ESTROUS SYNCHRONIZATION AND THE CONTROL OF OVULATION

- Cattle
- Small ruminants
- Pigs
BASICS

- Prostaglandins
- Progesterone and progestogens
- Gonadotropin-releasing hormone (GnRH)
- Estrogens (off-label use)
Bovine Estrous Cycle
Bovine Follicular Dynamics
Plasma Progesterone, Estradiol, FSH and LH after 1 mg EB im

Interval from estradiol benzoate treatment (hours)

Plasma progesterone, FSH and LH (ng/mL)

Plasma estradiol (pg/mL)
OPPORTUNITIES IN DAIRY CATTLE

- Improve reproductive efficiency by reducing or eliminating problems with estrous detection
- Time the entry of heifers into the milking herd
- Prerequisite for embryo transfer
OPPORTUNITIES IN BEEF CATTLE

- Shortened breeding and calving seasons
- More uniform calves at weaning
- Reduce or eliminate estrous detection
- Enhance genetic improvement through AI
- Prerequisite for embryo transfer
IMPORTANT REQUIREMENTS

- Acceptable nutrition and health
- Cattle cycling normally
- Record system
- Good AI technology
- Adequate facilities
PROSTAGLANDINS

CAUTION! NOT FOR USE BY:

- Pregnant women
- People with respiratory problems
PROSTAGLANDIN PROGRAMS

- Double injection, 11 to 14 days apart
  - 25 mg Lutalyse or 0.5 mg Estrumate, IM
- Many variations
Prostaglandin Programs

Prostaglandin Response Cycle

Responsive
Approx. 12 days
Functional C.L.

21 day
estrous cycle

Approx. 4-5 days
Developing C.L.

Approx. 4-5 days
Regressing C.L.

Not Responsive

ESTRUS
TIMING OF BREEDING

PROSTAGLANDIN PROGRAMS

- At detected estrus
- 80 hrs (68 hrs in heifers) after the last injection of prostaglandin
- 72 and 96 hrs (60 and 80 hrs in heifers) after the last injection of prostaglandin
EXPECTATIONS

PROSTAGLANDIN PROGRAMS

- 35 to 55% pregnancy rates on synchronized estrus
- >70% pregnant at 35 days
PROGESTERONE PROGRAMS

MELENGESTROL ACETATE (MGA)

The MGA-PGF System for Heifers

1. Feed MGA (0.5 mg/head/day)
2. Heats Seen (DO NOT BREED)
3. Single PGF injection 17-19 days after last day of MGA feeding
4. Heat detect & breed for 5 days after PGF

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Progesterone Programs

INTRAVAGINAL PROGESTERONE-RELEASING DEVICES

- 7-day insertion period with prostaglandin on Day 6 or 7
CIDR
Controlled internal drug-release insert
Approved for use in beef cattle and non-lactating dairy heifers

PRID
Progesterone-releasing intravaginal device
No milk withdrawal
Conception rate is higher when females are bred at detected estrus
   - Estrous detection can be labour intensive
   - Not all females are detected in estrus

Pregnancy rates may be higher with appointment insemination (e.g., with PGF programs)
   - Decreased conception rates
   - Increased AI and use of semen
   - However, all the females in the group are bred

Do not precisely control the time of ovulation
OVULATION CONTROL PROGRAMS

GnRH, PGF +/- CIDR or PRID

a) Ovsynch

GnRH  PGF  GnRH  Timed AI
7 days  48 h  0* to 24 h
* -‘Co-synch’ protocol: insemination at time of second GnRH (0 hours).

b) CIDR-synch

GnRH  CIDR  PGF  GnRH  Timed AI
7 days  48 h  0 to 24 h

c) Select-synch

GnRH  PGF  Insemination at estrus
7 days
OVULATION CONTROL PROGRAMS

CIDRs (or PRIDs) + Estrogens + Prostaglandins

- Day 0 (am): 1 mg estradiol benzoate + 100 mg progesterone + insert CIDR
- Day 7 (am): Prostaglandin + remove CIDR
- Day 8 (am): 1 mg estradiol benzoate
- Day 9 (pm): AI
EXPECTATIONS

OVULATION CONTROL PROGRAMS

- 45 to 70% pregnancy rate on synchronized estrus
- > 80% pregnant at 35 days
Estrous Synchronization in ewes
HEAT CYCLE: 17 ± days

- Estrus (30-40 hours)
- Ovulation
In breeding season
Advance lambing
CIDRs (Pfizer) for small ruminants may soon be available for use in NA. Can be obtained by EDR.

