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SARE Project LNC93-55

Special Management Practices in the Big Sioux Aquifer under Federal Incentive Programs

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Introduction

The Big Sioux Aquifer (BSA) is a shallow aquifer located under the fertile soils of eastern South Dakota. Most of this land is devoted to intensive agriculture. Preventing groundwater contamination from fertilizers, pesticides, and animal waste is a major objective of the Big Sioux Aquifer Water Quality Demonstration Project. The project covers 99,480 acres on over 400 farms in Brookings, Moody, and Minnehaha counties. Nearly 85% of these acres are cropland, with over 10,000 acres under irrigation (1).

The BSA is one of sixteen demonstration projects in the United States developed as a part of a 5-year comprehensive program funded by the USDA. The BSA is aimed at protecting groundwater quality in shallow aquifers by identifying farm management practices which are environmentally sound and economically feasible. The goal is to promote voluntary adoption of innovative production practices, management systems, and land treatment to reduce or eliminate contamination of the aquifer by agricultural operations (1).

There are a number of environmentally sound management practices within these programs that can be used by farmers to

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help them reach the goals that are stated for the BSA Demo Project. The Integrated Farm Management (IFM) Program, the Integrated Crop Management (ICM) Program, and the Water Quality Incentive (WQIP) Program were introduced in the 1990 Farm Bill and related initiatives. Research at South Dakota State University will focus on these new economic incentive programs to see if the incentives are attractive enough to encourage farmers to adopt more sustainable farming practices and systems. The research is being funded in part by a SARE (formerly LISA) grant and will encompass study of the economic and environmental implications of the 1990 Farm Bill for groundwater quality. Table 1 shows the number of participants in ICM and/or WQIP, sorted by county and program enrollment.

The Integrated Farm Management Program is described in the Sustainable Options Guide as "a voluntary commodity program flexibility option designed to assist producers in adopting more sustainable farming systems that incorporate resource-conserving crop rotations"(4, p.3). To be eligible, you must have or develop a farm management and crop rotation plan designed to: reduce soil erosion, improve soil fertility and soil tilth, and protect surface and ground water from contamination by minimizing agricultural pollutants, including fertilizers and pesticides. The plan must be approved by the Soil Conservation Service (4).

The Integrated Crop Management Program incorporates pest and nutrient management, crop selection and rotation, and conservation measures into a more comprehensive management

Table 1. Number of Farms and Acres Enrolled in ICM and WQIP.

County	ICM Program		WQIP Program		ICM and WQIP Programs	
	Number of Farms	Acres	Number of Farms	Acres	Number of Farms	Acres
Brookings	15	3,028	4	576	19	3,604
Moody	10	2,735	13	2,190	15	4,925
Minnehaha	7	2,032	6	1,783	11	3,815
TOTAL	32*	7,795	23*	4,549	45*	12,344

*-Some of the farmers are enrolled in both programs, so there is a total of 45 farms covered by 55 different farm plans.

program than is usually associated with Agricultural Conservation Program cost share (4). Practices may include soil and tissue testing, field scouting, cover crops, green manures, improved rotations, composting and other techniques for reducing the use of agrichemicals (4).

As with other cost-share assistance, the participant is eligible for up to a maximum of $3,500 per year. ICM agreements and payments run for 3 years. Payments are currently up to $7 per acre per year for small grains, row crops, and hay crops and up to $20 per acre per year for fruits, vegetables, and specialty crops on which ICM is practiced. These cost-share payments are used to hire crop consultants (4).

From 1990-1993, ICM was available in only five counties per state for up to twenty farms in each designated county. States also had the option of offering ICM in counties within USDA-designated water quality project areas. In those areas, there was no limit on the number of farmers who could participate. Starting in the 1994 crop year, the ICM program will be offered nationwide subject to authorization by the ASC State Committee and concurrence by the SCS and the Extension Service (2).

Farmers who wish to participate are to maintain basic pesticide and nutrient records and provide adequate documentation to demonstrate increased efficiency and enhanced environmental benefits. ICM cost-share may be used in conjunction with the IFM commodity program option. If used in this manner, a single farm plan may be developed that will serve both programs (4).

