Lesson 1: History of Veterinary Practice and Dog and Cat Reproduction

Introduction


Hello, and welcome to *Becoming a Veterinary Assistant* . I'm Jeff Grognet and I'll be your instructor for the next six weeks as we explore the exciting world of animal care and veterinary medicine. Many people think that animal care only happens in an office setting with veterinarians in white lab coats taking blood and passing out medicine. However, there's also a practical side to animal care that everyone should know about. And that's just what I'm going to share with you.

If you're a pet owner, you may be wondering if this is the right course for you. I'm happy to report that it is. I've tailored my course to provide everyone from the aspiring veterinary assistant to the concerned pet owner with sensible, valuable advice about caring for pets and patients alike. It's an insider's glimpse of what goes on behind the scenes at a veterinary's clinic. The information that I'll share with you will make you a smarter pet owner and a more valuable veterinary assistant.

Before we jump right in, I'd like to share a little bit about myself and why I dedicated my life to the care of animals. For as long as I could remember, I've wanted to be a veterinarian. As a child, I grew up surrounded by animals. With help from relatives, I would care for pets and any injured wild animals that happened across my path. This love of animals eventually became my career goal, and after seven years of education, I finally became a doctor of veterinary medicine.

I started out practicing medicine in a companion animal hospital. This hospital specialized in dogs, cats, and exotic animals like birds and rabbits. I joined as an associate and quickly became a partner. On the side, I dabbled in livestock (cows, pigs, sheep) and horses. With 12 years of experience, my wife (also a veterinarian) and I decided to open up our own practice. It was a dream come true when we opened the doors of our own practice for dogs and cats in 1995.

Since then, every day has been unique and challenging. Although we practice traditional medicine, we've recently added a new dimension by training in Chinese medicine to learn acupuncture. I then received accreditation in *Veterinary Orthopedic Manipulation* (VOM). This allows me to correct spinal problems in cats, dogs, and other domesticated animals. More recently, I've turned my attention to *frequency-specific low level laser* . This tool can help arthritic pets but also those with heart problems, incontinence, and even cancer.

Beyond animal care, my other professional interests are teaching and writing about new topics in veterinary medicine. I've been a regular contributor to *Dogs in Canada* , the *AKC Gazette , AKC Family Dog* , and *Cattlemen* magazines, as well as a weekly columnist for the *Western Producer* newspaper. Over the years, I've written a large number of freelance articles for numerous agricultural and pet-oriented publications.

My teaching career came about almost by accident. After years of providing my staff with regular training sessions, a local college asked me to develop a veterinary receptionist and assistant program. It was a hit and became the inspiration for this online course.

Many students took the college course because they were employed at a veterinary hospital or were interested in pursuing a career in veterinary medicine. Surprisingly, however, the majority of people who enrolled were pet owners who wanted to improve the quality of care they provided to their pets.

With this in mind, I designed my lesson material to provide you with the knowledge you need to answer questions that regularly come up during a visit to a veterinarian. Some of the things we'll cover are questions about vaccinations, the spread of worms, the best diet for your pet, home dental care, an introduction to fleas and ticks, and much, much more.

I'll also cover the essentials of pet first aid. This will help you deal effectively with minor pet emergencies at home. Finally, I'll introduce some of the alternative therapies out there that pet owners might have questions about.

At the end of the course, you'll be equipped to make informed health choices for your pets. For those of you working at veterinary hospitals, your knowledge will help your clients provide better care to their pets.

To get things started, we'll take a short but fascinating journey through the evolution of the veterinary profession and where trends are leading us in the future. Believe me, we've come a very long way from just 50 years ago! Then we'll take a look at where it all starts—reproduction. Because the majority of pets are cats and dogs, we'll focus on the process for these two animals.

A History of Veterinary Hospitals and Future Trends

Veterinary medicine has roots that reach back into ancient times. In the early days of the Roman Empire, animal caretakers were called *souvetaurinarii*. This is considered to be the origin of the word *veterinarian*. Because the only valuable animals were ones that could be eaten or ridden, early medical practice was restricted to horses, cattle, pigs, and sheep.

