OUT OF SEASON BREEDING IN EWES WITH NORGESTOMET, PMSG AND hCG

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Story in Brief

One-hundred-forty-one ewes were utilized to examine the effectiveness of a 7 or 9 day norgestomet implant combined with 400 IU of pregnant mare serum gonadotropin (PMSG) + 200 IU of human chorionic gonadotropin (hCG) injection at implant removal for out of season breeding. Norgestomet + PMSG-hCG treated ewes (n=95) were compared to an untreated control (n=46) group. Synchronized pregnancy rate (number ewes lambing due to synchronized estrus/total number ewes treated) was 44.3% while synchronized lambing rate (number of lambs born due to the synchronized estrus/number of ewes lambing) was 186% for the norgestomet + PMSG-hCG treated ewes compared to 6.6% and 167%, respectively, for controls. The norgestomet + PMSG-hCG synchronization treatment appears to have potential for out of season breeding.

(Key Words: Ewes, Norgestomet, PMSG, hCG, Synchronization.)

Introduction

The seasonality of reproduction in sheep has a major impact on when lambs reach market and eventual profitability of the operation. Historically, market lamb prices are at a high in the spring. If ewes could be successfully bred out of season so as to lamb in the fall, producers could sell lambs in the spring and take advantage of the high market prices.

Numerous experiments have been conducted using progestogens and pregnant mare serum gonadotropin (PMSG - which stimulates follicle development) for out of season breeding (Hulet, 1968; Carpenter and Spitzer, 1981; Fitch et al., 1986) although results have varied. Recent experiments (Umberger et al., 1991; Washburn and Esbenshade, 1991) have examined the effectiveness of combining progestogens with PMSG and human chorionic

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gonadotropin. Human chorionic gonadotropin (hCG), a hormone with luteinizing hormone (LH) like action, provides an artificial LH-like surge which is important in ovulation. Therefore, by combining hCG with PMSG, ovulation rate should be increased compared to PMSG alone.

The objective of this experiment was to evaluate the effectiveness of a progestogen, norgestomet, with PMSG-hCG for out of season breeding in a farm flock type operation.

Materials and Methods

Four hundred, yearling and 6 years of age or older, Rambouillet, Dorset and Dorset x Rambouillet ewes were placed with fertility tested Polypay rams on May 21, 1991 to began a nonsynchronized out of season breeding program. Ewes were divided into 2 groups (n=200/group) with a ram to ewe ratio of 1 to 20. Rams were fitted with marking harnesses and ewes were checked daily to determine breeding dates. On June 11, the two groups of ewes were moved through the working facilities. Ewes which had no previously recorded breeding date or were not freshly marked were assigned to either an estrous synchronization treatment or remained untreated. Ewes were randomly chosen so that two ewes were synchronized while one ewe remained untreated, resulting in a total of 95 synchronized ewes and 46 untreated ewes in the two groups.

Estrous synchronized ewes were implanted subcutaneously in the ear with a norgestomet implant (CEVA Laboratories), while untreated ewes received nothing. Ewes were returned to their respective groups and pastured with rams. Implants were removed from half the ewes in each group 7 days later and the remaining ewes 9 days later. Ewes were injected with 400 IU of PMSG and 200 IU of hCG at implant removal. Ewes were returned to their respective group immediately following implant removal and remained with controls and rams for 28 days. Previous research (Fitch et al., 1986) indicated no significant difference in pregnancy or lambing rates in ewes treated with a 7 or 9 day norgestomet implant combined with PMSG at implant removal. Therefore, by staggering implant removal ram breeding power could be maximized to adequately service the large numbers of ewes expected to express heat in the days following implant removal.

The average condition score of the ewes utilized for the synchronization trial was 2 (1 - very thin: 3 - average; 5 - very fat). Furthermore, since the majority of ewes utilized for the estrous synchronization trial had not been serviced during the previous 21 days of the breeding season they were assumed to be anestrous. Therefore, this group of ewes should have served as a good

model to measure the effectiveness of the norgestomet + PMSG-hCG synchronization treatment for out of season breeding.

