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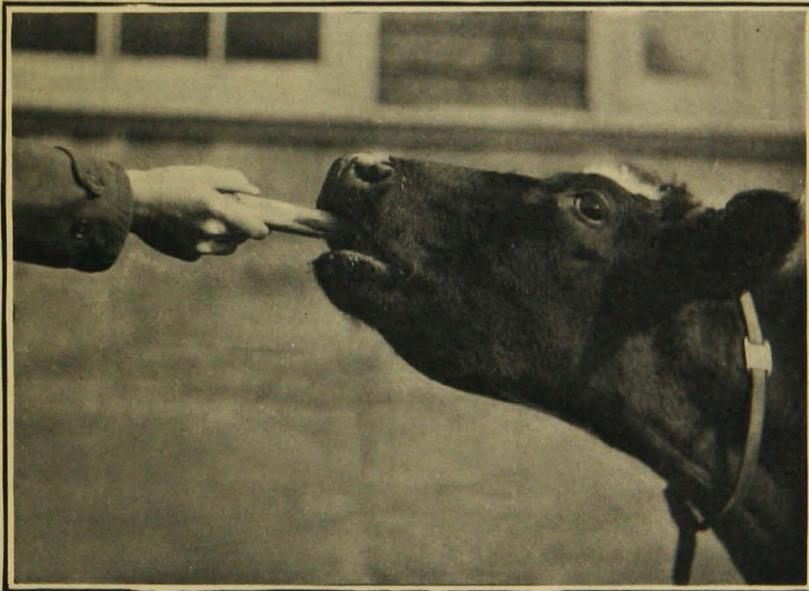
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# Bone-Chewing or Depraved Appetite in Cattle

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## THE CAUSE OF THE TROUBLE

Bone-chewing by cattle has been observed in many neighborhoods in Minnesota, but the trouble occurs most often in certain regions in the western part of the state. The cause is lack of a sufficient amount of the mineral element, phosphorus, in the ration fed, to supply the needs of the animal's body. This comes from the small amount of available phosphorus in the soil, which leaves the crops grown on it, especially the hay, deficient in the mineral.

## SYMPTOMS OF PHOSPHORUS SHORTAGE

One of the first signs that a cow is becoming short of phosphorus is seen in a desire to chew bones. Lack of appetite, especially for roughage, appears at the same time or earlier. At a later stage the animal gnaws wood, sometimes destroying mangers and boxes from which she is fed. When there has been a deficiency of phosphorus for a long period, the animal usually becomes stiff in the joints. Affected animals usually are thin and unthrifty. After having suffered from an extreme shortage of phosphorus for a long period, an animal may lose the desire to chew bones but remains in a very thin, listless condition, content to lie down most of the time, and shows little desire for feed.

## HARMFUL EFFECTS

The depraved appetite is merely a symptom of a condition which may make the animal almost valueless to the owner. A continued shortage of phosphorus results in stunted animals. Some mature cows purchased for experimental purposes weighed less than 600 pounds. Milk production requires a supply of phosphorus, and cows receiving feed short in this mineral, milk very poorly and dry up sooner than they otherwise would. In the phosphorus-deficient regions of Minnesota and elsewhere, the breeding qualities of cattle are also affected. A calf from each cow once in two years appears to be the common experience on some badly affected farms. At the Minnesota Agricultural Experiment Station it has been found that a cow suffering from a shortage of phosphorus requires about one-fifth more feed than would be needed if the proper amount of phosphorus were supplied. For a herd of 10 cows, the cost of this additional feed may amount to \$100 or more a year.

## WHAT ANIMALS ARE AFFECTED?

All the animals in a herd may be affected, but, as would be expected, those having the highest requirement for phosphorus, heifers and heavy-

milking cows, are the first to show signs of a deficiency, and are the most seriously affected. When cattle are purchased and brought into a herd they may not show symptoms of phosphorus deficiency during the first year or more altho the remainder of the herd may show them. The reason is that it sometimes takes a year or more to use up the phosphorus the animals had stored away in their bodies at the time they were brought into the herd. Until this reserve supply is used up, animals will not show signs of trouble.

### **WHEN DOES THE TROUBLE APPEAR?**

The trouble may appear at any season of the year, but it is most common during the winter and spring months following the period of dry feeding. Signs of the trouble usually disappear when cattle are turned on pasture. This is because there is more phosphorus in the dry matter of green grass than of dry hay. There is likewise more protein and vitamins, which phosphorus-deficient cattle also often lack. Pasture which matures quickly in a dry summer has the same deficiencies as the hay produced on the same kind of soil. The trouble is always more in evidence in the winter following a dry summer season, because less phosphorus is stored in plants during a dry season and the amount in the hay is, therefore, extremely low. Grass grown on low wet soil averages considerably lower in phosphorus than that from uplands.

### **HOW THE TROUBLE MAY BE CORRECTED AND PREVENTED**

Several methods may be followed in correcting or preventing the troubles resulting from a deficiency of phosphorus in the ration.

