

Female Reproduction

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The normal estrous cycle of the female Asian elephant is between 14 and 18 weeks in length with pregnancy lasting 20-22 months. The non-pregnant luteal phase, characterized by high circulating progestagen concentrations, ranges between 10-14 weeks, while the interluteal phase (or follicular phase) lasts between 3 and 6 weeks. During the follicular phase, 2 surges (peaks) of luteinizing hormone (LH) release occur. The first LH surge is anovulatory (anLH), whereas ovulation occurs three weeks later around 24 hours after the second LH (ovLH) surge. Although the changes in reproductive hormones during the cycle have been described, the unique double LH surge mechanism is still not understood. Particularly the function of the anLH surge is puzzling, while the ovLH surge is known to induce ovulation. A female only has three chances per year to conceive. Within each cycle, the fertile period can be considered to be from 2 days before, until shortly after the ovulation. Therefore, identification of this brief period is most critical to ensure that males breed females at the proper time.

Several methods have been developed to characterize the estrous cycle in Asian elephants; for instance, by observation of reproductive behaviors or the monitoring of serum and urinary estrogen and progesterone or their derivatives. Most of the reproductive cycle studies in elephants include estimations of progestagens, the major one being 5 α -pregnane-3,20-dione (5 α -DHP). Progestagen profiles were used to determine the onset of the luteal phase, which approximately indicates the ovulation period, as progestagens increase 2-3 days before the ovLH

surge, and ovulation occurs approximately 24 hours after the ovLH. Progesterone profiles can also be used for pregnancy diagnosis characterized by continuous elevated concentrations of progesterone over a 3-5 months period at double the concentrations encountered during the normal luteal phase of the ovarian cycle.

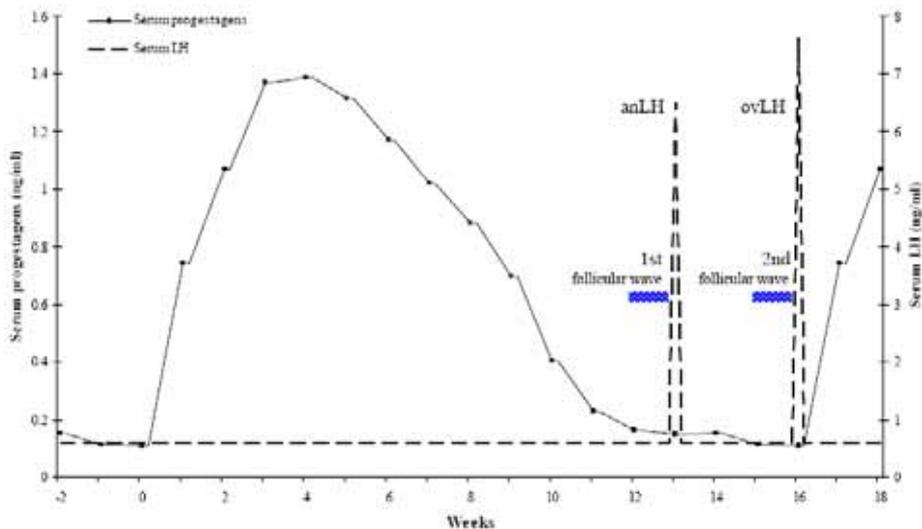


Figure 1. Estrous cycle of the elephant. Elevated progesterone indicates the luteal phase. When progesterone returns to baseline, the follicular phase begins. Two follicular waves occur with high estradiol concentrations associated with non-ovulated multiple follicles prior to the anLH surge and, 3 weeks later, one Graafian follicle prior to the ovLH surge are observed. Ovulation occurs approximately 24 hours after the ovLH surge, with a subsequent increase of progesterone concentration due to the steroidogenic activity of the corpus luteum. (Thitaram 2009; PhD thesis, Utrecht University, The Netherlands)



Figure 2. Ovary of female elephant. Several small follicles were observed on the ovary.