Reproductive Functions in Nili-Ravi Buffaloes after Short Term Treatment with Recombinant Bovine Somatotropin Hormone

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ABSTRACT : Effects of short-term treatment with somidobove (recombinantly produced bovine somatotropin, BST) on estrous cyclicity and fertility were studied in dairy buffaloes. Twenty buffaloes of Nili-Ravi breed calving during the same season were assigned to either control (n=8) or treated group (n=12). The buffaloes of treated group received single injection (prolonged release) of 320 mg of somidobove on day-60 postpartum. The mean values for interval to first postpartum estrus, first service conception rate, services per conception, service period and calving interval for the treated group were 96.4 days, 66.7%, 1.70, 164 days and 473 days, respectively. The corresponding values for the control group were 92.5 days, 62.5%, 1.87, 135 days and 439 days. Means of all variables did not differ between control and treated group ($p > 0.05$). Three buffaloes of the control and four buffaloes of the treated group did not conceive at first service. Out of these, two buffaloes of control and one buffalo of treated group exhibited normal estrous cycles. It is concluded from these data that short term BST-treatment has no adverse effect on reproductive functions of dairy buffaloes.

(**Kew Words** : Buffalo, BST, Estrous Cycle, Fertility)

INTRODUCTION

Dairy buffaloes of the Nili-Ravi breed are the major source of milk supply in Pakistan. More than 70% of the national milk production is contributed by buffaloes. Buffalo milk and its products are essential component of the diet of most people in Pakistan. By weight, the milk makes up nearly one third of all food consumed by an average family (Anjum et al., 1989).

Nili-Ravi is among the best dairy breeds of buffaloes in the world. However, under small farmer's feeding and management conditions, the average milk production per buffalo (1,800 liters per lactation) is significantly lower than the real genetic potential of this breed. Therefore, use of technologies that can increase the milk producing ability of buffaloes on immediate basis and under small farmer's feeding and management system seems to be extremely important need of the time.

Recombinantly produced bovine somatotropin hormone (BST) has been successfully used in dairy cows as short-term and long-term treatment for increasing milk yield. The lactostimulatory effect of BST is now well established in dairy cows and comprehensive review papers are available in the literature (Armstrong, 1988; Phipps, 1993; Bauman and Vernon, 1993). Few studies conducted with dairy buffaloes also indicate that short-term treatment with BST increased daily milk yield by 13 to 35% in this species (Ludri et al., 1989; Ferrara et al., 1989; Athar et al., 1994).

Effects of BST on reproductive performance of treated animals is not clear and researchers have reported conflicting results. Eppard et al. (1987) and Cole et al. (1991) concluded that BST treatment did not affect reproductive functions. However, results presented by Weller et al. (1990) and some others indicate that BST-treatment increased the number of days from calving to conception and the number of services per conception in dairy cows. Such effects have not been examined in BST-treated dairy buffaloes and the present experiment was designed to study the effect of short term BST-treatment on reproductive functions of Nili-Ravi buffaloes.

MATERIALS AND METHODS

Twenty buffaloes of the Nili-Ravi breed that calved at the Livestock Research Station (NARC) Islamabad during the months of June to December were included in this study. All experimental buffaloes were pluriparous and their lactation number ranged from three to six. Eight (8) buffaloes were kept as control and twelve (12) buffaloes received BST-treatment on day-60 postpartum. Buffaloes

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of the treatment group, received single injection (prolonged release) of 320 mg of somidobove (Elanco Animal Health Division, Eli-Lilly, Geneva) subcutaneously in the prescapular region with the help of specifically designed injector gun. The buffaloes of control group were injected with sterile saline solution (pH 10 to 10.5) as placebo.

Experimental buffaloes were housed in stalls and fed with 50-60 kg of available green fodder per animal per day. In addition, 3-5 kg of concentrates per day were provided in accordance with the daily milk-yield of individual buffalo. The buffaloes of both groups were hand milked twice-a-day at 01:00 and 13:00 hours, and daily milk yield of each buffalo was recorded from 20 days prior to BST injection to 40th day after the injection.

Starting on day-30 postpartum, buffaloes of both groups were observed for estrous signs twice daily (morning and evening) with the help of a teaser bull. The buffaloes detected in estrus were bred within 12-18 hours of the onset of estrous activity. Animals not returning to estrus were examined for pregnancy diagnosis through rectal palpation of uterus on days 50-60 post breeding. Interval from calving to conception (service period) and the first service conception rate were calculated. The data were analyzed statistically and Student t-test was employed for comparison of mean values of above mentioned variables between control and treatment group. The first service conception rate was calculated for each group and compared by Chi-square test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Effect of short-term treatment with BST on daily milk yield of buffaloes of the present study have been reported else where (Athar et al., 1994). In brief, the BST treatment increased daily milk yield by 24 to 28% during the period of 20 days following BST injection when compared with daily milk yield during 20 days prior to BST injection in the same buffaloes. BST-treatment had no effect on physical characteristics or composition of milk.

