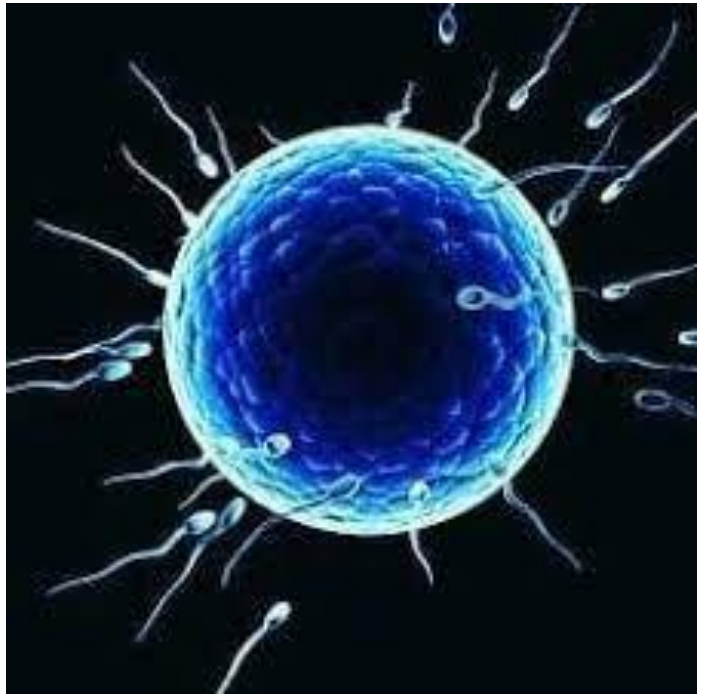
Introduction to Canine Reproduction



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Some terms to keep straight

Female

- Bitch
- Dam
- In heat/estrus
- Standing
- Flagging
- Whelping

Male

- Stud
- Dog
- Sire
- Sheath
- Mounting
- Tie

Breeding soundness exam in the bitch

Onset of puberty about 9 months (range 6-14)

Peak fertility from 2 years to 6-7 years

Breeding soundness exam:

- Complete physical exam
- Digital vaginal exam
- Vaginoscopy (otoscope)
- *Brucellosis* test
- Additional blood work ±
- Genetic testing

Breeding soundness exam in the stud dog

Onset of puberty about 10-12 months

Peak fertility from 2 years to 8 -10 years

Breeding soundness exam:

- Complete physical examination
- Testis
- Penis (persistent penile frenulum)
- *Brucellosis* test
- Additional blood work ±
- Genetic testing
- Semen evaluation

Semen collection

Use of a teaser bitch to aid collection

Collect semen into:

- Commercial artificial vagina
- Disposable baby bottle liner
- Funnel with a tube attached

Expect three distinct semen fractions:

- 1st fraction is prostatic fluid (2-20 ml)
- 2nd fraction is spermatozoan rich
- 3rd fraction is prostatic fluid

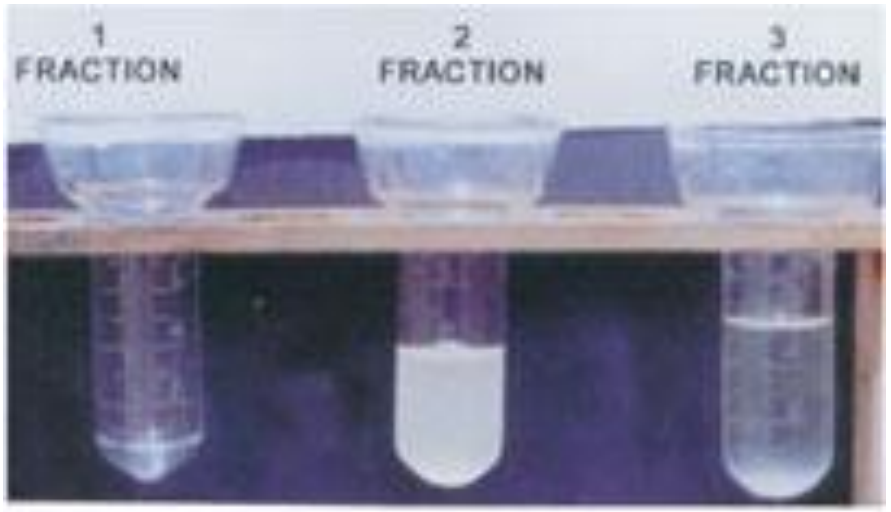


Fig. 3: Fractions of canine semen collected for evaluation

Semen evaluation

Motility

Morphology and viability (live/dead stain)

