

BASIC SCIENCES • PHYSIOLOGY

— STUDY NOTES

The Canine Estrous Cycle

The canine “heat” cycle — the bitch's **estrous cycle** — runs in four stages: **proestrus, estrus, diestrus and anestrus**. A bitch cycles roughly every 6–7 months, non-seasonally and monoestrously, driven by a rising-then-falling oestrogen curve, a single LH surge that triggers ovulation, and a long progesterone-dominated luteal phase. Knowing exactly where she is in the cycle is the key to timed breeding, spotting pyometra risk, and planning a spay.

INSIDE THESE NOTES

- The canine estrous cycle — overview
- The hormone curve
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- Proestrus & estrus — the visible “heat”
- Ovulation & the fertile window
- Clinical applications

LEVEL

Vets & veterinary students

EDITION

2026-06-27

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The Canine Estrous Cycle

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LEARNING OBJECTIVES

After working through these notes you will be able to:

- ✓ Name the four stages of the canine estrous cycle and their typical durations.
- ✓ Describe the oestrogen, LH and progesterone changes across the cycle.
- ✓ Explain why the bitch's fertile window falls several days after the LH surge.
- ✓ Use serum progesterone to time ovulation and the optimal breeding window.
- ✓ Recognise the clinical relevance — pyometra risk, pseudopregnancy, silent heat, and timing of spay.

TL;DR

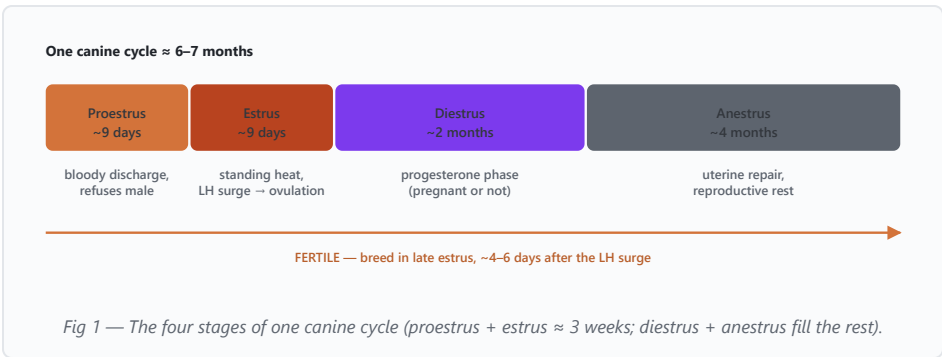
The canine “heat” cycle — the bitch's **estrous cycle** — runs in four stages: **proestrus, estrus, diestrus and anestrus**. A bitch cycles roughly every 6–7 months, non-seasonally and monoestrously, driven by a rising-then-falling oestrogen curve, a single LH surge that triggers ovulation, and a long progesterone-dominated luteal phase. Knowing exactly where she is in the cycle is the key to timed breeding, spotting pyometra risk, and planning a spay.

AT A GLANCE

CYCLE TYPE	Monoestrous, non-seasonal, spontaneous (reflex-independent) ovulator
PUBERTY	First heat ~6–12 months (small breeds earlier, giant breeds later)
INTERVAL	~5–7 months between cycles; breed-dependent (Basenji ~once/year)
PROESTRUS	~9 days (3–17) — serosanguineous discharge, vulval swelling, refuses the male
ESTRUS	~9 days (3–21) — accepts the male; LH surge → ovulation
OVULATION	~2 days after the LH surge; oocytes then mature a further ~2 days
DIESTRUS	~2 months — progesterone dominance, pregnant or not
ANESTRUS	~4 months — uterine repair and reproductive rest
BREEDING TOOL	Serum progesterone (ovulation ~4–10 ng/mL); LH surge ~2 ng/mL

01 The canine estrous cycle — overview

- **“Heat” = the estrous cycle:** the recurring hormonal + physical sequence that readies the bitch to mate, ovulate and carry a litter.
- **Two defining features: monoestrous** (one ovulation per cycle, not repeated cycles in a season) and **non-seasonal** (cycles at any time of year).
- **Puberty / first heat: ~6–12 months** (small breeds earlier, giant breeds later). **No menopause** — she cycles for life.
- **Interval: ~5–7 months** between cycles; breed-dependent (e.g. Basenji ~once a year).
- **Four stages, fixed order:** proestrus → estrus → diestrus → anestrus.



