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WAS OLD JULES RIGHT?: SOIL STEWARDSHIP ON LEASED LAND

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ABSTRACT—In a country where more than 40% of the agricultural land is farmed by tenant operators, the question of how that land base is farmed becomes paramount. In this study we examined soil erosion levels in relation to land tenure and surveyed tenant farmer practices and attitudes in Nebraska and South Dakota. We found leased land was farmed and maintained by tenants in an environmentally sustainable manner. Furthermore, we found no evidence to suggest variation from this norm due to type of lease, size of farm, type of farm organization, or landowner classification. While educational level and years of experience (age) contributed to soil stewardship practices, to a great extent tenant farmers in these Great Plains states farmed leased land in a conscientious manner to maintain their integrity and reputation in the community as being a "good farmer." Landowners, as well as society at large, benefit from this perspective.

Key Words: agricultural land, conservation, farming, federal farm policy, leased land, soil

> "They never amount to anything. Won't improve the land because they don't intend to stay or afraid they'll drive the rent up. Damn poor farmers."
>
> —Old Jules referring to tenant farmers in *Old Jules* (1935), by Nebraska author Mari Sandoz

Introduction

Stewardship and conservation of the nation's natural resources is a focal point as our society becomes increasingly environmentally conscious. However, such concerns, particularly with regard to soil erosion on our agricultural lands, have been an ongoing concern for decades within the agricultural community and both federal and state policy arenas. Given the fact that about half the land area of the United States is cropland, pastureland, or rangeland managed by farmers and their families, the importance of agricultural stewardship of the land is obvious. Agricultural producers are not only producing food and fiber but also are called upon to sustain the agricultural land base while contributing to safe drinking water, clear-flowing streams, and a host of other environmental amenities for all of society.

Through federal farm policy efforts as well as those of locally led conservation districts, which cover nearly all of the nation's privately owned lands, considerable progress has been made. According to the US Department of Agriculture's 1997 National Resources Inventory, erosion on US cropland has been reduced by 38% since 1982 (USDA 2000). The use of deliberate conservation practices, mandated by recent federal farm legislation, appears to have been a major contributor to this improvement. Nevertheless, the USDA (2000) estimated that 108 million acres (29% of the total cropland base) continues to have excessive erosion exceeding the tolerable soil-loss rate. In addition to failing to maintain a sustainable cropland base, these acres with excessive erosion raise off-site concerns regarding the impact of sediments, nutrients, and pesticides on water quality. In short, soil erosion remains a serious environmental issue.

While many factors enter into the land-use equation, the issue of land tenure is frequently raised. Conventional thinking follows a basic economic logic that it is the owner-operator who is the true steward of the land, simply because they reap the long-term consequences of sound management. The old Amish saying, "The best fertilizer of soil is the footprints of its owner," reflects that position well. Conversely, there is a widely held position similar to the quote from *Old Jules* that tenants are merely short-term managers who tend not to have the long-run economic interests of the land in mind, and therefore do not care for it wisely.

This issue of tenure regarding land stewardship is important, given the fact that a significant portion of agricultural land in the United States is farmed by someone other than the owner. In fact, more than 40% of the nation's agricultural land base is leased out each year, with the preponder-

ance being on a year-to-year leasing arrangement. In many parts of the Corn Belt and the Great Plains, there are major agricultural areas where the majority of the agricultural land base is under lease (*Census of Agriculture*, USDA 1999).

In light of the above, we studied the institution of agricultural leasing and its relationship to land stewardship practices deemed appropriate by society. Our specific objectives were: (1) to identify the relationship of soil stewardship, measured in terms of soil loss, to various tenure or leasing patterns and associated farming practices; and (2) to analyze the various beliefs, motivations, and value sets of tenants that contribute to farming and management processes observed on leased land.

Is Leased Land Being Farmed Poorly?: Previous Studies

The debate over this question goes far back in the economic literature. The Dust Bowl years of the 1930s generated considerable effort in the 1940s and 1950s to examine the question of land tenure, income, owner attitudes, and soil erosion. Erwin (1982) cited two predominant themes in the work of this period. The first was that tenure insecurity due to short leases was viewed as a significant obstacle to implementing conservation practices on leased land. The second theme was the general lack of provisions in most leases for allocating costs and returns of conservation practices between landowners and tenants. Such provisions dictate that payments for all conservation inputs should be proportional to the value contributed by the landowner and tenant toward production (Langemeier 1998). Problems obviously can arise, however; conservation investments often are seen as longer-term benefits to the landowner but increased short-run costs for the tenant.

