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Estrus synchronization in domestic farm animals
Benefits of Estrus Synchronization

• Bringing a large number of animals in estrus at nearly the same time is estrus synchronization

• Saving labor- Avoiding estrus detection
• Planned matings – Timed inseminations
• Planned calvings
• Shortened calving periods
• Uniformity of calves
Structures that regulate estrus

- Dominant Follicle
- Corpus luteum
Approaches

• Extending the luteal phase or terminating the luteal phase
  Progestins or prostaglandins

• Controlling the CL

• Control the Dominant Follicle and initiation of new follicular wave
Optimum Management

- Cows should be well fed
- Regularly cyclic
- Grouping for estrus synchronization
  - Heifers
  - Post partum cows
  - Anestrus non pregnant cows
# Synchronization Methods

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Prostaglandins

– Naturally occurring hormone that causes regression of the CL (luteolysis) and decreases progesterone secretion

– Can expect estrus within two days following injection
Principle of PGF$_{2a}$ Use

• Regress active corpus luteum
  » Only effective on day 5 - 17 corpus luteum
  » Not effective on days:
    ✓ 1 - 4 (CL not responsive)
    ✓ 18 - 21 (CL already regressed)
Prostaglandins: PGF2a

Lutalyse - Natural compound 25 mg dose I.M.

Estrumate - Analogue 500 µg dose I.M.

Lustin - Analogue 500 µg dose I.M.
Protocol for One Injection of Prostaglandin (PGF)

Causes luteolysis of functional CL

PGF injection

Beginning day of protocol schedule

Injected females should show signs of estrus within 1-4 days

Inseminate females in estrus

10 day estrus detection

Females that have been inseminated prior to day 5 should not be administered PGF injection unless abortion is desired.
Protocol for Two Injections of Prostaglandin (PGF) with Split Insemination

Causes luteolysis of functional CL

1st PGF injection
(administered to all females scheduled to be synchronized)

Injected females should show signs of estrus within 1-5 days

Days 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Inseminate females in estrus

5 day estrus detection

2nd PGF injection
(only to those not inseminated)

Injected females should show signs of estrus within 1-5 days

Inseminate females in estrus

5 day estrus detection OR

Inseminate by appointment at 72 hr after PGF

Females that have been inseminated prior to day 11 should not be administered PGF injection unless abortion is desired.
Reasons for Variation in Response

• Stage of the follicular wave

Time to response depends on stage of follicular wave!
• Heifers react faster than cows
  – Follicular growth is faster in heifers
• Animals may be pregnant
• No CL may be present – Anestrus

• Brahman cattle respond poorly to the two injection system of PGF2a
Management Considerations

• Have proper facilities to handle animals
• Good reproductive records
• Have enough A.I. technician help
  – One technician/100 cows will cause problems
  – Should be around 30-50 cows/technician
• Anestrus cows don’t respond to PGF2α
  – No CL!!!!!!
  – Be sure cows & heifers cycling
• Use good fertility semen
Breeding

1. Breed 72-80 hours after 2nd injection (FTAI)

2. Breed based on estrus detection after PGF$_{2a}$

Conception Rate

31 - 80%

67%
Use of Progestogens

• Progestagens have been specially useful for estrus synchronization of

• Treatment of cycling heifers or cows with low levels of a progestin, following luteolysis, resulted in the formation of persistent follicles that had a large diameter, extended lifespan, and increased production of estradiol
Mechanisms of action of progestins

• Progesterone concentrations are maintained at a relatively constant level during the seven days the insert is in the vagina. Upon removal of the insert, progesterone concentrations are quickly eliminated.

• The progesterone treatment blocks ovulation of a DF and also suppresses its dominance. Thus a new follicular wave is initiated.
• Suppresses LH surge and estrus behavior
Effective method for treating anestrus
• -increases DF development
• -primes estrus expression and LH surge
Administration:

Injection

Feed

Ear Implant

Vaginal Pessary or Controlled Internal (CIDR)

Time Consuming

Mix in ration

Place in ear

Placed in Vagina

Drug Release
Oral feeding of melengesterol to heifers 14 days.
Disadvantages of oral feeding for 14 days

• Persistent follicles
MGA + Lutalyse for Synchronization

Day 8

9 Days

Feed MGA (0.5 mg/hd/d)

Inject Lutalyse

Day 11-13

Breed

Estrus Detection

Advantage and Disadvantage: Must be feeding the animals grain!!
Progesterone Vaginal Implants

- CIDR-B
- TRIU-B
- PRID
**Controlled Internal Drug Release (CIDR) Protocol for Estrus Synchronization**

A CIDR is inserted intravaginally and delivers progesterone at a controlled rate into the circulation. Progesterone exerts a (-) feedback on the hypothalamus, leading to the suppression of LH and FSH and prevents estrus and ovulation.

