

PHYSIOLOGICAL PRINCIPLES UNDERLYING SYNCHRONIZATION OF ESTRUS

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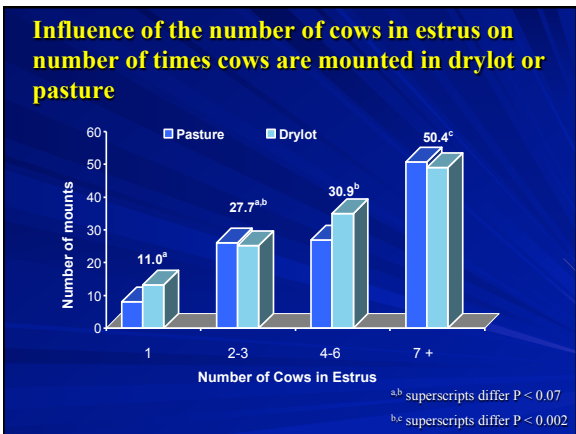
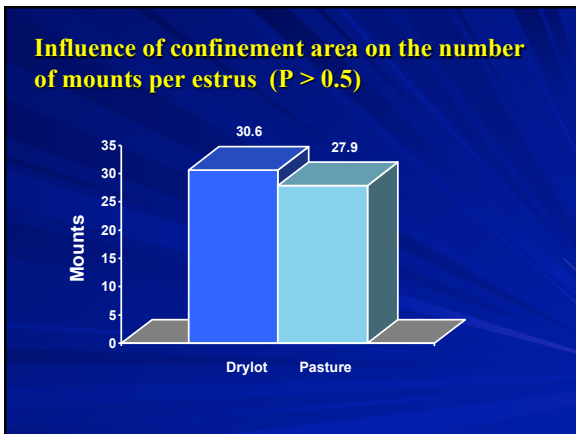
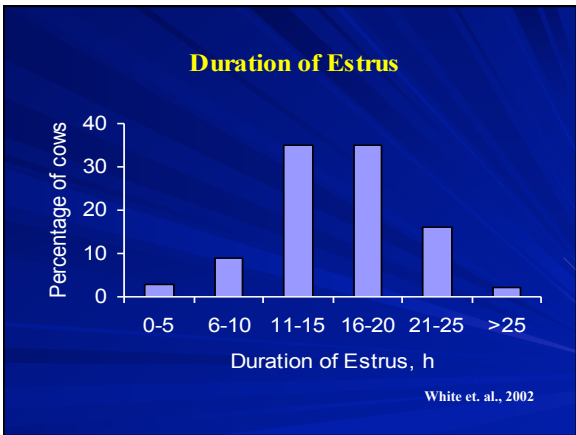
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Overview

- Physiology of the bovine estrous cycle
- Estrus synchronization products
- Hormonal management of the luteal phase
- Hormonal management of follicular waves
- Physiological factors affecting pregnancy rate to FTAI

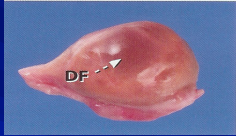
Characteristics of the Estrous Cycle

- Length of the estrous cycle
 - Average 21 days (range 17 to 24 days)
 - Two follicular waves – 17 to 20 days
 - Three follicular waves – 21 to 24 days
- Estrus (standing heat)
 - 12 to 18 hours (range 8 to 30 hours)
- Ovulation
 - Approximately 30 hours after the beginning of standing estrus


