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Effect of three dose levels of buffalo follicular fluid on estrus induction response in anoestrous goats

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ABSTRACT

The present study was designed to examine the effect of three dose levels of buffalo follicular fluid on estrus induction response in anoestrous goats. A total of 40 aparently healthy and adult anoestrous does were equally divided into 4 groups i.e. G_1, G_2, G_3 and G_4. Ten does in each group were treated with charcoal (@ 5 mg/ml) extracted buffalo follicular fluid @ 12 ml (G_1), 18 ml (G_2) and 24 ml (G_3) through subcutaneous route twice daily for 3 consequitive days. Ten does were kept as untreated control (G_4). All the does following treatment were subjected to estrus detection at 12 hours interval. Total 16 (53.3%) out of 30 does showed estrus following buFF treatment. The proportion of does in estrus was higher ($P > 0.05$) in 18 ml (G_2) as compared to 24 ml (G_3) (50%; 5/10) and 12 ml (G_1) (40%, 4/10) groups, respectively. None exhibited estrus in control group (G_4). The mean interval between last buFF treatment to onset of estrus were 6.3±1.93, 6.4±1.17 and 7.6±0.87 days and developed estrus was 18.0±3.46, 41.1±10.43 and 16.8±7.91 h in G_1, G_2 and G_3 groups, respectively. The difference in mean duration of time taken for onset of estrus among the groups was not significant ($P > 0.05$). The results demonstrated the beneficial effect of charcoal treated buffalo follicular fluid for induction of estrus in anoestrus goats. Total dose of 18 ml buFF was found to be better for induction of estrus in anoestrus goats.

Key words : Buffalo follicular fluid, estrus, anoestrous goat

Mammalian ovaries are abundant source of follicular fluid. It contains steroidal and non-steroidal hormones including inhibin and various other compounds (Edwards, 1974; Meur *et al.*, 1999), controlling different reproductive events in domestic animals (McNeilly, 1984; Miller and Martin, 1993; Ghosh, 1998). Alike other species, buffalo follicular fluid (buFF) also posseses inhibin activity (Palta *et al.*, 1996; Anita, 2004). Inhibin is an important hormone in the regulation of FSH secretion in almost all the domestic animals. In goats, it is a primary hormone that controls FSH secretion from the pituitary glands (Medan *et al.*, 2003). Further, an inverse relationship between the release of pituitary FSH and inhibin has recently been demonstrated in cattle (Bleach *et al.*, 2001), mare (Nambo *et al.*, 2002) and goats (Medan *et al.*, 2003).

There is a growing interest in studying characteristics of follicular fluid for its application to modulate reproduction in livestock. Earlier workers from our laboratories and elsewhere reported the application of buFF in regulating ovarian activity and estrus response in cattle as well as in goats (Singh, 1995; Agarwal *et al.*, 1996; Singh *et al.*, 1997; Ghosh, 1998; Kumar *et al.*, 1998) and *in vitro* culture of bovine and buffalo oocytes (Chauhan *et al.*, 1997; Ali *et al.*, 2004). Furthermore, bovine follicular fluid has been tried to advance the attainment of puberty in kids (Shah *et al.*, 1997). Majority of the above studies with follicular fluid have been restricted to cycling animals in order to examine the circulatory gonadotrophins profile and oestrus response, ovulation rate, fertility and prolificacy during and after the treatment or to investigate the effect of follicular fluid on gonadotrophins profile in hormonally treated and immunized animals. Studies pertaining to its application on ovarian functions in anoestrous animals are meagre. The present study has, therefore, been designed to examine the effect of charcoal treated buffalo follicular fluid on estrus induction response in anoestrus goats.

