

# Feedlot and Cow-Calf Section Combined Session

Dr. Frank Mitchell, Chairman

## How to Let the Diagnostic Laboratory Help You

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As far as giving the diagnostic laboratory at Texas A&M a fine flair, one of the gentlemen, Dr. Sippel, is Mr. Diagnostics himself. He's the one that taught me how to give good service. (I have an eleven-minute film that goes through a day at a diagnostic lab.) Every week we try to have a couple of practitioners drop down to the lab and see what and why we do some of the things we do, and why we get some of the answers we do, and why we don't get the answers that they think we ought to get! Now, if that sounds a little like double talk, that's sometimes just about the way you have to unsnarl some of the tissues and material that come in. But at least this will do one thing—the majority of the veterinarians that I have spoken to have never really seen the inside “guts” of a diagnostic laboratory. If you'll just bear with me for eleven minutes I'm going to open up your eyes just a little bit. I do think that it gives you an idea that when your specimen gets there that we don't have a large board and we throw darts, and wherever the dart lands, that's the diagnosis we send back to you! Honest. I'm certainly happy to be associated with you folks, American Association of Bovine Practitioners, and I've got to thank the folks that have sure taken good care of me. I am, as far as diagnostic veterinary service, almost evangelic in my fervor, so if I repeat myself it's because I've (1) just forgotten that I already said it, or 2) I want to say it again so you'll remember it. I truly believe in what I'm going to tell you.

Why do you even need to use a diagnostic laboratory? This is a good puzzle. In the majority of cases it is to confirm your diagnosis. We do not in our philosophic approach to this provide you with a diagnosis. We cannot do this. You are the person on the scene. You are the one that is aware of what is go-

ing on on the farm, where the cattle came from and everything like this. We provide laboratory tests and we interpret the results for you so that you can make your diagnosis. We never try and set ourselves up as providing a diagnosis, so that you send it in to try and confirm your diagnosis and to provide yourself with a learning means. After you have seen two or three cases of something and you're not quite sure what it is, you send it in and get a confirmation of what you suspected and that reaffirms your confidence in yourself as a diagnostician. The other thing is to safeguard yourself, to make sure you do have an accurate diagnosis. The other times are to see if you can find an answer to a diagnostic problem that you really can't figure out, for legal and insurance problems, or sometimes the client doubts you and the client requests it. I don't know how the majority of diagnostic labs throughout the United States go, being only in Texas working at a diagnostic laboratory; but, because we are a state supported institution, although we do charge for our services, we have to accept any and all specimens from anybody. The majority of cases, better than 99.9% of them, are submitted through the veterinarian. The veterinarian is truly the only person that can accurately assess a case and send in the right specimen. I sometimes think that the reason why we get some of the cases is because the veterinarian can't figure out what to do with this large dead animal, but those are only a few cases and I am sure none of you in this room would do such a thing as that.

When we created diagnostic laboratories, veterinarians came and started to use them quite frequently. The main concept I want to get across today is that a diagnostic laboratory is not an island unto itself. It is not an ivory tower. We are merely an

extra arm and a building addition; a diagnostic aids addition to your practice. If the diagnostic laboratory is not doing that for you, then it is not doing its job. But there are some problems that we have with the specimens that we get. First, you know what you want to do. Do you really know, when you send that specimen in, what you want to have accomplished? Granted, if you knew for sure, why bother to send it in, but I wish to give you some suggestions.

Time and time again I've seen lists of diseases going down one side and then over to this side, lists of materials to send in, and when a veterinarian goes out into the field he does not see a disease. He's not thinking of disease; he's thinking of a group of signs or syndromes that he is being presented with. When he receives a telephone call the calves don't have colibacillosis, they have the scours. If the calves have pneumonia, they don't have *pasteurella hemolytica* with overtones of PI<sub>3</sub> supplemented by a latent BVD infection. In order to get away from this, here are some suggestions to help you in submitting specimens to the diagnostic laboratory.

