1989

Lambing Performance of Ewes Treated with Melatonin of Artificial Photoperiod

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LAMBING PERFORMANCE OF EWES TREATED WITH MELATONIN OR ARTIFICIAL PHOTOPERIOD

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SHEEP 89-1

Summary

The effectiveness of photoperiod control or melatonin administration to induce fertile mating in July and August was evaluated in two trials. Ewes were exposed to one of four treatments: natural daylight (ND); natural daylight plus a Regulin[1] implant (ND+RI); natural daylight plus 3.5 mg melatonin per day in their feed (ND+M) or 8 hours of light and 16 hours of dark per 24-hour period (8L:16D). Trial 1 was initiated June 1, 1987, and trial 2 June 1, 1988. Fertile rams were introduced July 1 in both years and remained through August 26 or 23 for 1987 and 1988, respectively. Treatment resulted in a higher percentage of ewes lambing than for controls. The 8L:16D group also had an earlier lambing date than the other three groups. Treatment had no significant effect on lambs per ewe lambing, although there was a trend for control ewes to have a slightly lower and 8L:16D ewes a slightly higher number of lambs per ewe lambing.

(Key Words: Out-of-season breeding, ewe, photoperiod, melatonin.)

Introduction

Seasonality of breeding in the ewe is controlled primarily by the length of the dark phase of the 24-hour day. Melatonin levels increase during this dark phase. The daily length of time of elevated melatonin secretion appears to be the trigger that signals the normal fall breeding season. Various light-dark regimens have resulted in varied estrous response. A treatment of 8 hours of light and 16 hours of dark (8L:16D) has, in general, given the best response. Administration of exogenous melatonin should mimic the natural secretion associated with the extended dark phase. This study examined the effectiveness of light control or melatonin administration to induce cyclic reproductive activity during July and August.

Experimental Procedure

Trial 1. Forty-one Hampshire x Finn-Targhee (HFT) and 42 Finn-Dorset x Targhee (FDT) ewes, aged 2 to 3 years, were randomly allotted to one of four treatments on June 1, 1987: (1) natural daylight plus a melatonin implant [Regulin[1]] (ND+RI); (2) artificial photoperiod consisting of 8 hours light and 16 hours dark (8L:16D); (3) natural daylight (ND); or (4) natural daylight plus 3.5 mg melatonin fed per ewe daily (ND+M).

The ewes received 4.5 lb of a pelleted diet daily consisting of 74.5% corn cob, 24.5% dehydrated alfalfa meal and 1.0% molasses. In addition they received .25 lb of rolled corn per head daily. ND, ND+RI

Prepared for Sheep Day, June 9, 1989.

[1]Regulin® furnished courtesy of Gene Link Australia, Inc.

and ND+M ewes were maintained outdoors in drylot under ambient conditions as a single group.

ND+M ewes were separated daily at 4 p.m. to receive their rolled corn to which the melatonin had been added. As soon as the corn was consumed, the outside group was commingled and fed the pelleted portion of their daily diet.

The 8L:16D group was maintained in a temperature (23.9 °C) and light controlled room in the Animal Science Complex. The lights came on at 1300 hours and went off at 2100 hours. All groups were given fence line exposure to intact rams starting June 1. Semen-tested, fertile rams were placed with the ewes from July 1 to August 26. Ewe weights were taken at 28-day intervals, starting June 1 and ending with termination of the study on August 26. Data recorded at lambing time included ewe number, date of lambing, type of birth and sex and birth weight of lambs.

Trial 2. Trial 2 was a replicate of trial 1 and started June 1, 1988, and ended August 23. This trial used the same ewes that were used in 1987. At lambing time in the fall of 1988, 74 ewes remained with approximately equal numbers of FDT and HFT ewes. Ewes were assigned to the same treatments they were on the previous year to eliminate any crossover effects from the previous year's treatments. All other procedures were conducted similar to those in trial 1.

Results and Discussion

Trial 1. Lambing results are shown in table 1. No significant differences (P>.05) were noted in percentage lambing, mean lambing date or number of lambs born. A higher percentage of the control ewes (ND) lambed than expected. The ND ewes did have a slightly lower number of lambs born and the 8L:16D group appears to continue to have the highest percentage lambing. The relative low number of ewes per treatment, no doubt, contributes to the inability to detect significant treatment effects with the numerical differences observed.

Trial 2. Lambing results for trial 2 are shown in table 2. A higher percentage (P<.05) of treated ewes lambed than controls (ND). The number of lambs born per ewe lambing was numerically lowest for ND ewes, although not significantly different (P>.05). Light control ewes had the earliest average lambing date. No difference was noted between the other groups.

TABLE 1. EFFECT OF TREATMENT ON MEAN LAMBING DATE, PERCENTAGE LAMBING AND NUMBER OF LAMBS BORN PER EWE LAMBING - 1987

Treatment	Total no. ewes	Percent lambing	Lambing date[a]	No. lambs born/ ewe lambing
ND + RI	20	90	354	1.72
8L:16D	21	100	350	1.67
ND	21	81	354	1.47
ND + M	21	81	351	1.71

[a] Gregorian date. January 1 = 1.

TABLE 2. EFFECT OF TREATMENT ON MEAN LAMBING DATE, PERCENTAGE LAMBING AND NUMBER OF LAMBS BORN PER EWE LAMBING - 1988

Treatment	Total no. ewes	Percent lambing	Lambing date[a]	No. lambs born/ ewe lambing
ND + RI	20	95[a]	359[a]	1.65
8L:16D	19	89[a]	348[b]	1.84
ND	19	63[b]	364[a]	1.21
ND + M	16	93[a]	361[a]	1.81

[a,b] Means with different superscripts within traits differ (P<.05).

When the data from both years were combined, more ($P<.05$) of the treated ewes lambed than control ewes. Lambing percentages were 95, 92.5 and 86.4% for the 8L:16D, ND+RI and ND+M groups, respectively, compared to 72.5% for the ND ewes. The lower percentage lambing in 1988 compared to 1987 for control ewes, 63 vs 81%, may be attributed to the extremely hot weather encountered during breeding in 1988. Lambing date combined over both years was earlier ($P<.05$) for the 8L:16D treatment compared to the other three groups. Data from these two trials indicate that altering photoperiod to simulate short days or treatment with melatonin increased the percentage of ewes lambing from July-August breeding. The altered photoperiod resulted in the earliest average lambing date and a slightly higher lambing rate per ewe lambing.