- **Insert CIDR**
- **Remove CIDR after 7 days**
- **Causes luteolysis of functional CL and a return to estrus**
- **Inseminate females in estrus**
- **5 day estrus detection**

Removal allows LH pulse frequency to increase, resulting in estrus and ovulation of the dominant follicle.
GnRH Based Protocols

- **Principle:**
  - GnRH-induced LH release causes ovulation or luteinization of the physiologically mature DF
  - Loss of the DF leads to emergence of a new follicular wave
  - Destruction or ovulation of a dominant follicle results in a transient rise in circulating concentrations of FSH and subsequent initiation of a new follicular wave. PG administered 7 days later induces estrus and a second GnRH 2 days later assures ovulation.
• OVSYNCH
• SELECT SYNCH
• CO SYNCH
Ovsynch

GnRH → PGF$_{2\alpha}$ → GnRH → Insemination

7 → 2 → 1
Cosynch

GnRH → PGF$_{2\alpha}$ → GnRH and Insemination

Time:
- 7 days
- 2 days
Select-synch

GnRH → PGF$_{2\alpha}$ → GnRH and Insemination

Heat Detect and AI
GnRH Synchronization Protocols

Basic GnRH synchronization protocols (Select Synch, Ovsynch, Cosynch) begin with the same format of an initial GnRH injection followed by a PGF injection 7 days later. Differences are derived from timing of insemination, estrus detection, parity, and hormone administration.

Select Synch

Ovsynch

Cosynch
Estrus synchronization for heifers
Synchronizing Heifers

- Ovsynch success low
  - 50-60% synch rate

- Progesterone + PGF$_{2\alpha}$
  - Synchronization, but may not improve conception rate or pregnancy rate

- MGA + PGF$_{2\alpha}$
  - Takes a long time, but good pregnancy rates, cheap, and little labor required
Estrus synchronization for heifers

14-day CIDR®-PG
Perform TAI at 66 ± 2 hr after PG with GnRH at TAI.

- CIDR®
- PG
- GnRH
- AI

0 14 30 33
... 16 d ... 66 ± 2 hr

treatment day
5-day PG + CIDR

Perform TAI at 72 ± 2 hr after CIDR removal with GnRH at TAI.
Cow Systems

With heat detection
Select Synch & TAI
Heat detect and AI day 6 to 10 and TAI all non-responders 72 – 84 hr after PG with GnRH at TAI.
If Most of The Cows Are Anestrus...

Select Synch + CIDR®

- GnRH
- PG

0 treatment day
7 Heat detect & AI
• GPG + Progesterone
  – Prevents premature estrus expression during 7 days between first GnRH and PGF$_{2\alpha}$
  – Benefits anovulatory and cystic cows
  – Improves overall synchrony and pregnancy rate
Estrus synchronization in buffaloes

• PG and Ovsynch protocols useful in the breeding season only

• Progesterone treatments along with estradiol, eCG, PG and GnRH more useful during non-breeding seasons.

• Day 0---------------- Day 9 ---------------Day 11----------------- Day 12

• PRID/CIDR+E2 eCG + PG GnRH or hCG (AI)
Estrus synchronization in sheep and goats

- Non-breeding season
- Use progestagen/progesterone impregnated vaginal devices
- Use the ram effect
- Use melatonin Melovine/Regulin Implants
Use progestagen/progesterone impregnated vaginal devices

• Three types of devices are available: cronolone (20mg) impregnated sponges (Chronogest CR, MSD AH), Methyl Acetoxy Progesterone (60mg) impregnated sponges and CIDR(0.3g progesterone)
• Use progestagen/progesterone impregnated vaginal devices

Three types of devices are available: cronolone (20mg) impregnated sponges (Chronogest CR, MSD AH), MAP (60mg) impregnated sponges and CIDR(0.3g progesterone)

SHEEP

Typical treatment schedule

- Day 0: Sponge insertion
- Day 14: Sponge removal and PMSG injection
- Day 17: AI or mating

55h

If mating is used, preparation of the rams (flushing, light treatment or melatonin) and a suitable ewe to ram ratio are needed.
Three types of devices are available: cronolone (20mg) impregnated sponges (Chronogest CR, MSD AH), and CIDR.
Use PMSG at removal of progestagen/progesterone impregnated vaginal devices

Use Androvax, a vaccine against an ovarian steroid
Breeding season

Use of Ovsynch type protocols
Use of double prostaglandin protocols
Estrus synchronization in sows

- Gilts PG600 estrus within 5-8 d
- Oral Feeding of metallibure 19 d estrus in 5-8 d
- Allyl trenbolone (Regumate) **10-15 mg/gilt/day**
  Mixed in feed for 18 d
- Norgestommet ear implant
- Estradiol benzoate 5-15 d followed by PG
Estrus synchronization in mares

- Light treatment 60 W incandescent bulb for 1 month
- Deslorelin 1.5 mg IM once
- Domperidone 1.1 mg/kg PO SID for 10-14 days
- Sulpiride 1.0 mg/kg IM SID or BID

- Induction of ovulation – hCG effective only after follicle is 30 mm
- Single GnRH ineffective
- Termination of luteal phase (Use prostaglandins)
Estrus synchronization in camels

- PG effective during breeding season
- GnRH less effective
- Oral allyl trenbolone (Regumate)
- hCG is needed as ovulation is induced
- hCG followed by PG
• The above lectures are also explained in video lectures at my YouTube Channel Govind Narayan Purohit

• Kindly share the videos and subscribe to my channel if you like them

• Thanks