

ANALYSIS OF SOIL HEALTH OF PERENNIAL PASTURES UNDER DIFFERING YEARS OF WINTER ANNUAL VEGETATION AND GRAZING

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Utilizing winter annuals in livestock pastures reduces feed costs of hay, and provides additional vegetative cover that is beneficial to the soil. However, how this practice affects the soil microbial communities has not been well studied. This project was conducted on three different pastures that had been under cattle grazing for varying amounts of time: 10 years, 4 years, and 0 years. Additionally, the 10 and 4 year pastures had had winter annuals incorporated for the past 4 years while the ungrazed pasture had no management improvements. Each pasture was divided into three pseudo-replicates from which five soil cores were collected to a depth of 30 cm. Samples were analyzed for soil nutrient content, soil microbial community composition and enzymatic activity, and bulk density. According to years of management, soil pH was highest at 5.95, bulk density was 6% lower, and β -glucosidase 25% higher in the 10 year pasture compared to the other pastures. According to date of collection, total carbon decreased by 40% from fall 2016 to fall 2017 before recovering in spring 2018 while total nitrogen remained unchanged before increasing by 31% in spring 2018. The fungi to bacteria ratio (F:B) decreased fivefold from fall 2016 to spring 2017. As the soil microbial community structure, soil organic matter, TC, and TN was unchanged across years under management, it may be that an equilibrium was achieved across these systems. Also, the changes in the soil microbial community by date of collection may be in response to abiotic and biotic factors.

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