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Out of Season Breeding in Ewes

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Abstract
Sheep are seasonal, short-day polyestrous breeders (i.e., estrus occurs in response to shortening day length). Most sheep are bred from late September to November, with October being the most popular time to put in the rams. While there are a few breeds of sheep can that breed anytime of the year. Lamb supply is seasonal in nature and is explained largely by the seasonal nature of sheep reproduction, yet demand for product is present year-round. In order to meet market demand, deficits in supply are met by imported product and by domestic lamb feeders who hold lambs to extend the season of supply. Another strategy to fill in gaps in supply and to avoid product quality concerns is through out-of-season lamb production. Out-of-season production allows lambs with the optimal degree of maturity to be harvested throughout the year. This strategy, when combined with a decrease in the production birth interval, is referred to as accelerated production. Accelerated production has the potential to increase production efficiency and simultaneously remove the constraint caused by seasonal supply.

Out of Season Breeding:

Out of season breeding refers to the practice of inducing or manipulating the reproductive cycle of animals so that they breed outside their natural breeding season. This can involve various techniques such as controlling light exposure, altering nutrition, administering hormones, or using artificial reproductive technologies. The goal of out of season breeding in sheep is often to optimize production schedules, increase lambing rates, and align market demands with lamb availability. By enabling ewes to breed outside their natural season, farmers can stagger lambing periods throughout the year. This helps in maintaining a more consistent supply of lambs for market, rather than being limited to a single breeding season. This can be particularly advantageous for meeting seasonal market demands and ensuring a steady income stream.

For accelerated production or other modes of out-of-season production to be successful, one must find a way to overcome the seasonal constraint on sheep reproduction. Fortunately, there are breeds that are less seasonal which have been selected to breed out of season. Most of these breeds, however, still exhibit a degree of seasonality in their reproductive performance and exhibit a lower conception and ovulation rate in the less optimal mid-winter to mid-summer breeding period. Working with this relatively aseasonal genetic base, it is possible to manage this population to improve reproductive outcomes in the less optimal breeding season without the use of exogenous hormones.

Improved out of season reproduction in relatively a seasonal sheep can be realized by:

- Improving the nutritional management of both rams and ewes
- Improving breeding management practices
- Screening for male fertility
- Enhancing male bio-stimulation, often call “the ram effect.”

Several approaches for Out of Season breeding in ewes:

1. Breed and Genetic Selection

- Choose less seasonal breed of ewe and ram.
- Choose animal with history of out of season breeding.
- Crossbreed to enhance out of season breeding success.
- Use selection to reduce seasonal anestrous in the flock.

Genetic selection is a slow but permanent method of achieving breeding out of season. The trait has a low heritability (10%). This means it is difficult and time consuming to develop a flock of animals with the genetic ability to breed (naturally) year-round. In order to create a selection program that works, it is necessary to define what out of season means on your farm.

2. Hormone control

There are two options for hormone control: controlled internal drug release devices (CIDRs) or melengesterol acetate (MGA).

(a) Controlled internal drug release devices (CIDRs)

- Insert naturally occurring progesterone impregnated CIDRs into the vagina for 12–14 days.
- Upon removal, treat the ewes with Pregnant Mare Serum Gonadotrophin (PMSG).
- Introduce the ram to the ewes 24 hours after CIDRs is removed, when most ewes should be in heat. All ewes should be in heat after 48 hours.
- The fallout rate of the CIDRs varies between farms and seasons.
- There is a risk of vaginal infection or injury if the operator is not gentle and proper sanitation of equipment is not observed.

- CIDRs are not recommended for ewe lambs, primarily due to the risk of injury.
- Using CIDRs is the best method of synchronization for artificial insemination (AI) because the time of ovulation can be more accurately predicted than when using MGA.
- CIDRs and PMSG must be obtained from your veterinarian.

The results that producers see with this method can range from 8% to 85%. Typical results are 50% to 60% of the ewes treated having lambs out of season. CIDRs generally produce only one synchronized estrus out of season.

(b) Melengesterol acetate

Melengesterol acetate (MGA) is a feed additive. It is commonly used in feedlot heifer rations to prevent estrus. It is not licensed for use in sheep and therefore a veterinary prescription is required.