Synchronized pregnancy rate (number of ewes lambing due to synchronized estrus divided by total number ewes treated), synchronized lambing rate (number of lambs born due to the synchronized estrus divided by number ewes lambing), breeding season pregnancy rate (number ewes lambing divided by total number ewes treated) and breeding season lambing rate (number of lambs born divided by the number ewes lambing) were the dependent variables. Synchronized estrus is the 7 day period following implant removal. Treatment and age were the independent variables. Breed, implant length (7 or 9 day) and group were not significant sources of variation so they were not used in the final analysis.

Results and Discussion

A greater percentage (P<.01) of norgestomet + PMSG-hCG treated ewes (44.3%) became pregnant during the synchronized estrus than did controls (6.6%; Table 1). Only three more norgestomet + PMSG-hCG treated ewes became pregnant during the remainder of the breeding season with no more control ewes became pregnant (Table 1). Because only a small number of control ewes becoming pregnant during the breeding season it appears that most ewes were anestrous at initiation of treatment and that estrus was induced in almost one half the norgestomet + PMSG-hCG treated ewes. These results are slightly lower than those reported by Umberger et al., (1991; 51.0%) in ewes synchronized out of season with a 10 day melengestrol acetate feeding with 400 IU PMSG + 200 IU hCG injected the last day of melengestrol acetate feeding. In the present study, ewe condition was thin. Fitch et al., (1986) reported a 40.0% pregnancy rate for very thin to thin condition ewes synchronized with a 7 or 9 day norgestomet implant and PMSG. Umberger et al., (1991) did not report ewe condition.

Synchronized (186%) and breeding season (182%) lambing rates were not different for the norgestomet + PMSG-hCG treated ewes compared to the controls (167%) for both measures, respectively (Table 1). Fitch et al., (1986) reported a similar lambing rate (186%) in ewes synchronized with a 7 or 9 day norgestomet implant + PMSG. A note of interest, the lambing rate for the natural serviced ewes not utilized for the synchronization trial was approximately 130-140%. This suggest that the norgestomet + PMSG-hCG treatment increased ovulation rates compared to untreated animals. However, actual ovulation rates were not determined for either treatment group in this experiment.

Table 1. Effect of treatments on pregnancy rates and lambing rates in ewes bred out of season.

	Synchronized			Breeding Season	
Trt.	No.	Preg[a] rate (%)	Lambing[b] rate (%)	Preg[c] rate (%)	Lambing[d] rate (%)
Control	46	6.6[e]	167	6.6[e]	167
Treated	95	44.3[f]	186	47.4[f]	182

[a] Synchronized pregnancy rate is the number of ewes lambing due to synchronized estrus/total number of ewes treated.
[b] Synchronized lambing rate is the number of lambs born due to synchronized estrus/number of ewes lambing.
[c] Breeding season pregnancy is the number ewes lambing/total number ewes treated.
[d] Breeding season lambing rate is the number of lambs born/number of ewes lambnig.
[e,f] Values in the same column not sharing a common suerscript dilter ($P<.01$).

Ewe age influenced ($P<.01$) the percentage of ewes that became pregnant during the synchronized estrus (Table 2). More yearling ewes became pregnant (56.9%) to the synchronized estrus than did ewes 6 years of age or older (29.6%). These results agree with those reported by Fitch et al., (1986) for similar age groups synchronized with a 7 or 9 day norgestomet implant with PMSG. Lambing rate was not different between age groups.

One concern in treating ewes with PMSG and hCG is increased ovulation rates which may result in an extreme number of triplet or quad births. Lambing frequency data of the norgestomet + PMSG-hCG treated ewes is presented in Table 3. Of the 42 ewes lambing, 85.8% had either a single or twin birth. Therefore, dosage level of PMSG-hCG appears to be adequate to keep triplet and quad births to a minimum. However, as stated earlier, the actual ovulation rates were not determined in this experiment.

