

Cobalt Deficiency

Possibility of more frequent diagnosis

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WITHOUT doubt many of the diseases we in the province of Ontario encounter in livestock are similar to those which you meet with in the state of Iowa, for a considerable area of Ontario lies in the same parallel of latitude as the northern half of Iowa and the extreme western boundary of Ontario is only about 500 miles from the eastern boundary of Iowa. Furthermore, I receive your state publication, *The Iowa Veterinarian*, and, as I peruse its pages, I observe addresses and discussions on many of the same disease problems which confront us.

In my perusal of Iowa veterinary literature, I have not observed any reference to cobalt deficiency and, because its recognition in this province has only occurred in the last year or two, it may be that its recognition in your state has been overlooked. Accordingly, some observations on this subject are being submitted in reference to certain conditions affecting ruminants.

In the available literature on the subject the condition was first recognized in Australia and New Zealand a little over ten years ago. In those countries, the disease appeared in grazing ruminants and such terms as bush sickness, Morton Main's disease, *Maiora dopiness*, enzootic marasmus and nutritional anemia were applied to the condition. Later in Kenya Colony in Africa, *nakuruitis* of cattle was determined to be due to a lack of the mineral element cobalt in the forage. Following this a disease known as pining in certain areas of Great Britain was corrected by the application of cobalt to

grazing land upon which sheep and cattle were prone to develop the disease. On the North American continent, the so-called "salt sick" of Florida, a wasting disease appearing in cattle and sheep, has been corrected by the use of cobalt. More recently Grand Traverse disease in certain areas of the state of Michigan was corrected and prevented by supplementing the diet with a suitable cobalt preparation.

Symptoms

In the foregoing areas mentioned, except Michigan, the decline in the affected animals occurred while they were grazing, but in Ontario the manifestations of the condition appear during the stable feeding periods of the year, i.e., October to May. The manifestations and symptoms of a cobalt deficiency are somewhat insidious in character, and are shown by a loss of appetite for suitable feed and craving for unnatural material so that young cattle and, upon occasion, adult animals, as well, will be observed chewing at wood and other foreign material. This is followed by a loss of weight and condition leading to emaciation and undoubtedly a nutritional anemia. It is seldom observed in any cattle or sheep until after they commence to ruminate. Incidentally this latter statement may have significance.

Heretofore, we in Ontario and, I believe, in Iowa too have looked upon depravity of appetite—*pica*—as being chiefly due to a lack of phosphorus in the rations provided for farm animals. Calcium deficiencies have likewise been incriminated and also the need of iron. Admit-

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tedly there are times when these elements are required and this led to the formulation of comprehensive mineral mixtures for the supplementation of the rations being provided for farm animals. However, it is the writer's opinion that we will have to modify our opinion regarding the matter for a loss of flesh, unthriftiness and wood chewing have been observed in young cattle where it was not possible to be critical of the ration. This statement has been substantiated by a correction of the condition through the provision of cobalt without in anyway modifying the former diet. It is not intended to give the impression that there may not be occasions upon which the elements mentioned are required, but rather to reveal that cobalt deficiency is primarily more important in outbreaks of wood-chewing in young animals.

Function Unknown

It is somewhat of a paradox also that no one, as far as the writer can learn, clearly understands the function of the element cobalt in the body. It is only found in the body in trace amounts and is credited with being related to hemato-poiesis. This statement is debatable for cobalt deficient animals are probably suffering from a nutritional anemia. It has been suggested that cobalt is essential to the maintenance of the normal bacterial flora in the rumen. If so, this is probably a more logical explanation of the manifestations which occur when it is lacking.

Those who make a study of rumen digestion know the importance of the bacteria in the rumen which are responsible for many of the changes that occur in the rumen contents prior to passing on into the true stomach and intestines. It follows that anything which will destroy or render static the bacterial flora of the rumen will interfere with rumen digestion and function. Regardless of the manner in which it corrects the condition, the results obtained by the provision of the element in cattle so affected are remarkable and almost spectacular. It is upon the basis of the results obtained that the writer feels that cobalt deficiency is of

common occurrence in the province of Ontario.