02 Proestrus & estrus — the visible “heat”

- **Proestrus (~9 d, range 3–17):** rising **oestrogen** → vulval swelling + **serosanguineous (bloody) discharge**; she **attracts but REFUSES** the male.
- **Estrus (~9 d, range 3–21):** “standing heat” — she **accepts** the male, stands, flags the tail; discharge lightens to straw-colour.
- **Behavioural rule:** oestrogen makes her *attractive*; rising **progesterone** at the LH surge makes her *receptive* (willing to stand).
- **Track it:** vaginal cytology (cornification) estimates how close estrus is.

PROESTRUS		ESTRUS (standing heat)	
VULVA	Very swollen, firm	VULVA	Softer, "crinkled"
DISCHARGE	Bloody (serosanguineous)	DISCHARGE	Lightens to straw-coloured
BEHAVIOUR	Attracts but REFUSES male	BEHAVIOUR	STANDS, flags tail
DOMINANT HORMONE	Oestrogen ↑	DOMINANT HORMONE	LH surge → progesterone ↑

Fig 2 — Proestrus vs estrus. The single most useful sign is behaviour: refusing vs standing for the male.

03 The hormone curve

- **Oestrogen (FSH-driven):** rises through proestrus, **peaks late proestrus, then falls.**
- **LH surge:** a single sharp spike at the **proestrus–estrus border** → triggers ovulation ~2 days later.
- **Progesterone:** from the corpora lutea; **dominates the long second half** of the cycle.
- **Canine quirk:** progesterone starts rising **before** ovulation (at the LH surge) because the follicles luteinise early — which is exactly why serum progesterone is such a reliable breeding-timing tool.

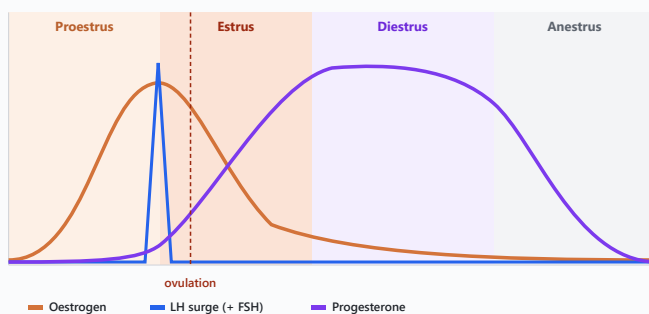
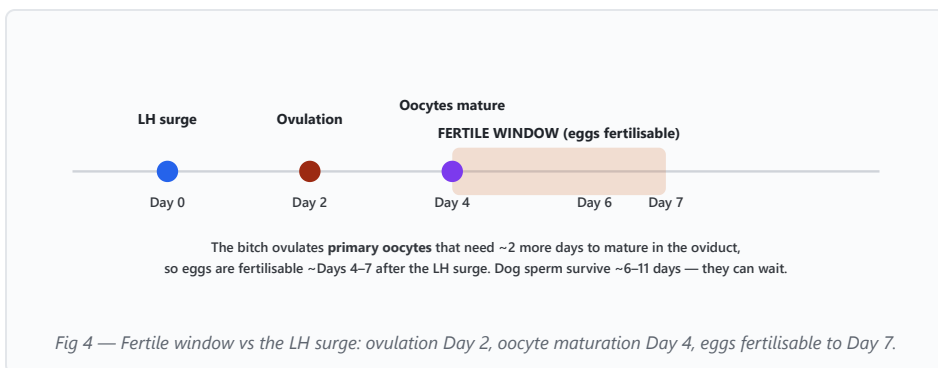


Fig 3 — Oestrogen peaks then falls; the LH spike sits at the proestrus–estrus border; progesterone rises from the surge through diestrus.