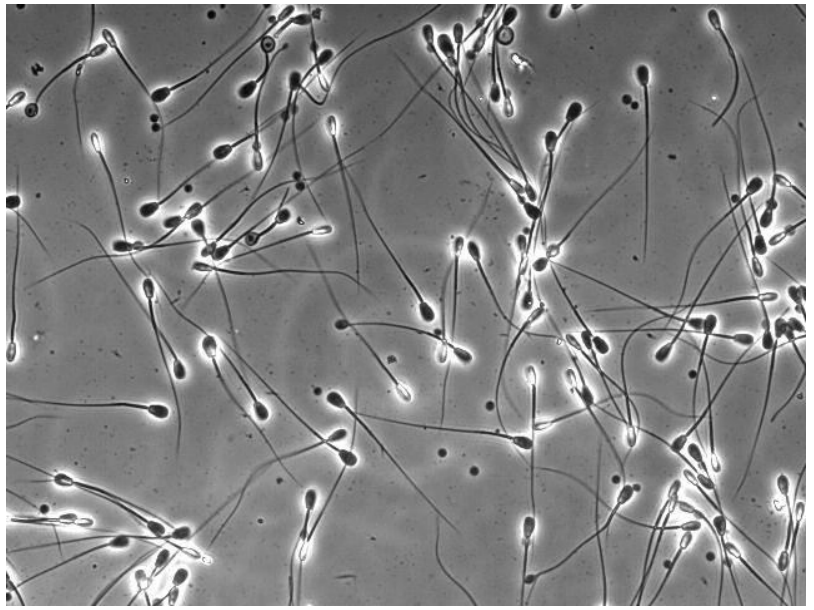
(< 20% abnormal in normal fertile dog)

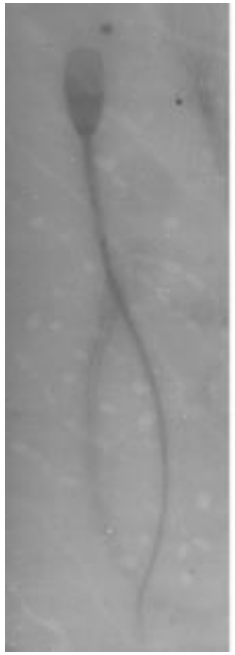
Determining concentration:

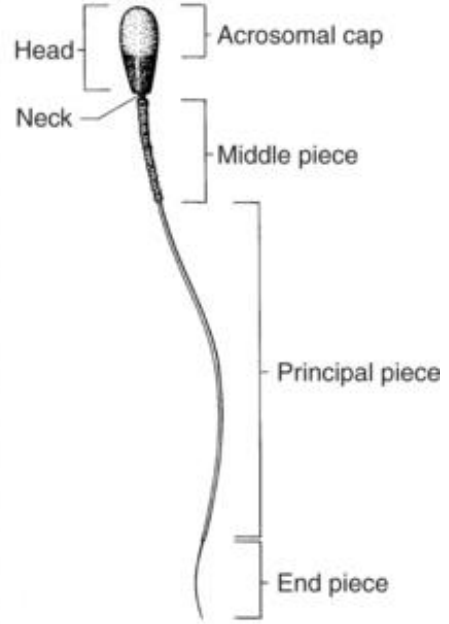
- Killed, diluted sample
- Hemocytometer/counting chamber
- Photometer

