

Considerations in a Differential Diagnosis

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Following a veterinarian like Dr. Eric Williams with his illustrious presentation, and then to look at the program and to see the many experts, namely, Drs. Panciera, Hibbs and Van Kampen, that are to follow me, I am wondering how a practitioner from Wisconsin could have even been inserted here.

The topic assigned to me is "Considerations in a Differential Diagnosis," with emphasis placed on factors appearing on the farm and those I see in an individual patient that may affect the diagnosis in the individual animal or the herd as a whole. When I started to think about this subject, I really did not know how I could do justice to this subject in a short time with my abbreviated knowledge, and still make it receptive to a practitioner.

You have heard from Dr. Williams on physical examinations, Dr. Panciera will present the post-mortem examination, Dr. Hibbs, the laboratory diagnosis, Dr. Van Kampen, the extraordinary diagnostic procedures. My remarks will mainly be directed to on-the-farm visit considerations. All presentations are directed toward making a diagnosis.

Factors I consider in a differential diagnosis are: 1. History. 2. Management, environment, and nutrition. 3. Observation and examination. 4. Symptoms—What systems of the body are involved? 5. Post-mortem lesions if a death is involved. 6. Laboratory findings. 7. Probable etiology and pathogenesis.

May I stress a phrase used by my anatomy teacher, Dr. Robert Getty—"Hasten slowly." Be sure to consider all factors, all symptoms before making that final decision. No doubt there are more considerations that many of you use but I have chosen these to briefly illustrate.

History

History has to be the first factor to consider in most cases unless it is an emergency and time does not permit. Even then you should attempt to field questions as you start therapy that may shed light to a stricken patient. Take the comatosed milk fever, down outside in the barn lot, some filth and manure around the animal. The owner informs you she did not clean although nothing is showing. He also reports that she was dry-treated so the udder should be all right. But you remember that this is an excellent herd with excellent production, and there have been two recently fresh cows with mastitis. There is no doubt in your mind that this cow has hypocalcemia. As she starts to respond, she rolls up on her sternum, and then is on her feet in 20 minutes. However, after some hard

bowel movement, she scours. Temperature is 102.4°F. You check the udder. It is fairly soft but one quarter in the strip cup shows one flake and a little colostrum which is not quite as thick as the others, a little more watery. With the history of top production and the use of dry cow treatment, I always start to watch for more coliform mastitis in these cows that no doubt had a low cell count in the quarters. The retained placenta may not be showing, really probably was hanging out when she calved and possibly went back in, with manure. You reach in and find a hot sanguineous fluid. So that history helped make a diagnosis. Milk fever with mastitis and metritis following. Also a paralysis of the tibial nerve over the trochanter major.

Make your questions leading, to the point, and still not offensive to the client. A provoked dairyman will get you nowhere. And still one must know his client and how to pry out the history. That OB I had last week, it was obvious John had used too much "power" in paralyzing the heifer. One cannot say to John, "Did you use the tractor?" because he will get huffy. But, George, you could say, "Where in the world did you get a cat to pull that calf?" and not offend him and get the point across.

Try to obtain an honest history. Many times one has to diplomatically question the owner, the wife, the son and the hired man.

Joe had a mastitis problem. Over the phone he said it started only last week when he received a high WMT (25) from the dairy plant. This was followed by several "garget" quarters he found in the strip cup last night. When I arrived at the farm, Joe was gone. His wife and hired man gave the history quite different from Joe's. They had had trouble for two months at the plant and also some bad quarters. The hired man had the theory it all started when they hung an extra weight on the vacuum release valve about 2½ months ago so they could keep the vacuum level high enough to keep the six milking machines on the cows. The wife agreed. This practically solved the differential diagnosis along with the etiology.

Respiratory problems often resolve the etiology themselves with an accurate history. Frank vaccinated all the animals going on the fair circuit against IBR and PI₃ with intranasal vaccine. I was called to examine a group of sick heifers two weeks later, but they were not those that were vaccinated and shown; they were among those left at home. History helped not only in the diagnosis, but in convincing Frank to vaccinate all his heifers and cows yearly. We use intranasal vaccine plus pasteurilla

bacterin each fall in many herds.

Last month I saw two heifers five months old, both paralyzed in the hind quarters, excellent animals, fat with good hair coats. History revealed the owner had let out the 12 heifers into the driveway of the barn while he cleaned the box stall. They ran furiously while out. When he put them back, one died suddenly and these two were down. One more was extremely stiff in the hind quarters. One had a hump in her back. Post-mortem of the dead heifer and one of the paralyzed revealed greyish white streaks in the heart muscle and psoas muscles. History plus symptoms plus lesions yield white muscle disease. Response to selium-vitamin E injection in the stiff heifer was good but not in the humped-up heifer.

Infertility problems can often be untangled through adequate history and records. Long calving interval, too many days open or until first noticed in heat, and other data from a well-procured history may reveal poor heat detection in a problem herd or the lack of net energy or anemia.

