

## **Manganese deficiency**

A dietary deficiency of manganese ( Mn ) may cause infertility and skeletal deformities both congenitally and after birth .

### **Etiology:**

- 1- A primary deficiency occurs endemically in some area because of a geological deficiency in the local rock formation .
- 2- An excess of calcium and , or phosphorus in the diet is known to increase the requirements of manganese in the diet of calves , and is considered to reduce the availability of dietary manganese to cattle generally .
- 3- Congenital chondrodystrophy in calves has been associated with manganese deficiency , and outbreak of congenital skeletal defects in Holstein calves due to manganese deficiency has been reported .

### **Epidemiology :**

1- Soil containing less than 3 mg / kg of manganese are unlikely to be able to support normal fertility in cattle. In areas where manganese – responsive infertility occurs , soils on farms with infertility problems have contained less than 3 mg / kg of manganese , whereas soils on neighboring farms with no infertility problems have had level more than 9 mg / kg .

2- A secondary soil deficiency is thought to occur and one of the factors suspected of reducing the availability of manganese in the soil to plants is high alkalinity. Thus heavy liming is associated with manganese – responsive infertility . There are three main soil types on which the disease occur.

A- Soils low manganese have low output even when pH is less than 5.5

B- Sandy soils where availability starts to fall .

C-Heavy soils where availability starts to fall at pH of 7.0 .

### **Pathogenesis:**

Manganese plays an active roles in bone matrix formation and in the synthesis of chondroitin sulfate, responsible for maintaining rigidity of connective tissue. In manganese deficiency, these are affected deleteriously and skeletal abnormalities result. Only 1 % of manganese is absorbed from diets and the liver removes most of it, leaving very low blood level of element.

### **Clinical findings:**

In cattle, the common syndrome is infertility, calves with congenital limb deformities, and calves which manifest poor growth, dry coat, and loss of coat color. The deformity includes knuckling over the fetlocks, enlarged joints and possibly twisting of the legs. The bones of affected limbs are shorter and weaker than normal and there are signs of joint pain, hopping gait and reluctance to move.

A manganese responsive infertility has been described in ewes and is well known in cattle. In cattle, it is manifested by slowness to exhibit estrus and failure to conceive, often accompanied by subnormal size of one or both ovaries. Subestrus and weak estrus have also been observed.

### **Clinical pathology:**

1- The blood of normal cattle contains 18- 19 Mg / dl (3.3-3.5 Mmol / L ) of manganese , although considerably lower level are sometimes quoted .

2- The livers of normal cattle contains 12 mg / kg of manganese and down to 8 mg / kg in newborn calves which also have a lower content in hair

3- The manganese content of hair varies with intake. The normal level is about 12 mg / kg and infertility is observed in association with level of less than 8 mg / kg.

4- In normal cows, the manganese content of hair falls during pregnancy from normal level of 12 mg / kg in the first month of pregnancy to 4.5 mg / kg .

**Treatment and control:**

The maintenance requirement for Mn represents 82 % of the total Mn requirement for non lactating, late gestation cow and 53 % for a cow producing 40 kg / day of milk.

Recent research has determined that Mn intake had to equal 580 mg / day to meet the metabolic fecal Mn requirement.