

Nutrition Basics

Vitamins and Minerals



Mineral feeders should be located in areas where the cattle frequent and must be weatherproof.

Vitamins

Vitamin A

The vitamin most likely to be deficient in beef cow rations is vitamin A. Vitamins D and E may be needed in special situations.

Green and yellow plants contain carotene, a pigment which animals convert to vitamin A. Cattle consuming feeds that are high in vitamin A activity store the surplus, primarily in the liver. These stores serve as a reserve when feed is deficient in Vitamin A. Cows are most likely to need vitamin A supplementation after lengthy grazing of drought pastures or when fed low-grade feeds in winter. Cows receiving good-quality green haylage, silage or legume hay are not likely to need vitamin supplements.

Signs of vitamin A deficiency in breeding herds include lowered fertility and calving percentages. Vitamin A deficient cows abort, drop calves that are dead or weak, and are difficult to settle.

Pregnant cows that are being fed low-carotene feeds should have 30,000 I.U. of vitamin A supplement daily; lactating cows should receive 45,000 I.U. (See further information on mixing vitamins with minerals and other methods of supplying them to cows.)

It is advisable to supply 10,000 to 20,000 I.U. of vitamin A daily when calves are under stress, on preconditioning rations, or being maintained on low carotene feeds in winter. The intramuscular injection of one to six million I.U. of vitamin A in cows is another method of administering vitamin A. Injections should be used: (1) when cows show deficiency, (2) where deficiency is likely to develop, or (3) when feeding vitamin A is not practical.

Vitamins D and E

Vitamins D and E are usually included with vitamin A supplements or injection solutions administered to cattle. Young growing animals have a greater requirement for vitamin D than mature animals. Vitamin D aids in the metabolic use of calcium and phosphorus. It is necessary for the formation of sound teeth and bones. Rickets is a

sign of vitamin D deficiency in young animals.

Cattle exposed to direct sunlight or those consuming three to four pounds of sun-cured forage daily should not need vitamin D supplements.

Most rations fed to beef cattle in Missouri are adequate in vitamin E. Alfalfa meal, green leafy forage, and whole grains are sources of vitamin E. White-muscle disease in calves and lambs has been prevented and cured by use of vitamin E. Selenium, a trace mineral, replaces or replaces vitamin E in the prevention and curing of this disease. Vitamin E deficiency lowers reproduction in rats and other laboratory animals, but this effect has not been confirmed in farm animals. Giving 25 to 50 I.U. of vitamin E per head daily to cows grazing stalk fields or other low-quality roughages is sometimes recommended.

(See *UMC Guide 2058, "Vitamins for Beef Cattle,"* for more information, or contact your area extension Livestock Specialist.)

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Minerals

Matching the mineral requirements of cattle (available in National Research Council tables, see the Herd Reference Edition of the Journal, page 522) with the average mineral composition of feeds gives an indication of the minerals that are most likely to be deficient in a ration.

Calcium and Phosphorus

Cows fed grass and legume roughages may need extra phosphorus but little or no calcium supplementation. Both calcium and phosphorus supplements may be needed if grain, corn cobs, stalks or cottonseed hulls make up a sizable part of the cow's ration.

The need for calcium and phosphorus is increased during growth, late

pregnancy and lactation. Certain minerals must be kept in proper ratio to one another in the ration because their metabolism and function in the body are interrelated. A calcium to phosphorus ratio of 1:1 to 1.5:1 is recommended for beef cattle rations.

Sodium and Chlorine (salt)

Cattle usually exceed their requirements when given free access to salt (sodium and chlorine). Consumption varies but cattle will eat more salt with high-roughage or high-moisture feeds. They will eat more loose salt, but the block form is adequate. Cows will often eat 1.5 to 2.5 lb. of salt a month. Cattle deficient in salt eat dirt, manure and urine in an attempt to get salt.

Potassium

Roughage rations usually have enough potassium for beef cattle. However, Missouri studies have shown that potassium will leach from the forage in fescue pasture during winter to levels as low as 0.30 percent of the dry matter. This is much below the potassium level of 0.60 to 0.80 percent of ration dry matter recommended for beef cattle. Thus, including potassium in mineral mixtures could be beneficial for beef cattle grazing fescue pasture from January through March.

Trace Minerals

Cobalt and iodine are the trace minerals most likely to be deficient in beef cow rations. Cobalt is required by rumen bacteria for synthesis of vitamin B¹². There is evidence that cattle should receive their cobalt needs every day. Cobalt supplementation is advisable for beef cows wintered on low-quality grass forages, cereal straw or stalks.

Trace-mineralized salt should be an adequate source of trace minerals under most conditions. Iodized salt is recommended with high-nitrate feeds. If plain salt is used, add an ounce of cobalt chloride or sulfate to each 100 lb. of free-choice mineral mixture when the cow's ration is likely to be deficient in cobalt.

Mineral Mixtures for Feeding Free-Choice

Free-choice mineral supplements

should be formulated to supply the kinds and amounts of minerals that are deficient in feeds being consumed by cattle. The taste and mineral composition of free-choice mixtures largely de-

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termine whether cattle will eat enough of a mineral mixture to correct the deficiencies of their main diet.

