7-28-1995

Economic and Environmental Impacts of Agricultural Management Systems on Wetland Areas in East-Central S. D.; Weather: Wet, Drought, Frost, Corn & Soybean Outlook

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ECONOMICS COMMENTATOR

SDSU

South Dakota State University No. 351 July 28, 1995

ECONOMIC AND ENVIRONMENTAL IMPACTS OF AGRICULTURAL MANAGEMENT SYSTEMS ON WETLAND AREAS IN EAST-CENTRAL S.D.

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Wetlands are an integral part of agricultural systems in the Prairie Pothole Region (PPR) of eastern South Dakota. Wetlands impact agriculture by storing water for groundwater and soil recharge, trapping sediment and runoff, and providing hay and forage. Agricultural practices can influence wetland water quantity and quality, habitat value, and species diversity.

South Dakota State University's Plant Science and Economics Departments are currently engaged in a cooperative research effort which investigates several environmental and economic factors associated with different farming systems and management of wetlands in the PPR. In this issue of the Commentator, we briefly explain the study and summarize key findings.

Selection of Farming Systems

Three distinctly different farm management systems located in east-central South Dakota were selected for the study. These include: transitional no-till (TNT), conventional (CON), and organic (ORG) farming systems. Each farm management system differs greatly in use of crop rotations, tillage practices, and chemical inputs. In general, the TNT and CON management systems use synthetic fertilizers and pesticides, while the ORG system uses no synthetic fertilizer and usually no pesticides. Tillage is the primary method of weed control in the CON and ORG systems while the TNT system relies more on the use of herbicides.

(Continued on p.2)

WEATHER: WET, DROUGHT, FROST, CORN & SOYBEAN OUTLOOK

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Spring 1995 market price rallies began as excess rainfall led to expectations of millions of acres going into prevented plantings. Spring wheat and corn acreage reductions were expected with oilseed acre expansions. The June 1 USDA Acreage Report contained planting estimates that verified these expectations. Compared to the acreage in the March 1, 1995 Prospective Planting Report, corn acreage intentions declined 3.3 million acres, while soybean and sunflower acreage increased 1.6 and 0.1 million acres, respectively. These planting intentions are expected to differ from actual plantings because many producers were still attempting to plant more of these crops after the June 1 survey was completed. But, final planted acreage is not expected to change more than one million acres for any of these crops.

In mid-June, with plantings anticipated, the grain market participants went from trading wet weather and prevented plantings to drought and reduced yields in one afternoon. Of course, this change came simultaneously with 100 degree temperatures and 6-10 day weather forecasts of below normal rainfall. Now, the market is trading weekly crop progress and condition reports issued by USDA every Monday afternoon along with 6-10 day weather forecast issued every Monday, Wednesday and Friday. This will most likely continue into mid-August when a change to frost expectations is made.

Market volatility associated with frost expectations is usually limited by the fact that only northern corn belt crop yields are affected by freezing temperatures. Price rallies based on frost normally struggle and fall short of realizing drought market highs of June and July.

(Continued on p.3)

Although each farming system employs different management practices, these farms have common features that facilitate detailed agronomic and economic comparisons: (1) the three systems are located close to each other with cropland located on similar soil types; (2) the principal crops on each farm include corn, soybeans, alfalfa, and some small grains which is representative of area cropland use; and (3) each farm has semipermanent, seasonal, and temporary wetlands in or around its crop fields.

On-farm interviews and field inspections were conducted to obtain detailed agronomic and economic information about each management system. This includes information on specific cultural practices, production inputs and machinery use, and detailed information on whole-farm and field tract cropping history including farmer reported yields.

Economic Comparisons

Whole-farm and field-level enterprise budgets were developed to compare economic costs and net returns in each agricultural management system.

Production costs by management system from lowest to highest were ORG < TNT < CON (Table 1). The ORG system had lower reported average yields and considerably lower production costs per acre than the other management systems. The ORG system also had a much greater reliance on a diversified crop rotation system. The TNT system generally had the least diversified crop rotation system, and similar or higher yields than the CON system. The added costs of tillage and machinery operations in the CON system exceeded any reduction in chemical costs compared to the TNT system.

The relative ranking of net returns by management system was consistently TNT > CON > ORG, unless organic premiums from soybean and corn sales were a major component of gross cash receipts (Table 2). For example, 1994 net returns to management were $62.23 and $58.28 per acre in the TNT and CON management systems, respectively. The ORG system had 1994 net returns of $32.62 per acre excluding organic premium income. However, because organic premiums were available in 1994, the ORG system had net returns of $73.53 per acre including the organic premiums received for corn and soybeans.

