

Ketosis Studied

acetonemia and pregnancy disease dual problem in cows and in sheep

Donald E. Jasper

Symptoms of ketosis in dairy cows—in many cases—are almost identical to those of milk fever.

The cows may stagger about and go down, unable to rise to their feet. Often chemical tests upon the urine, milk, or blood are necessary to differentiate between milk fever and ketosis, sometimes called acetonemia.

The two diseases can and frequently do exist in the same animal at the same time. When this occurs, the patient should be treated for both diseases.

Although alike in some respects, ketosis manifests itself quite differently from milk fever in many ways. Milk fever usually develops within 72 hours after calving while ketosis shows up more often from 10 days to six weeks later. In addition there is a wide variety of other symptoms which range from almost complete paralysis to cases in a state of extreme excitement. Cows may even act crazy, push against fences, or attack people. Some have poor eyesight or go blind for a day or more. Others are so nearly normal that their illness may not be observed unless careful milk records are kept and a definite drop in production is noticeable.

Probably some of the greatest losses are encountered in herds where a number of cows are producing at a rate of five or 10 pounds daily below their capacity, but appear normal otherwise. One of the early symptoms is a poor appetite. The cows may refuse the grain and eat hay listlessly. Sometimes the appetite is perverted and they eat dirt, chew on sticks, or other foreign objects.

The symptoms are somewhat similar in ketosis of ewes, or pregnancy disease. Afflicted ewes become listless, refuse to eat and lie down most of the time. When standing, the head may be held low, but it is sometimes drawn back so that the nose is pointed upward. Continuous shaking or tremors of the head is not uncommon. Ewes also may go blind, push against objects or show other abnormal behavior. As a rule they become greatly depressed, unable to get up, and die quietly. In contrast to the case in cows, ketosis in ewes appears during advanced pregnancy before lambing. It is also much more common in ewes that are carrying twins or triplets than in those ewes with only one lamb.

Nature of Ketosis

The changes in the blood and internal organs of cows and of ewes afflicted with ketosis are essentially the same. In each disease there is a low blood sugar level and an increase in the level of ketone bodies—acetone and certain acid products—in the blood. The liver becomes severely infiltrated with large amounts of fat, and other organs with lesser amounts of fat.

It has not been proved that the ketone bodies are poisonous when present in the blood in high concentration, but it is known that a low blood sugar level is serious. In all animals studied and in man the brain can use only blood sugar or glucose for energy. Therefore when the blood sugar falls below a certain critical level, the brain cells begin to act in peculiar ways. That is why all kinds of nervous symptoms are observed ranging from severe depression to great excitement or craziness. Ultimately, if the blood sugar level is not increased, the activity of the brain cells slows down and finally stops.

Prevention

Ketosis in ewes or pregnancy disease is seldom a problem in flocks that are well-fed—especially during the last third of the pregnancy.

If good pasture or good legume hay is supplemented with one to 1½ pounds of concentrates during the last six to eight weeks of pregnancy, ketosis rarely develops. In the flocks that have trouble in spite of a good ration, the addition of three quarts of molasses per 100 ewes per day for three or four days has been advised. A moderate amount of exercise seems desirable for ewes in advanced pregnancy and some feel that it is of considerable importance in preventing the disease. Perhaps adequate exercise assures a good appetite.

Prevention of ketosis in cows is not as easy as it is in sheep. Many cows develop ketosis in spite of a good diet. It is commonly observed that cows on pasture suffer less from ketosis than those on dry feed. Whether there is a specific factor in grass which counteracts tendencies toward development of the disease or whether increased palatability results in an increased caloric intake cannot be an-

swered at the moment. Although it apparently will not prevent all ketosis, the addition of some readily available carbohydrate such as molasses or sugar to the diet during the susceptible period seems quite logical. It would appear that such supplementary feeding, especially during the first six weeks of lactation, would probably prevent some cases entirely and make others less severe.

Cobalt supplements are being advocated by some but it is too early to say whether they are really of value. Vitamin A and several B vitamins have been tried but are apparently of little value.

Treatment

Although it is easier to prevent ketosis in ewes than in cows, the latter respond better to treatment than do the ewes. Unless ewes are treated early, they seldom recover.

A wide variety of treatments have been tried but glucose injected into the blood stream plus oral supplements of molasses or sugar has been the only method that has stood the tests of scientists in the laboratory and practical use in cases encountered on the farms. In cases which are highly excited, a sedative also is indicated. Affected cows should be treated as early as possible. One treatment is often enough but there are many times when cows must be treated repeatedly over a period of several weeks. Such cases are expensive to the farmer for the cows produce very little milk and lose a tremendous amount of weight.

The Future

The future is quite promising. The problem is under major attack by scientists of several institutions, including the Department of Veterinary Science of the University of California. Our complete understanding of the disease may depend upon a better understanding of metabolism in the animal's body. The atomic age has produced radioactive isotopes by which it is possible to trace substances fed or injected and find how they are changed to body tissues, milk or work. The role of the endocrine glands may be very important and they are being studied.

The increasing number of high-producing cows on the farm tends to intensify the problem. But the knowledge and tools of those seeking the solution are growing even faster.

Donald E. Jasper is Assistant Professor of Veterinary Medicine and Assistant Veterinarian in the Experiment Station, Davis.

A feeding project to determine the cause and methods of preventing abcess in beef livers is now in progress within the Department of Veterinary Science.