1985

# Effect of Prostaglandin F2α Administered During Early Gestation in Ewes

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# EFFECT OF PROSTAGLANDIN F2α ADMINISTERED DURING EARLY GESTATION IN EWES

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SHEEP 85-4

## Summary

The effect of prostaglandin F2α (PGF) on gestation in the ewe following mating was evaluated during the 1983-84 and 1984-85 breeding-lambing season. Ewes were exposed to Suffolk (trial I) or Hampshire (trial II) rams and received 10 mg of PGF intramuscularly on either day 1, 2, 3, 4, 5, 6 or 7 postmating in trial I or on either day 2, 2 1/2, 3, 3 1/2, 4, 4 1/2, 5, 5 1/2, 6 or 6 1/2 postmating in trial II. Administration of PGF later than day 4 decreased the number of ewes lambing to the first mating but had no effect on subsequent fertility in either trial as compared with the controls.

(Key Words: Sheep, Prostaglandin F2α, Luteolysis, Abortion)

## Introduction

Estrous synchronization can be utilized in the sheep industry to shorten the breeding period, resulting in a decrease in the length of the lambing period. This decrease in the lambing period could increase the efficiency of a producer's labor by decreasing the number of weeks spent in the lambing barn. The synchronization procedure that is currently being practiced at South Dakota State University consists of the introduction of rams in the evening followed by daily observations for any breeding activity. On the morning of the 4th day (3 1/2 days after introduction of rams), all ewes that had not previously shown any breeding marks are injected intramuscularly with PGF. The purpose of this study was to evaluate what occurs if a ewe has conceived and no breeding mark was observed or recorded and she receives PGF. The administration of PGF may terminate pregnancy by causing regression of the corpus luteum, resulting in a reduction of progesterone necessary for the maintenance of pregnancy. A 2-year study consisting of one trial per year was conducted to determine if PGF administered during early gestation will lead to termination of pregnancy and, if so, to determine at what stage of early gestation PGF will terminate pregnancy.

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Prepared for Sheep Day, June 6, 1985.

## Experimental Procedure

### Trial I

During the 1983 fall breeding season, crossbred ewes were placed with a teaser ram and started on a flushing ration (3/4 lb. cracked corn per ewe per day on good pasture) 2 weeks prior to the start of the breeding period. Subsequent to this 2-week period, teaser rams were removed and intact Suffolk rams were placed with the ewes. Flushing continued for an additional 2 weeks after the start of the breeding period. Breeding marks were recorded daily at 24-hr intervals. Upon detection of a breeding mark, one-half of the ewes received 10 mg of PGF intramuscularly (im) on either day 1, 2, 3, 4, 5, 6 or 7 (day 1 = first day of observed mating). The other half of the ewes served as uninjected controls, corresponding to the respective treatment days. Ewes remained with the Suffolk rams for 48 hr after detection of mating and were then exposed to teaser rams for 2 weeks to observe any cyclic activity that may have occurred as a result of the PGF. After this exposure to the teaser rams, ewes were placed with Columbia clean-up rams, allowing 28 days of exposure to intact rams. Columbia rams were used as clean-ups to allow for differentiation of breed of lamb at parturition to determine which mating resulted in the full term pregnancy. Therefore, Suffolk-sired lambs were a result of the first mating and Columbia-sired lambs were from the clean-up matings.

### Trial II

Crossbred ewes were flushed and exposed to teaser rams during the 1984 fall breeding season in the same manner as in trial I. Ewes were then exposed to Hampshire rams and breeding marks were recorded twice daily at 12-hr intervals. Two-thirds of the ewes received 10 mg of PGF im on either day 2, 2 1/2, 3, 3 1/2, 4, 4 1/2, 5, 5 1/2, 6 or 6 1/2 of gestation (day 1 = first day of observed mating). The other one-third of the ewes served as control groups corresponding to either day 2, 3, 4, 5 or 6. Ewes remained with the Hampshire rams for 48 hr and were then exposed to teaser rams and Columbia clean-up rams as indicated in trial I.

## Results and Discussion

### Trial I

The number of ewes lambing as a result of the first mating to Suffolk rams is given in table 1. Administration of PGF with increasing day of gestation decreased the percentage of ewes lambing, which appeared to be linear, from 87.5% for day 1 to 0.0% for day 7. No differences were observed ($P>.05$) between control groups, so these groups were pooled for a total of 40 ewes lambing (72.7%) to the first mating. The percentage of ewes lambing that received PGF on days 1 through 4 did not differ ($P>.05$) from the pooled controls. However, of those ewes that received PGF on days 5, 6 or 7, fewer lambed ($P<.05$) as a result of the first mating compared to the pooled controls. This indicates that administration of PGF after day 4 of gestation is detrimental and may lead to termination of pregnancy.