Quantitative studies of the relationship of land conservation practices to tenure characteristics have produced mixed results. In his study of 120 Missouri farms using the USDA's Universal Soil Loss Equation, Erwin (1982) found less erosion control on leased land than on land owned by the operator. In contrast, Lee (1980), using a nationwide database, found no significant difference in soil loss among the various ownership groups. Soil loss, she concluded, was not related to tenure. She suggested that operator age, education, crop configuration, and owner attitudes could be important variables that should be included in future models.

A 1991 survey of farmers in southwestern Ontario provided information for analyzing the use of soil conservation practices (Duff et al. 1991). The authors concluded that soil conservation practices tended to be used

with less frequency and intensity on leased land, especially by younger farmers. They suggested that financial constraints might be a contributing factor.

More recently, Westra and Olson (1997) concluded from their study of two counties in Minnesota that prediction of the adoption of conservation practices is not exclusively economic. They found that it was a combination of economic capability and willingness factors, as well as land and farm characteristics. Tenure aspects, from their perspective, might not be significant.

In summary, a review of previous research did not reveal a definitive pattern of results concerning the impact of land tenure on soil conservation or stewardship practices.

Methods

Given the limited geographic size of many of the previous studies and the general incongruity of their findings, we conducted a comprehensive study of cropland leasing practices and rental market characteristics in two Great Plains states, with a particular focus on the farming practices employed on leased land. A representative survey of nearly 1,500 agricultural producers in Nebraska and South Dakota was conducted in 1996 and 1997. These farmer-respondents leased part or all of their agricultural cropland base; in fact, on average they were simultaneously leasing cropland parcels from three different landowners. Combining multiple leased parcels with one or two owned parcels is the general norm in today's crop production agriculture (USDA 2002).

In addition to details on the lease and farming practices, respondents were asked to supply the specific legal description locating their primary rental parcel. This allowed us to further analyze soil characteristics for these tracts from published county soil surveys. In total, over 950 parcels of rented land were analyzed. For each of these tracts, the USDA's Revised Universal Soil Loss Equation (RUSLE) was used to estimate average annual soil loss per acre (USDA 1997). This soil-loss model is designed to predict long-term average annual soil loss carried by runoff from the specific tract, given specified cropping and management systems as well as physical characteristics of the tract itself. These soil-loss estimates were compared against the levels assumed sufficient for continued sustainability.

Using these soil-loss estimates as a proxy for soil conservation and stewardship, we did comparative analyses across a number of land-tenure

TABLE 1

AVERAGE ANNUAL SOIL LOSS PER ACRE DUE TO SHEET AND RILL EROSION ON CROPLAND

Year	Annual per acre soil loss (in tons) for:		
	Nebraska	South Dakota	United States
1982	4.8	2.8	4.4
1987	4.2	2.6	4.0
1992	3.5	2.2	3.5
1997	2.9	2.0	3.1

Source: US Department of Agriculture (2000).

and leasing configurations. From these, we developed an analytical model to identify factors contributing to soil stewardship, including a follow-up survey of a subset of survey respondents to inquire further regarding tenant perceptions and attitudes.

Results and Discussion

Soil-Loss Patterns

Estimates of average soil loss for the individual leased tracts ranged from less than 1.1 metric tons per hectare (0.5 tons per acre) per year to more than 40.5 metric tons per hectare (18 tons per acre). However, the mean soil loss across all 962 parcels averaged 3.98 metric tons per hectare (1.78 tons per acre) per year. The mean average soil loss for Nebraska and South Dakota was 4.22 metric tons per hectare (1.89 tons per acre) and 3.56 metric tons per hectare (1.59 tons per acre), respectively. In none of the substate Agricultural Statistical Districts did the average soil loss exceed 11.2 metric tons per hectare (5 tons per acre), which is considered the tolerable maximum limit for most soils. In other words, the overall average performance on the leased tracts was found to be satisfactory by USDA criteria.

Relative to the state and national estimates of average soil loss over time, which represent the total cropland acreage base (comprised of approximately 60% of owner-operated land and 40% of leased land), the average level of soil loss identified in this study of leased tracts is relatively low (Table 1). Assuming the physical erosion potential on these leased tracts

is similar to that of the total acreage base measured by the state and national averages for 1997, one could conclude that leased parcels are being farmed at least as well as, if not even better than, farmland in general. Thus, Old Jules appears to be wrong, at least in the context of leasing practices in present-day production agriculture as practiced in the Great Plains states of Nebraska and South Dakota.