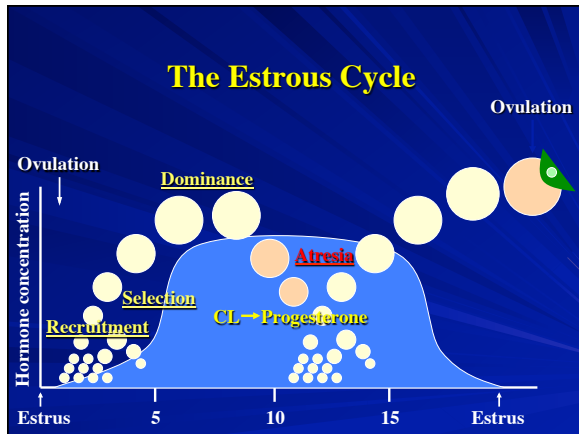


Ovarian Structures

- Graffian follicle



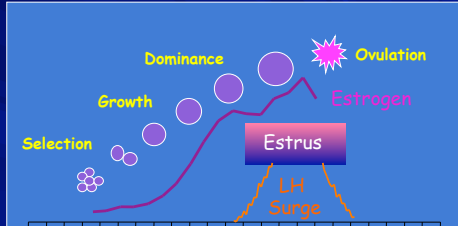
- Corpus luteum

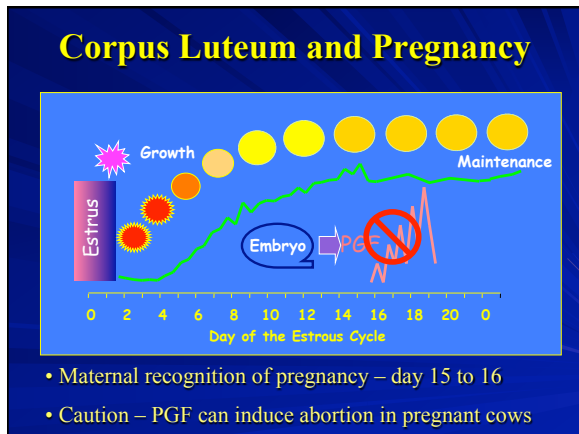
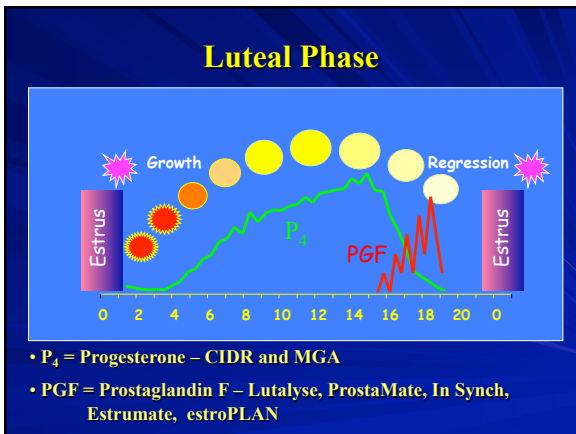
Stages of the Estrous Cycle

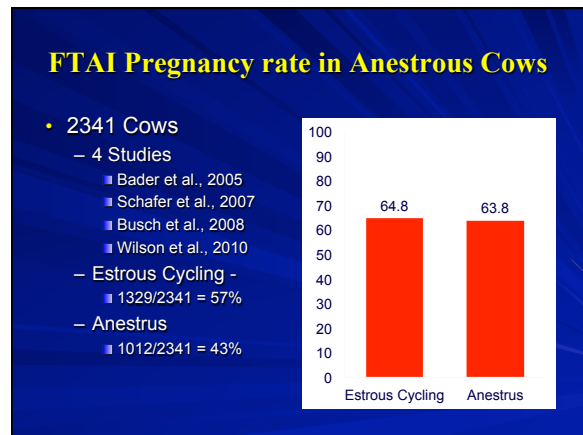
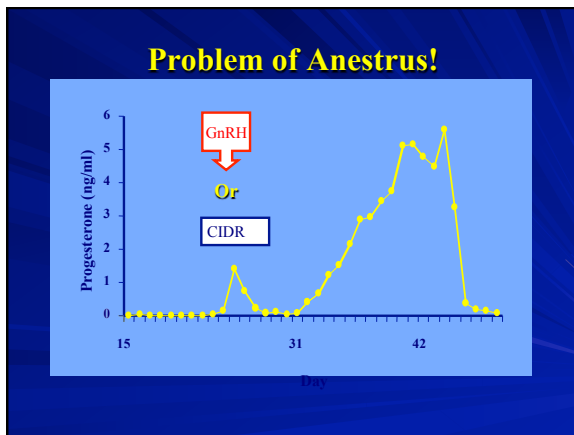
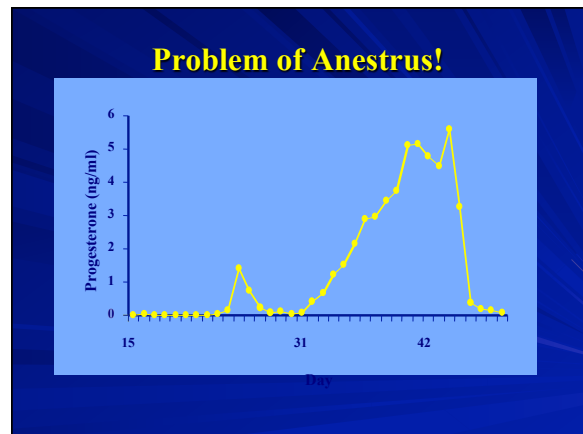
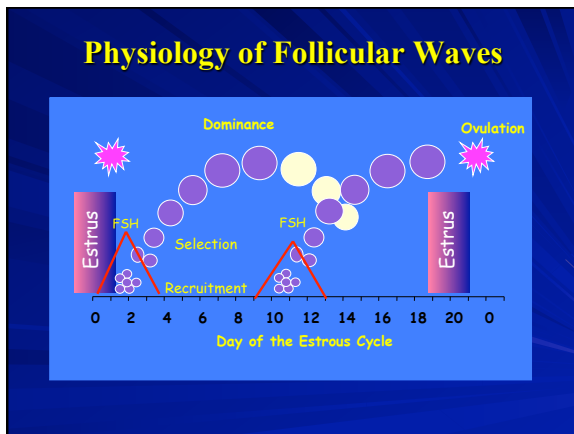
- Follicular Phase
- Estrus
- Luteal Phase

