

# **MINERAL MIXTURE**

## **FOR CURING DEFICIENCIES & IMPROVED PRODUCTIVITY OF DAIRY ANIMALS**



**NATIONAL DAIRY DEVELOPMENT BOARD  
ANAND**

## **INTRODUCTION**

Dairy cattle and buffaloes require a number of dietary mineral elements for normal body maintenance, growth and reproduction. Minerals that are required in relatively large amounts are called major or macro elements. Those needed in small amounts are classified as micro, minor, or trace minerals. The major minerals include calcium, phosphorus, magnesium, potassium, sodium, chlorine and sulphur. Among those needed in trace amounts are iron, zinc, manganese, copper, iodine, cobalt and selenium. Deficiency of minerals in the ration of animals impairs metabolic functions, which affects the growth in young calves and milk production and reproduction efficiency in adult animals. Supplementation of bio-available minerals through mineral mixture is of paramount importance, as minerals are nowhere synthesized in animal's body.

## **FUNCTIONS OF DIFFERENT MINERALS**

### **Calcium (Ca):**

- Essential for milk production.
- Necessary for bone & teeth formation.
- Required for contraction of muscles.

### **Phosphorus (P):**

- Essential for milk production.
- Required in energy metabolism.
- Required for bone & teeth formation.

### **Magnesium (Mg):**

- Important for the integrity of bone & teeth.
- Involved in protein synthesis and metabolism of carbohydrates & lipids.

### **Sulphur (S):**

- Required for protein synthesis and metabolism of carbohydrates & lipids.
- Sulphur is a part of B-complex vitamins, thiamin & biotin.

### **Sodium (Na) & Potassium (K):**

- Required for maintenance of osmotic balance.
- Required in acid- base equilibrium.

### **Copper (Cu):**

- Required for haemoglobin synthesis.
- Necessary for tissue pigmentation & component of several metallo-enzymes.
- Required for normal reproduction functions.

### **Zinc (Zn):**

- Spermatogenesis & the development of primary & secondary sex organs.
- Required for normal functioning of epithelial tissue.
- Activates vitamin A & its deficiency leads to night blindness.

### **Manganese (Mn):**

- Co-factor for many enzymes involved in carbohydrate metabolism.
- Activator in the synthesis of fatty acids.

### **Iodine (I):**

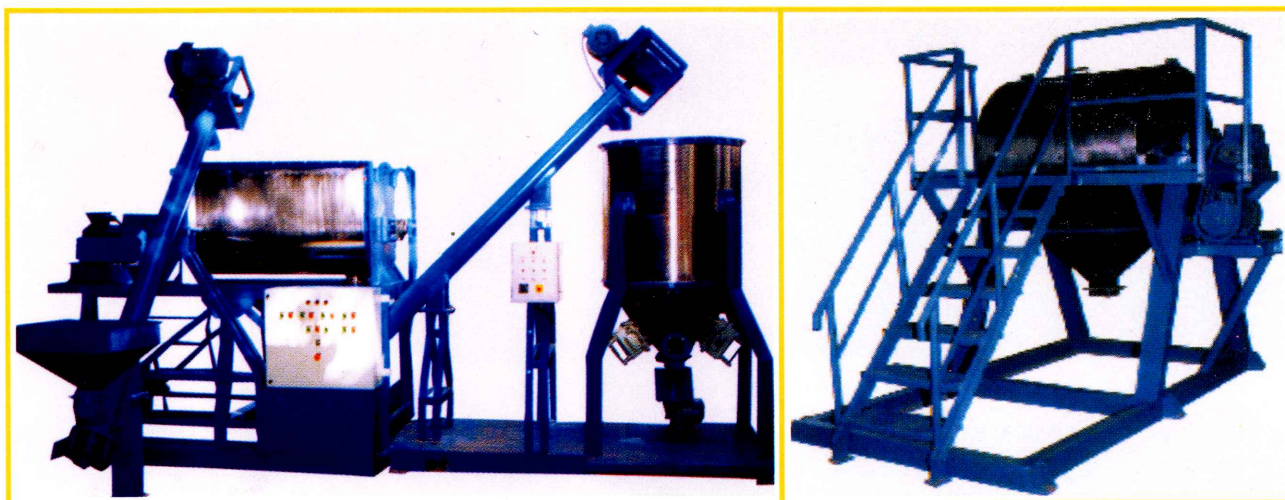
- Required for the synthesis of thyroid hormone ( $T_3$  &  $T_4$ ).
- Necessary for reproduction & growth of animals.

### **Cobalt (Co):**

- Required for the synthesis of vitamin  $B_{12}$  by the rumen microbes.
- Essential for haemoglobin synthesis.

## HOW TO PRODUCE GOOD QUALITY MINERAL MIXTURE

Mineral mixture is manufactured using dihydrate di-calcium phosphate (DCP) of rock phosphate origin and dried/monohydrate mineral salts. Dried/monohydrate mineral salts are crushed and mixed to a uniform particle size, using proper diluents, in a separate device, called ball mill. This trace mineral pre-mix is taken in the ribbon mixer, along with DCP and few other mineral salts, for proper dispersion and uniform mixing. The resultant mineral mixture thus produced contains all mineral elements in desired proportion and stable form. **Mineral mixture should not contain any ingredient of animal origin, even in traces.**



MINERAL MIXTURE MANUFACTURING PLANT

## MINERAL MIXTURE FORMULATION AND MINERAL SALTS

Element	Requirement (%)	Mineral salt
Calcium	20.0 (Min.)	Dicalcium phosphate [Ca (%): 23.0 (Min.) P (%): 18.0 (Min.), F (%): 0.10 (Max.)]
Phosphorus	12.0 (Min.)	Dicalcium phosphate
Magnesium	5.0 (Min.)	Magnesium oxide [Mg (%): 52.0 (Min.)]
Sulphur	1.8-3.0	Sodium thiosulphate [S (%): 39.0 (Min.)]
Copper	0.10 (Min.)	Copper sulphate [Cu (%): 24.0 (Min.)]
Zinc	0.80 (Min.)	Zinc sulphate [Zn (%): 33.0 (Min.)]
Manganese	0.12 (Min.)	Manganese sulphate [Mn (%): 31.0 (Min.)]
Iodine	0.026 (Min.)	Potassium iodide [I (%): 76.0 (Min.)]
Iron	0.40 (Min.)	Ferrous sulphate [Fe (%): 30.0 (Min.)]
Cobalt	0.012 (Min.)	Cobalt sulphate [Co (%): 20.0 (Min.)]

## MINERAL MAPPING & AREA SPECIFIC MINERAL MIXTURES

Minerals that are not sufficient from the feeds and fodder ingested by the animals only need to be supplemented through mineral mixture. Mineral mixture should supply only those minerals that are deficient in the ration. NDDB initiated mineral mapping programme in different States, by testing feeds and fodder samples in different agro-climatic zones, so as to develop area specific mineral mixtures. The programme has so far been completed in the States of Gujarat, Rajasthan, Kerala, Punjab, Maharashtra and Andhra Pradesh. Mg, K, Fe, Mn, & Se are more than sufficient in most of the areas, whereas, deficiency levels of Ca, P, S, Na, Cu, Zn & Co vary greatly within the State and their levels have been adjusted accordingly in the formulations.