Means of postpartum interval to first estrus and some variables of fertility in buffaloes of control and BST-treated group are presented in table 1. Two buffaloes each of the control and treated group showed first estrus before day-60 postpartum i.e., the day of BST injection. In remaining buffaloes, the interval to first estrus after calving was more than sixty days. For all buffaloes, the interval to first estrus averaged 92.5 and 98.4 days for control and treated group, respectively and did not differ between groups ($p > 0.05$). These values are within the normal range of 80-145 days reported for Nili-Ravi buffaloes under routine conditions of management and estrous detection (Chaudhary et al., 1985).

Table 1. Postpartum estrous interval and fertility in buffaloes of control and BST-treated group

Variable	Control group (n = 8)	BST-treated group (n = 13)	Overall (n = 20)
Postpartum interval to first estrus (days)	92.5 ±16.8	98.4 ±14.8	96.0 ±10.8
First service conception rate	62.5% (5/8)	66.7% (8/12)	65.0% (13/20)
Services per conception	1.87± 0.43	1.70± 0.28	1.75± 0.25
Service period (days)	135.0 ±35.4	164.0 ±33.28	152.4 ±24.4
Calving interval (days)	439.4 ±35.6	473.0 ±33.4	459.5 ±24.5

Values are Mean ± SEM. Values in parenthesis are number of buffaloes.
Means for all variables of fertility did not differ between groups ($p > 0.05$).

Short-term BST-treatment had no adverse effect on the first service conception rate (66.7% vs 62.5%), services per conception (1.70 vs 1.87), service period (164 vs 135 days) or subsequent calving interval (473 vs 439 days) of experimental buffaloes (table 1). The overall means of these variables of fertility fall under normal ranges reported for buffaloes by many workers (see review by Dobson and Kanonpatana, 1986). In fact, the overall first service conception rate observed in the present study (65%) is better, number of services per conception (1.75) is lower and service period (152 days) is shorter than values reported for these parameters by majority of the workers. Shah (1991) while reviewing the reproductive efficiency of Nili-Ravi buffaloes observed that average number of services per conception and service period ranged from 1.9 to 2.4 and 204 to 250

days, respectively.

Estrous activity of experimental buffaloes not conceiving at first service is depicted in table 2. Three (3) buffaloes of the control and four (4) of BST-treated group required more than one service for conception. Two buffaloes of the control (No. 524 and 228) and one of BST-treated group (No. 411) showed regular estrous cyclicity and conceived at third service. One buffalo of control (No. 414) and two of BST-treated group (No. 339 and 414) developed sub-clinical metritis and exhibited irregular cycles varying in length from 32 to 123 days. The remaining one buffalo of BST-treated group (No. 432) became anestrous as her ovaries were found inactive and non-functional upon palpation.

It can be inferred from data of the present study that short-term BST-treatment has no undesirable effect on the reproductive functions of dairy buffaloes. Similar findings were reported for dairy cows by Eppard et al. (1987). The adverse effects of BST-treatment in terms of increased nember of services per conception and prolonged service period of dairy cows as reported by some workers (Weller et al., 1990) are probably due to negative energy balance of treated cows resulting from increased milk yields. It has been suggested by Cole et al. (1991) that rapid mobilization of body stores with initiation of BST treatment probably causes a downward shift in the energy balance of cows which, if persists for longer periods, may bring changes in ovarian functions. Further studies in dairy buffaloes involving long term treatment are, therefore, indicated to examine the effects of BST, if any, on reproductive efficiency and subsequent fertility.

Table 2. Estrous cyclicity in buffaloes of control and BST treated group not conceiving at first postpartum breeding

Group	Buffalo No.	Postpartum interval to first estrus (days)	Number of estrous cycles recorded	Reproductive tract status*	Av. Estrous cycle length (days)
Control	524	57	3	Normal	22
	228	71	3	Normal	26
	414	115	4	Sub-clinical metritis	–
Treated	414	115	4	– do –	–
	339	109	3	– do –	–
	411	82	3	Normal	19
	432	47	2	Inactive ovaries	–

* Diagnosis based on clinical symptoms and palpation of genitalia.

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