TABLE 1. NUMBER OF EWES LAMBING AFTER RECEIVING PGF DURING EARLY GESTATION (TRIAL I)

| Treatment day | PGF No. lambing/no. exposed | Control No. lambing/no. exposed |
|---|---|---|
| 1 | 7/8 (87.5)[a] | 6/7 (85.7) |
| 2 | 7/8 (87.5) | 5/8 (62.5) |
| 3 | 4/8 (50.0) | 7/8 (87.5) |
| 4 | 3/6 (50.0) | 6/8 (75.0) |
| 5 | 2/7 (28.6)* | 6/8 (75.0) |
| 6 | 1/6 (16.7)* | 5/8 (62.5) |
| 7 | 0/8 ( 0.0)* | 5/8 (62.5) |
| Total | | 40/55 (72.7) |

[a] Percentage of ewes lambing to first service is given in parenthesis.

* Differ from pooled controls ($P<.05$).

TABLE 2. TOTAL NUMBER OF EWES LAMBING, INCLUDING EXPOSURE TO COLUMBIA RAMS (TRIAL I)

| Treatment day | PGF No. lambing/no. exposed | Control No. lambing/no exposed |
|---|---|---|
| 1 | 8/8 (100.0)[a] | 6/7 ( 85.7) |
| 2 | 8/8 (100.0) | 5/8 ( 62.5) |
| 3 | 7/8 ( 87.5) | 8/8 (100.0) |
| 4 | 5/6 ( 83.3) | 8/8 (100.0) |
| 5 | 7/7 (100.0) | 6/8 ( 75.0) |
| 6 | 5/6 ( 83.3) | 8/8 (100.0) |
| 7 | 5/8 ( 62.5) | 7/8 ( 87.5) |
| Total | 45/51 ( 88.2) | 48/55 ( 87.3) |

[a] Percentage of ewes lambing is given in parenthesis.

Table 2 summarizes the overall performance of ewes lambing as a result of the entire breeding period, including exposure to the Columbia rams. Of those ewes that received PGF, 45 of 51 lambed (88.2%) compared to 48 of 55 (87.3%) for the control groups. These data indicate that PGF had no effect on the fertility of subsequent matings.

Trial II

The number and percentage of ewes lambing as a result of the first mating for trial II are given in table 3. No differences were found between control groups so they were pooled for a total of 29 ewes lambing out of 48 (60.4%) that were exposed. Comparison with the pooled controls revealed that treatment with PGF on days 5, 5 1/2, 6 and 6 1/2 reduced ($P<.05$) the number of ewes that lambed as a result of the first mating. This supports the results obtained in trial I. As in trial I, the overall lambing percentage of ewes receiving PGF was similar (85.7% vs 83.3%) to the controls (table 4).

The results of trials I and II show that administration of 10 mg PGF after day 4 of gestation is detrimental to maintenance of pregnancy. However, the administration of PGF does not appear to have any effect on subsequent fertility. These data reveal that the estrous synchronization procedure outlined previously is valid and, if followed as recommended, will have no effect on existing pregnancies.

TABLE 3. NUMBER OF EWES LAMBING AFTER RECEIVING PGF DURING EARLY GESTATION (TRIAL II)

| Treatment day | PGF No. lambing/no. exposed | Control No. lambing/no. exposed |
|---|---|---|
| 2 | 8/8 (100.0)* | 6/10 (60.0)[a] |
| 2 1/2 | 5/8 ( 62.5) | |
| 3 | 6/9 ( 66.7) | 8/10 (80.0) |
| 3 1/2 | 6/10 ( 60.0) | |
| 4 | 8/10 ( 80.0) | 5/9 (55.6) |
| 4 1/2 | 5/10 ( 50.0) | |
| 5 | 0/0 ( 0.0)* | 5/9 (55.6) |
| 5 1/2 | 1/10 ( 10.0)* | |
| 6 | 1/8 ( 12.5)* | 5/10 (50.0) |
| 6 1/2 | 0/9 ( 0.0)* | |
| Total | | 29/48 (60.4) |

[a] Percentage of ewes lambing to first service is given in parenthesis.
* Differ from pooled controls (P<.05).

TABLE 4. TOTAL NUMBER OF EWES LAMBING, INCLUDING EXPOSURE TO COLUMBIA RAMS (TRIAL II)

| Treatment day | PGF No. lambing/no. exposed | Control No. lambing/no. exposed |
|---|---|---|
| 2 | 8/8 (100.0)[a] | 9/10 (90.0) |
| 2 1/2 | 7/8 ( 87.5) | |
| 3 | 9/9 (100.0) | 9/10 (90.0) |
| 3 1/2 | 7/10 ( 70.0) | |
| 4 | 9/10 ( 90.0) | 7/9 (77.8) |
| 4 1/2 | 8/10 ( 80.0) | |
| 5 | 7/9 ( 77.8) | 7/9 (77.8) |
| 5 1/2 | 8/10 ( 80.0) | |
| 6 | 8/8 (100.0) | 8/10 (80.0) |
| 6 1/2 | 7/9 ( 77.8) | |
| Total | 78/91 ( 85.7) | 40/48 (83.3) |

[a] Percentage of ewes lambing is given in parenthesis.