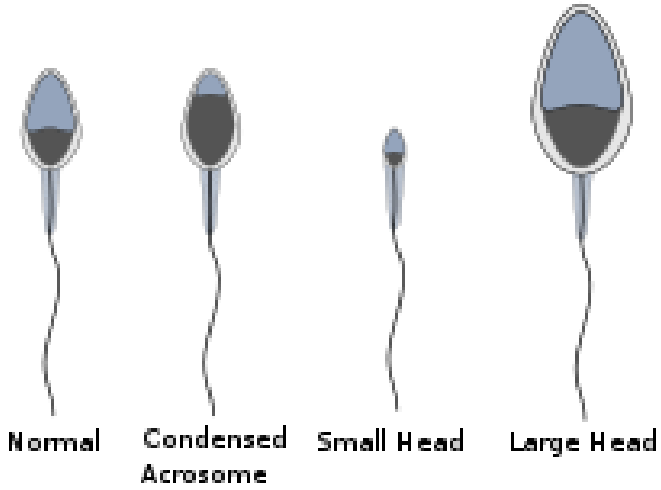
Concentration X Volume = “total sperm count”

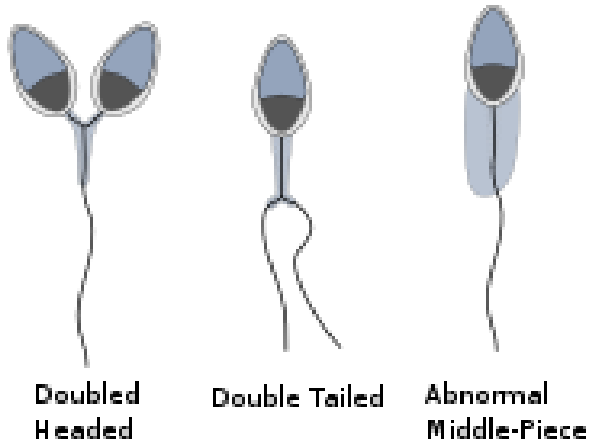
(commonly between 300 and 400 million)











Semen disposition

Collected semen can be:

Used immediately

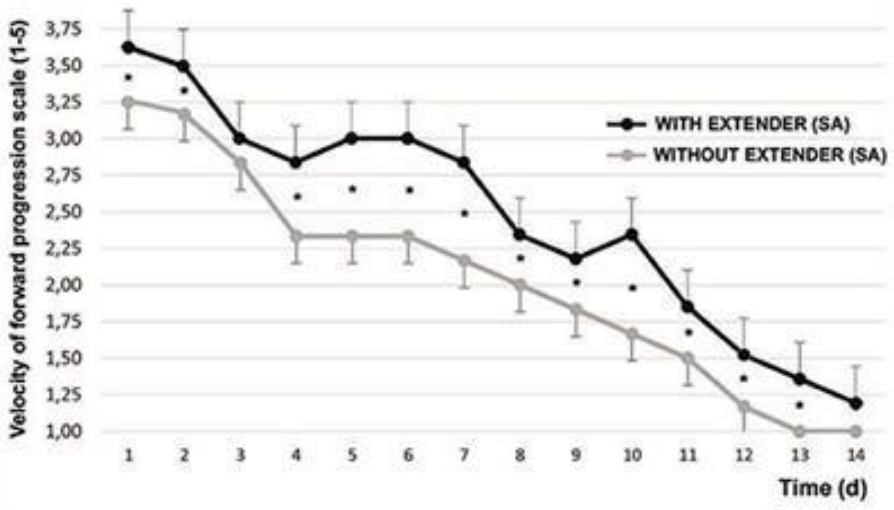
- Side-by-side insemination
- Sperm lives about 7 days in the bitch
- Insemination timing not as critical

