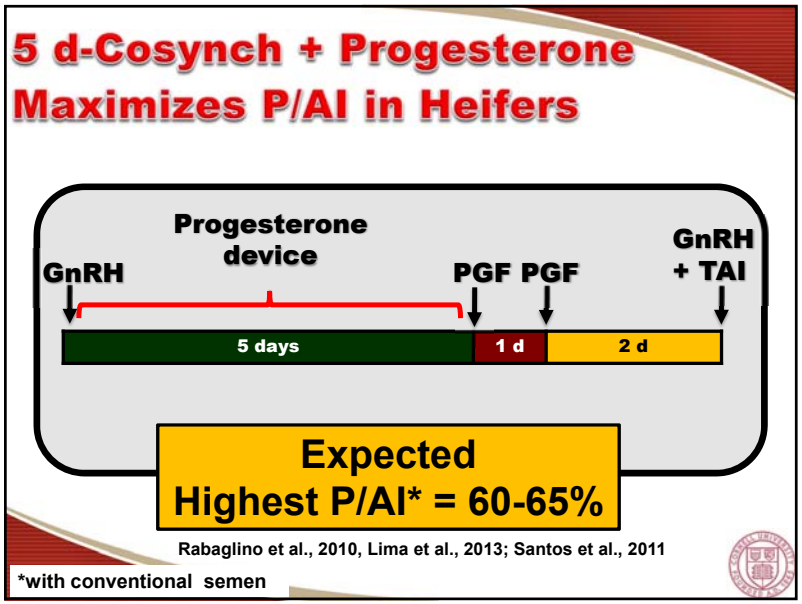


Pursley et al. 1995

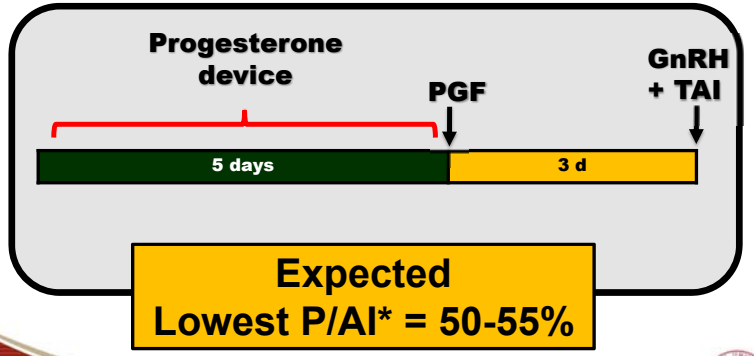

Physiology - Ovsynch-56 vs. 5d-Cosynch
~8 d fol. growth
7 days
56 h
16 h
GnRH
PGF2α
GnRH
TAI
~6 d fol. growth
5 days
24h
48 h
GnRH
PGF2α
GnRH+TAI


5 d-Cosynch + Progesterone Maximizes P/AI in Heifers
Progesterone device
GnRH
PGF PGF
GnRH + TAI
5 days
1 d
2 d
Expected P/AI* = ~50-65%
Rabaglino et al., 2010, Lima et al., 2013; Santos et al., 2011
*with conventional semen


Variants of the 5 d-Cosynch + P4
Progesterone device
±GnRH
PGF PGF
GnRH + TAI
5 days
1 d
2 d
Expected P/AI* = ~50-65%
1X PGF vs. 2X PGF = ~3-4-percentage points - ???
GnRH vs No GnRH = ~4-5-percentage points
*with conventional semen
Rabaglino et al., 2010, Lima et al., 2013; Santos et al., 2011


5 d-Cosynch + Progesterone Maximizes P/AI in Heifers
Progesterone device
GnRH
PGF PGF
GnRH + TAI
5 days
1 d
2 d
Expected Highest P/AI* = 60-65%
Rabaglino et al., 2010, Lima et al., 2013; Santos et al., 2011
*with conventional semen

5 d-Cosynch + Progesterone Maximizes P/AI in Heifers



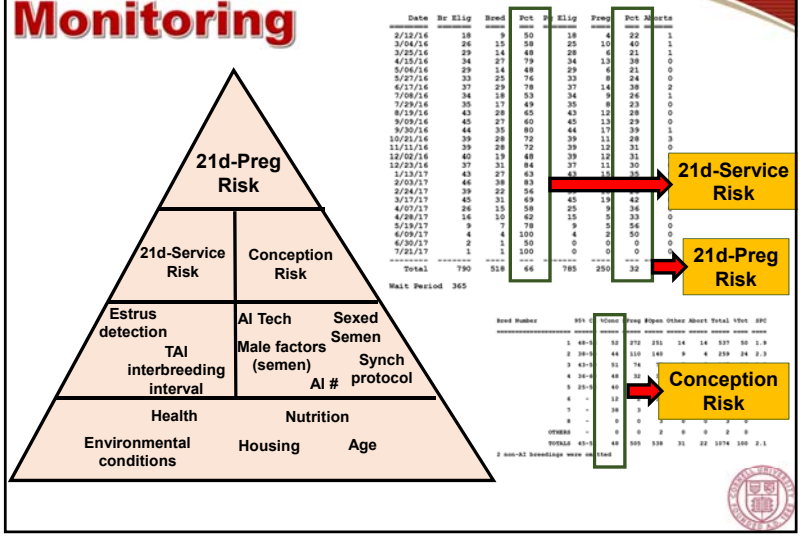
Expected Lowest P/AI* = 50-55%

Rabaglino et al., 2010, Lima et al., 2013; Santos et al., 2011

*with conventional semen

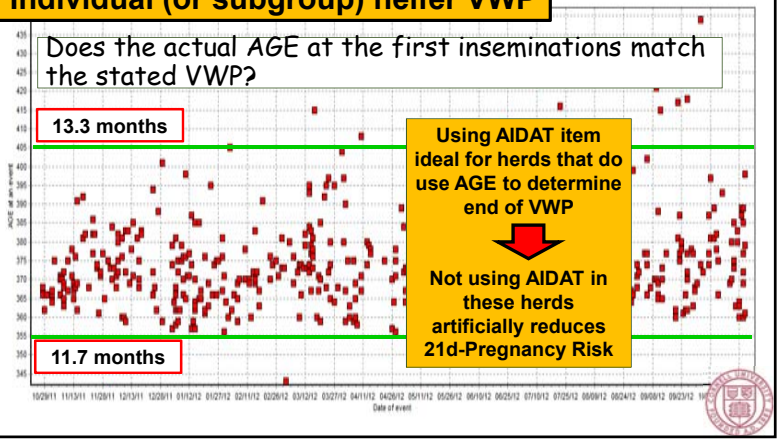
Repro Management

Basics of Heifer Repro Monitoring



Basics of Heifer Repro Monitoring

Individual (or subgroup) heifer VWP



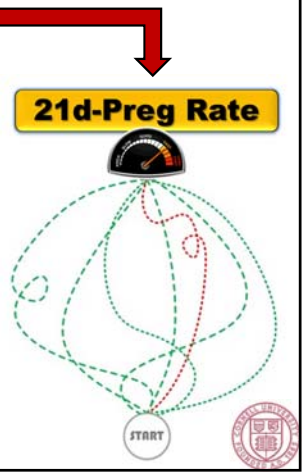
Final Considerations

Successful repro program:

1. proactive, systematic, and consistent

2. conducted by committed personnel - prioritizes attention to detail

3. Healthy animals!



Thank you!

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