Another herd had experienced ten abortions. The owner's diagnosis was brucellosis as the Bang's vaccine was of no value. According to him, he had no sick cows in the past three or four months. Routine acute blood samples were taken and sent to the laboratory with an aborted fetus. However, two days later, while on the farm, the owner's wife revealed a different history of several cows in August that practically dried up in the middle of their lactation. She informed me that their milk was thick and creamy. Two others had wine-colored urine. Now, a month later, four of those cows aborted. History gave me a differential diagnosis, the laboratory confirmed leptospirosis.

History of the herd owner's self-administered therapy often aids a differential diagnosis, as a coliform mastitis vs. *Strep. agalactae*. It can surely help in your choice of treatment when you are called.

History suggests a probability, as in a paresis following calving. Is she a first-calf heifer or a six-year-old cow?

History of control measures already employed on a farm should be explored. One or two factors that have not been tried, or a breakdown in technique could give you a solution. This is especially true in mastitis outbreaks. Machine function faltering and improper timing of milk letdown are examples.

Use tact in getting a history, be complete, do not give up in obtaining a thorough account of the problem.

Management, Environment, and Nutrition

These are truly as important as history and are really interrelated. Review these practices on a farm and you will often aid or even confirm your diagnosis.

Management practices in milking procedures one can observe during a visit to a farm are very revealing. Especially when one is there on an OB or milk fever. It is surprising how these change when the owner or hired help know you are watching, versus

when they do not know you are watching. They will talk to you 15 to 20 minutes (milking machines all on the cows) while you are treating the milk fever. But next week, while on a mastitis inspection at milking times, their habits change.

Surroundings should be observed. Coliform mastitis incidence often is explained by manure, filth, places to bruise udders, and generally unsanitary conditions. A series of suggestions such as proper washing preparatory to milking, use of dry towels, proper teat dipping, proper function of machine (one man had not looked at his machine for six months), proper sanitation in stalls, feeding after milking so they do not lay down; all are environment and management factors.

A herd with foot problems which the owner diagnoses as foot rot often involves all the above factors—management, environment, nutrition. Occasionally it is infectious but it is my experience that environment and nutrition are more involved. The good Lord did not make the cow to walk on cement all the time. There has to be some soft surface. Cement definitely creates laminitis, and laminitis predisposes to sole ulcers, abscesses, white line separations, hemorrhage from the deep digital flexor insertion, and overgrowth of feet. Nutrition also creates laminitis. Heavy grain feeding, heavy corn silage, lack of hay, feeding of acidotic rations, all also predispose to laminitis. I also feel heavy protein feeding such as rich alfalfa hay can cause founder. All these factors destroy the make-up of the foot. The infective process is many times secondary to these factors. The environment must also be surveyed to eliminate the source of infection and injury. Use of more bedding, use of rubber mats in free stalls and stanchions, allowing cattle to spend time on soft ground, and a correct ration aids in prevention.

Acidotic rations also predispose to stomach disorders, ulcers, indigestion, and cecal problems. These factors have to be considered in your differential diagnosis of a digestive disorder. Their correction or the addition of buffering agents must be considered in your therapy.

Nutrition has an effect on the respiratory tract. Not only does proper nutrition aid proper immunity and resistance, but certain rations also may have an irritant effect. High-protein rations such as alfalfa fed at one time in warm weather releases much NH_3 all at once in the rumen and irritates the respiratory tract epithelium and its elimination for the body. Often one will see excessive nasal discharge and this may predispose the animal to respiratory infection. One should feed grain with high-protein roughage.

In lactic acidosis, the ciliary movement of the respiratory epithelium is definitely slowed—thus, the animal is more susceptible to infection when on these rations.

Air quality in the environment of the patient has to be considered especially in calves. Calf hutches in rearing young have done more to emphasize this fact. Humidity, dust, odors, especially ammonia, and just

stale air predispose to respiratory infections. Here again the pulmonary clearance of infective and irritating agents is definitely involved and creates susceptibility. One wonders how a baby calf can survive while lying with his nose four inches off of an ammonia bed in which you can hardly stand.

A common condition in calves, the starvation syndrome, with scours, is often seen when nutrition is the main causative factor and not *E. coli* or salmonella. A proper survey of the food intake must be made. A non-digestible milk replacer; inappropriate sour colostrum or not enough; not enough milk; too much fiber; and other factors can be involved. Still the main symptom is scours and *E. coli* can be isolated. But nutrition is the underlying factor. One must use milk, vitamin B complex, vitamin E and amino acids to correct this problem.

So look at the management, consider the environment, and evaluate the nutrition in considering the diagnosis.

Observation or Examination of the Patient

This Dr. Williams has covered very thoroughly, I will only briefly discuss a couple of considerations.

We all know temperature, heart examination, respiratory evaluation and percussion and auscultation of the abdominal cavity and stomachs are important in a differential diagnosis. I would like to stress two other considerations—external inspection or observation of the patient, and rectal examination.

