The Ferret: Essentials for the Practitioner

Dr. Cathy Johnson-Delaney reviews the basics of ferret husbandry and medicine.

Speaker Bio:

Dr. Cathy Johnson-Delaney practiced avian and exotic animal medicine in the greater Puget Sound area of Washington State for over 30 years, retiring from clinical practice in 2013. Dr. Johnson-Delaney was board certified in avian and exotic companion animal medicine, and she has helped to advance the fields of exotic animal and laboratory animal medicine. She has served as President of both the Association of Avian Veterinarians and the Association of Exotic Mammal Veterinarians. Cathy was named the 2009 recipient of the Oxbow Exotic Mammal Health Award and the 2003 Exotic DVM of the Year. Cathy has presented internationally on all aspects of non-traditional companion animals, and she has also written extensively on related topics, serving as co-editor of the BSAVA Manual of Exotic Pets. She is the principal author and editor of the 2017 textbook Ferret Medicine & Surgery.

Learning Objectives:

1. The practitioner will have an understanding of ferret anatomy and physiology, including major differences from the dog an cat.
2. The practitioner will be able to identify different common coat colors and patterns, including those associated with congenital deafness.
3. The practitioner will have knowledge of basic behaviors, nutrition, clinical techniques.
4. The practitioner will be able to formulate a preventive health plan for the life of the ferret.
5. The practitioner will be able to recognize some of the most common ferret health disorders, determine diagnostic testing needed, and initiate effective treatment programs.

Slide 1

Good evening, everyone. Thank you so much for joining us. . I'm Katie Krothapalli. I'm the Director of Veterinary Education for Vetcetera.

Our speaker that this afternoon is Dr. Cathy Johnson-Delaney. She's got over 30 years of experience in avian and exotic medicine. And she's going to be introducing us to the ferret tonight and giving us just some basics for a general practitioner in treating these species in your clinical practice. So it's going to be a really fun webinar. We're glad you guys joined us. And I'll turn it over to Dr. Johnson-Delaney with that.

Thank you, Katie.

I'm really happy to be here. This is my first lecture for the Academy, and I'm really honored to have been asked to help develop what I hope will be a ferret module-- at least some basics, and then get into some specifics.

I've been working with ferrets for a very long time, and they're my favorite critter. And I hope by the end of the lecture, you'll think of them that way as well. They are really a great little animal to work with.

They're happy. They're cheerful. And they put up with all sorts of things. And the more you mess with them, the happier they are.

They're pretty good with taking medicine. And it's completely opposite than your prey species, like a rabbit or a Guinea pig, that the more you work with them, the more stressed they get. The more you work with a ferret, the happier it gets. So with that, I'm going to get started.

As Katie said, if you've got questions and things, you can post them in the Q&A section, which I hope you can see on your Zoom. And we'll try to answer them at the end. And if we don't get to everybody, we'll figure out some way to get them by email.

And I hope that this will get you started. Or if you already see ferrets, this will give you some pointers on some other things. I'm going to stop my video at this point simply because I don't like watching myself. And we'll focus on ferrets. So here we go.

All right, the ferret-- I was asked to give the Essentials for the Practitioner, and that's kind of like saying, talk about everything you know about cats and one hour that a practitioner needs to know. We can't cover everything. I've provided a reference list or resource list that I hope will help you. And it also contains some of the really specific treatment, like for distemper, and vaccine reaction that you need to have.

Slide 2

So we'll get started. The objectives for this course are to look at some of the ferret anatomy and physiology, especially where there are some major differences from dogs and cats. I want to introduce you to the common coat colors and patterns and those that are associated with congenital deafness, and a little bit of the nomenclature, the sort of lingo that ferret people use to describe ferrets because that takes a little getting used to. Just some of their basic behaviors, like how to teach them not to bite and how to, hopefully, get them to potty in their litter box.

We'll go over a little nutrition and some clinical techniques. We'll talk a bit about a preventive health program as far as vaccinations go. We'll go through some of the common health disorders, the diagnostics, and the treatment programs. But obviously, we can't cover everything in this. So I've just hit the highlights.

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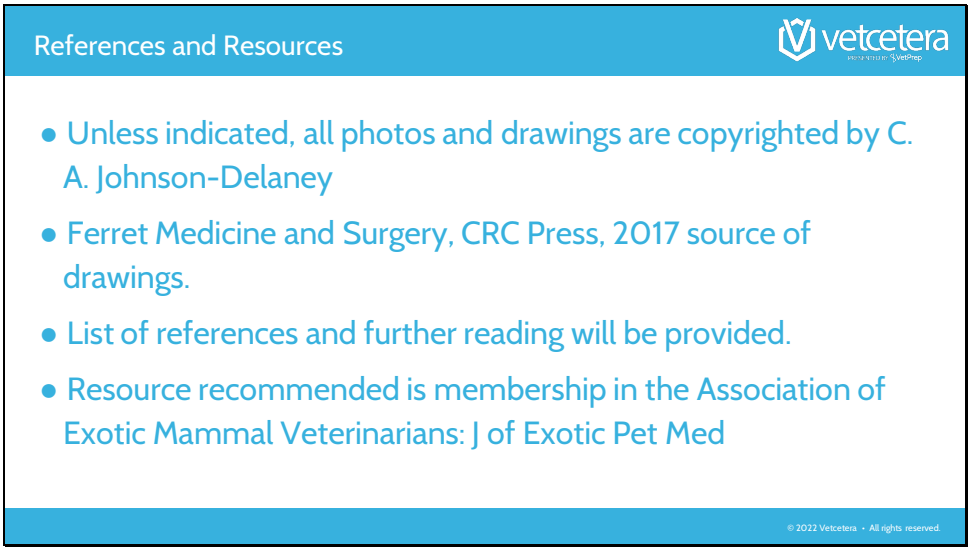

All of the photos and drawings, unless I indicate them, are in my book for medicine and surgery, which is the source. That list of references and further reading material will be provided. Another resource that is recommended for everybody, if they're not already members of the Association of Exotic Mammal Veterinarians, which has client handouts, and has webinars, and participates in Exotics Con and online seminars. They also, as your membership, you get a subscription to The Journal of Exotic Pet Medicine, which is probably-- [COUGHS] excuse me-- the journal that you want for keeping up on new things in cases.

Slide 4

OK, ferrets are a domesticated species. They are the only domesticated species of the Mustelidae, which is the otter, mink, weasel, wolverine, badger, and until recently, skunk-- but skunks aren't in it anymore-- but stoats. The black-footed ferret is not closely related to our domestic ferret.

Our domestic ferret is descended from the European polecat, which is Mustela putorius. It's Mustela putorius furo, which literally means sticky thief. And that's pretty good.

They're working on some of the genetics to distinguish if they're enough different from the European polecat for them to just become Mustela furo. And I think that's probably going to happen. The thing you need to know is that they are all one blood type worldwide. They are so inbred, they are a man-made species, and that's probably part of our problem.

The intact female is a jill. The intact male is a hob. The babies are kits. The spayed female is a sprite, and the neutered male is a jib. They have a five to seven-year lifespan on average. Yeah, there's a few who get eight, nine years old. There's an old reference that said 11 to 14 years that everybody copied because they all hoped they had 11 to 14 years. And I only had one ferret ever make it very close to 14 in this 46-plus years that I've been working with ferrets. So five to seven years, unfortunately, is their lifespan.

They have the highest tumor rate of any mammal on the planet, even of the mice that are designed to grow tumors, if I remember that. They have a very fast gut. Their transit time is about 1.75 hours. And they have a fairly soft and sometimes even soft, mucousy stool. And they have six to eight bowel movements a day. So sometimes, it seems like they are pooping machines. But that's a very fast gut.

And you've got to remember that ferrets are still illegal in some states, like Hawaii and California. And in some municipalities, there are some different laws regarding ferrets. So even though a lab animal facility in California may have ferrets or until recently, in Massachusetts. The municipalities themselves have other rules, so you just have to check. Hopefully, you're all in areas where ferrets are legal.

Ferrets are often called pocket pets, which drives me nuts because have you ever tried to keep a ferret in a pocket? Yeah, it doesn't work so well. Of course, you can't keep hamsters in pockets either or Guinea pigs, so it drives me crazy.

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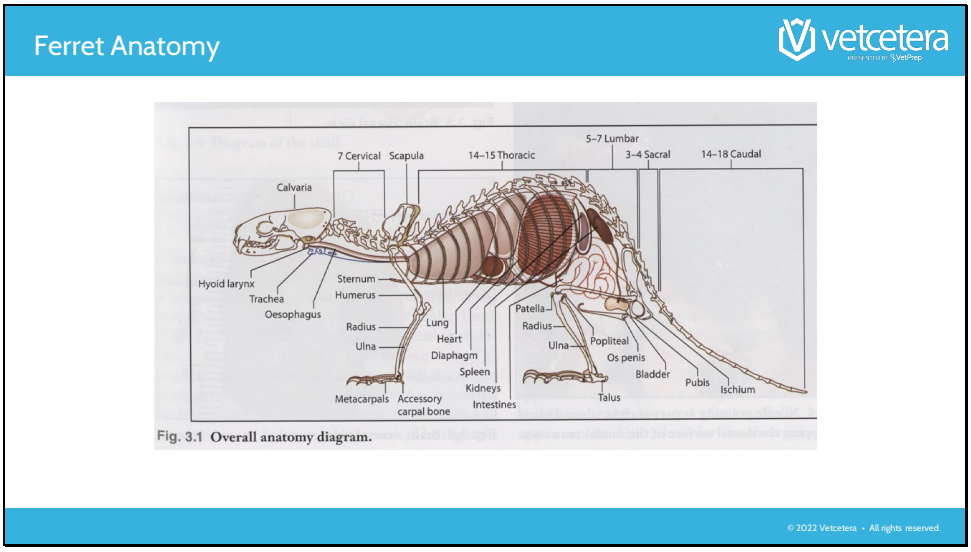

Anyway, essentially, think of a ferret as a long-bodied beast, the mammal equivalent of a snake, sort of. They can turn their flexible body in the diameter of the body by compressing their chest, their ribs. They are long and slinky.

They're kind of designed to go down rabbit and rodent holes and flush the prey species out. And then you better have a harness on it because you've got to haul the ferret out. They're very good for that. But it also creates some problems.

First off, just note that they have a very long, elongated skull. When you are trying to tie in a trach tube, a lot of times, you can't do it here because of thick musculature. And so you'll loop it around their legs. Sometimes, you can tie it over their nose if you're not working on the teeth. But that's just a difference.

They have a very long neck, and it bulks up in the winter. They can put a lot of fat around the lymph nodes, just so you know. If you go to listen to the heart-- oops, I'm sorry. If you go to listen to the heart like you do in every other animal here, you're not going to find it.

Go to the middle of the body. The heart is way back here, basically in the middle of their body. And it is surrounded by long lungs. And again, they are compressible. You should be able to practically get your hand around that heart. The chest should be compressible. If the chest isn't compressible, we start looking for some problems.

Then as you track back here, one thing to note is the spleen, and we'll talk about that later. The spleen is an elastic sort of organ in the ferret. It can expand to carry up to 35% of the blood volume during anesthesia.

It tends to get larger with age, normally, and not be able to expand as much up and down with anesthesia. But it also becomes the site of extramedullary hematopoiesis after about age two, three, sometime in there. So if the spleen is huge, you have to do a bone marrow biopsy and find out if the bone marrow can actually produce red cells before you even think about taking the thing out.

I only take them out if they are so huge, they are really interfering with the ferret's ability to move or if they've had big cysts on it, big hematomas that have popped. But that ferret has to be able to make red cells in the bone marrow. Take the bone marrow biopsies from the neck of the humerus, from right here, and also from the wing of the ilium or the ischium, right in here.

The femur, by this point, by, usually, three or four years of age, it's going to be mostly replaced by fat. And it's going to be really hard to get good bone marrow. So I use these two sites, and I always get a couple of biopsies because you want to make sure that you've got good bone marrow.

OK, the kidneys are freely movable. They don't stay up in this position. They drop all around.

The other weird feature is this J-hooked os penis baculum in the male. The urethral opening is right here on the side, so you have to kind of go around it. It's kind of weird. But it's something that you have to deal with a lot because male ferrets have a lot of prostate issues.

Yes, neutered male ferrets have prostate issues because of what the adrenal does when you take the gonads out. It immediately starts producing sex steroids. And we'll talk a bit about that.

It's because ferrets are seasonal copulatory ovulators. Their neuroendocrine system is keyed in with light cycle and time of year. So all those things, we have really messed up with having them as house pets. But we've also messed up with them being so inbred-- so whole lecture unto itself.

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Adrenal glands: Adrenal Disease

- All ferrets will develop some degree of adrenal disease
- Starts with neutering
- We can prevent it
- Ultrasonography

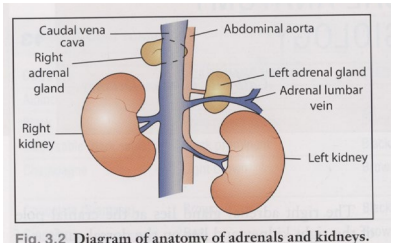

Fig. 3.2 Diagram of anatomy of adrenals and kidneys.

OK, you do have to remember that all ferrets will have some degree of adrenal disease at death, whether they had clinical symptoms or not. There are changes in that adrenal gland, and it starts as soon as they're neutering. The hypothalamus and the thalamus send out the signal of LH, and there's no gonad.

And the adrenal glands go, oh, we can make the sex steroids. We'll take over. And it starts as soon as you neuter or spay them. We can prevent adrenal disease. We'll talk a bit about that.

Ultrasonography for diagnostics, I think, is one of your best friends with working with ferrets. This is an ideal situation where the ferret was laying on its back, and it didn't have a lot of fat, and nothing was moving around. You have your left adrenal here with its own little artery and vein.

The right adrenal lies usually between the caudal vena cava, the abdominal aorta, often with a direct opening into the vena cava. Yeah, that's great fun. It'll lap into itself.

You use landmarks taught for finding the adrenals in dogs and cats. You probably can't find the adrenals most of the time because you've got the animal on its side, and these things all slide around, and the kidneys down together. And animals aren't like that. It's just ferrets.

Everything is freely movable in that abdomen, so you can feel everything.

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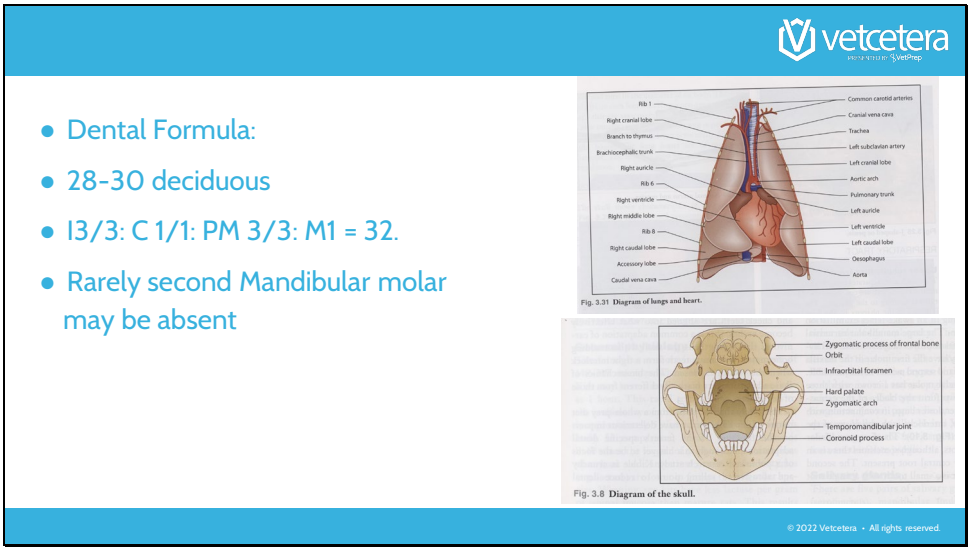

Dental formula is pretty much a typical carnivore. A lot of the books say that the second mandibular molar is absent. I haven't found that. I am still trying to find a ferret that doesn't have that second mandibular molar. So I kind of put M2 up there.

Anyway, they are a classic carnivore with the carnivore dentition. And we'll show a little bit of that. They also need their teeth cleaned and everything, just like dogs and cats. This is a diagram of where the heart is enveloped by the lungs. And actually, quite a ways up here is the thoracic inlet. It's a very long way to the heart from the thoracic inlet.

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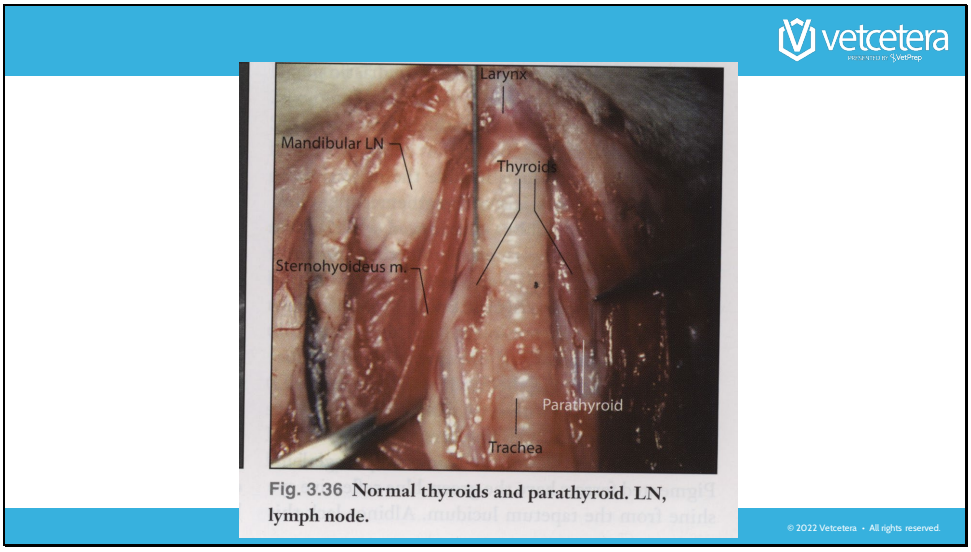

OK, another sort of bizarre thing that ferrets have is-- OK, here's the heads-up here. Here's the larynx here. The thyroids are up here, and they are these little flat, strap-like organs and that with the parathyroids on the distal end. That they're flat.

There can be an isthmus. Sometimes, there is. Sometimes, there isn't. But this is where they are, up here by the larynx. If you try to palpate thyroids down where cats and everybody else have them at the thoracic inlet, you're never going to find them. And they're flat. But luckily, we don't see a lot of problems with the thyroids. Yay.

