

**Key words** : nitrates, fodder, methaemoglobin, dyspnoea, diphenylamine, sulphanilic acid, methylene blue.

Nitrate poisoning occurs in animals due to consumption of fodder or drinking water containing high nitrate levels. Generally nitrates are not much toxic to animals. But their reduced form i.e nitrites is very toxic to the animals. Nitrate poisoning occurs when the nitrate consumption of animal exceeds its capacity to convert into nontoxic products and urea. The nitrite is converted to ammonia which is further converted to protein by the ruminal microorganisms. The excess ammonia is absorbed by the blood stream and is excreted in urine as urea. This type of mechanism occurs when the nitrate breakdown system is in balance and no surplus nitrites accumulate. When the nitrates are consumed in huge quantities, the animal is unable to convert to safe end products. The excess nitrite is bound to haemoglobin, forms methemoglobin which reduces the oxygen carrying capacity of red blood cells. The animal dies of respiratory failure. Ruminants are more prone to nitrate poisoning than monogastric animals because in ruminants the microbes in their digestive tract favor the conversion of nitrate to nitrites.

The present paper deals with outbreak of nitrate poisoning in 20 buffalos of Santhanuthalapadu village in Prakasam district of Andhra Pradesh in July 2022.

#### History and clinical signs

Twenty animals were affected. The affected animals exhibited symptoms like drowsiness, weakness, muscle tremors, increased heart and respiratory rates, staggering gait and recumbency. brownish discoloration of mucous membranes due to formation of methaemoglobin. Venous blood also had chocolate brown colour. Death occurred in 5-6 animals within 2-10 hours.

Haematological examination of blood for haemoglobin, PCV, revealed normal values. Cultural examination of blood revealed no bacterial infection of pathological significance.

#### Treatment given

1. The affected animals were treated with 1% solution of methylene blue @ 8.8 mg/kg b.wt slow I.v .
2. Saline purgatives to empty GI tract
3. Broad spectrum antibiotics in 8-19 lts of cold water to inhibit microbial conversion of nitrate to nitrite.

#### Materials and Methods

The affected animals were examined for presence of abnormal clinical symptoms. Haematological examination of blood for haemoglobin, PCV revealed normal values. Cultural examination of blood revealed no bacterial infection of pathological significance. About 15 ground water samples and 15 fodder samples were collected from the place of incidence for this study. The water samples were initially tested by sulphanilic acid qualitative reagent. Those which are found positive by qualitative test were quantified as per AOAC ( 21<sup>st</sup> Edition 2019). The nitrate levels in water samples were found to be ranging from 200 ppm to 1056ppm. The maximum tolerance limit of nitrates in ruminant animal is 100ppm.

#### Results and Discussion

The results on nitrate in water samples are detailed in the table.

S.No	Nitrate content in ppm
1	821.68
2	431.27
3	554.32
4	200.54
5	149.71
6	650.30
7	503.03
8	1055.64
9	864.64
10	732.76
11	979.93
12	828.52
13	411.41
14	719.69
15	260.83

Presence of nitrate in water samples is undesirable which indicates organic pollution. The fertilizers and organic wastes contaminate the water and cause nitrate toxicity. Stagnant waters particularly well water tend to accumulate toxic levels of nitrate (Madhaveswaran *et al* 2013)

The fodder samples were negative for nitrates. The nitrate content of the fodder sample is influenced by various factors like nitrogen content in the soil. According Radostits *et al* (2007) excessive use of poultry litter/ manure would build up nitrates in the soil which gets stored up in forage plants thereafter. Application of nitrogen containing fertilizers like urea, ammonium nitrate are also responsible for occurrence of nitrate poisoning. The distribution of nitrates in the forage is an important factor that interferes with the amount of nitrates to which the animal has access, because the stem has higher concentration of these ions in relation to the leaves ( Kahn 2005). Sidhu *et al* (2011) reported that mixing of high nitrate containing crops with low nitrate containing crops would reduce the chances of toxicity in dairy animals.

Immature cereal crops weeds, cereal hays have high levels of nitrates grow along with grasses and become toxic to animals upon grazing. Under normal environmental conditions the plants absorb nitrates and convert them into amino acids and proteins. According to Larry J. Thompson ( 2021) decreased lighting, cloudy weather increases the nitrate accumulation in fodder as nitrates are not utilized by active photosynthesis. Stress conditions like drought build up very high nitrate levels in plants ( Nicholls and Miles,1980)

Nagarajan *et al* (2015) mentioned sudden death among two Gir cows with bleeding from rectal orifice. Upon necropsy examination, oral mucosa was cyanotic, rectal mucosa near anus revealed slight congestion in all the cows, subcutaneous hemorrhages and oedema of the abdomen, oedema of lungs and dilatation of heart were also seen. In pericardium 2-3 dL of clear yellowish red fluid was found.

Spearman (1989) reported that the cattle were found dead on the pasture without any overt clinical signs.Asiani and Vojdani (2007)

reported clinical signs like posterior incoordination, weakness, trembling of the muscles of the hind limbs. depression, diarrhea and extensive ventral subcutaneous edema in nitrate poisoning cases

### Summary

Incidences of nitrate toxicity in Santhanuthalapatu village of Prakasam dist are high. The farmers use nitrogen containing fertilizers and urea for crops. Majority of the water samples received for testing contained nitrate levels ranging from 200 to 1056 ppm. This is suspected to be the cause of death among buffalos. The affected animals were treated with methylene blue. Some animals recovered following treatment. The farmers were recommended to give nitrate free water to the animals. To know the status of nitrate levels, it was advised to often get the water samples tested for nitrates.

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