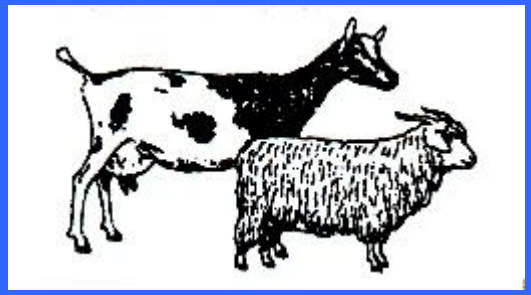
If You've Goat Goats, You've GOT to be Kidding!

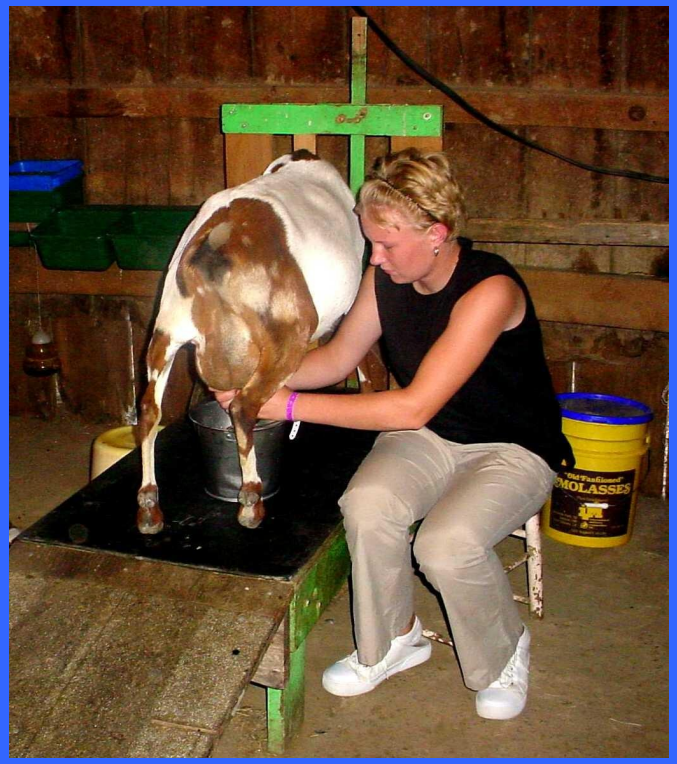


Susan R. Kerr, DVM, PhD

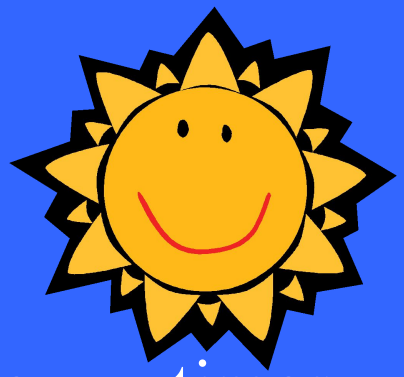
WSU-Klickitat County Extension Director

Why Do We Care About Goat Reproduction?

- Usually, no lactation without pregnancy and kidding
- Need replacement animals (doelings, bucks)
- Need to produce market kids

