



# Synchronization of Estrus and ovulation



Prepared by-

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# Learning Outcome

- Define Estrus Synchronization.
- Remember ES protocols.
- Recall hormones used for ES.
- Explain the mechanism for estrus Synchronization.
- Advantages of Estrus Synchronization

# Estrous Cycle

- **GnRH** → Hypothalamus
- **FSH**      **LH** → Anterior Pituitary
- **Estrogen (E2)** → Follicular cells
- **Progesterone (P4)** → Corpus Luteum
- **PGF2 $\alpha$**  → Uterine Endometrium

# Estrous Cycle

- GnRH stimulates the Anterior Pituitary to release FSH
- FSH acts on the ovary to begin follicular development
- Follicles grows until mature and estrogen inhibits FSH
- This causes the Anterior Pituitary to release LH
- LH acts on the follicle bursting the blister → **ovulation**

# Estrous Cycle

- Spot on the ovary becomes the CL
  - CL produces progesterone
- On day 14 if the uterus does not detect an embryo then it releases PGF2 $\alpha$
- PGF2 $\alpha$  destroys the CL (**Luteolysis**) and the cycle begins again

# Commercial available hormones

**GnRH (Buserelin acetate) → Receptal Vet,  
Gynarich (each ml contains 4mcg)**

**2.5 ml (10mcg)**



# Prostaglandins (PGF<sub>2</sub>α)

- **Synthetic (Cloprostenol sodium)** = Pragma, Cyclix, Vetmate, Clostenol, Estrumate etc.
- 2 ml vials (500 mcg)
- **Natural** = Lutalyse (Dinoprost tromethamine)
- 5 ml vials (each ml contains 25 mg)



# Estrogens

- Progynone Depot (Estradiol valerate, 1 ml Ampoules, 10 mg)
- Pregheat (Estradiol benzoate 2 ml vials, 1 mg)





# Progesterone

- **CIDR = Controlled Internal Drug Release**
- **PRID = Progesterone Releasing Intravaginal Device.**
- silicone-coated nylon core impregnated with progesterone



# Estrus Synchronization

Administration of exogenous hormones



Manipulation of females estrous cycle



Estrus (heat) at the same time



AI/Breeding at same time.

- Many **estrous synchronization** protocols have been developed that use a combination of different drugs.

# Why synchronize

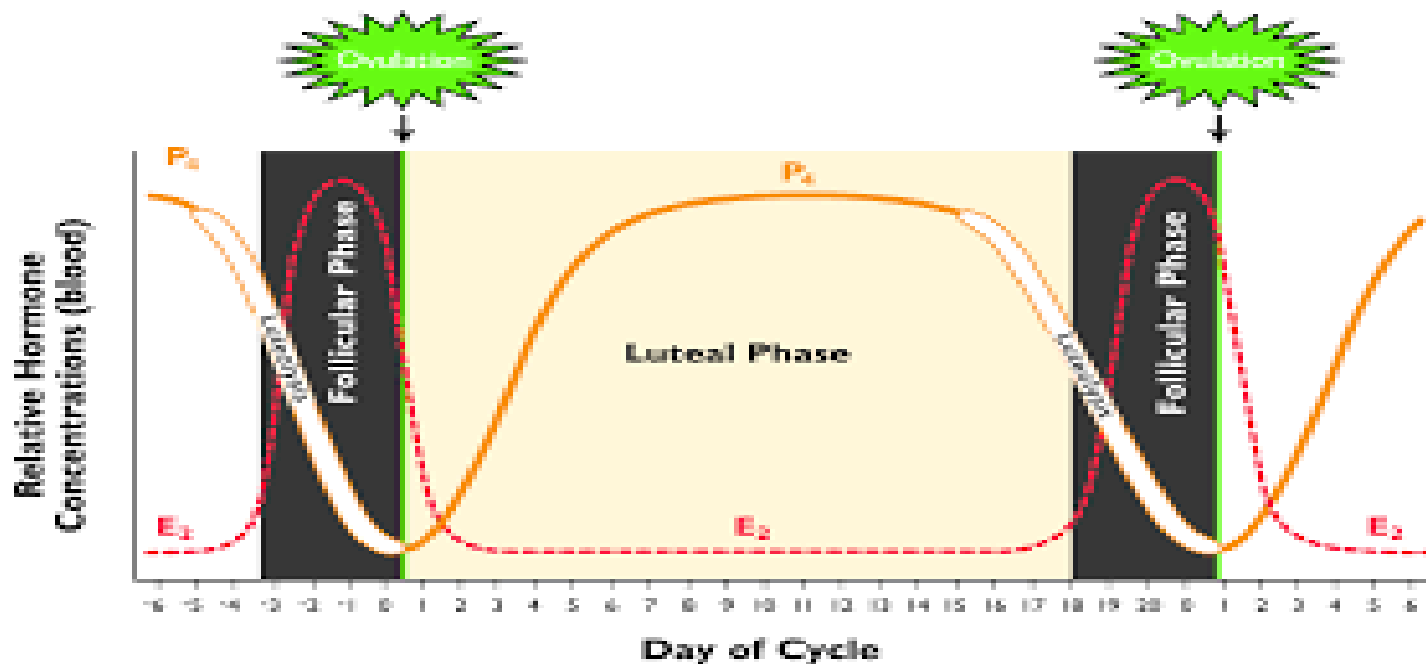
- Many estrus synchronization protocols can induce 75 to 90% of the cycling animals to display estrus within a 5 day period.
- Many protocols can induce a fertile heat as much as 50% of the anestrous cows.

