mistaken for the common broadleaf carpet grass or low paspalums which usually dominate overgrazed marshes. Cattle, being selective grazers, seek out the "ice-cream" maidencane. As a result, production is limited to mere survival by a small amount of leaf production for maintaining the root system. The simple mechanics of closing a gate and resting the marsh for a growing season will initiate the rapid recovery of this highly desirable grass. Normally, maidencane, being a taller grass, will shade out the shorter and less productive grasses. Successful periods of rest followed by planned periods of grazing will assure high production.

In some instances, a light mechanical disturbance will speed up re-establishment. A light pasture chopper may be used but must be followed by a rest from grazing.

This grass is recognized by ranchers to be the most productive of all native grasses. Numerous observations and weighings by Soil Conservation Service range men show it producing as much as 9,000 pounds of air dry forage per acre. This, of course, has been on well-managed areas. Studies conducted by the University of Florida have shown production up to 9,900 pounds per acre. These studies also show that more production was obtained on moderately grazed pastures than from pastures grazed only lightly. Further studies are being conducted to determine the frequency and intensity of grazing and seasonal variation in production and nutritive values.

Present day economy dictates that grassland agriculture must produce with as little input of fossil fuel energy as possible. High yield of good quality forage from maidencane is available with the lowest possible input of energy. In most instances all that may be required is a grazing plan, coordinated with other available forage resources. Such a plan would provide for planned periods of resting and grazing.

Wetlands, where maidencane is a major species, play an important role as pollution filtration systems. These wetlands include sand ponds, inland marshes, and the broad flood plains of the major rivers and streams. These natural marsh areas when left relatively undisturbed, except for good grazing management, capture and recycle nutrients from the uplands. Maidencane, and especially many of the associated species of the marshes, take up nitrogen and phosphorus and hold them during summer and fall months. When nutrients are finally released they slowly filter through the marshes, thus preventing entry into large bodies of water to cause eutrophication during periods of high temperatures. Unfortunately, through the years many of these natural marshes have been altered by various methods and degrees of drainage.

However, by grazing management and water control for reestablishment of the marsh ecosystem, ranchers as well as others, will obtain increased benefits from these wetlands.

Mineral Supplementation Can Mean Life or Death in the Humid Tropics

Wayne H. Miles

The 300 million hectares (750 million acres) of savanna rangelands and 550 million hectares (1,375 million acres) of forests of the low humid tropics of South America constitute an area having possibly the greatest potential for expansion of beef production of any similar area of the world. In general, current cattle production is at a low technological level with overall low production. It is said that South America has twice the cattle numbers of the United States and half the beef production. Since production levels in the tropics are well below the overall average, then production per cow is even less than a fourth of US averages in the low wet American tropics.

While disease and tropical climate are factors in lower production, low level of nutrition is considered to be the major problem. In recent years a great deal of progress is being made through research and rancher experience in the use of improved pastures based on Brachiaria decumbens, Hyparrhenia rufa, Panicum maximum and other grasses.

The International Center for Tropical Agriculture (CIAT), Cali, Colombia, is on the verge of a major breakthrough that will provide persistent perennial tropical forage legumes to use in combination with grasses. The four most promising legumes include two natives, Stylothankes capitata and Zornia latifolia, and two introductions, Desmodium ovalifolium and Pruperia phaseoloides (tropical kudzu). Low levels of protein now reduce cattle gains and these legumes promise to raise protein levels in forage. Daily cattle gains on experimental grass legume pastures are over 500 grams per day and compare favorably with those of the temperate zone. Average rates of gain on native range are now about 250 grams per day.

An area of nutrition research which is receiving minimal attention in the tropics, at the moment, is mineral nutrition. While the US Agency for International Development (AID) has recognized this as a major problem and is financing a program with the University of Florida at Gainesville to promote mineral nutrition research in Latin America, there seems to be very little current work in this field in Colombia where the author ranches.