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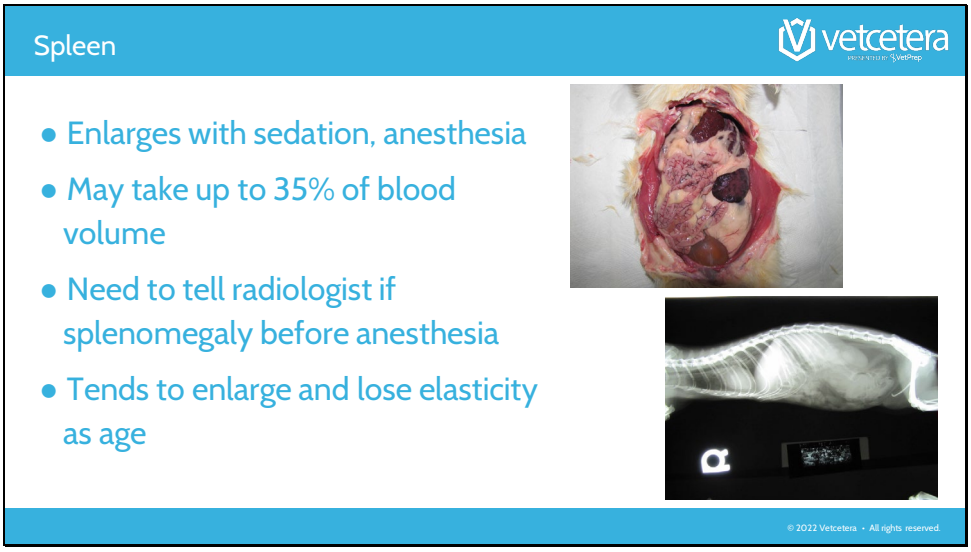

OK, talked about that good, old spleen. It enlarges with sedation and anesthesia, and it'll go back within 10, 15 minutes. It can take up to 35% of the blood volume, so that can affect your hematocrit and your white count. You need to tell the radiologist if there was splenomegaly before the anesthesia because, otherwise, every single film you get back is going to say splenomegaly. Yeah, we knew that. What's the big deal?

OK, here's this point of the elbow, and here's the thoracic inlet way up here. And see, the heart is way down here, right up against the diaphragm-- and again, freely movable. So just things to palpate.

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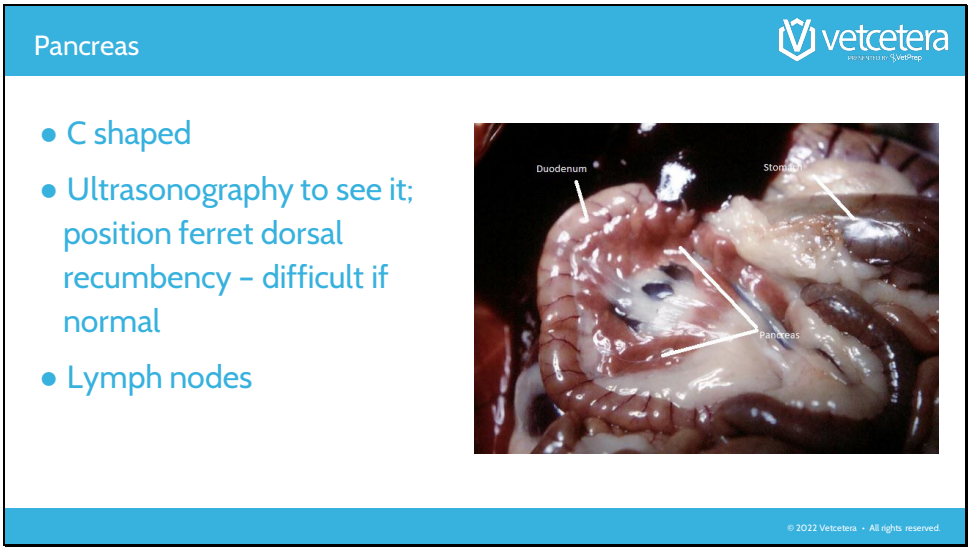

Another different thing, especially when you're doing ultrasound looking for the pancreas in a dog or a cat, a dog/cat has this nice lobe up against the duodenum and the stomach, and it's just wonderful two-piece thing. Now, a ferret is a C-shaped thing. It lops all around. It can have extra little pieces stuck in the fat. It can loop on itself, practically. There's all sorts of different conformations.

And I will say that, sometimes, you will find extra pieces of spleen. You can find little pieces of adrenal gland elsewhere. For an animal that is so inbred and man-made, boy, they sure have some variation when you get in on the individual's anatomy.

Lymph nodes-- they're very prominent in a lot of locations in the pyloric area. It's one of the places you look for lymphoma. In the curvature of the stomach and mesenteric lymph nodes, they have the peripheral ones that tend to be pretty much embedded in fat. And if they're really soft, I don't worry about them too much. But if they start being pretty hard, then you got to start suspecting a problem.

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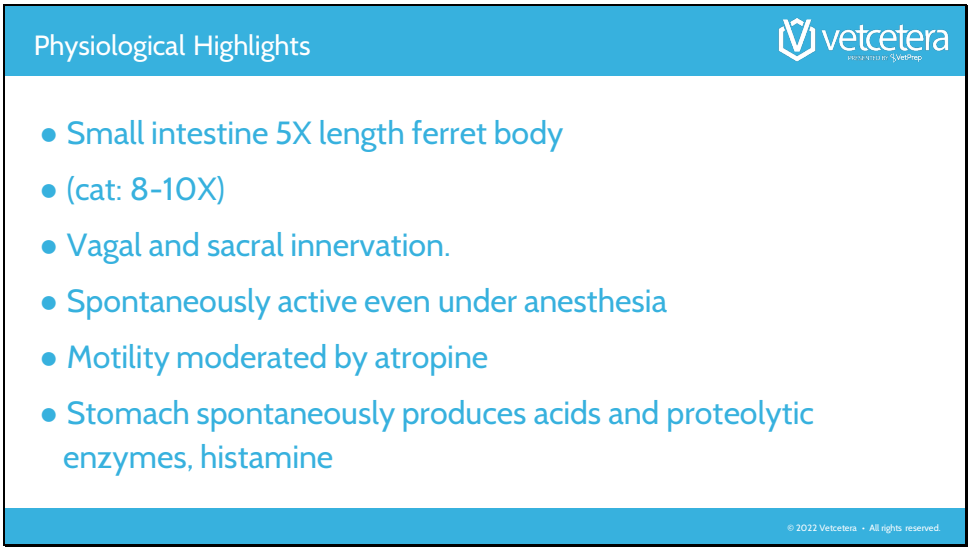

OK, they bend. They also love salmon oil. OK, the small intestine in a ferret is only five times the length of the ferret body. And you compare that to a cat, that it's eight to 10 times the length of the body, it's a very short GI tract.

It's very highly innervated with both the vagal nerve. And then from the mesentery south, its sacral innervation. It is spontaneously active, even under anesthesia. And even if you give atropine, you're still going to have gut motility, a fair amount of it.

The stomach spontaneously produces acids, proteolytic enzymes, and, most importantly, histamine. And the histamine reaction, along with if you have a rough intubation, or you're doing a lot of manipulation of the neck, or you're doing a bunch of manipulation of the gut, you can trigger a vagal nerve reaction. And literally, the heart will become bradycardic or stop. So be careful when you're doing those things. You can shut everything down pretty quick.

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Because of that fast gut, for surgeries, you really only need to fast them a couple of hours, two to three hours at most. When you're trying to screen for insulinoma or other disease problems, you do want to check for hypoglycemia. And that's usually-- we consider hypoglycemia under 60 milligrams per deciliter after two hours. That's hypoglycemic.

To do an insulinoma test, if a ferret just comes into your office, and it's kind of collapsed, and you get a blood sugar of 60 or 70, don't clamp it on prednisone, please. Check it for other things. It just means it didn't eat.

Ferrets normally have to eat multiple times during the day. They're like little birds with fur. They've got to keep stuffing that gut. So you feed them, and then you take an insulin level and a blood level or a glucose level at time zero, and then two hours afterwards, you check the blood glucose, if it's 80, 90, don't worry about it. Three hours, it's still 70, 80, yeah, they're good. If, at two hours, however, it is below 60, then you start investigating insulinoma.

But a ferret who hasn't eaten for four hours is going to have a fairly low blood glucose. It doesn't mean that he has insulinoma. It just means he hasn't eaten.

They do have a gallbladder, and they can get gallstones, and they can cause problems. Remember, the entire gut secretes cholecystokinin when there is food in it that contains fat, which, of course, ferrets being the carnivores, there's fat in there. But that also results in a very secretory, mucousy gut in just a passage, and it can be kind of green. It's passing bile at the same time. That just tells you the ferret needs to eat, and it has an irritated gut. You can't distinguish when the jejunum ends and the ileum begins. There is no cecum, and there's no ileocolic junction.

Retro peristalsis, i.e., emesis, vomiting begins in the colon with sacral innervation. So they literally vomit their guts from all the way at the anus. It's pretty remarkable.

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They are a model for the vomiting reflux and also for acid reflux.

Heartbeat, 200 to 400 beats a minute. Blood volume's 5% to 7% of body weight. You can usually withdraw for a blood sample two to three cc's and not worry about it unless the ferret is extremely ill and dehydrated.

A blood pressure of a non-sedated ferret is 140 to 164. You do blood pressures to get ranges. If the ferret is awake, and, actually, even if they're sedated, it's a great way to get a stool sample. I swear, as soon as you inflate that cuff, they poop. So have a washable cuff. You're going to need it.

They have very large anal glands, as do all of the members of the mustelid family. And these scent glands, the musk glands are usually removed by main commercial supplier. Or actually, there's two. There's a large one in Canada as well. And they do this early spay/neuter, and they take out the anal sacs.

Sometimes, they don't do so well at taking out the anal sacs, and you have to do some stuff. But we used to de-musk them. You don't need to de-musk them. A ferret, when they're excited, may poof. And usually, they get a real horrified look on their face, like, oh, my God, I made a really bad odor.

But even without these big scent glands, a ferret smells like a ferret. The scent glands around their ears, in their mouth, they smell like a ferret, just like a dog smells like a dog. If you keep their ears clean, you keep their teeth clean, you feed them a good quality diet, and you clean their litter box and papers twice a day, and change their bedding a couple of times a week, they don't have much odor at all, certainly no more odor than a really well-cared-for cat. So if a ferret is stinky, something's wrong.

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Anyway, basic behavior, they sleep a lot. We joke that they sleep 23 hours out of the 24, but it's usually about 20 to 21. They sleep hard, and they play hard. They like hammocks. They like hanging things to sleep in. They nestle themselves in really cute positions in pillowcases and sacks. Their main thing to remember is defecating and urinating in corners. They back up, and that's where they go. First commandment of the ten commandments is thou shalt poop in corners.

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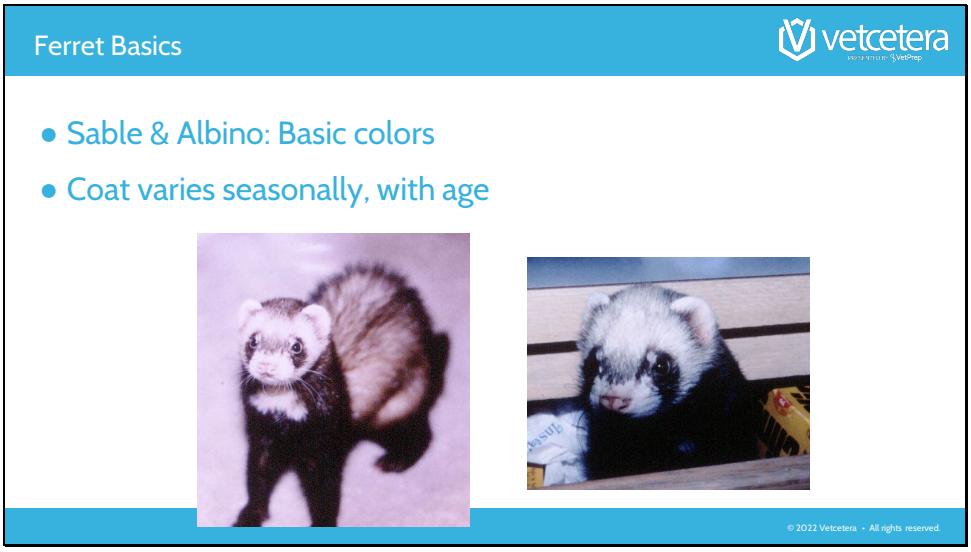

And so that gives you a hint for where you put a litter box, so the papers are in corners. And they will back up and use it.

The basic colors are sable and albino. And everything else has come from sable and albino. The coat will vary seasonally, and it tends to whiten with age. They tend to be darker in the summer when they're slimmer, and they're whiter when they get more under fur in the winter. This is the same ferret, summer and winter that same year. They don't quite look like the same ferret. The white bib disappeared. So you take pictures of your ferrets, and they change. It's cool.

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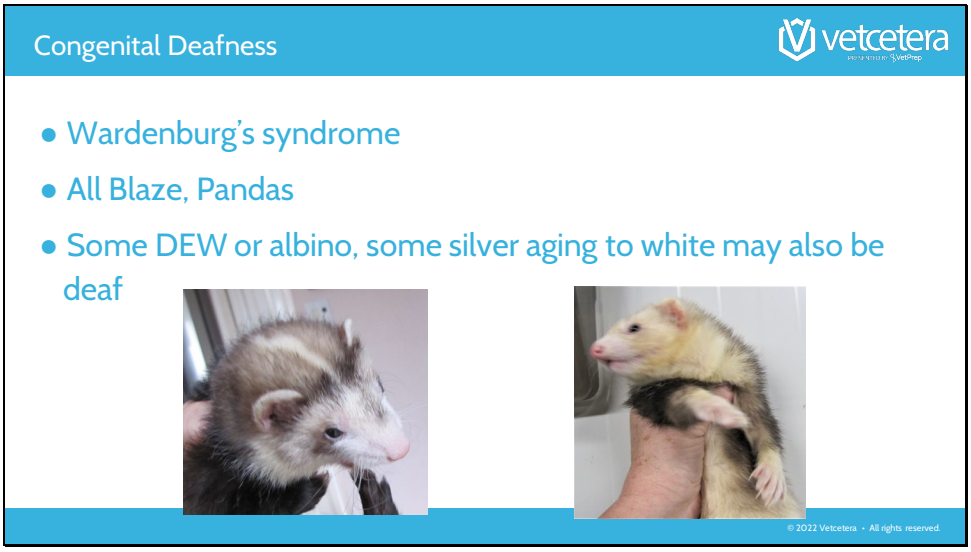

We do have a big problem, though. And I wish the breeders would stop churning these guys out. It's Waardenburg syndrome, and it is congenital deafness. And it is total deafness.

And all blazes, which we call stripy heads, but all blazes and all pandas, which have a white head and neck and, sometimes, white feet but definitely white head and then a regular-colored body, they are all deaf. They're really cute.

Now, this one's got a unilateral microphthalmia on top of being congenitally deaf. You know, I mean, you might as well have handicaps. Some dark-eyed whites, and some albinos.

And some of the ferrets that have what they call it the whiting gene that are silver. And as the age, they become white. They may also be deaf. But as a rule, most of your ferrets aren't deaf, except for blazes and pandas.

Interestingly, these deaf ferrets are over-represented at ferret shelters because the pet stores never told people that they were deaf. And the ferrets may bite. They get startled. And if people knew how to work with them, they wouldn't get turned into shelters. We have lots of ferrets, lots of stripy heads.

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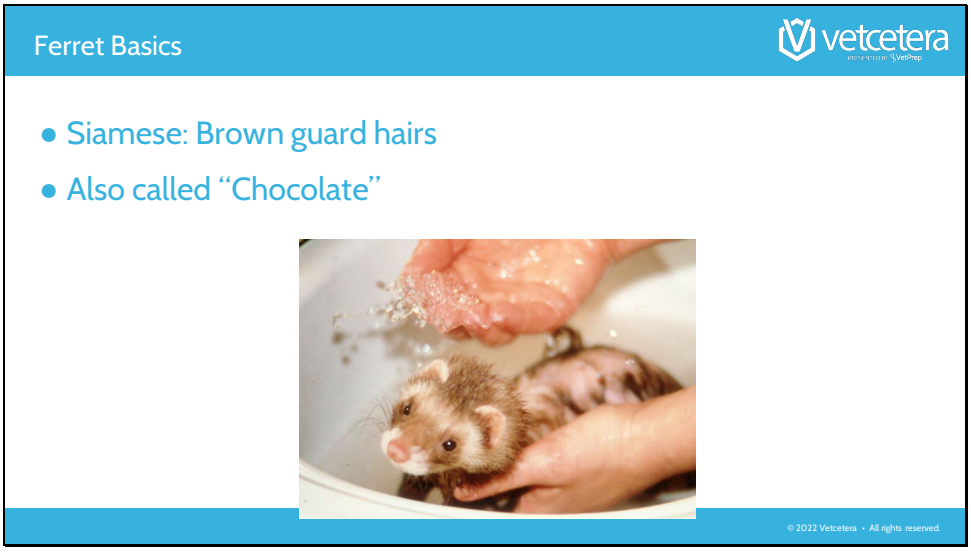

The brown guard hairs used to be called Siamese. They are now called chocolates. And of all of these things, there's light, medium, and dark chocolates.

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There are ones with pink noses. There's all sorts of nose patterns, which we record at the ferret shelter. There's a silver mitt or any kind of a mitt that's got white feet. There's the dark or the black-eyed white. There's a cinnamon, which isn't very common. I had one. They're red. They're really cool.

There's a silver, which is pretty common. There's champagnes, and you can have light, medium, and dark champagnes. And there's roan, which have a lot of white guard hairs sticking out. But this is a dark sable and a light sable, pretty common.

The thing to remember-- the more ferrets, the happier. They are a very social animal. They like to be in groups. They like to play with each other. And they wrestle and run around. It's great fun.

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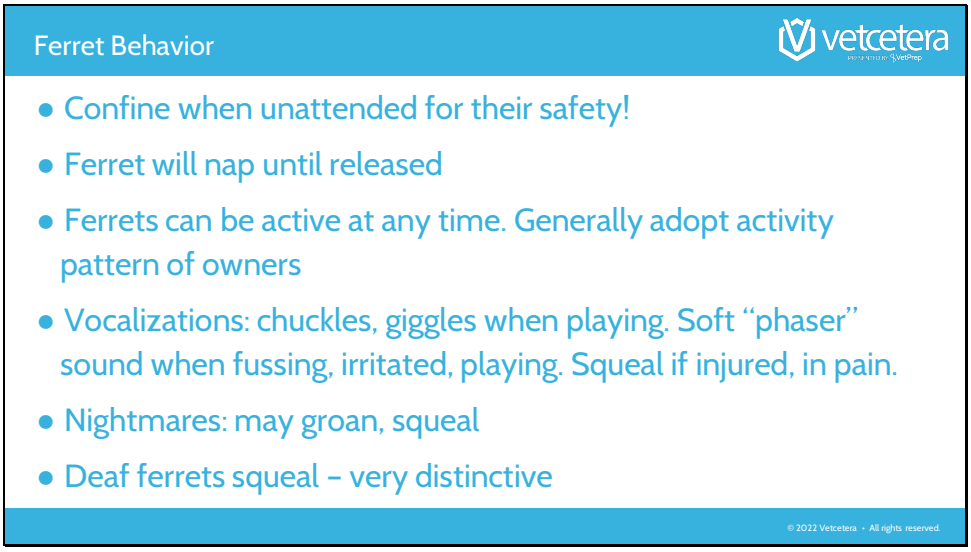

OK, you do have to confine them when unattended for their safety because they climb, they fall, they pull things over, they get squished in chairs, they get into washing machines. So they need to be in a condo when they're unattended.

They'll nap there until they're released. And they can be active at any time, and they'll play with their owners whenever you want them to. Vocalizations or chuckles, and they'll giggle when playing. They giggle. They also go [IMITATES SOUND], which I call a soft phaser sound when they're fussing, or irritated, and sometimes playing. They will squeal if injured or in pain. And it is a real-- oh, it's a real scream.

They can have nightmares, and they may groan, and squeal, and grunt in their nightmares. Deaf ferrets squeal like a baby ferret. It's a very distinctive squeal. It's different than the one in pain.

And it's funny. Over at the ferret shelter, we let them all to play. They're in playgroups. And almost any time, you'll hear [SQUEALS], and this deaf ferret squealing. And we just kind of, eh, yeah, whatever.

