THE EFFECT OF HORMONAL TREATMENT ON OESTROUS CYCLE AND OVULATION IN COWS AND BUFFALOES

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The efficiency of hormonal treatment for anoestrus was studied on 154 dairy cows and buffaloes of the West Pakistan Agricultural University, Lyallpur. Various doses of Pregnant Mare Serum (P.M.S.) were tried with or without prior treatment with progesterone.

Treatment with progesterone alone (25 mg. daily for 15 days) did not appear to bring the animals in heat or cause ovulation. Development of follicles was, however, noted on palpation. The administration of P.M.S. after progesterone treatment was necessary for inducing oestrus and ovulation.

The frequency of animals responding to the same dose of P.M.S. was different in breeding and off-breeding seasons for both cows and buffaloes. The following doses of P.M.S. resulted in a high percentage of response and high conception rate without twining: heifers: 500 I.U.; cows throughout the year: 1500 I.U.; buffaloes during breeding season: 2000 I.U.

Time taken for showing heat symptoms after P.M.S. treatment was 3-4 days and varied with doses of P.M.S., condition of ovaries, and the season. The drop observed in milk yield after P.M.S. treatment was between quarter to half a pound and was not significant statistically.

INTRODUCTION

Prolonged anoestrus in cows and buffaloes prevents them from producing a calf every year and thus results in a long dry period. This is one of the biggest causes of low return to livestock owner. The cost of maintenance of the cow with fewer calves and long-dry period is a detriment to the economical production of livestock.

Derangements in oestrus result in low breeding efficiency in livestock. For economical animal husbandry, it is essential to make the oestrous cycle regular. This is possible by inducing oestrus and follicular growth within 2-3 months after calving.

REVIEW OF LITERATURE

Under natural conditions, animals tend to procreate at a season of the year which is suitable for survival. Buffaloes and cows are polyoestrous but

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they show their high sexual activity in a particular season, *i.e.*, in September-March and April-July, respectively (Majeed *et. al.*, 1966). Such a pattern is not due to one factor alone, but there are several known factors, relating to seasonal breeding, including day length, temperature, humidity, nutrition, feeding and management. Any of these factors may suppress the secretion of active hormones and put the animals in an anoestrus phase.

Several workers have studied the effect of administration of Pregnant Mare Serum (P.M.S.) and progesterone alone or in combination. Hammond and Bhattacharya (1944) observed twin and triplet calves by using the extract of horse pitutary and P.M.S. They explained that the response of treatment appeared to depend upon the degree of anoestrus. Hafez (1953) induced ovulation in 9 anoestrous buffaloes with 1200, 1800, 2400 I. U. of P.M.S. Sestak (1960) also has advised to give P.M.S. to anoestrous cows.

Hussain and Mukherji (1956) tried to induce ovulation with 375-700 I.U. of gonadotrophin in Tharparker heifers. They reported that no ovulation took place and the formation of mature follicles was observed. Kaay *et al.* (1941) reported hypertrophy of ovaries in heifers with P.M.S. treatment.

The time taken for the onset of heat varied according to the dosage level of P.M.S. Hafez (1953) reported it to be 96-144 hours for a dosage ranging from 1200-2400 I.U. of P.M.S. Luktuke and Bhattacharya (1948) stated that it was 48-96 hours for the doses of 1000-2000 I. U. of P.M.S.

Timberger and Hansel (1955) treated 30 cows with 50, 75 and 100 mg. of progesterone for 8-13 days. There was no significant effect on oestrus. Graham and Dray (1954) reported that 6 cows were given 50 gm. of progesterone daily for 5-20 days and all the cows came in heat. Ulberg *et al* (1951) reported that a daily dose of 12.5 to 25 mg. usually suppressed heat in heifers, but some ovulations were also recorded when injections were stopped.

MATERIAL AND METHODS

Buffaloes and cows used for this project were freshened at the Dairy Farm of the West Pakistan Agricultural University, Lyallpur. Some animals were also treated at the request of the owners. The total number treated was 154.