Follicular and Estrus Phases



- Maturation of the preovulatory follicle
- Estrus behavior
- Ovulation (induced by the LH surge)





- ### Hormones utilized in Estrus Synchronization Protocols
- Progesterone/Progestins
 - Prostaglandin $F_{2\alpha}$
 - GnRH

- ### Progesterone
- #### Biological Functions
- Inhibit estrus/ovulation
 - Preparation for pregnancy
 - Maintenance of pregnancy

Progestins/Progesterone

Role in Synchronization

- Inhibit estrus/ovulation
- Induce cyclicity

Prostaglandin F_{2α}

Biological Function

- Luteal regression in nonpregnant animals

Role in Synchronization

- Induce premature luteal regression

Gonadotropin Releasing Hormone (GnRH)

Biological Function

- Control secretion of LH
- Induces gonadotropin surge

Role in Synchronization

- Induce ovulation
- Synchronize follicular waves

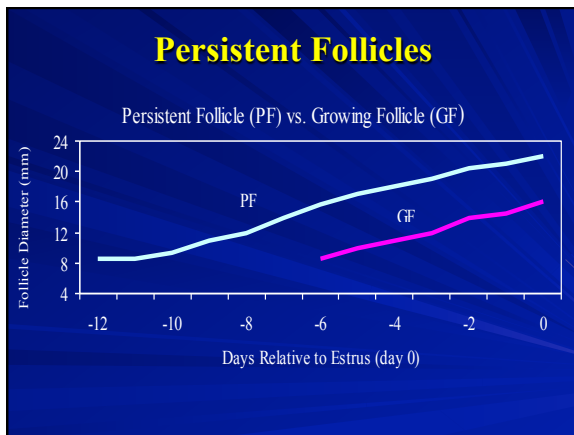
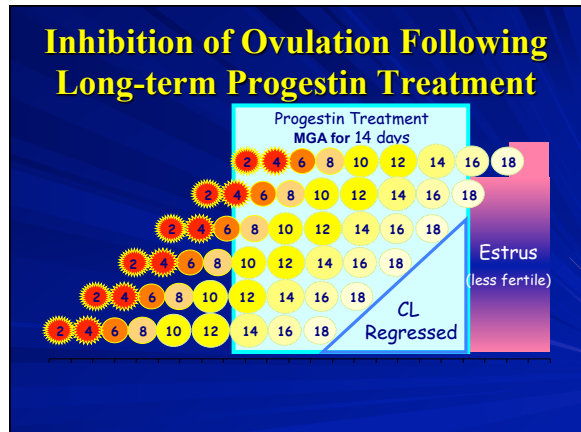
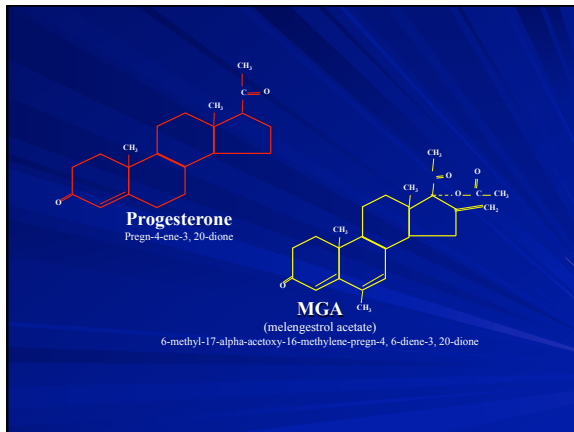
Hormonal management of the luteal phase