The other thing to remember is that chuckle/giggle when they play, we call it dooking-- D-O-O-K, dooking. And it goes, [IMITATES DOOKING]. It's dook soup, not duck soup, which is what we make for them to nurse them.

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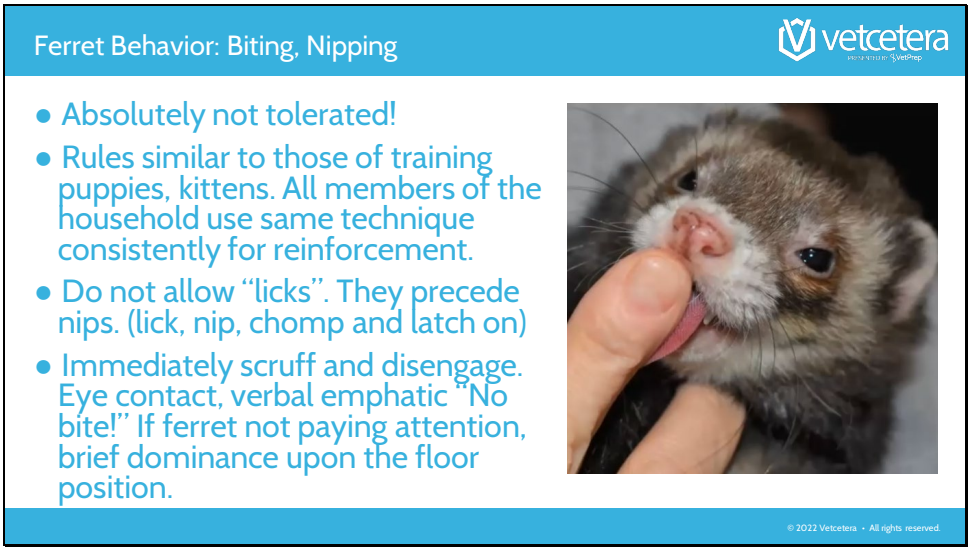


OK, you get a lot of questions and a lot of issues with biting or nipping. It's just like with a puppy and kitten. It's not tolerated.

The rules for training them are very similar to training a puppy and kitten, and you've got to get all members of the household to do the same technique and do it consistently for the reinforcement. You don't allow lick, lick, lick, nip, chomp, latch on. Little licks are not kisses. They are preceding the nips, usually. This person has a little bit of a treat on the finger. It was just for demonstration.

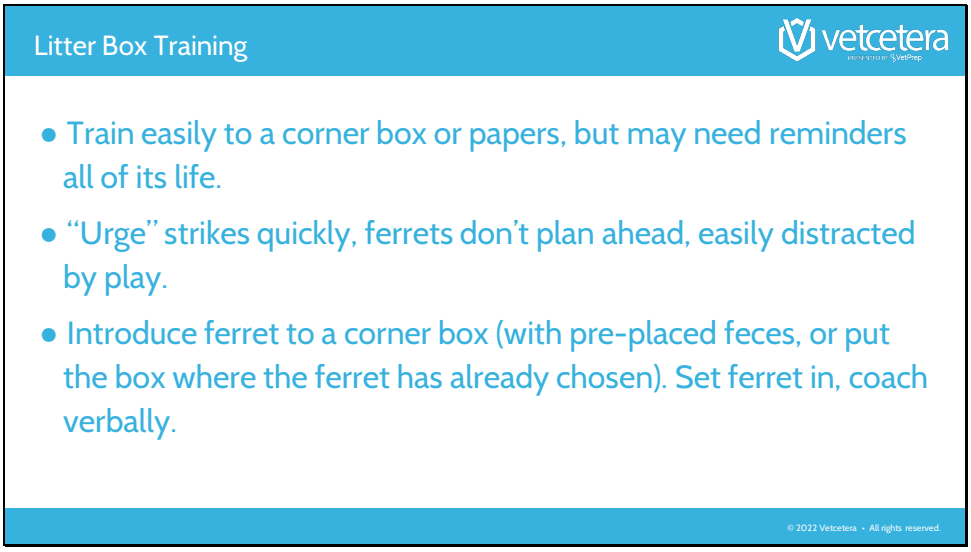
But I also wanted to show you one of these distinctive-- this is a T nose pattern. They have freckled noses. They have spotted noses. There's all sorts of nose patterns.

Anyway, if a ferret does latch onto you, in the vet clinic, I always like to have a few cotton-tipped applicators, Q-tips with isopropyl, with rubbing alcohol on them because you can immediately put one of those on the ferret's mouth. And bam, they release immediately. But you can also scruff them, and they'll disengage because they open their mouth usually when they scruff.

Make eye contact with them. Hold them up in front of you. And they'll start looking up at the ceiling and looking all around, like, who, me? What did I do?

But make them look at you. Do eye contact. Verbally and emphatically say, no bite. Sometimes, you might have to do just a very brief dominance up-on-the-floor position and yell, no bite. They usually catch onto this in a day or so. They don't like being disciplined in any way, shape, or form. They just want to have fun.

Slide 21



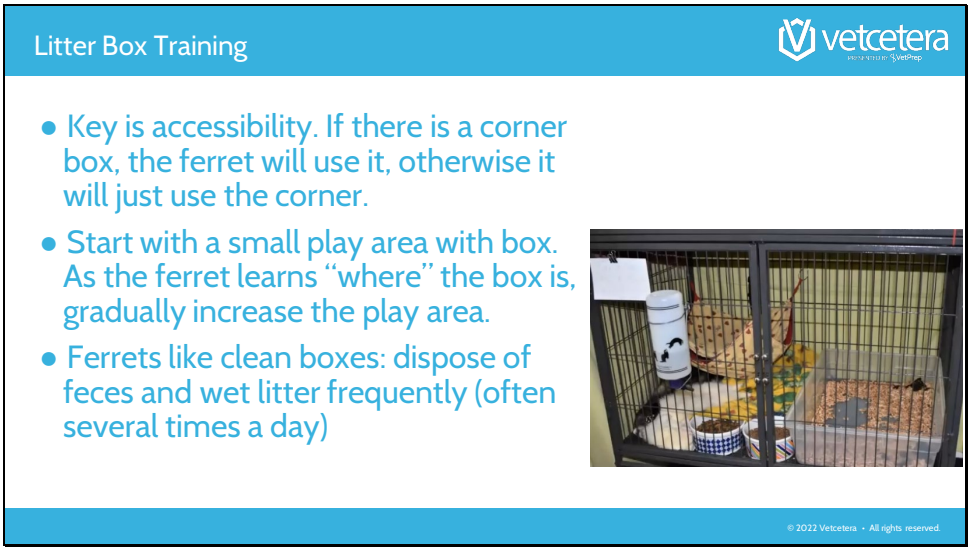
It is not hard to train a ferret not to bite, not at all.

Litter box training-- everything says, oh, yeah, it's easy. Just put the stuff in a corner box. But when ferrets get playing, they don't plan ahead. They get distracted. That urge to potty comes really quickly. And sometimes, any port in a storm, back up against any wall.

They may need reminders throughout their life. They aren't perfect. Actually, I've had some ferrets who are perfect. Most of them, yeah, there's little accidents occasionally.

You do introduce them to a corner box. A lot of places, a lot of times, the ferret kind of selects where they want the box in the room or the cage, but you can select it as well. And you just teach the ferret to use that, and you praise them. And they catch on. They don't like to be messy.

Slide 22

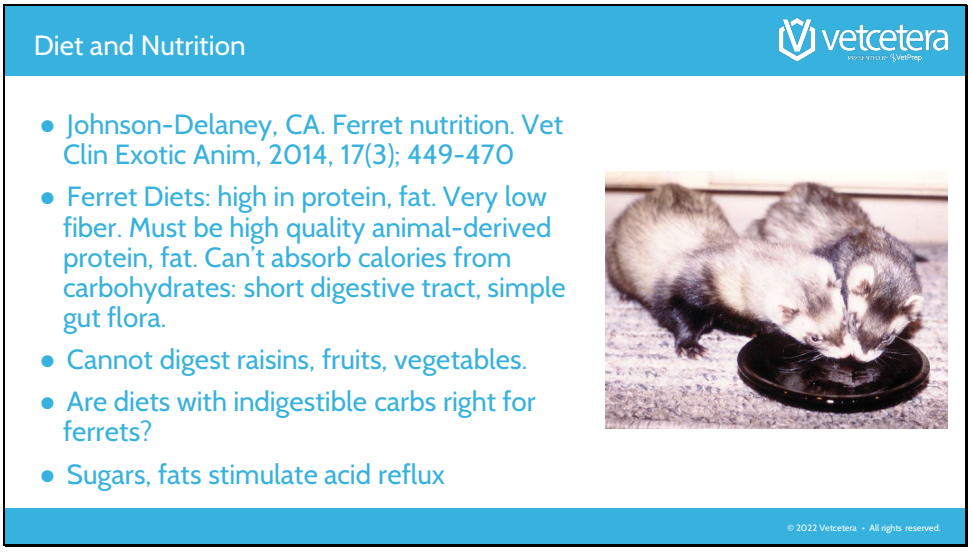


This is one of our quarantine cages at the shelter. And we have this big box because, actually, there's three ferrets in there. They came in all at once. And they potty, if you notice, even in the corners of the big box. But they have access to the box.

When you start a baby ferret out, you start with a small play area, just like you do with a kitten so that they learn where it is. They always should have one in their cage. But you do have to deal with litter boxes.

And they like clean boxes. If there's poop in it, they might not use it again. I have a princess ferret. She uses it once, and then she'll go in front of the box because, oh, my, she doesn't want to get messy. So we clean ours twice a day. Some people clean them every time they potty. Twice a day is fine.

Slide 23



As far as nutrition goes, I wrote a chapter in 2014 that pretty much sums up what you need to on ferret nutrition in that they have that short gut. They don't have a lot of time to absorb food. They need a very high-protein diet. We're talking about a 37%, 38% moderate fat, probably up in the 20%, 30%, and very low fiber. Any food with over 4% fiber, the ferret cannot digest it. So that rules out an awful lot of cat foods and all dog foods. So there you go.

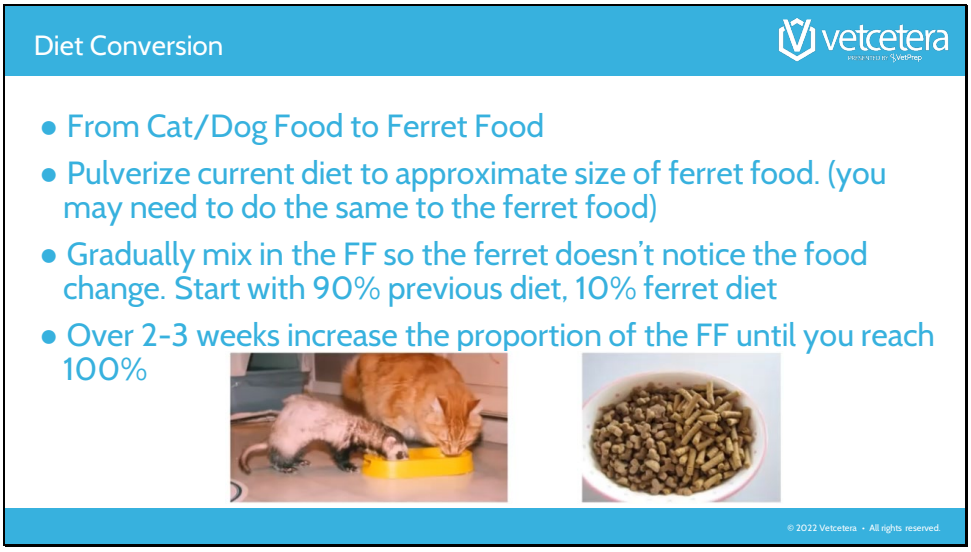
You want animal-derived protein fat. These are not vegetarians. These are carnivores. As far as the calories from carbohydrates, the complex carbohydrates that are in some foods as binding agents, more or less, they really can't absorb calories from those. They're getting their calories and the fat. If they get simple sugars, they'll use them.

But we really don't encourage that. Remember, treat foods-- they can't digest raisins, fruits, vegetables. They may push them as treats, but they can't.

There's a big controversy and discussions about indigestible carbohydrates in ferret foods. Are they the right thing to have? Or are they the thing that sets up insulinoma? And I would say, from having ferrets for 46 years and only having two with insulinoma and feeding them a pelleted diet, eh, probably not, but whatever.

Don't feed them sugars and fats. You can stimulate acid reflux, of which they are an animal model for with a 1/2 teaspoon of oil. So just remember that.

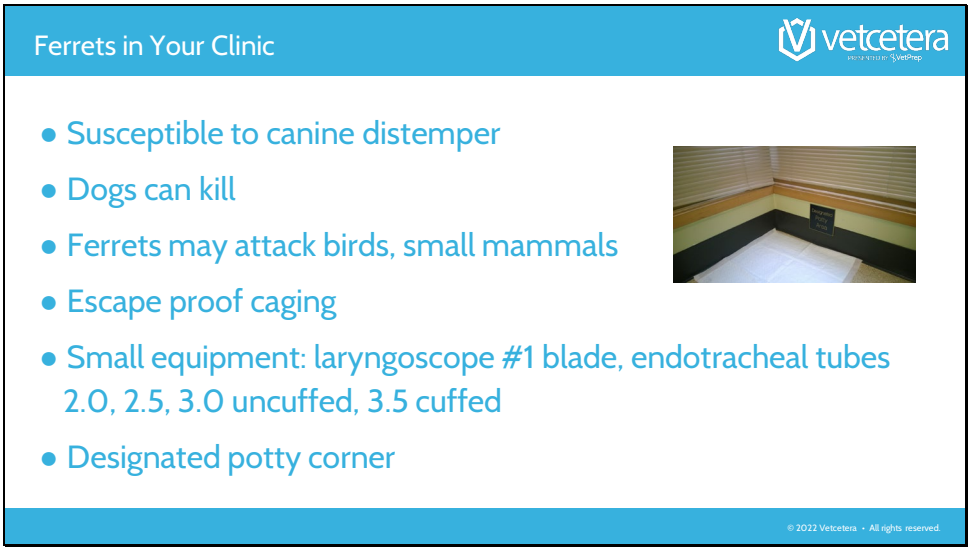
Slide 24



Diet conversion from a cat or dog food to a good ferret food is usually quite easy. If the ferret likes the new ferret food, man, they switch pretty darn quick. Otherwise, you pulverize everything to be the same size of the ferret food, and you mix them and blend them in varying proportions until you're 100% ferret food.

This was my ferret. Yes, he's adrenal. He's a mess. He's old. This is Robbie, first ferret to get Lupron. Anyway, he thinks he's stealing a piece of cat food from Murphy. Murphy doesn't care. This is a blend of food that we use at the ferret shelter. It's totally ferret Marshall Farms food. And in here, which is actually the biggest part is Missouri, we mix them.

Slide 25



In your clinic, remember, they're susceptible to canine distemper. If this ferret was recently at a Humane Society or a shelter that has a lot of stray dogs that come in, you ain't got to worry a bit. You also, in your clinic, got to remember that dogs can kill ferrets.

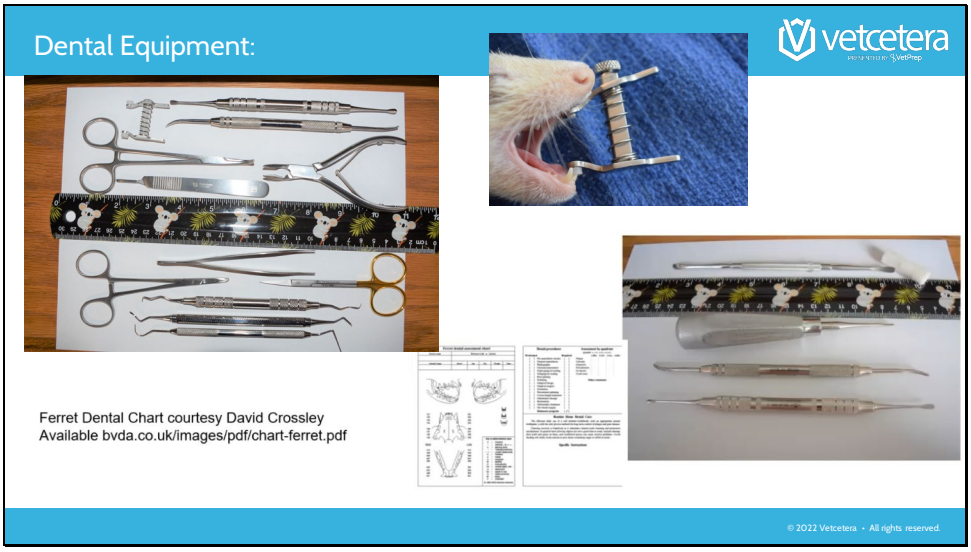
To a dog, a lot of ferrets look like a rat or something that they should kill. So you want to keep them separated. And fortunately, I know a lot of-- I've had a lot of ferrets killed by dogs. I've never had a ferret killed by a cat. I've had ferrets scratched by a cat, but never killed one.

Ferrets in your clinic can attack birds and small mammals. So it's probably not a good idea to house a hamster next to a ferret or even a budgie. But a lot of our ferrets, they haven't a clue anymore. So it's sort of like, OK, well, we got some of those at our house. And we don't pay any attention to them.

You do want escape-proof caging at your clinic. And this is in our exam room, the male exam room. We have a sign that says, Designated Potty Area. And we swear, the ferrets walk up to it, they read the sign, and they turn around, and they go potty. So you get a sample. It's real good.

Anyway, special equipment you need-- a laryngoscope with-- I use the number one blade. And then you want very small endotracheal tubes, uncuffed ones, and the 3.5 can be cuffed. To pack off a tube at the back when you are having anesthetized ferrets, I use those dental cotton rolls. It works really well. But you do need small things for ferrets.

Slide 26



Dental equipment-- definitely some different things that I think work very well in ferrets. I love this elevator that is a two-ended to lift. It's very small. This is a 90-degree-- or an almost 90-degree hemostat that you can actually use to pull the teeth. I do a lot of gingivotomies. I have the little Micro Olsen-Hegar's. I use primarily a lot the McCall Scaler. That's my favorite. You'll want to have a probe. And I also use some vascular forceps to hold gingiva.

One of the things that you absolutely, I don't think, can get along without is the Nazzy Ferret Mouth Gag. This was a little mouth gag that will work for kittens as well. I'm not sure if it works for puppies, but it probably does.

It was named after one of my research-- one of my study ferrets on my adrenal study. And after he died, I took his measurements, and his teeth, and the jaw strength and everything. And with the help of the people at Universal Surgical, later Jurgensen, we came up with the Nazzy Ferret Mouth Gag. So you'll probably want one of those.

Small equipment, again, dental rolls-- yes, absolutely. Use a flat spatula, the very smallest feline elevator. Like I said, I like this one. There's also this wonderful dental chart that David Crossley came up with it's available on the British Veterinary Dental Association's website. You'll want to incorporate that into your clinic's records for dental for the ferret. They're really wonderful, and you can download them for free at no charge.