It has been pointed out that in other countries the disease appeared in grazing cattle and sheep but in Ontario the occurrence of the depravity of appetite is a stable feeding problem. It is most frequently observed in young cattle ranging from the ages of 5 months to 1 year old. At first the affected animals lose their appetite, become unthrifty and dull. Then they may be observed chewing at the wooden partitions or any other wooden material available. They become hide bound, the hair loses its luster, and in extreme cases they become so weak as to require assistance in getting them on their feet.

Another occasion upon which a cobalt deficiency occurs is in bulls which are kept stabled all of the time and fed nothing but cured roughages and stored concentrates. Not infrequently bulls managed and fed in this manner lose their appetite, become unthrifty and in some instances impotent. The character and variety of the rations provided in many of these outbreaks cannot be criticised except that there may not have been an opportunity for such animals to graze on green forage. The condition has not been observed very often in adult cows but I have reports of a few instances.

The recognition of the condition is not difficult and the significant diagnostic features are the loss of appetite for normal food, chewing at wood and other foreign material, loss of flesh with ultimate emaciation, weakness and anemia.

Treatment

The treatment and prevention of the disease consists simply in the provision of the element cobalt in some form or other. The surprising features of the treatment are the small amounts required to correct the condition and the quick response to its use. Because I believe in keeping such information in the hands of the profession, the procedure I have followed is to recommend through the practicing veterinarians of the province the dispensation of cobalt sulphate in an aqueous solution made by dissolving 5 grams of

the preparation in 500 cc. of water and the oral administration of 15 cc. once a day to each of the affected animals. As a rule, improvement in the appetite will be observed in from three days to one week and at the end of the second week they will be eating all of the normal food which they require and will have forgotten their wood-chewing propensities. Once the affected animals commence eating, the cobalt solution may be fed on the grain ration. The prevention of the condition is accomplished by providing the solution for regular use mixed with their feed. Smaller amounts will suffice for this purpose.

Similar results have been obtained in young sheep which have poor appetites and have become unthrifty during the winter feeding time of the year.

Individual Cases

Upon occasion individual cases will appear in a herd. These have been most frequently observed in young bulls which were born in the fall, stabled all winter and, because they had become sexually mature, were kept stabled and fed cured roughage all summer. Then during the second winter they would go off feed, become unthrifty and manifest other signs of malnutrition and pica. A two or three weeks course of cobalt solution will often bring them back to their normal status.

In conclusion, reference should be made to the possibility that in Iowa ruminant foods may not be lacking in cobalt, but up until about three years ago we in Ontario had not thought of it playing any part in depravity of appetite. However at the present time the writer is convinced that a deficiency of this element is the most important factor in the incidence of such manifestations.

Research work carried out by Dr. O. Wilford Olsen, U. S. Bureau of Animal Industry, Angleton, Tex., gives promising assurance that hexachlorethane reduces losses from live flukes in cattle. The drug is emulsified with bentonite in water and given as a drench. It is obtainable from professional supply houses or through the drug trade.

By implanting pellets of stilbestrol beneath the skin of the neck of young roosters a scientist at the University of California produced all the appearances of genuine capons in his experimental birds. Masculine characteristics were lost and quite phenomenal gains in weight were obtained.

Female birds so treated assumed male characteristics. Stilbestrol is a synthetically-made female sex hormone. The drug is absorbed very slowly, and necks of birds so treated must be discarded before they are offered for sale or eaten. Midwest veterinarians, in a few instances, are distributing these pellets among poultry raisers specially selected. As yet, experimentation has not gone far enough to justify widespread application to flocks. The end advantage may be in effecting quick weight gains rather than in actually making true chemical capons.

There is surprisingly little known about the cramps which develop in normal persons during exercise, at night when stretching or turning, after yawning or when some unusual position is held excessively long. In these circumstances an intense involuntary contraction is superimposed on the voluntary activity in much the same manner as occurs in the pathologic state described as myokymia. Apparently the contraction is accompanied by spike action potentials and therefore is more closely related to normal voluntary contractions than the so-called contractions in which spike potentials are not seen. The cause of the cramp lies in an abnormal sensitivity of the muscle fiber at or near the motor end-plate which permits the appearance of series of autogenic discharges which force the muscle into an intense tetanic contraction. This process is evidently intensified by fatigue, insufficient blood supply, mild myositis or neuritis, vitamin B deficiency, alkalosis, low serum calcium and a variety of congenital diseases of the muscles. Cramps seen in these conditions have clear affinities with those observed in normal persons.