

Production systems to integrate livestock grazing and grain production in southern Brazil and Midwestern USA

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Introduction Agriculture in the USA and Brazil has undergone similar and dramatic changes in the past 20 years. In both countries, production systems have become increasingly specialized. Large farms are characterized by single enterprises, simple crop rotations, and livestock production is segregated from grain production. The lack of diversification and high production costs expose producers to risk from economic swings of single enterprises and greater reliance on pesticides and synthetic fertilizers to maintain profitability, along with greater risk of soil erosion from continuous row crop production. Scientists in southern Brazil and Ohio are collaborating to develop no-tillage systems that integrate livestock grazing with cash grain production. The goal is diversified production systems that are profitable as well as biologically and environmentally sound.

Strategies of integration Two primary strategies are being followed for integrating livestock grazing and grain production: rotation of annual grain crops with perennial pastures and livestock grazing of winter cover crops or annual pastures in rotation with summer grain crops. The first strategy seems to be readily adopted by livestock producers, especially when pasture renovation is desirable. The second strategy often receives resistance from grain producers, because they believe grazing livestock will significantly compact the soil and adversely affect soil properties such that subsequent grain yield will be compromised.

Systems research To address producer concerns, a systems approach to studying soil-plant-animal interactions was carried out in southern Brazil since 1994 and is now being developed at several institutions in the USA. The research is providing a basis for best management practices for integrating livestock grazing and cash grain production on the same land base in a sustainable and ecologically sound manner. Evaluations include species for autumn and winter grazing, stocking density and grazing intensity, timing of grazing events, and animal performance on winter annual pastures while considering the impact on nutrient cycling, soil physical and chemical properties, pest cycles, and subsequent grain production. Brazilian studies have shown that winter grazing does not compromise grain yield of soybean (*Glycine max* L.) and corn (*Zea mays* L.); winter grazing may even increase yield provided animal stocking and grazing are managed appropriately (Mello and Assmann, 2002; Moraes et al., 2003). Soil physical properties are affected by animal traffic, but biologically amelioration of soil compaction from grazing appears possible via pasture and grain crop root system growth under strategically managed grazing (Moraes and Lustosa, 1997). In Brazil, managed grazing of high quality forages by steers with improved genetic potential has yielded average daily gains exceeding 1.2 kg/day on winter annual pasture and 0.8 kg/day on productive perennial summer pasture, resulting in live weight production of 650 kg/ha during the winter season (annual pastures rotated with summer grain crops) and 1600 kg/ha on permanent summer pasture (210 days). Steers have reached market weight in 18 months on grass pastures. In Brazil, the no-tillage integrated systems can improve profits 8-fold over the average extensive stocker grazing systems and 1.5-fold over soybean grain production systems. In Ohio, evaluations are focusing on extending the grazing season with cereal forages established within corn, soybean, and winter wheat grain rotations to reduce use of expensive stored feed during the winter months. Studies are in progress to evaluate winter grazing strategies to minimize adverse impacts on soils and subsequent grain production. The results have motivated grain and livestock producers to experiment and learn first-hand of the financial, biological, and environmental benefits of integrated systems. Integrated livestock grazing – grain systems show tremendous promise to increase profitability and sustainability of farms in Brazil and the USA.

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