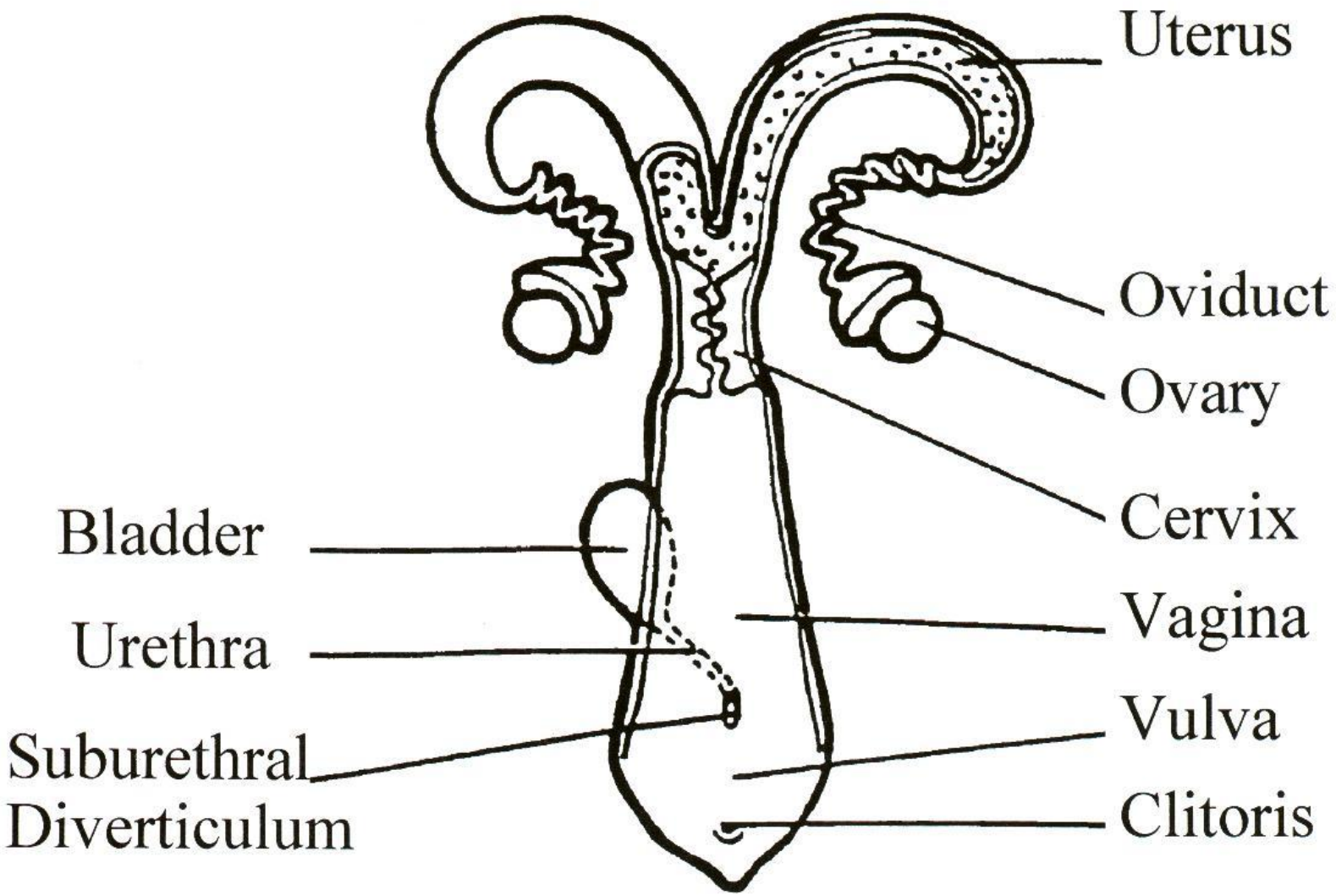


The Basics

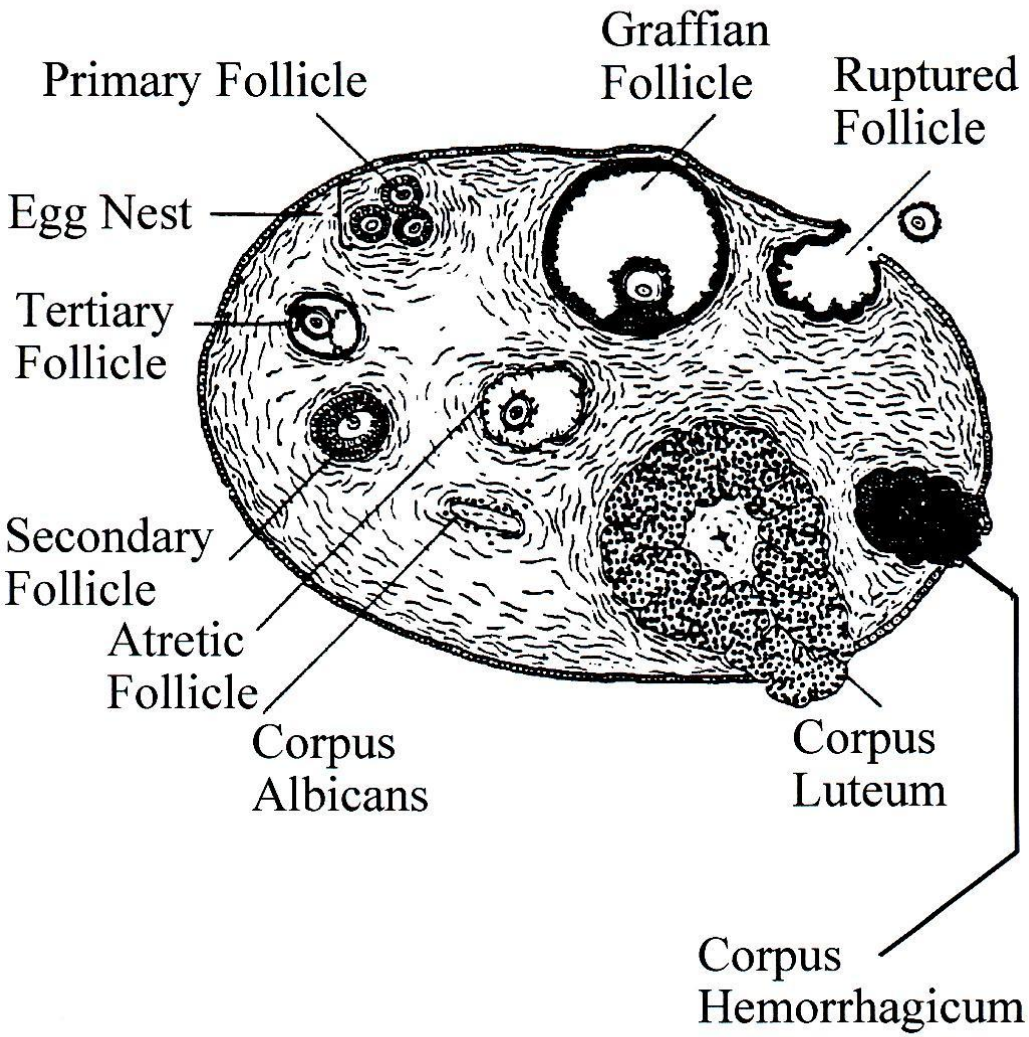


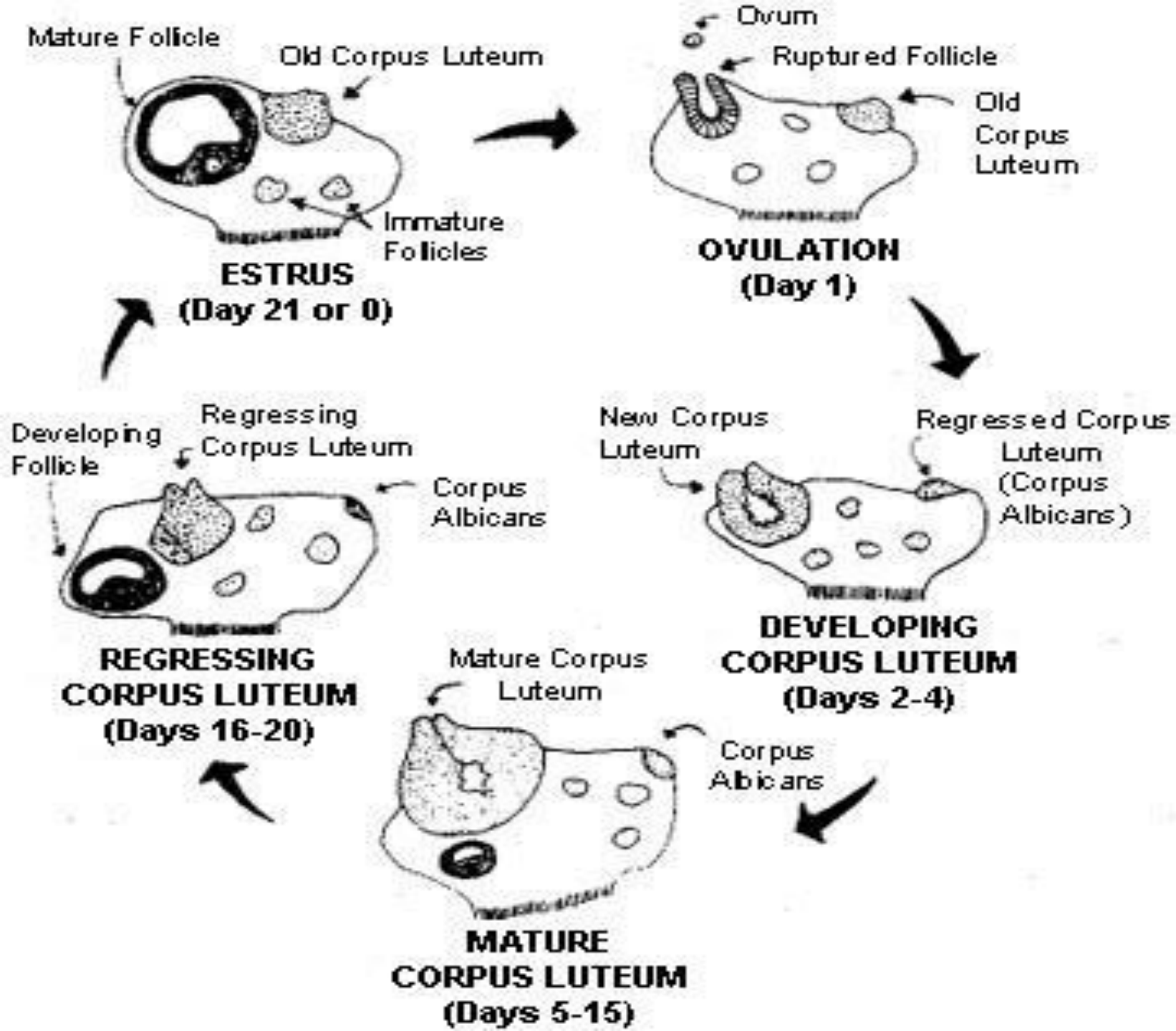
- MOST breeds are naturally “seasonally polyestrous” and come into heat multiple times in the Fall so kids are born in Spring (best chance for survival)
- Pregnancy lasts 5 months
- Twins and triplets are common (even more so with flushing, genetic selection and certain breeds)
- Puberty reached at 7 months average (from 4 to 10)

Parts of the Reproductive Tract: Doe

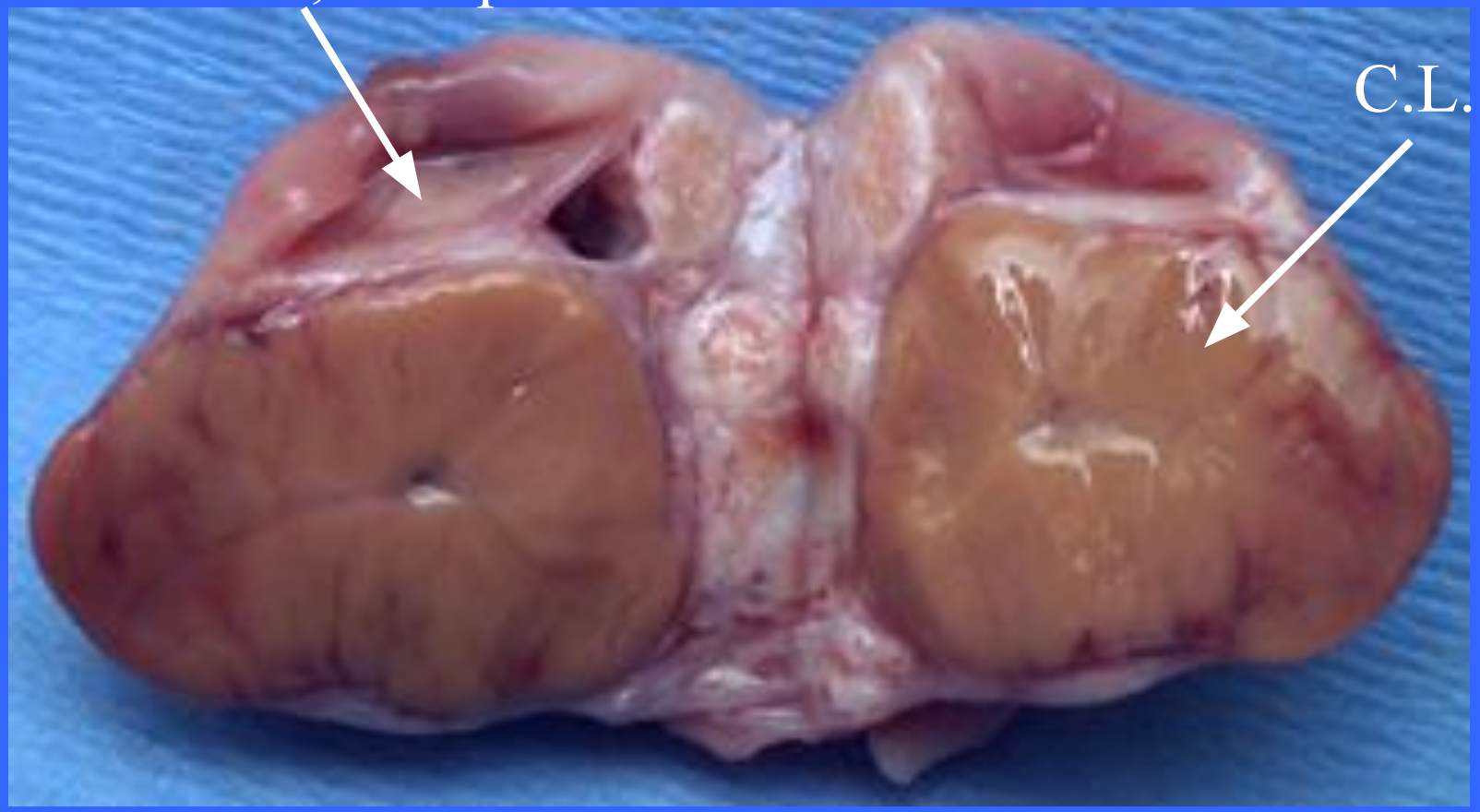


Ovarian Structures





http://muextension.missouri.edu/explore/agguides/ansci/g02015.htm



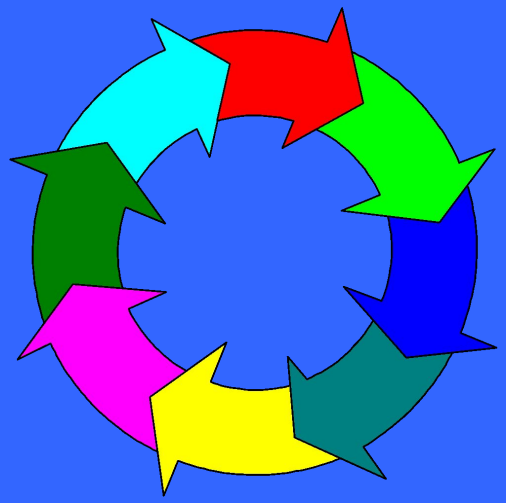
Ovary with transected C.L. and follicle.
Note yellow color of C.L.