While Colombia ranchers say that they favor the use of
mineralized salt, most either provide minerals only occasionally or dilute the mineral mix with excessive amounts of salt. Many provide no supplement. One reason is high cost. Cost per cow is about US $8.00 per year for the 20 kg (44 lb) needed. Another deterrent, according to personal experience, is that commercial mixtures do not adequately supply one or more of the minor elements essential to top production including reduction of death losses.

To understand the importance of mineral nutrition to tropical beef production one must understand that the oxisols of the savanna grasslands and ultisols of the tropical forests, which are the most common soils of the low humid tropics, are among the most severely leached, acid, infertile soils that occur. Acid, infertile soils produce forages deficient in a number of minerals that are essential to adequate nutrition for cattle. In the area where the author ranches, phosphorus, calcium, sodium, copper, cobalt, zinc, selenium, iodine, and sulphur are either known to be deficient or are suspect. Unfortunately, little forage analysis or liver analysis work has been done in the American tropics. More specific information is needed to develop mineral supplements to fit particular areas. Most mixtures have been designed with little or no research to show which mineral deficiencies are important for cattle nutrition occur in the area.

The Colombian Animal Production Association, composed of graduates and advanced students of veterinary and animal science plus leading cattlemen, sponsored, in September, 1979, a symposium in Bogota on mineral nutrition. Dr. Lee R. McDowell, a leader of the US-AID mineral nutrition project at the University of Florida, was invited to be a principal speaker. Hopefully this indicates an awakening interest in the field.

An important mineral nutrition project was carried out at the Carimagua Research Station in the Colombian "Llanos" in 1975-76 by Soekanto Lebdosoekojo and published as a doctoral dissertation at the University of Florida in 1977. Analysis of native forage as published in this report showed that calcium, phosphorus, sodium, zinc, and copper are deficient and that cobalt that is barely adequate as a yearlong average is deficient in the rainy season. The world "deficient" is used to indicate that level of each of these minerals is below the requirements indicated in Nutrient Requirements of Beef Cattle (1976) and Nutrient Requirements of Dairy Cattle (1978) published by the US National Academy of Sciences.

The Lebdosoekojo analysis did not cover selenium, iodine, or sulphur, which are also suspect as being deficient. "Llanos" rangelands are usually burned each year and are maintained as grasslands by these recurring fires. Since selenium and sulphur are volatilized by fire and the soils have been subject both the long-term leaching and fire, either or both may be deficient. On our own ranch, thanks to the cooperation of Dr. McDowell and the University of Florida, we have had one detailed forage analysis. This showed selenium to be borderline with 0.1 parts per million (ppm). Prior to adding selenium to our own mixture, we gave several thin animals a Vitamin E-selenium injection. The animals treated appeared to improve.

I am not aware of any goiter among our cattle but feel that the inclusion of iodine is justified pending more definitive research, since our soils are so severely leached. Sulphur was not added to our mix due to the rather large dietary requirement. We have forage analysis pending with the University of Florida for sulphur and may add this mineral if the analysis indicates too low levels.

To complete the mineral availability status of range forages as shown by the Lebdosoekojo research, potassium was barely adequate (.87% vs .80% recommended), iron was excessive (563 ppm vs. 50 ppm recommended), molybdenum was very adequate at .54 ppm but not in the excessive range indicated in the literature as adversely affecting copper nutrition.

It is important to note that a more recent analysis of native grass from another part of the same Carimagua Station showed slightly less zinc (11 ppm vs. 13 ppm) and almost three times as much copper compared to the Lebdosoekojo study on the same ranch. This tends to support the theory that when a particular mineral is at or near minimal levels in a particular area that one pasture may be marginally sufficient and another nearby may be deficient. Until more adequate research is available, we decided to add minerals suspected of being deficient to our supplement rather than take a chance of lower animal production.