# Methods of synchronization

Two basic methods of estrus synchronization-

**A. Extending the luteal phase**

**B. Shortening the luteal phase**



## A. Extending the luteal phase

- Long term administration of **progestogen** → withdrawal of progestogen → CL regression → Estrus.
- Negative feedback on LH secretion after CL regression.
- On progestogen withdrawal, follicular growth, estrus and ovulation occurs within 2 to 8 days.

- Several methods of administration of progestogen are commercially available.
- E.g. Orally active progestogens (Altrenogest), Pessaries, Ear implants and **Intravaginal devices (CIDR, PRID)**.
- **CIDR = Controlled Internal Drug Release**
- **PRID = Progesterone Releasing Intravaginal Device.**

## B. Shortening the luteal phase

- By Using PGF2 $\alpha$

1. **One shot method:** Inject PGF2 $\alpha$ , heat detect and breed within 7 days.

## 2. Two shot method:

### a. Option 1:

- Inject PGF2 $\alpha$ , heat detect and breed within 7 days,
- inject again on day 11-14, heat detect and breed within 7 days

**b. Option 2:** inject PGF2 $\alpha$ , then again on day 11-14, heat detect and breed



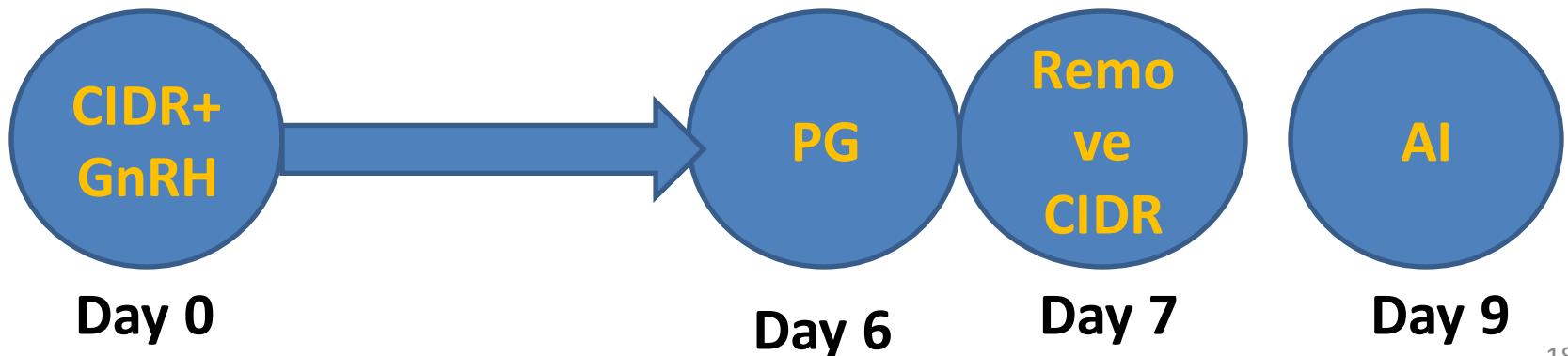
# CIDR

- CIDRs (**C**ontrolled **I**nternal **D**rug **R**elease) are an intravaginal progesterone insert.
  - The progesterone is released at a controlled rate into the bloodstream after insertion.



# CIDR

- Insert CIDR and inject with GnRH on day 0
- Day 6 inject with PGF2 $\alpha$
- Remove CIDR on day 7 and begin heat detection
- Should breed 48 hrs after removal of CIDR



# How CIDR Works


- CIDRs are coated with progesterone.
- Progesterone will prevent the animal from going into heat (**Act as Artificial CL**).
- CIDR removed → progesterone level decrease → Estrus and ovulation.