From http://lam.vet.uga.edu/lam/LM000026.HTML

Reproductive Hormones

- Leutenizing Hormome (LH)
- Gonadatropin releasing hormone (GnRH)
- Follicle Stimulating Hormone (FSH)
- Prostaglandins
- Estrogens
- Progesterones
- Oxytocin
- Relaxin
- Testosterones
- Prolactin

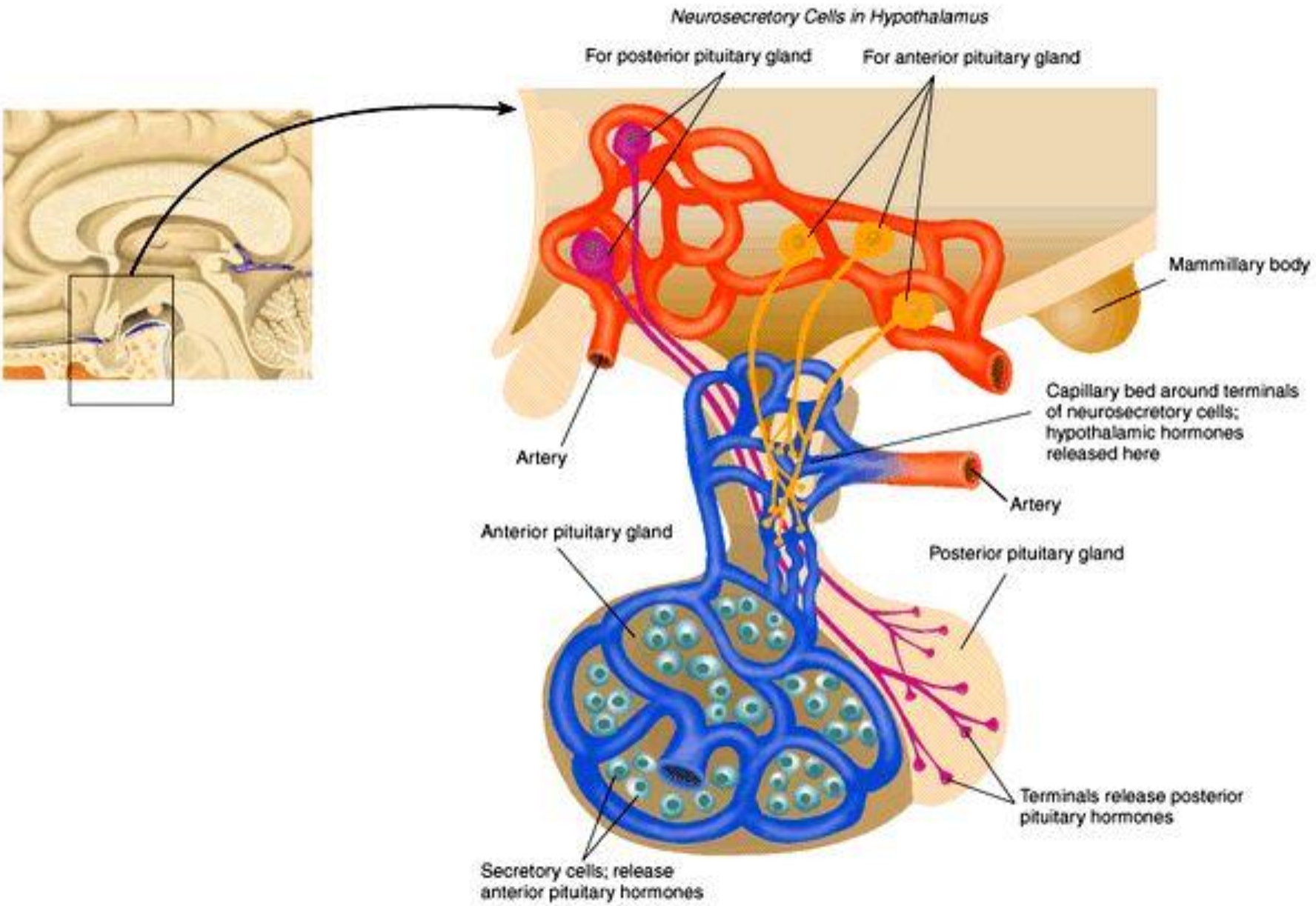
The Hormonal Feedback Loop



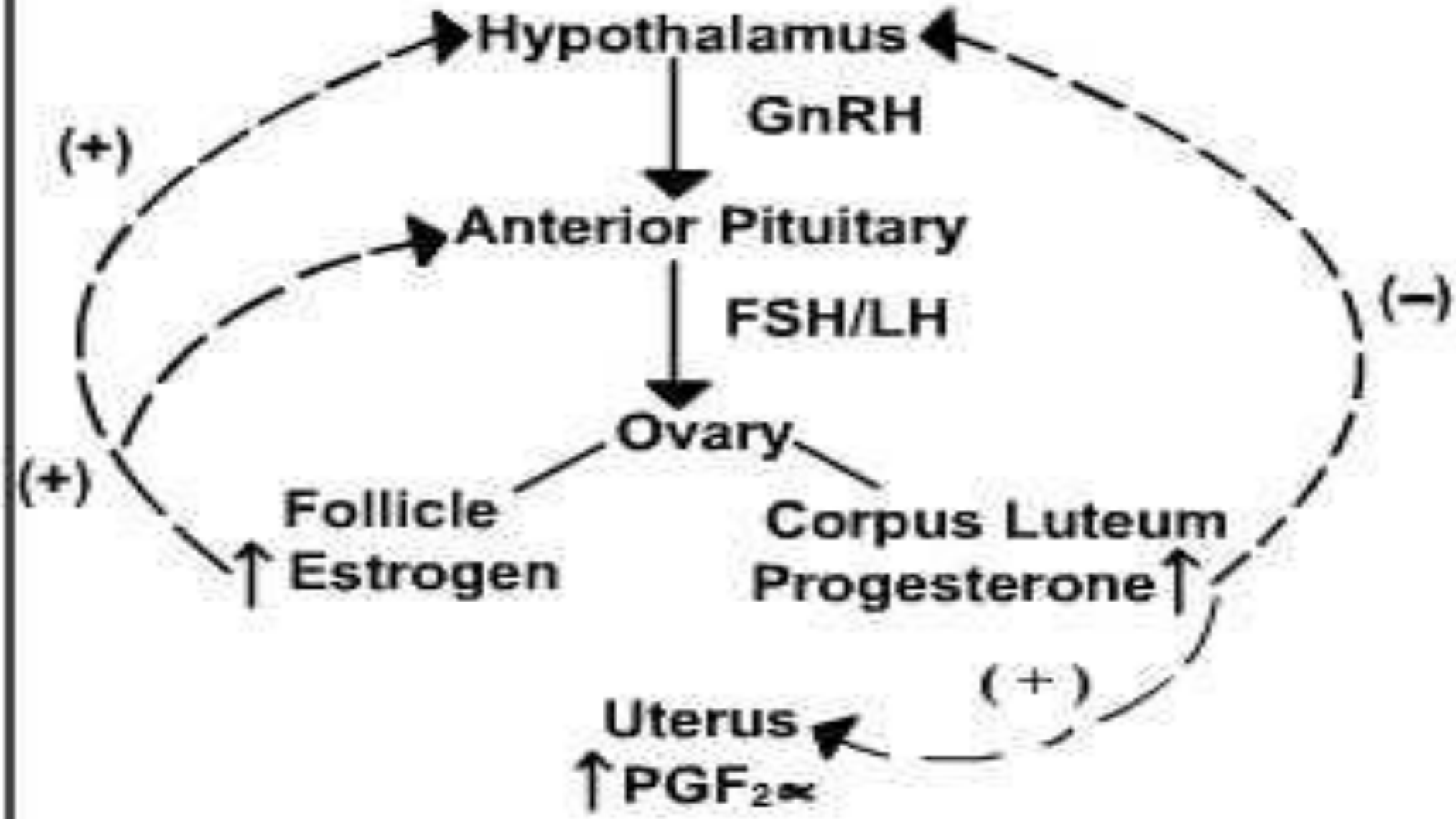
Hypothalamus, pituitary gland, ovaries

▶ The Pituitary Gland

Source: http://www.driesen.com/pituitary_gland.htm



HYPOTHALAMIC-PITUITARY GONADAL AXIS



From http://beef.unl.edu/learning/estrous.shtml

GnRH

- Gonadatropin Releasing Hormone
- Produced by the hypothalamus
- Pulse of GnRH causes release of LH and FSH from the pituitary gland
- Is sometimes used to treat cystic ovaries

LH

- Luteinizing Hormone
- Produced and released by the anterior pituitary gland in response to pulse of GnRH
- Works with FSH to stimulate follicle to produce estrogen (days 18-21 of cycle)
- Stimulates ovulation 24 hours after LH peak
- "Luteinizes" the ruptured follicle which creates and maintains the C.L., which produces progesterone (days 4-16)
- Stimulates testes to produce testosterone

FSH

- Follicle Stimulating Hormone
- Produced and released by the pituitary gland in response to GnRH
- Function: stimulate the development of a *follicle* (fluid-filled structure that contains an egg; days 17-21 of cycle)
- With LH: stimulates estrogen secretion from the follicle (days 18-21)
- Stimulate production of sperm cells in testes