At about 2000 BC over in Egypt, cats were domesticated and revered as symbols of fertility and protectors of children. This relationship sprung out of the cats' abilities to rid cities of vermin and poisonous snakes that plagued communities around the Nile. Caring for these companions became important, though medical care was almost nonexistent. Whenever a family cat died, the family members went into full mourning. Dogs, however, did not receive such reverence until medieval times in Europe when they became valuable as hunting companions. It was around this time that medical care started for man's best friend.

Jumping ahead in time to the beginning of the 19th century, cattle and horses were added to the list of animals that deserved medical attention. Once again, it was because of economic demands that they stay healthy that humans decided to provide medical care for them. Dogs became a sideline of large animal practice in the 20th century and the expendable cats were only viewed as useful for keeping vermin down in the barns.

When the internal combustion engine was invented, it changed not only the world of transportation, but also the veterinary field. Horses dwindled in numbers, so veterinarians had to find something else to do. Dogs at last were considered important.

Eventually, hospitals sprang up that were devoted solely to companion animals. Soon, these canine-focused practices were thriving and the areas of canine medicine and surgery were born and expanded rapidly. Cats, on the other hand, didn't get the same amount of attention.

It wasn't until the 1970s that cats were recognized for their unique attributes. Prior to this time, cats were considered similar to small dogs and treated the same way. The assumption that their diseases mimicked those in dogs led to many fallacies and incorrect care. Veterinarians began specializing in feline medicine so there was a corresponding knowledge explosion.

Twenty-first Century Veterinary Care and Beyond

Today, clients demand excellent medical care for their dogs and cats. They want the same level of care for their pets that they expect for themselves. In response to this demand, veterinarians continue to explore these fields of animal care and it's been an explosion of exploration and knowledge ever since. The need for advanced care has also led to a high demand for board-certified veterinarians who specialize in specific areas of companion animal practice.

Technology, especially the internet, has also had an impact on veterinary medicine. I use it for educating myself and for discussing cases with other veterinarians. My clients also use it. If I mention a disease, it's not uncommon for them to go home, research the condition, and come back to me the next day with insightful questions. Information from the internet is usually helpful, but it can be misleading. It must always be evaluated in the correct context. "Dr. Google" isn't always correct.

What does the future hold? In the past, veterinarians had an ever-expanding number of patients so they were guaranteed success in practice. In the last fifteen years, that climate has changed dramatically. There is now a surplus of veterinarians, so much so that some veterinary colleges are considering reducing enrollment.

Because of this competition, just opening a hospital will not ensure that a practice is profitable. Veterinarians have to be good business managers who can attract and keep clients. Word of mouth referrals are critical. A veterinarian must be competent, but more importantly, clients and patients must be treated correctly by skilled and knowledgeable staff at the hospital. Also, specializing in any one of the many new fields can also help a veterinary practice succeed. Some of those areas are dentistry, ophthalmology, surgery, behavior, internal medicine, and holistic care.

A veterinary surgeon at work

Your Role at the Hospital

The attitude and abilities of the veterinary staff can make or break a practice just as easily as the behavior and knowledge of a veterinarian can. I believe that a well-informed, personable veterinary team member who can advise clients correctly is a true asset to every veterinary hospital, and this is what my course is all about.

You may be wondering what role everyone at the hospital has and how you can fit in. Let's look at each person and what they do.

The veterinarians are the ones who decide on patient care. This is what I do. Unless you are ready to go to university for many years, you won't become a James Herriot. For those of you who don't know who this fictional veterinarian is, I guess I'm dating myself.

As you walk into a veterinary hospital, you'll see and speak to the receptionist. This person's varied role includes setting appointments, admitting patients, doing billing and payments, and giving advice on animal health topics. There are short courses available at some colleges to learn these skills, but most receptionists are trained on the job.

Veterinary technologists (or technicians) work directly with the patients. They might be pulling a blood or urine sample, taking a radiograph, watching a patient under anesthetic, assisting with a dental procedure, or doing minor surgery. To become a tech requires an intensive two-year college course. There are some distance education opportunities for "techs" now, but their availability depends on where you live.

