Animal Reproduction Science 115 (2009) 66–75

Contents lists available at ScienceDirect

Animal Reproduction Science

journal homepage: www.elsevier.com/locate/anireprosci

Effect of exogenous administration of buffalo follicular fluid on follicular development, estrus response and luteal function in anoestrous goats (*Capra hircus*)

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ARTICLE INFO

Article history:
Received 21 July 2007
Received in revised form 16 July 2008
Accepted 1 December 2008
Available online 6 December 2008

Keywords:
buFF
Follicle development
Estrus
Luteal function
Goats

ABSTRACT

The effect of buffalo follicular fluid (buFF) on follicular development, estrus response and luteal function was investigated in anoestrous does. Treatment with buFF (18 ml/doe) had no significant effect on the number of antral follicles of all class categories during the period of administration. However, after cessation of buFF treatment, the number of total antral follicles increased significantly with time ($P < 0.003$) as well as due to the treatment × time interaction ($P < 0.02$), without any influence on follicle size. Injection of buFF also caused a marked increase ($P < 0.049$) with time in the number of medium-sized follicles at cessation. Approximately 60 and 20% of buFF-treated anoestrous does showed behavioural and silent estrus, respectively, compared to none in the control. The mean interval between cessation of buFF treatment to onset of oestrus and oestrus duration was 67.0 ± 18.5 and 17.0 ± 3.6 h, respectively. Corpus lutea size varied between 4.6 and 5.8 mm with an average diameter of 5.2 ± 0.3 mm. Only 33.3% of does showed serum progesterone levels above 1 ng/ml, while the remainder (66.7%) had below 0.5 ng/ml. Our results indicate that exogenous administration of buFF causes enhanced follicular activity following cessation of treatment, which results in behavioural oestrus

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0378-4320/$ – see front matter
doi:10.1016/j.anireprosci.2008.12.001

and corpus luteum (CL) development in anoestrous does. CL development and its function is, however, inadequate in buFF-treated anoestrous does.

1. Introduction

Follicular fluid (FF) obtained from mammalian ovaries influences various reproductive performances and endocrinological attributes when injected into farm animals (Wallace and McNeilly, 1986; Henderson et al., 1986). Steroid-stripped FF is rich in inhibin bioactivity (deJong and Sharpe, 1976) and has been used extensively, as a crude preparation of inhibin, in various in vivo and in vitro studies (Knight et al., 1991). Inhibin acts as a negative feedback regulator of FSH, which is a key determinant of follicle growth and development (Knight and Glister, 2001). Furthermore, an inverse relationship between the release of pituitary FSH and follicular inhibin has recently been demonstrated in goats (Medan et al., 2003a). Reports have also shown that exogenous administration of FF causes an initial inhibition of follicular development, which subsequently results in enhanced follicular development as well as increase ovulation rate (Miller et al., 1979; Wallace and McNeilly, 1985). Such an increase in follicular development has been attributed to the hyper-secretion or rebound release of FSH after cessation of FF treatment (Cummins et al., 1983; Miller and Martin, 1993). Similar to bovine follicular fluid (bFF), buffalo follicular fluid (buFF) is also rich in inhibin (Palta et al., 1996), which, when administered exogenously either in crude form or as a specific molecular weight fraction of protein, delayed the PG-induced onset of estrus and ovulation rate in cycling goats (Kumar et al., 1998; Ghosh et al., 2005). Our laboratory has previous reported the effects of buFF on estrus response and endocrine attributes in crossbred cattle (Singh et al., 1997) and in anoestrous goats (Das et al., 2004, 2005). Studies on the effects of exogenous administration of buFF on follicular growth, development and estrus response, particularly in anoestrous animals, are, however, meager. The aim of this study was to examine the effect of charcoal-treated buFF on follicular growth and development, onset of estrus, corpus luteum development and its function in anoestrous goats.

2. Materials and methods

2.1. Location

The present study was conducted at the Indian Veterinary Research Institute, Izatnagar, located at an altitude of 564 ft MSL, at latitude of 28° North and 79° East. Average rainfall is 266.4 mm. The experiment was carried out between April and May 2003.

2.2. Experimental animals

Twenty adults, apparently healthy, non-descript female goats (does) aged between 2 and 6 years and of 20–30 kg body weight, maintained at the Division of Animal Reproduction and Livestock Production Research Section of the Indian Veterinary Research Institute, were selected for this study. All the does were acyclic (anoestrus) at the assignment of treatment; this may have to be attributed to high environmental temperature. The anoestrous condition was ascertained by the non-exhibition of estrus for at least 25 ± 5 days or more on teaser parading.

2.3. Management and nutrition

The experimental animals were maintained under standard farm managemental conditions with routine veterinary aids in a loose house system. Green grass (berseem, oat, cowpea, maize and jowar), depending on seasonal availability, and water were available ad libitum. An additional concentrate mixture (wheat bran 97%, DSB 25%, maize 25%, mineral mixture 2% and salts 1%) at 250 g/doe/day was given during the period of the study.