- Feed MGA at a rate of 0.125 mg, twice a day for 12-16 days.
- The MGA can be formulated into a ewe supplement or into a complete ration.
- The two feedings should be as close to 12 hours apart as possible. It is important to keep the hormone levels in the blood consistent.
- Similar to the CIDRs give PMSG as part of the hormone treatment.
- Administer PMSG five to 10 hours after the last feeding of MGA.
- For good results, strictly follow the timing of the MGA feeding and administration of PMSG.
- The ewes will come into heat two to two-and-a-half days after the last feeding of MGA.
- Introduce the ram after 48 hours.

Similar to CIDRs, there is a wide variation in the results of using MGA, with reports of 10% to 85%, with average results of 50% to 60%.

3. Light control

Modifying day length can induce sheep to ovulate out of season. The change of day length from long days to short days initiates estrus. As a result, it is necessary to create a situation with light control where long days are followed by short days before the out-of-season breeding starts. This can be done gradually or abruptly. There are different protocols:

- Alternate between 8hr dark/16hr light and 16hr dark/8hr light.
- 60 days of 24hr light and followed by 60 days of ambient light.
- Induce male in treatment.

4. Ram effect

The sight, smell (via pheromones) and breeding behavioral cues of rams can have a stimulatory effect on ewes that is "lightly" in anestrus. This effect is commonly referred to as "the ram effect". Ewes that are lightly in anestrus include both those from highly seasonal breeds about to enter or exit the typical anestrus period (period of infertility present from February to July in the Northern hemisphere) *and* those from less seasonal breeds during the entire anestrus period.

The ram effect is strongest when ewes have been isolated from rams for at least 30 days. When ewes are isolated from males for extended periods, the reintroduction of males can either induce behavioral estrus a full 17-day cycle later, or cause ewes to exhibit a "silent" heat at 4-6 days following exposure, where the ewe ovulates but does not exhibit behavioral estrus. This silent heat is followed by behavioral estrus 17 days later. This creates 2 modes of behavioral estrus within a flock: one at 17 and one at 23 days following ram exposure. Due to slight variations in the timing of estrus and in the length of gestation in sheep, one sees a concentrated birth period of approximately 7 days in length.

The ram effect allows both the induction and synchronization of estrus. Most producers like the induction effect, but some would prefer not to synchronize ewes as it concentrates the lambing period to the degree that it can tax both facility and labor resources. An option to alleviate this might be to divide the ewe flock in half and stagger both teaser and fertile ram introduction to each group by a week.

Management factors affecting the success of out-of-season breeding:

Treatment of ewes

The management and care of the ewes has a large impact on the success of out-of-season breeding.

- Ewes must be in good body condition, preferably gaining body weight at the time of mating. Feed the ewes a flushing ration prior to and during breeding.
- Minimize, or avoid stress and handling during treatment, mating and for one month after mating.
- If possible, mate ewe lambs separately from mature ewes. The rams will preferentially mate mature ewes and ewe lambs tend to come into estrus later than mature ewes following hormone treatment.

Treatment of rams

It is also important to ensure good care and management of the rams. Poor nutrition can decrease testicular size and sperm reserves at a time when the size and reserves are already smaller.

- Production of spermatozoa takes seven to eight weeks. Begin supplementary feeding eight weeks prior to mating to increase sperm reserves.
- There are seasonal variations for rams in semen production, quality and libido. Elevated body temperatures in rams from hot weather can cause temporary infertility.
- Shear rams two months prior to breeding and ensure that all wool is removed from the scrotum.
- Ensure that adequate ram power is available for out-of-season breeding. Rams are not able to breed as many ewes out of season. It is recommended that a maximum of five ewes to each ram be used out of season, particularly when hormone treatments are used and the ewes are synchronized. Hormone treatments can be staggered to optimize ram power.

Conclusion:

Out of season breeding in ewes offers significant advantages for sheep farmers looking to enhance production efficiency, meet market demands, and improve genetic potential within their flocks. By employing a combination of reproductive management techniques, farmers can strategically breed ewes outside of their natural breeding season, thereby optimizing resource utilization, mitigating risks, and achieving sustainable economic outcomes. However, careful planning, management, and consideration of animal welfare are essential to the success of out of season breeding in sheep farming.

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