



Simulation of Drought and Grazing Effects on Forage Growth in the Northern Mixed Grass Zone of the U.S.A. Using the GPFarm-Range Model

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Drought and grazing intensity are major determinants of forage growth and productivity. Research findings on these effects are not always conclusive. Some researchers found no significant effects of grazing on forage re-growth potential but others observed reduction in forage re-growth under intensive grazing. The extrapolation of field observations is often limited because of their location and time specificity. On the other hand, models synthesize knowledge of the systems behavior so that once validated, they provide effective tools for investigating livestock and forage growth under a wide range of environmental and management conditions. We tested the ability of the GPFARM-Range model to simulate forage growth at Miles City, Montana, from 1993 to 1996 under 3 treatments: (1) no drought and no grazing, (2) drought in 1994 and short-term intensive grazing by sheep in 1994 and 1995 and (3) drought in 1994 but no grazing. The model was parameterized assuming that ewes weighed 65 kg and their lambs weighed 20 kg. The daily dry matter intake was set at 1.5% of the live weight. The patterns of forage growth within and between years were well captured by the model. In particular, the abrupt decline in forage biomass following the grazing events was correctly simulated. The results indicated that over the 4 years, simulated forage generally agreed well with the observed with r^2 ranging from 0.63 for treatment (1) to 0.82 for treatment (3). It was concluded that the GPFARM-Range model could adequately assess grazing intensity and environmental effects on forage productivity.

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