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## Effect of PGF<sub>2α</sub>, oxytocin and their combination on the service behavior of Jersey bulls

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**Abstract**

The present investigation was carried out in the department of Animal Reproduction, Gynaecology and Obstetrics with an objective to evaluate the effect of PGF<sub>2α</sub> and oxytocin on the service behaviour with a scoring system of Jersey bulls. A total of 48 ejaculates, six from each bull before treatment were evaluated by routine semen analysis and other post freeze characteristics and in vitro fertility tests. Then the selected bulls (group I) injected with 25mg of PGF<sub>2α</sub> 30 min. prior to semen collection, twice a week. The group II were administered with oxytocin 20 IU, 10 min. prior to collection twice a week. The group III animals were injected with 25mg of PGF<sub>2α</sub> and 20 IU oxytocin, 30 min and 10 min before collection respectively twice a week. The group IV animals didn't receive any treatment. Further a total of 48 ejaculates i.e., six from each bull were evaluated post treatment by routine semen analysis and other in vitro fertility tests. Post treatment service behaviour index of each bull were observed during semen collection. In the PGF<sub>2α</sub> group the mean value of service behaviour indices in pre and post treatment group were found to be 1.85 ± 0.10 and 0.98 ± 0.05. The overall mean value of the service behaviour indices registered a significant higher value ( $P < 0.01$ ) as compared to its pre treatment counterpart. Similar value was also observed in oxytocin group followed by combined drug effect.

**Keywords:** PGF<sub>2α</sub>, oxytocin, service behavior, Jersey bulls

**Introduction**

The widespread use of dairy bull semen in artificial insemination requires that semen production be as efficient as possible. Investigators have shown that low libido is one of the most common problems encountered with bulls and one that frequently leads to culling (Fraser, 1968). Attempts to relate differences in reproductive performance among bulls with respect to hormone concentrations have generally been unsuccessful (Post *et al.*, 1987). It has been seen that acutely suppressing concentrations of testosterone and estradiol will not abolish sexual behaviour in boars, but will tend to increase in the number of unsuccessful mounts of a boar to a dummy sow. But the number of false mounts have decreased by the treatment with PGF<sub>2α</sub> (Estienne *et al.*, 2004) [3]. In commercial situations, treatment with PGF<sub>2α</sub> has been used to expedite mounting behaviour, as well as restore libido in boars displaying decreased sex drive (Szurop *et al.*, 1985) [10]. In a study by Szurop *et al.* (1985) [10], treatment with PGF<sub>2α</sub> (Enzaprost) restored sexual behaviour in older boars exhibiting low sex drive. Administration of PGF<sub>2α</sub> resulted in increase in the level of blood serum testosterone in bulls; the peak and duration of the increased testosterone were proportional to the dose of PGF<sub>2α</sub>. Sexual preparation also induces the release of oxytocin (Sharma and Hays, 1973) [9] which, if injected before ejaculation, increases the sperm output of rams, bulls and rabbits (Voglmayr, 1975; Agmo *et al.*, 1978) [11, 1]. Since there is meagre reports on the effects of PGF<sub>2α</sub> in low libido Jersey bulls, this study was designed to investigate the effect natural PGF<sub>2α</sub> (Lutalyse) on some reproductive characteristics of such bulls.

**Materials and Methods**

Eight Jersey bulls stationed at Frozen Semen Bank, Cuttack under State Department of Animal Husbandry and Veterinary Services, Odisha, were randomly selected from the available breeding stock with a history of low libido and poor semen output for this study. The bulls selected were within the age group of 4 to 6 years, averaging around 500 kg body weight and were maintained under optimum nutritional and managerial practices as per the minimum standard protocol (MSP) fixed for maintenance of breeding bulls at bull stations. The animals were healthy and clinically free of external and internal parasites.

Group I and Group II bulls received 25 mg of natural PG (Lutalyse, Agri Vet, India) 30 minutes prior to Semen collection and 20 IU of Oxytocin (Foetocin, TTK Healthcare Ltd., Chennai, India). 10 minutes prior to Semen collection. Combinations of PG and Oxytocin was used in Group III bulls. Group IV was untreated control. In the present study the components of service behaviour were observed during semen collection and assessed as per procedure laid down by Chenoweth (1981) [2], Rao *et al.* (1996) [8] and Mohanty (1999) [6] with some minor modifications in the indices of scoring system (5 to 1 point).