- Progestins
- Prostaglandin F_{2α}

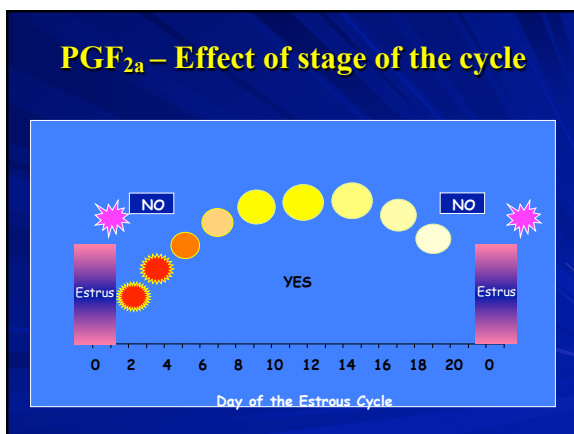
Progestins

- Melengestrol Acetate - MGA
- Controlled Internal Drug Release - CIDR

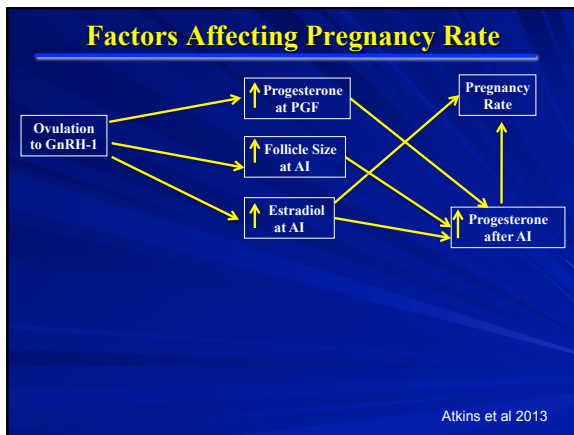
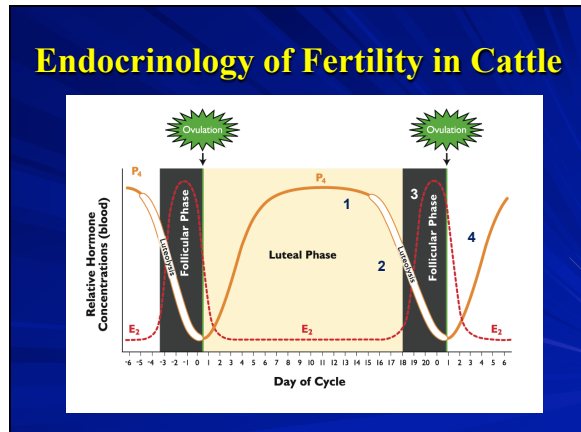
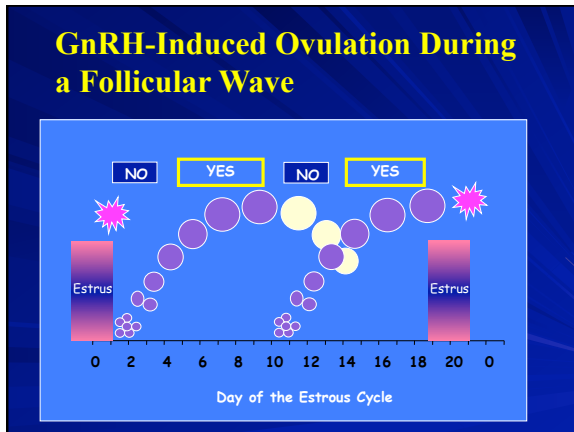




- ### Prostaglandin F_{2α} (PGF)
- (Lutalyse, ProstaMate, Estrumate, In Synch, estroPLAN)
- Causes CL regression
 - No effect on noncycling cattle
 - No induction of cyclicity
... No Jump-start
 - Effective days 6 to 16 of the estrous cycle (day 0 = estrus)



- ### Hormonal management of follicular waves:
- GnRH** (Cystorelin, Factrel, Fertagyl, Ovacyst)
- Induces ovulation
 - Synchronizes follicular waves
 - Induces formation of a CL



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Estrus Synchronization Courses

>Welcome to "Fundamentals of Beef Reproduction and Management: Focus on Estrus Synchronization."
Reproduction is the major factor impacting profitability in a beef herd operation. The largest cause of reproductive loss in beef herds is that cows fail to become pregnant during the breeding season. Many breeders fail to become pregnant because they do not show estrus (heat) or fail to conceive after showing estrus. Estrus synchronization protocols have been developed that increase the proportion of females that conceive early in the breeding season and facilitate the use of artificial insemination as a valuable protocol for genetic improvement through the selection of sires that are genetically superior for economic traits (e.g., calving ease, growth and carcass merit). Recent advances in estrus synchronization protocols that facilitate the adoption of AI in combination with improved herd health programs provide a series of technologies that if properly integrated will add significant value to calves.