Progesterone

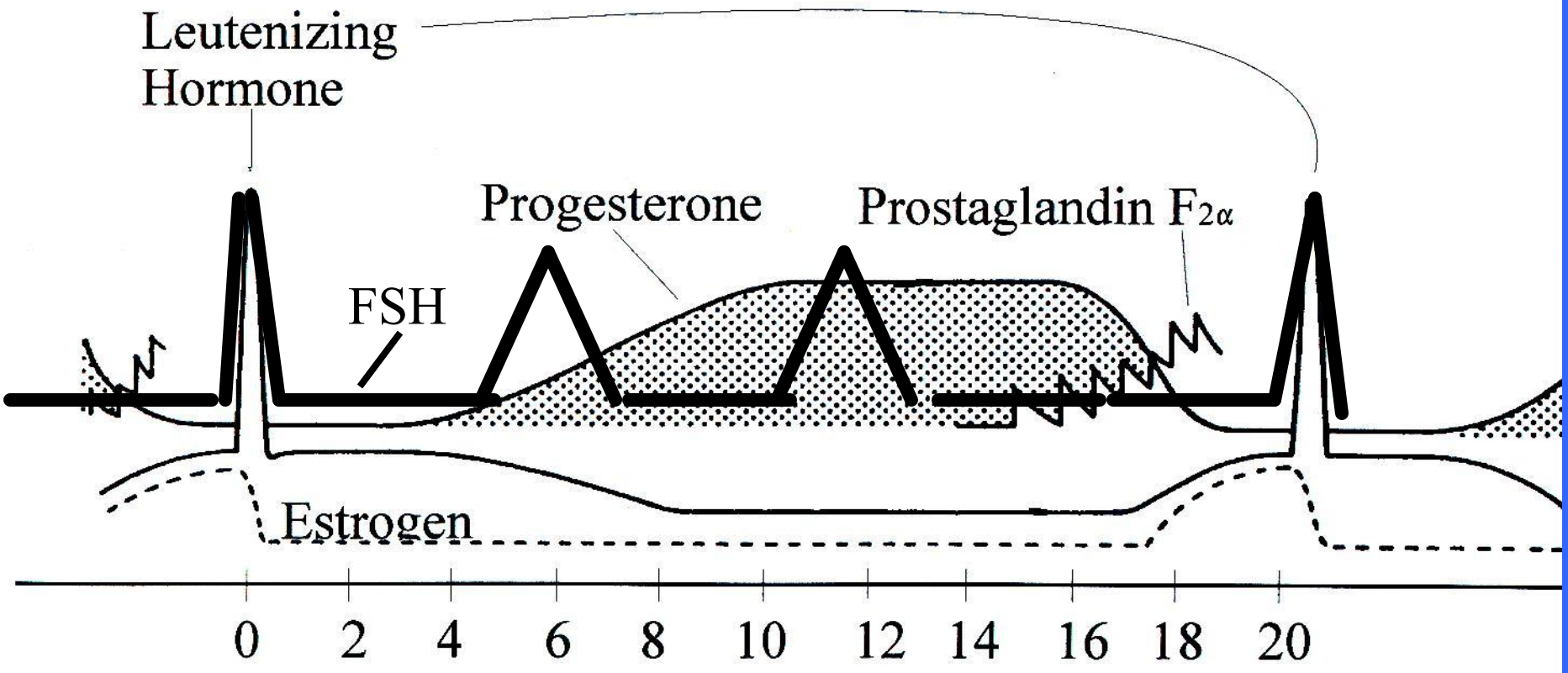
- “The hormone of pregnancy”--prepares uterus for implantation and prevents uterine contractions
- Produced by the C.L. until the end of the cycle or end of pregnancy
- Helps prepare uterus for implantation, maintains pregnancy, causes some mammary duct growth

Estrogen

- “The heat hormone”
- Produced by the mature follicle on the ovary
- Produces estrus behavior, growth of reproductive tract, uterine contractions and mammary duct growth
- High blood levels briefly at the time of estrus

Prostaglandins

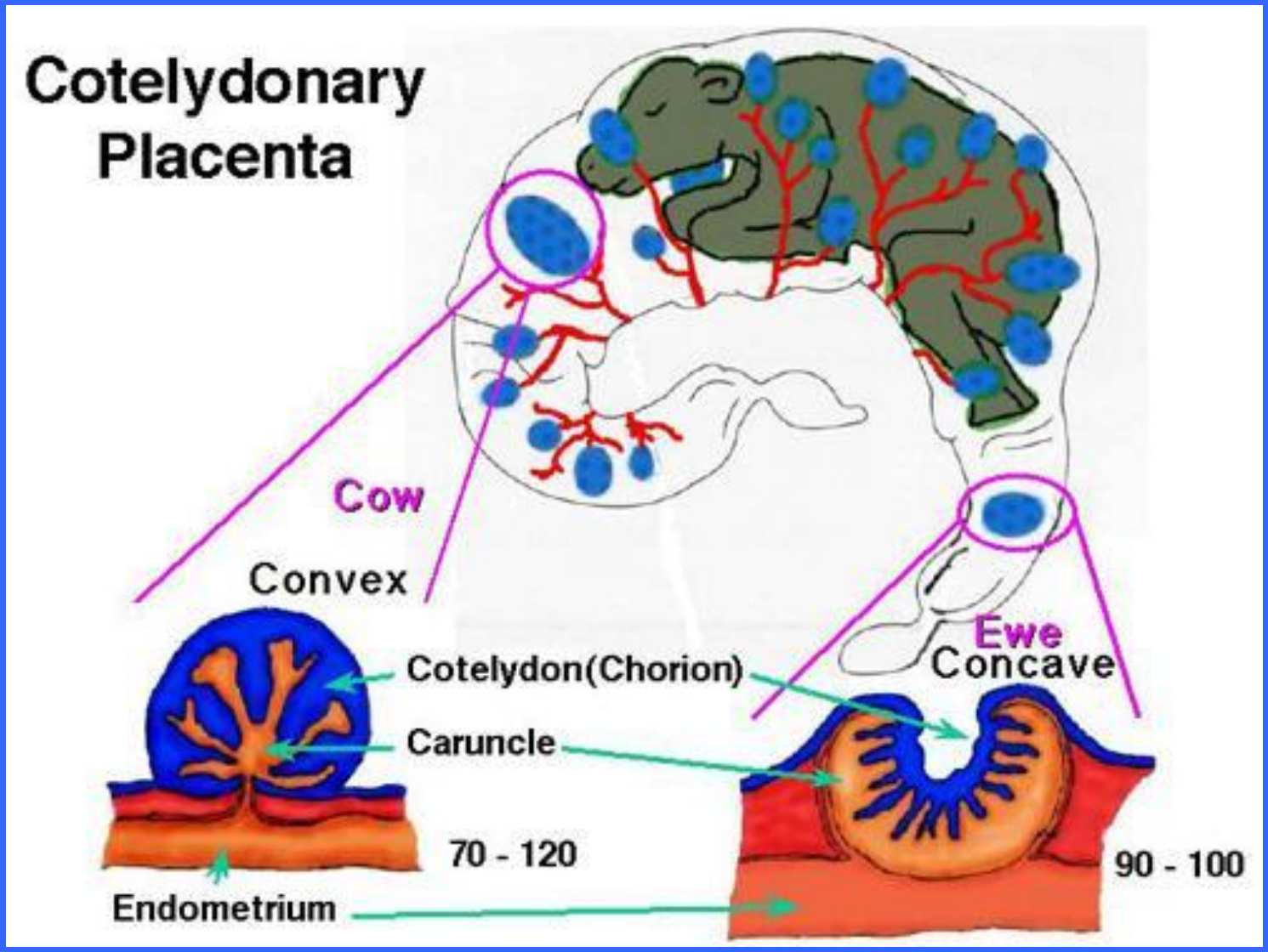
- Produced by the uterus toward the end of the cycle or end of gestation
- Cause regression (destruction) of the C.L.
- Also cause contraction of smooth muscles (uterus)
- Non-steroidal anti-inflammatory drugs (NSAIDs) have anti-prostaglandic effects (Ibuprofen®, etc.)