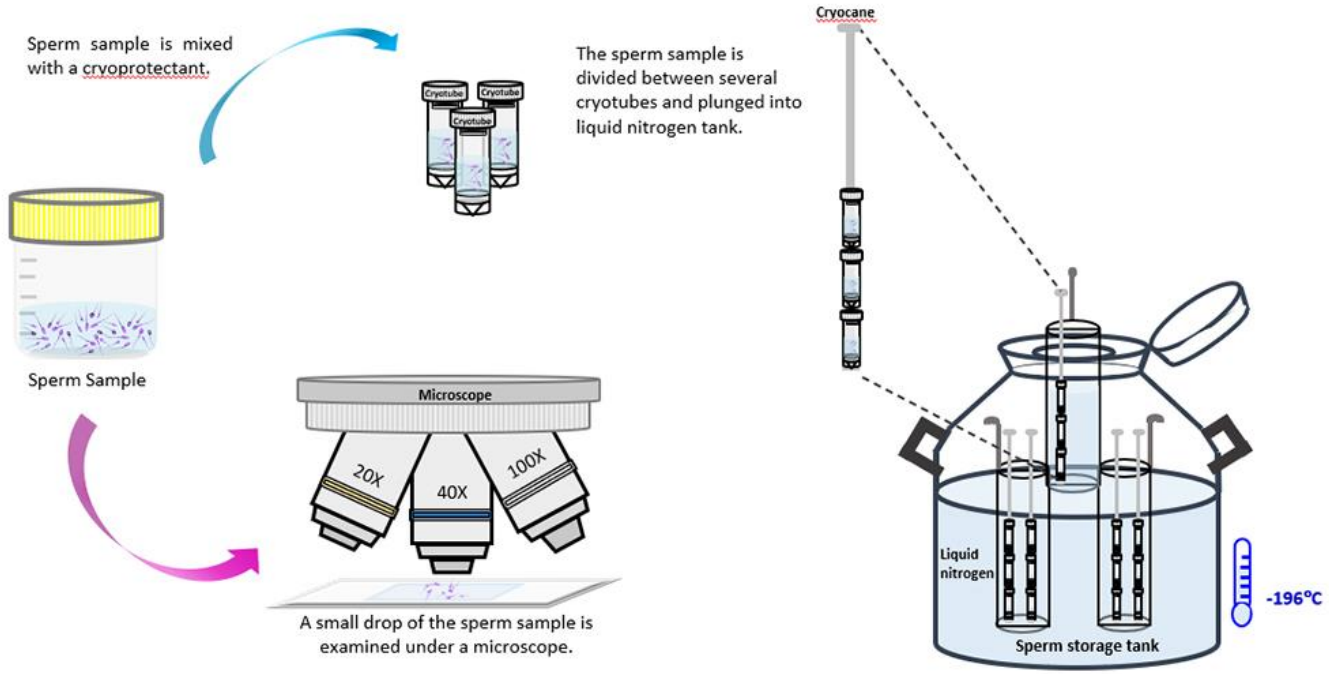
Chilled fresh for later use

- Viable for about 3-10 days
- Depends on the extender used

Frozen indefinitely (stored in liquid nitrogen)