First, step back and observe. What is the general attitude? The shape of the abdomen should be studied. How often can one see a left displacement by the contour of the left paralumbar fossa; or the dehydration in the eye and enlarged abdomen of a cecal or abomasal torsion or a hydrops amnion. The enlarged prescapular, prefemoral, or supramammary lymph nodes in lymphosarcoma may also be seen. In the infertility examination of a cow, one should observe the tail head, the sacro-aciatic ligaments, the vaginal discharge on the lips of the vulva or tail. Can you recognize the mucus of a pregnant cow, the mucus of a cystic cow, the mucus of an endometritis or the discharge of a pyometra? No, your diagnosis is not made yet, but it enters into your differential. Or that lame cow and how she stands? Is it a nerve paralysis—tibial, peroneal, obturator? Is it an injury to the stifle, are both claws involved or only one, is the swelling of the foot bilateral? Check her stance. These foot or leg observations are necessary before the next step of close examination. Be sure to pick up the foot. Look at the mucus membranes of the eye, of the vulva. Many times this is my first clue to a disease, such as leptospirosis.

The rectal examination, I feel, is one of the most important procedures in observation and examination. It is routine in genital tract involvement—pyometra, cystic ovaries, the infertile female or bull—but it should also be used in differentiating kidney disorders, digestive disorders (cecal torsion, right displacement, right abomasal torsions,

peritonitis, lymphosarcoma or other neoplasms, intussusception, and other obscure entities of the abdominal cavity. I know I hate to find that tight mesentery attachment indicating a twist, or that massive ballooned-up cecum, but I am glad I did not miss it. Do not forget the rectal examination.

Symptoms

My fourth consideration and I guess it is the most important. They are your findings after the above examinations. It leads you to the system or systems of the body that are involved. Time does not permit to cover every aspect. I am only going to say that with years of practice we have made some strides in diagnosis, but we still have a long way to go. Take the digestive disturbances. I studied indigestion, bloat, ketosis, and hardware (and we did not even recognize traumatic reticulitis or gastritis). It was pericarditis when I entered practice. Now we differentiate LDA, RDA, abomasal torsion, abomasal ulcers, rumenitis, acidosis, alkalosis, traumatic gastritis, cecal torsion, and others.

Take the diseases of the central nervous system—listeriosis, thrombo-embolic encephalitis, polioencephalomalacia, magnesium-calcium tetany, tetanus, lead poisoning, viral encephalitis complex, insecticide toxicities causing nervous symptoms and others. A differential diagnosis by symptoms, history, environment, laboratory findings, and post-mortem often can be obtained. Be careful of pathognomic symptoms.

Post-mortem Examination

I only mention this one as a factor no one should ignore. Too many veterinarians refuse to take time. That recently-dead animal can answer many questions. Two months ago I diagnosed a right displacement, did surgery and after five days of medication for infection, rumen atony, no appetite and strong ketosis, the patient died. A post-mortem revealed a liver with much lipo-deposition and fatty degeneration. The bone marrow also showed much fat deposition. This was a herd problem—the fatty cow syndrome. The post-mortem confirmed my supposition. A free corn silage diet (lack of hay) during late lactation and dry period had to be the cause. I have seen some improvement in the rest of the herd by correcting the ration and the use of choline in two recently fresh cows.

Post-mortem examination is an invaluable tool—use it.

Laboratory Findings

Laboratory findings have to be used in a diagnosis. Metabolic profiles are gaining respect. Bacteriology in infectious diseases is a must. But just a word about laboratory work at the farm. A test for ketone bodies has been used for years. But how about the pH test of the rumen contents and the test for Brownian movement of rumen contents in digestive upsets?

A test for hemoglobin determination also is used,

especially in anestrous cows. Also in the suspected care of aflatoxin poisoning. This could be a must in this day because of the storage of grains and the presence of molds.

Calcium determination in the field with the EDTA test (JAVMA, April, 1965) is also invaluable in the downer cow, indigestion, or the displacement.

Phosphorus, magnesium, potassium, and other minerals are also important but must be determined at a laboratory. This also goes for the TON and proteins in a ration. A balanced ration should be the first priority in analyzing many disease conditions.

The last considerations have to be the etiology and then the pathogenesis of a disease condition. Certain things can be eliminated in certain areas, although in this day and age many things can travel. But also, if

certain etiological factors are absent, then certain conditions may be eliminated.

Although this has been a hurried and scant presentation on differential diagnosis, I do hope I have illustrated adequately the points I consider. This is by no means complete. The next three speakers will have more to add to the subject of making a diagnosis.

Once again, thank you for your attention. I know I am not going to change many of your ways. Maybe only a point or two will be used. It is just like the old farmer that told me he was not going to use the metric system. If God wanted us to use it, he would have had 10 disciples instead of 12. Thank you, and be sure to use those God-given talents in your diagnosis on that old dairy cow—touch, sight, hearing, and common sense.