One of the problems we are constantly faced with and one of the problems that we probably get the least answer for, maybe in about one of every four or one out of every three cases, is abortion. The three main specimens, any one of which is not good by itself but all three together give us a real good chance, is the serum from the dam (and this is the one that we receive the least), the placenta (this the one that we receive the most) and the fetus (this is the one that falls in between). If the fetus is full term and you have a problem of distance then just take a sterile syringe and collect some abomasal fluid, take some plastic bags and collect a piece of liver and kidney, and also a tube and collect some fetal blood serum or body fluids as we can oftentimes check for antibodies which may have caused the abortion in the fetal fluids, and also the brain. Throughout this lecture I'm going to be asking you to give us some brain. I get so tired of getting cases for which they describe beautiful central nervous system signs, and I get a piece of cecum! This is all right if it is coccidiosis. Sometimes I can trick you into believing that maybe it was coccidiosis-induced encephalopathy, but still a large number of these have hydrocephalus and if for no other reason I put the brain there for you to quickly open the calvarium and you can possibly check for this. The same with the heart. In a study done at A&M by Dr. Kemler on fetuses collected at the slaughterhouse, he found fetal heart defects (whether they would have been fatal or not we couldn't completely ascertain) in about 8% of the cases. You're interested in solving this man's problem, so you are trying to define whether it is infectious or noninfectious. Even if you find it is noninfectious, you still would be curious as to whether it is some sort of congenital problem, possibly of plant origin or something like this.

I'm not sure whether you have perennial broomweed in some of your areas, but out in Texas this is a constant problem and it mimics beautifully

brucella abortion. Speaking of brain, you never know when one of these organs will give you the final clue. We had a case come through where we did not have the serum from the dam; we did not have the placenta, we had bits and pieces of the fetus, including the head of the fetus. We opened up the head and found a fibrinous meningitis. We cultured it and, unfortunately for the individual concerned, it was positive for brucella. But at least we had an answer for him.

(The speaker showed a slide of an interesting lesion that was induced at Colorado by their current virologist, Dr. Conrad Yukstir. It showed a cotyledon area and areas of necrosis. The abortion was induced by a Chlamydial agent—the same agent that causes sporadic bovine encephalomyelitis and polyarthritis in lambs.)

We have found the fluids within the eye, being the nice container that it is, do not get badly contaminated, so we can check for nitrates and some other compounds. So in sudden deaths, or in cases where you suspect nitrate intoxication and you do not have any clear body fluids to check, take that eyeball and send it in and it can be quickly checked for nitrate intoxication.

Rumen contents—we take and puddle through them. Our toxicologist is the best rumen puddler I've ever seen and he has gotten many, many seeds that he's characterized and oftentimes he can help us pin down a toxic plant! Then the liver, the kidney, blood, if at all possible, urine, and skeletal muscle—why bother with this? Well, because the majority of times people ignore it. It and the skin are big organs and so seldom do they send in a piece of skeletal muscle and oftentimes the lesions are there, or at least lesions that could indicate the answer. The reason I say lesions, I suspect when you post an animal you're going to send in the lesions that you see and suspected material if any. Hanging in our toxicologist's office there is a cartoon in which there is a cowboy dragging a cow from one side of the hill to the other side. There is a large oil well on the side of the hill towards which he's dragging the cow. He said that the cow was worth much more dead on this side of the hill than on the other side! But if you don't tell us about that oil well, then we will not think to check for oil possibly. This is a rough row to hoe for any veterinarian, but these are some of the things we ask you to send in so that we can screen for a great majority of the toxins or infectious processes. If you have a live animal with CNS signs, send serum and cerebrospinal fluid if at all possible. Send blood without EDTA in cases where you suspect lead. We've had false lead positives because a lot of EDTA for anticoagulant purposes does contain an adequate amount of lead to give a false result. We think in terms of over 10 parts per million in liver and kidney but in blood you are down to two and three parts per million, so that is why we say no EDTA. I am assuming that you are going to do a white cell count on this to find out whether it is an intoxication or possible virus infection. Finally,

feces—check for lead and coccidiosis. These are four, not the only four, good things to consider when you have an animal with central nervous system signs.

