REPRODUCTIVE BIOLOGY

ORIGINAL RESEARCH

Circulating concentrations of ovarian steroids and follicle-stimulating hormone (FSH) in ewes with 3 or 4 waves of antral follicle emergence per estrous cycle

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SUMMARY

The mechanism governing the number of follicle-stimulating hormone (FSH) peaks and emerging follicular waves in ruminants remains unknown. The main purpose of the present study was to examine the relationships between progesterone (P_4) levels, circulating concentrations of FSH and antral follicular development throughout the interovulatory interval in sheep. We retrospectively analyzed and compared daily serum concentrations of P_4, FSH and estradiol (E_2) obtained in cyclic (November-December) Western White Face ewes (Columbia×Rambouillet) that had 3 (n=10) or 4 (n=19) follicular waves per estrous cycle. Follicular growth was monitored in all animals by daily transrectal ultrasonography. Mean P_4 concentrations

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were greater ($p<0.05$) in sheep with 4 waves per cycle compared to their counterparts with 3 waves of follicular growth. The ewes with 3 waves exceeded ($p<0.05$) animals with 4 follicular waves in mean serum FSH concentrations on days 0–2, 6, 7, 9–11, 14 and 15 post-ovulation. Animals with 4 follicular waves exceeded ($p<0.05$) the ewes with 3 waves in mean serum E_2 concentrations on days – 1, 2 and 10 of the estrous cycle studied (day 0=ovulation). The present results are supportive of the notion that luteal P_4 is an important endocrine signal, which controls the periodicity of FSH peaks and the number of emerging follicular waves in cyclic ewes.
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Key words: sheep, follicle-stimulating hormone, antral follicles, follicular waves, progesterone

INTRODUCTION

Ovarian antral follicles in ruminant species develop in an orderly fashion, producing sequential follicular waves [1, 3, 10]. This pattern of antral follicular growth is closely associated with periodic elevations in serum concentrations of follicle-stimulating hormone (FSH); peaks of transient increases in FSH concentrations occur just prior to follicle wave emergence. Several studies in cattle have described the numbers of follicular waves and their associated endocrine variables [1]. Approximately 95% of the bovine estrous cycles studied expressed either the 2- or 3-wave pattern [1]; however, the 3-wave pattern seems to be predominant [6]. Unlike in sheep, the number of emerging follicular waves in individual cows seems to be maintained from cycle to cycle [15]. It was also demonstrated that bovine estrous cycles with 2 waves (20.4±0.3 days in duration) were 2–3 days shorter as compared to those with 3 waves (22.8±0.6 days; [11]). It was suggested that this difference was due to an earlier regression of the corpus luteum (CL) in 2-wave cycles (around day 16) than in 3-wave cycles (day 19; [2]). In a more recent study, it was confirmed that cattle with the 2-wave pattern had a shorter estrous cycle compared to those exhibiting the 3-wave pattern (19.8±0.2 vs. 22.5±0.3 days, respectively