The veterinary assistant is likely the one you want to know about. If you become one, your role is to assist anyone in the hospital who needs it. If the tech wants to take blood, how do you restrain the cat? If a dog neuter is the next surgery, what do you need to set up for it? How do you take a lateral radiograph of a cat's chest? What do you tell Mrs. Smith about the worms and fleas her dog has? Can you give advice on what to feed a geriatric cat?

I designed my courses to teach you how to assist in all these duties. When you're looking for a job, they'll give you an advantage over other applicants so that you can become employed at a veterinary hospital. I've also had many students who are already working with a veterinarian but they want to bolster their knowledge to do their job more effectively.

Some students wonder about veterinary assistant certification. There is an Approved Veterinary Assistant (AVA) designation provided by the National Association of Veterinary Technicians in America (NAVTA). To get this, you need to attend a college that offers the programs. These programs are commonly associated with veterinary technician programs. The alternative is doing it through distance education if you're employed at a veterinary hospital, again through NAVTA.

If you don't live where you can take an AVA program, can't afford the time to attend classes, or don't work at a veterinary hospital, this is the alternative. I teach three six-week Veterinary Assistant courses and also a lengthier course (three to six months depending on how fast you do it), which are all available through your college. You can get information on these courses by checking the college website. I will provide links to more information on these courses at the end of Lesson 12 before we finish up this course.

Back to the Basics: Canine and Feline Reproduction

Since cats and dogs have become such important members of our families, participating in responsible animal reproduction is often part of the pet owning experience. *Responsible* breeding means that you have your animal checked out by a professional who can identify any defects in your animal that might be passed on to its offspring. If your pet suffers from *hip dysplasia* , poor eyesight, or any other number of genetic diseases, they should not be bred. Period.

Your next step as a responsible pet owner is to have your pet spayed so that these weaknesses aren't passed on. It may sound cruel, however, many of the genetic diseases found in the most popular breeds, like Golden Retrievers or German Shepherds, are a result of people breeding

animals that are genetically imperfect. This can mean a lifetime of pain and illness for the animals and thousands of dollars in bills for the owner.

Finally, it's also important to make sure you have enough loving families to send your puppies or kittens to. This will avoid unwanted pets that have to be euthanized or who go feral if they're released to fend for themselves.

With this information in mind, let's begin to look at some key glossary terms related to breeding.

Glossary

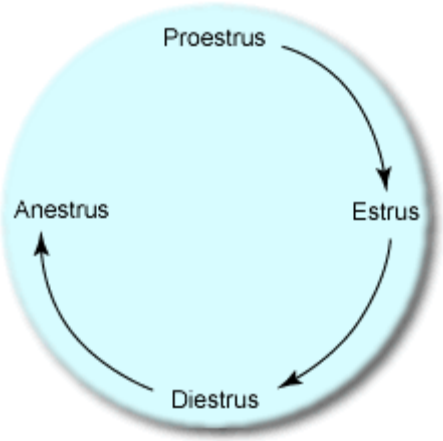
Term	Definition
Tomcat	Male (intact) cat
Heat	Period of sexual receptivity
Whelping	Giving birth (cat or dog)
Queening	Giving birth (cat only)
Estrous cycle	Hormonal cycle that controls reproduction
Estrus	To be in heat and receptive to the male for breeding
Vulva	The exterior part of the reproductive tract in the female
Palpation	Using hands to determine anatomy, such as palpating the abdomen to establish if an animal is pregnant

Canine Breeding: Female and Male

A recurring question from owners with new puppies is, "When will my dog come into heat?" Unfortunately, there's no single answer that applies to all dogs. Females have their first heat once they reach sexual maturity, but this depends on the breed and the size of the dog. In small dogs the first heat occurs when pups are between six and ten months of age. In giant breeds, such as Great Danes, it isn't uncommon for a female to start cycling at 16 to 20 months.

When a female starts her cycle (a four-step process), she begins the proestrus stage, and the first noticeable sign is a swelling of the vulva. Many owners miss this stage, especially if the dog is long-haired. But they rarely miss the next sign: bleeding from the vulva. This vaginal discharge attracts male dogs but the female rarely allows mating during this phase of her cycle. She is more inclined to attack a male who is too forward.

