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Effects of Transhumance and Vegetation Type on Soil Quality of Rangelands in Northern Benin

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Abstract

Increasing use of natural rangelands by animal herds transhumant from the Sahel to coastal countries may affect the ecology of rangeland soils and food production in these countries. To elucidate this further, we evaluated the effects of transhumance and vegetation type on soil quality of rangelands in two municipalities of northern Benin (Sinende and Tchaourou). Two zones with different intensities of transhumance (Strong: ST and weak: WT) and three vegetation types (VT) namely open forest/woodland savannah, wooded savannah/shrubland savannahs and crop field mosaic were studied. Soil samples (1 kg of pooled soil samples) were collected from 90 plots of 100 m² (60 on ST and 30 on WT zones) in 5 different spots of 1 m² using an auger. The composite soil samples were analysed for texture, pH and organic matter contents using standard methods. In addition, soil compaction was monitored using a penetrometer at 5 cm depth.

The results indicated that, irrespective of transhumance zone and vegetation type, soils encountered in Northern Benin rangelands have loamy-sandy and loamy textures. Also, the organic matter content was similar across zones ($p = 0.6571$) and varied across VT ($p = 0.0004$). However, soil compaction was significantly affected by VT ($p = 0.0386$) and transhumance zone ($p = 0.0026$) and was stronger in the ST than WT zone. In contrast, soil texture and pH were neither affected by transhumance ($p = 0.1083$) nor by VT ($p = 0.9995$). Moving herds strategically from one pasture to the other, may help avoid rangeland soil degradation, reduce overexploitation of pasture resources, and improve rangeland quality and productivity.

Keywords: Livestock, natural pasture, pastoral mobility, rangeland soils