Lambing distribution for the norgestomet + PMSG-hCG treated ewes conceiving to the synchronized estrus is presented in Figure 1. All ewes

Table 2. Effect of ewe age on response to norgestomet + PMSG-hCG.

Age(yr)	Number of ewes	Synchcronized[a] pregnancy rate (%)	Synchronized[b] lambing rate (%)
1	51	56.9[c]	196
6+	44	29.6[d]	169

[a] Synchronized pregnancy rate is the number of ewes lambing due to synchronized estrus/total number of ewes treated.
[b] Synchronized lambing rate is the number of lambs born due to synchronized estrus/number of ewes lambing.
[c,d] Values in the same column not sharing a common suerscript dilter ($P<.01$).

Table 3. Lambing frequency of norgestomet + PMSG-hCG treated ewes conceiving to the synchronized estrus.

Type of birth	Number of ewes	Proportion of total ewes (%)
Singles	12	28.6
Twins	24	57.2
Triplets	5	11.9
Quads	1	2.3

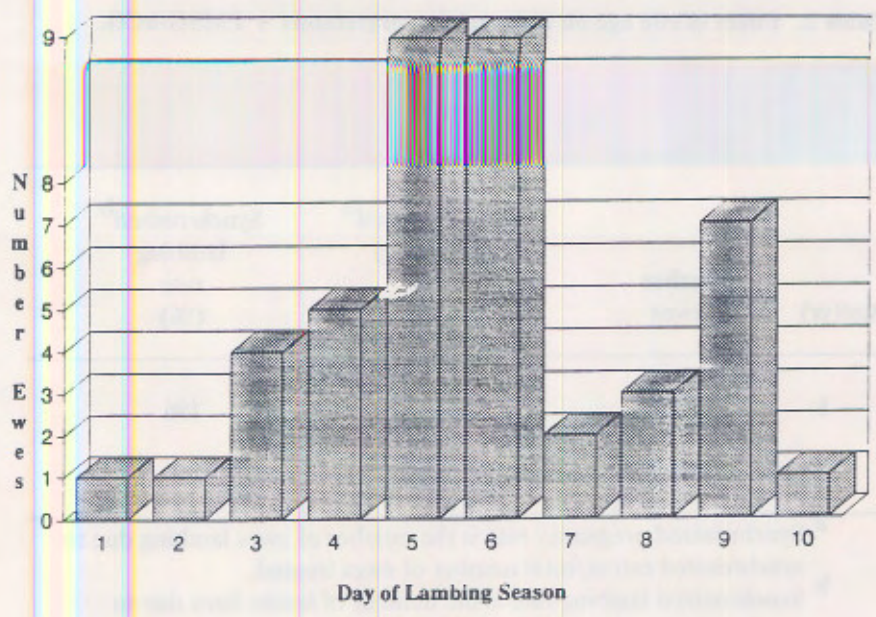

Figure 1. Lambing distribution of norgestomet + PMSG-hCG treated ewes conceiving to the synchronized estrus.

(n=42) lambed over a 10 day period with 21.4% lambing on the peak day. Therefore, these results suggest that there is variation in the lambing distribution of estrous synchronized ewes and concern for all ewes lambing on the same day is not warranted. Furthermore, a short lambing season, a result of estrous synchronization, would allow a producer to better manage his/her time and labor resources during the lambing season.

These results indicate that out of season breeding with norgestomet + PMSG-hCG can be an effective method of synchronizing estrus although its overall effectiveness may be limited by ewe condition and age. Furthermore, it appears that lambing rates can be increased in norgestomet + PMSG-hCG treated animals over non treated ewes. Intensively managed or farm flock operations would be good candidates for this type of program.

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