The three courses are designed to familiarize you with the following topics:

- Course 1 Includes:
 - Physiological principles that underlie estrus synchronization
 - An overview of commercially available estrus synchronization products
- Course 2 Includes:
 - Specific estrus synchronization protocols currently recommended for beef heifers and cows.
- Course 3 Includes:
 - Management considerations for implementing an estrus synchronization program in your herd
 - A discussion of the impact of estrus synchronization on reproductive management.

In addition, each module includes assessment questions to help you evaluate your comprehension of the information.

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- ### How do you determine what went wrong?
- Calculate the conception rate and/or pregnancy rate – Is it actually low?
 - Ask for help – Veterinarian, AI rep, extension specialist, etc.
 - Don't make any assumptions.
 - When trouble shooting try to systematically work through the possibilities.

What are the primary problems?

- Cattle are not good candidates for an estrus synch/AI program
- Protocol compliance
- Sire selection
- Facilities
- Shipping (trucking) stress
- Cattle lose weight during the breeding season.
- Failure to pay attention to detail.
- Unlikely the biological activity of the ES products is compromised

Management considerations for selecting heifers and cows for synchronization of estrus

Before you start an estrous synch and AI program – Heifers

What has the pregnancy rate of your heifers been over the past few years?

Have your heifers received growth promoting implants?

Have you selected an appropriate target weight?

Heifers-contd.

Have your heifers attained 65% of their mature body weight?

What proportion of your heifers have a reproductive tract score of ≥ 4 ?

Before you start an estrous synch and AI program – Postpartum Cows

What has the pregnancy rate in your cows been over the past few years?

What is the current length of your breeding season?

Postpartum Cows – contd.

What proportion of your cows are cycling by the start of the breeding season?

What was the body condition score of your cows at calving?

Postpartum Cows – contd.

What is the current body condition score of your cows?

How many days postpartum will your cows be when estrus synchronization is initiated?

Postpartum Cows and Heifers

How much time can you devote to estrus detection?

Considering your handling facilities, how many cows can you breed in an hour?

Estrus Synchronization Products

Progestins

- Melengestrol Acetate
- EAZI-BREED CIDR

Prostaglandin F_{2α}

- Lutalyse
- ProstaMate
- In Synch
- Estrumate
- estroPLAN

Estrus Synchronization Products

GnRH

- Cystorelin
- Fertagyl
- Factryl
- OvaCyst

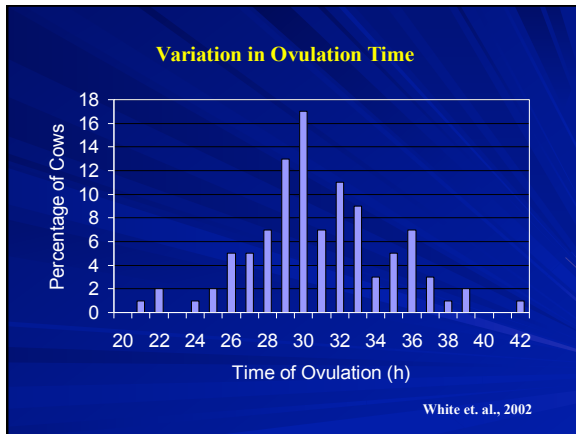
Hormonal management of follicular waves

- GnRH – Induces dominant follicle to ovulate
- Estradiol – dominant follicle turnover (↓FSH)
- Progesterone – dominant follicle turnover (↓LH)

GnRH

(Cystorelin, Factrel, Fertagyl, Ovacyst)

- Induces ovulation
- Synchronizes follicular waves
- Induces formation of a CL



- ### Role of Progestins in Estrus Synchronization
- Synchronization of estrus in
 - beef heifers & cows
 - dairy heifers & cows

 - Advances onset of puberty in heifers

 - Advances return to estrus after calving in cows