Overall, the major differences in net returns per crop acre were attributed to differences in (1) reported average yields; (2) production costs per acre; (3) crop mix (proportion of acres planted to each crop); (4) availability and extent of organic premiums; and (5) amount of wetlands in each farming system.

Table 1. Production Costs by Farming System ($ per acre)

	ORG	TNT	CON
1992	$87.11	$115.30	$147.22
1993	52.01	54.19	112.86
1994	73.49	118.89	139.79

Table 2. Economic Ranking by Farming System Net Return ($ per acre)

TNT	CON	ORG	
$41.59	$38.59	$12.77	in '92 "normal yields"
8.07	3.23	(5.53)	in '93 "very low yields"
62.23	58.28	32.62	in '94 "above-average yields"

The extent of hydric soils and wetlands was a factor affecting all three farming systems. The Natural Resource Conservation Service definition of a hydric soil is "a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part." The study indicated that crop fields with a higher proportion of hydric soils and wetlands had lower average yields and lower average profit contributions than other fields.

Environmental Results

The SDSU Plant Science Department selected twelve wetland sites for intensive water quality monitoring. Considerations for selection included representation of each farming system, soil classification, and wetland type, as well as wetlands which had been farmed through and/or altered.

The objective was to determine the effects of different farm production systems on the concentrations of nitrate, phosphate, and pesticides in surface and groundwater. In the PPR, surface water and groundwater are often hydrologically linked. Since water movement does not stop at field or farm boundaries, water protection from nonpoint sources such as agricultural chemicals may need to be implemented at a regional or watershed level.

Pesticides were detected in surface and groundwater in all three farming systems. The frequency of detection was greatest in the TNT during the summer sample date. The type of farm management system, in this study, did not have consistent effects on nitrate and phosphate concentrations. Regardless of system, important water quality factors were management

...tices which reduced runoff. This was accomplished by rotation with forage legumes and buffer strips in the ORG system, reduced tillage to maintain residue in the TNT system, and terraces in the CON system. When runoff control practices failed, water quality deteriorated.

The use of buffer strips may be the most adaptable practice of reducing runoff regardless of management system. Buffer strips eliminate row crop losses, offer wildlife habitat, recycle run-off nutrients, and can be harvested for hay or forage.

The wetlands reduced concentrations of nitrates and phosphates through denitrification and phosphorous absorption. However, these mechanisms represent a loss of crop nutrients from the system and wasted inputs. In the future, wetland management should include the use of buffers to protect wetlands rather than the use of wetlands as buffers.

Conclusions

Managing agricultural fields with wetlands can challenge both economic and environmental goals. However, a major conclusion of the study is that all three systems are profitable and can be managed in an environmentally sound manner. The study indicates that some practices, such as planting buffer strips around wetlands, are the most environmentally sound and are often economically beneficial regardless of farm management system.

This Economics Commentator article is based on the South Dakota State University Economics Staff Paper 95-3 (July 1995) entitled ***Economic and Environmental Contributions of Wetlands in Agricultural Landscapes*** (Larry Janssen, lead author). Copies may be obtained by contacting the Economics Department at South Dakota State University, Scobey Hall, Box 504A, Brookings, SD 57007.

(Weather... continued from p.1)

July USDA supply and demand and price forecasts for corn and soybeans are presented in the following table. June acreage estimates and early July conditions were used to project production of 7.785 billion bushels of corn and 2.24 billion bushels of soybeans. Given these supply conditions, demand was projected and ending stocks computed at 725 million bushels of corn and 325 million bushels of soybeans. This is a very tight carryover for corn but more than adequate for soybeans. The USDA national corn and soybean price estimates are $2.55 to $2.95 and $5.50 to $6.50 per bushel, respectively.

Supply and Demand: Corn and Soybeans

	CORN		SOYBEANS	
	USDA	SDSU	USDA	SDSU
Planted Acres (mil)	72.0	72.5	63.1	63.5
Harvested Acres (mil)	65.0	65.5	62.2	62.5
Yield (bu/Ac)	119.7	116.5	36.0	34.0
Production (mil bu)	7785	7630	2240	2125
Beginning Stocks	1505	1500	385	385
Imports	10	10	5	5
Supply	9300	9140	2630	2515
Feed	4925	4900	--	--
Crush	--	--	1385	1380
Food, Seed & Industrial	1775	1760	--	--
Seed & Residuals	--	--	120	100
Exports	1875	1850	800	775
Demand	8575	8510	2305	2255
Ending Stocks	725	630	325	260
Nat'l Average Price	$2.55-2.95	$2.60-3.00	$5.50-6.50	$5.75-6.75
S.D. Average Price	$2.30-2.70	$2.35-2.75	$5.25-6.25	$5.50-6.50