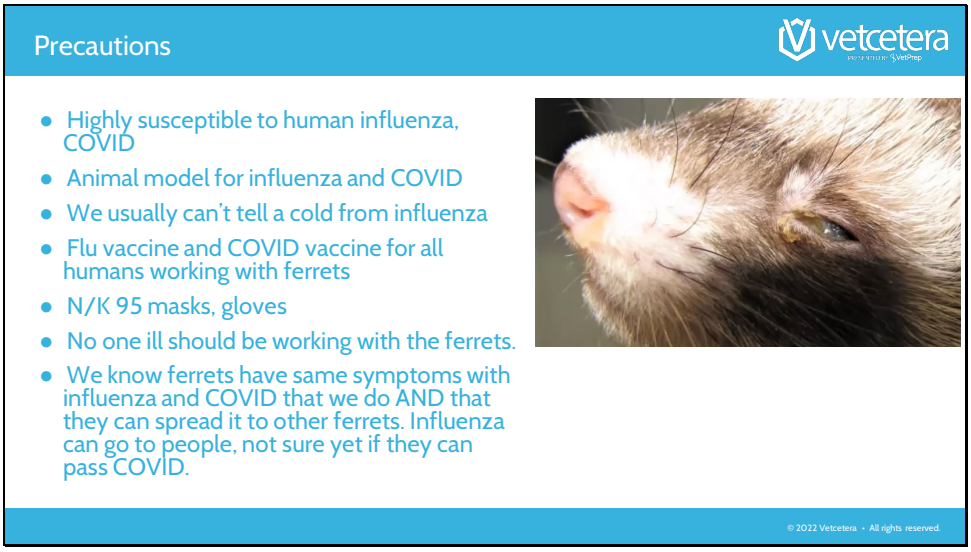
Slide 27

OK, staff training-- yes, you are going to have to train the staff on how to handle ferrets, how to be comfortable around them. I would suggest taking them to Exotics Con. That can be very helpful for staying up on things. Again, Journal of Exotic Pet Medicine. Association of Exotic Mammal Veterinarians has client education material. LafeberVet has a lot of stuff on ferrets.

Please join if you're not already with us for the Exotic DVM forum. It is a free forum. It's open worldwide to veterinarians and veterinary students. And you can discuss cases and learn a whole lot about a lot of things. We're there to help each other. And it's a lot of fun, and it's free.

You'll also want Vet Clinics North America Exotic Animal Practice for all your review articles. Now, this little ferret, he's actually a blaze. He has an ulcer back here and another ulcer in his mouth here, another ulcer. Please note, there is that second mandibular molar. Like I said, I try to look at every single ferret. He's also got a fracture in this tooth.

Slide 28



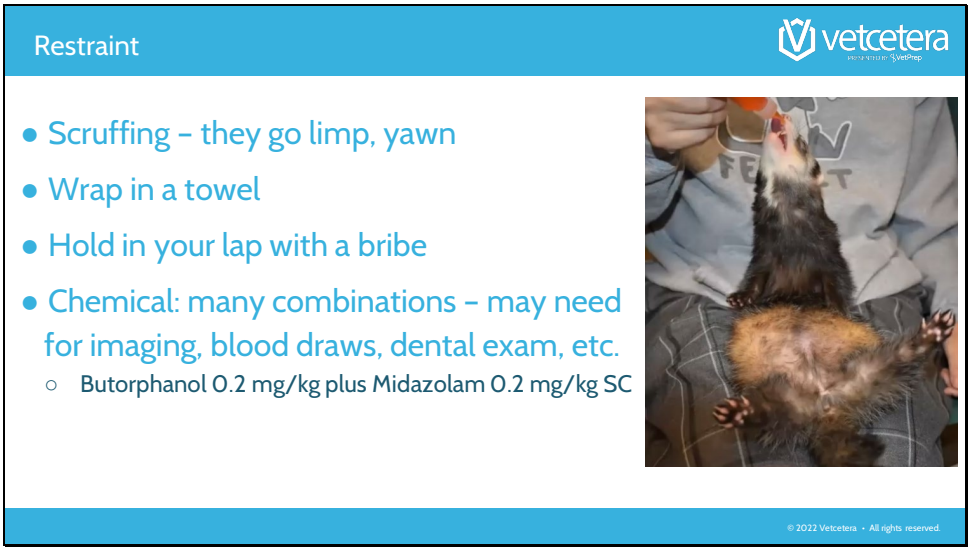
Anyway, OK, ferrets are highly susceptible to human influenza. They are the animal model for that. All flu vaccines are tested in ferrets. They are also an animal model for the SARS COVID-19. And this is a ferret that has influenza. We know, with influenza, they can get it from you, and they can pass it back to humans. We don't know yet that for COVID, if they can pass it back to humans. Some ferrets have died of COVID. They can get it.

And remember that for all of us humans, somebody comes in sneezing, coughing, whatever, we really can't tell a cold from influenza most of the time. So if you're sick, stay away from your ferret, or your staff people shouldn't be working with ferrets. We do require flu vaccines and COVID vaccines for all the humans working with our ferrets at the shelter, and, actually, at Northwest Zoo, where we worked and at my clinic-- well, we didn't have COVID vaccine, but we do now because we're trying to protect the ferrets and the hamsters.

We're protecting ourselves. But let's face it. The hamsters and the ferrets have got to be protected too. You can wear an N95 mask, gloves. Basically, no one else should be working with the ferrets.

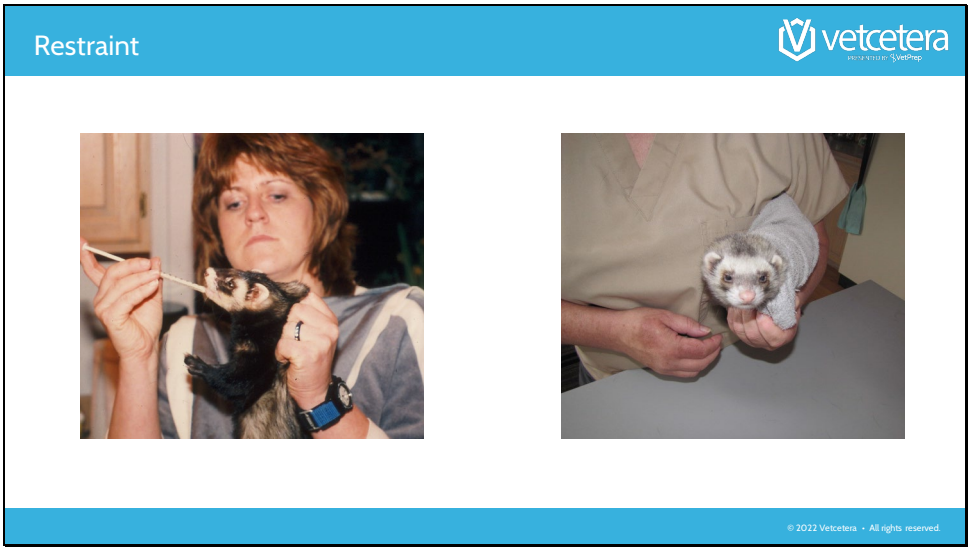
We know that ferrets have the same symptoms with influenza and COVID that people do and they can spread it to other ferrets. Like I said, we're not sure if they can spread it back to us, but don't want to take the chance.

Slide 29



OK, for restraint, the easiest one is to scruff them. They go limp, they yawn, you get their mouth open. You can also wrap them in a towel. You can hold them in your lap with a bribe. If you have to get them to actually hold still for things like imaging, or blood draws, or a real dental exam because they've got a painful mouth, my favorite is butorphanol at 0.2 megs per kilogram plus midazolam at 0.2 megs per kilogram. You can do it either IM or subQ, and the ferret will then cooperate with what you need to do. It works very well.

Slide 30

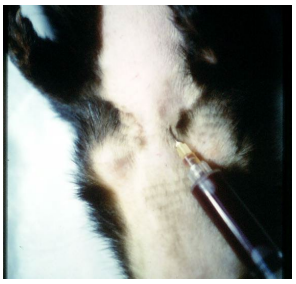


This is scuffing a ferret, giving some oral medication. Most oral medications, you don't need to do this, but it was demonstration. And then wrapping them on a towel, little ferret burrito, that works well too for a really wiggly ferret.

Slide 31

Blood draw site

- Sternal notch blood draw – Cranial Vena Cava



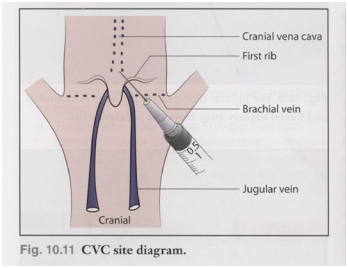


Fig. 10.11 CVC site diagram.

OK, blood draw, a favorite place to get a large blood draw quickly is the sternal notch of the cranial vena cava. Diagram from this is the xiphoid process. There's the first rib. There's kind of a notch. You aim underneath it towards the opposite knee, and you'll be able to get, usually, two to three cc's really quickly. Takes a little practice, but it works really, really well.

Slide 32

Vascular Access

- Use 22-23 ga needle
- Also cephalic, saphenous, jugular, tail
- Catheter usually in cephalic
- Ferrets don't bother bandages

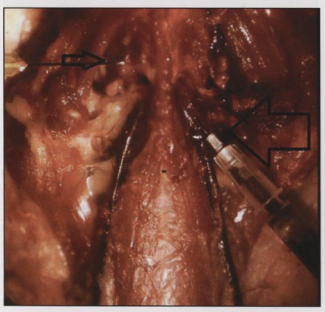
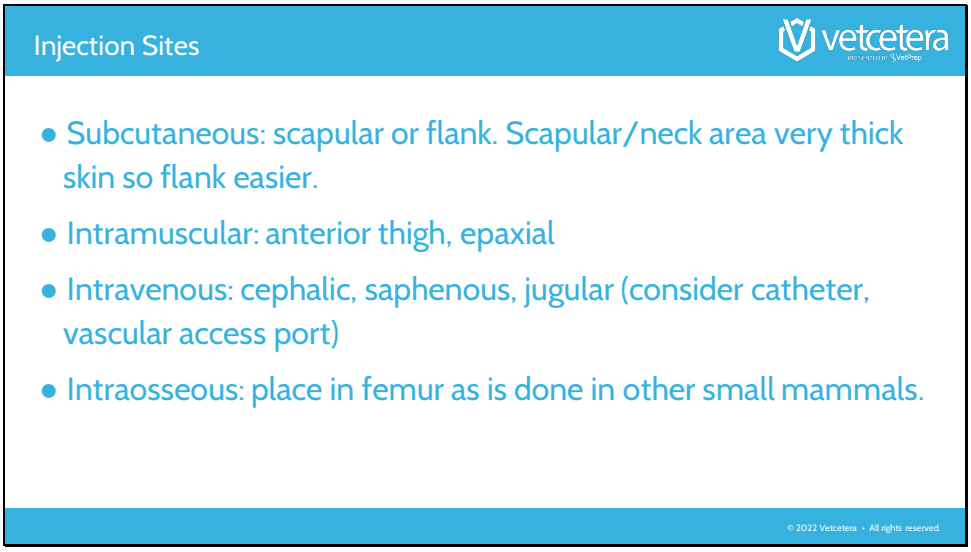


Fig. 10.12 The dissected anatomy for the CVC site. Small arrow is the first rib, large arrow is the site of entry.

Dissected anatomy in this, the needle goes in. I usually use a 22 to 23 gauge needle. You can also get blood from the cephalic, the saphenous. The jugular sometimes can be really hard because there's a lot of fat around them, and I'm not good on the jugulars. And there's also a tail vein you can use, but they don't like that.

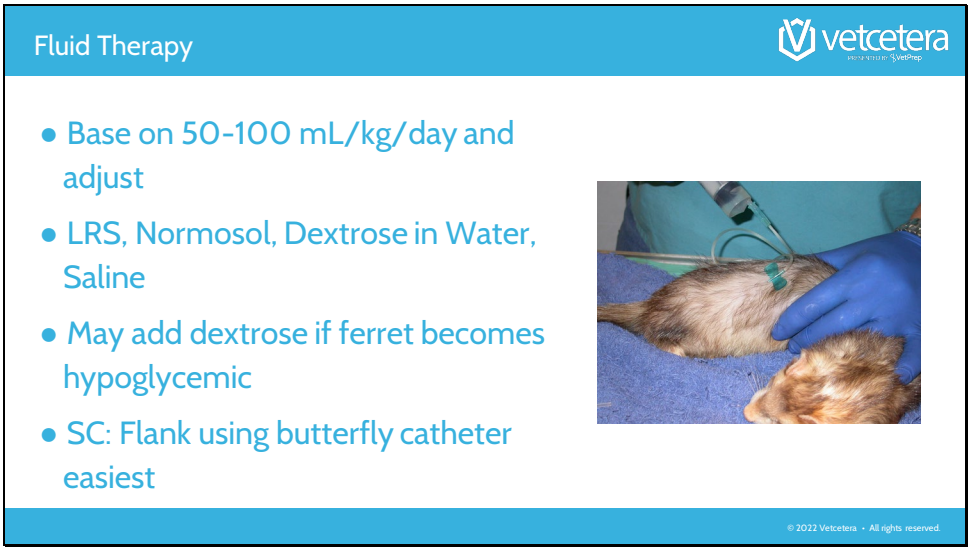
Catheters, we usually put them in the cephalic. And ferrets don't bother these bandages. They're really good about them. Their friends may bother them, but they don't bother them.

Slide 33



Injection sites, subcutaneous-- you can do them in the classic scapular area, but that's the thickest skin that they have. So it's really easier to give them in the flank, where they've got lots of extra skin. Intramuscular, I like the anterior thigh or the epaxials IV, cephalic, saphenous, or the jugular. If you're going to do a jugular to put in a catheter or vascular access port, you really are going to have to anesthetize them and do a cut down to do it right. Interosseous catheters can be placed in either the femur or the tibia, as done in other small mammals.

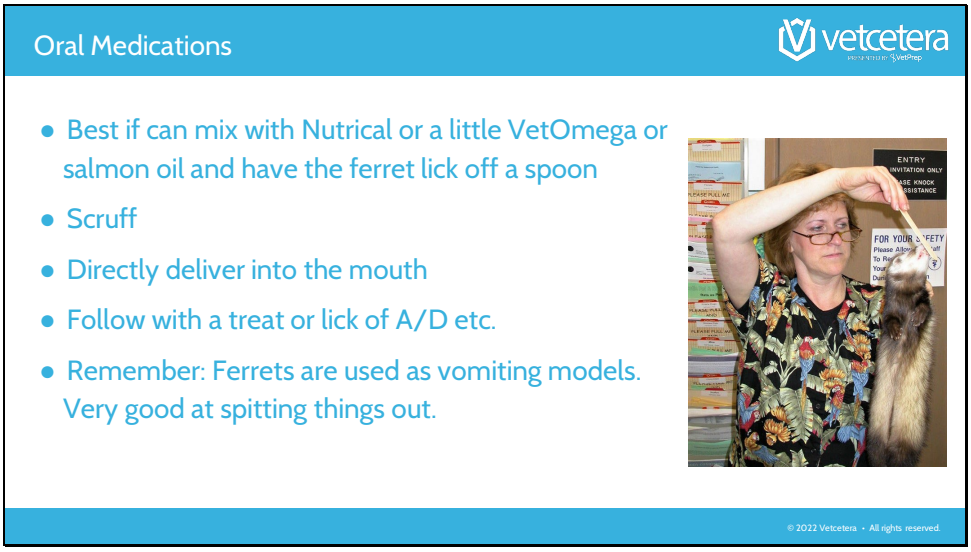
Slide 34



This is a ferret getting subcu fluids in the flank. You can do it by yourself. It's very easy. My husband can even give subcu fluids to a ferret by himself at a home using a butterfly catheter 23, 22 gauge. We base their fluid therapy usually on 50 to 100 mls per kilogram per day and then adjust it.

Remember, using dextrose in water doesn't really give them a sugar level. So if you have a hypoglycemic ferret, you are going to have to add extra dextrose using 50% dextrose and calculate it. We usually use Lactated Ringer's or Normosol. And again, that flank is much easier to deal with.

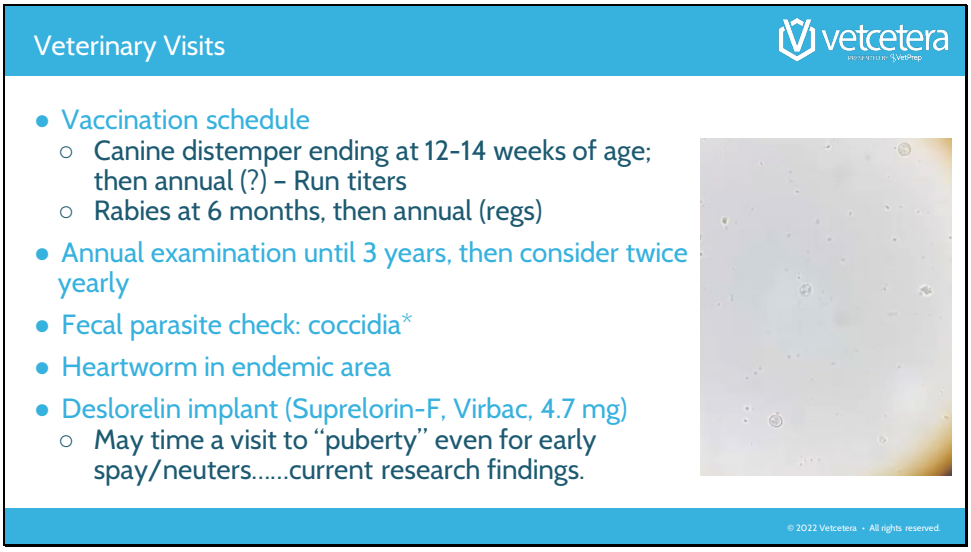
Slide 35



Oral medications-- ferrets are easy. You can put it right in their mouth. You can bribe them and mix it with a little Nutri-Cal or a little of the Vet Omega or that salmon oil. And they'll lick it off a spoon. They'll lick it off a tongue depressor. This is a great way to distract a ferret and have your staff do this to give injections elsewhere. A ferret doesn't care what's going on.

When you scruff them, they go kind of limp, and they yawn. So they're easy to work with. Anything you do, if it doesn't taste very well, then follow it immediately with something that they like or a treat, like a little lick of Nutri-Cal or something so that they don't associate that with not tasting good. You always use metronidazole benzoate. Don't use the regular metronidazole. You will have a foaming ferret that goes bananas if you try to get that bitter taste in them. Remember, they're used as vomiting models. So they're really good at spitting things out.

Slide 36



OK, for veterinary visits, vaccination schedules, they need a canine distemper vaccine and rabies vaccine. We like the canine distemper vaccine to end at 12 to 14 weeks of age and then annual, but we run titers. Rabies at six months, then annual, and there's regulations involved with how often or if your ferrets are required in your state or your municipality to have them. They are in Washington state. All dogs, cats, and ferrets have to be vaccinated for rabies.

We recommend an annual exam until they're three years of age and then twice yearly because, at three years of age, all of a sudden, they go over this, now, we're over middle age and into geriatrics almost immediately. Fecal parasite checks, especially when they're young. Coccidia is a bugaboo. It's a very small coccidia and hard to get rid of. There's actually four species of coccidia that they can have.

Heartworm in the endemic areas-- I do not have any personal experience with heartworm in ferrets. We don't have it much up here in the Pacific Northwest, luckily. Climate change, we probably will be having it. But we don't really have it. And ferrets are mostly indoor pets, so it's just not common. But if it is in your area, then screen them for heartworm just like you would a dog.

And then, they need a hormone suppression. Remember that I said that as soon as you do spay or neuter, the adrenal glands start kicking into gear. So we recommend that all ferrets get a deslorelin implant, which is SUPRELORIN F from Virbac. It's 4.7 milligrams. We try to time it for when puberty would be for a ferret that, of course, was early spayed or neutered. Remember, ferrets are seasonal.