Factors Explaining Conservation Patterns on Leased Land

Given these findings that suggest tenant-farmed land is not being farmed poorly as conventional wisdom has suspected, we asked, What factors contribute to this phenomenon? Also, what elements of today's production agriculture are positive incentives to sound conservation management, regardless of tenure?

To address these questions, we constructed an analytical model in which the erosion potential (per-acre soil-loss estimates) was made the dependent variable and was regressed against a total of 12 independent variables that represented tract, lease, tenant producer, and farm operation characteristics. All these variables are factors that are mentioned frequently as having an influence on land conservation practices (Table 2). For example, type of business organization of the tenant producer is frequently raised as a factor, implying that farm corporations do not farm the land as well as an individual proprietor. Likewise, many people perceive that smaller-farm operators farm leased land more conscientiously than larger-farm operators (Johnson 1995), and therefore several farm-size variables were included in the model.

There is also a long-standing belief among those familiar with agricultural land tenure and leasing that tenants who are leasing cropland on a cash basis (annual rent paid the landowner in cash) do not farm and steward the land as well as those that crop-share lease (pay annual rent to the landowner in the form of a share of the annual crop). The reasoning behind this position is that under crop-share leasing the landowner is much more involved with the tenant in the ongoing management and operation of the agricultural parcel than under cash-rent leases; therefore, the landowner's long-term interests in the stewardship of the land would be more present in the farming practices used (Langemeier 1998).

Finally, logic suggests that length (or duration) of lease would impact management practices on leased land, with tenants being more apt to employ practices that have longer-term economic payoffs (such as soil stewardship) the longer the duration of their lease.

TABLE 2

DEFINITION OF VARIABLES USED IN ANALYSIS

Variable name	Type of variable[a]	Definition/Description
Dependent variable:		
Erosion Potential	C	RUSLE estimate of sheet and rill per acre for the tract
Independent variables:		
Tract characteristics		
Index of erosion potential	C	Index indicating erosion potential of tract as related to the rainfall, soil type, and slope length
Tillage practices	D	Type of tillage used by tenant operator
Conservation practices	D	Soil-conserving practices either performed by the tenant or permanent structures
Lease characteristics		
Length of lease	C	Number of years the tenant has farmed the tract
Lease type	D	Lease type, either share or cash
Type of landlord	D	Relationship to landlord
Producer characteristics		
Education	D	Tenant's formal education
Age of Tenant	D	Tenant's age
Farm operation characteristics		
Total acres operated	C	Number of acres in tenant's total operation
Total acres leased	C	Number of acres the tenant leased into their operation
Operation receipts	D	Tenant's gross receipts from farming
Type of business structure	D	Farm business structure of tenant

[a] C = continuous, D = discrete.

Our model results proved to be quite unexpected, as the six variables representing these above-mentioned factors were found *not* to be significant ($p < .05$) and consequently were dropped from the final version of the model. Specifically, the nonsignificant factors were: (1) lease type, (2) length of lease, (3) total acres operated by the tenant, (4) total acres leased by the tenant, (5) total annual gross sales from the tenant's farming operation, and (6) type of business structure of the tenant's farming operation.

The remaining six variables were found to be significant (Table 3), and these factors were regressed in the analysis. The factors included: index of erosion potential, tillage practices, conservation practices, type of landlord, and education and age of tenant (Table 3). The model generated an $R^2 = .491$, indicating the six remaining variables accounted for almost half of the sample variation. All of the variables were significant at the $p = .05$ level.

The model results overwhelmingly showed that the physical characteristics of the tract itself, specifically the index of erosion potential, provided the most explanatory information regarding the amount of sheet and rill erosion on a leased tract. However, other factors contributed as well, especially tillage practices (Table 3).

Tillage practice was a discrete variable, with eight categories representing the different types of tillage systems. Least-square means were used to indicate relationships between the categories. Review of these lease-square means for tillage indicated that soil erosion followed expected patterns. Fall clean till (i.e., fall moldboard plow) had the highest positive value while no-till practice had the smallest least-square mean, showing that it is the most soil conserving of the tillage practices.