Since the time of the USDA estimates, crop conditions have deteriorated as shown on the condition index figures (on page 4). The market prices have increased as traders anticipate lower yields and smaller supplies. The supply and demand estimates based on conditions and long term weather forecasts are presented in the table under the SDSU column. The projected prices for corn and soybeans now are $2.60 to $3.00 and $5.75 to $6.75 per bushel, respectively. Current, new crop futures market prices reflect the upper end of these price expectations. These prices will change with each week's condition and progress reports as higher or lower yields and supplies are anticipated. If droughtiness is no longer perceived as a problem and conditions improve, corn and soybean prices will drop about 25¢ and 75¢, respectively. If conditions continue to deteriorate, prices may reach new highs. This volatile action usually continues until mid-August when market forecasts of production amounts are more sure. Then, prices tend to drift lower until harvest. However, this year frost concerns (because of late plantings) may hold prices higher, especially if the 30-day weather forecast issued in mid-August calls for below normal temperatures. Grain prices most likely will remain quite volatile until the frost danger is past in early October.

In summary, weather will continue to dominate corn and soybean markets for the next two to three months. Use scale up marketing plans to take advantage of these good prices and use pricing strategies that limit stress levels.

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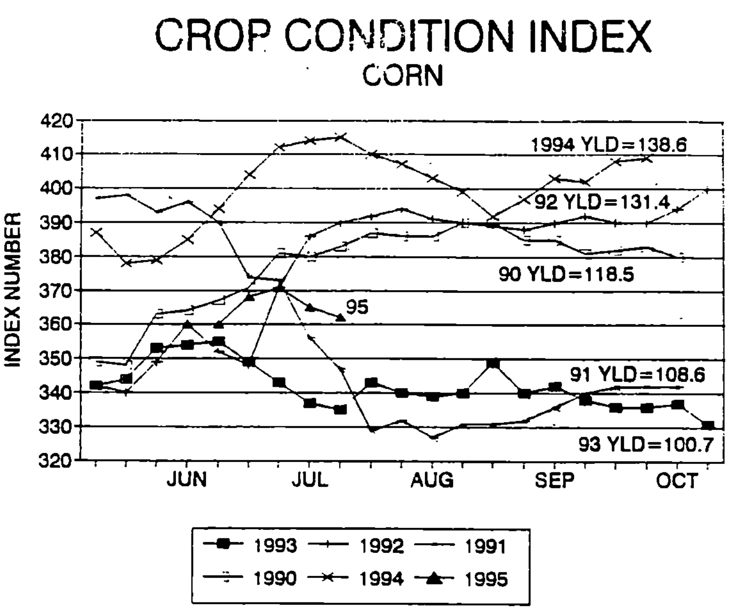

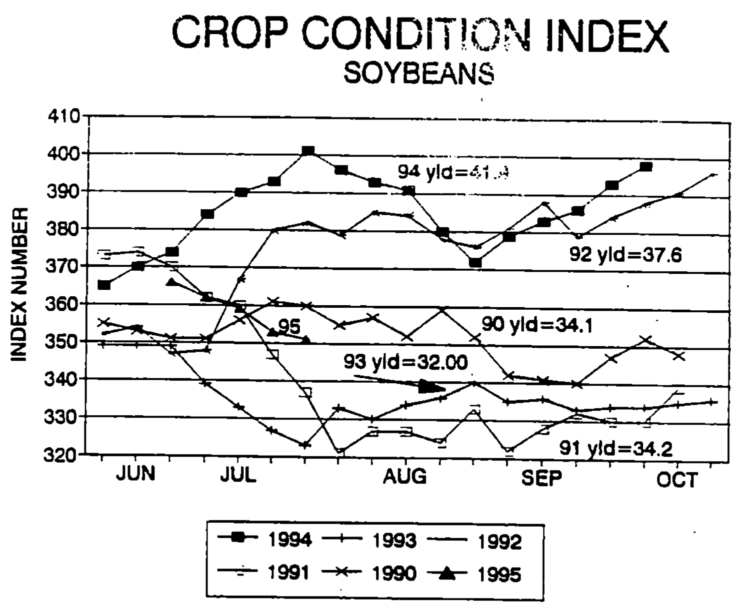

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ECONOMICS COMMENTATOR

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