LAKE OKEECHOBEE WATERSHED PASTURE WATER MANAGEMENT FOR REDUCED PHOSPHORUS LOADING PROJECT

Project Overview:

This project was part of a collaborative effort among various stakeholders designed to provide recommendations for the development and implementation of environmentally and economically sustainable cow/calf practices in the Lake Okeechobee watershed. Earlier research results indicate that changes in cattle stocking density are unlikely to produce measurable effect on nutrient loads in the short-term, and that phosphorus loads may be related to phosphorus accumulation in soils due to past fertilization practices in improved pastures. Given these results, a water management study was initiated in 2004 to evaluate the feasibility of on-farm retention/detention of water in controlling P losses from beef cattle ranches. Our hypothesis is that more phosphorus is retained when water flows more slowly or is held back relative to when it drains off quickly.

Project Objectives:

The specific objectives of the project were: (1) to document the effects of water storage and reduced flow on the quality of water leaving the pastures; (2) to evaluate forage yield and quality, and animal performance as influenced by water retention treatments; and (3) to determine nutrient load reductions from the pastures by integrating flow, vegetation, water quality and animal performance data.

Project Description/Features:

The study was conducted on eight 50-acre plots in a block of improved pastures located at the Buck Island Ranch (Fig. 1). Two water treatments were evaluated; *reduced and uninterrupted flow*. Reduced flow involved holding water back in the pastures while maintaining a "desired" water table depth. This treatment was imposed on Plots 1-4 by installing flashboard riser control structures in the ditches, one close to the existing flume and another at the midsection of the ditch (Fig. 2). Plots 5-8 were subjected to uninterrupted flow treatment, allowing water to flow freely in the pastures. The plots were grazed at an optimal stocking rate except for Plots 1 and 8 which served as long-term grazing controls.

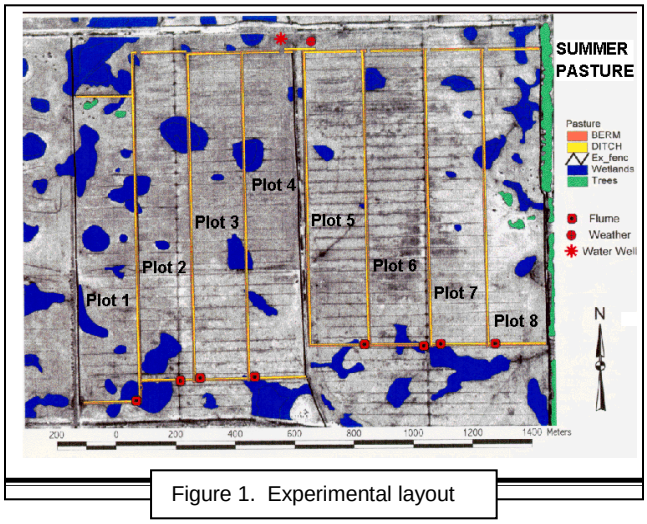

Figure 1. Experimental layout

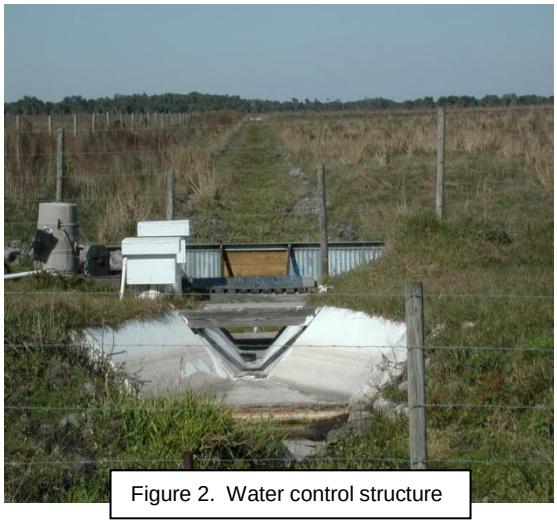

Figure 2. Water control structure

Project Status:

This project was completed in March 2009. Pasture water retention significantly reduced total nitrogen (TN) loads from the pastures. Overall annual TN loads were 11.28 kg ha^{-1} in pastures with uninterrupted flow and 6.28 kg ha^{-1} in pastures with reduced flow, a 44% reduction. Effects of water retention on total phosphorus (TP) loads were equivocal. In 2005, the reduced flow treatment increased TP loads by 39%, due to increased TP concentration, but in 2006, it reduced TP loads by 37%. In 2007, an extremely dry year, TP loads were negative due to backflow exceeding forward flow. In 2008, TP loads were 16% lower in reduced flow pastures, but the difference was not significant. If 2005 and 2007 results are removed, the average reduction in TP loads due to water retention was 27%.