Manipulating Ovulation and Estrous Synchronization

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Why Cycle Control?
1. Group females for parturition:
   a) Decrease labor, calving period
   b) More uniform weaning weights.
2. Reduce or eliminate estrus detection.
3. Needed for artificial insemination:

Manipulating Ovulation

• Hormonal induction of ovulation
  – PGF$_{2\alpha}$
  – GnRH
  – Progestins
• Superovulation
  – FSH
  – eCG

Cattle

Principle of PGF$_{2\alpha}$ Use

• Regress active corpus luteum
  – Only effective on a day 5 - 17 CL
  – Not effective on days:
    ✓ 1 - 4 (CL not responsive)
    ✓ 18 - 21 (CL already regressed)
    ✓ Represents 1/3 of estrous cycle

Estrous Cycle in the Bovine

- Progesterone
- Ovulation

Follicular Size vs Day After Ovulation
Induction of Ovulation with PGF$_{2\alpha}$

**Follicular Size**

**Day After Ovulation**

- 9
- 16
- 21

**Induction of Ovulation with PGF$_{2\alpha}$**

**Principle of GnRH Use**

- Luteinize or Ovulate a dominant follicle
  - Terminates the current follicular wave
    - Inhibin and Estradiol decrease
    - FSH increases to "recruit" a new follicular wave
  - No effect on old CL if present
  - A dominant follicle must be present
  - Generally followed by PGF$_{2\alpha}$ to regress CL formed or old CL

- Works on CL
- Ovulation time dependent on status of follicular wave
**Principle of GnRH Use**

- Induce ovulation of a dominant follicle
  - Used for timed AI
  - No CL present
  - Dominant follicle must be present

**Ovsynch**

- **GnRH**
  - 7 days
  - Eliminates current follicular wave
- **PGF$_{2\alpha}$**
  - 36-48 hours
  - Luteolysis
- **GnRH**
  - Timed AI
  - 8-18 hours
  - Ovulates dominant follicle

*Beef – Better with presynch or co-synch protocols*

**Follicular Size**

- **Ovulation**
- **Day After Ovulation**
  - 9, 16, 21

- **Progesterone**
- **GnRH**
- **PGF$_{2\alpha}$**

**Follicular Selection and Recruitment**

- **Ovulation**
- **Dominance Recruitment Selection**

*Dairy - OK*


**Ovsynch Problems**

- Works best on animals that are near day 7 of the cycle at 1st GnRH
  - Presynch
    - PG, 14 days, PG, 10 days, Ovsynch
    - G, 7 days, PG, 3 days, G, 7 days, Ovsynch (double Ovsynch)
    - G, 7 days, PG, 11 days, Ovsynch
    - G, 7 days, Ovsynch (GGPG)
    - PG, 3 days, G, 7 days, Ovsynch (PG-3-G)

**Use of Progestogens**

**Principle**
- Provides progesterone
- Simulates a CL
- Prevents ovulation
- Has no effect on the animal's CL (ie. normal lifespan)
- Does not regress the CL!!!
- Remove after animal's CL regresses
  - Current or next follicular wave will ovulate!!!!
  - Occurs 2 – 5 days latter
  - May use PGF2α to regress animal's CL

**Administration**
- Injection, Feed (MGA), Implant, Control Internal Drug Release (CIDR)

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**Normal Cycle**

- Progesterone
- Day After Ovulation

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**Normal Cycle**

- CL Prog.
- Day After Ovulation
Progestens Effect on Ovulation

Stimulating Follicular Development

Cows that come into estrus on day of AI have higher conception rates!
### Sheep
- **Progestin**
  - CIDR
  - In season - works alone
  - Out of season - requires eCG
- **Prostaglandin**
  - Only works in season
- **Lights**
  - Decrease day length
- **Melatonin**
  - Give orally or IM

### Swine
- **Prostaglandin**
  - Not of practical
  - Only effect days 12 - 17
- **Progestins - Altrenogest (Matrix)**
  - MGA causes ovarian cysts
  - Regumate (oral) for 18 days
  - Cost is $5 - $1/0/day
- **Wean Piglets**
- **Puberty Induction - PG600 (eCG + HCG)**

### Equine
- **Prostaglandin**
  - Mare CL more sensitive than cow's
  - Only effective in season
- **HCG**
  - Ovulation induction, >35 mm follicle
- **Progestins**
  - Altrenogest (Regumate)
  - Only effective in season
  - Reduce estrus behavior in competition animals
- **Light**
  - 16 hrs day light for 60 - 90 days.