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Approaches to modify Reproductive Seasonality in Goats

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Abstract

Almost all species at the time of origin were seasonal breeders for assurance of feed to their young ones for better survival. But as domestication started this phenomenon is no more applicable for most of the species. Goats of the temperate regions are still seasonal breeders. Period of sexual quiescence can be minimized by different strategies like hormonal, male effect, etc. to get progeny throughout the year.

Introduction

Goats have first domesticated some 10,000 years ago. Originating from a few wild goat and sheep ancestor varieties in the region of today's Iraq, Iran, Syria and eastern Turkey. In 1784, the Italian Biologist Lazzaro Spallanzani wrote "*It is well known that almost all animals, except man, have a stated season for the propagation of their species"*. Goats are seasonally polyestrous and breed at a specific time ensures the survival of offspring by aligning parturition with an adequate period of nutrition and climate circumstances. Within different latitudes, photoperiod is the principal factor that regulates seasonality in goats. Food availability and social interactions are also common factors that affect reproduction.

Reproductive seasonality in goats

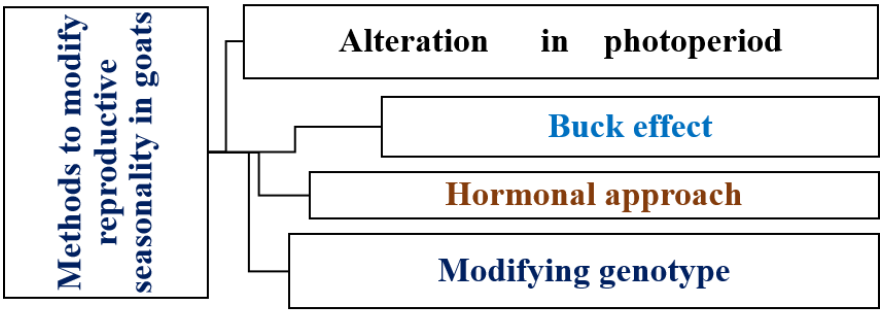
Reproductive seasonality is observed in goat breeds of the temperate region (Chemineau *et al*., 1992a) and some local breeds adapted to or originating from subtropical

latitudes. For goats, originating from tropical and subtropical environments, reproductive seasonality is less marked and some local breeds have just a short anoestrous period or breed all year round (Arroyo *et al*., 2007).

Purpose of modifying seasonality of breeding in goats

- To decrease fluctuation of income that means to obtain products like milk & meat throughout the whole year.
- To obtain 3 kidding in a 2-year rotation.

Methods To Modify Reproductive Seasonality in Goats



1. Alteration in photoperiod

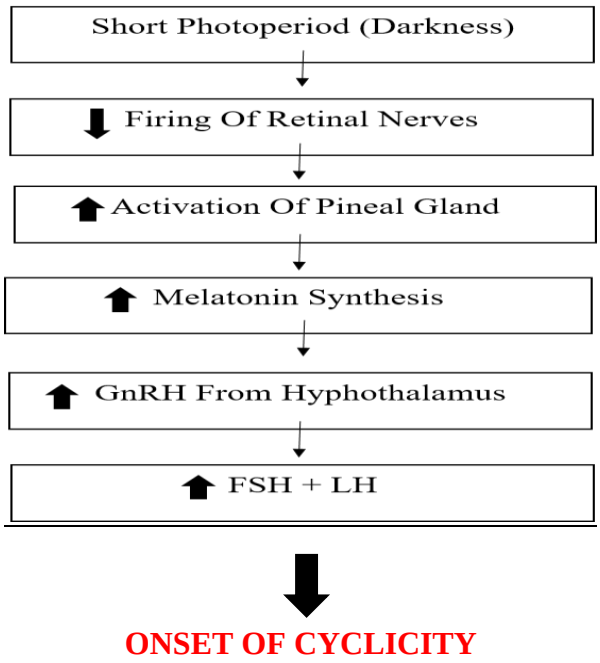
The seasonality of reproduction in goats is controlled by day length (Malpaux *et al*., 2001); out-of-season reproduction can be achieved using strategies based on changing the length of the photoperiod. Treatments based on the alternation of Long days (LD) and Short days (SD) can be used in either closed or open barns by imposing an artificial light regimen. Under field conditions, SD effects are easily provided by melatonin implants. This advances the onset of the breeding season and induces ovulatory activity in females throughout seasonal anestrus.

