

How Cattle Grazing Influences Heavy Metal Concentrations in Tropical Pasture Soils

ABSTRACT

This study investigates the impact of short-term (1.5-year) heavy and long-term (33-year) moderate grazing intensities on the heavy metal concentrations in soils of tropical pastures. The concentration of heavy metals (Cd, Fe, Mn, Cu, Cr, Pb, and Zn) was determined in the Livestock Section of University Putra Malaysia, Selangor, Malaysia. The heavy metal concentrations in the soil were not affected ($P>0.05$) by short-term heavy grazing intensity. The concentrations of Fe, Mn, and Zn were significantly affected ($P\leq 0.05$) by long-term moderate grazing or soil depth and by the interaction between them. The Cu concentration in soil was only affected ($P<0.05$) by grazing, but not ($P>0.05$) by sampling depth or their interaction. The concentrations of Fe, Mn, Cu, and Zn in long-term moderately grazed pasture soil were 127.9, 194.8, 54.8, and 39,900% higher, respectively, than ungrazed pasture. Soil Fe, Mn, and Zn concentrations were significantly higher ($P<0.05$) in surface (0-10 cm) than subsurface (10-20 cm) soils. Results suggest that the excreta of grazing cattle can be an important source of heavy metals in intensively managed pastures in the long-term. However, metal concentrations were maintained within the normal range and were not high enough to be dangerous from the toxicological point of view.

Keyword: heavy metals, intensively managed pasture, long-term moderate grazing, short-term heavy grazing, Malaysia