# Ultrasonic Evaluation for the Time of Ovulation in Ewes Treated with Norgestomet and Pregnant Mare Serum Gonadotropin During the Spring and Fall Breeding Seasons

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## Story In Brief

Ovaries of sixty Dorset and Rambouilet X Dorset ewes were evaluated during Spring and Fall breeding seasons (n = 30 per season). Ewes were randomly assigned to one of three treatment groups (n = 20/group): controls were given prostaglandin $F_{2\alpha}$ 9 days apart, 10 day norgestomet implant only, and 10 day norgestomet implant + 500 IU i.m. pregnant mare serum gonadotropin (PMSG) at implant removal. Onset of estrus was detected with the HeatWatch Estrus Detection System. Ovaries were monitored via rectal ultrasonography every six hours to determine time intervals from implant removal to onset of estrus, implant removal to ovulation, and onset of estrus to ovulation. Ovulation occurred on average 70 to 80 hours after implant removal in ewes treated with norgestomet, and treatment with PMSG at implant removal advances time of ovulation 16-18 hours.

(Key Words: Synchronization, Ultrasound, Ewes, Ovulation, Norgestomet.)

## Introduction

In the sheep industry, use of artificial insemination (AI) could greatly enhance the efficiency of genetic gain as demonstrated in the dairy, beef and swine industries. While AI of ewes has been utilized, wide variability in conception and fertility rates have been problematic and hindered its acceptance in the industry. Laparoscopic AI (LAI) and Transcervical AI (TAI) are two artificial insemination techniques that have been utilized with some success in sheep. Laparoscopic AI has been somewhat effective, however, costs and required surgery has slowed reception for use by sheep producers. Transcervical AI could potentially be the most convenient practice for producers to use, but ease of the procedure using the recommended equipment and inconsistencies in fertility rates must first be revised before it will become widely practiced. In an overview by Salamon and Maxwell (1995) causes of reduced fertility rates with AI were method, depth of insemination, semen handling and treatment of ewes which are all key factors for successful fertility rates. Timing of insemination plays a key role in the success of artificial insemination as well. Utilization of progestins and follicular stimulants have provided reasonable techniques for estrous synchronization, but the time of ovulation relative to removal of the progestin is unclear. Insemination of ewes has been accomplished, on a timed basis, from when progestagen implant was removed, usually between 50-65 hours (Eppleston and Maxwell, 1995).

The goals of this study were: 1) To observe the time interval from onset of estrus to ovulation and its variability among ewes. 2) To observe the time interval from onset of estrus to ovulation in ewes synchronized with progestagens and follicular stimulants.

## Materials and Methods

Sixty, 5 to 7 year old, Dorset and Dorset x Rambouilet cross ewes were synchronized and onset of estrus and ovulation were recorded during Spring and Fall breeding (n = 30 per breeding season). Ewes were divided into three treatment groups (n = 20/group). Control (C) ewes were given a 5 mg dose of prostaglandin $F_{2\propto}$ 12 and 3 days prior to the beginning ( implant removal = day 0) of the trial. An implant only group (I) consisted of ewes who were implanted with norgestomet for 10 days. A third group of ewes (PI) were implanted with norgestomet for 10 days and given 500 IU Pregnant Mare Serum Gonadotropin upon removal of implants.

On the day of synchronized estrus, the ewe□s ovaries were observed transrectally using an Aloka 500 with a 7.5 MHz human prostate transducer (linear array, Corometrics Medical Systems, Inc., Wallingford, CT) while in dorsal recumbancy. Ovaries were evaluated at the onset of estrus, and every six hours until ovulation. Location of ovary, and size and location of the follicle on the ovary were recorded.

Exact time for initiation of estrous behavior was detected by activation of the HeatWatch system. Mounting by a vasectomized ram was recorded by a transducer adhered to the rump of the ewe that reported radiowave signals to the main computer program. The computer program recorded the time, duration and identity of the ewe mounted.

Onset of estrous (EST), ovulation (OVUL) and interval from onset of estrous to ovulation (INT) were examined for effects of season, treatment group and interaction by analysis of variance using GLM and least-square means procedures of SAS (1985).

## Results

Treatment comparisons are presented in Table 1. Only 7 out of 20 (35%) C ewes responded to the $PGF_{2\alpha}$ synchronized estrus, compared to 13 out of 20 (65%) I and 14 out of 20 (70%) PI ewes ($P<.10$). Onset of estrus (range=26-68h) and time interval form estrus to ovulation (range=12-62h) were not effected by breeding season ($P>.10$), however, time to ovulation after implant removal (range=54-100h) was longer ($P<.10$) during Fall breeding (79.3h) compared to Spring breeding (70.8h) in I and PI ewes. The mean estrus to ovulation interval was reduced ($P<.05$) in the C ewes (20.9h, range=16-27h) in comparison with I (35.9h, range=12-62h) and PI (38.0h, range=17-53h) ewes. Time of ovulation from implant removal was prolonged ($P<.10$) in the I group (79.4h, range=64-100h) compared with the PI group (70.6h, range=54-82h), and mean time of estrus onset after implant removal was also greater ($P<.10$) for I ewes (43.5h, range=26-68h) compared with PI ewes (34.9h, range=24-45h).

## Discussion

Time of ovulation after implant removal is shortened when using follicular stimulants (PMSG) in combination with progestins to synchronize ewes. Previous research has recommended that semen be placed in the reproductive tract 10 to 12 hours, not more than 36 hours prior to ovulation (Salamon and Maxwell, 1995). Present data indicates that ovulation after implant removal occurred between 70 and 80 hours. Since most timed AI is performed either 50 to 65 hours after implant removal or 20 to 30 hours after estrous detection, data from this study indicates that insemination is occurring at a time appropriate for sufficient fertility rates to be obtained.

In this study, Control ewes had a tendency to have a shortened time to ovulation after estrous detection (range=16-27h). This would indicate that insemination of natural estrous ewes should occur sooner after detection of estrus. Results from this study suggest 10 to 12 hours after estrous detection would be an appropriate time to obtain optimum fertility rates.

## Literature Cited

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**Table 1. Percent response to synchronization and means for EST[a], OVUL[b] and INT[c] by treatment in mature ewes[d].**

| Treatment | No. | % estrus | EST(h) | OVUL(h) | INT(h) |
|---|---|---|---|---|---|
| Control | 20 | 35[e] | N/A | N/A | 20.9[e] |
| Implant only | 20 | 65[f] | 43.5[e] | 79.4[e] | 35.9[f] |

| | | | | | |
|---|---|---|---|---|---|
| PMSG+implant | 20 | 70[f] | 34.9[f] | 70.6[f] | 38.0[f] |

[a]EST = implant removal to onset of estrus.

[b]OVUL = implant removal to ovulation.

[c]INT = onset of estrus to ovulation.

[d]5 to 7 years in age.

[e,f]LS Means within a column lacking a common superscript letter differ (P<.1).

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