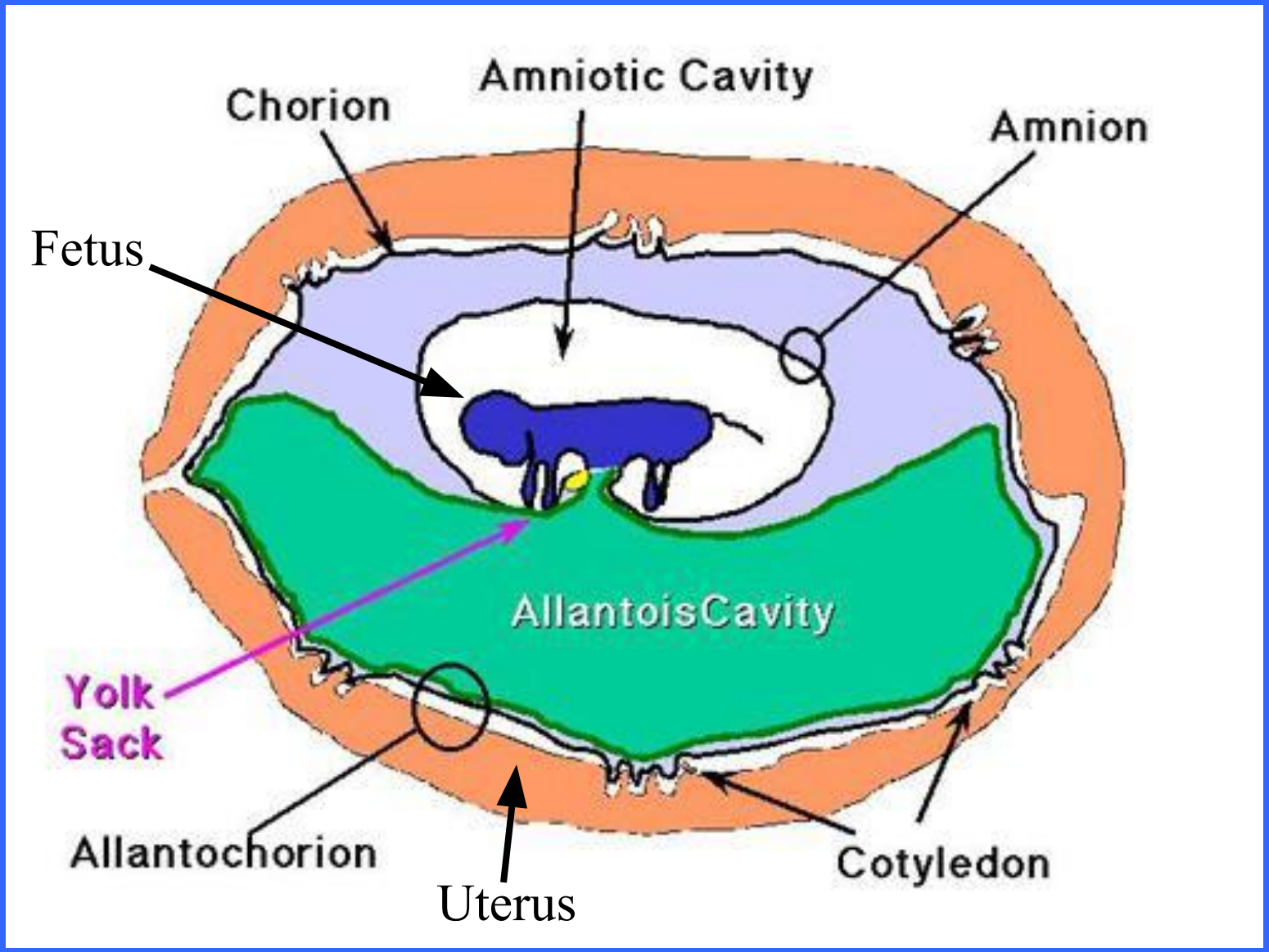
Hormones and Phases of the Estrous Cycle

Oxytocin

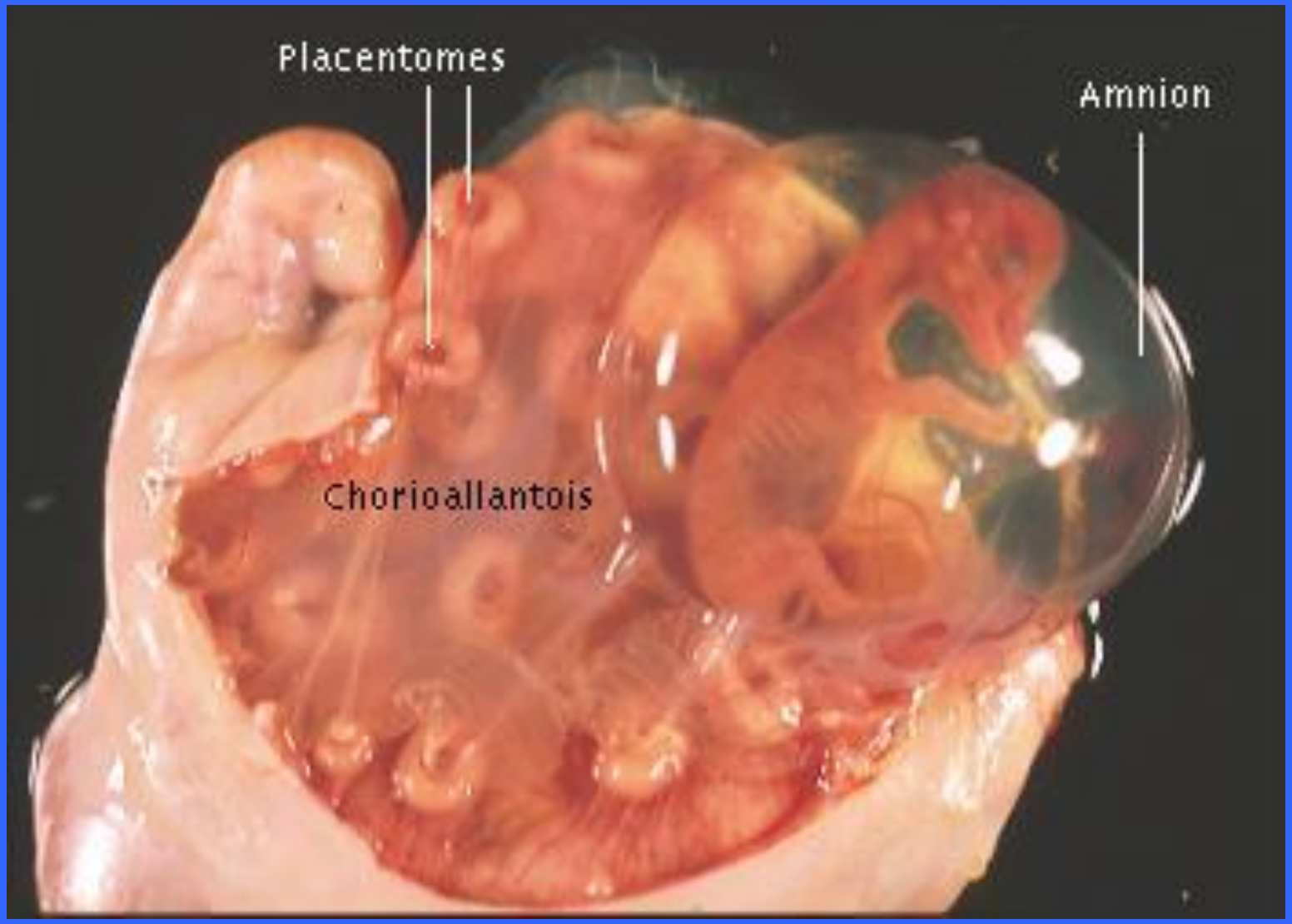
- Causes smooth muscle to contract (uterus, myoepithelial cells of udder)
- Produced by the posterior lobe of the pituitary gland
- Short half life
- Synthetic forms available



Source: http://www.wisc.edu/ansci_repro/lec/lec_19/lec19_images.html

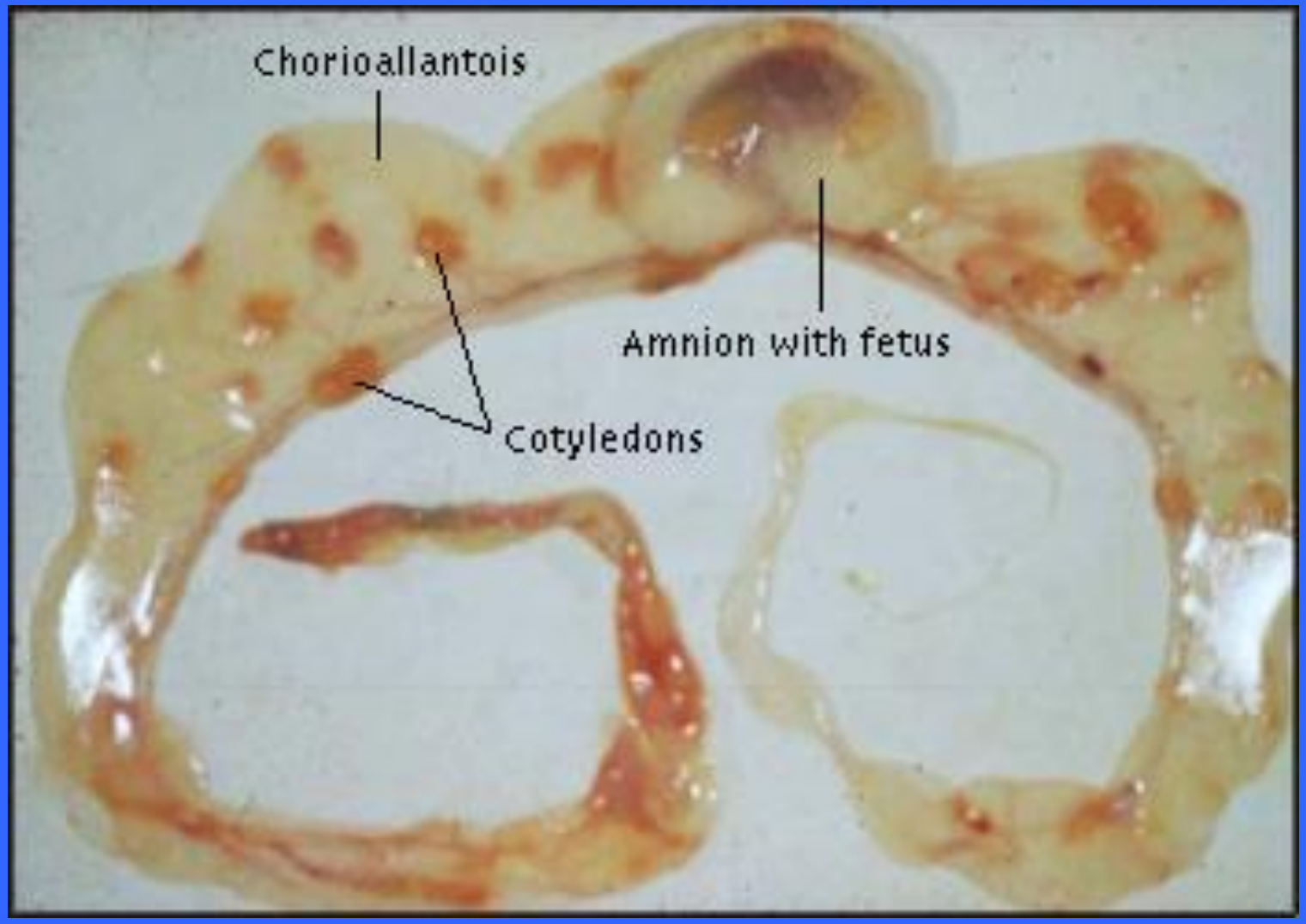


Source: http://www.wisc.edu/ansci_repro/lec/lec_19/lec19_images.html



Sheep fetus in uterus.

