

REPRODUCTIVE PHYSIOLOGY

Response of Cows to Repeated Treatments With PMS

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Story in Brief

A single injection of 2000 IU PMS was given on day 17 of the estrous cycle to 14 Angus cows that had never previously been treated with PMS, and to 11 Angus cows that had received PMS the previous year. A third group of 11 cows that had been treated with PMS the previous year received 1500 IU PMS on day 5 and 2000 IU PMS on day 17 of the cycle.

Treatment with PMS the previous year reduced the superovulatory response of cows to PMS. Cows that had never been previously treated had a significantly greater ovulation rate (5.3 *vs* 1.8) a wider range in ovulations (1-16 *vs* 0-5) and more cows ovulating four or more eggs (45 percent *vs* 9 percent) than did cows that had been previously treated. Although the differences were not significant, cows previously treated with PMS and given only a single injection of PMS on day 17 had a slightly greater ovulation rate (1.8 *vs* 1.4) and more cows ovulated two or more eggs (45 percent *vs* 18 percent) than did similar cows receiving PMS on both day 5 and day 17.

The results obtained in this study indicated that treatment with PMS one year will adversely affect the response to PMS the subsequent year. It further suggests that this adverse effect is more marked in cows receiving the sequence of two PMS treatments.

Introduction

The induction of multiple births in beef cows by the injection of pregnant mare serum (PMS) has been the subject of considerable research by the Oklahoma Agricultural Experiment Station. This research has been conducted since 1968 in cooperation with the U.S.D.A. at the Southwest Livestock and Forage Research Station. It has demonstrated that approximately one cow in every four treated with a sequence of two injections of PMS can be expected to respond with a multiple birth. However, it has also revealed a

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number of problems associated with PMS treatments that greatly limit its use in practical production.

The results obtained in recent years has suggested that PMS injections given one year may adversely affect the superovulatory response of cows to a sequence of two PMS injections given the following year. This was reported in the 1977 Animal Science Research Report (MP-101, page 157). A marked refractoriness to repeated PMS treatments would greatly limit the use of this technique in practical production since cows could be treated only once in their life. Therefore, it was important that this limitation be investigated further to see whether it applied only to the sequence of two PMS injections or would also be a limiting factor in the response of cows to a single injection of PMS.

The purpose of this experiment was to compare the response to a single injection of PMS in cows that had never been previously injected with PMS to those that had received PMS the previous year. In addition a comparison was made of the response of cows that had been previously treated with PMS that were given either a single injection or a sequence of two PMS injections.

Materials and Methods

This experiment utilized 36 lactating Angus cows that were observed in heat between May 8 and July 3, 1977. The cows were maintained on native grass pastures at the Southwest Livestock and Forage Research Station, El Reno. Fourteen of the cows had never been previously treated with PMS. The remaining 22 cows had received a sequence of two PMS injections (1500 IU on day 5 and 2000 IU on day 17) the previous year.

Starting May 5, the herd was checked twice daily for the occurrence of heat. Heat detection was aided by the use of vasectomized bulls wearing chin ball markers. When the cows that had previously been injected with PMS were detected in heat, they were alternately assigned to either Treatment II or III. All cows that had not been previously treated with PMS were assigned to Treatment I.

The three treatments used in this experiment were: Treatment I (no previous PMS) 2000 IU PMS on day 17 of the cycle designating day of heat as 0; Treatment II (previous PMS) 2000 IU PMS on day 17; Treatment III (previous PMS) 1500 IU PMS on day 5 and 2000 IU PMS on day 17. All injections were made subcutaneously in the shoulder region. Following the day 17 injection, all cows were fitted with a K-Mar heat detector patch and placed in a lot with a fertile bull. The bull was also equipped with a chin ball marker to further aid in detection of heat following treatment.

The PMS used in this study was a lyophilized product that had been obtained in bulk from Argentina in 1973 and standardized to a potency of 200 IU/mg. It had been stored continuously in a freezer at -10°C . About one month prior to use, it was diluted and assayed for potency in 21 day old female

Table 1. Response following PMS treatment of cows with or without a history of previous PMS treatments

Item	Treatments		
	I	II	III
	No previous PMS	Previous PMS	
	PMS day 17	PMS day 17	PMS days 5 and 17
Number of cows	14	11	11
No. observed in heat	12	10	8
Interval - PMS to heat, days	4.5	4.5	5.4
Ovulation rate	5.3	1.8	1.4
Ovulation range	1-16	0-5	0-5
No. of cows with:			
0 ovulation	0	1	3
1 ovulation	7	5	6
2 ovulations	1	2	0
3 ovulations	0	2	0
4+ ovulations	6	1	2

rats using the World Health Organization Standard PMS preparation. For purposes of treatment the PMS was dissolved in sterile saline so 5 ml would contain the quantity required per injection. Ovulation rates were determined in all cows by high lumbar laparotomies performed seven to fourteen days after breeding.

Results and Discussion

The response of the cows to the PMS treatments is presented in Table 1. There were no differences in the estrual response of the two groups of cows (Treatments I and II) that received only a single injection of PMS. However, slightly fewer of the cows receiving the sequence of two PMS injections (Treatment III) were observed in heat (73 percent compared to 86 percent and 91 percent for Treatments I and II, respectively). In addition cows receiving PMS on both days 5 and 17 had a slightly longer interval from treatment to standing heat. Since these differences were not statistically significant they can only be considered to be trends that may or may not represent real differences between the treatments.

The superovulatory response of the cows to PMS as reported in Table 1 does appear to be adversely influenced by PMS treatment the previous year. The cows of Treatment I that had never previously been treated with PMS had an average ovulation rate of 5.3 eggs. This was significantly greater than the average ovulation rates of the cows of Treatments II (1.8) and III (1.4) that had been previously treated with PMS.

Another indication of the enhanced superovulatory response of the cows is the range of ovulations. The range for the cows that had never previously received PMS was 1-16, compared to 0-5 for the two groups that had received PMS the year before. A total of 50 percent of the cows of Treatment I had superovulated, that is ovulated two or more eggs. This was similar to the response observed in Treatments II with 45 percent.

Although the ovulation of four or more eggs is not desirable from the standpoint of the production of multiple births, it does indicate increased superovulatory response of the cow to PMS. The fact that 43 percent of the cows of Treatment I had four or more ovulations, compared to only 9 percent of the cows of Treatment II appears to be strong evidence that previous treatment with PMS reduces the superovulatory response to later treatments.

It is obvious that the previous treatment with PMS reduced the superovulatory response of the cows in this study to PMS. The data reported in Table 1 also suggests that that response was further reduced in cows that received PMS on day 5 as well as day 17. Of the cows previously treated with PMS, 45 percent superovulated when treated only on day 17 compared to only 18 percent of those receiving PMS on both day 5 and day 17. The reasons for this reduced response could not be determined from the data obtained in this study.

The results obtained in this study confirms the trends observed in earlier studies. The treatment of cows with PMS one year will adversely affect their response to PMS in the succeeding year. A greater reduction in response results when the cows are treated with a sequence of two injections the second year. Therefore, the sequence of two injections of PMS should be given only to cows that have never been previously treated with PMS. Once a cow has been treated with PMS she should receive only a single injection in subsequent years.