



Short Note

Nitrate/nitrite toxicity in buffaloes of Himachal Pradesh: A case investigation

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Abstract

The present study was conducted on the fodder sample and rumen contents received from the Animal Husbandry Department, H.P. to investigate the suspected cases of poisoning in buffaloes. The samples were subjected to various qualitative and quantitative toxicological analysis. Qualitatively both fodder sample and rumen contents were found positive for the presence of nitrate/nitrite by diphenylamine and salicylic acid test. Through quantitative estimation, the concentration of nitrate/nitrite in the fodder sample was found to be 0.2 per cent.

Key words: Nitrate/nitrite, plant toxicity, ruminants.

Nitrogen is one of the most widely deficient plant nutrients present in the world's soils. Various agricultural practices have therefore been developed to increase its concentration in the soil. These practices include incorporating legume varieties in pasture and applying various nitrogen-rich fertilizers to crops. Such practices sometimes cause plants grown in these soils to have nitrate levels above safe limits, resulting in livestock poisonings (Robson, 2007). Though any plant may be suspected for taking large concentration of nitrate, some plants like cereal grasses (oats, millets and rye), maize, sunflower and sorghum readily accumulate nitrate. Both nitrate and nitrite are toxic, but it is difficult to differentiate between the two poisonings and to treat them separately. Among livestock, ruminants are found highly susceptible for nitrate poisoning as nitrate gets converted to nitrite by rumen microbes, which is

much more toxic.

The present investigation was conducted on the fodder sample and rumen contents received from the Animal Husbandry Department, H.P. (Polyclinic Bhangrotu) for toxicological analysis to investigate the acute mortality in buffaloes of village Biharta, Distt. Mandi. Five animals died within 12 hours of consuming fodder with the history of restlessness, respiratory distress and tympany. Some of the other affected animals showed symptoms of hypothermia, there was no rumination, any feed and water intake. Postmortem of the dead animals was conducted. The fodder sample and rumen contents of the five dead animals were subjected to toxicological analysis for the presence of heavy metals (Spot test, Reinch's test), nitrate/nitrite (Diphenylamine test, salicylic acid test) and cyanide/hydrocyanic acid (Ferrous Sulphate test, Steyn's test). The quantitative estimation of

nitrate/nitrite contents in the fodder samples was done with the colorimetric method using Bray's indicator (Wiseman and Jacobson, 1965).

The postmortem examination revealed emphysema and congestion in lungs in all the carcasses. Intestine was empty, filled with gas and congested at some places in all the carcasses except one. The greenish discoloration of the subcutaneous areas was found in 20% cases.. Two whitish patches were present on intestinal wall and mesentery in one of the carcass.

Toxicological analysis of fodder sample and rumen contents was found negative for heavy metals and cyanide/hydrocyanic acid. However, both the fodder sample and rumen contents were found highly positive (++++), and positive (+++), respectively for the presence of nitrate/nitrite on qualitative estimations by both the tests performed. The results were reported to the concerned Animal Husbandry Department with the suggestions to immediately withdraw the fodder material and to advise the

livestock owners not to graze the animals on such pastures. Through quantitative estimation, the concentration of nitrate/nitrite in the fodder sample was found to be 0.2%. Nitrate levels higher than 0.3-0.45% are considered potentially dangerous (Camberato and Johnson, 2012), but obtaining a representative sample of the forage is the most important step in determining forage nitrate. The above investigations revealed that the mortalities in buffaloes were suggestive of high concentration of nitrate/nitrite in the fodder material. Identification of the fodder sample, however, could not be done due to supply of mutilated sample.

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