Not available in NA.
Medroxyprogesterone acetate
Used extensively in Canada until recently
Now no longer available
Healthy fertile ewes
Good nutrition
Healthy proven rams
Adequate facilities
14 DAYS LATER
Equine Chorionic Gonadotropin (eCG = PMSG)

Follicle-Stimulating Hormone (FSH) Activity

- May enhance response during breeding season
  - 200-400 IU at time of device removal
- Essential for success for out-of-season breeding
  - 400-600 IU at time of device removal
REMOVE SPONGE:
Heat approximately 36 hours
Introduce the ram at 48 hours
• One ram per ten ewes
• Wait 48 hours
• Small groups
• Minimize stress
> 60% in well-managed flocks during the breeding season

40-60% in mature ewes bred out-of-season

- Lower fertility in ewe lambs
143 to 153 days
ESTROUS SYNCHRONIZATION IN SMALL RUMINANTS USING MGA (MELENGESTROL ACETATE)

Feed MGA @ 0.125 mg/head q12h

↓
↓
↓ 12- 16 days
↓
↓

300-500 IU equine chorionic gonadotropin (eCG) 8-10 hours after last feeding of MGA

↓
↓ 24-36 hours
↓

Ewes begin to exhibit estrus

Timing of estrus and ovulation is probably more variable than when sponges are used but the protocol is less expensive and involves less handling.

100 µg gonadotropin-releasing hormone (GnRH) 30-36 hours after MGA (or sponge removal) will improve the synchrony of the LH surge and ovulation.
Prostaglandins

15 mg Lutalyse or 125-150 µg Estrumate IM During Breeding season

- Two injections, 9-11 days apart
  - ± 200-300 IU eCG with second injection
- Estrus in 30-48 hrs
- Put rams in ~36 hrs after last injection
Control of the Estrous Cycle in Does

- Similar regimens to those used in sheep
- With progesterone devices, PGF is often given at the time of removal (longer CL life)
- PGF regimen
  - Two doses, 11-12 days apart
  - During breeding season
Estrous Cycle Control in Sows

- Batch weaning at ~3 weeks postpartum
  - Up to 90% exhibit estrus in 4-8 days
  - Can be enhanced by boar exposure
Double injections of prostaglandins are not effective
- Prostaglandins luteolytic only after Day 12 of the cycle

Altrenogest (Regumate®) progestogen
- Not approved for pigs in Canada or USA
Estrous Cycle Control in Sows

Post-farrowing regimen

- +/- Prostaglandin just after farrowing, then
- PG 600 (400 IU eCG and 200 IU hCG) or 500-750 IU eCG at weaning
  - Increases the incidence of fertile estrus
  - Estrous synchrony not good
  - May not be economical
Estrous Cycle Control in Sows

- 750-1500 IU eCG at weaning and 500-1000 IU hCG 72-96 hrs later
  - Breed within 24 hrs of hCG injection
  - >90% conception rates
  - Expensive
Estrous Cycle Control in Sows

Recent Developments

- 600 IU eCG at weaning and 2.5 mg LH 80 hrs later
  - Breed 36 hrs after LH
  - Eliminates estrous detection
  - Decreases doses of semen required
  - Does not fit in well with barn schedules
Estrous Cycle Control in Sows

Possible modification of previous protocol

- 600 IU eCG at weaning and 2.5 mg LH 72 hrs later
  - Possibly use 900 IU eCG on first-litter sows
  - Breed 30 hrs after LH
  - Better fit with barn schedules
Questions?