



Using Center Pivot Irrigation for Central Sands' Pastures

Situation: The Central Sands area of Wisconsin gets its name from the presence of sandy loam soils with an organic matter content of 1-1.5% organic matter. Sandy loam soils have very low water holding capacity and low organic matter also limits the nutrients available to growing plants. With an average growing season rainfall of 21 inches, the Central Sands areas can have serious droughts during the growing season lasting 40-50 days. This has reduced the production per acre in improved grass/legume pasture to 4-4.5 tons of dry matter per acre.

Response: In Adams County one beef cow-calf operation and one dairy farm implemented center pivot irrigation to increase the amount of high quality forage available to their herds. Information was needed regarding the potential yield advantage of irrigation to support pasture production, so both farms cooperated to provide comparisons between irrigated and non-irrigated pastures over a two year period in 2006 and 2007.

Methods: Eight sites in each 60 acre center pivot were selected at random for forage sampling on each farm. Four of these sites were for irrigated pasture and four were for non-irrigated sites. The non-irrigation sites were developed by making a 81 square foot area by forming a circle using two 16 cattle panels. These were secured with 4 steel posts and heavy duty canvas was applied prior to the irrigation system being turned on to insure this area did not receive the irrigated water. In each circle an area of 10 square feet was harvested 5 times annually over a two year period.

Results: The cow-calf operation irrigated weekly to insure that the grass/legume pasture received 1.5 inches of water from a combination of rainfall and irrigating water. The forage mixture contained alfalfa, red clover, white clover, tall fescue, and orchard grass. The dairy operation irrigated weekly to insure that the grass/legume pasture received .75 inches of water from a combination of irrigated water and rainfall. This dairy farm forage mixture included perennial rye grass, orchard grass, alfalfa, and white clover.

Table 1. Summary of Forage Yields 2006 and 2007

Year	Beef Irrigated Dry Matter Tons/Acre	Beef Dryland Dry Matter Tons/Acre	Dairy Irrigated Dry Matter Tons/Acre	Dairy Dryland Dry Matter Ton/Acre	Growing Season Rainfall
2006	8.45	4.60	7.32	4.55	18*

2007	9.30	4.84	7.89	4.66	14
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* 4.4 inches occurred over a 3 day event in late June

The yield to response was very positive adding almost 3-4 tons of forage per acre. Each area sampled had the same fertilization and harvesting time. The only difference was the amount of water available to the plants.

If we put a value of \$120 per ton on the value of the harvested forage, irrigated pasture values were \$332-\$535 over dry land pastures (Table 2).

Table 2. Value of Forage Increase

Year	\$ Value of Increased Forage Beef Operation	\$ Value of Increased Forage Hay Operation
2006	\$462	\$332
2007	\$535	\$387

The increased production from irrigation makes it cost effective for most producers to consider, especially in areas with high land prices or in areas where land to expand is not available to rent or purchase.

Typical cost for a center pivot area are \$30,000 for drilling a 12 inch well (watering 240 acres), and an irrigation system will cost around \$450 per acre. Electricity or fuel charges will normally cost \$4-5 per inch of water applied. If we look at a useful life of 25 years on the equipment and 20 years on the well the cost per acre applying one inch of water is somewhere around \$17-\$20 per acre to cover all cost. If we apply 8 inches of water in a growing season our cost is \$160 per acre and if we increase the yield by 1.33 ton per acre we are at a breakeven level.

The big advantage with the center pivot irrigation is the fact you are assured of getting a forage crop in drought years. These fields can also be used in a crop rotation and can then be planted to grain or vegetable crops.