



The possible geological sources of chronic copper poisoning of sheep in some specific farms of the Karoo Basin, South Africa

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Copper (Cu) is an essential trace element for domestic animals, however, higher concentrations can cause poisoning in sheep [1, 2]. Chronic toxicity can occur if over than 25 mg/kg of Cu is consumed daily over a period of time [3]. Cu is then accumulated in the liver, then released into the bloodstream when sheep experience stress, such as transportation, poor nutrition, dosing or handling, change in weather, and drought [1].

In South Africa, a form of chronic Cu poisoning, called enzootic icterus occurs in sheep farmed in some specific farms of the main Karoo Basin [4]. The geology of the study area consists of argillaceous rocks [5] and the Karoo igneous intrusions, commonly called the Karoo dolerites, which intruded through a network of sills, dykes, and discordant sheets [6].

It is suspected that the Karoo dolerites, might be the source of excess Cu [4]. However, no detailed research has been conducted in order to prove or disprove such a theory.

Our preliminary data on the Karoo dolerites show that these rocks contain Cu concentration ranging between 57.02 and 83.93 mg/kg, which is above the average concentration in earth's crust (55 mg/kg [7]). Whereas other rock types in the area show lower Cu concentrations of 6.19 – 41.11 mg/kg. Molybdenum (Mo) is also considered as it can affect the uptake of copper when it is combined with sulphur (S) to form an insoluble complex, which prevents the liver from absorbing the Cu [1].

Preliminary liver analysis show that Cu concentration in two healthy adult sheep contained 1211.00 and 2723.37 mg/kg dry weight (DW) which is more than double the maximum allowable concentration of 450 mg/kg DW according to the laboratory report.

Based on these data, we believe that the doleritic rocks might be indeed the source of the Cu-poisoning of sheep in the study area. However, further analysis are needed in order to confirm this theory.

References:

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