Concrete benefits resulting from the use of a "complete" mineralized salt are provided in the 1977 Annual Report of CIAT. This report summarizes the results of a 4-year trial comparing salt alone to salt plus minerals. The addition of
minerals to the supplement reduced abortions, increased average cow weight, reduced preweaning death loss of calves, increased calving percent, and increased weaning weight of calves. Abortions were reduced from 9.3% with salt to 0.75% with minerals. Death losses prior to weaning were 19.2% with salt compared to 10.5% with minerals. Calves were weaned from 38.5% of cows on salt compared to 60.5% with minerals. Weaning weight of calves increased from 116 kg (255 lb) on salt to 147 kg (323 lb) with minerals. The average weight of calf per cow measured at 9 months of age was 98% higher for the herd with minerals.

Even this does not tell the entire story, as there are several other animal health problems on ranches in the area around the Carimagua Station related to mineral nutrition. A problem called “secadera” (wasting disease) accounts for about 25% of death losses in the Colombian Llanos. Symptoms are similar to starvation. Almost any cowboy in the Llanos recognizes the disease, but research has not pinpointed either cause or treatment. There may even be more than one cause of the problem. This caused about 25% death loss in our own herd in 1977 and again in 1978 but disappeared when a minor element mix of cobalt, copper, zinc, iodine and selenium was added to our bone meal and salt mix early in 1979.

Fractures of legs, spine, and pelvis are many times more prevalent than in the US. Ranches in the same area that have used a free choice mineral salt mix for several years report almost no fractures.

Another peculiar problem is called “calambre” (nervous collapse). An animal being worked in the corral will begin to tremble, lie down, and not be able to rise. It is usual to butcher these animals for meat because most die in about a week. A problem called “vaca inflada” (dropsy) affects pregnant cows. The placenta fills with fluid containing calcium crystals. This usually results in loss of the calf and sometimes the cow. Both these diseases have been studied by Dr. Charles Mullinax, DVM, who believes that both are a result of mineral imbalance or mineral deficiency, though specific cause has not yet been determined.

Review of research literature indicates that animals suffering from mineral deficiencies are weakened and may die of various unrelated infections. Some, including the author, feel that 50% or more of the death loss of cattle in the “Llanos” of Colombia is related to mineral deficiencies or imbalances.

It is important to note that even with “best” technology, 10% of the calves at the Carimagua Station die before weaning. This is excessive. The Carimagua mineral supplement has not been modified as a result of the Lebdosokekojo research and adds less than 2 ppm of copper and 3.5 ppm of zinc to the diet of range cattle. When these amounts are combined with levels in the forage as analysed by Lebdosokekojo, dietary levels reach only about 37 to 38% of recommended dietary levels. (N.A.C.). The author would be interested to see a research trial to determine whether the addition of more copper and zinc plus selenium and sulphur to the Carimagua supplement might improve health and reduce preweaning death losses. On our own ranch the addition of cobalt, copper, zinc, selenium, and iodine to the supplement has brought an unhealthy herd back to health.

An idea of the prospects for increasing cattle production in the low, wet tropics is indicated by an analysis of current production compared to potential production in the Colombian Llanos principally by better nutrition. The Llanos has an area of about 18 million hectares (45 million acres). Currently this area contains about 3 million head of cattle. Extraction rate is about 10%, so about 300,000 head are marketed each year. With better pastures plus better mineral nutrition, cattle numbers could reach 18 million head and the extraction rate could double to about 20% to provide about 3,600,000 head for sale each year.

The Llanos makes up only about 6% of the savanna grasslands, and only 2% when tropical forest lands are also included, of the low, wet American tropics.

Annual burning of “llanos” range is common in Colombia. This is an old practice, in fact, it occurred naturally before cattle were introduced to the area. Purpose of burning is to remove unpalatable grass and to encourage more palatable regrowth. Cattle eat ash after a burn and this along with bone chewing are common symptoms of mineral deficiencies.

Better mineral nutrition is an area of technology that can be applied quickly and for relatively low cost. It appears to the author to be imperative that more research effort be directed to this important field.

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