Obviously, as the trouble is indirectly caused by a shortage of phosphorus in the soil, one way to correct it is to apply some form of phosphorus fertilizer. This plan will appeal to the farm owner who is looking toward the future. The advantages of following this plan are an increase in the phosphorus content of the forage crops grown and an increase in the yield per acre as well.

Animals that show the symptoms described require treatment which will give immediate relief. For prompt relief, the use of such feeds as cottonseed meal, wheat bran, or linseed meal, which contain liberal amounts of phosphorus, is recommended. This plan is especially to be recommended because not only will the animals benefit from the greater supply of phosphorus provided but also because they need the other important nutrients supplied by these feeds. This is true because phosphorus-rich foods, such as those mentioned, are especially rich also in valuable proteins that are lacking in phosphorus-deficient rations usually fed in the phosphorus-deficient regions.

### FEEDING BONEMEAL

A third method of correcting and preventing the trouble is to provide the animals with some form of mineral supplement. For this purpose bonemeal is recommended as being the most satisfactory. The bonemeal to use is that prepared especially for feeding purposes. The cattle should be allowed all they want of this product at all times. This can best be done by placing a liberal supply in a clean box where the cattle can easily get at it. As bonemeal, of the kind used for this purpose, is almost free from odors, cattle will usually eat it quite readily if they need it.

Investigations made of reported cases where cattle refused to eat bonemeal have invariably disclosed that either the cattle to which it

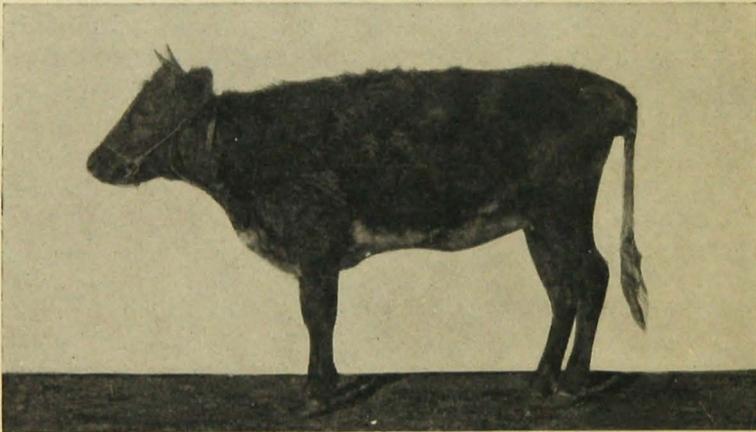


Fig. 1. A Cow Suffering from Phosphorus Deficiency

The entire herd from which she came was affected in the same way. She was three years old and weighed only 457 pounds. She was so stiff she could scarcely walk. She had been in milk six months. Her ovaries were not functioning.

was offered were not deficient in phosphorus, or an inferior product was provided. Nothing but a good grade of bonemeal of the kind prepared especially for feeding purposes should be used. Fertilizer bonemeal often has a foul odor and may be rejected by the animals for this reason. If trouble is experienced in getting animals to eat the pure bonemeal, a little salt may be mixed with it to get them started. Later on it is best to feed bonemeal without mixing it with salt. When the two are mixed the animal wanting one must consume the other. In this way more bonemeal may be taken than needed, because the animal wants to salt, or the animal may not take enough bonemeal because it objects to so much salt.

For the first few weeks after the bonemeal is supplied, some of the badly affected animals may consume large quantities, even as much as

two or three pounds a day. Later, however, as the supply of phosphorus in the body is built up, a much smaller amount will usually be consumed. Experience has shown that an animal will consume about as much bonemeal as is needed to keep up the phosphorus supply in the body.

The amount of bonemeal required by an animal for one year will, of course, vary greatly according to the size, age, production of the individual, and the phosphorus content of the ration fed, as well as on the reserve supply in the animal's body. Based on results from five affected herds that were provided with bonemeal and fed according to the plan outlined, from 40 to 70 pounds of the product is sufficient for one animal for one year. Heavy-producing cows and rapidly growing calves and heifers may require somewhat more.

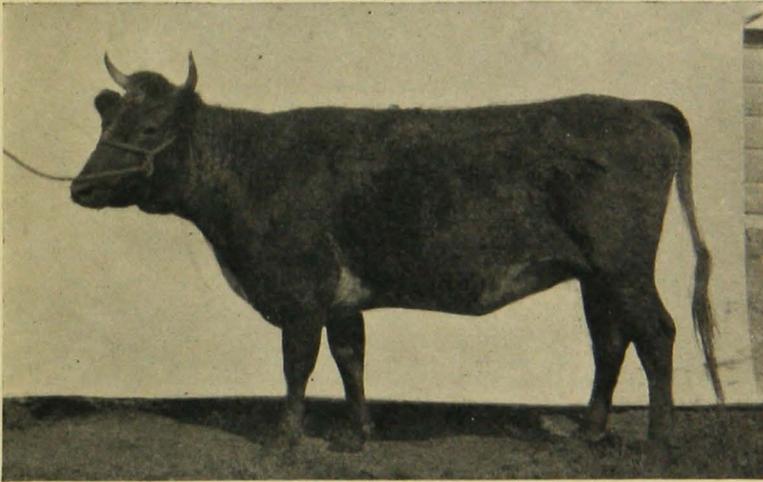


Fig. 2. The Same Cow as in Figure 1 After Receiving a Phosphorus Supplement for 300 Days  
She gained in weight from 457 to 808 pounds, an average of 1.1 pounds per day. The stiffness disappeared within two weeks.

