

THE ROLE OF MACRO-MINERALS IN SHEEP NUTRITION

Gerald A. Proverbs, Francis Asiedu, Norman Gibson
and
Aman Hosein

MACRO-MINERALS

Only 15 of the mineral elements in the sheep's body have been shown to be essential. The major or **macro minerals** involved in sheep nutrition are: salt (NaCl), calcium (Ca), phosphorous (P), magnesium (Mg), potassium (K) and sulphur (S).

All body cells and tissues contain minerals in widely varying amounts and in different chemical forms. Approximately 99% of the total body calcium, 80-85% of the total phosphorous and 70% of the total magnesium occur in the sheep's skeleton.

Salt (NaCl)

Salt is essential for proper body function, but it may be unnecessary to provide supplementary salt under most feeding conditions since sheep seem to have the ability to utilize the natural salts in their feed in sufficient quantity. Salt is routinely added to sheep concentrate feeds at a level of 1.0%.

There is disagreement between animal scientists as to the importance of supplemental salt in a sheep's diet. Very

few of the 180 million sheep in Australia receive supplemental salt whereas in Europe and North America sheep routinely receive supplemental salt. In fact farmers in the USA provide their sheep on range with between 200 and 350 g (7-12 oz) of salt per ewe every month.

Sheep are particularly fond of salt and consume considerably more of it per unit of body weight than do cattle. If fed free choice sheep will consume between 250 and 350 g (7-12 oz) of salt per month. Loose salt, rather than block salt should be provided, since sheep bite salt blocks rather than lick them. Many sheep have broken their teeth from biting salt blocks.

Since salt is so palatable, it is a useful carrier for supplying other minerals that are either unpalatable or are required in minute amounts, such as iodine and cobalt.

The total salt requirement of growing lambs is about 0.4% dry matter of the ration. Finishing lambs consume about 275 g (9 oz) per head/month.

Symptoms of salt deficiency - A deficiency of salt may result in: an abnormal appetite, with the sheep trying to satisfy their craving by licking dirt; a decrease in feed consumption; and a decrease in performance.

This Information Product was produced with funding from the Canadian International Development Agency (CIDA) as an output of the Caribbean Sheep Production and Marketing Project No. 255/12723



Calcium (Ca)

Calcium is essential for development and maintenance of normal bones and teeth. Approximately 99% of the total calcium found in the sheep's body is in its bones and teeth. It is also important in blood clotting and lactation. Forages, especially legumes, are generally high in calcium. However, to meet the requirement for this mineral, sheep rations should contain a minimum of 0.5% Ca.

Sheep are able to tolerate wide ratios of Ca to P in their diets as long as this situation is only for short periods of time. The National Research Council recommends 1.1-1.4 parts Ca to 1 part P. Levels above 2:1 are not recommended.

Excessive calcium in the diet may be more of a problem than a deficiency, especially if phosphorus is low. In recent feeding trials CARDI scientists observed that Barbados Blackbelly rams were especially prone to water belly (urolithiasis) when the Ca to P ratio exceeded 2 parts Ca to 1 part P. However, this condition can be prevented by increasing the level of P in the diet to 0.2% if the sheep are consuming feedstuffs known to be high in Ca.

Finishing lamb rations based on low-quality roughage, or high in concentrates, may require calcium supplementation.

Phosphorous (P)

Forages are generally low in phosphorous. Also as plants mature, the phosphorous content decreases. A phosphorous deficiency may occur in sheep if fed on hay or standing hay especially in the dry season when forage quality is poor.

The sheep's ration should contain 0.4% P. Forages containing below 0.2% phosphorous are usually considered deficient for ewes during gestation, and 0.34% borderline during lactation.

Symptoms of phosphorous deficiency - Phosphorous deficiency is characterized by a decreased appetite, craving and chewing on bones, and soil eating. Young lambs show a lameness, bent leg bones and swollen joints. Some ewes will become infertile and milk production is reduced in nursing dams. The level of phosphorous in the blood is less than 4 mg/100 ml of plasma.

Magnesium (Mg)

Magnesium is necessary for many enzyme systems to function in the cells and for the proper functioning of the nervous system in sheep. It is closely associated with the metabolism of calcium and phosphorous. The exact requirement of magnesium for sheep is unknown.

However, rations containing 0.06% are considered adequate for the adult ewe. The blood serum of the mature ewe normally contains about 2.5 mg/100ml.

There have been no reports in the literature of magnesium deficiency symptoms in Caribbean sheep.

Potassium (K)

Potassium is essential for proper nerve, muscle and enzyme function in sheep. It is also required to maintain the activity of the rumen microorganisms. The potassium requirement of sheep has not been clearly defined but it appears to be about 0.5% of the diet. Roughages usually contain adequate quantities of potassium.

Scientists have reported that the incidence of urinary calculi in feedlot lambs can be reduced by feeding supplemental potassium chloride.

Sulphur (S)

This macro-mineral functions in the synthesis of the sulphur containing amino acids, cystine and methionine, in the sheep's rumen. Rations for mature ewes should contain 0.16-0.18% sulphur. Young lamb rations require a higher level around 0.26%. Most feedstuffs contain more than 0.1% sulphur.

Australian scientists have shown that mature tropical grasses and grass hays are very often low in sulphur and recommend that grazing ewes receive sulphur in their mineral supplement.

SHEEP MINERAL PROFILE

A good sheep mineral should provide the following minerals and vitamins A and E.

MINERALS	RANGE	RECOMMENDED LEVEL
Calcium	12-20%	14%
Phosphorous	12-20%	14%
Salt	10-18%	12%
Magnesium	3-6%	4%
Sulphur	0.15-0.2%	0.2%
Iron	0.2-0.3%	0.25%
Zinc	0.1-0.3%	0.125%
Iodine	0.003-0.006%	0.005%
Manganese	0.05-0.08%	0.075%
Copper	None	None
Cobalt	0.002-0.003%	0.0025%
Vitamin A	70,000-100,000 IU/Kg	80,000 IU/Kg
Vitamin E	50-200 IU/Kg	100 IU/Kg

ISSN 1018-1229