INTRODUCTION TO CANINE REPRODUCTION AND PRE-BREEDING TESTING

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As veterinary technicians, we have the power to create educated owners. Creating an informed client allows them to make decisions when it comes to reproduction. We can direct them onto the right path - whether they choose to stay on that path or not. It is our responsibility to provide clients with truthful information when they ask questions. A client cannot make a right or wrong choice if they do not have the correct information - ignorance is bliss! We cannot assume that the average pet owner knows the ins and outs of canine reproduction.

You can be a veterinary professional who is pro-rescue and pro-breeder – both “good rescues” and “good breeders” are things we WANT to support! Both rescuing and breeding take extra effort to do well.

Tech tip: Always educate your clients in a professional manner. Owners may be embarrassed or even inappropriate when discussing reproduction. Preparation ahead of time (practice conversations with coworkers, discuss with DVM or senior techs what they recommend) can assist with either situation.

Reproductive terminology:
theriogenology: branch of veterinary medicine concerned with reproduction, including physiology and pathology of the reproductive systems of animals and the clinical practice of obstetrics, gynecology, and andrology
bitch/dog: intact female canine, intact male canine
dam/sire: female canine parent, male canine parent
congenital: present at birth
Genetic: (in this use) a trait/characteristic passed through DNA from the parent(s)
dominant: gene will be expressed with only 1 copy
recessive: gene needs 2 copies to be expressed
polygenic: multiple genes
progesterone: hormone produced by the corpus luteum of the ovary that functions in preparing the uterus for pregnancy and maintaining it if pregnancy occurs
estrogen: hormone or group of hormones produced by the developing ovarian follicle; it stimulates female sex drive and controls the development of feminine characteristics
ovulation: the process of egg release and maturation
estrus cycle: reproductive phases beginning at puberty that vary at regular intervals to prepare the uterus to receive a fertilized ovum; it is measured from beginning of estrus or heat period to the beginning of the next
proestrus: phase in the estrous cycle just before estrus, characterized by development of the ovarian follicle (2-9 days average)
typical physical presentation: vulva swollen, bloody discharge, attractive to males but won’t allow mating

**estrus**: period of the reproductive cycle in which the female is receptive to the male (7-9 days average)

typical physical presentation: bitch will allow mating

**diestrus**: the phase of the progesterone dominance following estrus (58 days)

**anestrus**: the period of the estrous cycle that occurs between diestrus and proestrus, uterus undergoes self repair (4-12 months)

**semen collection**: in canines: the bulbis glandis and penis are extruded from the prepuce, and ejaculate is collected in an artificial vagina

**semen freezing**: cryopreservation of sperm cells

**vaginal artificial insemination**: semen is deposited into cranial vagina near the cervix with insemination pipette

**trans-cervical insemination**: using a rigid endoscope and rigid catheter, semen is deposited into the uterus through the cervical os

**surgical insemination**: body of uterus is exposed through a midline abdominal incision; semen is deposited into the uterine lumen and horns via a small over the needle catheter (ex. 20g) or needle

*Tech tip*: Drawing a comparison between menstrual and estrous cycles can often assist in understanding. Humans ovulate every 28-32 days versus canines every 4-12 months. Humans are shedding the uterine lining when they are bleeding; canines are entering the fertile period when they are bleeding.

**Proper anatomical terms:**
Educate your clients to the difference between humans and animals – human anatomical terms can even be foreign to some – ask if they need a better explanation! We are here to help.

**female reproductive organs**: vulva, vagina, uterus, cervix, ovaries, egg, estrus

**corpus luteum**: the ruptured follicle that takes on a yellow fatty substance after ovulation, also produces progesterone.

**ovarian follicle**: the small, cyst like structures in ovaries that, when fully developed, contain a mature ovum

**male reproductive organs**: prepuce, penis, testicles, bulbis glandis, scrotum, semen, sperm

**The Talk**: So you want to breed your dog…

Explain the breeding process to your client from beginning to end – educate that English bull dog owner that their brachycephalic breed will need a C-section or the owner of the dysplastic German shepherd that the puppies produced can also carry that trait.

Much of the discussion with a client who is interested in breeding their pet will be counseling them, tapping into our “soft skills” as technicians. They will have many questions – even the most experienced technician cannot be expected to know all the answers when it comes to breeding and genetics of each breed.
Soft skills must also be called upon when the client asks our advice on breeding an animal that is not qualified (for one reason or another). When counseling clients, we need to remember that we are the animal’s advocate – if the bitch or dog is likely to produce abnormal or unhealthy offspring, they should not be bred. This should be made clear to the owner. If Fluffy the bichon frise has luxating patellas – regardless if she is limping or not - she has the potential to produce this malformation in her offspring.