Here are the stages of a normal estrous cycle:



Four stages of estrous cycle

Proestrus begins the estrous cycle. This is followed by *estrus* , *diestrus* , and *anestrus* .

After about nine days of proestrus (it can range from three to fourteen days), estrus begins. This is technically the heat. The vaginal discharge changes from bloody to clear or pink. It's during estrus that ovulation occurs, so the female will be more receptive and will allow the male to approach and breed. The estrus phase lasts for about a week, though it can range from two days to twenty.

If a female dog isn't bred, or is bred and does not become pregnant, she enters a short stage called *diestrus* . Some can go through a false pregnancy during this time. They think they're pregnant so they eat more and put on weight as if they're expecting. When the 63-day mark rolls around, they grab a ball or stuffed animal and carry it around like it is a pup. Many produce milk for the puppies they believe they carry. I've even seen a few who go into labor, complete with contractions.

Pregnancy is technically a diestrus as well, but we refer to it as *pregnancy* . Interestingly, the hormone fluctuations that occur during pregnancy, false pregnancy, or plain diestrus are indistinguishable.

Once diestrus is finished, the female enters a period of hormonal dormancy, called *anestrus* , between her heat cycles. The average length of this stage is four months (making the entire cycle roughly 7 months long). The complete estrous cycle varies from five to twelve months. For some, it's even longer.

When the Time is Right

Although there are many days when a dog can successfully mate, some days are better than others. To help ensure a successful breeding, a veterinarian can do a *vaginal smear* . In this procedure, a sterile cotton swab is inserted into the vagina. The cells collected on the swab are transferred to a microscope slide, stained, and analyzed. The type of cells present indicate when she is going to ovulate.

Another way to pinpoint the best breeding time is by checking blood hormone levels. We're looking for a rise in the progesterone level to tell us when ovulation is about to occur. You'll see a reference periodically to *Luteinizing Hormone* (LH). It's produced by the pituitary gland, and when it peaks, it triggers ovulation. As such, it's often used as a marker for when ovulation occurs and events are tracked from that time. Because the testing for LH is done in laboratories, it's used more for research than practically.

The old way to get the best chance of conception is to give the female access to the male every second day during her estrus until she will no longer stand for breeding. This still works very well and it avoids testing.

If the dog becomes pregnant, she can look forward to a gestation (pregnancy) of about 63 days. The actual length of pregnancy is determined by the number of puppies because they trigger birthing. If there are more puppies, the gestation is shorter. If there are fewer puppies, the pregnancy will be longer. In fact, if there is only one pup, pregnancy can extend up to 68 days. If there is only one or two pups, they can grow very large, both from the extended time in the uterus and the additional nutrition they get because of lack of competition inside the uterus. Large pups make birthing (whelping) more difficult. A caesarean section (C-section) may be needed if the pups are too large to pass through the birth canal.

The male's mission in life follows a much more simple path: produce sperm to impregnate the egg. He can start doing this when he is sexually mature. This occurs at about the same age that the female (of the same breed) commences her cycles. Males can maintain their fertility well into their senior years. Females often stop cycling as they age, but pregnancies in dogs up to eight years old are possible.

Feline Reproduction: Female and Male

Cats are very efficient reproductive machines. I've seen tiny kittens in heat as early as four months of age who then give birth when only six months old. I've also seen cats pregnant while they're still feeding the kittens from their last litter. There's no doubt about it—cats can reproduce very quickly!

A happy litter of kittens

Most cats are six to seven months old when they start their cycling, but this varies with the time of year that they reach this age. If a kitten is six months old in October, she probably won't cycle until she is eight or nine months old because the lengthening of days of spring is an important trigger.

The effect of light on breeding cycles isn't restricted to cats. We also see it in rabbits and rodents. Nature is smart to arrange it this way. A part of the brain called the *pineal body* senses light and drives hormones. As it senses longer days (after December 21), it gets the cycles going. In the case of cats, they come into heat in about February or March. The kittens would be born in April or May. This is timed so that there is also a food source—lots of mice and such—that are also exploding in population.

In the northern hemisphere, the feline breeding season roughly starts in January and continues into September. A cat's estrous cycle has the same four phases as a dog's so I won't repeat this information again, but I will tell you what the differences are between the two species.