Source: http://arbl.cvmbs.colostate.edu/hbooks/pathphys/reprod/placenta/ruminants.html



Bovine fetus and placenta removed from uterus.

Source: http://arbl.cvmbs.colostate.edu/hbooks/pathphys/reprod/placenta/ruminants.html

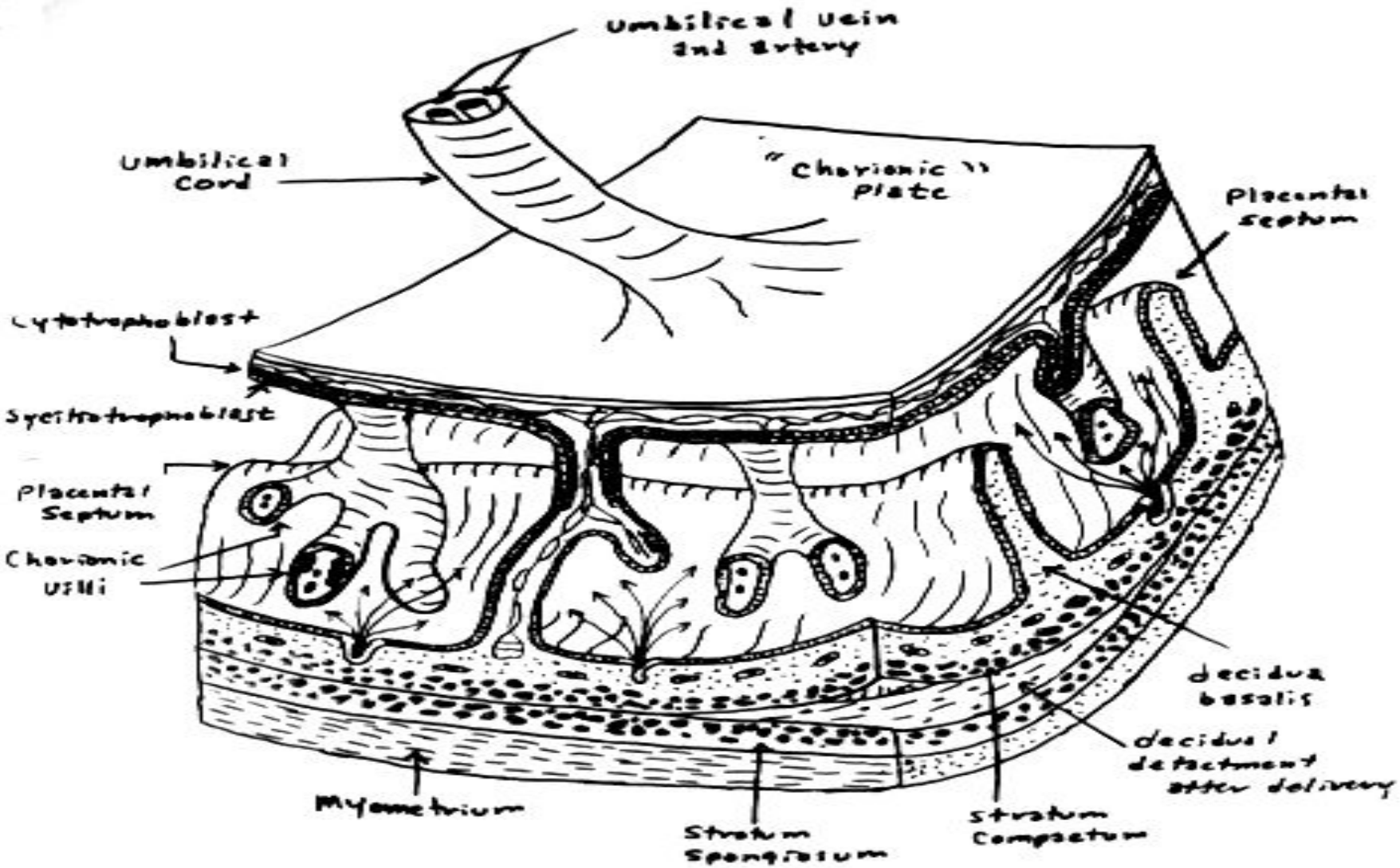


Diagram of origination of umbilical cord from placenta

Source:
http://www.udel.edu/Biology/Wags/histopage/illuspage/ifr/ifr10.GIF

The Estrous Cycle

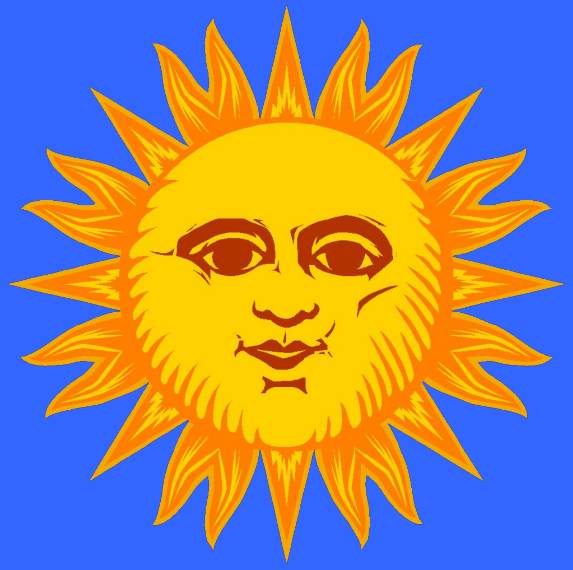
- Usually 21 days unless in transition
- Standing heat for 24 (to 72+) hours
- Estrogen dominant for 2-4 days
- Progesterone dominant during luteal phase (12-14 days)
- Phases: Estrus (day 0-1), metestrus (day 1-5), diestrus (day 6-17) and proestrus (day 18-20)

Control of Estrous Cycle

- Doe's hormones
- Day length (season or artificial light)
- Presence or absence of bucks

Signs of Estrus

- Bleating
- Pacing
- Squatting
- Frequent urination
- Drop in milk
- Swollen vulva
- Tail wagging
- Decreased appetite
- Clear vaginal discharge



Breeding Options

- Doelings: 60-70% of mature weight, or by 10-12 months old maximum
- Does: Two-three months after kidding (for three kid crops in two years)
- Every Fall, as does cycle naturally
- When she stands for buck
- AI: 12-18 hours after start of estrus

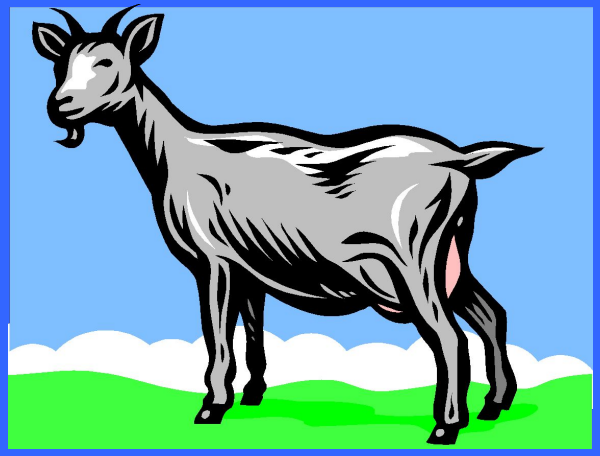
Out-of-season breeding techniques

Assess body condition score before breeding

Early re-breeding means early weaning

Pregnancy Detection

- Lack of heat
- Lack of interest in/by buck
- Hormonal assays (milk, serum)
- Ultrasound
- Doppler
- Hulet's Rod
- Ballottement
- X-rays



Normal Kidding

- Phase 1 = Prepatory period (ligaments relax, udder fills, fetus repositions, cervix dilates, cervical plug discharged); lasts 12-36 hours
- Phase 2 = Labor and delivery of kid(s); lasts 5-60 minutes
- Phase 3 = Passage of fetal membranes and placenta; lasts 0-12 hours

Phase 1

- Pacing
- Vocalizing
- Off by self
- Gets up and down often
- Looks at abdomen
- Doesn’t eat
- Paws ground
- May leak milk
- Tailhead ligaments very loose
- Fetus is being presented to cervix, causing dilation
- Vulva swollen

Phase 1

Phase 2

- Doe usually lies down
- Fetal membranes appear
- Abdominal presses evident
- Nose and/or feet appear
- 5 to 60 minutes between kids

Phase 2

Phase 2

Presentation of fetal nose

Phase 2

Delivery of fetal head

Phase 2

Phase 2

Note angle of lamb's body with respect to ewe's pelvis and mimic this when helping to deliver kid/lamb/calf/foal.

