

Integrating Forage into a Traditional Cropping System

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Sustainability of traditional cropping systems in the Northern Great Plains is being challenged both economically and environmentally. Forage-based cropping systems have been implemented successfully in other parts of the world. Livestock grazing has been an important component of these forage-based systems. Forage-based cropping systems are being compared to a grain only (wheat [*Triticum aestivum*] and pea [*Pisum sativum*]) cropping system in southwestern North Dakota at the Dickinson Research Extension Center. Forage-based systems include either an alfalfa (*Medicago sativa*; ALF) or a birdsfoot trefoil (*Lotus Corniculatus*; BFT) forage phase. In 2003, the ALF system included three fields (wheat, second-year ALF [ALF2], and a newly-seeded ALF/oat [*Avena sativa*] mix [ALF1]). The BFT system also consisted of three fields (one of wheat and two of newly-seeded BFT/oat mix [BFT1]). Sets of legume fields (2.5 ac per field) in each system were rotationally grazed with yearling beef heifers to determine livestock performance from June through August. Forage available for grazing was greater in ALF1 than BFT1 ($P=0.09$). However, BFT1 had more forage available for grazing than ALF2 ($P=0.01$). In general, forage available for grazing was greater during the middle of the grazing season compared to either earlier or later ($P\leq 0.10$). Although there was no difference in individual animal growth (lb/d; $P=0.5$) or pasture output (lb/ac; $P=0.5$) between newly-seeded legumes, BFT1 supported greater gains ($P=0.01$) and output ($P=0.01$) than ALF2. The ALF system produced more grazing days than the BFT system (92 vs 69; $P=0.01$). There was no difference in overall pasture output between systems (150 and 153 lb/ac for ALF and BFT, respectively; $P=0.9$). When compared across similar periods, the BFT system produced numerically more output per acre (31 lb/ac; $P=0.4$). There was no difference between newly-seeded legumes in regards to individual animal growth or pasture output. However, the BFT produced more forage available for grazing and pasture output than previously established ALF. Based upon these limited data, birdsfoot trefoil would be a suitable alternative to alfalfa in a forage-based wheat production system in southwestern North Dakota.