TILLAGE AND GRAZING EFFECTS ON SOIL PHYSICAL PROPERTIES AND CROP YIELD

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ABSTRACT

Water conservation using deficit irrigation and dryland cropping systems are being implemented where the Ogallala aquifer limits irrigation capacity. Decreased crop productivity and profitability has encouraged integration of cattle grazing to supplement crop income, but potential soil compaction may reduce infiltration, limit root growth, and depress yield. Our objectives were to quantify the effects of grazing and tillage practices on ponded infiltration, soil density and penetration resistance with depth, crop yield, and cattle gain. Dryland wheat (*Triticum aestivum* L.) and grain sorghum [*Sorghum bicolor* (L.) Moench] were grown in a 3-year wheat-sorghum-fallow (WSF) rotation with all phases duplicated for grazed or ungrazed plots on a 40 ac. area that we split with no- or stubblemulch- tillage within three blocks (replicates). Cattle gain, crop growth and yield, and measured soil properties were compared with a randomized complete block split-split plot analysis of variance. Dryland wheat forage was sufficient for 32 days grazing with a mean gain of 120 lbs acre^{-1}, which offset the reduced wheat grain yield of 20 bu. acre^{-1} for grazed plots compared with 23 bu acre^{-1} for ungrazed wheat. With timely removal of grazing cattle from wheat, residues for fallow were unaffected by grazing and the subsequent sorghum yielded a uniform 37 bu acre^{-1}. Soil density and penetration resistance measured during fallow after wheat increased with grazing, but were unaffected during fallow after sorghum. Grazing generally depressed infiltration rates for all tillage and cropping phase combinations with the exception of the fallow after wheat no-tillage plots. Limited grazing of dryland wheat successfully increases overall productivity of the WSF cropping system by maintaining wheat grain production and adding cattle gain, but soil compaction reduces infiltration.