Completion of Phase 2: Delivery of Lamb

Completion of Phase 2: Delivery of Kid

Beginning of Phase 3: Expulsion of Fetal Membranes and Placenta

Lochia: Normal for up to three weeks post-kidding. Dark red, no foul smell.

Dystocia
= difficulty with delivery

Causes:

- Fetal-maternal relative size mismatch
- Uterine inertia (fatigue, low calcium)
- Maternal factors: ringwomb, hernias, pelvic fracture...
- Malpresentation of fetus
- Fetal monsters or malformation

Normal Presentation:

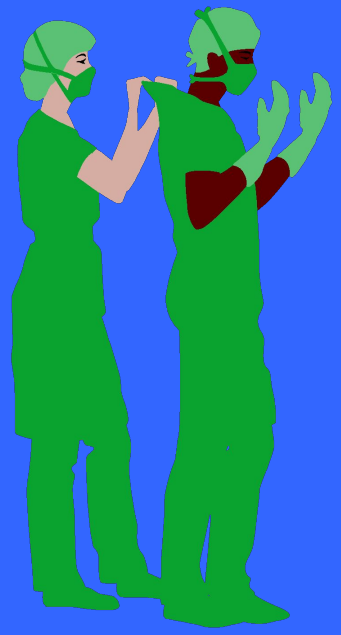
Front feet and nose of one kid

Malpresentations

- Head back
- Leg(s) back
- Jumbled-up twins/triplets
- Transverse
- True breech (rump and tail presented)
- Posterior presentation (hind feet presented)
- Poll presented

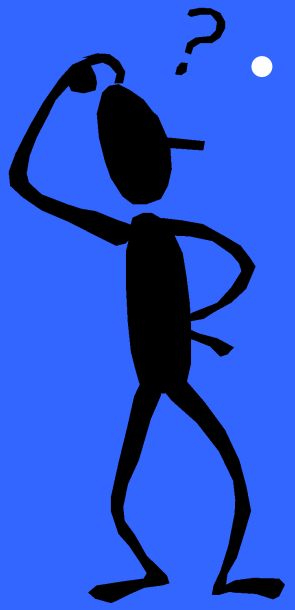
Keys to Assisting:

- Be clean
- Be gentle
- Be patient
- Use lubricant
- Small hands help
- Twins can be very confusing
- Take time to figure out what you feel
- Look for key landmarks you can identify
- Have assistant retract does' vulva
- Be willing to be "repulsive" (retropulse kid back into doe)



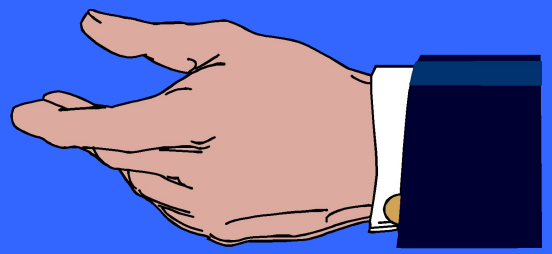
Questions

- Is she dilated enough?
- Does she just need a tincture of time?
- Front leg or hind leg?
- One or more kids? Which parts are which?!
- Should I check for another kid?

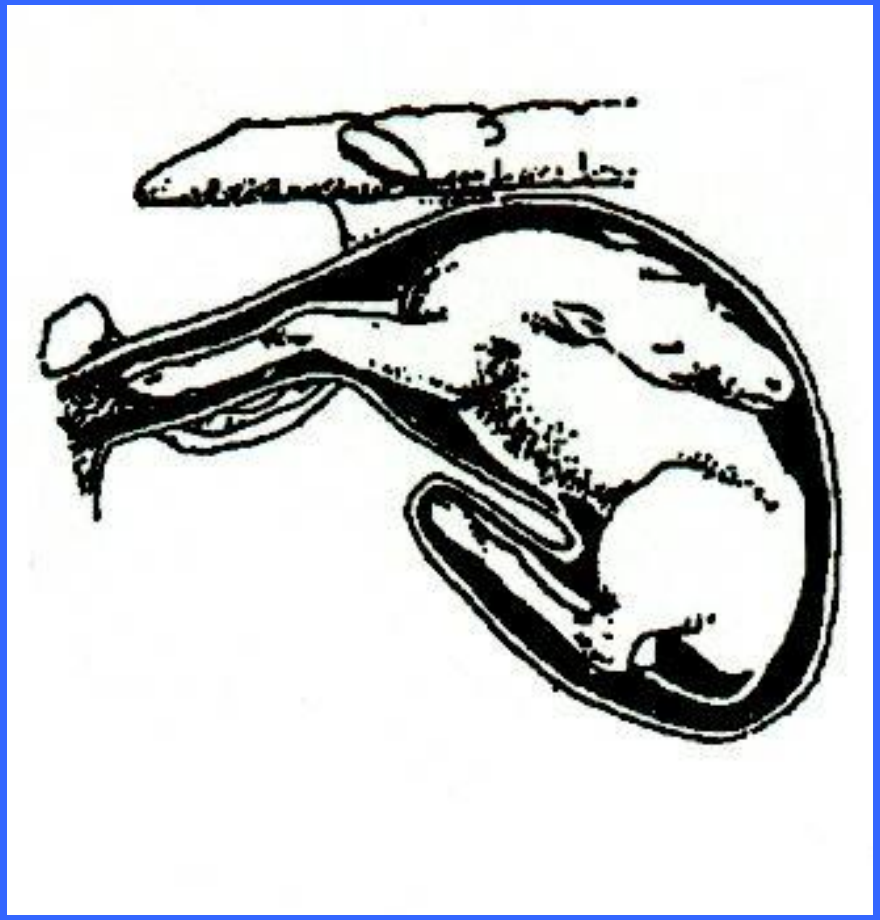


When to Assist:

1. Malpresentation
2. No progress after one hour of active labor (doeling) or one half hour (doe)

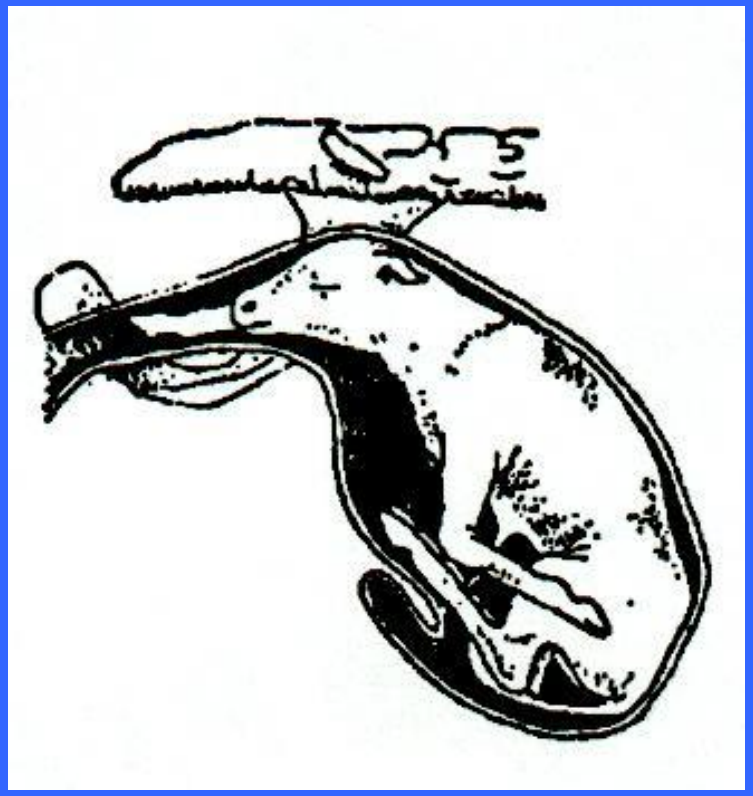


Head Back



- Very common
- Could confuse with breech presentation
- Won't feel tail or anus
- Check for ear, eye, teeth.
- Angle of mouth is a good handle
- Can be difficult to correct if kid dead a while
- Head snare can help

Leg Back



- Also very common
- ID front leg vs. back
- ID twins, single or triplets
- Follow leg to chest to other shoulder; follow leg to knee, bend knee tightly closed, cup hoof in hand, lift up and forward while pushing shoulder back; hoof must be delivered first
- Must protect uterus from hoof

Reproductive Problems

- Dystocia
- Pregnancy toxemia
- Milk fever
- Abortions
- Retained placentas
- False pregnancy
- Nymphomania (cystic ovaries, Copper def.)
- Prolapsed uterus

Retained Placenta

- Retained beyond 12 hours
- Causes: infections, premature, abortion, selenium deficiency, calcium deficiency
- DON'T PULL!
- Treatment: call your vet
  - Oxytocin
  - Perhaps Lutalyse®
  - Antibiotics (intrauterine vs. systemic)
  - NSAIDs help with fever, inflammation, toxins
  - Tetanus booster

Prolapsed Uterus

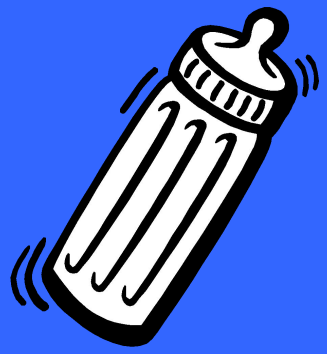
- Associated with lack of exercise, nutritional deficiencies and/or dystocia
- Treatment: call your vet
  - Clean, clean, clean (use HOT water)
  - Elevate hind quarters
  - Use gentle fists, not fingers
  - Antibiotics, oxytocin, tetanus booster
  - No need to stitch vulva if uterus replaced properly
  - "Bit" or bite block prevents doe from straining against prolapse reduction efforts