The Water Quality Incentive Program is a voluntary program to encourage producers to plant resource conserving crops. It provides incentive payments for farmers to develop and implement 3- to 5-year farm management plans that will protect water quality through reduction in the waste stream of agricultural pollutants, including fertilizer, manure, and pesticides (5). Participation is limited to 10 million acres of cropland during 1991-1995. The USDA will enter 3- to 5-year agreements with farm owners and operators to develop and implement plans (5). The participating farmer must agree to implement a water quality plan approved by the USDA, report his or her usage rates of nutrient, pesticide, and animal waste materials for the previous 3 years, and supply well test results, soil tests, tissue tests, and application levels to the Soil Conservation Service and the local conservation district for each year in the program (5).

Farmers planting a conserving crop under this program may not lose payments or crop base. If the farm plan requires changes in cropping systems, the participant is to be afforded base and yield protection, meaning neither base nor yields will be adjusted downwards during the period of participation (5).

USDA is to provide technical assistance in developing and implementing plans. SCS will be in charge of assigning technicians to help work out acceptable plans. In addition, Extension agents, private consultants, fertilizer dealers, or other entities may also provide technical assistance for plan development, but SCS must still certify the plan. WQIP can be

used in conjunction with IFM. Again, as in the case of joint IFM and ICM enrollment, a single farm plan will be sufficient to enroll in both programs (5).

Integrated Farm Management

The Integrated Farm Management Program has a low level of participation within the BSA. As of August 13, 1992, there were believed to be eleven participants within the BSA. When actual farm plans were acquired for the SARE/Water Quality project, it was found that only a total of three farmers had actually met the requirement of following a farm plan that made them eligible for the program. There are a total of 630 acres enrolled in the IFM between the three farmers within the BSA. The size for the individual contracts is 128 acres, 370 acres, and 132 acres.

There are many different practices that can be incorporated into an IFM farm plan. The farmers from Moody and Minnehaha counties utilized six different practices in their farm plans. Since there are only three participants in the IFM, each farm plan is shown in detail in Table 2.

Integrated Crop Management

The Integrated Crop Management program was first introduced by the Agricultural Conservation and Stabilization Service in

Table 2. Practice Participation for IFM Participants in Moody and Minnehaha Counties*

	Cons. Cropping Sequence	Crop Residue Use	Resource Conservation Crop	Hayland Planting	Hayland Management
Farmer 1 (Moody Co.)	yes	yes	yes	yes	yes
Farmer 2 (Minnehaha Co.)	yes	yes	yes	no	no
Farmer 3 (Minnehaha Co.)	yes	yes	yes	no	no

*-There are presently no IFM participants in Brookings Co.

1990 under its existing Agricultural Conservation Program. In 1990 and 1991, the ICM was funded under ACP funds. Most of these funds were special ACP funds categorized as SP-53 funds. In 1992, funding for ICM in the 3-county area was also provided by BSA funds. There is a possibility that funding for ICM may shift back to ACP funding in 1994 due to the introduction of the ICM program on a nationwide level. ICM practices are also funded under the Water Quality Incentive Program.

The participants in the ICM program within the BSA used six different practices in their farm plans, in different combinations. The practices include Nutrient Management, Pest Management, Conservation Cropping Sequence, Crop Residue Use (Conservation Tillage), Irrigation Water Management, and Well Capping.

There is a total of 32 farmers enrolled in the ICM program in the 3-county area. Almost one-half of the participants (15) are located within Brookings County. One of the participants in Brookings County is irrigated and is enrolled in Irrigation Water Management as an ICM practice. Moody County has 10 participants and Minnehaha County has 7 participants. None of the participants in Moody or Minnehaha County are using Irrigation Water Management. Table 3 shows the different practices used in the 3-county area and the amount of participation in each practice for each county.

Size of contracts varied greatly among the 32 farmers. The size of the smallest contract is a 40-acre contract in Brookings

Table 3. Practice Participation in the ICM Program Under ACP and BSA Funds

County	Nutrient Mgmt.	Pest Mgmt.	Cons. Cropping Sequence	Crop Residue Use	Irrig. Water Mgmt.	Well Capping
Brookings	15	15	15	15	1	0
Moody	9	9	7	8	0	1
Minnehaha	7	7	1	1	0	0
TOTAL	31	31	23	24	1	1

County and the largest contract is a 935-acre contract in Moody County. This may seem like a large number of acres for cost-share assistance, but this farmer is still limited to the $3,500 maximum. The total number of contract acres in the 3-county area is 7,795 acres, which averages 243 contract acres per participant. Total cost-share of $131,978 for the 3-county area is based on the total cost-share for the 3-year contracts. Average 3-year cost-share is $4,124 per participant.