## Results and Discussion

The pre and post treatment service behaviour indices of Jersey bull treated with PGF<sub>2α</sub> (lutalyse) was evaluated on the basis of various sexual characteristics like approach to test site,

eagerness to approach stimulus, approached dummy, sniffing and licking, flehmens reaction, protrusion of penis, mounting on dummy, penile movement, libido and reaction time were presented in Table1. The mean values of service behaviour indices were found to be 1.85±0.10. The post treatment average value was calculated to be 2.98 ± 0.05. The overall mean values of service behaviour index registered a significantly higher value ( $p<0.01$ ) of 2.98 ±0.15 in comparison to its pretreatment counterpart (1.85±0.10). Increase in testosterone concentration may be associated with more LH release from pituitary which could have affected the release of testosterone from interstitial cells of testis. The positive feedback has been shown to occur between prostaglandin and LH release and vice versa (Hafez and Hafez, 1993) [5].

**Table 1:** Mean and Test of Significance of Service Behaviour Index of Jersey Bulls treated with Prostaglandin F<sub>2α</sub> in Pre and Post Treatment Period

Service behaviour index	Approach to test site	Eagerness to approach stimulus	Approach to dummy	Sniffing and licking	Flehman's reaction	Protrusion of penis	Mounting on dummy	Penile movement	Libido	Reaction time	Mean SI
Treatment	1.80±0.31	2.17±0.31	2.00±0.26	2.33±0.33	2.17±0.31	1.67±0.33	1.67±0.33	1.83±0.31	1.67±0.33	1.17±0.17	1.85±0.10
Post Treatment	2.67 ±0.56	3.00±0.45	3.67±0.42	3.00±0.45	3.17 ±0.40	2.67±0.61	3.17±0.40	3.33±0.56	2.83±0.40	2.33±0.33	2.98±0.15
't'	1.50	1.53	3.37	1.20	1.98	1.43	2.87	2.36	2.00	3.13	6.46

Service behaviour indices of Jersey bull treated with oxytocin was evaluated and their pre and post treatment values were compared with test of significance and tabulated (table2). Approach to test site eagerness to approach stimulus and approach to dummy didn't reveal any significant difference between pre and post treatment values. The sniffing and licking (3.67 ± 0.42), protrusion of penis (3.83 ± 0.54) and penile movement (3.67 ± 0.67) of post treatment sampling was significantly higher to pre treatment value of 1.33 ± 0.21, 1.67 ± 0.21, and 1.50 ± 0.34 concurrently for respective parameters. Similarly protrusion of penis (3.83 ± 0.54), mounting on dummy (3.17 ± 0.40), libido (3.17 ± 0.40) and

reaction time (3.83 ± 0.54) were significantly higher in post treatment period corresponding to their pre treatment evaluation i.e. 1.67 ± 0.21, 1.50 ± 0.22, 1.33 ± 0.21 and 1.33 ± 0.21. The overall mean values revealed that the post treatment rating (3.35 ± 0.15) was significantly higher ( $p<0.01$ ) than pre treatment mean value (1.53 ± 0.80). The service behavior indices following oxytocin treatment revealed that sniffing and licking, Flehmen's reaction, protrusion of penis, mounting on dummy, penile movement, libido and reaction time showed significantly better scoring in comparison to their untreated sampling (Table 2).

**Table 2:** Mean and Test of Significance of Service Behaviour Index of Jersey Bulls treated with Oxytocin in Pre and Post Treatment Period

Service behaviour index	Approach to test site	Eagerness to approach stimulus	Approach to dummy	Sniffing and licking	Flehman's reaction	Protrusion of penis	Mounting on dummy	Penile movement	Libido	Reaction time	Mean SI
Pre Treatment	1.50 ± 0.22	1.50 ± 0.34	1.67 ± 0.33	1.33 ± 0.21	2.00 ± 0.26	1.67 ± 0.21	1.50 ± 0.22	1.50 ± 0.34	1.33±0.21	1.33 ± 0.21	1.53± 0.80
Post Treatment	3.00 ± 0.45	3.00 ± 0.45	3.00 ± 0.45	3.67 ± 0.42	3.17 ± 0.40	3.83 ± 0.54	3.17± 0.40	3.67 ± 0.67	3.17 ± 0.40	3.83 ± 0.54	3.35 ± 0.15
't'	2.15	1.54	1.93	4.95**	2.44*	3.94**	3.62**	2.89*	4.04**	4.29**	10.89**