# Ovsynch Protocol

## Ovsynch<sup>®</sup>

*Traditional Method*

 **GnRH** – Day 0

 **PGF<sub>2α</sub>** – Day 7

 **GnRH** – Day 9

 **Timed A.I.** – up to 24 hours after second GnRH

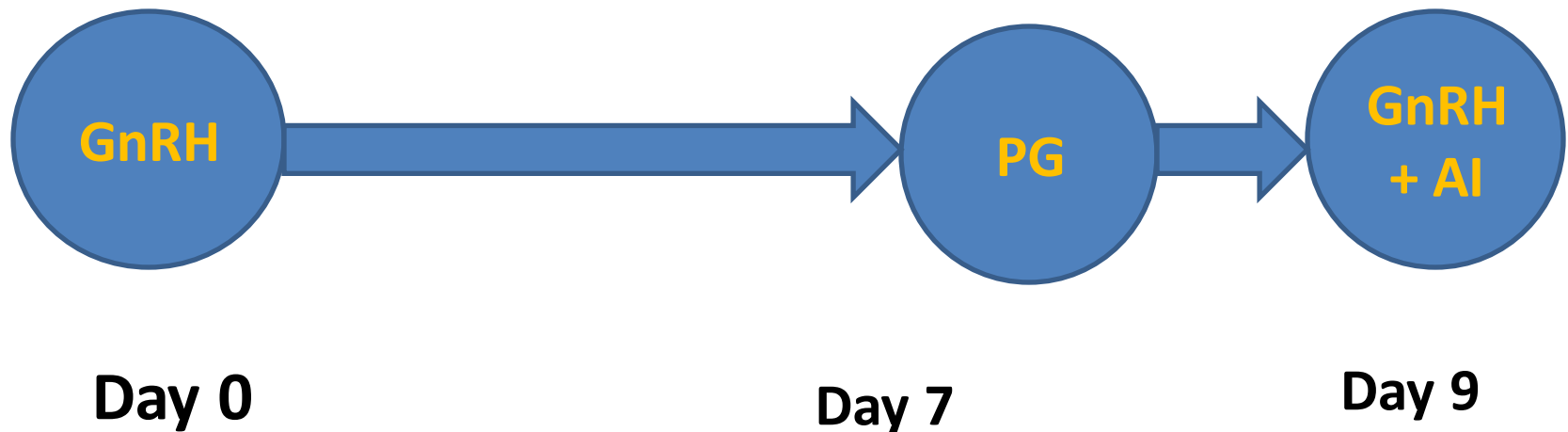
0 M Inject GnRH	1 T	2 W	3 Th	4 F	5 S	6 S
7 M Inject PGF <sub>2α</sub>	8 T	9 W Inject GnRH	10 Th Timed A.I.	11 F	12 S	13 S

# Ovsynch Protocol..

- Ovsynch occurs in three stages
  - ❖ **Day 0** : GnRH injection to create a new follicle, Ovulate dominant follicles and leutinize follicles
  - ❖ **Day 7** : PGF<sub>2α</sub> injection to end the current estrus cycle and regress the corpus luteum
  - ❖ **Day 9** : Second GnRH injection to cause the new follicle to ovulate and release the egg
    - **All cows will ovulate 24-32 hours after the second GnRH injection**
  - ❖ **Day 10** : AI

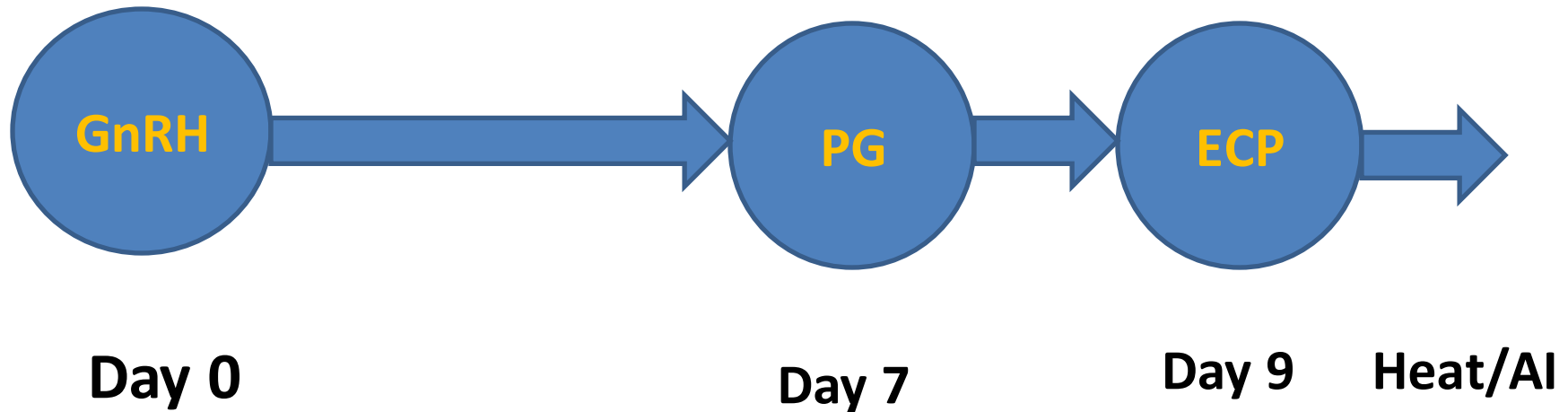
# Modified Ovsynch (cosynch Protocol)

- AI or breeding simultaneously with second injection of GnRH.
- Reduces time spend on heat detection.



