ELSEVIER

Animal Reproduction Science 112 (2009) 384–389

ANIMAL REPRODUCTION SCIENCE

www.elsevier.com/locate/anireprosci

Short communication

Do cyclic female goats respond to males with an increase in LH secretion during the breeding season?

P.A.R. Hawken *, T. Esmaili, T. Jorre de St Jorre, G.B. Martin

School of Animal Biology, University of Western Australia, 35 Stirling Highway, Crawley, WA 6009, Australia

Received 20 February 2008; received in revised form 3 April 2008; accepted 23 April 2008
Available online 2 May 2008

Abstract

The male effect is currently only used during seasonal or lactational anoestrus because the response is thought to be blocked in cyclic females by periods of elevated progesterone. In this study, we tested whether cyclic, female goats would respond to male exposure with an increase in pulsatile LH secretion. During May (breeding season; Southern Hemisphere) the cycles of 16 Australian Cashmere goats were synchronised using intravaginal progesterone pessaries. Pessary insertion was staggered to produce groups in their early luteal (EL; $n=8$) and late luteal phases (LL; $n=8$). The LL group was retrospectively subdivided into mid-luteal (ML; $n=4$) and late luteal (LL; $n=4$) groups due to differences in oestrous cycle length that emerged during the study. Male exposure stimulated an increase in LH pulse frequency in the EL and LL groups ($P<0.01$) but not in the ML group ($P>0.1$). This increase was accompanied by an increase in basal and mean concentrations of LH in the LL group ($P<0.05$) but not in EL ($P<0.1$) or ML ($P>0.1$) group. There was no effect of male exposure on LH pulse amplitude ($P>0.1$). Progesterone concentrations differed among all groups on the day of male exposure ($P<0.05$) and declined significantly over the 12-h sampling period in the LL group ($P<0.05$). Prolactin concentrations declined in the EL group but did not change significantly in the ML or LL group. In conclusion, male exposure induced an increase in pulsatile LH in goats in the early and late luteal phases of the oestrous cycle. The high concentrations of progesterone in females in the mid-luteal phase appeared to block the male effect.

Keywords: Male effect; Breeding season; Cyclic; Goats; Luteinising hormone

* Corresponding author at: School of Animal Biology M085, University of Western Australia, 35 Stirling Highway, Crawley, WA 6009, Australia. Tel.: +61 8 6488 3588; fax: +61 8 6488 1040.
E-mail address: phawken@animals.uwa.edu.au (P.A.R. Hawken).

0378-4320/$ – see front matter © 2008 Elsevier B.V. All rights reserved.
doi:10.1016/j.anireprosci.2008.04.022

1. Introduction

The 'male effect', the neuroendocrine response of anovulatory females to males that can often lead to ovulation, is well characterised in sheep and goats (Review; Walkden-Brown et al., 1999). Though males cannot be used to induce spontaneous ovulation in cyclic females, there is evidence that they can affect the distribution of oestrus (Ngere and Dzakuma, 1975; Chemineau, 1983; Hawken et al., 2008). In sheep, this 'breeding season male effect' appears to be driven by an increase in pulsatile LH secretion similar to that observed in anovulatory ewes (Hawken et al., 2007). Female sheep and goats display similar physiological responses to the male effect, including the neuroendocrine response leading to ovulation (Walkden-Brown et al., 1999) following the introduction of males or male fleece or hair (Knight and Lynch, 1980; Claus et al., 1990) and the subsequent occurrence of short cycles (Review; Chemineau et al., 2006). Therefore, it is logical to assume that cyclic goats will also respond to male introduction with an increase in LH secretion (Hawken et al., 2007). In this study we tested this hypothesis and also studied the effect of males on the concentration of progesterone and prolactin.

2. Materials and methods

2.1. Experimental animals

The experiment was carried out in accordance with the Australian code of practice for the care and use of animals for scientific purposes (7th Edition, 2004) and was approved by the University of Western Australia Animal Ethics Committee (RA05/100/483).

During April (breeding season; Southern Hemisphere) 16 adult, multiparous female goats (Australian Cashmere) were isolated (more than 500 m away) from testis-intact males for a minimum of 1 month. In May, they were allocated to one of two groups: early luteal ($n = 8$) and late luteal ($n = 8$). To ensure that the females were at the correct stage of the cycle on the day of male exposure (Day 0), the females were synchronised using intravaginal progesterone pessaries (CIDR; Pacific Vet, Australia). Pessary insertion and withdrawal were staggered to produce the two groups on Day 0 of the experiment. The stage of the cycle was estimated based on the females coming into oestrus 2 days after CIDR removal with extra days added to produce each stage of the cycle: early luteal (+5 days) and late luteal (+19 days). However, subsequent analysis of progesterone profiles showed that 4 of the 8 females in the late luteal group had a short cycle after progesterone withdrawal, an outcome that is not unusual for cyclic goats (Menchaca and Rubianes, 2001), so were in their mid-luteal phase on the day of male exposure. The late luteal group was therefore subdivided into mid-luteal (ML; $n = 4$) and late luteal (LL; $n = 4$) groups that were then analysed separately.

2.2. Experimental protocol and blood sampling

To confirm the stage of cycle on the day of male exposure (Day 0), blood was sampled twice weekly from the LL and ML groups from Day −18 to Day 0 and twice from the EL group on Day −5 and Day 0. One day prior to male exposure (Day −1), females were fitted with a jugular cannula and housed in pens in their treatment groups on the research farm at the University of Western Australia (31°58′S). On Day 0, females were given fence-line contact with adult, sexually experienced males ($n = 6$) midway through the frequent sampling regime. To study the hormonal responses to male exposure, blood was sampled every 15 min for 6 h before and 6 h after male