Conservation practice was also a discrete variable, with five categories representing different types of more permanent conservation practices. As expected, soil losses were highest where no such practices were used and lowest where terraces had been employed.

Type of landowner was represented as a discrete variable. The category found to have the highest least-square-mean soil loss was "other," which by definition included organizations, such as a governmental agency or a church. This may indicate some lack of soil-conserving practices on the part of these groups. The least-square-mean soil loss was higher for a relative or local landowner than for an unrelated, nonlocal owner, an outcome that was not expected. Also, the mean soil loss for a related or local farmer was only marginally significantly different ($p = .05$) from the "other" types of landowners; however, it was significantly different from the unrelated or nonlocal landowners. This result may reflect an increased level of competition among tenants for tracts from unrelated or nonlocal landowners, leading these tenants to steward tracts to a higher degree for fear of losing the tract to local competing farmers in future years.

The two producer characteristics found to be significant were education level and age of tenant. The model indicated that the more education tenants have beyond high school, the lower the predicted soil loss will be on the tracts they farmed. This may indicate a relatively greater willingness, or

TABLE 3

REGRESSION ANALYSIS OF FACTORS AFFECTING SHEET AND RILL EROSION IN NEBRASKA AND SOUTH DAKOTA

Summary statistics: $N = 914$ $R^2 = .491$ Dependent mean = 1.85
$F = 43.24$ Root mean square Error = 4.404

Covariant factors	*df*	Type III Sum of squares	F-value	*p*<
Index of erosion potential	1	11920.0	614.60	0.01
Tillage practices	7	3425.5	25.23	0.01
Conservation practices	4	690.0	8.89	0.01
Type of landlord	2	252.3	6.50	0.01
Education	4	273.5	3.53	0.01
Age of tenant	2	211.95	5.46	0.01

ID letter		Least-square mean	Means with common letters do not differ significantly ($p = .05$)							
	Tillage practices									
a	Fall clean till	3.99	a			d		f		
d	Other	3.28	a			d		f		
f	Spring clean till	3.15	a			d		f		
b	Fall mulch till	2.03								h
g	Spring mulch till	1.63					e		g	h
e	Ridge till	1.34					e		g	h
h	Strip till	0.98			c		e		g	h
c	No till	0.41			c					h
	Conservation practices									
c	None	2.57			c	d				
d	Strip	2.46		b	c	d				
b	Contour	2.04	a	b		d	e			
a	Buffer	1.73	a	b			e			
e	Terrace	1.71	a	b			e			
	Type of landowner									
a	Other	2.51	a	b						
b	Relative, local	2.09	a	b						
c	Unrelated, nonlocal	1.70								
	Education									
d	Some high school	2.70		b						
b	High school	2.17		b			e			
e	Technical	2.00	a		c		e			
a	College graduate	1.83	a		c		e			
c	Some college	1.81	a		c		e			
	Age of tenant									
a	Less than 44	2.32	a	b						
b	44 to 64	2.27	a	b						
c	65 plus	1.71								

openness, by those with more education to innovate or self-educate as to the most efficient methods of production, which typically include more conserving farm practices. The results also suggested that as tenant operator age advances, predicted soil losses decrease. Tenants in excess of 65 years of age were significantly different (p = .05) from those under 65. This may reflect experience and a heightened consciousness among older tenants concerning the environment and sustainable land use. It also may reflect a potentially larger financial base to draw from to carry out sound farming practices on these leased parcels.

Tenant Producer Attitudes and Perceptions

The fact that we found that tenant-farmed agricultural land was being stewarded wisely, even with little or no landowner oversight, is a key finding of this study. Yet, while the significant factors in our model could explain essentially half of this phenomenon (R^2 = .491), we remained curious. Could it be that particular attitudes, value sets, and tenant perceptions also contributed to this generally high level of land stewardship observed on leased parcels?

This question led to a follow-up survey of a random subset of 150 tenants who had previously responded to the initial survey. In this follow-up we attempted to identify the particular attitudes and perceptions that motivated tenants to farm with environmental consequences in mind. Of the 150 surveys mailed, 117 surveys were returned with usable data (78% response rate).

The results to the follow-up survey indicated that there were indeed attitudes and perceptions among tenant operators that led to sustainable farming practices. In response to a specific question on community norms, the vast majority (85%) agreed that a norm existed in their particular community that suggested that leased land should be farmed as well as one's own property. Moreover, the results suggested this was true regardless of whether the landowner was a relative or nonrelative, or whether the landowner's residence was local or nonlocal.

