

ESTROUS SYNCHRONIZATION
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Let us start to learn how to control estrous in animals

Def. of estrus synchronization


Synchronization of estrus involves manipulating the estrus/ovarian cycle in order to mate the female at a predetermined time.

In other words

- Bring a high proportion of females in heat at a predetermined time.

Indications of estrous synchronization

- Group females for parturition:
 - i. Decrease labor, decrease calving period
 - ii. Reduce calving season.
 - iii. To reduce the breeding season.
- Reduce time required for estrus detection.
- Schedule livestock handling and breeding.
- Shift of the calving season to be coincident with the most favorable season for marketing.



Principle of estrous synchronization

- Prolongation the luteal phase >> progesterone
- Shortening the luteal phase >> Prostaglandin

Methods of estrous synchronization

- 1- Progesterone
- 2- Progesterone plus prostaglandin combinations
- 3- Prostaglandins
- 4- GnRH plus prostaglandin combinations



1- Progesterone

Principles and regimens of estrous synchronization with progesterone

- First products used to attempt control of the estrous cycle
- Acts to suppress estrus and ovulation

MAP (5-methyl-17 acetoxy-progesterone)

MGA[®] (Melengestrol Acetate) CAP (6-chloro-16-ethyl-17-acetoxyprogesterone) DHPA (dihydroxyprogesterone acetophenide)

Intera-vaginal progesterone release device

CIDR[®] (Controlled-Internal-Drug-Release) PRID (Progesterone-Releasing-Intera-vaginal-Device)

Methods of Progesterone administration:

- Feed:
 - MAP 180 mg
 - CAP 10mg
 - MGA 1 mg/day.
- Pessary or Control Internal Drug Release (CIDR).
- Implant (Norgestomet)
- Injection

A: PRID: stainless spiral coil covered with an insert silicone rubber matrix, coated with P4.
 B: CIDR: T-shaped silicon elastomer device containing P4, and an applicator for insertion into the vagina.
 C: progesterone impregnated intra-vaginal sponge with speculum and introducer.
 D: progesterone-ear implant and implanting device.

1- Oral progesterone compounds

i. MGA[®] (Melengestrol Acetate)

- This system depends on treatment with MGA for 14 days or more (by feeding).
- MGA in the feed keeps the serum levels of progesterone high enough to prevent ovulation and estrus.
- MGA does not affect the life-span of the CL - it regresses 17 days after the previous estrus
- All heifers will be in heat 2 to 6 days after the last day of MGA feeding.
- bulls can be turned in with heifers 17 days later.

2- Intra-vaginal progesterone release device

ii. CIDR[®] (Controlled-Internal-Drug-Release)

- CIDR[®] is a T-shaped devise that is about 5 inches long that is inserted into the vagina of breeding females
- Progesterone released by CIDR[®] insert in the vagina keeps the serum levels of progesterone high enough to prevent ovulation and estrus.
- High progesterone during CIDR[®] insert does not affect the lifespan of the CL, where it regresses 17 days after the previous estrus

3- Progesterone implant (Syncro-Mate B)

- Synchromate B system depends on:
 - Inject 2ml of solution contain 5 mg estradiol valerate & 3 mg norgestomet
 - Implant Norgestomet (Progestagen) 6 mg
 - Remove implant 9 days later.
 - Breed 48 to 60 hours later or 54 hours later.

Syncro Mate B


Implant & Inject SMB (9 Days) Remove implant 48-60 hrs (Time Inseminate or Detect Estrus)

1- Drawbacks of progesterone compounds

14% Reduces first-service conception rate at following estrus (Zimbelman et al., 1970)

pregnancy rates from the resulting estrus after P4 treatment are unacceptably low due to the following:

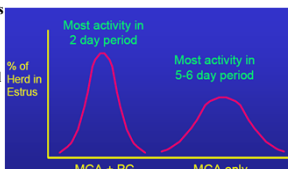
- Altered follicular dynamics.
- Reduced sperm transport.
- Retarded embryonal development.




2- Progesterone plus prostaglandin combination

Principle of Progesterone plus prostaglandin combination

- If treatment with MGA is for 14 days or less
 - It must combine with a luteolytic agent (PGF_{2α}) to successfully control time of estrus
- Heifers will begin to exhibit estrus about 48 hours after PGF_{2α} and most activity will end by 32 hours later (sooner than with PG treatment alone)

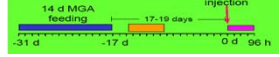


Progesterone plus prostaglandin combinations protocols

1- MGA with Prostaglandins

System I:

- This system depends on initial synchronization of females by feeding with MGA (0.5mg) for 14 days and PGF_{2α} is administered during the luteal phase of the subsequent cycle.

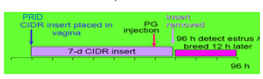


System II:

- This system depends on feed MGA for 9 days (0.5mg/head/day) to prevent estrus in diestrus and proestrus animals then give PGF_{2α} on Day 8 to regress CL (s)
- Remove MGA on Day 9 (stop feeding) and cows will be in heat in 2-5 days.