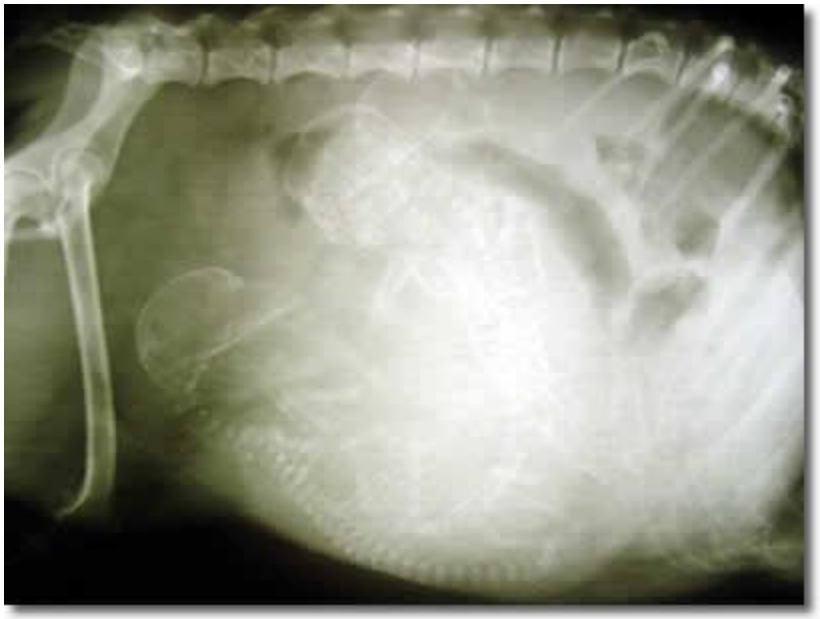
The proestrus part of a queen's cycle is inconspicuous, but owners don't miss the estrus stage. Cats in estrus often appear to be in pain and their owners sometimes rush them to the hospital because they howl and roll about as if in pain. Cats do this because they're crying for a mate, not because of an illness or injury. Cats in this stage usually pull their tails up and raise their rumps if you touch them over the hips or back.

When to Mate

A queen is receptive to a male for about seven days during estrus. She does not ovulate unless she copulates with a male. A male has small spines on his penis that ensures the female knows she has been bred. This *induced ovulation* ensures that none of the queen's eggs are ever wasted. If a queen isn't bred, she continues to show signs of heat about every three weeks.

The length of pregnancy in cats varies from 64 to 69 days. The average number of kittens per litter is four. Younger queens tend to have smaller litters than older queens.

To determine if a queen is pregnant, I prefer to feel for the kittens (what we call *palpation*). This is most accurate between 18 and 28 days after the breeding. This is because the *feti* (plural for fetus) and the fluids surrounding them feel like small ping pong balls. Before this time, the feti are too small to feel, and after 28 days, so much fluid surrounds the fetus that it can be hard to differentiate pregnancy from a uterine infection. *Radiographs* can be used to verify the number in the litter once the kittens' bones have calcified (over 45 days into the pregnancy). The same methods can be used in the dog.



A radiograph showing puppies

Male cats become fertile at the same age as queens; that is, six to seven months of age. Though I've had clients swear this shouldn't happen because it isn't proper, male kittens can and will breed their mothers. Kittens that are to be kept with their mothers should be neutered, which is the topic of the next chapter.

Reproduction: How and Why Should We Stop It?

There's an old wives' tale that I must overcome when I talk to clients about spaying and neutering. Some people still think that dogs make better pets if they have a litter or a heat first. I don't believe this and I haven't found any data to support this statement.

Sterilization is the most important surgery a dog or cat will have in its life. It's an accepted form of birth control, but just as importantly, it has medical benefits for both males and females.

There are two reasons for wanting to spay a female cat or dog. One is to stop them from contributing to the pet population. Take a trip to a local shelter and you will quickly see that there are too many unwanted cats and dogs in the world.

Sadly, one part of my job was to euthanize cats at an overcrowded shelter. On one of these visits, I entered the room and was greeted by 25 faces. All of them were destined to die. Ever since these experiences with this side of animal care over 20 years ago, I've been a staunch advocate for spaying and neutering.