So a ferret that is born in April or a ferret that born in September, they are all going to come into their first reproductive season that following year. The males start building hormones in December, January. And the females start January, February.

So puberty is kind of based on when they were born for how you time it. We'd love to time it so we could get that thing in there before that first LH surge, but probably, we can't. We don't know when that would be.

Slide 37

All right, the biggest ecto parasite problem they have is ear mites. Oh, lord, do they have ear mites. These ear mites seem now to be fairly resistant to ivermectin. Ivermectin just doesn't seem to be clearing them like it used to.

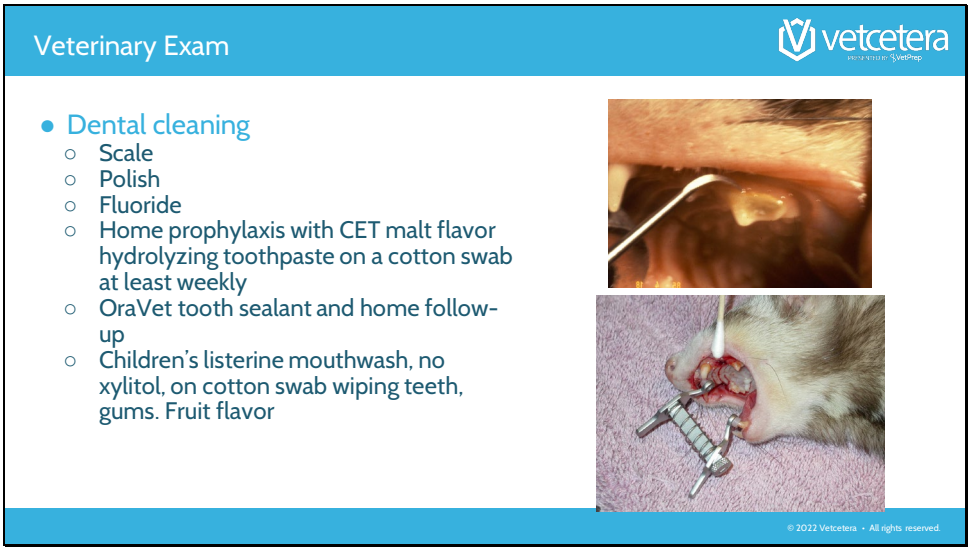
They can spread it to other pets in the household. There are a lot of different treatments that can be done. The old one we used to do is treat them with ivermectin and give them a bath the next day.

Yeah, we're now going, most of the time, with selamectin. They're Revolution. You can use small cat doses. It helps with the ear mites. It also will control fleas.

We don't have a lot of ticks in our area. So I can say, I have never pulled a tick from a ferret. But probably, some of you guys have.

Cuterebra can be an issue if they're housed outside or if they get outside sometimes. Anyway, same control fleas as you do with everybody else. And again, the heartworm in the endemic areas, you test and treat just like you would if they were a dog.

Slide 38

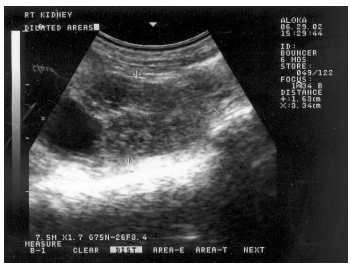


Dental-- cleaning, scale, polish, fluoride, home prophylaxis with hydrolyzed toothpaste or-- oh, boy, I got a speed up here. Anyway, we brush their teeth. We seal their teeth. We can use a children's Listerine mouthwash to clean their mouths with, works just fine. Here's one with, again, the Nazzy showing a broken tooth, tooth out of there.

Slide 39

Veterinary Exam

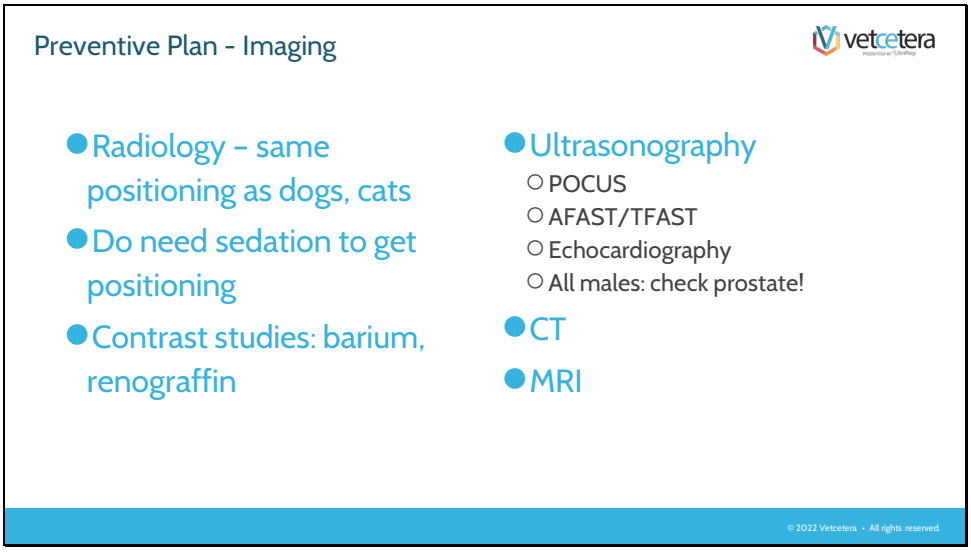
- Age 3 and older: geriatric
- CBC, chemistries – baseline
- Hormone panel – UT (sex steroids)
- Radiographs
- Ultrasound
  - Echocardiography
- ECG
- Urinalysis
- Replacement of implant



The geriatric exam, age three and older, all of a sudden, they become old. CBT these chemistries. Its baseline. If they're having signs of adrenal disease, I still like to get a University of Tennessee hormone panel to know what I'm dealing with. Am I dealing with an androgen? Am I dealing primarily with progesterone? I want to know.

Radiographs, ultrasound, abdomen and heart, ECG, urinalysis, and then replacement of the implant as needed.

Slide 40

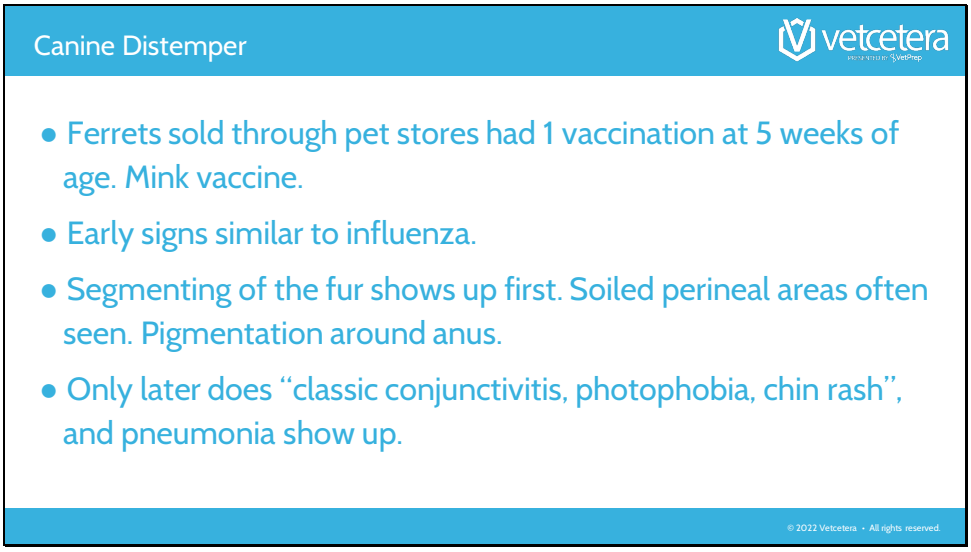


OK, radiology is the same positioning basically for dogs and cats. You do really need sedation to get that positioning perfect.

Contrast studies-- barium goes really fast, normally. So unlike a dog or cat that's going to take hours and hours, you can do it in three hours with a ferret. Ultrasonography is my favorite diagnostic with ferrets-- the point-of-care ultrasonography, the little handhelds now you can get. AFAST and TFAST, which are terminology from VetFAST from Dr. Luciano, which I probably mispronounced his name, looking fluid in the abdomen and chest very quickly.

Echocardiography-- and all male ferrets over the age of three, start checking that prostate because you do not want the prostate to enlarge and block the urethra. We do CT and MRIs in ferrets but not as commonly.

Slide 41

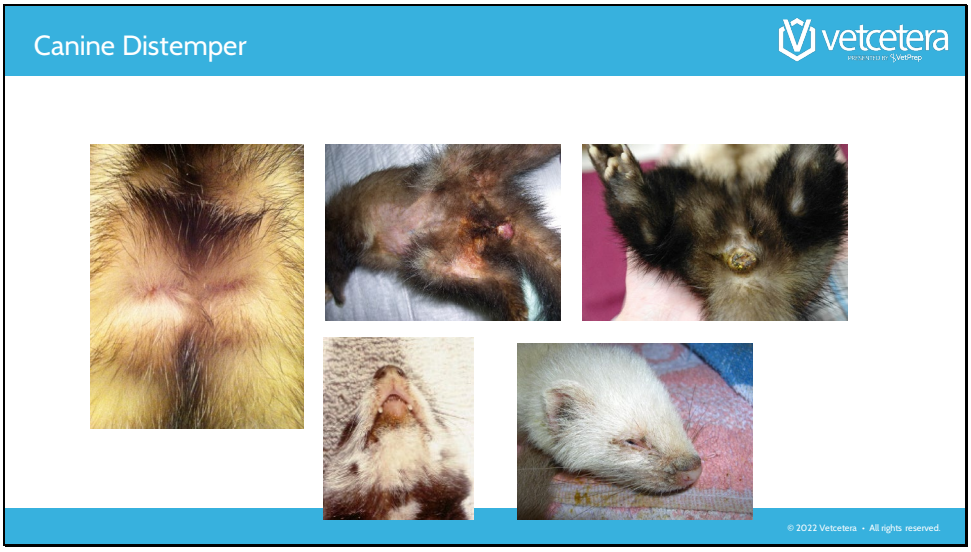


OK, canine distemper-- the ferrets sold in pet stores primarily in the United States had one vaccination at five weeks of age when they did the neuter and de-scent. It was a vaccine usually used for me. But sometimes, they're testing out one for ferrets or whatever. But anyway, they had one vaccination, so they're not protected.

The early signs of canine distemper are very similar to influenza according to the books. But what we found was, before any respiratory signs show up, the segmenting of the fur shows up. And I'll show you a picture of that. And then they get soiled perennial areas because they're just not taking care of themselves.

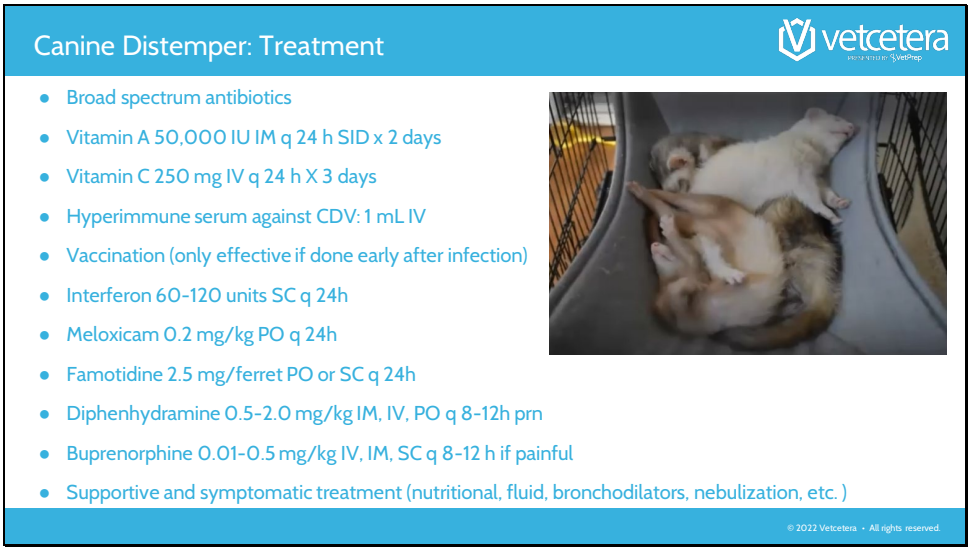
And they also build up this pigment ring around the anus, which I'm really not sure what that's all about. Only later does that classic conjunctivitis photophobia, and chin rash, and pneumonia show up. We unfortunately had to deal with this as an outbreak at the ferret shelter about 11 or 12 years ago. And we learned firsthand.

Slide 42



This is the segmenting. And the skin is erythematous, like a rash underneath the skin. Then this perennial soiling. This guy's going to get stuff. He needs treatment. Here's this ring around the anus. It's a pigment ring. It's really weird. And then, they get the respiratory signs, the classic. But it starts with this. And this to this may be two or three weeks. So it's just different.

Slide 43

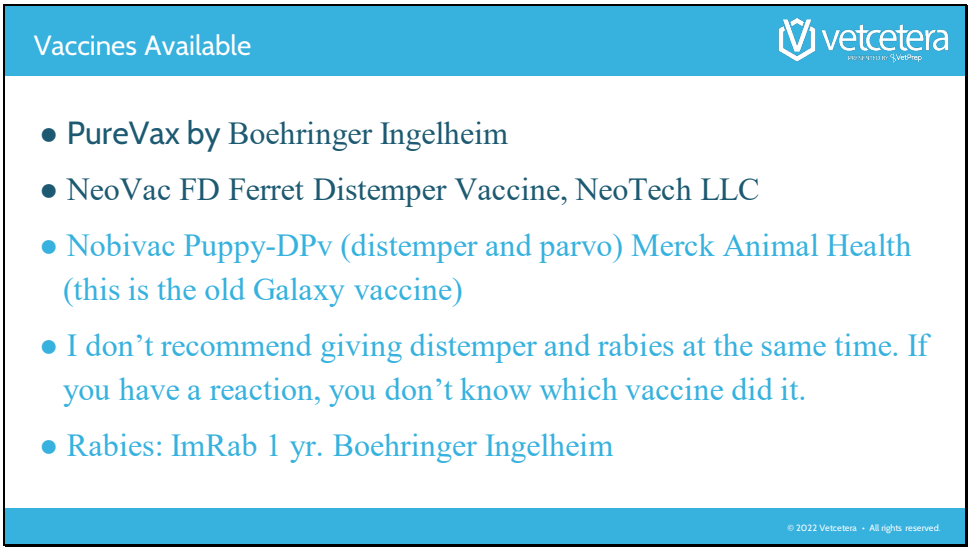


I did put this into your notes. There is a treatment for canine distemper. They do not have to die of it. We pulled most of them through. It can be a little labor-intensive, but you can get the ferret through it.

We're treating the symptoms. We're also boosting their immune system. And we also vaccinate in the face of the outbreak because the ferret, chances are, didn't get fully vaccinated if they've come down with it. And a ferret who has been housed in a Humane Society or an animal shelter that's got stray dogs coming into it, that's a problem.

Our ferret, the outbreak we had, they traced it to a raccoon infection. So if you take ferrets-- people take ferrets out to dog parks, or they take them outside, or they have a dog, the cat that's been outside and bringing in. We're not sure how they can get it.

Slide 44



There are two in the US. There's two licensed vaccines for ferrets-- Purevax and NeoVac, FD Ferret Distemper vaccine for individual pet ferrets. That's probably what you should use. At the ferret shelter, we've been using Nobivac Puppy because, first of all, it's the old galaxy vaccine. It's tried and true. We have very few reactions with it. It also is a lot cheaper. And when you're vaccinating 400-plus ferrets a year at the shelter, you need to do that.

We don't give distemper and rabies at the same time because if you have a reaction, you don't know which vaccine did it. Rabies, IMRAB one-year, the licensed one. And that, again, following regulations.

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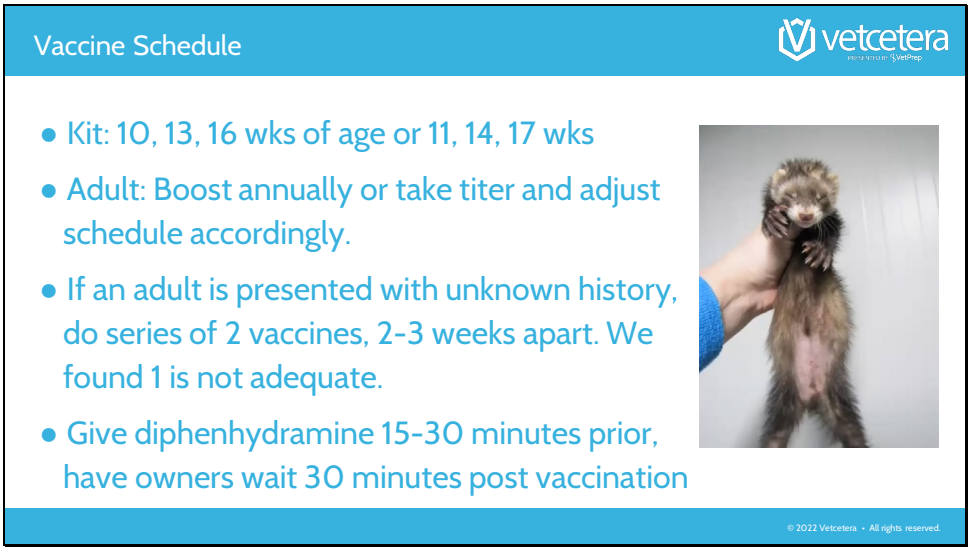

Vaccine schedule is not that much different than a dog. A kit 10, 13, 16 weeks of age or 11, 14, 17 adults boost annually or take a titer.

If an adult is presented with an unknown history, you do a series of two vaccines, not just one. We found one wasn't adequate. And you always give Benadryl diphenhydramine 15 to 30 minutes prior to a ferret getting any vaccine. And you have the owners wait. Vaccine reactions usually happen quite quickly, but not necessarily.

This is one of the little kits as they come from the breeder. You can still see the incision. They say they're eight weeks old. That's not eight weeks. That's about seven at the most. So they're little.

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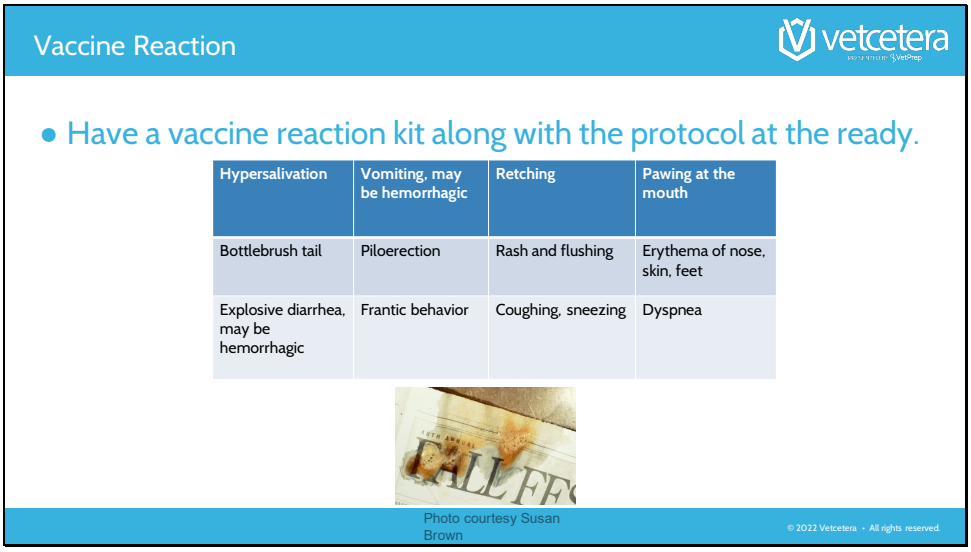

Vaccine reaction kit-- I put this in your notes-- you want to have that at the ready whenever you're doing vaccine because you don't want to be running around. They start usually with hyper salivation, and retching, and vomiting. And frequently, it's hemorrhagic. They get frantic behavior. And you go through this complete treatment.