If you have a dead animal with previous CNS signs, the first organ to consider is the brain. With CNS signs, most of them originate in the brain. The liver can be used for toxicological work as well as the rumen contents. Is cerebral spinal fluid in the dead animal easy to get? When you have the tongue removed, reflect the head back. slice down to the atlanto occipital area, take a syringe and pop it through into the spinal cord. You can pull out a very good quantity of cerebral spinal fluid that you can use for cultural purposes. If you mix a little bit with some alcohol you can use it for cell examination and it is a very handy thing to have. Kidney for lead. Colon for coccidiosis. Cord if indicated. When you're sending in, it is hard to get a cord out. I don't care who does it, or how they do it, it's still hard to get a cord out. One of the ways if you don't feel like doing it, is to take an axe and chop off here and there if you think the lesion is there. Clear the meat off a little bit and wrap in some plastic, refrigerate it, and send it in.

We had two Charolais calves come in, half-sisters, same bull, different mother and they both had CNS problems. We took the brain out beautifully. Both of them had a blastoma, a very unusual tumor in the central nervous system originating on the roof of the third ventricle. If he wouldn't have been curious enough he might have missed that. This is two cases, half-sister Charolais, and it is well worth publishing.

From the respiratory system we need a tracheal swab along with serum samples later paired. One of the things you ought also to consider with respiratory signs is feces, possibly to culture for virus type like BVD. In a dead animal, don't forget the lymph nodes. Oftentimes they are not very contaminated, particularly the retro-pharyngeal nodes which are draining the tonsil area and the area of the nose. Be sure to send in any other lesions that you see. These are simple you say. Well, they don't always send them and then we break down and we don't quite give you the answer that you want to give the owner. If we don't keep you happy, you don't send specimens in, and it hurts both of us as well as our profession, because the most accurate diagnosis we can give also gives you a chance to use the therapy that you're supposed to be using.

For GI signs in the live animal, send serum, paired later, feces, nasal secretions, etc. All of these I am presupposing that you as veterinarians have already done, which you are going to do as far as clinically examining these animals. The GI signs of the dead animal—liver and various sections of the GI tract. It is so easy to reach in there and take a piece of gut. You don't know how many times we've received pieces of duodenum as colon! It's not hooked up to the right end to be a colon! Most of the lesions you see in the gut are going to be in the posterior gut. So that piece that you took is useless. Remind yourself that diarrheas are segmental, the majority of the lesions

are in the large and lower small intestine and make sure you get sections from these along with the nodes that are draining them. That cecal node, the large mass of tissue in the posterior colon, rumen contents, etc. Put gut contents in a separate container. For years I have been trying to make up my mind whether cattle have enterotoxemia Type B, as seen in sheep. I've just recently discussed with a practitioner a suspected case, but it is very rare. If you send in some gut content in a separate container, you're sending us the gut content as it was when you posted that animal, not as it will be by the time it gets to the lab.

**I find if I go into a necropsy or a case and already have in my mind what the diagnosis is going to be, I'm wrong a large part of the time. We concede this statement down at Texas Veterinary Medical Diagnostic Laboratory—"A diagnosis preconceived promotes acute mental constipation."**

When in doubt, phone-communicate! The diagnostic lab wants to serve you and the only way we can serve you the way you want to be served is for you to communicate. Enthusiasm and communication I think are two of the most beautiful words in our language. So don't hesitate. We have a service set up by which we can handle phone calls very readily. In our lab we have a person who is interested in swine, dogs, and cats. We even have a person that does posts on dolphins, seals, parakeets, canaries, goats, and cattle. Each one of us has our own little interest, and we try and maintain ourselves current in this and when a practitioner calls in with a problem we try and align him with this individual so he can get just as good an answer as we possibly can give him.