As soon as people tell me they want to breed their bitch so that their children can see the miracle of birth, I tell them to arrange 10 homes for the puppies. I also tell them to visit the local shelter to see the unclaimed dogs there.

The cat ward at the local shelter

The second reason for sterilization is to avoid medical problems as the pet ages.

Diseases Suffered by Non-spayed and Non-neutered Pets

Female dogs left intact have about a 50% chance of developing mammary tumors. The hormonal fluctuations during estrus prompt the development of the mammary glands and this makes them susceptible to the development of growths. About 40% of these breast growths are malignant, meaning they can spread to other areas of the body. By spaying dogs before their first heat, the chance of breast tumors drops to a negligible level.

Queens are also prone to mammary tumors. Though the disease is relatively rare in cats compared to dogs, it is a far more serious condition in cats. About 95% of mammary growths are malignant in cats.

A severe uterine infection called a *pyometra* can also threaten the life of a female cat or dog. During estrus, the cervix of the female is open to allow sperm to reach the eggs. At this point, bacteria may move up into the uterus, triggering an infection. Females with pyometra usually become ill about six weeks after they finish their heat cycle. Emergency surgery to remove the pus-filled uterus is the standard treatment. The picture below shows a diseased uterus. It has been

removed and opened up so that you can see the pus inside. Compare how this uterus looks to the one I show below during a routine surgery for sterilization.

Intact males have their own health problems. Many develop *prostate infections* that can be very difficult to treat. About 50% of intact males form tumors in their testicles. Though few of these are malignant, the treatment is still castration. Some owners feel their senior dogs are too old for neutering. I assure them that there is no age limit for this procedure as long as the dog is otherwise healthy.

Do you confuse the words *prostate* and *prostrate*? The *prostate* is a gland possessed by males that produces fluid for semen. *Prostrate* means stretched out with face on the ground in adoration or submission. You can see that they mean totally different things, but clients often get them confused.

A testicular tumor—affected one is the large one

Male cats don't get prostate or testicular disease as frequently as dogs, but the production of the male hormone testosterone by their testicles creates its own problems. Intact males want to fight, establish territory, and roam to find females. They're at high risk for developing abscesses from fights and for contracting serious viral infections. They're also more likely to spray urine to mark territory.

Sterilization is the answer to stopping unwanted pregnancies and curtailing these medical ailments, as well as helping curb behavioral problems.

How the Procedure Works

In both dogs and cats, the terms *neutering* or *castrating* are interchangeable words meaning removal of the reproductive organs. This can refer to removal of either the testicles or ovaries. You'll find, however, that many veterinarians refer to the sterilization process with different words.

Male sterilization is often just called *neutering*. This involves the removal of both testicles, which are the source of sperm and male hormones. Castrated males cannot get females pregnant, they do not wander in search of females in heat, and they do not fight with other males for sexual status. Without testosterone, the prostate eventually shrinks away so it can't become infected. We can also call this surgery a *castration*.

A spay operation

In females, sterilization is also sometimes called a *castration* or *neuter*. But, because a female is sterilized by removing both her uterus and ovaries, and we want to be technically correct, we use the term *ovariohysterectomy*. Another word you'll see is a *spay*, but this should only apply if the veterinarian is only removing the two ovaries (and leaves the uterus intact).

When a female is sterilized, there are no ovaries left to produce hormones, which means there is no estrous cycle. Females will not come into heat and the mammary glands do not undergo the changes that predispose them to tumor formation. Also, with an ovariohysterectomy, there is no uterus remaining so it totally prevents pyometra.

Cat being neutered
(Before on the left and after on the right)

I recommend performing these surgeries when my patients are six months of age when the adult teeth have erupted. This is before the females come into heat and before the males develop annoying behaviors.

Some animal shelters advocate early (pediatric) surgery, where both cats and dogs are sterilized as young as four weeks of age. There is a slight risk associated with doing surgery in individuals this young. Specifically, if a puppy or kitten is harboring an infection and it's missed, the anesthetic could push them over the edge and kill them. This has been seen in kennel settings where viruses could be circulating through the population.

