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MINERAL NEEDS of Cattle - Sheep - Hogs



The Basic Three...
● salt ● calcium
● phosphorus

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EXTENSION SERVICE
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MINERAL NEEDS OF CATTLE - SHEEP - HOGS

Salt

Animals need plenty of salt to make efficient use of their feed.

Researchers have found that hogs on a ration without salt needed 562 pounds of feed per 100 pounds of gain. Another lot on the same ration plus salt gained twice as fast and needed only 363 pounds of feed per 100 pounds of gain. This example shows the daily need of all animals for sodium and chlorine, the elements in table salt.

Saline Water Supplies

Water supplies in some areas of North Dakota contain naturally high or even excess amounts of salt and certain minerals, particularly if the water supply is artesian. Livestock drinking only water like this may not eat enough salt unless they get mineral supplements in their rations. Very little is yet known about the mineral content of such saline waters and their effect on animal feed intake and performance. Livestock will usually eat enough of any mineral they are lacking, if offered it free choice. Giving livestock access to salt and to calcium-phosphorus-trace mineral supplements free choice but separately seems the best mineral program for farms with a saline water supply.

Phosphorus

Animals that do not get enough phosphorus in their diets have a rough hair coat and grow slowly. They also have poor appetites, they may chew rocks, bones, or wood, they make poor use of feed particularly protein, and in severe cases fail to breed and reproduce. All animals need phosphorus to use the energy and protein furnished by their rations.

Some cereal grains have most of their phosphorus in an organic form called phytin phosphorus that may be poorly available to a simple stomached animal such as the pig. Oats is particularly bad. A supply of inorganic phosphorus (such as furnished by mineral supplements) must be included in a swine ration. Phytin-bound phosphorus is not of concern in cattle and sheep rations.

Cereal grains are fairly good sources of phosphorus, except for pigs. Protein supplements such as soybean and linseed oil meal, wheat bran and cottonseed meal contain more phosphorus than do cereal grains. Lush, fast growing grass supplies plenty of phosphorus.

Phosphorus content of all grasses and hays decreases with maturity, and usually drops to low levels in prairie grass by September or earlier in dry weather. For this reason, western range cattle often are "phosphorus hungry" in the fall.

Calcium

Feed grains are extremely poor suppliers of calcium. Some protein supplements, meat and bone scraps for example, are excellent sources of calcium. Others such as linseed oil meal are only fair. Low quality roughages such as straw and mature hays are poor sources of calcium. However, calcium content does not decline so sharply as phosphorus when forages become too mature. Alfalfa and sweet clover hay are good sources of calcium. Commercial protein supplement manufacturers many times add calcium and phosphorus to supply needed amounts in their products.

Vitamin D

Direct exposure to sunlight produces Vitamin D by acting upon certain fatty materials in an animal's skin.

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Vitamin D is essential for absorption of calcium and phosphorus from the digestive tract. Only young animals born and housed indoors in winter, or older, growing animals housed indoors for extended periods of time are likely to lack Vitamin D. With the exception of sun-cured hay, natural feeds almost totally lack Vitamin D.

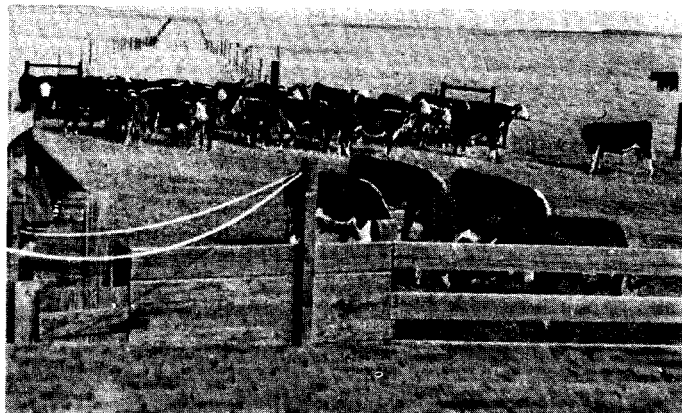
Growing animals that do not get enough of either Vitamin D, calcium, or phosphorus (or combinations) can develop "rickets." Animals draw upon their bone reserves of calcium or phosphorus if their diet lacks these elements for a short period of time. A continued shortage of calcium or phosphorus will result in serious breakdown of the animal's skeletal system, as well as decline or loss of production.

Calcium/Phosphorus Ratio

Calcium to phosphorus ratios from 1:1 to 6:1 are satisfactory for ruminants. Animals getting enough Vitamin D may tolerate wider or narrower ratios than that.

Most swine feeds, including some of the protein supplements, are poor calcium sources. Calcium to phosphorus ratios from 1:1 to 2:1 are desirable for swine. Feeding excess amounts of calcium to swine may provoke zinc deficiency. Including supplemental Vitamin D in the ration is more important for swine because they are more likely to be raised indoors away from direct sunlight. When sufficient Vitamin D is provided, ratios are of less importance.