Causes of Abortions

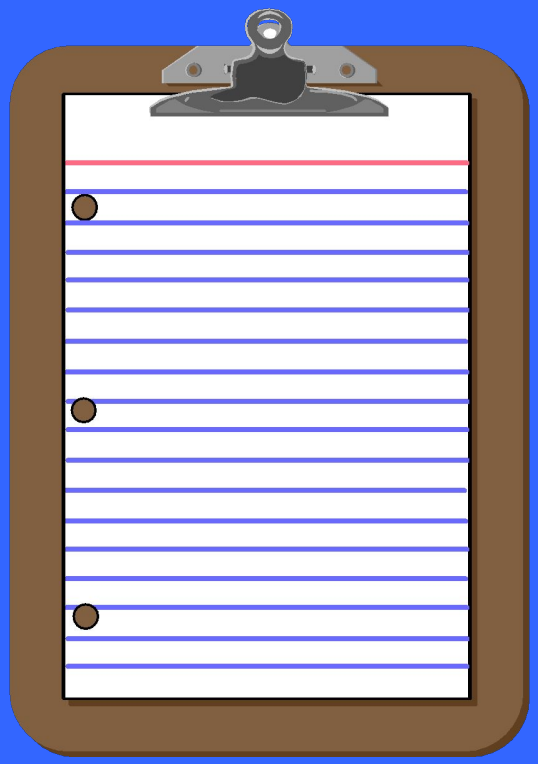
- Spontaneous regression of CL
- Toxins
- Exogenous hormones
- Fetal malformation/genetic error
- Trauma
- Maternal illness (fever, starvation)
- Too many feti for uterus to support
- Campylobacteriosis
- Selenium deficiency
- Listeriosis
- Salmonella
- Steroids
- Molds/fungi
- Toxoplasmosis
- Leptospirosis
- Immune factors
- Chlamydiosis (last 2-8 weeks); treatment and vaccination available

Neonatal Kid Care

- COLOSTRUM! When in doubt: tube feed
- Dip navel with 7% iodine; clip to 1-2”
- Check doe’s udder; strip out teats
- Vitamin E/Selenium injection
- Tag, tattoo or other ID
- +/- anti-toxins, depending on doe’s vaccination history
- Keep warm
- May need enema in 1-2 days.
- Beware of Floppy Kid Syndrome...



Record Keeping



- Birth weight
- Animal ID
- Dam and sire
- Number of kids
- Kidding ease
- Treatments, medications
- Weaning weight
- Dates of routine procedures
- Illnesses
- Birth date
- Number of kids weaned
- Pounds of kids weaned

Grafting

- Reasons
- Pelt technique
- Meconium & fetal fluids technique
- Doe relies on smell, especially anal area, head and umbilicus
- If graftee kid too old and vigorous for doe to accept as her neonate, tie 3 of kid's legs together; it will struggle and bleat and act more like a newborn

Kidding Supplies

- See handout
- ESSENTIAL:
  - tube feeder
  - Bo-Se®
  - Iodine
  - Thermometer
  - Epinephrine
  - Disinfectant soap

Synchronizing Estrus

- Why??
- Methods

  1. Progesterone sponges, implants or feed additive for at least 14 days, +/- FSH; heat in 3-5 days.

  2. Prostaglandin (Lutalyse ® or Estrumate®) injections for herd; repeat in 10-11 days; most in heat 2 days later. Goat must have CL for treatment to be effective

- You will need to have enough bucks or straws to service all does!

NOTE: none of these products are approved for use in goats

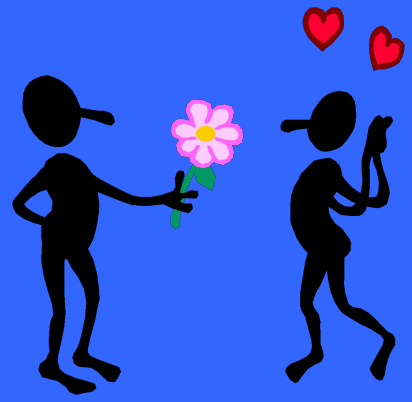
Superovulation and Embryo Transfer

- Cost prohibitive for most herds
- Being used by purebred Boer breeders and breeders of other rare or high-value breeds or individuals
- Steps: synchronize donor and recipient; superovulate donor; breed/inseminate donor; flush embryos; implant embryos in recipients
- Nutritional flushing two weeks pre/post-breeding associated with increased number of ovulations

Artificial Insemination

- Reasons
- Growing in availability, practicality and popularity
- Steps: semen collection, processing, storage, insemination
- Inseminate 12-18 hours after estrus starts
- Methods: cervical, trans-cervical and laparoscopic

Breeding Out-of-Season



- Reasons
- Remember: most breeds respond to decreasing day length and start cycling in August or later.
- Methods: (combination is best)

  Melatonin orally, injection or implant

  Artificial Light: 16 hours of light

  Male effect (new buck => greater effect)

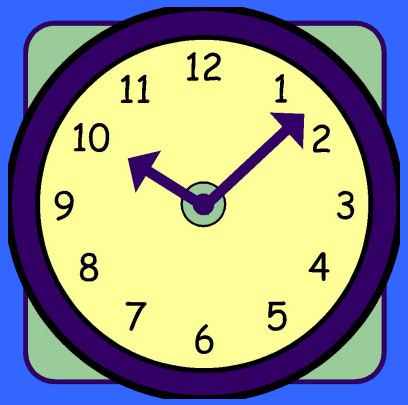
Artificial Day Length

- Two months of 16-19-20 hour days, or 1-2 hr. of bright light 16 hours after dawn; holds off cycling
- After two months, return to short day length; does start cycling in about 6 weeks
- Add buck for added male effect
- Consider electricity bill...

Hormonal Manipulation of Out-of-Season Breeding

(during anestrous period)

- Progesterone source for 11 days (d. 0-11)
- Give prostaglandin and PMSG on day 9
- Estrus 36-48 hr. later

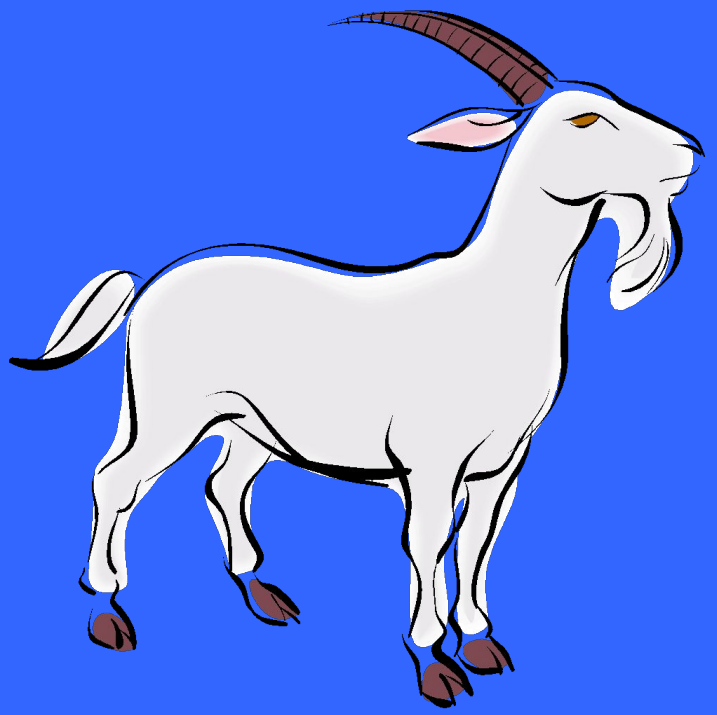


The Buck's Reproductive Tract

- Testes (produce sperm and testosterone)
- Scrotum (thermoregulation of testes)
- Epididymis (sperm maturation and storage)
- Vas Defrens (transport tubules)
- Ampulla
- Accessory sex glands
- Urethra (with sigmoid flexure)
- Penis (with filiform appendage)

Influences on Buck Fertility

- Temperature
- Season
- Health
- Nutrition
- Genetics



Selecting Bucks

- Positive traits of buck and progeny! (weaning weights, dressing percent, rate of gain, conformation, etc.)
- Fertile! (Re-assess each year)

  Normal external genitalia

  Libido

  Normal ejaculate (microscopic exam)
- Healthy and sound

SUMMARY

- The best reproduction program is part of an entire herd health program
- Nutrition plays a very important role
- Colostrum, colostrum, colostrum!
- Know due dates for best management!!!
- Not every animal should pass its genes on
- Plan breeding to hit best market dates with kids
- To turn a profit, you must learn how to do most treatments and interventions yourself

Resources

- Goat Medicine, Smith & Sherman, 1994, ISBN 0812114787
- www.wisc.edu/ansci_repro/
- www.sheepandgoat.com
- http://www.tennesseemeatgoats.com/articles.htm
- http://www.cals.ncsu.edu/an_sci/extension/animal/meatgoat/ahgoats_index.html
- http://www.wvu.edu/~exten/infores/pubs/livepoul/dirm2.pdf
- http://muextension.missouri.edu/explore/agguides/ansci/g02015.htm
- http://beef.unl.edu/learning/estrous.shtml (great graphics!)