04 Ovulation & the fertile window

- **Ovulation:** ~2 days after the LH surge.
- **Primary oocytes:** the bitch ovulates **immature** eggs that need ~2 more days in the oviduct to mature → eggs fertilisable ~**Days 4–7** after the surge.

- **Sperm survive ~6–11 days** in the tract — they can “wait” for the eggs, which widens the breeding window.
- **Bottom line:** peak fertility is **several days into estrus, not at its start** — a mating on the first “standing” day can miss.



STAGE	DURATION	DOMINANT HORMONE	ACCEPTS MALE?
Proestrus	~9 d (3–17)	Oestrogen ↑	No (attracts only)
Estrus	~9 d (3–21)	LH surge → progesterone ↑	Yes — standing heat
Diestrus	~2 months	Progesterone	No
Anestrus	~4 months	Baseline (low)	No

05 Diestrus & anestrus

- **Diestrus = the luteal phase (~2 months):** corpus-luteum **progesterone** dominates — **same length & profile whether or not she is pregnant.**
- **Consequences:** (1) **pseudopregnancy** — nesting, mammary development, even lactation in a non-pregnant bitch; (2) prolonged progesterone primes the uterus → **pyometra risk.**
- **Anestrus (~4 months):** low baseline hormones; the **uterus repairs & remodels**; no external signs. Its length sets the ~6-month interval.

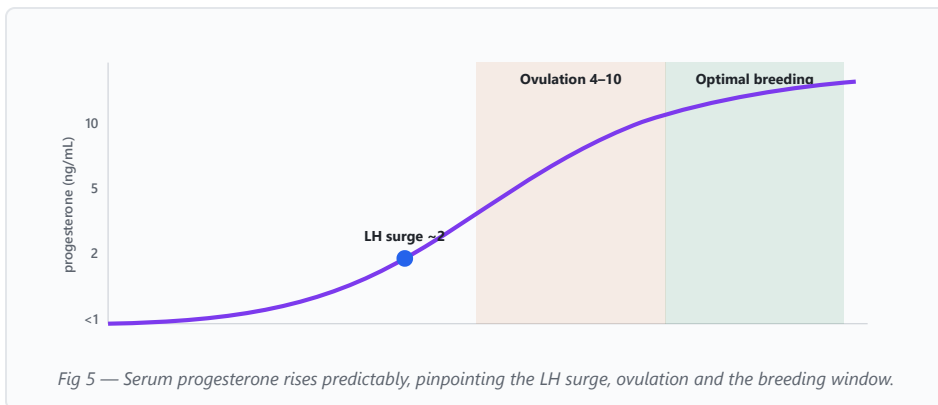
~2 mo

The luteal phase — about the length of pregnancy (~63 d) and present in every cycle, pregnant or not. Why pyometra follows a heat by 4–8 weeks.

06 Clinical applications

- **Timed breeding:** serial **serum progesterone** — **~2 ng/mL** at the LH surge, **~4–10 ng/mL** at ovulation; breed **~2–4 days after ovulation** (once oocytes have matured).

- **Pyometra:** diestrus progesterone primes the endometrium; bacteria (often *E. coli*) → pus-filled uterus, classically **4–8 weeks after a heat**.
- **Spaying:** ideally in **anestrus** (tract quiet, least vascular).
- **Silent heats:** ovulation with minimal external signs — test, don't just watch for blood.



POST-HEAT RED FLAG

Lethargy, increased thirst and vulval discharge in an entire bitch 4–8 weeks after her season = suspect **pyometra** — a surgical emergency. Don't "wait and see."

Know exactly where she is in the cycle and breeding, pyometra risk and spay timing all fall into place.

— canine reproductive physiology, after Cunningham 6e.