- Freezing and thawing steps critical
- Viable for about 12 hours after thawing





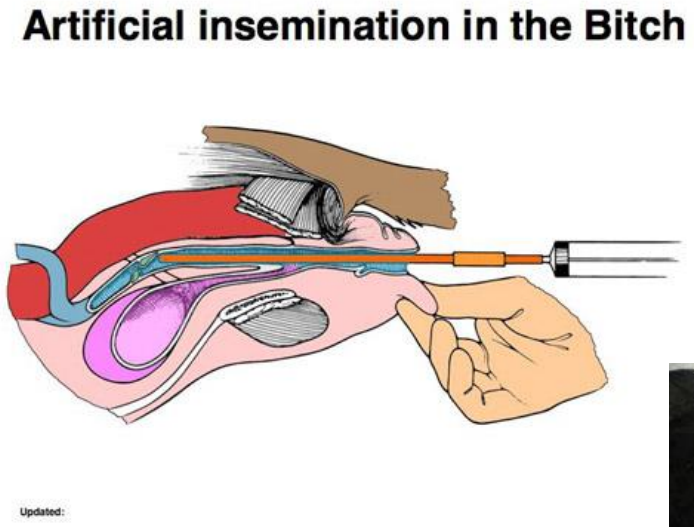
Insemination techniques

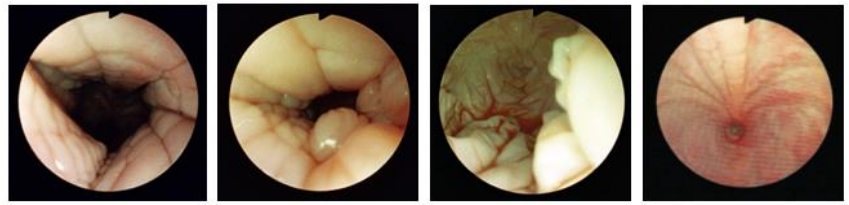
Vaginal

- AI catheter
- Simple plastic catheter, cut to length

Intrauterine

- Norwegian
- Endoscope-assisted
- Surgical
- Volume instilled ranges from 1 ml in small breeds to 3-4 ml in large dogs





Heat cycle in the bitch
(How to know when breeding should occur)

Ovulation usually occurs 12 days after the onset of pro-estrus, but it can occur as early as 5 or as late as 25 days

The “surge” of luteinizing hormone (LH) usually occurs about 2 days prior to ovulation

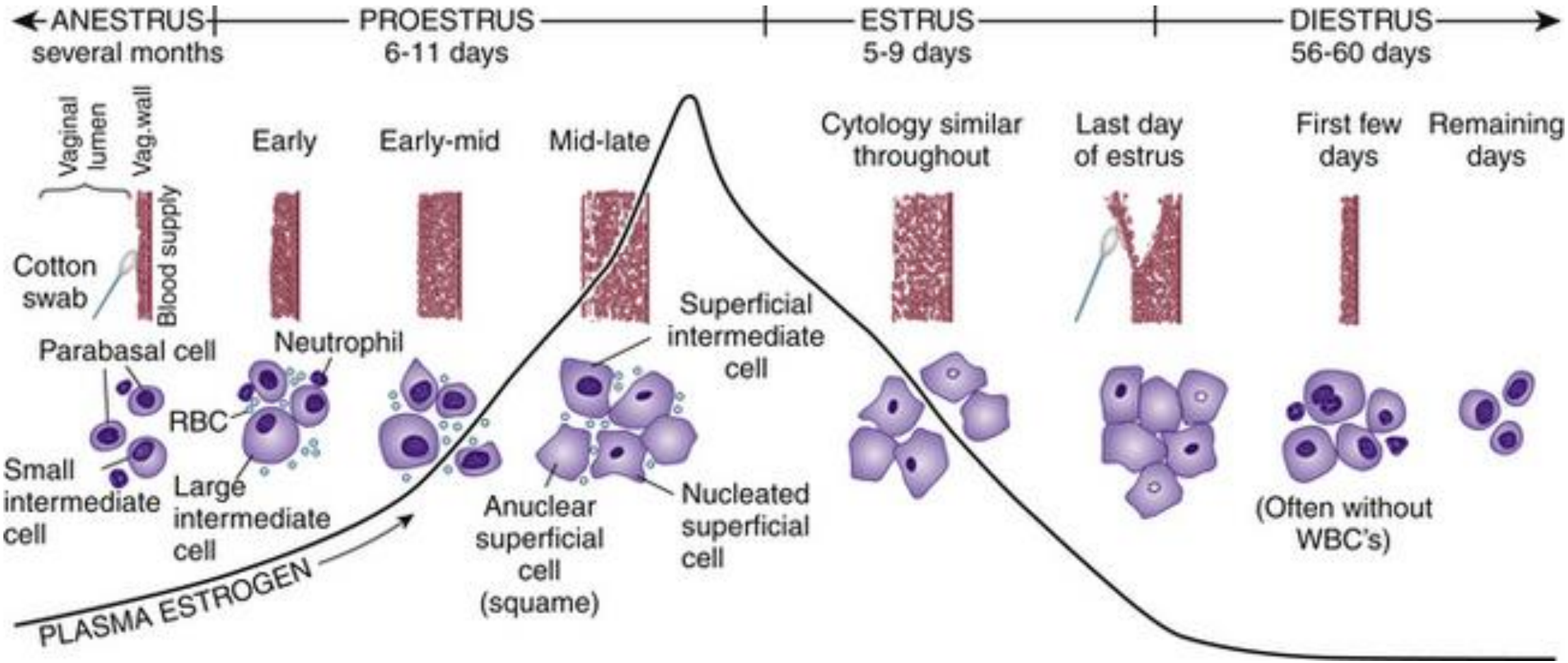
Optimal fertilization period usually ranges from 2 days to up to 5 days following ovulation