Water Quality Incentive Program

The Water Quality Incentive Program is not only used to fund some ICM practices, such as Nutrient and Pest Management, but it is also used to fund incentive payments for other water management practices such as Pasture/Hayland Planting, Grasses and Legumes in Rotation, Livestock Exclusion, Irrigation Water Management, and Well Testing. Table 4 shows the amount of participation for each of these practices in each county under the WQIP.

There is a total number of 23 farmers enrolled in WQIP in the 3-county area. Some of the farmers are also enrolled in the ICM program. The county breakdown for participation is as follows: Brookings County - 4 participants, Moody County - 13 participants, and Minnehaha County - 6 participants. Many of the WQIP participants in Moody County also have farm plans for the

Table 4. Practice Participation in the WQIP

County	Nutrient Mgmt.	Pest Mgmt.	Cons. Cropping Sequence	Crop Residue Use	Irrig. Water Mgmt.	Pasture and Hayland Planting	Grasses & Legumes in Rotation	Livestock Exclusion	Well Testing
Brookings	3	3	3	3	2	0	0	0	2
Moody	11	11	10	10	4	1	0	1	3
Minnehaha	6	6	6	6	0	1	1	2	2
TOTAL	20	20	19	19	6	2	1	3	7

ICM program. Out of the 23 participants, 6 (2 in Brookings Co. and 4 in Moody Co.) use irrigation on their contract acres.

The size of WQIP contracts varied from 0 acres (only involved in the well testing practice) to 456 acres. The total number of WQIP acres in the 3-county area is 4,549 acres. The average contract size is 198 acres. The lengths of contracts in the WQIP can range from 3 to 5 years. The total amount of incentive payments for the 3-county area is $101,249. Average incentive payment is $4,402 per contract.

Summary

The three programs initiated in the 1990 Farm Bill and related initiatives attempt to achieve improvements in water quality by different methods. The IFM program targets changes in crop rotations, by requiring 20% of the acres receiving deficiency payments to be planted to resource conserving crops. The ICM and WQIP use cost-share and incentive payments, respectively, to try to entice farmers to use farming practices that improve water quality. From examining the farm plans for the farmers in the 3-county area, it is apparent that there are four practices in the ICM and the WQIP that were used in a majority of the farm plans. These four practices (Nutrient Management, Pest Management, Conservation Cropping Sequence, and Residue Use) are included in 42 of the 55 farm plans for the ICM and WQIP. (See footnote to

Table 1; because some of the 45 farms are enrolled in both the ICM and the WQIP, there is a total of 55 farm plans.)

The case farm selection process started with the collection of farm plans for each participant from the SCS office for each county. Next, the District Conservationist from each county was interviewed in regard to each participant's likely disposition towards being involved in the SARE project. The next step was a meeting of the project team to prioritize participants who were judged by the District Conservationists to be good potential cooperators. Participants were given priority based on (a) remarks by District Conservationists, (b) crop rotation, (c) extent of program participation, (d) runoff and leaching vulnerability of the soils on their farm, (e) how typical the soil types on their farm were in relation to the rest of the county, and (f) how representative each farm was of different farming systems in the BSA area. Three dryland operations (one in each county) and one irrigated operation were chosen as best cooperator candidates. All four candidates were contacted by telephone in December 1993 and verbally agreed to participate in the project. In addition, an IFM participant contacted the project team and offered to participate in the study.

Bibliography

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(3) "Integrated Farm Management Program Option"; **Sustainable Options Guide;** Sustainable Agriculture Working Group; February 1992.

(4) "Integrated Crop Management Cost-Share Program"; **Sustainable Options Guide;** Sustainable Agriculture Working Group; February 1992.

(5) "Water Quality Incentive Program"; **Sustainable Options Guide;** Sustainable Agriculture Working Group; February 1992.