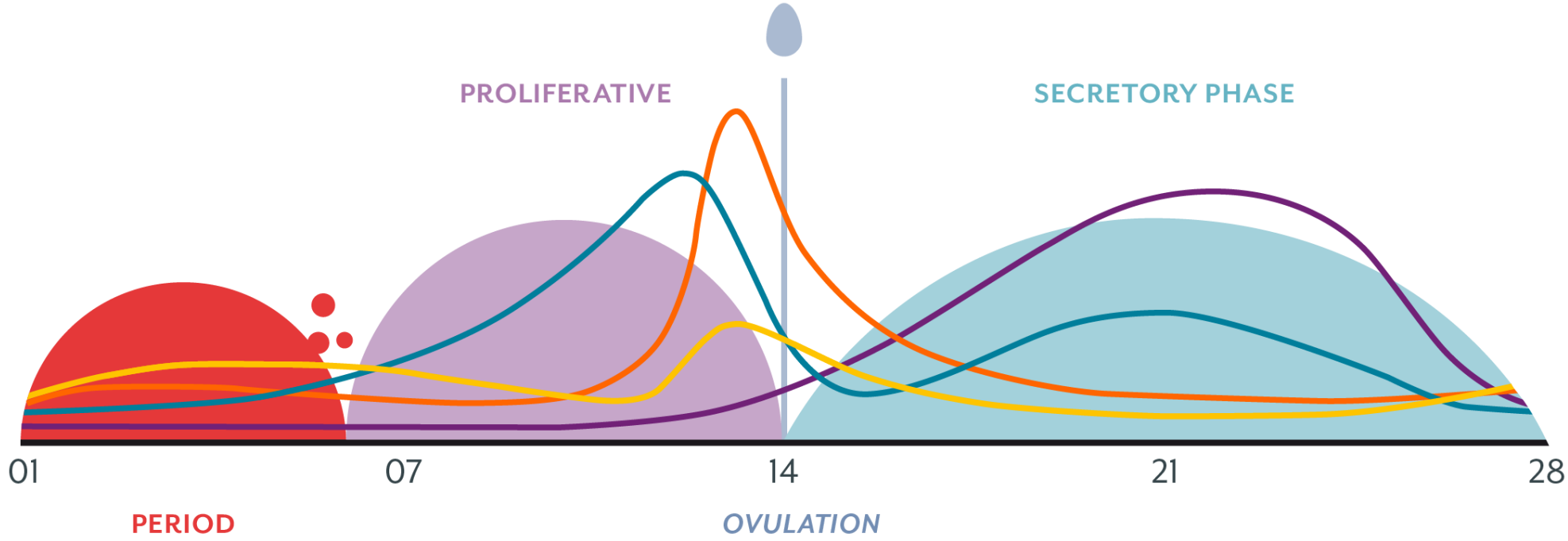

ESTRUS CYCLE

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The estrous cycle

- The estrous cycle (also oestrous cycle) comprises the recurring physiologic changes that are induced by reproductive hormones in most mammalian placental females. Humans undergo a menstrual cycle instead. Estrous cycles start after puberty in sexually mature females and are interrupted by anestrous phases or pregnancies. Typically estrous cycles continue until death. Some animals may display bloody vaginal discharge, often mistaken for menstruation, also called a "period". The estrous cycle is the cycle in the female reproductive system that prepares it for reproduction. The cycle is conveniently divided into 4 phases:

Proestrus

- One or several follicles of the ovary are starting to grow. Their number is specific for the species. Typically this phase can last as little as one day or as long as 3 weeks, depending on the species. Under the influence of estrogen the lining in the uterus(endometrium) starts to develop. Some animals may experience vaginal secretions that could be bloody. The female is not yet sexually receptive.
- the old corpus luteum degenerates; the uterus and the vagina distend and fill with fluid, become contractile and secrete a sanguinous fluid; the vaginal epithelium proliferates and the vaginal cytology shows a large number of non-cornified nucleated epithelial cells. Variant terms for *proestrus* include *pro-oestrus*, *proestrum*, and *pro-oestrum*.