Bitches are spontaneous ovulators, meaning there can be marked variability in the time of ovulation relative to the onset of pro-estrus and standing estrus. They may not read the book, and timing is critical with artificial insemination. Treat them as individuals.

Pro-estrus is characterized by enlargement and reddening of the vulval lips, serosanquineous vulvar discharge, marking, and a tendency to roam.

Breeding timing modalities

Vaginal cytology



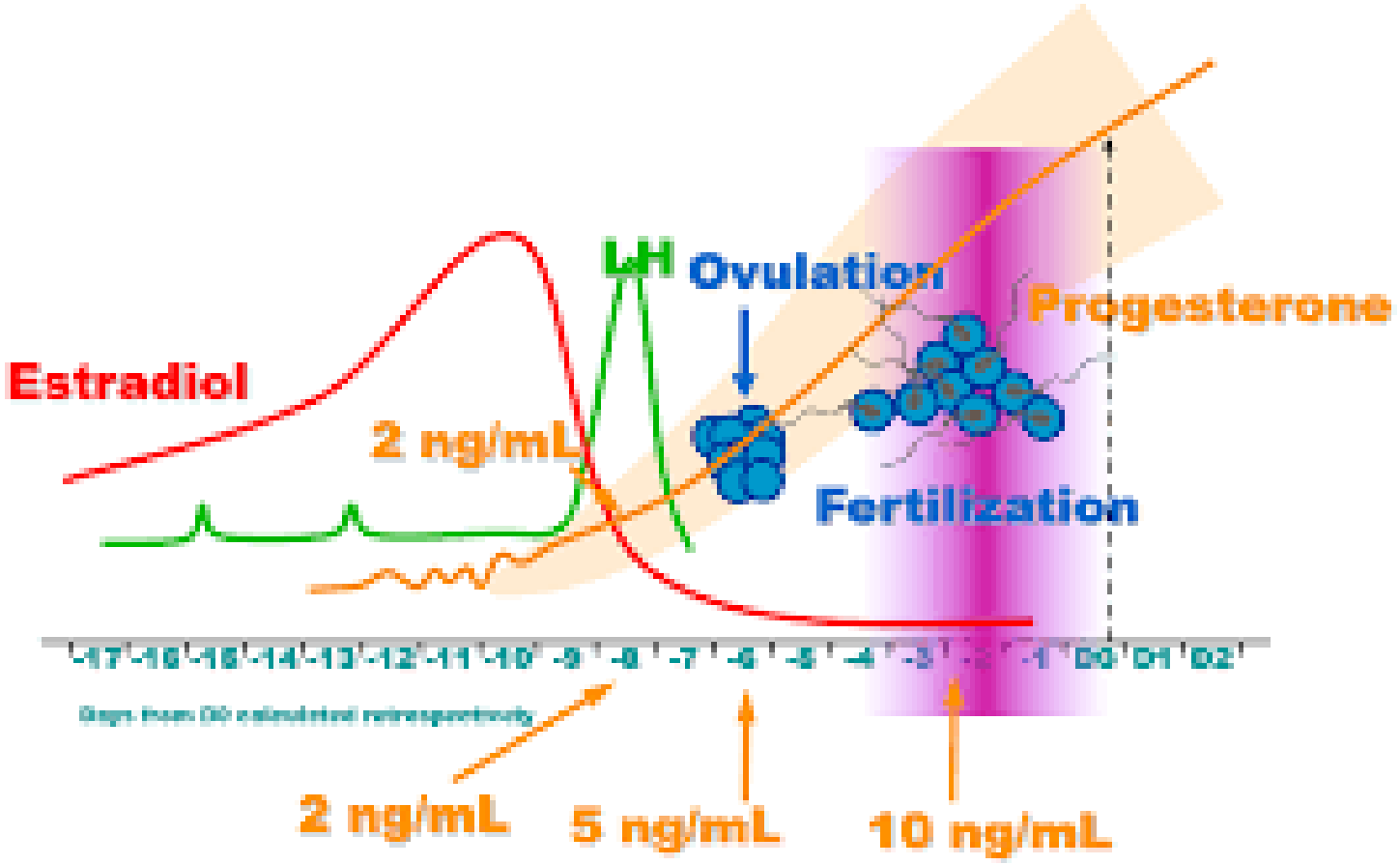
Breeding time modalities (continued)

