

Christina T. Igono¹, Juan Solomon² and Dhurba Neupane¹

¹Department of Natural Resources and Environmental Science and ²Department of Agriculture, Nutrition, and Veterinary Sciences, University of Nevada, Reno

ABSTRACT

The management of pasture can alter the properties of soil both in depth and distance from water or shade source. Soil samples were collected from two historical strip-stocked pastures at the University of Nevada, Reno Main Experiment Station in Reno Nevada. The grazed pastures comprised of a mixture of tall fescue (*Festuca arundinacea*), white clover (*Trifolium repens*), Kentucky bluegrass (*Poa pratensis*), orchardgrass (*Dactylis glomerata*) and timothy (*Phleum pretense*). Each strip was one hectare in size and typically stocked with crossbred cattle, at a stocking density of 20 animals ha⁻¹ for a duration of 1- to 2-d. The objective of this study was to evaluate the effects of strip stocking on soil nutrient distribution in a semiarid environment. Soil samples were collected from three different depths (0- to 8-cm, 8- to 15-cm and 15- to 23-cm) and distances from water source (0- to 60-m [Zone 1], 60- to 120-m [Zone 2] and the rest of each strip [Zone 3]). Soil extractable P and ammonium (NH₄-N) concentrations were affected by soil depth ($P < 0.0001$) but not by distance from water source ($P > 0.05$). Both soil extractable P and NH₄-N concentrations were greater at the soil surface 0- to 8-cm compared to deeper in the soil profile. Soil nitrate-N (NO₃-N) concentration was not affected by soil depth ($P = 0.385$) but was affected by distance from water source ($P = 0.0015$). Soil NO₃-N concentration was greatest in Zone 3 followed by Zone 2 and 1 respectively. These results are preliminary and with the exception of soil NO₃-N, TSN, and TSC concentrations, distance from water source did not affect soil extractable P and soil NH₄-N in strip-stocked pastures.

INTRODUCTION

- The pattern of grazing animals and stocking method employed can lead to spatial variability in soil nutrients concentration in pastures.
- Using stocking methods that enhance the uniformity of soil nutrient distribution is a major goal of grazing management.

OBJECTIVE

To evaluate the effects of strip stocking on soil nutrient distribution across a predominantly mixed grass pasture in a semiarid environment.

MATERIALS AND METHODS

Research Site

The study site was at the University of Nevada, Reno Main Experiment Station in Reno Nevada. The soils at the study site are predominantly sandy loam.

Data Collected

✓ **Soil Sampling:** Soil samples were collected from three separate zones in each strip at three different depths (0 to 8, 8 to 15, and 15 to 23-cm respectively) using a 2-cm soil core.

✓ **Soil pH** was measured using Corning pH meter 240.

✓ **Soil Inorganic N:** Ammonium (NH₄-N) and Nitrate (NO₃-N) were analyzed using Lachat Quickchem.

✓ **Soil Total C and N:** were analyzed using the dry combustion (Dumas method), with LECO CN Analyzer.

Statistical Analysis

Soil data (nutrient concentration) were analyzed by fitting mixed models using PROC MIXED in SAS.



Sodium Bicarbonate-P Analysis using Spectrometer



Grazing Strip



Soil inorganic N (NH₄ and NO₃) analysis using KCl extraction



Grazing Strip

RESULTS

Table 1: Soil nutrient concentration within zone

Soil Nutrients						
Distance From Water Source	Soil-pH	Bicarb-P	NH ₄ -N	NO ₃ -N	TSN	TSC
		mg/kg			g/kg	
ZONE 1	6.7	1.26	1.02	32.2	2.0	25.8
ZONE 2	6.7	1.27	1.01	34.5	2.2	27.8
ZONE 3	6.7	1.39	1.14	39.5	2.5	29.2
SEM		0.06	0.11	1.4	1.0	0.7
P Value	>0.05	0.207	0.621	0.001	0.014	0.002

Zone1: 0-60 m, Zone2: 60-120 m and Zone3: from 120 m to the rest of the strip.

Table 2: Soil nutrient concentration within soil depth.

Soil Nutrients						
Soil Depth	Soil-pH	Bicarb-P	NH ₄ -N	NO ₃ -N	TSN	TSC
		mg/kg			g/kg	
0-8cm	6.7	1.61	1.40	33.8	2.5	30.5
8-15cm	6.7	1.27	1.07	36.7	2.3	27.0
15-23cm	6.8	1.04	0.70	35.5	2.0	25.4
SEM		0.06	0.11	1.4	1.0	0.7
P Value	>0.05	<.0001	<.0001	0.385	0.016	<.0001

SUMMARY

These results are preliminary and with the exception of soil NO₃-N, TSN, and TSC concentrations, distance from water source did not affect soil extractable P and soil NH₄-N in strip-stocked pastures.