FEEDING MINERALS



For Beef Cattle

Provide about 1½ to 2½ pounds of trace mineral salt per head per month. Block salt can provide minimum needs, but timid cattle will not get enough unless several blocks are available. Block salt is especially useful to spread grazing over large pastures. Place the salt away from the water supply to widen the grazing pattern.

Loose salt, block salt, and rock salt are all satisfactory where they are not exposed to weather. Loose salt is needed to mix with other minerals.

Cattle on high roughage rations, particularly silage or lush growing grass, eat more salt than cattle on high grain rations. Pasture cattle eat much more salt than dry lot cattle. For breeding stock, the following mixtures of phosphorus and calcium are satisfactory:

1. A half-and-half mix of dicalcium phosphate and loose trace mineral salt.
2. A half-and-half mix of steamed bonemeal and loose trace mineral salt.
3. In western North Dakota where mature prairie grasses are used for hay and pasture as the main feed source, a mineral mixture should have at least 10 per cent phosphorus and not more than 30 per cent calcium. Several high phosphorus commercial mineral supplements are on the market. Range protein supplements are usually fortified with phosphorus.



For Feedlot Cattle

The need for calcium and phosphorus supplements depends largely on the ration being fed. Feedlot cattle getting a high-grain, finishing-type ration will need additional calcium more than additional phosphorus. An all-purpose mineral that contains at least 6½ per cent phosphorus and about 30 per cent calcium should be satisfactory with such a ration. A 1:1 mixture of ground limestone and either dicalcium phosphate or steamed bonemeal, by weight, will furnish about this proportion of calcium and phosphorus. Feed this mixture free choice in addition to trace mineralized salt. Mix 1 part salt with 2 to 4 parts of the calcium-phosphorus supplement to improve the palatability of these materials and also reduce the blowing losses. Trace mineralized salt should be offered separately in addition to the calcium-phosphorus supplement.

The same mixtures as for breeding cattle should be good enough for feedlot cattle getting a medium to high roughage ration. Offer western feeder cattle upon arrival one of these high phosphorus mineral mixtures for about three weeks. You can then switch to a lower phosphorus supplement.

Force-Feeding Minerals to Feedlot Cattle

Some feeders may prefer to mix mineral supplements and salt into their grain ration. If they do this, they should also offer an appropriate mineral mixture and salt free choice. One-half per cent salt and ½ per cent of a

mineral mixture can be included in a ground, mixed ration. This means $\frac{1}{2}$ pound salt and $\frac{1}{2}$ pound mineral mix per 99 pounds of grain. The mineral mixture should be formulated on the basis of the proportions of grain and roughage in the ration. Force-feeding more salt and minerals than an animal needs will not improve its gains, efficiency, or well-being. Large excesses of any mineral may be harmful and should not be fed.

If you feed prairie hay as the roughage with a high-grain ration (full fed), mix 0.6 per cent ground limestone into the grain ration (0.6 pounds per 100 lbs. grain) to provide enough calcium.

If alfalfa hay is fed with a full feed of grain, 0.4 to 0.5 per cent ground limestone mixed into the grain ration should prevent any calcium shortages. Combining a source of readily available phosphorus such as dicalcium phosphate or steamed bonemeal in a ratio of one part to two parts ground limestone would be better. In addition, provide a similar mixture free choice.



For Dairy Cattle

Commercial protein supplements usually contain trace minerals and a source of calcium and phosphorus. Therefore, if you are feeding a commercial protein supplement you will not need to add mineral supplements to the grain mix. Trace mineral salt and dicalcium phosphate should be available free choice.

If you do not feed a commercial protein supplement, it is recommended you mix one per cent of trace mineralized salt and one per cent dicalcium phosphate (or steamed bonemeal) with the grain, as well as having these available on a free choice basis.

If legumes make up a large part of the forage intake, you can replace the dicalcium phosphate with a material lower in calcium content. Such a mix might include two parts trace mineralized salt, one part dicalcium phosphate, and one part sodium tri-polyphosphate or other phosphorus supplement. A narrow (1:1) ratio of Ca/P in the total ration has been found to lower the incidence of milk fever in some dairy herds.

Commercial dairy mineral supplements having a narrow Ca/P ratio are available.

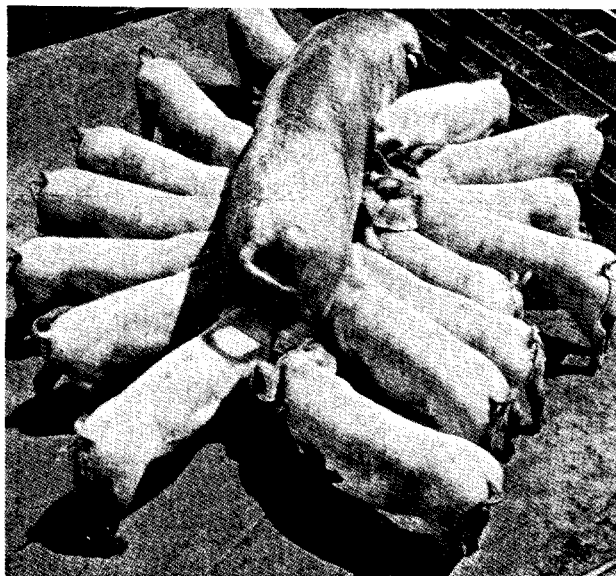


For Sheep

Provide $\frac{1}{2}$ to one pound of trace mineral salt per ewe per month free choice and preferably in the loose form. Trace mineralized salt is best. Sheep tend to use more salt if fed high silage rations or when on fast growing pasture.

