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Dicalcium Phosphate for Livestock

Cooperative Extension, South Dakota State University

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Dicalcium Phosphate for Livestock

Phosphorus is the most costly mineral supplement in livestock rations when considered from the standpoint of both the amount required and cost of the supplements. Roughages which make up a large part of the rations for cattle and sheep are generally too low in phosphorus to meet the requirements. This is especially true for the low protein roughages.

Swine rations are composed largely of the cereal grains, which are low in both calcium and phosphorus in relation to the requirements; so they too generally need phosphorus supplementation. When soybean meal or other plant protein meals are used as protein supplements, a supplementary source of both calcium and phosphorus is necessary. Only when the protein supplement is composed largely of animal by-products will additional phosphorus not be needed in swine rations.

Bone meal has been a popular phosphorus supplement with livestock men for many years. It is a good source of phosphorus (12-15%) but the supply is becoming more critical. Many meat packers formerly producing bone meal for sale now use their supply of bones in other products. It, therefore, is becoming more important to look to other sources for phosphorus needs in livestock rations.

Since phosphorus supplements are generally needed, improvement in production and feed efficiency and a reduction in feed costs can result from proper supplementation with a good and economical source of phosphorus.

IMPORTANT CHARACTERISTICS OF PHOSPHORUS SUPPLEMENTS

When you select a phosphorus supplement, consider the following factors:

1. Percent phosphorus in the supplement.
2. Palatability of the supplement in free-choice mineral mixtures and when offered alone.
3. Availability of the phosphorus to livestock.
4. Cost per unit of phosphorus.
5. Mixing and feeding properties.
   a. Mix uniformly with other ingredients in mineral mixes and remain uniformly distributed in handling and feeding.
   b. Remain free from caking and becoming hard upon exposure to moisture.
   c. In a physical form which will resist wind losses.

PROPERTIES OF DICALCIUM PHOSHATE

Dicalcium phosphate is a good source of phosphorus for livestock. It has a high phosphorus content, with the usual feeding grades containing 18.5%. The phosphorus is one of the more available forms among supplements for livestock. It is a palatable supplement in mineral mixtures and when fed alone.

Dicalcium phosphate is not readily soluble in water and it does not cake and become hard when exposed to moisture. Some dicalcium phosphate products are granular. These granules insure more uniform mixing with other ingredients, prevent settling-out of mixes, and resist wind losses.

Like many other phosphorus supplements, dicalcium phosphate also contains calcium. The calcium content may vary from 20 to 30% for different brands.

CALCULATING COST OF PHOSPHORUS IN SUPPLEMENTS

Determine the relative value of different phosphorus supplements on the basis of cost per unit of phosphorus and take into consideration the other factors previously listed. If the ration also needs supplemental calcium, give some additional value to the calcium it contains. The amount of phosphorus and calcium will determine most of the value of mineral supplements for livestock. Trace minerals may have an important influence on the feeding value under some conditions; but because of the relatively low requirements of livestock for the trace minerals, they should not add greatly to the total cost.

Cost of Phosphorus Only

The cost per pound of phosphorus can be determined by dividing the percent phosphorus into the cost per 100 pounds of the supplement. When dicalcium phosphate costs $5.00 per 100 pounds and contains 18.5% phosphorus, the cost per pound of phosphorus is 27 cents ($5.00÷18.5=$.27). In order to buy phosphorus at the same price per pound in bone meal with 12% phosphorus, the price would be $3.24 per 100 pounds (12x$.27=$3.24). The equivalent price for bone meal with 15% phosphorus would be $4.05 (15x$.27=$4.05).

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DICALCIUM PHOSPHATE

as a Phosphorus Supplement for Livestock

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Similar calculations can be made for other phosphorus supplements. One would have to assume about equal digestibility and availability of the phosphorus or obtain values for these.