### COMMERCIAL MINERAL FEEDS

Prepared mineral feeds are sold extensively in phosphorus-deficient regions. Most of these, if fed in large enough quantities, relieve the abnormal conditions resulting from a shortage of phosphorus. The results are due to that portion of the mixture, chiefly bonemeal, sometimes boneblack, which contains phosphorus. The questions that arise regarding these mixtures concern the nature of the ingredients and the price. The fairest comparison in price is with bonemeal on the basis of the phosphorus content.

When cattle are suffering from a lack of phosphorus there is no object in feeding a mineral mixture containing large quantities of lime

and common salt. In fact, results from experimental work indicate that including lime in the form of limestone or marl under these conditions actually makes the trouble worse. Some mineral mixtures also contain rock phosphate, which is detrimental if present in any considerable quantities on account of its usual high fluorine content.

Mixtures containing a great variety of ingredients are also undesirable, for most of the constituents are usually valueless to an animal because no ordinary ration is likely to be lacking in them. One of the mineral feeds extensively advertised, according to the label<sup>1</sup> contains salt, calcite, hardwood ashes, sodium bicarbonate, iron oxide, copper sulphate, anise, potassium iodide, bonemeal, bone ash, and bone charcoal. The last three ingredients are the only ones which carry an appreciable amount of phosphorus, and, in a region where bone-chewing is prevalent, are the only ones in the entire mixture which cattle are likely to need as supplements, with the possible exception of the iodine.

For relieving phosphorus deficiency, of which bone chewing is the most common symptom, the cheapest and best form of phosphorus supplement should be selected. The average phosphorus content of the 19 brands of commercial mineral feeds for cattle, analyses of which are reported in the annual report for 1934 by the Division of Feed Inspection, Minnesota State Department of Agriculture, is about 5.0 pounds in every 100 pounds of the feed. The highest amount in any one is 8.0 pounds. A hundred pounds of steamed and special steamed bonemeal,<sup>2</sup> on the other hand, contain 12 to 14.5 pounds of pure phosphorus. For correcting phosphorus-deficiency troubles one pound of these bonemeals equals two to three of the average commercial mineral mixtures on the market. This means that if bonemeals sell at \$3.00 per one hundred pounds, an equal amount of the average mineral mixture on the market is worth, as a source of phosphorus, only one-half to one-third as much. Compared in the same way, the best commercial product listed should sell for \$1.65 to \$2.00 to be as cheap a source of phosphorus as the bonemeals. The prices of commercial mineral feeds are much above these figures. This means that the bonemeals are a much cheaper source of phosphorus than the commercial mineral feeds on the market.

### WHEN DO CATTLE NEED MINERALS?

If cows receive good hay in the winter with a reasonable amount of grain and are on good pasture during the summer, there is no reason

<sup>1</sup> Sixteenth Annual Bulletin, Division of Feed Inspection, Minnesota State Department of Agriculture, page 242.

<sup>2</sup> Ordinary bonemeal containing about 50 per cent calcium phosphate is no longer available in quantity for cattle feeding, only the steamed products containing 60 to 75 per cent calcium phosphate.

for feeding bonemeal or minerals of any kind unless some of the abnormal symptoms described are observed. On the other hand, on farms where cattle during certain seasons regularly develop a desire to chew bones it is very important that they be allowed free access to a supply of bonemeal or other phosphorus-rich mineral products, except ordinary rock phosphate, not only after the depraved appetite appears but throughout the entire year. If the owner waits until positive symptoms, such as bone-chewing, are observed, severe losses have already been experienced, both in the condition of the animal and the amount of feed consumed. It is only by following this practice on such farms that the losses from the trouble may be prevented and animals are enabled to grow and to produce to the best of their ability.

In this connection it is also important to point out that not all troubles that occur among cattle are to be attributed to a deficiency of phosphorus in the ration. It should be emphasized that only when cattle show a desire to chew bones is there positive evidence of a lack of phosphorus in their diet, for bone-chewing is a definite symptom of a phosphorus deficiency. Furthermore, there is no evidence that the use of calcium and phosphorus supplements of any kind prevents or cures abortion or reduces sterility in cattle. However, as already suggested, in regions where the soil is greatly lacking in phosphorus, the use of bonemeal or other phosphorus-bearing mineral supplements will usually make breeding more regular.

### SOURCE OF INFORMATION

This circular is based upon an investigation of mineral deficiency under way in the Minnesota Agricultural Experiment Station since 1923. An extended scientific report of the results is published in Technical Bulletin 91, Minnesota Experiment Station, University Farm, St. Paul.