The Feeding of Mineral Supplements to Live Stock

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Altho animals need a large number of mineral substances, as may be shown by analyses of their carcasses or of their milk, ordinary farm rations will take care of the requirements for most of these minerals. Mineral supplements, therefore, need only contain a few minerals in which farm feeds are known to be deficient.

Mineral Elements in Which Farm Rations May be Deficient

All seeds and seed by-products are particularly deficient in calcium, and very probably deficient in sodium and chlorin; grains are possibly somewhat deficient in phosphorus. Roughages are all deficient in sodium, not so much because of a low percentage of this mineral as because of an excessive content of potassium, which increases the wastage of sodium by the animal body. Non-leguminous roughages and pastures are not reliable sources of minerals, particularly if grown on acid and non-fertile soils. They may be deficient in both calcium and phosphorus.

In certain regions of this country, particularly in the Northwest States and around the Great Lakes, heavy losses have occurred in restricted localities among new-born pigs, lambs, kids, calves, and foals due to goiter, the young being born dead or weak and hairless or nearly so. Occasionally goiter develops after birth among growing animals in these regions, especially among calves. This condition is due to a deficient supply of iodin in the food and water supplied to the dam during her gestation period or to the young during the period of most active growth. Apparently the feeds or the waters in these parts of the country do not at all times contain sufficient iodin.

The minerals in which farm rations may be deficient, therefore, are calcium, phosphorus, sodium, chlorin, and iodin. There is no evidence that farm rations are ever deficient in any other minerals. Hence, mineral mixtures need not contain any minerals other than these.
The need for iodin seems to be restricted to certain localities and to pregnant females, or young growing animals. Its general use in mineral mixtures is neither necessary nor advisable.

**Forms in Which Necessary Mineral Supplements May be Provided**

*Calcium* may be provided: (1) in high-grade limestone, preferably limestone containing only small amounts of magnesium; (2) in bone meal, or spent bone black, but preferably in steamed bone meal; (3) in wood ashes; (4) in rock phosphate or acid phosphate; and (5) in slaked lime. However, high-grade limestone or commercial preparations of calcium carbonate and steamed bone meal may be recommended the most highly as sources of calcium on the basis of the experimental results of Dr. E. B. Forbes obtained at the Ohio Agricultural Experiment Station. Wood ashes are rich in the carbonate and hydroxid of calcium and should serve as an excellent source of this mineral.

*Phosphorus* may be provided in bone meals or in rock phosphate or acid phosphate; steamed bone meal is to be preferred, however.

*Sodium* and *chlorin* are readily and cheaply provided in common salt.

*Iodin* may be provided as potassium or sodium iodid, the latter being the cheaper source.

**How to Compound Simple Mineral Mixtures**

From what has already been said, it is evident that mineral mixtures for live stock need include only a few substances. They should all contain common salt, and a calcium supplement; as a measure of safety some form of calcium phosphate should be used, particularly for dairy cows and for growing animals subsisting mainly on pastures grown on non-fertile soils.

A mixture composed of equal parts of ground limestone and salt, or wood ashes and salt, would supplement calcium deficiencies satisfactorily, but would contain only small amounts of phosphorus.

A mixture composed of equal parts of steamed bone meal and salt, would supply both calcium and phosphorus in readily available form.

A mixture composed of equal parts of finely ground limestone (or wood ashes) steamed bone meal, and salt, would supply more calcium than phosphorus. While this is a more logical supplement to farm rations than the simpler mixture of bone meal and salt, it is probably no better in practice, since the excess phosphorus in the latter mixture is not detrimental and can be readily disposed of by the animal body.
If the excessive amount of salt contained in the above mixtures detracts from their palatability, the proportion may be reduced, or, in mineral mixtures for swine, may be replaced by tankage, which ordinarily contains considerable salt. A mixture of 9 parts steamed bone meal and 1 part tankage, or of 45 parts ground limestone, 45 parts steamed bone meal, and 10 parts tankage, should prove excellent in swine feeding. If the ration contains linseed oil meal or wheat middlings, feeds rich in phosphorus, a mineral mixture containing 9 parts finely ground limestone and 1 part tankage can be used with no fear of phosphorus deficiency.

In localities where goiter has been experienced, small amounts of potassium iodid or sodium iodid may be added to the water or the grain mixture of pregnant animals or of young growing animals. As an ingredient of mineral mixtures for general use, however, iodids cannot be recommended on the basis of present information.

Laxatives, worm remedies or other drugs, as well as coal, charcoal, sulfur, peat, or other fillers, perform no necessary or useful function in mineral mixtures compounded for general use.

**General Recommendations for Use of Mineral Supplements**

Obviously when rations contain considerable amounts of feeds rich in calcium or phosphorus, the necessity of using mineral supplements is removed entirely or greatly reduced. Leguminous roughages, skim milk, and tankage are excellent calcium feeds; wheat bran, wheat middlings, red dog flour, rice polish, soybeans, cottonseed meal, linseed oil meal, skim milk, and tankage are excellent sources of phosphorus.

The need for mineral supplements depends not only upon the ration fed but upon the condition of the animal. Young growing animals, pregnant and lactating females, and laying hens require a greater concentration of minerals in the ration than mature animals not burdened with the extra demands of reproduction or milk secretion.

The following general recommendations, therefore, seem justified:

When *swine* are not fed liberal amounts of skim milk, buttermilk, or tankage, or do not have free access to good green pasture (*preferably legume pasture*), their rations should be supplemented with calcium supplements. Free access to a simple mineral mixture or an addition of 2 pounds of minerals to 100 pounds of dry concentrates should provide plenty of calcium if the mineral feeds above given are not available.
Growing chicks and laying hens might well be provided with suitable mineral supplements at all times. For growing chicks, coarsely ground bone may be added to the mash in the proportion of 5 to 10 pounds for 100 pounds of mash. For the laying hen, free access to oyster shell at all times is advisable. Dairy products and tankage are reliable sources of minerals for poultry also.

Cattle, sheep, and horses raised on non-leguminous forage, especially if the soil is acid and non-fertile, should be given calcium and phosphorus supplements to the extent of 3 to 4 percent of the grain ration. If raised on good legume forage, probably no necessity for such supplementing exists, tho free access to salt should be provided.

Dairy cows in milk should have their rations carefully balanced with respect to minerals: for example, legume hay for calcium, and wheat bran, wheat middlings, soybeans, linseed oil meal, or cottonseed meal for phosphorus. The value of fresh green pasturage in furnishing a vitamin to aid in the maximum assimilation of calcium should also be mentioned. Under such favorable conditions it is still a question whether calcium supplements are necessary for maximum production. As a measure of safety, the use of calcium supplements to the extent of 3 to 4 percent of the grain ration, may be justifiable; however, the mineral deficiencies of poor forage cannot be entirely corrected by mineral supplements alone. Free access to salt should, of course, be allowed.

Just how much iodid is required to protect against goiter in those localities where this trouble is experienced, is not known. A dose of 2 grains of potassium or sodium iodid daily per head for sows, ewes, cows, and mares throughout the gestation period has been shown to be effective, however. Iodids in larger amounts may prove to be poisonous, so that care should be taken that no greater quantities than those mentioned be used. In administering this small dosage, it has been recommended that the iodid be dissolved in water in the proportion of one ounce of iodid to one gallon of water. One tablespoonful of this solution will contain about 2 grains of iodid. This amount may conveniently be sprinkled over the feed, or, in the case of ground feed, may be thoroly mixed with it.