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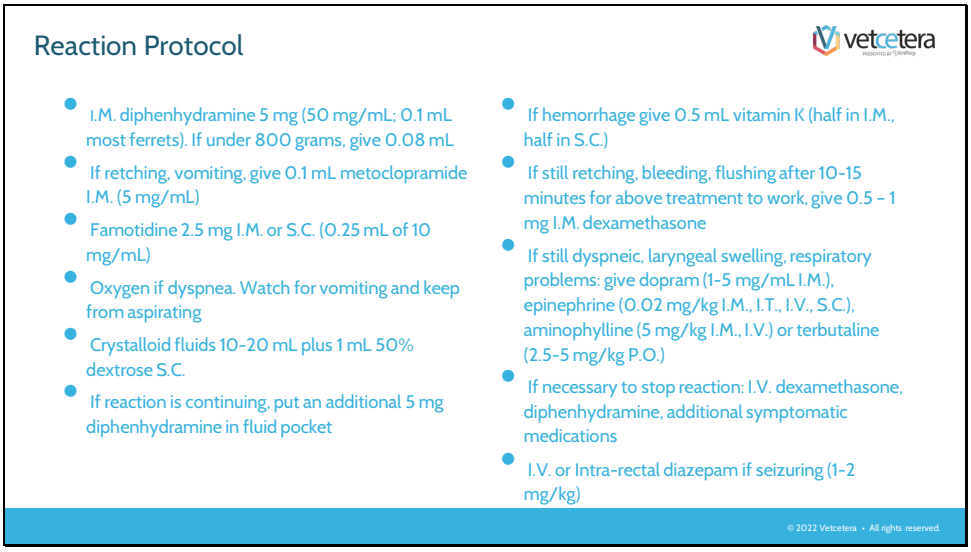

Do not reach for the epinephrine. First, ferrets are very sensitive to that. If they've got underlying heart, it may kill them. So I usually don't even get to epinephrine. You can do most with diphenhydramine, and if you have to, eventually with some dexamethasone. Usually, that's as far as you have to go. But remember, they're having a humongous histamine reaction when they're having a reaction. So work with that.

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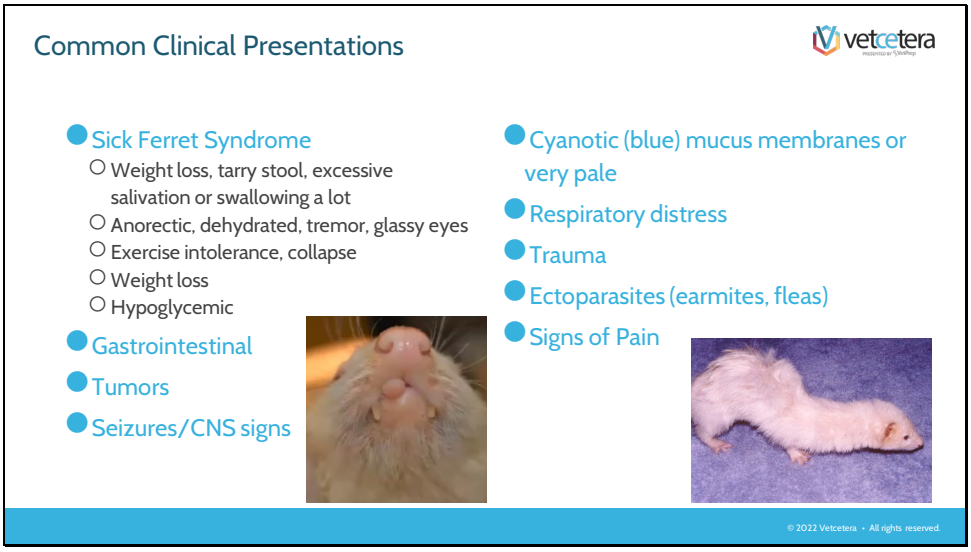

Sick ferret syndrome-- a ferret comes in with weight loss, tarry stool, excess salivation, or swallowing a lot because they're nauseated. They're anorectic, they're dehydrated, tremor, glassy-eyed. Remember, that can happen within 24 hours if they're not eating. Exercise intolerance, collapse, weight loss, and they may be low blood glucose just because they haven't been eating, or they're anorectic. That's just a sick ferret. It doesn't tell you anything about what's wrong at all. It just tells you it's sick. It's just like a sick bird syndrome.

Gastrointestinal tumors-- again, very common. You do see seizures and central nervous system signs sometimes from trauma, sometimes from toxicity, sometimes from tumors. Respiratory problems can happen and respiratory distress, certainly, trauma. You can have really bad ectoparasites, and a sign of pain. Hunching ferrets are-- as said in the literature, they're stoic. If you find an area of pain, they let you know.

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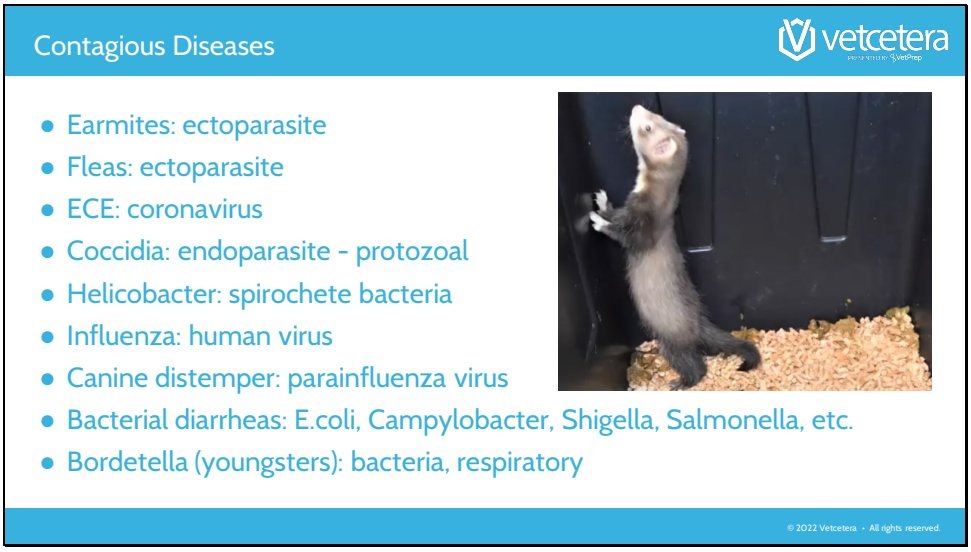
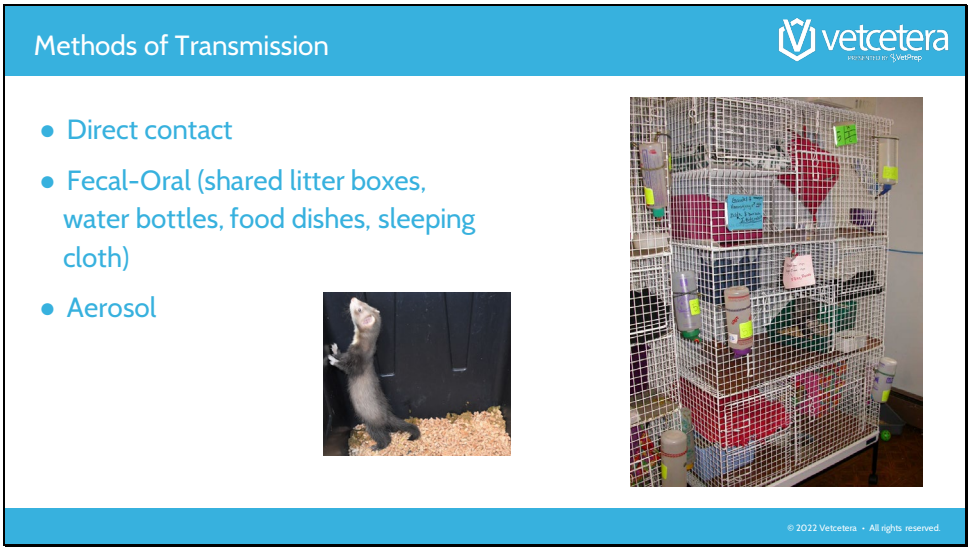


This is another ferret that just got shipped. Notice all the poop. They're little kits.

Ear mites, an issue. We talked about these. Coronavirus, the ferret enteric coronavirus, all the ferrets have it. They will break with this EC ear, this green slime. Usually, they will self-regulate it. Coccidia can be a problem. They also-- most of them have Helicobacter mustelae, which was the animal model for Helicobacter in humans.

The influenza virus, canine distemper, they can get bacterias. I will tell you that most of them coming from this breeder, I've isolated Campylobacter out of them. And some of them can have Bordetella, especially if you've got baby ferrets next to baby Guinea pigs, bunnies.

Slide 50



This is the way they're shipped, 12 to a carton. The poop, it's not great. This is some housing that we use. They can do direct contact, fecal/oral. Remember, they pile on each other. They share germs pretty easily and aerosols.

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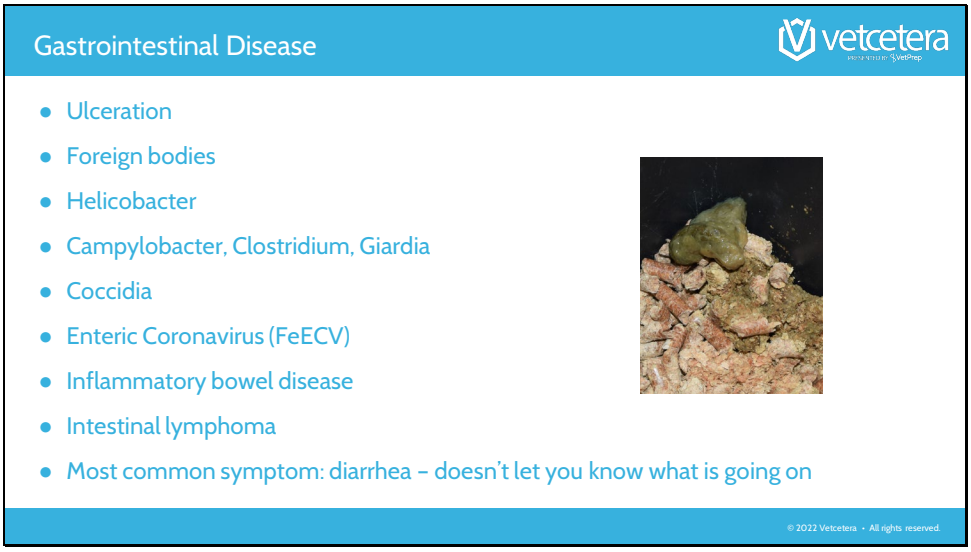

OK, GI tract-- this is a huge day unto itself. Diarrhea doesn't tell you what's going on. Ulceration can be anywhere in the GI tract. Foreign bodies, they eat things they shouldn't, like blankets, and toys, and all sorts of stuff. And it isn't just baby ferrets that will eat something they shouldn't. An adult ferret we'll do it too if they found it interesting and they goofed. Some of them, too, when they're stressed, they'll chew blankets. So never rule out a foreign body if a ferret all of a sudden stops eating and has an acute gut, and they're dropping away like crazy.

Inflammatory bowel disease, you usually see only an older ferrets. And frequently, it leads to intestinal lymphoma. These two are kind of tied together. And again, the symptom's diarrhea, but it doesn't tell you what is causing that.

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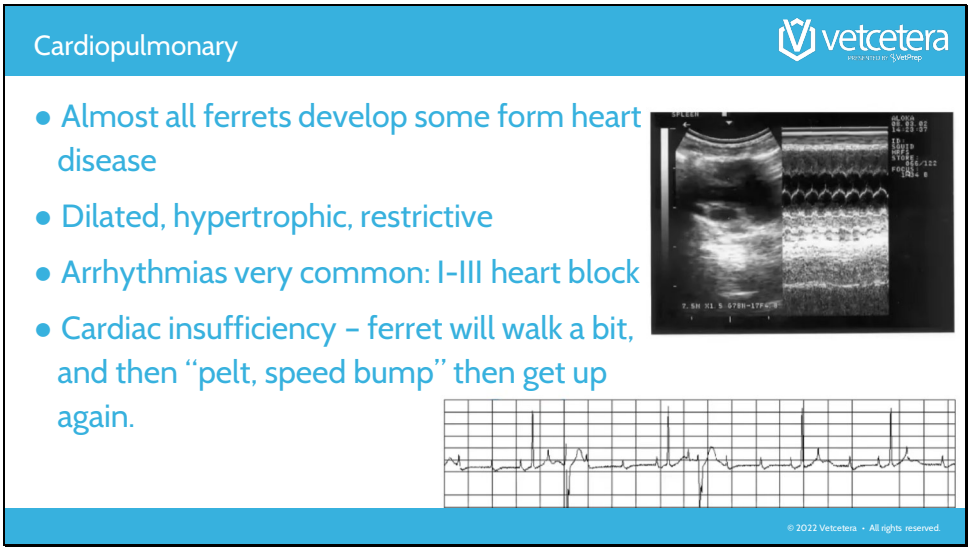

Almost all ferrets develop some form of heart disease as they get older. It's usually a combination dilated hypertrophic kind of called a restrictive, but I say it leaned a bit more to dilated. I had a real hypertrophic one at the shelter the other day, though.

Arrhythmias are common. Some people say a first-degree heart block is normal. I don't think so. But we can treat these. And cardiac insufficiency in a ferret, the fair will walk a bit and then pelt or speed bump, and then get up.

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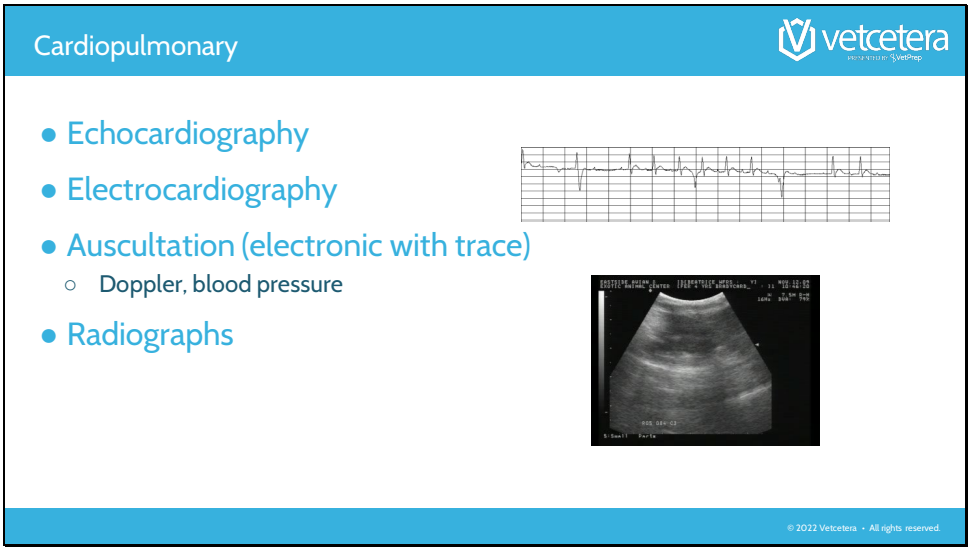

So we do a lot with echocardiography.

That's what really tells me when I'm looking at a heart in a ferret in what's going on with it. It's your best friend. Don't forget the ECG. And especially, for looking for heart block and then, of course, your auscultation. I've been using the electronic one that I can get a trace from. And also, the owner can hear it as well. It's pretty cool.

Radiographs only tell you if the heart is visibly grossly enlarged. But you can have a lot of heart disease with a heart of normal size. So that doesn't necessarily mean anything.

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I'm not going to go through this, but if you turned it up, you could hear the heartbeat.

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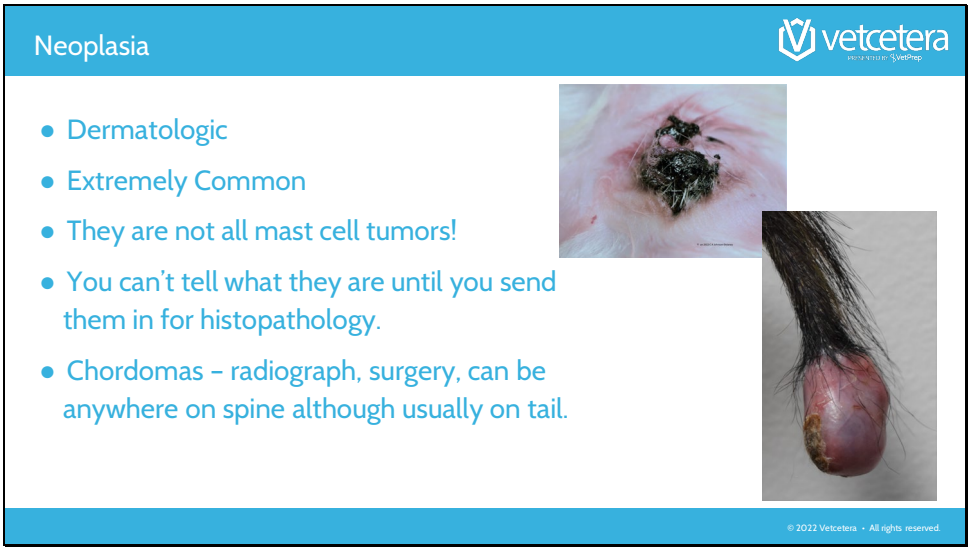

Neoplasia, extremely common. Dermatologic-- a lot of ferrets develop things. People tend to call them all mast cell tumors. They're not all mast cell tumors. And all the ones I've been removing lately, I haven't had a single mast cell tumor. And yet, everybody call them mast cell tumors. Send them in for histo.

Chordomas that usually are at the end of the tail also can be anywhere on the spine. So you need to investigate, and take radiographs, and do the surgery, and make sure you don't have it further up, and that you got the tumor fully.

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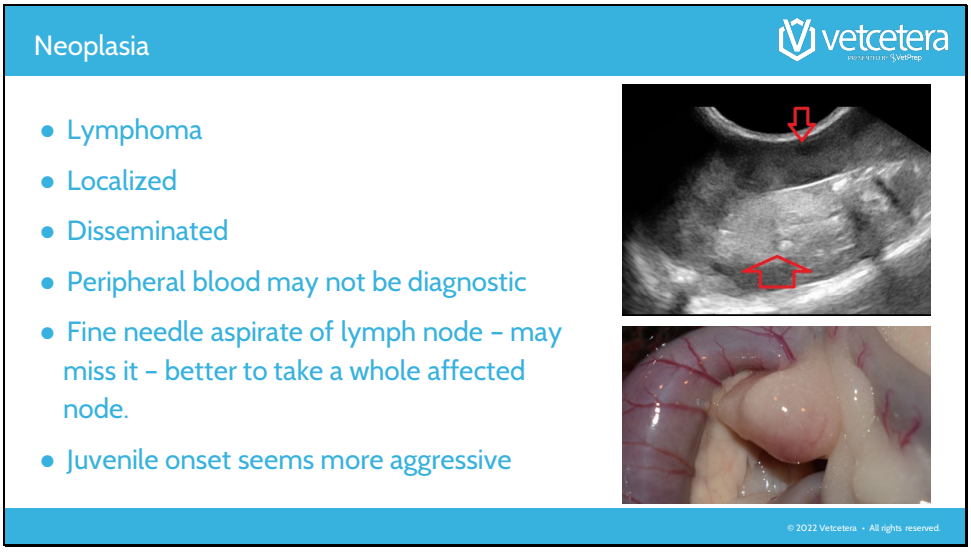

Neoplasia lymphoma is probably, I would say, almost the most common and it can be localized, or in just a few lymph nodes, or it can be disseminated throughout every organ in the body. This is a spleen ultrasound with pockets. This is a lymph node that's actually enlarged.

