SYNCHRONIZATION OF ESTRUS IN BOVINES

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Estrus Synchronization means regulation of estrus cycle of a group of animals in such a way that all of them evince estrus during a predetermined period of time.

Advantages

1. Better control of calving interval
2. Reduction of dependence on heat detection
3. Reduction of errors in heat detection
4. Increased reproduction with the same number of cows
5. Increased economic use of AI
6. Reduce labour
7. Useful in the embryo transfer technique
8. Timing of parturition
9. Schedule entry of heifers into the milking herd.

Under the Indian field conditions major use of synchronization agents lies in the management of infertility rather than estrus synchronization.

- Unobserved heat
- Untimely insemination
- Subestrus / Silent estrus
- Anestrus: True anestrus – Progestogens are useful
- Fixed time insemination

Criteria for successful controlled breeding

a) Animal requirement:

- Disease free – especially of reproductive tract
- Proper weight 2/3 of the adult body weight.
- Adequate nutrition – must be in positive energy balance
- Adequate post-partum interval about 45-60 days.
For prostaglandins – Animals must be cycling.
Normal non-pregnant reproductive tract.

**b) Management requirement:**
- Proper timing - Once the programme is initiated it must be carried through all steps in proper sequence and at proper times.
- Good semen quality
- Good AI technique

**Basic Principle**
The duration of the estrus cycle is controlled by the corpus luteum. Progesterone (P4) elaborated by the CL imposes a block for the next estrus and ovulation. As per the planned programme, the life span of CL has to be controlled. Therefore, regulation of estrous cycle means regulation of the life span of CL.

**Approaches**
Two basic approaches

a. The first approach is by removing or inducing the demise of the corpus luteum, so that all animals in an appropriate group enter the follicular phase of the cycle at the same time.

b. The second approach involves suppression of follicular development during an artificially extended luteal phase so that upon removal of the pharmacological blockade after a sufficient period of treatment all animal should enter the follicular phase.

A. The first approach achieved by the following ways

i. **Enucleation of the corpus luteum by digital pressure per rectum**

Disadvantages
- Complete removal is not possible
- Risk of haemorrhage
- Adhesions developing in the ovary (ovario – bursal adhesions)
- Need of professional assistance

ii. **Use of PGF2α**

- Basic requirement for its use is that the animal must be cycling
- Should be used between 6th to 16th day of the cycle.
- PGs are not effective in estrus, against developing and regressing CL.

**Recommended time to inject prostaglandin during the estrous cycle in the cow**

**Selection of program:**
Depend on
- The skill to identify CL
- Economy

Program A – Single injection Regime
Program B – Double injection Regime
Program C – requires one injection in about 2/3 of the animals and double injection in 1/3 of the animals.

Administration:
- Intramuscular route
  - Natural PGF$_2$α – 25 mg
  - Synthetic analog – 0.5 mg
- Intra-vulvo sub mucosal route
  - Natural PGF2α – 10 mg
  - Synthetic analog – 0.2 mg

Options for controlled breeding individual as well as group of cows using prostaglandins

B. The second approach achieved by the use of progestogens (P4)

Progestogens: The advantage of progestogens are
- CL need not be identified
- All the animals can be administered at the same time.
- Can be given at any time of the cycle.
- Even if the animal is not cycling – if can be given.
i. Injection of progesterone:

50 mg daily for 18-20 days or 500mg every 10 days. It prevents estrus and ovulation.