MATERIALS AND METHODS

A total of 40 nondescript, apparently healthy, adult anoestrous goats aged between 2 to 6 years were selected for this study. The anoestrous condition was ascertained by non-exhibition of estrus for 25±5 days or more period on

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teaser parading and visual observations. The experimental animals were maintained under standard farm managemental practices with routine veterinary aids in a loose house system. Green grass (Berseem, Oat, Cowpea, Maize and Jowar) depending on seasonal availability and water were made available to the animals *ad libitum*. Besides, an additional concentrate mixture (wheat bran-47%, DSB-25%, maize-25%, mineral mixture-2% and salts - 1%) @ 250 g/doe/day was given during the entire period of the study.

All the experimental animals were randomly divided into 4 groups. In treatment groups, does were administered subcutaneously with steroid extracted (Wallace and McNeilly, 1985) buFF @ 2 ml (Gr. I, n = 10), 3 ml (Gr.2, n = 10) and 4 ml (Gr-3, n=10) twice daily for 3 days in the following schedule. Ten does were kept as untreated control (Gr-4, n = 10).

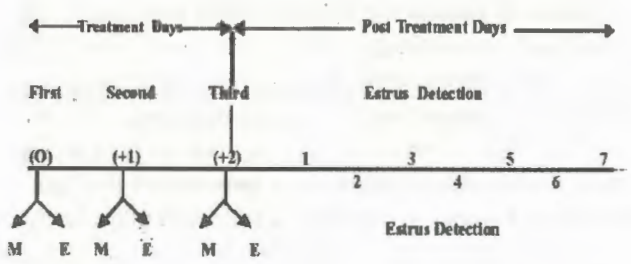
Experimental design

Treatment group : G_1 = buFF @ 2 ml - 12 ml

G_2 = buFF @ 3 ml BID x 3 d - 18 ml

G_3 = buFF @ 4 ml - 24 ml

Control group : G_4 = Untreated



Onset of oestrus was monitored twice daily using vasectomized buck and visual observations of signs of oestrus. Does in oestrus was defined by the first time when she allowed to mount and the duration of oestrus was the period between first and last acceptance to the buck. The proportion were compared using normal deviate test and the overall comparison of means were carried out by ANOVA using Duncan's Multiple Range Test (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

Effect of administration of buffalo follicular fluid on induction of estrus in anoestrous goats has been presented in Table 1, Fig. 1 and 2. Irrespective of the dose levels used, 16/30 (53.3%) does showed estrus following the buFF treatment, while none of the untreated (control) does exhibited estrous. The profound estrus effect might be attributed to the suppression of FSH during the treatment followed by a rebound release of FSH at the end of buFF treatment leading to increased follicular development and estradiol production (Das, 2003). The proportion of does in estrus was higher ($P > 0.05$) in 18 ml (70%) group as compared to 24 ml (50%) and 12 ml (40%). This variation in the response may be due to dose related suppression of gonadotrophins and its subsequent rebound (McNeilly, 1985; Henderson *et al.*, 1986). Higher dose levels (24 ml and 18 ml) produced better (50%) to high (70%) estrus response which might be because of desired suppression followed by significant rebound lasting for a longer duration (Henderson *et al.*, 1986; Kind *et al.*, 1988; Das, 2003). On the other hand insufficient suppression FSH followed by its subsequent rebound

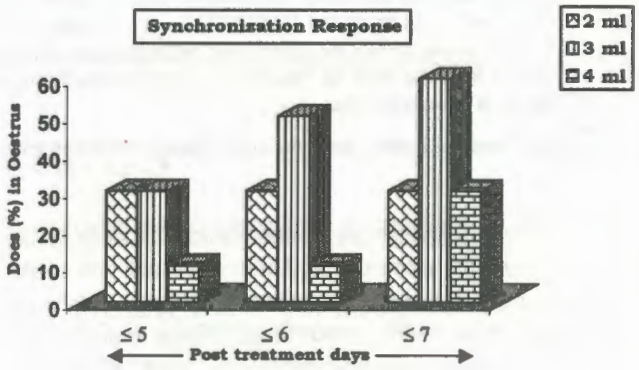


Fig. 1 Oestrus synchronisation response in anoestrous goats treated with three dose levels of buffalo follicular