Peripheral blood, though, may not tell you a darn thing. Peripheral blood may look completely normal, and this ferret has disseminated lymphoma. If you can do a fine-needle aspirate of a lymph node, great. You can still miss it. I would prefer you take the whole node.

The juvenile onset lymphoma, especially if the ferret's under a year of age, seems very aggressive. And you don't really even have a chance to get them on prednisone, which can be a treatment. But there are treatments for lymphoma. There are a lot of things that have been tried. Some of them, you can do good quality of life with just prednisone and famotidine alone. Just depends on the ferret.

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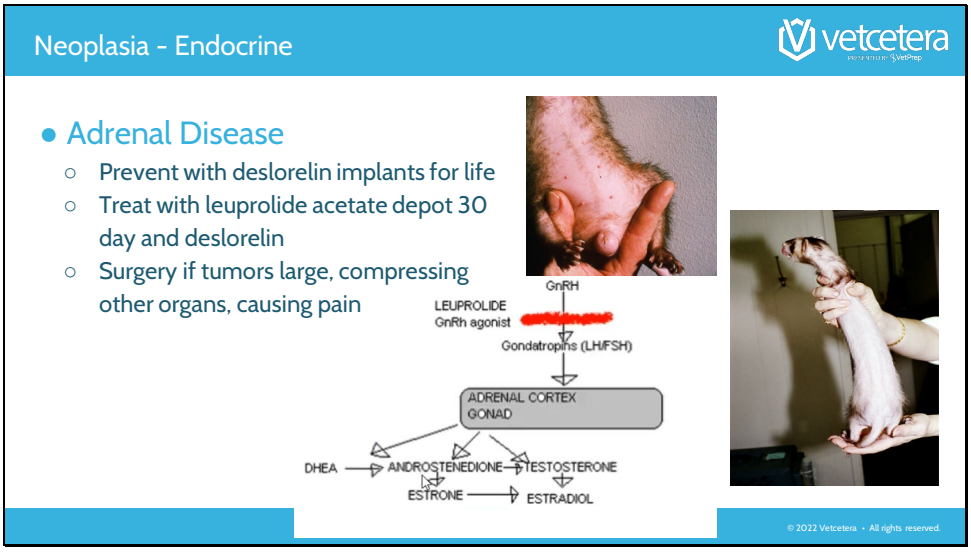

We talked briefly about adrenal disease. The hair loss and the enlarged vulva are classic. But you can have a ferret that just has elevated I understand the Iron or testosterone. And the hair coat's gorgeous. Their prostate's a disaster, and their lymph node is the size of a tangerine.

So we usually start giving them a Lupron shot, a leuprolide acetate depot shot immediately. it'll start working before the implant does and then put an implant in. But remember, if they have adrenal disease, you are looking at treatment for the rest of their life. They may or may not get their hair back. To me, that's irrelevant. I want to slow down the growth of the tumor. And I want to make sure that the prostate allows the ferret to urinate.

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Islet cell disease is also called insulinoma or it progresses Tyler's cell carcinoma. I don't like the thinking of it as benign because it isn't. It metastasizes. It goes up into the liver. It goes in the bile duct. It spreads throughout the pancreas. It will progress to islet cell carcinoma in many cases.

So that doesn't sound very benign to me. And it will cause the ferret to have severe hypoglycemia. They'll tear at their mouth. They salivate. they'll collapse. They'll scream. It's just not pleasant when they're having a seizure.

We can treat this with dioxides. It's what we start with usually. Prednisone-- don't just clamp them on prednisone. Start with diazoxide if you can or with a combination. Frequent feedings-- yeah, if you can get the owner to feed them every two or three hours, and when they let them out to play, make sure they have a snack before they start playing. You can get by with that for quite a long time. Surgery, yes you can remove nodules. Great. You can remove parts of the pancreas. You can turn them into a transient diabetic, but it's going to come back. You can't cure it.

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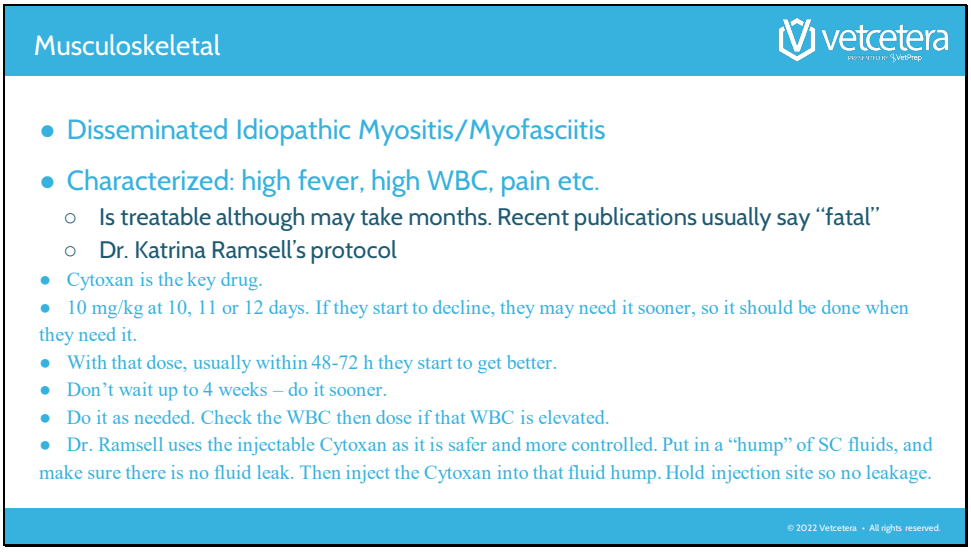

One disease that I want to mention before we finish here-- because in some of the recent books, it isn't correct. Some of the recent publications say it is usually fatal, or it is fatal. Dr. Katrina Ramsell has developed a treatment. We do not think of dim usually as being fatal anymore. We can get them through it. It may take a while, but we can get them through it. And Cytoxan injectable is the key to that.

Dr. Susan Orosz also gives them a muscle relaxant to help. Remember, they're running a very high fever, usually, a high white count. We're talking, like, 30,000 or 40,000, their white count. They're in pain. Every place you touch them, they hurt. Their muscles are spasming. Or they've got such a high fever, they're practically passed out. So you need to support them with fluids and analgesics. Buprenorphine is really good.

We sometimes treat these guys too with Meloxicam to help with that fever. You want to give fluid therapy and, again, get them eating. It's an intensive thing to start with. But you can get them through it. So please, do not just euthanize a ferret because it was diagnosed as having dim, as we call it. You can diagnose it completely with a muscle biopsy, but you need to be treating that fever, and the white count, and the pain, and the supportive care long before that biopsy is going to come back.

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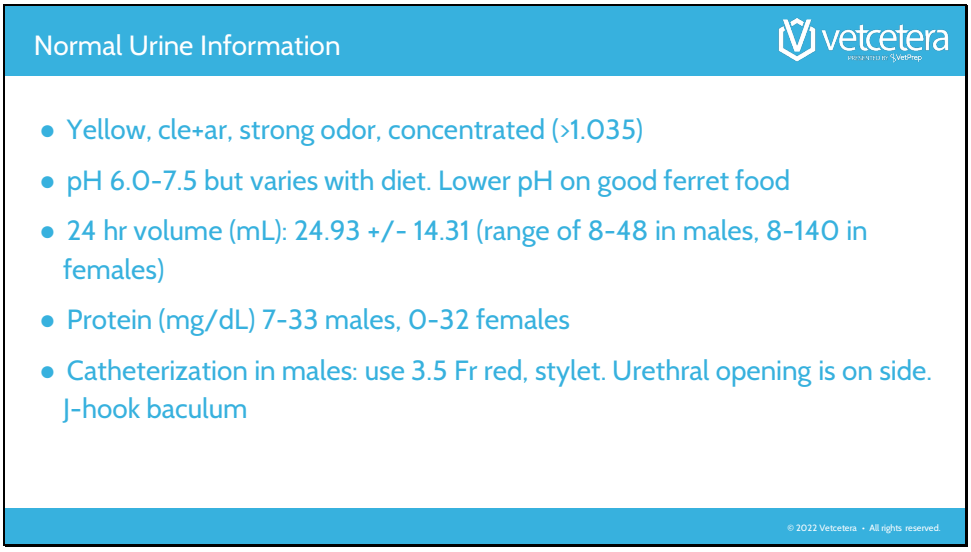

Urine-- very concentrated, usually. It's acidic, like other carnivores. 24-hour volume is actually fairly high for a mammal that-- remember, ferrets are-- they process stuff fast. It usually does have a protein level in it, more so in the males. And again, that catheterization in the males is going to take a little practice-- 3.5 red French with a style. That is my favorite. Urethral opening is on the side. Some people like the Slippery Sam Tomcat catheters. But they don't go around the pelvis very well to get up, and they certainly don't go far enough to deal with that prostate.

I had one that we tried to get in, and it found out that the baculum was broken in three places. And oh, it was a mess.

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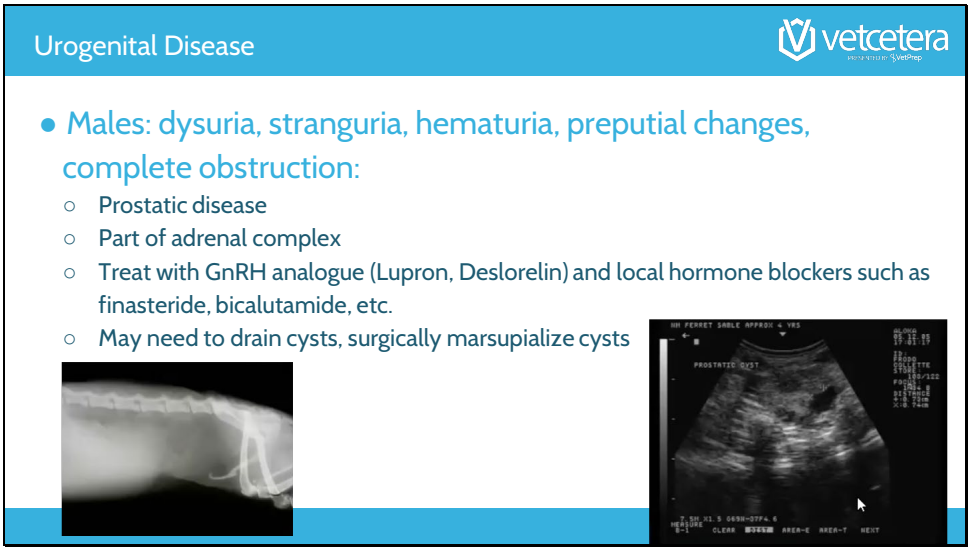

Anyway, like this one, this is just broken in one place.

Prostate-- ultrasound those prostates. Big cysts, you can drain with ultrasound guidance or with surgery. You can omentalize them with stuffing the omentum in them. The really big ones, there's surgeries to marsupialize them to the outside.

But remember, this is part of adrenal disease. It's part of the complex. So you've got to suppress the hormones. We also use local hormone blockers in the males, like finasteride or bicalutamide, et cetera to work on that prostate tissue directly. We've got to keep the urethra open. And that can be a real challenge sometimes. So it's something that, again, the ultrasound is your best friend on this.

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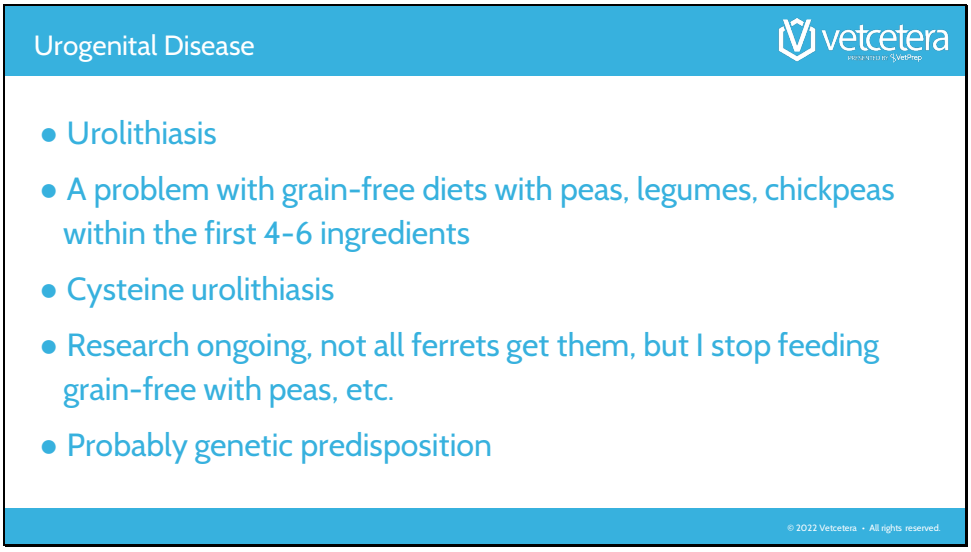

Urolithiasis, I'm going to bring this to your attention, and then I think we're just about done. They can get struvite and regular kinds of neural urolithiasis, just like a cat or a dog. However, we have another problem. We have a cystine urolithiasis, and it is associated with feeding grain-free diets with peas, legumes, chickpeas.

And those are usually within the first four to six ingredients. Now, not every ferret fed a grain-free with those are going to get cystine urolithiasis. But an awful lot of them do, and it can be life-threatening. There's research ongoing. We just recommend, don't feed grain-free with peas. Don't feed. And the companies that replaced grain-free-- or replaced the peas with sweet potatoes and kept the exact same guaranteed analysis-- yeah, I'm not buying that.

I don't believe that is true. It can't have had the same manufacturing. We think it's a genetic predisposition. But remember, ferrets are so inbred, it's really hard to find differences in their genomes.

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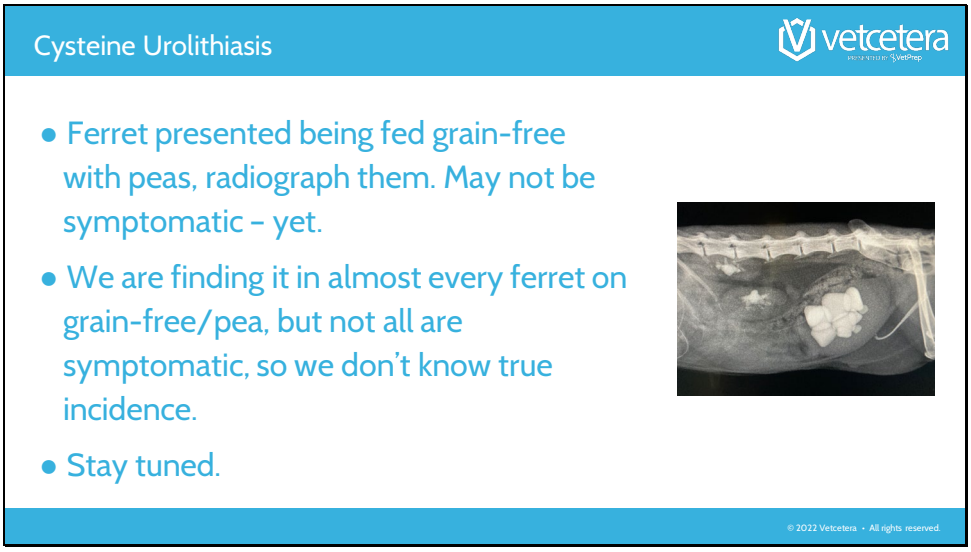

The cystine urolithiasis can be extremely dramatic. And a ferret can present not having any symptoms yet. But it's on that grain-free diet with peas-- take a radiograph. You may be surprised what you find.

This ferret had urolithiasis up in the kidneys. And luckily, with fluid therapy and getting on the right diet, those slowly dissolved, and they got out. And obviously, surgery had to be done for this mess. So we don't find cystine urolithiasis in ferrets who are not on a grain-free pea, legume, chickpea diet. The only ferrets that have cystine have-- they've got that pea diet. So they're not all symptomatic. We don't know the true incidence. Stay tuned, but beware.

Slide 64

OK, the list of references is being provided. That also has that vaccine reaction protocol, some nutraceutical formulations, which we didn't even get even get into to talk about. Dr. Ramsell's protocol is there for dim. And if you have questions or want to contact me, that's my email, cajddvm@hotmail.

And also, too, I would direct you to the Exotic DVM website to join our forum. And do not be afraid to look in a ferret's mouth and look at their teeth. You can get them to open their mouth. We are not in their food chain. Ferrets want to be played with. They just want to have fun. And you can work with them. They're happy little animals.

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So with that, I'd like to thank you for choosing Vetcetera for your continuing education program. And I'm not sure how we're doing on time.

We're a little over, but there is actually one question. So if you want to answer that, we can do that real quick. This person wants to know, do ferrets have similar toxicities as dogs, and cats, and infants? She mentioned onions, grapes, and raisins.

Well, they can't-- [LAUGHS] you can feed onions, grapes, and raisins to ferrets. I'll tell you, feed a raisin to a ferret. It'll come out the other end completely intact, surrounded in mucus. Onions and grapes or high-fiber. I don't think they're even going to be able to digest them if they eat them. They're high-sugar.

We wouldn't feed a grape. I've never seen a ferret eat enough grapes or raisins to have a toxicity-- and definitely, not onions. We don't use onions in anything with ferrets. So I don't-- ferrets won't touch stuff like that. These guys want-- they're carnivores. They're not going to deal with that people-y treat food stuff.

They will eat a raisin. And it will scar them out. You'll know there's no obstruction in that ferret if that raisin comes out the other end. That's good. If the raisin doesn't come out, start the barium series, get looking at that gut because you got a problem. But I've not run into anything suggesting that those are problems in ferrets.

Piggybacking on that, are there any human food items that you should hide around ferrets? [LAUGHS]

As I said, anything sugary-- fruits, vegetables, carbohydrate-- they can't digest it. Anything over that 4% fiber, forget it. It's gone. They eat meat. They'll eat cooked salmon. OK, they sell freeze-dried minnows for ferrets as treats. No. A ferret looks at that goes, you've got to be kidding me. Those are great for turtle treats. I buy those for my turtles.

I stay away from the soft, moist, like, Bandits and those kinds of treats. Some ferrets really like them. But that carbohydrate stuff, that moist and-- it's not good for them. So day to day, they eat either meat or pellets. We feed commercial ferret food, OK? The ferrets-- there are some very good foods out there. There's another one being developed that we've been doing feeding trials on.

I won't feed anything that has not been through a real feeding trial. So that really limits what you can feed your ferret. There's an awful lot of foods out there. They haven't gone through feeding trials. They're kind of knockoffs of cat foods and other things. The feeds-- in that nutrition chapter, I go through that in my book to go through it.

But I feed my ferrets-- if you want to know-- totally ferret, the plain for active adult ferret, just the plain one. The whole thing about reducing protein for a senior ferret, there is no evidence to support that. In fact, probably, not a good idea. They lose the ability to hold in protein as their kidneys deteriorate.