2- CIDR® or PRID® plus PGF2α

- CIDR® or PRID® insert in the vagina keeps the serum levels of progesterone high enough to prevent ovulation and estrus for 7 days.
- PGF_{2α} is luteolytic when administered during diestrus, and should be given on day 6 (1 day before insert removal).

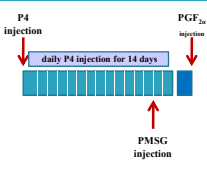




3- Progesterone plus PMSG combination

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- Progesterone (50mg) administered by injection for 14 days
- PMSG (500IU) is administered on day 12
- PGF_{2α} (cloprostenol; 500µg) is administered on day 15
- Animal response: more than 72% of animals come in heat





Prostaglandin principle of use and commercial preparations

Action

- PGF_{2α} is effective as a luteolytic agent during the mid luteal phase of the estrous cycle

PGF_{2α} injection between 5-17 days of estrous cycle

administration	5-17 days
Effect	Regression of CL
Species	Dinewall, Jersey, Friesian, Guernsey, and dairy
Effect	Rapid fall in P4 conc. Within 24hrs
Dose	Estrumate 500 mg (3-4 hours lactating or nonlactating)
Effect	E2 increase within 24 hrs
Effect	Preovulatory peak of LH within 3 days And onset of heat
Effect	Ovulation 24hrs after onset of estrus

Schemes of Prostaglandin use for estrus synchronization

- Program I:** Double PGF_{2α} injection, 11-12 days apart with mating upon heat observation or FTI at 72-80hrs.
- Program II:** Single PGF_{2α} injection with heat observation.
- Program III:** Observe animals for signs of heat for a period 5-6, and inject animals not detected in estrus on 5th day, then observe estrus and breed accordingly.
- Program IV:** On day 1, palpate all animals and inject those having CL. Observe estrus for 5 days. Inject the remaining animals on day 12 and breed accordingly.

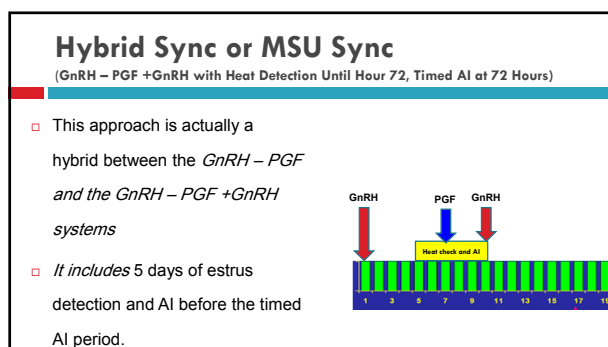
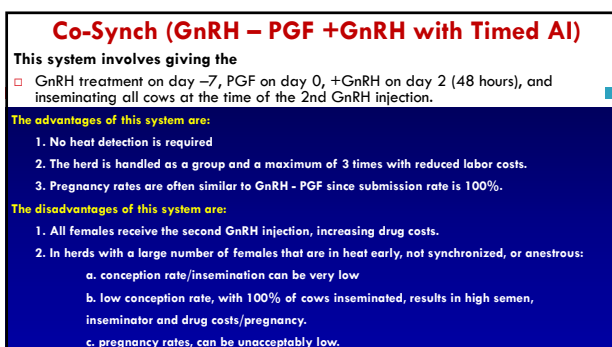
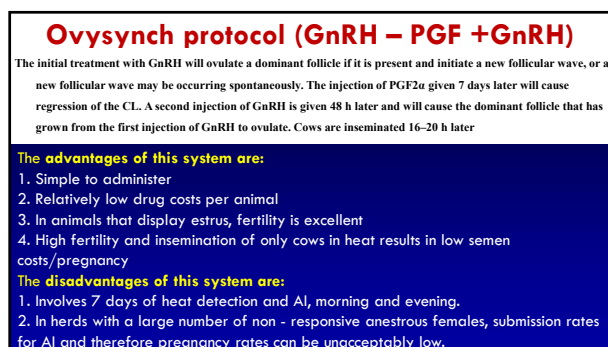
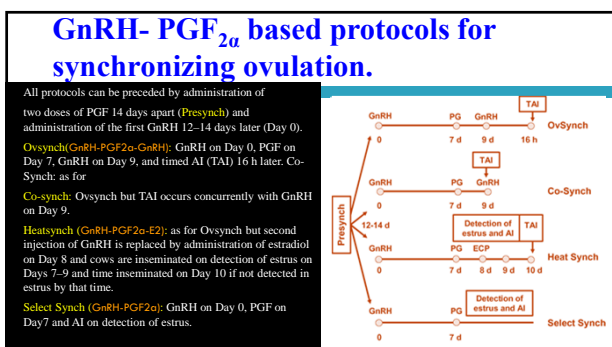
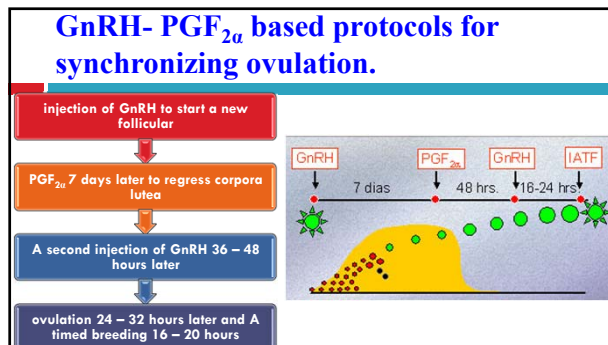
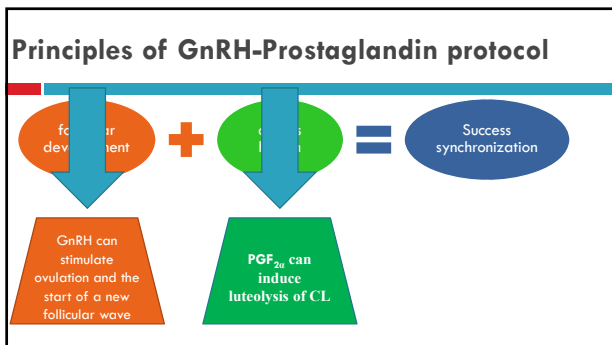
Reasons for variation of response to prostaglandin treatment.