Costs of Phosphorus and Calcium

Since calcium can generally be furnished cheaper from limestone or other high calcium products than from high phosphorus supplements, the value of the calcium can be determined from the cost of high calcium supplements. Feeding grades of limestone contain about 40% calcium. This value divided into the cost of 100 pounds of limestone gives the cost per pound of calcium. When limestone costs $1.00 per 100 pounds, the cost per pound of calcium is 2½ cents ($1.00÷40=$.025), which is rather cheap in comparison to the cost of phosphorus.

Based on the above calculation, dicalcium phosphate with a maximum of 23% calcium would have 57 cents worth of calcium. When it costs $5.00 per 100 pounds, the 18.5 pounds of phosphorus would have a value of $4.43 ($5.00-$.57=$4.43), or 24 cents per pound of phosphorus ($4.43÷18.5=$.239). In order to buy bone meal containing 12% phosphorus and 25% calcium at the same price per unit of phosphorus and calcium, the price would have to be $3.50 per 100 pounds (12% phosphorus x $.24=$2.88; and 25% calcium x $.025=$.62). Similar comparisons could be made for other phosphorus supplements.

FREE CHOICE MINERAL MIXTURES CONTAINING DICALCIUM PHOSPHATE

The amount of calcium and phosphorus in mineral supplements should vary with the type of ration being consumed. Some suggested mixtures containing dicalcium phosphate for free-choice feeding are given below.

CATTLE AND SHEEP

Good Quality Pasture (Spring and Summer) and Good Quality High Roughage Rations

Dicalcium phosphate	40%
Trace mineral salt	60%

Low Quality Pasture (Fall and Winter) and Low Quality High Roughage Rations

Dicalcium phosphate	60%
Trace mineral salt	40%

Fattening Rations with 20 to 50% Legume Roughage

Dicalcium phosphate	50%
Trace mineral salt	50%

Fattening Rations with 20 to 50% Nonlegume Roughage

Dicalcium phosphate	50%
Ground limestone	10%
Trace mineral salt	40%

Fattening Rations Composed of Barley, Oats, and Ground Ear Corn with Little or no Additional Roughage

Dicalcium phosphate	30%
Ground limestone	30%
Trace mineral salt	40%

SWINE

Rations Composed of Cereal Grain and Soybean Meal

Dicalcium phosphate	40%
Ground limestone	40%
Trace mineral salt	20%

Rations Containing Both Soybean Meal and Animal Protein

Dicalcium phosphate	25%
Ground limestone	40%
Trace mineral salt	35%

The above mineral mixtures are suggested for free-choice feeding when additional mineral supplements have not been added to the rations. Free-choice feeding of mineral supplements appears to be a satisfactory method of supplying the required minerals. If force-fed in the ration, the amounts of the mineral elements should be calculated for each type of ration. The level of phosphorus should be about 0.30-0.35% and the level of calcium about 0.40-0.45% of the total air-dry ration for cattle and sheep. Swine rations should contain about 0.40-0.50% phosphorus and 0.60-0.65% calcium when mineral supplements are not being offered free-choice.

Trace mineral salt other than that in the mineral mixtures was not suggested with the mineral supplements. The mineral supplements were formulated on the basis of supplying salt in about the proper ratio to other mineral ingredients with the different rations.

Some additional salt offered free-choice might be advisable since the animals would not need to eat the mineral mixtures merely to satisfy their appetite for salt. This additional salt could be block salt for cattle and sheep or loose salt for swine. When salt is also provided free-choice, the amount of salt in the mineral mixtures could be reduced to about 20-25%. Increase the other ingredients accordingly, but keep dicalcium phosphate and limestone in about the same ratios as suggested when both are used.

In some areas of South Dakota the water is high in salt. It probably would be advisable not to include salt in the free-choice mineral suplements in these areas since it may reduce free-choice consumption of them. Dicalcium phosphate could be offered alone or mixed with limestone in the ratios shown above. Trace mineral salt should also be offered free-choice even though consumption may be low under these conditions.

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