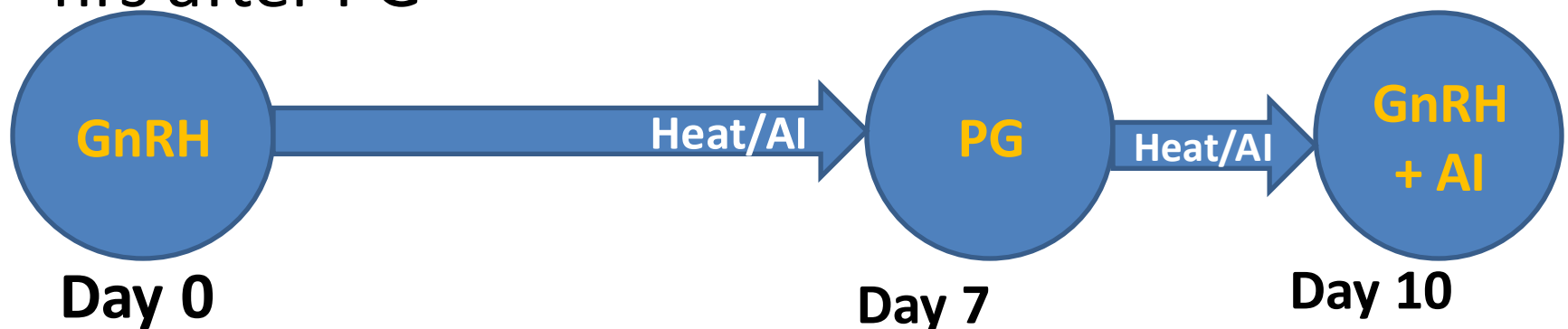
# Heat synch Protocol

- Uses less expensive estradiol cypionate (ECP) in place of 2<sup>nd</sup> GnRH injection of Ovsynch.
- AI 48 hrs. after estradiol injection or 72 hrs of PGF2 $\alpha$  injection.



# Select synch Protocol

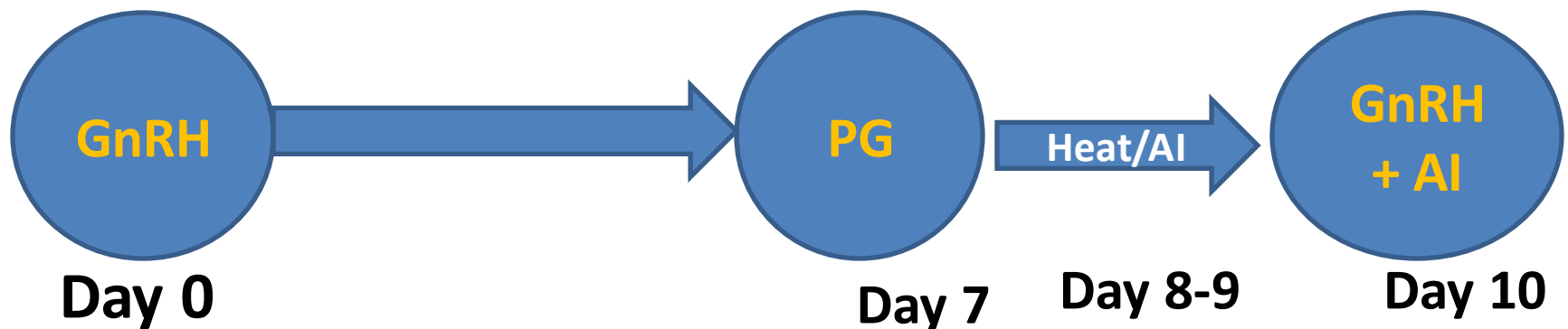
- Heat detection 24-48 hrs. before PG injection.
- Exclude PG for animals in heat on day 6 or 7.
- Heat detection and AI at 48 to 60 hrs. after PG.
- GnRH and timed AI of non responders at 72 hrs after PG





# Hybrid synch Protocol

- Heat detection and AI after PG.
- GnRH and AI of non responders at 54-80 hrs after PG





*THANK YOU*