The hormones used for this study were the pregnant mare serum and oily solution of progesterone. The animals were first examined clinically to detect any abnormality of the genital organs, and to determine the stage of oestrous cycle as indicated by the corpora lutea and the follicles in the ovaries. Diagnosis of pregnancy was made by rectal examination of the reproductive organs.

TABLE 1.—*The Effect of Various Doses of PMS and Progesterone During Breeding Season (B.S.) and Off-Breeding Season (O.B.S.)*

	P_0	S_{500}	P_0	S_{1000}	P_0	S_{1000}	P_0	S_{2000}	P_{25}	S_{1000}
	B.S.	O.B.S.	B.S.	O.B.S.	B.S.	O.B.S.	B.S.	O.B.S.	B.S.	B.S.
Cows Treated	..	..	..	6	5	18	5	..	..	5	5
Same in heat	..	..	..	4	2	15	4	..	..	0	3
Conceived at 1st insemination	..	..	..	3	2	14	4	..	..	0	3
Conceived at 2nd insemination	..	..	..	1	..	..	..	..	..	..	..
Conceived at 3rd insemination	..	..	..	..	..	1	..	..	..	..	..
Cow heifers treated	..	6	10	..	..	..	..	..	..	5	5
Came in heat	..	6	5	..	..	..	..	..	..	3	5
Conceived at 1st insemination	..	6	5	..	..	..	..	..	..	2	5
Conceived at 2nd insemination	..	1	..	..	..	..	..	..	..	..	..
Buffaloes treated	..	..	..	8	4	11	12	6	5	5	5
Came in heat	..	..	..	4	2	7	5	6	4	0	3
Conceived at 1st insemination	..	..	..	3	2	6	4	6	4	0	3
Conceived at 2nd insemination	..	..	..	1	..	1	1	..	..	..	..
Buffalo heifers treated	..	10	8	..	..	..	..	..	..	5	5
Came in heat	..	9	4	..	..	..	..	..	..	0	3
Conceived at 1st insemination	..	8	3	..	..	..	..	..	..	0	3
Conceived at 2nd insemination	..	1	1	..	..	..	..	..	..	..	..

P_0, P_{25}=0, 25 mg. of progestrone daily for 15 days.

S_0,...., S_{2000}=0,...., 2000 I.U. of P.M.S.

TABLE 2.—*Average Time (Hours) Taken for the Onset of Heat After the PMS Treatment.*

	PMS 500 I.U.		PMS 1000 I.U.		PMS 1500 I.U.		PMS 2000 I.U.	
	B.S.	O.B.S.	B.S.	O.B.S.	B.S.	O.B.S.	B.S.	O.B.S.
Cows	..	..	62.4 to 74.4	84.00 to 96.00	138.85 to 150.85	72.00 to 84.00	..	..
Cow heifers	46.00 to 59.60	113.60 to 124.80	..	..	..	..	..	..
Buffaloes	..	..	84.00 to 96.00	96.00 to 108.00	73.71 to 85.71	204.00 to 213.00	85.00 to 70.00	81.00 to 93.00
Buffalo heifers	63.33 to 69.33	93.00 to 105.00	..	..	..	..	..	..

O.B.S. Off-breeding Season.
B.S. Breeding Season.

Records on onset of heat, time of onset of heat, daily milk yield before and after injection and conception rate were kept.

RESULTS AND DISCUSSION

Buffalo-heifers and cow-heifers of various ages were treated with 500 I.U. of P.M.S. There was 100 per cent response to treatment during breeding season and 50 per cent during off-breeding season in cow-heifers (Table I). Three Tharparker heifers of 1½ years, 2 years and 2½ years were treated at the Dairy Farm. The heifers of 2½ years and 2 years of age came in heat and conceived. The other heifer of 1½ year age showed only the formation of large follicles. The results of treatment in buffalo-heifers were also encouraging. Ninety per cent came in heat during breeding season and 50 per cent came in heat during off-breeding season (Table 1).

There were various responses to different doses of P.M.S. in buffaloes. (Table 1). Fifty per cent came in heat with a dose of 1000 I. U. of P.M.S. during breeding and off-breeding season. The conception rate was 100 per cent. There was 63.33 per cent and 41.66 per cent response with 1500 I. U. of P.M.S. during breeding and off-breeding season respectively. The response was 100 per cent and 80 per cent with 2000 I.U. of P.M.S. during breeding and off-breeding seasons respectively. The conception rate was 100 per cent in all treatments.