Tenants were also asked if they perceived specific social pressure to adhere to such norms regarding the use and care of land they were leasing. Nearly two-thirds (65%) responded that they did feel specific pressures. Of those, the majority (64%) perceived it to be pressure to maintain their integrity in the community, while nearly a fourth (24%) interpreted this pressure as that of maintaining their own reputation as a good farmer. Only

a small percentage (9%) felt the pressure was a threat in the form of being able to continue leasing such land in the future.

When asked to rank the importance of the environment, 38% of the tenant respondents considered themselves to be "very concerned" about the environment, the highest ranking possible, while another 54% stated they were "concerned" about the environment. Only a very small percentage (less than 5%) considered themselves to be at the lower range of the concern scale.

Respondents to this survey were asked a series of questions that addressed whether environmental concerns of farmers really applied to the land they lease. The conventionally held hypothesis is that producers will tend to make specific farming decisions that favor the land they own over the land they lease. For example, when timing of the operation may be critical, this hypothesis predicts that producers would tend to perform that operation on their owned land before moving on to the land they lease. However, our survey respondents overwhelmingly responded that timing was determined by whichever land parcel "was ready" first. In fact, only a small percentage (<10%) prioritized their owned land over leased land regarding the timing of agricultural practices. We conclude that agricultural producers considered their land base of both owned and leased land as a complete system, and they farmed it in the most systematic and efficient manner, regardless of the ownership considerations of the various parcels.

The survey respondents were also asked if they would fix an ongoing conservation problem on the land they leased. A large majority (75%) said that they would, just as they would on land that they owned. Another 6% said "yes," even if it were not specifically profitable for them as tenants to do so. Also, 10% gave a conditional "yes" if it were profitable for them to do so in the short term. In total, more than 90% of the tenant-respondents surveyed said they would fix a conservation problem on land that they did not own, even though the majority of them operated with year-to-year leasing arrangements with the landowner.

With regard to specific conservation problems on leased land, four out of five (80%) of the respondents indicated they would choose to apply the best land-management practices on leased land even without the landowner's knowledge or understanding of its significance. Furthermore, our chi-square tests of significance suggested there was no significant difference ($p = .05$) in responses to this question between tenants leasing from relatives or local landowners versus those leasing land from nonrelatives or nonlocal landowners.

Conclusions

On the basis of this study, it would appear that Old Jules's statement is no longer valid. We found that agricultural producers in Nebraska and South Dakota in general are stewarding the soils on their land, both owned and leased, in an environmentally conscientious manner. Current estimates of average annual soil losses on leased land, as measured by sheet and rill erosion, were found to be well within the estimated tolerable limits for long-term sustainability. Moreover, lease type and the relative degree of monitoring of the farming operation by landowners showed no significant influence on how leased land is farmed.

We found producers farming leased agricultural land in a manner similar to that of land they own. We conclude that they consider their land base of both owned and leased land as a complete system, and that they farm it in the most systematic and efficient manner, regardless of the ownership considerations.

This study suggests that most tenant farmers practice sound soil-stewardship practices, at least in part because of their own personal integrity and values and the perceived importance of that personal integrity in the community. They want to uphold their reputations as "good farmers." The economic pressure of tenant competition for leased land may be there as well, but it is apparently secondary to the social aspects of capital management that exist within the local community.

Educational level seems to play a role in the level of land stewardship. Evidence from our study suggests that those having more advanced education are more willing and/or able to apply conservation measures. Likewise, tenant age also appears to be an influence on conservation. As producers advance in years, their interest in and financial means for conservation may increase.

Items not found to be significant in this study were several elements often thought to be the cause of decreased stewardship. These included the size of the tenant's operation, the type of the tenant's business structure, and the relative security the tenant perceives in retaining a leased tract.

Our results have important implications. For the thousands of agricultural landowners across the Great Plains who rely upon others to farm their land, it is reassuring to know that long-term stewardship of their landholdings is being carried out, even without intensive monitoring and management oversight on the part of the landowner. Our study suggests that the norm in today's production agriculture is for the land to be cared for in a

responsible manner by farmers who perhaps could be more aptly called "land stewards" than tenants. In addition, these findings are also important from the broader societal perspective. In this country where more than 40% of the agricultural base is farmed by someone other than the owner, it is reassuring to know that our typical rental institutions and the associated practices are not contributing to long-term soil degradation.

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