The same calcium-phosphorus mix suggested for cattle also works for sheep on similar rations. A high roughage diet for sheep may need additional phosphorus.

Your mineral mixture will take care of the calcium needs of your sheep. Sheep are not likely to lack calcium if you feed good quality legume hay. However, sheep may need additional calcium if they are eating poor quality roughages such as straw or corn stover.



For Hogs

If you give salt in loose form, pigs will regulate their own intake. If you feed a complete ration, add $\frac{1}{2}$ per cent of the ration as salt to meet requirements. Trace mineralized salt is recommended.

Hog rations usually lack calcium since their main feeds of grain and protein supplements are low in this mineral. Calcium is the cheapest nutrient that can be added to the ration. A mineral with about 30 per cent calcium and six per cent phosphorus fed free choice usually is enough to cover any deficiency when fed in adequate amounts.

Calcium is especially important in gestation-lactation rations for sows. The lactating sow has unusually high needs, and unless calcium is supplied may have a skeletal breakdown in the latter stages of lactation.

A satisfactory simple mineral mixture may be made of 40 per cent steamed bonemeal or dicalcium phosphate, 40 per cent ground limestone, and 20 per cent trace mineralized salt. Feed it free choice.

Trace minerals are especially important in swine rations. Commercial swine supplements usually contain enough trace elements.

TRACE ELEMENTS

Trace mineral salts are suggested because livestock need several elements in their diets. Where complete rations are mixed on the farm, specially-formulated premixes furnishing trace minerals can now be purchased.

Iodine - North Dakota is an iodine-deficient area. A shortage of this element leads to poor reproduction, the birth of hairless litters for hogs, and goiter or big neck in cattle, sheep and hogs. Animals need iodine for hormone production by the thyroid gland.

Be sure to use fresh mineral mixtures or salt. Iodine escapes easily into the air. Mineral mixtures stored for long periods may lose some or all of their iodine content.

Iron - Little pigs need iron from the start. They receive almost no iron from sow's milk and grow so fast that they are usually deficient by the third day. Several different iron compounds are available to prevent anemia in little pigs. Injectable iron-dextran compounds are the most dependable method of assuring each piglet getting enough iron. Two injections, one at three days and another at 10 days, are advised. Clean soil put into the farrowing pen for pigs to root in also helps.

Iron shots will not benefit growing-finishing pigs which are doing poorly. Older pigs get enough iron from natural feeds. Injecting iron into such older pigs will not help, and can severely discolor and damage the ham.

Iron is needed by animals for formation of hemoglobin, the material in red blood cells that carries oxygen to all parts of the body. Pigs also need iron to get maximum energy value from feeds.

Copper - Among other functions, copper is needed together with iron to form red blood cells and prevent anemia.

Cobalt - Cobalt is extremely important, particularly for cud-chewers, because the rumen bacteria need cobalt for manufacturing Vitamin B₁₂. A few cents worth of cobalt is enough to feed a large livestock herd for at least one year. If trace mineral salt containing cobalt is used exclusively, cobalt bullets will not be of additional benefit to ruminants.

Manganese - Except for chickens, manganese is not thought to be lacking in rations. More information is needed on the extent and seriousness of deficiencies.

Magnesium - Enough magnesium usually is available, but small amounts are included in many trace mineral mixtures, anyway.

Zinc - This mineral may be deficient in swine rations, especially if high calcium levels are used. Zinc deficiency in growing-fattening hog rations may result in a rough, greasy skin condition called parakeratosis. Swine rations should be formulated to contain added zinc at 50 to 100 parts per million.

POISONOUS MINERALS

Flourine is the most dangerous. Avoid mixtures that contain more than 0.3 per cent of it. Excess flourine is likely to cause lameness, mottled teeth and poor production.

Other poisonous materials possibly helpful in small amounts but dangerous in larger portions are selenium, molybdenum and arsenic. For example, selenium is known to be required in very minute amounts, yet in much of western North Dakota it may be present at toxic levels in certain plants. Additions of selenium to rations are banned by Pure Food and Drug laws at this time.

TABLE OF MINERAL SUPPLEMENTS

MINERAL SUPPLEMENT	% CALCIUM	% PHOSPHORUS
Bonemeal, steamed *	24	12
Bone meal, special steamed *	26	14
Deflourinated Rock Phosphate *	21-35	9-18
Dicalcium Phosphate *	24-26	18-20
Monosodium Phosphate	None	22
Sodium Tri-polyphosphate	None	25
Phosphoric Acid (When used in commercial supplements. Not available for farm use.)	None	24
Limestone (98%)	38	None
Ground Oyster Shells	38	None

* Ranges indicated for calcium and phosphorus reflect differences in the quality of supplement.