

Seasonality and reproduction

A season from year play vital role in the reproduction of some farm animals.

According to the effect of season , animals can be classified as the following:

- 1- Non seasonal species or breeders as cow and sow, these animals have regular estrous cycle along the year with average 17-24 days in cows in normal conditions. and there is no obvious effect of season on the reproduction in these species.
- 2- Seasonal species or breeders as mare, ewe, goat, bitch and queen. The season in these species plays vital role in the time of estrous cycle and number of estrous cycles in a part of year, and as below

A- Monoestrus seasonal animals: these animals have 1-2 estrous cycle(s) during the breeding season and if animal not to be pregnant, the animal will enter a phase called anestrus(as in bitch).

B- Polyestrus seasonal animals: these animals have several regular estrous cycles during the breeding season until be pregnant(as mare, ewe and goat)

these seasonal breeders can be classified depending on photoperiod into

- 1- Long-day breeders as in mare that start to show estrus behavior from late winter and early spring when photoperiod begins to increase with long hours of light.
- 2- Short-day breeders as ewe and goat which begin to show estrus behavior in the late summer and early autumn, when photoperiod begins to be short with short hours of light.

The C.N.S, hypothalamus, pituitary gland and pineal body are the major organs or elements that control the breeding during specific season.

Pineal body translates the environment seasonal changes of photoperiod into neural impulses that affect endocrine system especially hypothalamus which produces GnRH.

The major product of pineal body is melatonin that release from pinealocyte cells, melatonin is synthesized and secreted during darkness and reaches hypothalamus and inhibits the frequency of pulsatile discharge of

hypothalamic GnRH., which regulate the release of pituitary gonadotropins (FSH,LH).

In long photoperiod breeders as mare \uparrow photoperiod \rightarrow \downarrow melatonin \rightarrow \uparrow (FSH,LH.) \rightarrow growth of ovarian follicles \rightarrow resumption of estrous cycles.

In short photoperiod breeders as ewe & goats \downarrow photoperiod \rightarrow \uparrow melatonin \rightarrow \uparrow (FSH,LH.) \rightarrow growth of ovarian follicles \rightarrow resumption of estrous cycle.

Mechanism of seasonality

During the day, light levels are detected by the **retina** which sends impulses to the **suprachiasmatic nucleus** of the **hypothalamus** and then to the superior cervical ganglion. Postganglionic nerve fibers synapse with inhibitory nerve fibers within the **pineal gland**. These fibers cause inhibition of the pinealocyte cells of the pineal gland preventing synthesis of the hormone **melatonin**. At night there is reduced retinal firing and so reduced inhibition of pinealocytes by postganglionic superior cervical ganglion fibers and so melatonin is synthesized and released. Melatonin stimulates the synthesis and release of GnRH from the hypothalamus leading to pulses of luteinizing hormone release from the **pituitary gland**. High frequency, low amplitude LH pulses lead to breeding activity. Whereas low frequency, high amplitude LH pulses lead to anoestrus and inactive gonads.