I won't sterilize my patients this young because I don't need to (the owners reliably get their animals sterilized later) and I want to ensure I have a healthy patient for surgery. However, for shelters, whose primary goal is population control, early neutering is ideal. It allows adoptees to be sterilized before they leave the shelter.

If you want to see a dog neutered or a cat spayed, just do a search for videos using those key words. Some movies show the entire procedure from start to finish.

Here's a question we get quite often at the hospital. If you have an adult female dog or cat, can you tell if they're sterilized? In some, we can find a scar that tells us they've had abdominal surgery. Clipping the hair and putting alcohol on can help us see the scar better. In this case, we assume the animal was neutered.

In cats, it can be hard to find a scar. We sometimes just wait and see if they come into heat. In dogs, we can do hormone tests, but they have to be done at the right time to be valid. We sometimes wait and see what happens with them as well.

The Future of Spaying

What will the future bring? Researchers continue to focus their efforts on developing a vaccine to prevent pregnancy. One of the products currently being developed works by stimulating immunity against parts of the developing egg. Although they won't become pregnant, females will still cycle. This means that the medical problems discussed above are still a concern. In the years to come, these products may have a place in helping us control animal population, especially in areas that do not have regular veterinary services, making a better quality of life for our pets.

Summary

In this lesson, we reviewed how veterinary medicine has advanced, especially in the last 100 years. At one time veterinarians concentrated on horses and cattle. Most veterinarians now work with companion animals. We also have specialists available to provide advanced care in many fields such as cardiology, dermatology, surgery, and others.

By now you should be able to answer the questions " *How long will my dog be in heat?* " as well as " *When is the best time to spay my cat?* " And, you should have a clear understanding of the medical problems that can be avoided by sterilizing dogs and cats before they're sexually mature.

Next Steps

Once you finish all this, it's time for lesson 2. We are going to look at the complex field of vaccines and vaccination programs. How do vaccines provide protection against infectious disease? Why are boosters needed? Do vaccines need to be given every year? Let's go get the answers!

Lesson 1 Quiz

You will see the five questions below.
1

Question 1, Multiple Choice

Once a cat has been bred, how many days later is palpation most effective for diagnosing pregnancy?

1. A

   30 to 40 days.

   This isn't a good time to palpate because it's difficult to differentiate between a pregnancy and a uterine infection (pyometra).

2. B

   7 to 14 days.

   This is too early to detect a developing fetus.

3. C

   50 to 60 days.

   Palpation can be used, but an x-ray would be more effective this late in pregnancy to count the fetal skeletons.

4. D

18 to 28 days.

- 2

Question 2, Multiple Choice

What is an infection in the uterus called?

1. A

   Cervix.

   This is the physical barrier that prevents a uterine infection. It isn't the term for an infection itself.

2. B

   Pyometra.

3. C

   Estrus.

   This is the time period that a female is receptive to the male. It has nothing to do with an infection.

4. D

   False pregnancy.

   This isn't an infection but a hormonal state in which the female thinks she's pregnant.

- 3

  Question 3, Multiple Choice

  The word *veterinarian* has its roots in which of the following?

  1. A

     Medieval Europe.

     The word veterinarian was already in use at this time.

  2. B

     Ancient Egypt.

     The Egyptians had animal healers but did not refer to them as veterinarians.

  3. C

     Ancient Rome.

  4. D

     Cave paintings.

     Though cave paintings often depicted animals, there were no veterinarians.

- 4

  Question 4, Multiple Choice

  When a male dog is castrated, which organs are removed?

  1. A

Sperm.

Sperm are a product from the testicles, not an organ themselves.

2. B

The prostate.

This gland is left intact and not removed during a castration.

3. C

The testicles.

4. D

The ovary and cervix.

These are parts of the female anatomy, not the male.

- 5

Question 5, Multiple Choice

What percentage of mammary tumors are malignant in dogs and cats?

1. A

40% in dogs and 40% in cats.

The proportion that is malignant in cats is much higher.

2. B

95% in dogs and 40% in cats.

The proportion in dogs is lower and the proportion is higher in cats.

3. C

95% in dogs and 95% in cats.

The proportion that is malignant in dogs is much lower.

4. D

40% in dogs and 95% in cats.