KEY TERMS — QUICK GLOSSARY

Estrous cycle

The recurring reproductive cycle of the non-primate female; in the bitch, four stages over ~6 months.

Monoestrous

One estrous cycle per breeding period — the bitch has a single ovulation per cycle, ~twice a year.

Proestrus

The first stage: rising oestrogen, vulval swelling, bloody discharge; the male is attracted but refused.

Estrus

"Standing heat": the bitch accepts the male; the LH surge triggers ovulation.

LH surge

The sharp luteinising-hormone peak that triggers ovulation ~2 days later.

Diestrus

The luteal phase (~2 months): corpus-luteum progesterone dominates, pregnant or not.

Anestrus

The reproductive rest phase (~4 months): uterine repair before the next cycle.

Pseudopregnancy

A clinical mimicry of pregnancy in the non-pregnant bitch, driven by the normal diestrus progesterone (then prolactin).

QUICK REVISION — REMEMBER THESE

- 1 The bitch is **monoestrous and non-seasonal** — one ovulation per cycle, roughly twice a year, at any time of year.
- 2 The four stages always run **proestrus** → **estrus** → **diestrus** → **anestrus**, each with a distinct hormone profile and behaviour.
- 3 **Proestrus** = rising oestrogen, bloody discharge and vulval swelling — but she still *refuses* the male.
- 4 **Estrus** = standing heat; the **LH surge** triggers ovulation and the switch to progesterone.
- 5 The bitch ovulates **primary oocytes** that need ~2 more days to mature — so peak fertility is several days *after* the LH surge, not at the start of estrus.
- 6 **Diestrus** is a long luteal phase (~2 months) whether or not she conceives — the basis of pseudopregnancy and of pyometra risk.
- 7 **Serum progesterone** is the practical tool for timing ovulation and the optimal breeding window.

MEMORY AIDS

The 4 stages in order — Proestrus → Estrus → Diestrus → Anestrus — *"Please Enter, Dogs Allowed"*.

Proestrus vs estrus behaviour — Pro = Prohibited (refuses the male); Estrus = Entry allowed (standing heat).

Fertile window — LH surge → +2 days ovulation → +2 days oocyte maturation = breed ~4 days after the surge.

TEST YOURSELF — ACTIVE RECALL

Cover the answers and try to retrieve each one from memory first — self-testing beats re-reading.

1. Name the four stages of the canine estrous cycle, in order.
2. How often does a bitch typically come into heat?
3. Which hormone dominates proestrus, and what are the signs?
4. What does the LH surge trigger, and when does ovulation follow?
5. Why is the bitch's peak fertility a few days into estrus, not at the start?
6. What hormone dominates diestrus, and for how long?
7. What serum progesterone value roughly marks ovulation?

ANSWERS

1. Proestrus → estrus → diestrus → anestrus.

2. About every 5–7 months (non-seasonal, monoestrous); breed-dependent.
3. Oestrogen — vulval swelling, serosanguineous discharge; she attracts but refuses the male.
4. It triggers ovulation, which follows ~2 days later.
5. She ovulates primary oocytes that need ~2 more days to mature before they can be fertilised.
6. Progesterone (from the corpora lutea), for ~2 months — whether or not she is pregnant.
7. About 4–10 ng/mL (the LH surge is ~2 ng/mL); optimal breeding is ~2–4 days later.

WHEN TO REFER OR ESCALATE

- Vulval discharge + lethargy + increased thirst 4–8 weeks after a season — suspected **pyometra**; emergency, refer for imaging + surgery.
- Prolonged proestrus/estrus (>3–4 weeks) or persistent serosanguineous discharge — ovarian cyst / follicular cyst / granulosa-cell tumour; refer.
- Primary anestrus — no first heat by ~24 months — endocrine + karyotype workup (intersex, hypothyroidism, ovarian dysgenesis).
- Failure to conceive despite mating in apparent estrus — progesterone-timed breeding workup ± brucellosis screen before the next cycle.

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