Estrus

- Estrus refers to the phase when the female is sexually receptive (" in heat," or" on heat" in British English). Under regulation by gonadotropic hormones, ovarian follicles are maturing and estrogen secretions exert their biggest influence. The animal exhibits a sexually receptive behavior, a situation that may be signaled by visible physiologic changes. A signal trait of estrus is the lordosis reflex , in which the animal spontaneously elevates her hind quarters. In some species, the vulvae are reddened. Ovulation may occur spontaneously in some species (e.g. cow), while in others it is induced by copulation (e.g. Cat). If there is no copulation in an induced ovulator, estrus may continue for many days, followed by 'interestrus', and the estrus phase starts again until copulation and ovulation occur.

Metestrus

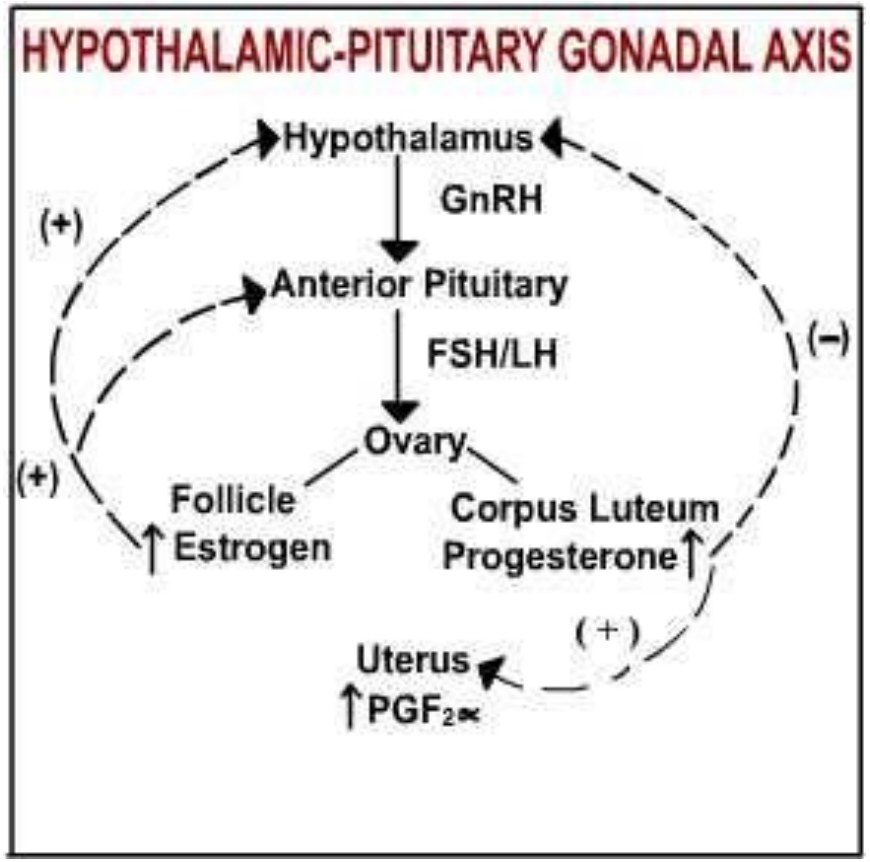
- During this phase, the signs of estrogen stimulation subside and the corpus luteum starts to form. The uterine lining begins to secrete small amounts of progesterone. This phase typically is brief and may last 1 to 5 days. In some animals bleeding may be noted due to declining estrogen levels.

Diestrus

- Diestrus is characterized by the activity of the corpus luteum that produces progesterone. In the absence of pregnancy the diestrus phase (also termed pseudo-pregnancy) terminates with the regression of the corpus luteum. The lining in the uterus is not shed, but will be reorganized for the next cycle.

Anestrus

- Anestrus refers to the phase when the sexual cycle rests. This is typically a seasonal event and controlled by light exposure through the pineal gland that releases melatonin.
- Melatonin may repress stimulation of reproduction in long-day breeders and stimulate reproduction in short-day breeders. Melatonin is thought to act by regulating the hypothalamic pulse activity of the gonadotropin-releasing hormone.
- Anestrus is induced by time of year, pregnancy, lactation, significant illness, chronic energy deficit, and possibly age.
- Chronic exposure to anabolic steroids may also induce a persistent anestrus due to negative feedback on the hypothalamus/pituitary/gonadal axis.