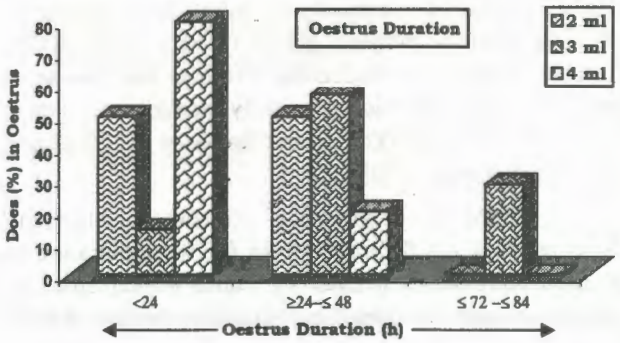


Fig. 2 Duration of oestrus in anoestrous goats treated with three dose levels of buffalo follicular fluid

Table 1. Effect of three dose levels of buFF treatment on oestrus response in anoestrous goats

Groups	Does treated (No.)	Does in oestrus No. (%)	Onset of oestrus interval (days)	Range (Days)	Duration of oestrus (h)	Range (h)
1. Control	10	–	–	–	–	–
2. buFF						
i) 2 ml	10	4 (20)	6.3±1.93	4–12	18.0±03.46	12–24
ii) 3 ml	10	7 (70)	6.4±1.17	4–13	41.1±10.43	12–84
iii) 4 ml	10	5 (50)	7.6±0.87	5–10	16.8±07.91	06–48

probably be a reason for lower estrus response with lower dose level of follicular fluid (Kind *et al.*, 1988). A dose level of 5.0 ml once or twice daily given for 3 days (total 15 to 30 ml) has been reported to produce optimum rebound of FSH in sheep (Henderson *et al.*, 1986). Similarly, a dose level of 2.0 ml twice daily for 2 days (total 8 ml) had lower FSH suppression effect than 5.0 ml dose (total = 20 ml) in an identical schedule (Kind *et al.*, 1988). The optimum response achieved in the present study was with 18 ml which falls within the acceptable range (15-20 ml) of the dose of follicular fluid as reported in the above studies.

The onset of estrus was delayed in 24 ml than 18 and 12 ml buFF treatment, however, the difference in interval between the last buFF treatment to the onset of oestrus among the groups was not significant ($P > 0.05$). The delay in onset of oestrus with 24 ml buFF may be because of delayed rebound of FSH as a result of slower clearance rate of inhibin following administration of the high dose of follicular fluid (Bleach *et al.*, 2001). Both suppression and delayed oestrus onset was reported in cycling goats treated with 21 ml or 42 ml and 24 ml of buFF (Agarwal *et al.*, 1996; Kumar *et al.*, 1998). The proportion of does that showed oestrus for a normal duration (> 24 to < 48 h) were almost similar between 2 and 3 ml groups but relatively higher than in 4 ml group (Fig. 1). The oestrus synchronization response following three-different dose levels of buFF treatment has been depicted in Fig. 2. Does synchronized into estrus within 6th and 7th day after last buFF treatment was uniformly higher in 3 ml than the remainder 2 and 4 ml groups. At present we are unable to compare our results with other reports on oestrus response due to paucity of literature on the use of buffalo follicular fluid in anoestrous animals. The animals which did not show estrus after buFF administration may be attributed to the variation in the sensitivity of hypothalamo-pituitary axis to the feedback effects of altered profile of endogenous steroids and inhibin after follicular fluid treatment (Wallace *et al.*, 1988). The another possibility of weak behavioural signs of estrus in such animals may also can not be ruled out.

It may be concluded that exogenous administration of charcoal treated buffalo follicular fluid may be used as an alternative approach for induction of estrus in anoestrous goats. Total dose of 18 ml buFF was found to be better than 12 or 24 ml for induction of estrus in anoestrous goats.

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