

Pre-Breeding Management of Rams and Ewes
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The pre-breeding period is defined as the 8-10 week period prior to the first day that rams are turned out with the ewes. Although it is traditionally a relatively quiet period for the sheep producer, the pre-breeding period involves multiple physiologic processes in the ram and ewe that can significantly impact fertility during breeding season, and therefore can subsequently impact the size and uniformity of the lamb flock. During this period of time, the sheep producer can conduct a few fairly simple management practices to ensure that the ram and ewe flock are in optimal physical condition for breeding.

Pre-Breeding Evaluation of the Ewe Flock

Creation of sperm in rams requires approximately 7 weeks to complete; sperm is then stored in the epididymis, an organ adjacent to the testis. In other words, on the first day of the breeding season, the ram will be utilizing semen that was produced 7 or more weeks previously. Late summer heat can significantly impair ram fertility because spermatogenesis (the creation of sperm) occurs in the testes at a temperature that is slightly below core body temperature. Rams that are excessively conditioned are prone to heat stress, as are rams in full fleece. Shearing rams at this time should be considered to limit heat stress. Careful shearing of the scrotal wool should be performed for breeds and individuals with greater scrotal wool cover. For flocks in colder climates with mid-to late-fall breeding schedules, ram shearing should be timed such that 2-4 cm of fleece has grown by the time breeding begins.

Heat stress can be further limited by provision of adequate shade – producers should watch the rams frequently during a summer day to ensure that the rams have shade available as the sun moves across the sky. Sand bedding in shaded areas allows for greater body heat loss when the rams lie down; the scrotum is kept cool as well. Salt and water should be readily available near the areas where the rams seek shade during the hottest periods of the day. In flocks with significant external parasite or biting insect problems, reduction of these burdens through insecticide application to the animals and / or the environment may limit fertility impairment from scrotal dermatitis (inflammation of the scrotal skin). The heat associated with inflammation of the scrotal skin has been shown to impair ram fertility.

In certain locales, infection with bluetongue virus during the late summer or early fall can cause significant morbidity and reduction in fertility in the ram flock. This viral disease is spread by gnats of the genus *Culicoides*; the disease appears to be more prevalent in flocks located near river valleys and low-lying wetlands. Many sheep may acquire the virus, develop antibodies to clear the infection, and recover without consequence. However, if a large number of rams in a flock are naïve (not immune) to the virus, infection can cause high fever and severe systemic disease that can render rams temporarily subfertile or infertile. Vaccination of sheep against bluetongue is not approved in most states. Producers in areas where bluetongue infection is particularly problematic may have to delay breeding until well after the first frost, when the *Culicoides* gnat is no longer biting.

Fever and debilitation from other common infectious diseases, such as pneumonia, can also impair subsequent fertility. Pneumonia may develop during summertime transport, showing, sales, or other stressful activities. Owners should carefully plan summer show and transport activities so as to limit the potential impact of these activities on ram fertility when the breeding season arrives.

Since weight loss is expected during the breeding season, the target BCS for rams at the onset of the breeding season is approximately 3.5 on a scale of 1 (emaciated) to 5 (obese). To limit the risk of development of ulcerative posthitis (pizzle rot), thin rams should not be fed high-protein complete feeds or allowed unlimited access to high-protein forage such as alfalfa hay. If under-conditioned rams are to be fed increased levels of energy, booster immunization against enterotoxemia is recommended.

Annual breeding soundness examination and serologic testing for infection with *Brucella ovis* have been repeatedly proven to improve flock fertility. Breeding soundness examination is described in a separate fact sheet produced by Colorado State University Veterinary Extension. The ram population should be measured against ewe numbers, with adequate consideration of ram age, breed characteristics, and topography of the breeding pastures. A ram-to-ewe ratio of 1:50 (2% of the ewe population) is usually appropriate for mature rams on flat pasture or rangeland. A mature, experienced, and BSE-proven ram can successfully breed as many as 100 ewes, particularly if the ewes are fenced in to limit their capacity to disperse. A 1:25 ram: ewe ratio is recommended if ram lambs are to be used. Greater ram numbers may be needed for synchronized breeding programs.

Pre-Breeding Evaluation of the Ewe Flock

Culling of ewes prior to breeding should be based upon body condition score (BCS), udder health, dentition, lameness or other musculoskeletal problems, and in some flocks, results of serologic testing for eradicable diseases (e.g. ovine progressive pneumonia, Johne's disease). The body condition scores for the entire ewe flock should be recorded, as this data can be used to adjust feeding practices to optimize body condition at breeding. In addition, trends in flock BCS data accumulated over subsequent years can be used to adjust summer grazing or feeding practices. The ewe cull should precede any immunization or anthelmintic treatment administered to the ewe flock, as administration of these products to cull ewes represents a lost treatment expense for the producer and might create violative residues if the ewes are promptly taken to slaughter. If the owner does not elect to maintain a closed flock, new introductions into the ewe flock should take place at least 8 weeks prior to the breeding season, at a time of year when gestation is not ongoing in the ewe flock. Further, immunization for abortion pathogens (*Campylobacter* and *Chlamydophila*) and/or tetracycline feeding during gestation may warrant consideration.

Thin ewes, including ewes selected for culling on the basis of low body condition, can be targeted for specific disease testing, using serology (OPP, Johne's Disease), necropsy, or slaughter checks. As an initial step in documenting the presence of Johne's Disease in the flock, serologic tests can be applied to the thinnest 20% of ewes and rams, as these animals are more

likely to test positive if their thin condition is truly due to this disease. Fecal flotation is a test that your veterinarian can perform for determination of internal parasite burden. Individual fecal samples should be taken from at least 10 adult ewes and an equal number of ewe lambs; feces are removed from the rectum and placed into a labeled ziplock bag. Samples should be kept cool and transported promptly to your veterinary clinic or diagnostic laboratory. Ewe fertility has been shown to be responsive to pre-breeding anthelmintic (deworming) treatment in flocks where internal parasite burdens are problematic.

Flushing is a practice wherein the amount of feed energy is increased to ewes, beginning 3-6 weeks prior to the breeding season. As a result of the increasing plane of nutrition, ewes will gain weight and tend to ovulate more eggs at each estrus period during the breeding season. This effect of flushing tends to be most pronounced in thin ewes, while ewes in good body condition do not respond much to flushing. Therefore, segregation of the ewe flock into a thin group (to be flushed) and adequate body condition group (no flushing) is sensible. Most medium-sized breeds of ewes can be flushed by feeding 0.5-1.0 pounds of grain per ewe per day; it is important to begin slowly (0.25 pounds/ewe/day) and gradually increase the amount of grain fed to the target level over a 7-10 day period. The duration of flushing needs to be at least 2 weeks long; if ewes are very thin, as many as 6 weeks of flushing may be needed. When possible, continuation of flushing for 2-4 weeks into the breeding season may help maintain pregnancy in previously thin ewes.