

three services, we will surgically remove the prolapsed rings. If our initial examination is for reason of infertility and prolapsed rings are present, we will remove them.

Our hypothesis is that this condition may interfere with conception in one of two ways. The prolapsed rings represent a site of chronic infection which may ascend into the uterus precluding implantation. An observation in support of this is that some affected cows experience a longer than normal interval between estrus periods. Also in support of this, we and others have cultured a variety of organisms from the area of the prolapsed rings; however, the significance of this observation and finding is inconclusive.

Another possibility exists that the cervix affected with prolapsed rings may not form a cervical plug. This could cause early termination of pregnancy.

Our procedure for removing the rings is as follows. We begin by administering a light epidural anesthetic. We inject 3 cc of 2% lidocaine HCl epidurally. Although there are no sensory fibers present in the cervix, we use the epidural technique to avoid causing the cow to strain. A tail tie is then used to secure the tail, or an assistant is used for this purpose. We prepare the perineal area by scrubbing and then applying 2% tincture of iodine. We use a plastic sleeve and enter the vagina with

the left hand and arm. A uterine forceps is directed into the vagina with the right hand. The left hand is used to identify the best location to secure the jaws of the uterine forceps. The forceps is attached to the largest part of the prolapsed ring. Then, with gradual traction the cervix is drawn out through the lips of the vulva and exposed. The left hand is used to aid in extracting the cervix. Occasionally it is necessary to have an assistant push inward on the vulva to aid exposure. Once the cervix is exposed, the prolapsed rings are amputated with a scissors. The cervix immediately retracts to its normal position. The vagina is then irrigated with an antiseptic solution. Our preference is dilute iodine solution (2% Lugols solution).

If the cow is to be bred, it should be done prior to the surgery or at the following estrus period. Results are measured by subsequent conception. We have not done an extensive number of these, but results have been rewarding.

References

- Roberts, S. J. (1971). *Veterinary Obstetrics and Genital Diseases*, 2nd ed., Edwards Bros., Ann Arbor, Mich. — Arthur, G. H. (1964). *Wright's Veterinary Obstetrics*, 3rd ed., Williams & Wilkins Co., Baltimore, Md.

Question: Have you had any scar tissue build up after this surgical procedure?

Answer: No, we have not had a problem with this.

Application of Certain Enzyme Tests in Bovine Practice

Edward Sterner, D. V. M.
Ionia, Michigan

Having read the article on serum enzymes in *The Bovine Practitioner* of November 1972 by Dr. L. J. Rich and Dr. M. L. Dunavant, I decided to attend the seminar on Laboratory Medicine in Bovine Practice given by Dr. G. W. Osbandiston held at the Milwaukee meeting in 1972. From these two exposures, I decided to further explore the value of kinetic enzymes and their meaningfulness in our practice. We spent considerable time evaluating the different types of equipment to determine which would be the most satisfactory in our type of operation. We decided on the Coleman Spectrophotometer, Model 55. Even though it was more

expensive, we felt that its accuracy and ease of cleaning and care justified this expense. From our experience I feel that it is important to have an available competent service representative who is fully qualified and experienced to give service as well as information on the performance of these tests and on the equipment sold.

The enzyme tests that we have performed are: Serum glutamic oxaloacetic transaminase or SGOT; Creatine phosphokinase or CPK; Lactate dehydrogenase or LDH; Glutamic dehydrogenase or GLDH; and Sorbitol dehydrogenase or SDH.

In further reference to the enzyme tests I will use the abbreviated letters. The enzymes that we perform most frequently are: SGOT, CPK, and LDH. One of the reasons is that we can run these tests in approximately six minutes, whereas the GLDH and SDH take a minimum time of twenty to thirty minutes.

I would like next to give in international units what we have found from what we considered normal animals on the limited number of tests we ran. The SGOT was 40-60 cows. Calves may be slightly lower. The CPK was 5-40. The LDH was 270-500 which were very variable. The GLDH was 0-3. I feel results may vary from tests conducted on different makes of spectrophotometers and from different manufacturer's reagents.

Another point to consider is the collection and care of the blood sample. Hemolyzed blood or serum is not to be used in the above mentioned tests. We collect the sample in either a heparinized vacuum tube or in a plain glass tube. The sample is then refrigerated and taken back to the laboratory. The test is conducted as soon as possible. If this is not possible, the serum is separated and frozen and then run at a later time, but always within six to eight hours. Leaving a sample in an unrefrigerated state seems to have a detrimental effect on the enzymes.

We have had a considerable number of downer cows along with calves that were of questionable diagnosis. In this respect I felt the field of kinetic enzymes might help us better evaluate the correct diagnosis and possibly prognose the outcome of such cases. (I also felt it would give us a better approach as to the best way to handle such cases and what form of treatment to use, if any.)

One of our observations was that the same particular problems seemed to occur most frequently in certain herds. This caused us to evaluate nutritional standards very carefully. Management practices are also given close scrutiny. The dry cow condition and ration is brought to the owner's attention. In one of the herds which had problems with downer cows, I picked out ten dry cows at random and ran SGOT and GLDH tests. In the early part of the dry period the SGOT was not elevated and the GLDH followed the same pattern. As the dry cow approaches parturition, this condition may change quickly at the stress period of calving. With this situation known in these herds, it prompts us to carefully check dry cows for inappetence or early symptoms of parturient paresis, and if so, a blood calcium test is run. This has changed our form of treatment in these cases where the calcium is 8 mg. % or above. We have

used lactated ringers solution and ambex plus choline orally.

