

*Project Leader:* David Barrett

*Address:* Department of Plant & Animal Sciences, NS Agricultural College

*Project Short Title:* Development of a new heat & ovulation synchronization treatment for ewes out of the breeding season

*Application & Benefits to Sheep Industry:*

Reproductive performance in ewes out of the breeding season is poor even after the application of conventional controlled breeding techniques and reproductive flock health is absolutely critical for industry profit. It is not easy to enhance the reproductive performance of ewes that are out of the breeding season because this is a time of year that they do not naturally breed. In NS, 2,500 lambs were born between July and December 2010, while 16,600 lambs were born between January and June 2010. There is increasing demand for more lamb, especially for the growing ethnic market. Ovarian follicle (contains the egg) development and ovulation occur at a predictable time in ewes treated with a new follicle wave/ heat synchronization treatment, Veramix<sup>®</sup> sponge-estrogen-Folligon<sup>®</sup>, out of the breeding season. A follicular wave is defined as the emergence/growth of a group of follicles from a follicle pool and one or more of these growing follicles grow to an ovulatory size before regressing or ovulating. An ovulated follicle then develops into a corpus luteum, producing the hormone progesterone, important for the maintenance of pregnancy. This particular treatment has great potential because ewes superovulated after pre-treatment with Veramix<sup>®</sup> sponges-estrogen have significantly less variability in ovarian response and embryo yields compared to ewes pre-treated with only Veramix<sup>®</sup> sponges out of the breeding season. However, the synthetic progesterone Veramix<sup>®</sup> sponge was discontinued and replaced by the controlled internal drug releasing device (CIDR<sup>®</sup>) containing natural progesterone. Recently, our lab compared the patterns of follicular and corpus luteum development in out of season ewes treated with either Veramix<sup>®</sup> sponge-estrogen-Folligon<sup>®</sup> or CIDR<sup>®</sup>-estrogen-Folligon<sup>®</sup> and observed no differences in the timing of ovulation, number of ovulations, or number of corpora lutea that developed following Folligon<sup>®</sup> injection. It is critical to determine the reproductive performance, such as pregnancy and lambing rates, of ewes out of the breeding season that are treated with a CIDR<sup>®</sup>-estrogen-Folligon<sup>®</sup> protocol within commercial farm settings. There is currently intensive investigation of methods to improve controlled breeding techniques in ewes out of the breeding season. The sheep veterinarian and scientist will be able to incorporate the findings from this project into advice on reproductive management. A Master of Science student will be trained during this project, which will contribute to the development of highly qualified personnel to service both the sheep industry and agricultural industry as a whole. The sheep industry could potentially profit from the findings of this project.

*Deliverables:*

This project will result in practical knowledge of the effects of CIDR<sup>®</sup>-estrogen-Folligon<sup>®</sup> treatment on ovarian function, pregnancy rates, and lambing rates in ewes out of the breeding season so that the longer range impacts of this treatment regime on overall flock reproductive performance, including lamb production, can be predicted. As this treatment protocol is being developed for the Canadian sheep industry, it is important to determine how this treatment affects reproductive function in ewes. In addition, recommendations may arise from the work

that support new practices to improve reproductive performance out of the breeding season based on observations of ovarian function, pregnancy rate, and lambing rate in ewes in this trial.

*Objective:*

To compare the hormonal/ ovarian responses and pregnancy/ lambing rates of ewes treated with CIDR<sup>®</sup>-estrogen-Folligon<sup>®</sup> or CIDR<sup>®</sup>-Folligon<sup>®</sup> out of the breeding season.

*Methodology:*

A total of 200 ewes, out of the breeding season, from 6 commercially operating farms will receive CIDRs (Eazi-Breed<sup>™</sup> CIDR<sup>®</sup> for Sheep and Goats) for 12 d followed by an intramuscular injection of eCG (500 IU; Folligon<sup>®</sup>) at intravaginal device removal. Half the animals will be randomly assigned to receive an intramuscular injection of estrogen 6 d before intravaginal device removal. Following CIDR removal and eCG injection, ewes will be observed for estrus and bred to a ram. Pregnancy will be diagnosed using transrectal ultrasonography on day 40 after breeding. The number of lambs born to service will also be observed. On one-third of the animals on each treatment ovarian ultrasonography and blood sampling will be done on the day of CIDR insertion, estrogen injection, and eCG injection, and additional blood sampling also on day 3 (~estrus), and days 10, 17, and 20 days after intravaginal device removal (~days 7, 14, 17 of estrous cycle) to be assessed for reproductive hormones. Ovarian follicular and luteal dynamics will be determined from ultrasound records, such as the number and size of follicles.

*Proposed Project Start and Completion Date:* Spring 2012 – December 2013

*Communication & Technology Transfer:*

The findings will be presented as an oral or poster presentation at appropriate local, provincial, national, and/or international scientific proceedings and at least one article will be published in a peer-reviewed journal. The Canadian Sheep Breeders' Association (CSBA), Canadian Sheep Federation (CSF), Saskatchewan Sheep Breeders' Association (SSBA), Société des éleveurs de moutons de race pure du Québec (SEMRPQ), Sheep Producers Association of Nova Scotia (SPANS), and Pure Breed Sheep Breeders' Association of Nova Scotia (PBSBANS) will be informed of the findings, as they become available, through their newsletters, other communication media, or annual general meetings (AGMs). Related research has been presented in Sheep Canada Magazine, at the 2010 NS Sheep Producers Research Workshop, and PBSBANS AGMs.

*Applicant's Experience:*

The project leader is an Assistant Professor in the Department of Plant and Animal Sciences at the NS Agricultural College. David Barrett has a M. Sc. and Ph. D. in Veterinary Biomedical Sciences specializing in ruminant reproductive physiology and a B. Sc. with a major in nutrition. He has 4 publications on the effects of Veramix<sup>®</sup>-Folligon<sup>®</sup> treatment with or without estrogen treatment on important ovarian and hormonal characteristics (for example, ovulation, estrogen and progesterone production) in sheep. David Barrett has 12 years of experience in researching ruminant ovarian hormones and physiology. He has extensive experience in heat detection and synchronization and ultrasonography and measuring hormones.