- Absence of CL i.e. Anestrus:** Heifers usually respond quickly and begin standing the second day.
- Age and animal status:** Beef cows respond, mainly on the third treatment.
- Stage of corpora lutea development:** Day 7 PGF gets faster response due to ovulation of follicle from 1st follicular wave. Day 10 PGF has slower response due to ovulation of follicle from 2nd follicular wave.
- Stage of the follicular wave:** (Refer to bar chart)

To ensure high estrus response after PGF_{2α} treatment

- Female must have CL susceptible to luteolysis.
- The endocrine mechanisms must function properly.
- The female must experience psychic estrus (not silent).
- It has the opportunity to display estrous behavior.
- a bull, teaser or other cows must be present.
- Estrus detector must be present to observe the estrous.





Other means of synchronization:

a) Early 48 – hour weaning:

Separation of cows and calves for approximately two days when the calves are one to two months of age causes a larger pregnancy of cows to initiate estrous cycles or to display estrous activity. This may be sufficient for some management schemes.

b) Shang treatment:

It is the combination of the two $\text{PGF}_{2\alpha}$ treatments 11 days apart with 48-hour weaning after the first, second or both $\text{PGF}_{2\alpha}$ injections has been tested.

Synchronization of estrus in sheep and goat

Prostaglandins:

- Goats and sheep are generally susceptible to prostaglandin-induced luteolysis from days 4 to 16 of the estrous cycle.
- Does exhibit the onset of estrus 36 to 60 hours $\text{PGF}_{2\alpha}$. While 60 to 70% of the ewes exhibit estrus 30 to 48 hours after treatment.
- Dose of $\text{PGF}_{2\alpha}$ is 15 mg luteolyse (Dinoprost) or 125-150 μg Estrumate (Clorostenol) at 9 to 11 days interval.

Synchronization of estrus in sheep and goat

Progesterone: (Route and dose):

Transvaginal
(Vaginal sponges)

- Flurogestone acetate (Chronogest): 45mg
- MAP: 60mg.
- CIDR: 330mg progesterone

Subcutaneous
ear implants

- Synchro-Mate-B. As either half or whole implants. Implants may be placed in the backside of the ear or in the underside of the tail.

Oral:

- MGA: 0.125 mg fed twice daily for 8 to 14 days.

Injection

- Progesterone: 5-25mg i.m daily.

□ The duration of treatment : 9 to 21 days (Although a short 12-day resulted in a higher CR).

□ Animals typically show estrus 12-36 hours after progestin removal.

□ Breeding:

• Upon heat detection: 12 - 24 hr after the onset of estrus.

• FTI: twice at 30 and 50 hours or once at approximately 43 to 46 hours after progestin removal.

How can you induce a fertile estrus in ewes during the anestrous or transitional period?

□ During late winter and spring anestrous:

- 1- Use progesterone or progestin for 8 to 14 days.
- 2- Administration of gonadotropins e.g. eCG (400 – 500 IU) at the time of progestin removal or within 48 hours prior to removal.

□ During the summer transitional period:

- 1- injection of 20mg of progesterone in oil prior to introduction of a teaser ram improves the synchrony of estrus.
- 2- Inject $\text{PGF}_{2\alpha}$ 16 days following ram introduction.

Synchronization in Mares 1-Progestogens

□ Regumate (Altrenogest)

- Feed for 12 days.
- Tease for optimal mating 2 to 4 days post-withdrawal

□ Return to estrus: 7 - 10 days post-withdrawal

□ Ovulation: 5 days post-withdrawal.

Synchronization in Mares 2- $\text{PGF}_{2\alpha}$ & GnRH

□ Lutalyse ($\text{PGF}_{2\alpha}$)

- 5 mg; 1/5 dose
- After 3 days, return to estrus (fairly precise).
- Ovulate 8 days post-injection.
- Used extensively for scheduling individual mare mating.
- N.B. Behavioral signs of estrus may not be observed

□ Ovuplant (GnRH)

- Use when mare has a 30 mm follicle.
- AI 48 hr post-implant.