LH surge

- Usually 2 days before ovulation
- Reliable and accurate, but not readily available in all areas
- Must be monitored daily to identify peak

Progesterone concentration

- Sharp increase from baseline about 2 days before ovulation
- Serial monitoring every 2-3 days
- Some clinics can run in-house
- 1 ng/ml = 3.17 nmol/L




wikiHow

Common breeding issues

Why won't she stand?

She might not like him

- Housemates
- Too bonded to owner
- Previous poor experience

Not far enough along in heat cycle

- Confirm with LH or progesterone assay

Not actually in heat

- Infection

Why won't he mount?

Told off too many times before

Inexperience (virgin dog)

She is not really in standing heat yet

Low libido

Painful

- Sore back or hips

Pregnancy diagnosis

Manual palpation

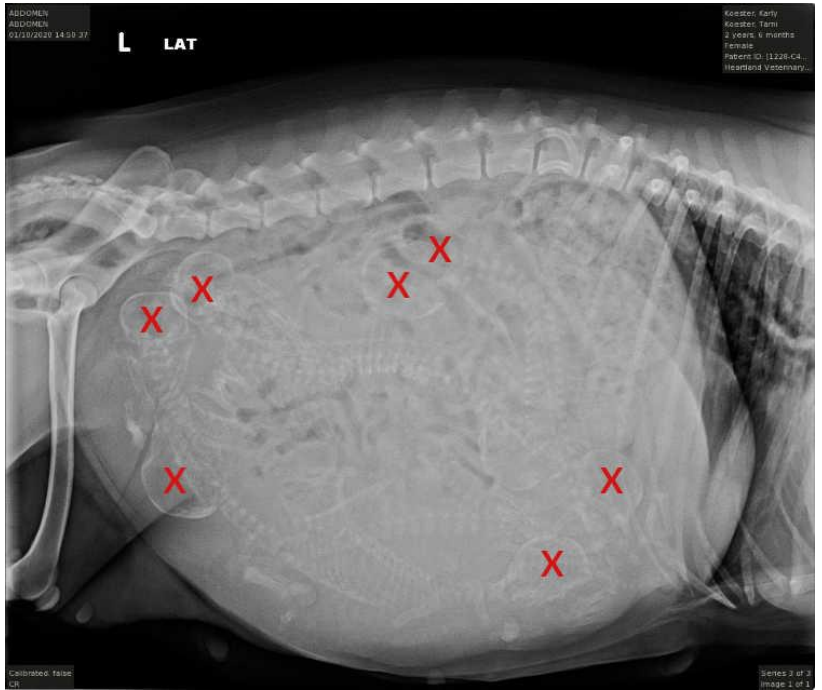
- At 3 weeks about 15 mm, round and firm
- At 4 weeks about 25 mm, oval
- At 5 weeks 30-35 mm, oval

Ultrasound at about day 17

Radiography after day 42

Gestation averages 63 days

- range 56-72 days, calculated from 1st mating
- 63 ± 1 day calculated from ovulation
- 60 ± 1 day calculated from fertilization



Whelping

Body temperature drops sharply 8-24 hours prior to whelping

- To 35° C in small breeds, 36° in medium size breeds, 37° in large breeds

Rapid decline in progesterone about 24 hours prior to whelping

- from 12-15 nmol/L (4-5 ng/ml) to < 6 nmol/L (2 ng/ml)