- Estrus occurred within 4-6 days post-withdrawal of the treatment.
- Daily injection is a cumbersome process.
- No distinct cut-off point because of the influence of the subcutaneous depots of hormone.
- Fertility is depressed at first estrous after progesterone therapy due in part to adverse influences on transport and survival of spermatozoa in the female reproductive tract.

ii. Orally-active progestagens:

- Overcome the disadvantages of progesterone therapy by repeated injections.
- More suitable for large batches of animals in feed lots.
  - a) MAP – 6 methyl – 17 – acetoxy progesterone – 500 mg daily for 21 days.
  - b) CAP – 6 – chloro – 6 dihydro – 17 acetoxy progesterone – 100 mg / daily / head
  - c) MGA - Melengesterol acetate – 1 mg / day / head

Good estrous synchronization is obtained, but conception rate is low.

iii. Intra vaginal sponges:

Sponges soaked in oil containing progesterone is positioned deep in the vagina and left for a period of 9 to 12 days, following withdrawal oestrus symptoms noted within 24 – 72 hrs. The intra-vaginal sponges are available on cost basis at Department of Veterinary Physiology, VCRI, Namakkal.

Disadvantages:

- Sponges may be displaced.
- At the time of withdrawal there may be some tearing of vaginal mucosa.
- Place of insertion may act as a focus of infection.

iv. Controlled Internal Drug Release (CIDR):

It is a T shaped silicone rubber impregnated with progesterone and molded over a nylon spine. A small nylon tail is attached to the end of the CIDR, which protrudes from the vulva allowing for easy removal. This contains 1.9g of progesterone. The CIDR is inserted into the vagina using the applicator left for 7 to 10 days and then withdrawn.

In cyclical animals a capsule containing 10 mg estradiol benzoate is also inserted along with CIDR. The estradiol benzoate can also be given in the form of injection at the time of insertion. Alternatively a dose of prostaglandin (CIDR + PGF2α) can be given one day before withdrawal of insert. Fixed time AI at 48 and 72 hours after removal of CIDR is recommended.
v. Progesterone impregnated intra vaginal device (TRIU-B)

Progesterone impregnated intra vaginal device (PIVD) a new swasthich shaped progesterone impregnated intra vaginal device named TRIU-B®. It contains 3 medicated rings (green color) and one non-medicated ring (white color). Each medicated ring (green color) contains 186 mg of progesterone. One additional ring (pink color) contains 400 mg of progesterone has also been provided. The barrel and the plunger provided was used for insertion of PIVD (TRIU-B) after proper washing with 1-2 per cent potassium permanganate solution and applied externally 2 per cent lignocaine hydrochloride gel. This protocol is similar to that of CIDR + PGF₂α.

1. Synchronization of Ovulation

Various estrus synchronization protocols have been developed to bring a large percentage of groups of females into estrus at a predetermined time. These protocols have involved controlling estrous cycle length in cattle either by extending the life span of the corpus luteum by the use of progestogens or shortening the life span of the corpus luteum by the use of Prostaglandins. The reduced fertility following the synchronization protocols made it necessary to understand ovarian follicular and corpus luteum dynamics in cattle. An increase in this basic understanding as well as the development of treatment regimens to manipulate ovarian follicular and corpus luteum dynamics over the last decade have resulted in development of better estrus synchronization protocols based on a) elimination of the dominant follicle and initiation of new follicular wave, b) initiation of new follicular wave, synchronization of Ovulation and timed artificial insemination. These protocols are very promising and have the potential to enhance pregnancy rates and the success of artificial insemination programs.
Synchronization of ovulation with GnRH and PGF₂α brought a major impact on managing lactating cows by allowing timed AI and ascertained ovulation time with eliminating oestrus detection. Therefore increased rates of estrus detection would ideally increase pregnancy rates within set time limits, thereby leading to shorter calving intervals, increased production, increased economy and improved standard of living of farmers in many developing countries.

Ovsynch

In the Ovsynch program, 10 μg of GnRH was given at random during the estrous cycle, followed by 25 mg of natural PGF₂α or 500 μg of synthetic PGF₂α and a second dose of 10 μg GnRH. Ovulation was synchronized because the preovulatory follicles were at a similar stage in development and was responsive to LH at the time of the second GnRH treatment. This program coordinated follicular recruitment, CL regression and time of ovulation and permitted fixed time AI 16 hours after the second GnRH dose was administered. Thus by synchronizing ovulation, reproduction in lactating dairy cows could be effectively managed without the need for estrus detection.
REFERENCES