Mentally preparing a pro and con list can help move this discussion with clients along. Examples can include:

**Pro:**
- bettering the breed, passing on good genetics, can have some idea about inherited traits,
- ability to socialize and develop pups from neonates to puppy stage properly, can choose what homes offspring go to, may produce a great puppy (conformation, agility, etc)
- *Possibility of additional income is often viewed as a pro, but it is not common for responsible breeders to make money from their litters after covering all of the expenses (listed in the following section).*

**Con:**
- cost (including but not limited to: conformation/competition, health testing, stud fee, extra food for dam, whelping supplies, c-section cost, puppy vet visits, puppy food and supplies, complications, emergencies, etc.) danger of breeding, pregnancy, and delivery to mother, risk of pyometra if left intact, work and time of raising a litter (incl. time off work, never ending laundry), passing on poor genetics, no guarantee of what traits (good or bad) will pass on, chances of birth defects and decisions regarding those pups, difficulty finding homes, risk of “non-maternal” dam, un-sold pups, change of schedule for all living in home, risk of pup death post whelp (fading puppy, cleft, congenital condition, husbandry), post-partum complications of bitch, canine to canine transmissible or zoonotic diseases, contribution to pet overpopulation, pregnancy is a life-threatening condition

**Pre-Breeding Testing**

**Help to provide resources for clients:**
- Local kennel clubs
- Local breed clubs (or state/national)
- OFA
- UC Davis genetic lab
- VetGen DNA
- AKC Breeder Education Series
  - “Planning breedings”
  - “Are you ready to breed a litter?”

AKC has a very client and staff friendly page that breaks things down step by step: [http://www.akc.org/dog-breeders/responsible-breeding/](http://www.akc.org/dog-breeders/responsible-breeding/)

Breed of dog can change testing protocol:
Example: German shepherd dog

**OFA** lists recommended tests and certifications - hip dysplasia, elbow dysplasia, temperament test, cardiac evaluation, autoimmune thyroiditis, DM, eye exam

Can you test for more than what is required? YES

**VetGen** lists what tests are available for that breed - DM, Hemophilia A, hyperuricosuria, dwarfism, mucopolysaccharidosis, renalcystadenocarcinoma nodular dermatofibrosis, MDR1, day blindness

Remind the client that there are other conditions that cannot be genetically tested for, but do have a genetic component. Entropion, allergies, and even temperament are all examples of things that can be passed on to offspring but are not truly “genetically” tested for. It is also vital to explain to the client that even with the “best breedings” - recommended testing completed, pedigrees reviewed, etc. – congenital problems can and do still occur. Humans can never have 100% control of how genes combine in any breeding, and we must be prepared for that.

**When the client chooses to breed against medical advice – as technicians, we have done all we can do.** Maintaining proper record keeping allows us to protect ourselves, to have a record that we informed and educated the client on the risks and possible consequences. Breeding AMA can and will continue to happen. Many technicians see irresponsible breeders on a regular basis.

Reproducing mixed breed dogs can result in healthy animals but does NOT decrease genetic disease potential. A study from US Davis has shown that occurrence of genetic diseases truly depends on the specific condition. For example, DCM and elbow dysplasia are more likely in purebreds, but CCL rupture is more likely in mixed breeds. However, with years of consistency that the genetic lines of healthy purebred dogs have, it is next to impossible to reproduce that when mixing two different breeds (example: when considering polygenic conditions). When breeding two different breeds of dog, there is a higher risk in the “genetic lottery” - can have different conformation, coat types, more variable temperament, etc.

**Bitch testing:**

Progesterone levels of female can help properly time the breeding and also choose a C-section date. This test will need to be done multiple times and can be started 5-7 days after first signs of heat.

Vaginal cultures will look for bacteria in the vaginal canal. This is not considered a routine test for breeding. Many laboratories will identify “typical genital flora” as such. Other cultures, such as *Mycoplasma*, may need to be ordered separately dependent on lab. The bacteria *Mycoplasma* in large numbers can cause reproductive complications, such as vaginitis or abortions. This should only be done if abnormal vaginal discharge is present or problems with fertility occur.

**Dog testing:**

Semen evaluation of the male allows a reproductive specialist to evaluate the health of the sperm cells themselves. Evaluation includes sperm cell morphology (noting different types of defects and percentage of normal sperm cells), sperm motility (percentage of motile sperm), concentration of the sample (how many cells there are), and more. This test can be done on any male to ensure viability of semen.
Semen cultures are similar to vaginal cultures – if a dog is suddenly sterile or there are other clinical signs leading to DVM to do culture, this test is performed (not routinely done). Semen cultures are typically ordered by a DVM if fertility problems occur (dog becomes infertile or “misses” breedings).

Note: a vaginal or semen culture may come back with positive growth without being considered abnormal or requiring treatment.

**Both Sexes:**
Brucellosis (*Brucella canis*) is a bacterial, zoonotic disease that is still prevalent in the US today. It causes abortions, still births, and sterility in canines. It can be passed in reproductive fluids, milk, blood, and urine. It is recommended to test a bitch every time she is bred – *B. canis* can be passed in urine so an animal can be positive even if never previously bred. If actively breeding naturally, males should be tested every four to six months.

Note: Brucellosis is in Michigan! MSU published a study in August of 2018 highlighting the outbreak.

Any dog or bitch that an owner is considering breeding should have a physical exam. It is also ideal that they be fit, fully vaccinated, and free of parasites.

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