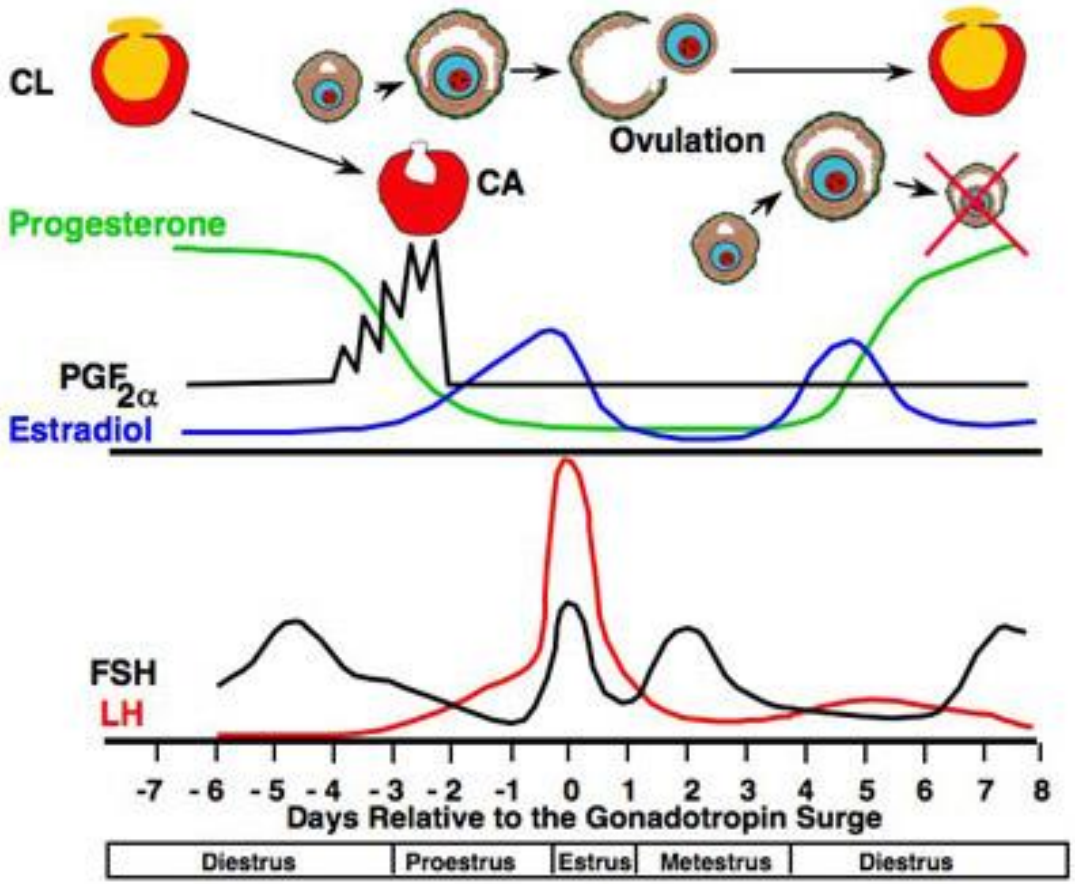
The cycle is regulated by the hypothalamic-pituitary-gonadal axis, which produces hormones that dictate reproductive events.

The hypothalamus produce gonadotropin-releasing hormone (GnRH) in response to circulating estrogen, or to cease GnRH production in response to progesterone.

Anterior Pituitary produces the gonadotropins follicle-stimulating hormone (FSH) and luteinizing hormone (LH) in response to GnRH and estrogen. FSH and LH production is inhibited by progesterone.

Follicles are structures on the ovarian surface that contain ova (egg) and produce estrogen. Follicles range in size and maturity at different stages of the cycle, but usually only one is selected to ovulate. A corpus luteum (CL) is a structure that forms from the previous cycle's ovulation point. The CL is responsible for progesterone production. Both estrogen and progesterone are produced following FSH and LH stimulation of the ovary.

Uterus produces prostaglandin F_{2a}(PGF_{2a}).



Hormonal and Ovarian Changes During the Estrous Cycle