Only Hafez (1953) presented the record of response in buffaloes to P.M.S. treatment. The results of the present study are not comparable with those of Hafez (1953), because he did not compare the results of breeding season and off-breeding season. He administered 1200, 1800 and 2400 I.U. of P.M.S. to 9 anoestrous buffaloes in three consecutive doses. Ovulation and conception resulted. In this study the high degree of anoestrous and few cystic conditions of ovaries in buffaloes lowered the response in the case of low dosage treatment. According to Hafez (1953), the low reproductive efficiency in buffaloes might be due to high milk yield as heavy drain of phosphate causes a disturbance of hormone balance. In this study, 28 buffaloes were treated when they were in heavy milking stage. This might be a cause of reduced response to small doses.

Luktuke and Bhattacharya (1948) treated 34 anoestrous cows and 3 heifers with 1000-2000 I.U. of P.M.S. Seventy-five per cent animals came in heat. The conception rate was 78 per cent. The results of this study closely compare with the results given by Luktuke and Bhattacharya (1948). There was 64 per cent and 40 per cent response in cows during breeding and off-breeding season with 1000 I.U. of P.M.S. (Table 1). The percentage of cows

that responded was 83.3 and 80 per cent in breeding and off-breeding season respectively with 1500 I.U. of P.M.S. The conception rate was 100 per cent, although some animals conceived at second insemination. The response was quite high during breeding season with 1000 I.U. and with 1500 I.U. during both the seasons. The results of this study showed 100 per cent conception rate comparable to 78 per cent by Luktuke and Bhattacharya (1948). Rowson (1951) was able to obtain only 55 per cent ovulations. It was supposed that high conception rate was due to the pre-treatment checking of reproductive organs and it helped to remove the abnormalities present in any organ.

Time taken for response

As presented in Table 2, the time for onset of heat in cow-heifers was 46-59 hours and 113.6-124.8 hours and 65.3-69.3 and 93-105 in buffalo-heifers during breeding and off-breeding seasons respectively, with a dose of 500 I.U. of P.M.S. The time was recorded as 62.4-72.4 and 84-96 hours in cows, and 84-96 and 96-108 hours in buffaloes during breeding and off-breeding season respectively, with 1000 I.U. of P.M.S. These observations closely compared with the time recorded by Hafez (1953) and Luktuke and Bhattacharya (1948). The dose of 1500 I.U. was given to the cows which had ovarian abnormalities. These cases took longer to come in heat due to the factors affecting the response. The time was 138.85-150.85 hours during breeding season. On the other hand, it was recorded as 72-84 hours during off-breeding season. These cases had no apparent ovarian abnormality. Abmayr (1950) reported that cows came in heat 10-30 days after the first injection which had ovarian abnormalities.

In buffaloes, the average time for response was 73.71-85.71 and 204-213 hours during breeding and off-breeding season respectively, with 1500 I.U. of P.M.S. This was reduced to 58-70 and 81-93 hours, during breeding and off-breeding season respectively, with 2000 I.U. of P.M.S. It was concluded that high doses and pre-treatment ovarian palpation for genital health control brought about early response.

Response to progesterone treatment

Injections of 15 mg. progesterone for 15 days did not yield encouraging results. A total number of 20 animals comprising 5 buffaloes, 5 cows, 5 buffalo-heifers and 5 cow-heifers were treated. Only 3 cow-heifers came in heat and only two concieved (Table 1). Rectal palpation of the genitalia showed that there was follicle formation in 3 buffaloes, 4 buffalo-heifers, 4 cows and 5 cow-heifers after the treatment was stopped.

It is possible that the L. H. activity was decreased with progesterone

treatment. The P.M.S. injection was given to the animal to activate the action of L. H. sixty per cent buffaloes, 60 per cent cows, 60 per cent buffalo-heifers and 100 per cent cow-heifers came in heat. The conception rate was 66 per cent with progesterone only and 100 per cent with the combination of P.M.S.