Our success is not 100%, but it is much better than our previous cases in administering a bottle of calcium to a cow that does not need calcium.

Another instance where these tests have been a great deal of help is in calves—determining if we are dealing with white muscle syndrome or some other disease. On one farm two calves that were down, the SGOT was 785 and 1600 international units respectively. The CPK was 317 and 1775 international units. After proper treatment the calves made an uneventful recovery.

In all of our diagnosed displaced abomasums we routinely run an SGOT, CPK, and possibly a GLDH test. We evaluate these tests before a decision is made as to whether surgery or salvage is to be the course to follow. If these values are high, we consider this a high risk case for surgery and many times recommend salvage. These results have been confirmed by histopath sections taken on postmortem when we ignored the test values. Therefore, to improve the chances of success, we rely on the enzyme test results which have proven satisfactory.

In mastitis cases where there is no other involvement, the SGOT did not seem to vary but little, if any, from normal.

In metritis cases where there is no other involvement, the SGOT level remained normal.

In primary acetonemia, the SGOT was about 80 to 90 international units, but in secondary cases with considerable liver involvement, the SGOT would go from 250 to as high as 2400, as in one case.

In muscle damage I would like to mention that the CPK level seems to elevate at an earlier onset of the tissue damage than SGOT, but it also seems to drop quicker than the SGOT. These findings may be of help in giving a clue as to what condition we are dealing with. In cases of extreme elevation, one must be aware that the enzymes will use up the substrate in a very short time (in some cases less than one minute), and as a result, a much smaller sample of serum must be used.

In a suspected hardware case, the SGOT was 61 international units, the CPK was 32, the LDH was 478, the PCV was 27, the fibrinogen was 1100 milligrams, and the WBC was 20,000. On necropsy, the pericardium was extensively involved but not the myocardium. The findings verified the enzyme tests.

In conclusion, I still feel we are novices in this field as we have run approximately 300 tests. I do

feel that these tests have been of considerable help in our practice.

May I summarize it in this way: 1) The most important thing is still the veterinarian making the examination. He still has to decide whether these tests are necessary. Seventy-five percent of the cases we see we can diagnose without these tests, but the other 25% are where these tests may give us considerable aid. 2) The use of the various

enzyme tests are a helpful aid in a positive diagnosis of the more difficult cases. 3) The tests give us a better prognosis of the case and possible course to follow. 4) It gives me an added feeling of satisfaction that we have added a more sophisticated test in the field of diagnosis. I feel I can look Joe Doakes in the eye and say that this is what our laboratory tests reveal, and this I am certain we will find—a feeling of satisfaction.

Bovine Restraint

John Carson, *D.V.M.*
Brodhead, Wisconsin

I am going to describe some restraint techniques I use in our dairy practice in southern Wisconsin. Maybe a better title would be, "How to Keep From Getting Kicked." For those of you that still work with family-sized units—60 milking cows or less—you will find these techniques helpful if you are not already using them. For you consulting veterinarians, pass them along to your client's help.

Next, I wish to describe the use of a nose lead with one added feature—a bull ring attached to the chain end. By looping the rope around a post and back through the bull ring it gives you the added leverage you need to really stretch the cow's neck. A cow restrained like this will not be shaking her head and neck while being given IVs or taking blood samples. This is also a helpful restraint for any other procedure dealing with an uncooperative cow. Nearly every individual cow I treat gets a nose lead applied whether it be for examination, treatment or surgery. Some veterinarians prefer to use a rope halter rather than a nose lead. You can use the bull ring through the halter rope just as well but I would whiplash around the ring for added strength.

Whenever possible, pull the cow the same direction as the side you are working. This is advantageous as it allows the cow to see what and where you are and also causes the rear quarters to move in the opposite direction.

To restrain a rear foot for examination and treatment, a rope is thrown over a beam and then attached just above the hock. The next step is to put the loose end of the rope around the hock, going between the legs from the back to the front. This step is important because it puts the leverage

in the right spot. Now, with a little pressure applied, the cow will jump a little and it is very easy to raise that leg. If you have one of those very uncooperative beasts that lays down, you can throw the loose end of the rope over the beam again to give you another pulley advantage. To keep the cow from thrashing her foot forward and backward, I then put this halfhitch in the rope, pull it forward around the stanchion, back to the knot and tie it. Now, if you stand about six feet tall and weigh about 190 pounds and get your hip and leg under the cow's leg I guarantee you you would not get kicked any further than across the alley.

You can apply this same technique to the front foot. I'm sorry I do not have any slides but throw the rope over the beam, attach the honda to the fetlock rather than the knee, go between the legs from back to front, and pull. Make the halfhitch and then pull laterally to pull the foot away from the cow's body.

Sometimes I have the problem of a sealed barn with no exposed beam to throw a rope over. In this case I use an S-shaped hook made by my local blacksmith. I can not remember who to give credit for this design but I sure thank him. I have had enough ice-tong type hooks fall on my head to swear off them for life!

You can drive this hook into any wooden floor joist or post. Then you have the ring to run the rope through. When you are done you just pound on the opposite S-curve and it comes right out. This type of hook also works well if you are working with calves in a pen and there is nothing to tie your halter rope to.