Clinical stages of whelping:

- 1st stage usually 6-12 hours, up to 36 hours → intermittent uterine contractions, no signs of abdominal straining, some bitches show no behavioral signs, others are uncomfortable, restless, panting, nesting, shivering, vomiting, cervix starts to dilate and puppies rotate *in utero*
- 2nd stage usually 3-12 hours, up to 24 hours → body temperature rises to normal, first puppy engages in the pelvic inlet causing expulsive uterine contractions and abdominal straining, allantochorionic membrane may rupture with discharge of clear fluid, first puppy usually delivered within 4 hours of onset of 2nd stage
- 3rd stage → expulsion of the placenta usually follows within 15 minutes of the delivery of each puppy, but occasionally 2 or 3 puppies may be born before the passage of their placentas, interval between births usually 5 – 120 minutes, parturition is usually complete within 6 hours (up to 12) of onset of 2nd stage, greenish post-partum discharge (lochia) of fetal/placental fluids may last 1-3 weeks

When to call the veterinarian

If the bitch shows strong, frequent contractions for 20-30 minutes without delivery of a puppy

If labor continues more than 12 hours

If there is a greenish discharge without delivery of any puppies (possible placental breakdown)

Signs of fetal stress or pathology:

- Doppler shows puppy heart rates < 150/minute (normal 180-240)
- X-ray indicates possible dead fetus (intra-fetal gas)
- Ultrasound shows no fetal movement or heartbeats

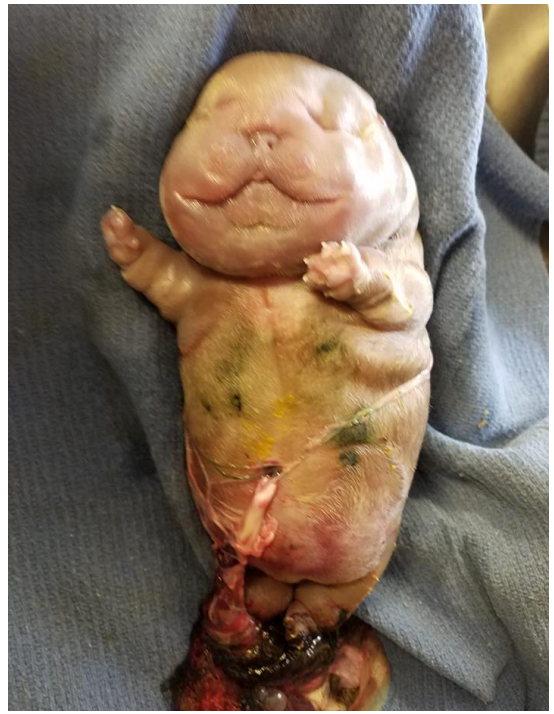
Dystocia

Primary

- Uterine inertia
- Genetic component

Secondary

- Metabolic causes → hypocalcemia, hypoglycemia, sepsis, hypotension
- Anatomical problems → stenosis from trauma, breed conformation, mass/tumor



Fetal causes

- Oversized puppies (breed mismatch or small litter size)
- Hydrocephalus
- Anasarca
- Fetal malposition (flexed neck)

Dealing with dystocia

Primary dystocia or metabolic causes

- Try calcium gluconate 10% solution

(0.465 mEq $Ca2^{+}$ /ml) at 0.1 ml/5.5 kg SC q 4-6 hours

- Wait 15 minutes, then oxytocin 0.25 IU/bitch SC or IM, can increase dose to 3-4 IU/bitch

If unsuccessful, puppies should be taken by C-section:

- Pre-oxygenate the bitch
- Induce with propofol or mask down with isoflurane
- Administer LRS at 10-20 ml/kg/hour IV (respiratory alkalosis)
- Have sufficient staff available to resuscitate puppies

Owner instructions post-surgery:

- Make certain bitch is fully recovered from anesthesia
- Monitor the first puppy introductions
- Consider post-op analgesia (Tramadol® 5 mg/kg q 12 hours, minimal sedation of the neonates)