Protocol for manipulation of photoperiod-

Change the length of time the goats are exposed to light to mimic the lengths of daylight experienced in late summer and early autumn. This requires a minimum of 16 hours of light each day for a minimum of 45 days, with a light intensity of 200 lux measured at the doe's eye level. The length of the light period is then progressively and steadily reduced by 1 to 2 hours per week until 8-10 hours of light per day is attained. A gradual change in light causes activation of melatonin receptors in the hypothalamus. Breeding bucks should be presented to the doe

after 6-8 weeks of the termination of light treatment, the doe will be in the heat after 10-20 days of buck introduction. (Gómez-Brunet *et al*., 2008).

How does photoperiod affect cyclicity?

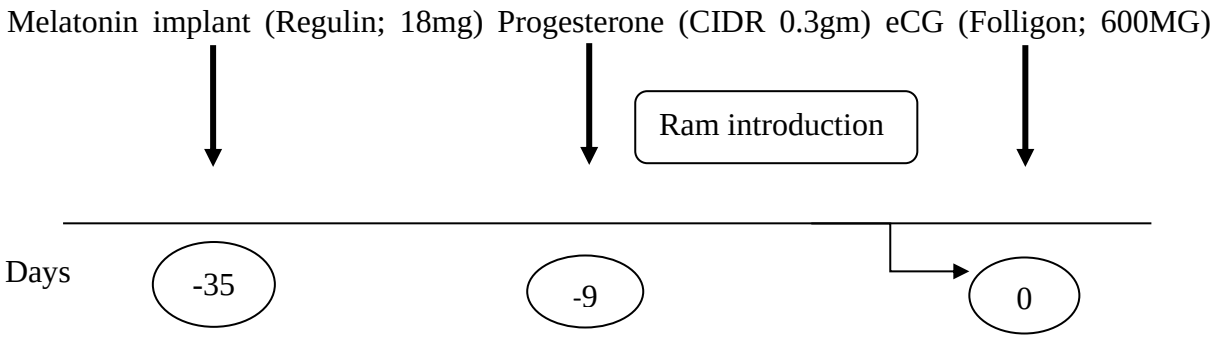


2. Ram effect

The "Buck effect" is when non-cycling goats are stimulated to ovulate by the sudden introduction of a novel buck. Bucks secrete chemical substances called pheromones, which are perceived by the doe and can stimulate the onset of estrus approaching the onset of the breeding season. To get the good effect, the doe should be strictly isolated from bucks for at least 6 weeks. Doe must have no contact with bucks by sight, sound, or smell, which means that they must be separated by a considerable distance. In addition, when using a vasectomized or teaser buck, this can allow the doe to achieve several estrous cycles before the desired date of breeding, which will increase fertility. The mechanism involved in the buck effect is mainly pheromonal and mediated via the female vomeronasal organ (VNO).

3. Hormonal approach

The administration of a synthetic progestagen (FGA: fluorogestone acetate), eCG (equine chorionic gonadotropin), hCG (human chorionic gonadotropin) and cloprostenol (PGF2α analog) induces and synchronise ovulation rapidly, ensuring high fertility (~60% kidding) with just one round of AI performed 46-48 h after treatment.



Modifying genotype

Knocking out the gene that responds towards lights and induces breeding is another way to modify seasonality. Crossing the photo-sensitive goats (breeds of temperate) with that of photo-insensitive (breeds of tropics) may also modify the reproductive seasonality. However, this method is still unexplored.

Conclusion

Goats are seasonal breeders in temperate regions and the photoperiod is the main reason for this seasonality. We can modify seasonality for breeding purposes in goats by using light treatment, hormonal treatment and by using buck to get more progeny and its product throughout the whole year.

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