A mineral mixture that is adequate for free-choice feeding to a lactating cow that is receiving legume hay would not be suitable if the ration were changed to corn silage and soybean meal. The corn-silage ration would need both calcium and phosphorus, whereas the legume hay would need phosphorus but no calcium addition.

Free-choice mineral supplements for cattle on grass and legume forages should have about 10 to 12 percent phosphorus. A free-choice mixture that is often recommended for cattle on grass and legume forage is composed of:

- 1 part trace-mineralized salt
- 1 part dicalcium phosphate or bone meal
- 1 part monosodium phosphate

This mixture contains six percent calcium and 13 percent phosphorus.

For more information on minerals for beef cows, see *UMC Guides 2080, "Minerals for Beef Cattle Needs,"* and *2081, "Minerals for Beef Cattle-Supplements."*

Magnesium

Experiments at Virginia Polytechnic Institute (VPI) have indicated that a lactating beef cow needs approximately 0.70 ounces (20 grams) of dietary magnesium daily to maintain normal serum magnesium levels (2.0 mg./100 ml.). A gestating beef cow requires about 0.32 ounces (9 grams).

In high-risk situations, (see the risk conditions listed under "Occurrence of Grass Tetany") tests indicate cows need to be fed an average of 2 ounces (57 grams) of magnesium oxide a head daily for best prevention of grass tetany. This much magnesium oxide contains 1.3 ounces (36 grams) of magnesium or almost twice what research shows the body needs daily. Underconsumption by some animals in the herd and other factors must be involved in the need for this high a level of magnesium intake.

Supplementing the cow with 0.6 ounce of magnesium oxide (10 grams magnesium) will usually be sufficient.

Animals need to have a daily intake of magnesium because most of the magnesium is cleared from the blood within 20 to 30 hours after it is consumed. Also, there is little or no storage of magnesium by older animals.

Magnesium and Grass Tetany

Grass tetany is also known as winter tetany, grass staggers, wheat poisoning tetany, and hypo-magnesium. Grass tetany is caused by a physiological deficiency of magnesium which may result

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from a deficiency of magnesium in the feed or factors which lower the utilization of magnesium.

Animals affected may become excitable and then show such symptoms as trembling muscles and grinding of the teeth, followed by violent convulsions, deep coma and death. Some animals, however, remain quiet but are unable to rise. Cows often resemble those with

milk fever and many of them have low serum calcium as well as low serum magnesium.

Occurrence of Grass Tetany

- The greatest number of tetany cases usually occurs in April and May but many cases are now seen in the fall and winter.

- Tetany occurs most frequently in cows 6 years old and older which are nursing calves under 2 months of age.

- Cows grazing grass pasture or consuming grass hay account for most of the cases. Cloudy, windy, rainy weather with the daytime temperature between 40 and 60 degrees Fahrenheit seems to affect both the cow and the grass she consumes and encourages the incidence of grass tetany.

- Tetany seldom occurs when legumes or legume-grass mixtures are a major portion of an animal's diet. Legumes may contain more than twice the

concentration of magnesium that grasses contain when grown on the same soil.

• Soils that have a high level of available potassium (above 250) in top three inches are more suspect than others. But tetany can also occur under other soil conditions.

Keep plenty of magnesium oxide mineral available during danger periods such as early spring and after calving. Other magnesium compounds can be used but the availability of the magnesium and palatability of the compound is a problem with some. Dolomitic limestone is not a satisfactory magnesium supplement for cattle.

To be effective, a mineral mix should contain at least 10 percent magnesium. Some commercial mineral mixes marketed for the prevention of grass tetany contain less. Keep mineral in boxes located at several places in the field to give all animals ready access.

Suggested Supplements to Prevent Grass Tetany

Feeding some good legume or grass-legume hay in danger periods is helpful since legumes are higher in magnesium than grasses.

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In VPI trials, cows on grass pasture ate 0.6 to 1.6 ounce of magnesium oxide daily when fed the following supplements: one part trace-mineralized salt; one part magnesium oxide; and one part of either dried molasses, ground shelled corn, cottonseed meal, dehydrated alfalfa meal, or distillers' dried grain with solubles.

Other mixtures to feed include:

- Mineral mixtures:
 - a. Trace-mineral salt, 30; bonemeal or dicalphosphate, 30; magnesium oxide, 30; dried molasses, 10. This mixture provides about 18 percent magnesium.
 - b. Salt 75, magnesium oxide 25.
- Concentrate mixtures:
 - a. For self-feeding with forage containing 10 percent crude protein. Ground grain, 65; magnesium oxide, 20; salt, 15.
 - b. For self-feeding with low-protein roughages. Cottonseed meal, 65; magnesium oxide, 20; salt, 15.
 - c. For hand-fed supplements, use (a) or (b) but omit salt.

(More information is available in UMC Guide 2101, "Grass Tetany.") **AJ**

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