\*  $P<0.05$

\*\*  $P<0.01$

The post treated bulls showed significantly higher rating ( $p<0.01$ ) with respect to various service behaviour indices like approach to test site (3.83 ± 0.54), eagerness to approach stimulus (3.67 ± 0.61) and penile movement (3.00 ± 0.04) compared to their corresponding pre treatment values viz 1.50 ± 0.22, 1.33 ± 0.21 and 1.77 ± 0.17 (Table.3). Similarly post and pre treatment values for flehmen's reaction (3.67 ± 0.61 Vs 1.50 ± 0.34), protrusion of penis (3.50 ± 0.7 Vs 1.50 ± 0.22), mounting on dummy (3.17 ± 0.40 vs. 1.50 ± 0.34) and

reaction time (3.17 ± 0.60 vs. 1.17 ± 0.17) significantly differ ( $p<0.05$ ) between pre and post treatment sampling. On the contrary no significant difference could be observed between pre and post treatment values with respect to approach to dummy, sniffing and licking and libido parameters. Comparison of overall mean of service behaviour indices recorded a significantly higher value ( $p<0.01$ ) in post treatment period (3.30 ± 0.19) compared to the mean of pre treatment sexual characteristics (1.60 ± 0.09).

**Table 3:** Mean and Test of Significance of Service Behaviour Index of Jersey Bulls treated with Prostaglandin + Oxytocin in Pre and Post Treatment Period

Service behaviour index Treatment	Approach to test site	Eagerness to approach stimulus	Approach to dummy	Sniffing and licking	Flehman's reaction	Protrusion of penis	Mounting on dummy	Penile movement	Libido	Reaction time	Mean SI
Pre Treatment	1.50 ± 0.22	1.33 ± 0.21	2.17 ± 0.31	2.33 ± 0.33	1.50 ± 0.34	1.50 ± 0.22	1.50 ± 0.34	1.17 ± 0.17	1.83 ± 0.31	1.17 ± 0.17	1.60 ± 0.09
Post Treatment	3.83 ± 0.54	3.67 ± 0.61	2.83 ± 0.48	3.17 ± 0.40	3.67 ± 0.61	3.50 ± 0.72	3.17 ± 0.40	3.00 ± 0.45	3.00 ± 0.68	3.17 ± 0.60	3.30 ± 0.19
't'	3.97**	3.59**	1.71	1.60	3.08*	2.66*	3.16*	3.84**	1.56	3.20*	8.83**

\*  $P < 0.05$ \*\*  $P < 0.01$ 

The mean service behaviour indices and their overall values in untreated jersey bulls were reflected in table 4. The evaluated mean values were found to be 1.33 ± 0.21, 1.67 ± 0.21, 1.50 ± 0.34, 1.67 ± 0.33, 1.67 ± 0.21, 1.17 ± 0.17, 1.50 ± 0.34, 1.50 ± 0.22, 1.83 ± 0.31 and 1.33 ± 0.21 for approached

test site, eagerness to approach stimulus, approach to dummy, sniffing and licking, flehmens reaction, protrusion of penis, mounting on dummy, penile movement, libido and reaction time respectively. The overall mean of service behaviour indices was estimated to be 1.52 ± 0.81.

**Table 4:** Mean Service Behaviour Index of untreated control group of Jersey Bulls

Approach to test site	Eagerness to approach stimulus	Approach to dummy	Sniffing and licking	Flehman's reaction	Protrusion of penis	Mounting on dummy	Penile movement	Libido	Reaction time	Mean SI
1.33 ± 0.21	1.67 ± 0.21	1.50 ± 0.34	1.67 ± 0.33	1.67 ± 0.21	1.17 ± 0.17	1.50 ± 0.34	1.50 ± 0.22	1.83 ± 0.31	1.33 ± 0.21	1.52 ± 0.81

The overall mean values of flehmen's reaction, libido, penile protrusion and reaction time were assessed and comparison

was made between various treatment groups by test of significance (Table.5).

**Table 5:** Test of Significance of Flehmen's reaction, Penile protrusion, Libido, Reaction time and Mean Scoring Index of Service behavior in different treatment groups of Jersey Bulls

Between Protocol	't' Value				
	Flehmen's reaction	Libido	Penile protrusion	Reaction time	Mean SI
PG VS Oxytocin	0.00	0.53	1.42	2.35*	1.70
PG VS PG + Oxytocin	0.68	0.20	0.88	1.21	1.42
PG VS Control	4.60**	1.76	1.66	2.54*	9.01**
Oxytocin VS PG + Oxytocin	0.68	0.21	0.37	0.82	0.22
Oxytocin VS Control	4.60**	2.63*	3.63**	4.29**	11.20**
PG + Oxytocin VS Control	3.92**	1.55	2.51*	2.88*	9.71**

\*  $P < 0.05$ \*\*  $P < 0.01$ 

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