One of the problems is the time factor between collection of the specimens and arrival at the laboratory. One of the best ways we've found to send almost any and everything is to take the individual organs that you wish examined and package them in world pack bags, or similar type bags, individually so there is no cross contamination. These are sealed tightly enough so they can be mailed without reprisal from the mail service, although with the cost of mail service going up I don't know what it's going to do to us. Then put them in a styrofoam container in such a way that they get iced down. This is fairly good but it is not as good as we generally like to see. You start at the bottom, layer your specimens, put an ice pack, another specimen, ice pack, another specimen, and some insulation at the top. It amazes me sometimes—the other day we got a call from the Post Office. "For God's sake come over here and get one of your packages," the voice said. "Why, what's wrong, is it leaking or something, did it ruin a whole mail sack?" "No," he said, "It's moving." We went over and sure enough here was a large box and the thing would kind of go "rustle, rustle, rustle" and then it would fall on its side. And then it would go "rustle, rustle, rustle" and it would turn over again. I didn't know if it was a boa constrictor or what in there.

When I opened it up, here was baby pig that had come through the mail! I almost felt I hated to put him away and find out what was wrong with him. I figured if he could survive the U.S. mail service, there wouldn't be anything wrong with him.

But use good containers. Your serum samples oftentimes come in and there's no serum left in them. Or those brucella caps—the tops to the brucella serum tubes often have holes in them from the California bleeding needles that you use. Due to the constant shaking and vibration they get during transport, the serum leaks out. I could go on and on.

I would like to read to you one little article here by Robert M. Miller: "We hear a lot about computers making our diagnoses in the years ahead, but a computer is no better than the man who programs it, and all of us have an intricate computer available to us all the time to make our diagnosis. It is incredibly complex and surprisingly accurate when operated properly. Best of all it is inexpensive and distinctively packaged. It's called the brain."

So, just use your brain when you're using your lab. You are going to get a lot better service from your lab and the answers that you feel you should get.

Be sure and include information and your name.

The serologist will tell you that his worst problem with his serology tests (and this is more specifically in bovine practice) is the lack of paired-serum samples. If you have a group of animals that has a respiratory and abortion problem and you go out and bleed five or six and send them in and we get titers, they may not mean anything. If you have samples two weeks later and there is a rise in titer, two-, four- or six-fold, then it is significant. I'm sure that you have heard this thousands of times. If you cannot get the serum sample from the same animals and you have bled a group of animals, checking for BVD, and you go back two weeks later and you can't bleed animals A through Z, but instead you have to bleed animals one through 12, that's still going to be somewhat of a paired sample. It's from the same herd exposed under the same conditions, so don't hesitate to send a serum sample in that way.

A lot of times you see the word "anticomplementary," or oftentimes they'll just have "AC" written after your report. What does this mean? It means that when we add the complement, the serum reacts before we get the antigen in and so we can't do the test anymore. Why? Well, I think most serologists would like to know the answer to that, but we don't really know.

This is something that we seldom get the proper sample for. It's a cat that died and the spleen and the urinary bladder is very dark and the spleen is greatly enlarged.

Neonatal isoerythrolysis is a condition we can confirm more or less microscopically but if we have a blood sample (just enough red blood cells from this animal), we can do a Coombs test and find out whether those red blood cells are coated with bovine antiglobulins and pin it down for you.

Bacteriology—one of the worst problems with bacteriology is the animal has been treated, not just once, but extensively and more times than not it's not your fault. The animal has already been treated before you get there. Post-mortem autolysis—when you take some tissues, if you can smell it four hours later when you pack the specimens up to the lab, you know that that animal was dead long enough so that you might not get any results back. This isn't true with some things. Perhaps you can still recover clostridium, but is it going to be meaningful? Anthrax? Yes, it is meaningful.