P.M.S. administration increased ovulation in those animals which developed follicles. Nellor and Cole (956) had reported that 90 per cent heifers came in heat when P.M.S. was injected after the initial injection of progesterone. The results of this study also indicated that P.M.S. administration stimulated ovulation from follicles developed as a result of progesterone treatment.

The effect of P.M.S. treatment on milk yield

The effect of P.M.S. injection upon milk yield both in cows and buffaloes was non-significant. The differences between average daily milk yield four days before and four days after the treatment were non-significant. The mean differences were less than half a pound per day and mostly indicated a decrease after treatment. Polidori (1953) has, however, reported that during oestrus there was reduction in milk in Alpino cows and reduction in butter-fat content in Friesian cows. The slight and statistically non-significant decrease observed in the present study may have been due to oestrus rather than due to the direct effect of P.M.S. on milk yield.

LITERATURE CITED

Abmayr, H. 1950. Experiment with "Equaman" a hormone preparation from pregnant mare serum in anaphrodisiae cows. *Tierarztlch. Umsch.* **5**: 69-71 (*Anl. Breed. Abst.* **19**: 1151. 1951).

Graham, E.F., and A. E. Dray. 1954. A method of reacjusting the bovine oestrus cyle with progesterone. *Proc. S. Dak. Acad. Sci.* **32**: 78-83 (*Anl. Breed. Abst.* **23**: 1142. 1955).

Hafez, E.S.E. 1953. Gonadotrophin induced ovulation in the buffaloes. *Vet. Res.* **65**: 384-385 (*Ani. Breed. Abst.* **21**: 1231. 1953).

Hammond, J. 1946. The induction of ovulation in domestic animals. *Ani. Breed. Abst.* **14**: 228.

Hussain, S. M., and A. B. Mukherji. 1956. Experiment on hormonal augmentation of early maturity in Tharparker heifers. Govt. Cattle Farm, Patna. *Indian Vet. Jour.* **36**: 119-123.

Kaay, F. C., En. L. P. H. Vander, and Je. De. Vink. 1941. The effect of the gonadotrophic hormone of pregnant mare serum on different domestic animals. K. Akad. Proc. Sect. Sci. Wetenschap. Amsterdam. Verslaf. Gewone. Vergader. Ald. Natuurk. **44**: 670-681, 760-768. (*Biol. Abst.* **21**: 1957. 1964).

Luktuke, S.N., and Bhattacharya. 1948. Augmentation of fertility in cattle by pregnant mare serum gonadotrophin. *Indian Jour. Dairy Sci.* **1**: 59 (*Biol. Abst.* 23: 6773. 1949).

Majeed, M.A., A. W. Qureshi, and M. Tayyab. 1966. Seasonal variations in calving frequency of West Pakistan buffalo and cow and their effect on reproductive efficiency *W. Pak. Jour. Agr. Res.* **4**: 140-150.

Nellor, J. E., and H. H. Cole. 1956. The hormonal control of oestrus and ovulation in the beef heifers. *Jour. Ani. Sci.* **15**: 650-661.

Polidori, F. 1953.The effect of oestrus cycle on variation in the amount and quality of milk in Friesian and Brown Alpino cows in the Camerino District. *Bull. Soc. Custeh.* **46**: 21-27 (*Ani. Breed. Abst.* **23**: 644 1955).

Rowson, L. E. 1951. Method of inducing multiple ovulation in cattle. *Jour. Endocr.* **7**: 260-270.

Sestak, S. 1960. Experience in the use of pregnant mare serum to control infertility in cows. *Mol. Mjasnskotovod.* 5: 53-55 (*Ani. Breed. Abst.* **29**: 195. 1961).

Trimberger, G. W., and W. Hansel. 1955. Conception rate and ovarian function following oestrus control by progesterone injection in dairy cattle. *Jour. Ani. Sci.* **14**: 224-232.

Ulberg, L. C., R. E. Christian, and L. E. Casida. 1951. Ovarian response in heifers to progesterone injection. *Jour. Ani. Sci.* **10**: 752-759.