So I don't decrease the protein in older ferrets. The shelter we feed Missouri is-- we feed a mixture of Missouri, totally ferret, and the Marshall food because all these ferrets coming from Marshall Farms are on Marshall food. And they can get used to it. We have ferrets who were fed a milk and broccoli diet, and they die. We have ferrets who people have been feeding raw eggs, and they are avidin-biotin messed up, and they are very sick.

Have you ever seen vaccine-related sarcomas in ferrets? Yes. That's why we give them in the hindquarters, kind of low on the leg, subQ, like I think you do in cats. I don't work with cats. But yes, I had one, a ferret that had a vaccine-related sarcoma. And we kept removing them, and removing them, and it eventually killed him. So yes, we have seen that.

The vaccine reactions-- I can tell you following that protocol, I've been working with ferrets-- I counted it up-- 46 years. I have personally never lost a ferret to a vaccine reaction. I know people, and I have been around them where they popped them like they would react-- with epinephrine or whatever, and they lose the ferret. Pay attention to that bleeding, and pay attention to that histamine. Those are the keys. And you can pull a ferret through. There's no reason to lose a ferret on a vaccine reaction.

Thank you very much. I think that's all we have time for today, and it's been a really great webinar. I have really enjoyed it. I've learned a lot.

[LAUGHS] Now, adopt a ferret. We have lots.

Right? [LAUGHS] Well, you're welcome to hop off if you want to, Dr. Johnson-Delaney. We appreciate you being with us.

OK, thank you.

Yeah, thank you. Have a good night.

References, Resources and Further Reading
The Ferret: Essentials for the Practitioner
2022
Cathy A. Johnson-Delaney, DVM
cajddvm@hotmail.com

Canine Distemper Treatment Protocol

- Broad spectrum antibiotics
- Vitamin A 50,000 IU IM q 24 h SID x 2 days
- Vitamin C 250 mg IV q 24 h X 3 days
- Hyperimmune serum against CDV: 1 mL IV
- Vaccination (only effective if done early after infection)
- Interferon 60-120 units SC q 24h
- Meloxicam 0.2 mg/kg PO q 24h
- Famotidine 2.5 mg/ferret PO or SC q 24h
- Diphenhydramine 0.5-2.0 mg/kg IM, IV, PO q 8-12h prn
- Buprenorphine 0.01-0.5 mg/kg IV, IM, SC q 8-12 h if painful
- Supportive and symptomatic treatment (nutritional, fluid, bronchodilators, nebulization, etc.)

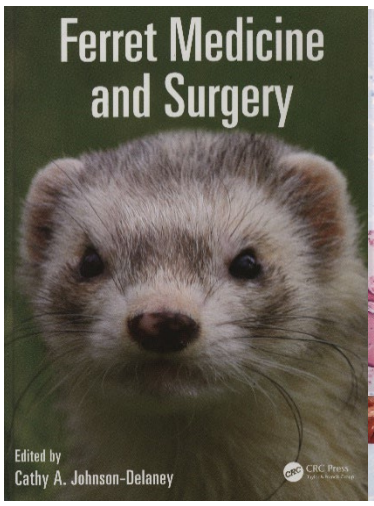
Ferret Vaccine Reaction Protocol

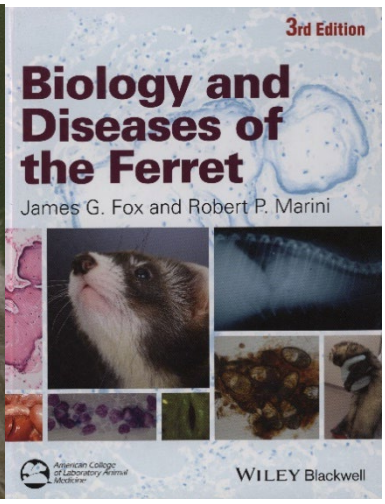
- I.M. diphenhydramine 5 mg (50 mg/mL; 0.1 mL most ferrets). If under 800 grams, give 0.08 mL
- If retching, vomiting, give 0.1 mL metoclopramide I.M. (5 mg/mL)
- Famotidine 2.5 mg I.M. or S.C. (0.25 mL of 10 mg/mL)
- Oxygen if dyspnea. Watch for vomiting and keep from aspirating
- Crystalloid fluids 10-20 mL plus 1 mL 50% dextrose S.C.
- If reaction is continuing, put an additional 5 mg diphenhydramine in fluid pocket
- If hemorrhage give 0.5 mL vitamin K (half in I.M., half in S.C.)
- If still retching, bleeding, flushing after 10-15 minutes for above treatment to work, give 0.5 – 1 mg I.M. dexamethasone
- If still dyspneic, laryngeal swelling, respiratory problems: give dopram (1-5 mg/mL I.M.), epinephrine (0.02 mg/kg I.M., I.T., I.V., S.C.), aminophylline (5 mg/kg I.M., I.V.) or terbutaline (2.5-5 mg/kg P.O.)
- If necessary to stop reaction: I.V. dexamethasone, diphenhydramine, additional symptomatic medications
- I.V. or Intra-rectal diazepam if seizuring (1-2 mg/kg)

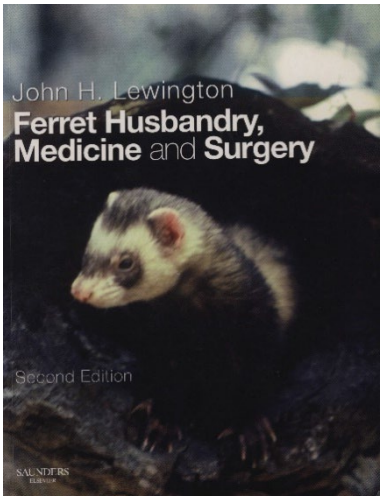
Dr. Ramsell's Treatment Protocol for Disseminated Idiopathic Myofasciitis

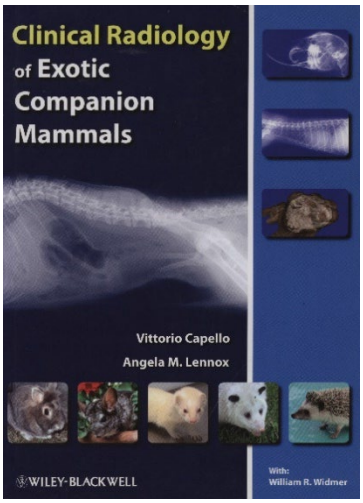
- Cytoxan is the key drug.
- 10 mg/kg at 10, 11 or 12 days. If they start to decline, they may need it sooner, so it should be done when they need it.
- With that dose, usually within 48-72 h they start to get better.
- Don't wait up to 4 weeks – do it sooner.
- Do it as needed. Check the WBC then dose if that WBC is elevated.
- Dr. Ramsell uses the injectable Cytoxan as it is safer and more controlled. Put in a "hump" of SC fluids, and make sure there is no fluid leak. Then inject the Cytoxan into that fluid hump. Hold injection site so no leakage.

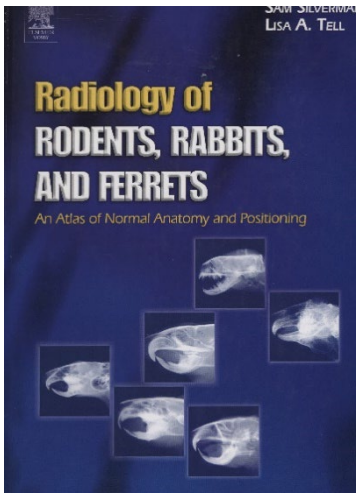
Recommended books and journals if you work with ferrets:

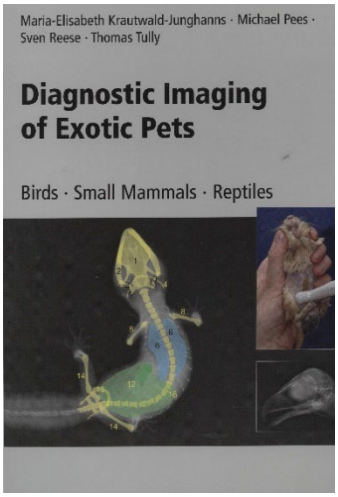


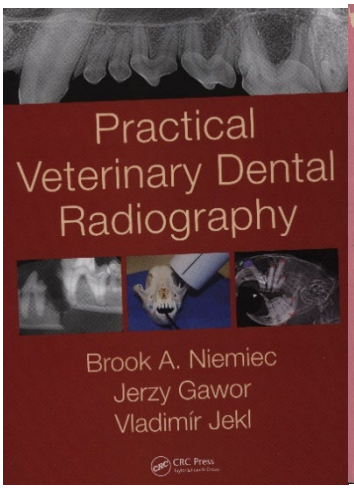


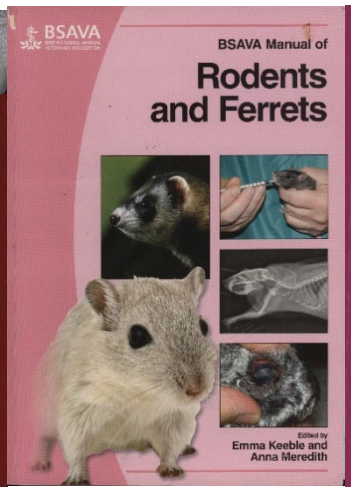


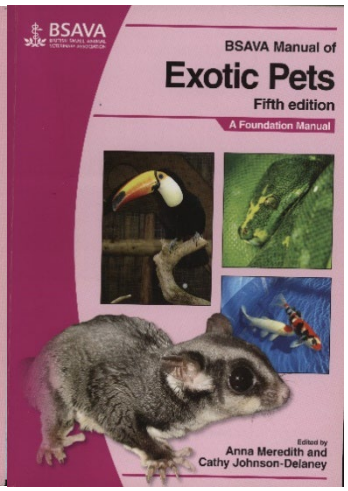


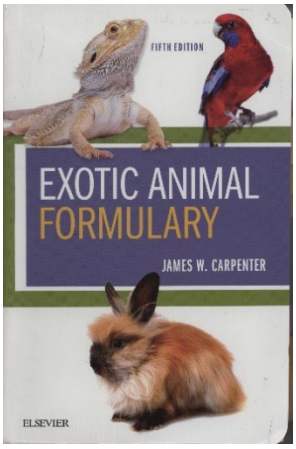


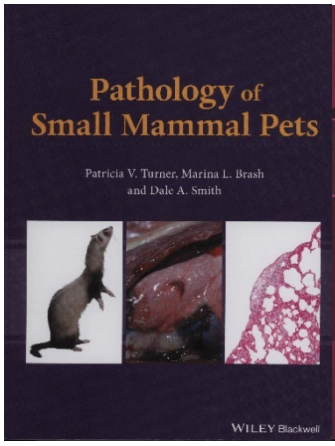


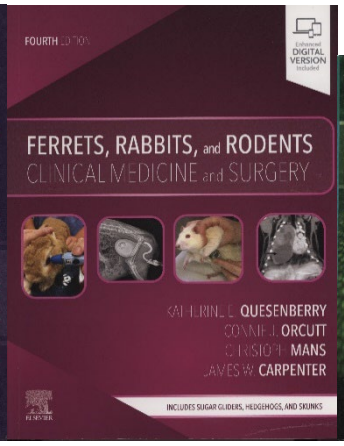


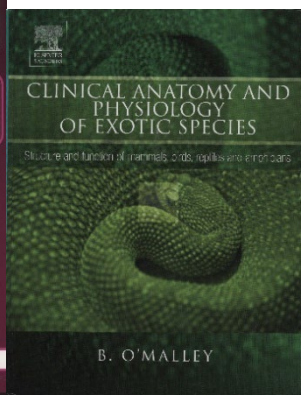


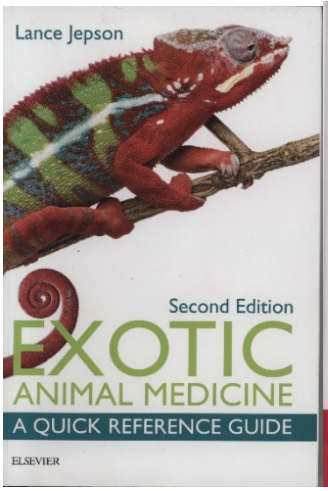


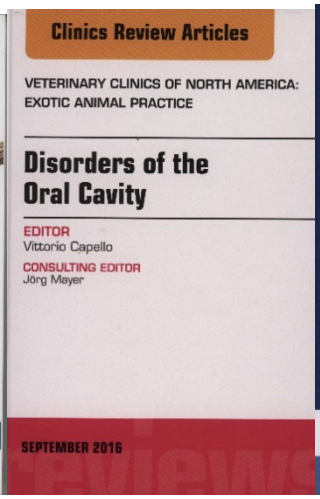


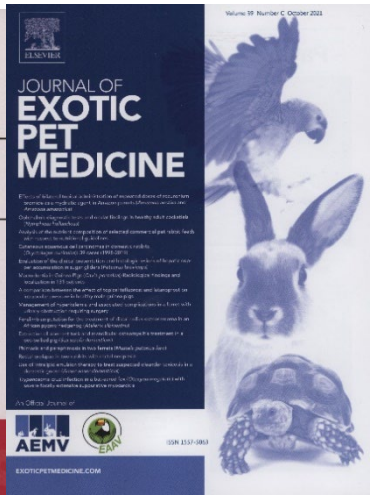












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AU: Larrat S, Summa N.
TI: Ferret Behavior Medicine.
SO: Vet Clin North Am Exot Anim Pract;(2021);24;1:37-51.

AU: Johnson-Delaney, CA
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TI: Anatomy and disorders of the oral cavity of ferrets and other exotic companion carnivores.
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TI: SEDATIVE AND CARDIORESPIRATORY EFFECTS OF INTRAMUSCULAR ALFAXALONE AND BUTORPHANOL AT TWO DOSAGES IN FERRETS (MUSTELA PUTORIUS FURO).
SO: J Zoo Wildl Med;(2021);51;4:841-847.

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TI: Presentation and survival time of domestic ferrets (Mustela putorius furo) with lymphoma treated with single- and multi agent protocols: 44 cases
SO: J Exot Pet Med;(2019);31;1:64-67

AU: Pierfrancesco Boa, Claudio Tagliavia, et al
TI: Comparative characterization of the prostate gland in intact, and surgically and chemically neutered ferrets
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SU: Keywords: Prostate Ferret Deslorelin Exotic small mammal Anatomy Histology

AU: Karra N. Pierce,DVM, Samuel Lee,DVM, et al
TI: Hyperglycemic hyperosmolar syndrome in a domestic ferret (Mustela putorius furo) following a partial pancreatectomy
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AU: Carolyn Tai, BS, CVT, VTS (ECC) et al
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TI: Persistent infection and pancytopenia associated with ferret systemic coronaviral disease in a domestic ferret.
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TI: Composition of Ferret Uroliths in North America and Europe: 1055 Cases (2010-2018) (Session #2918)
SO: Proc Exoticscon;(2019);2019;0:403

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SO: J Exot Pet Med;(2018);27;2:95-102

AU: Laura Vilalta, DVM , Antonio MelTndez-Lazo, DVM, Dip. ECVCP , et al
TI: Anal Sac Adenocarcinoma with Metastases and Hypercalcemia in a Ferret (Mustela putorius furo)
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AU: Schoemaker NJ.

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SO: Vet Clin North Am Exot Anim Pract;(2017);20;1:183-208.

AU: Huynh M, Chassang L, Zoller G.
TI: Evidence-Based Advances in Ferret Medicine.
SO: Vet Clin North Am Exot Anim Pract;(2017);20;3:773-803.

SU: Kristin M. Sinclair, DVM, Dip. ABVP (Avian), Chrissy Eckstrand, DVM, Peter F. Moore, BVSc, PhD, and Michelle G. Hawkins, VMD, Dip. ABVP (Avian)
TI: AEMV Forum: Epitheliotropic Gastrointestinal T-Cell Lymphoma With Concurrent Insulinoma and Adrenocortical Carcinoma in a Domestic Ferret (Mustela putorius furo)
SO J Exot Pet Med;(2016);25;1:34

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TI: Liver Lobe Torsion in a Domestic Ferret (Mustela putorius furo)
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SO: J Vet Dent;(2016);33;2:108-111

AU: Long H, di Girolamo N, Selleri P, Palmieri C.
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SO: J Comp Pathol;(2016);154;4:341-344.

AU: Debbi Walcker, Vondelle McLaughlin, Kevin Farlee, Cathy Johnson-Delaney, DVM
TI: Surviving Canine Distemper at a Ferret Shelter
SO: Proc Exoticscon;(2015);2015;0:361

AU: Dario d'Ovidio, DrMedVet , ECZM (Small Mammal), Raffaele Melidone, DrMedVet, Dip. ACVP, Giacomo Rossi, DrMedVet, Dip. ECZM (Wildlife Population Health), et al
TI: Multiple Congenital Malformations in a Ferret (Mustela putorius furo)
SO: J Exot Pet Med;(2015);24;1:92-97

AU: Sarrah W. Kaye, DVM , Robert J. Ossiboff, DVM, PhD, Dip. ACVP , Brendan Noonan, DVM , et al
TI: Biliary Coccidiosis Associated With Immunosuppressive Treatment of Pure Red Cell Aplasia in an Adult Ferret (Mustela putorius furo)
SO: J Exot Pet Med;(2015);24;2:215-222

AU: Carlos Martínez, Mikel Sabater, Jacobo Giner, Minh Huynh
TI: Spontaneous Primary Hypoparathyroidism in A Ferret (Mustela Putorius Furo)
SO: J Exot Pet Med;(2015);24;3:333-339

AU: Monica C. Overman
TI: A Review of Ferret Toxicoses
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AU: Brianne E. Phillips, Craig A. Harms, Kristen M. Messenger
TI: Oral Transmucosal Detomidine Gel for the Sedation of the Domestic Ferret (Mustela putorius furo)
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TI: Evaluation of a ferret-specific formula for determining body surface area to improve chemotherapeutic dosing.
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AU: Bennett KR, Gaunt MC, Parker DL.
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SO: J Am Vet Med Assoc;(2015);246;4:451-484.

AU: Smith SA, Zimmerman K, Moore DM.
TI: Hematology of the domestic ferret (Mustela putorius furo).
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TI: Ferret wellness management and environmental enrichment.
SO: Vet Clin North Am Exot Anim Pract;(2015);18;2:233-244.

AU: Frohlich JR, Donovan TA.
TI: Cervical chordoma in a domestic ferret (Mustela putorius furo) with pulmonary metastasis.
SO: J Vet Diagn Invest;(2015);27;5:656-659

AU: Huynh M, Guillaumot P, Hernandez J, Ragetly G.
TI: Gall bladder rupture associated with cholecystitis in a domestic ferret (Mustela putorius).
SO: J Small Anim Pract;(2014);55;9:479-482.

AU: Johnson-Delaney CA.
TI: Ferret nutrition.
SO: Vet Clin North Am Exot Anim Pract;(2014);17;3:449-470.

Nutraceuticals/Herbal Formulation

Cardiac Formula:
1000 mg L-carnitine
1000 mg taurine
1000 mg CoQ10
40 IU vitamin E
Add to 30 mL of VetOmega (balanced omega 3-6-9). Stir, do not shake. Keep refrigerated. Dosage 0.5-1 mL/ferret per day

Vet Omega: info@vetomega.com 512-809-8389

Additional Resources:
Association of Exotic Mammal Veterinarians: www.aemv.org
Exotic DVM Forum: www.exoticdvm.com