In virology, a specimen taken too late in the disease course, improper specimen submitted, and then our old friend, post-mortem autolysis, or perhaps we'd better say post-mortem decomposition, are the three problems we have with our virological specimens. A specimen taken too late in the disease course—you say, "How can I possibly get it any earlier?" Our virologist says simply take the specimen before the animal shows signs! I even hear a chuckle—you can do that? The point is, when you go out to a place and here is a respiratory problem with one dead animal and nine others that don't really look too sick, you take the specimen from the dead animal. Virologically speaking you should be collecting nasal swabs or nasal exudate, feces, and serum samples from the live animals as well as from the dead animal. Our chances of getting a virus agent for you are far greater than from the dead animal. This is simply what he means—take the specimen before the animal shows signs.

In toxicology, in the majority of the cases it is the wrong specimen. For instance, in organophosphate intoxication—send in frozen whole blood for a cholinesterase determination. For possible urea intoxication send in frozen whole blood. Keep frozen during transit. Kidney for lead. Liver and rumen contents for arsenic. All of these are listed and you should be able to get a list from your diagnostic lab telling you how to send these in. Specimen not available? A lot of times you go out on a case of cyanide intoxication and the animal has been dead for 24 hours. By that time all the cyanide is gone, but if it's less than 24 hours, you can take a piece of skeletal muscle, preserve it in 1% mercuric chloride which complexes the cyanide and holds it until we get to the lab and uncomplex it. We can check it and confirm your diagnosis of cyanide poisoning. These are the three main problems that toxicology has.

A lot of times the clinicians forget to look at the heart or the lungs. They concentrate on the abdominal cavity and end up not making a correct diagnosis.

One of the main problems we have with folks that send in things for poisons is that they tell us to check for all poisons. We immediately call them and say we've got an A poison screen, a B poison screen and a C poison screen. They ask what I mean. Well, the A poison screen costs \$150, the B is \$300 and the C is \$1000. Well, what do you check for, they ask. Well,

there are about five or six in each one, but that's how much time and effort it takes to check for some of these things. So, try and be as specific as possible. If you suspect lead, say so. If you suspect urea, say so. Look around and kick through the brush and stuff like that, and it's surprising to see what kind of poisonous plants you can turn up. It is very difficult to work with a specimen marked "check for all poisons." If you post an animal though and take the abomasum and you find a hole in it and a lot of hemorrhage around it, you can suspect arsenic.

I haven't said anything about the pathology. We have a machine that bumps, wheezes, and burps and gurgles. We can take the fresh tissues that you send in and fix them so that we can get an answer back to you in less than 24 hours, we hope.

As Dr. Sippel mentioned in his talk, we handle the emergency situations, like anthrax, VEE, monitor preventive medicine programs and when we get together at our staff meetings, we try and discuss these individual problems, We'll invite the clinician in if he so desires, but we try and provide an answer

for you. We try and make the interpretations for you, but we have to do it based on what we receive from you, so we can only be as good as you let us be.

How do you evaluate a diagnostic laboratory? Let's give them a star if the biggest point is service. These are from a very dear friend of mine, Ned Brown, who runs our Amarillo lab, but that's got to be the biggest point. If your diagnostic lab does not have that as its biggest point, then it's no good. Little points of teaching; sending reprints, if I diagnose a tumor and it is a new type of tumor, I make a copy of the most current reprint I can find and send it to you so you can make your clinical appraisal and prognosis from it. Administration—you can't ever get by without some administration. But down here at the bottom is research. If your diagnostic laboratory reverses this, what do you end up with? In other words we're not doing our job if we put research first, administration second, teaching next, and service last. You've got to have the service first. This is the feedback that we expect from you practitioners. When we stop giving this service, or are not giving you the service you want, tell us about it.