

Tillage Practices on Kentucky Cropland: The 1985 Food Security Act's Effect

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Kentucky has a great deal of soil erosion each year. The average rate of rill and sheet erosion on Kentucky's cultivated cropland is about 12 tons per acre per year, according to estimates by the Soil Conservation Service. This level continues despite extensive educational efforts and despite the cost-share program of the Agricultural Stabilization and Conservation Service (ASCS). This rate of soil loss is alarming because most of Kentucky's soil types have a tolerable soil loss rate ("T" Value) of only 3-5 tons per acre per year.

Food Security Act's Provisions

In 1985, Congress passed the Food Security Act (FSA) to accelerate use of soil conservation practices on highly erodible land and to protect wetlands. Although each landowner voluntarily decides whether to comply with FSA provisions, only those who do comply are eligible for USDA Farm Program benefits.

Three 1985 FSA programs are likely to significantly affect conservation farming practices in Kentucky: the Conservation Reserve (CRP), Sodbuster, and Conservation Compliance.

Conservation Reserve

If landowners remove highly erodible cropland from production for 10 years, they will receive annual payments. Based on the SCS definition of highly erodible lands, approximately 46 percent of Kentucky's cultivated cropland is highly erodible. Therefore, programs affecting this land have great potential for changing tillage practices in Kentucky.

Sodbuster

If land users plan to produce a commodity crop on highly erodible land which was not cropped during 1981-85, they must use cropping techniques outlined in an approved conservation plan.

Conservation Compliance

This portion of the FSA covers all remaining highly erodible cropland. Landowners producing crops on highly erodible land must develop a conservation plan. The plan must be approved by January 1, 1990 and fully applied by January 1, 1995 for the landowner to stay eligible for government support programs.

The conservation plan should allow for crop production while controlling soil erosion within acceptable limits according to SCS specifications. Conservation practices such as crop rotations, residue management, cover cropping and reduced tillage are among the most practical and economical methods of controlling soil erosion in most areas of Kentucky. However, as the slope length and percent increase, cropping systems involving no-tillage, strip cropping, sod-based rotations and possibly structural measures may be necessary to adequately control soil loss.

Considering the differences in soil types, topography, and rainfall that occur across the state, how well have producers matched their tillage practices to the erosive characteristics of the land they use? According to the Conservation Tillage Information Center, in 1986, Kentucky reported only 40 percent of the cropland to be conventionally tilled, while 37 percent was reduced-tilled, and 23 percent no-tilled (National Survey of Conservation Tillage Practices. Kentucky County Summary. Ft. Wayne, IN). These tillage statistics certainly suggest that Kentucky producers are attempting to make conservation tillage a vital part of their cropping operations.

If the tillage system on much of Kentucky's highly erodible land needs to be changed in order to comply with the 1985 FSA provisions, then a large job lies ahead. An estimate of the tillage change required by the FSA should help professional conservationists and educators to know the size of the task and identify counties requiring the greatest change.

Food Security Act Effects

What will be the effect of the 1985 Food Security Act on farming practices in Kentucky? An answer is not easy to give because the bill is complex and because limited information is available on some aspects of soils and land use in Kentucky. However, we attempted to determine the potential impact of the FSA on tillage practices for each county in Kentucky using two different methods.

(A) Method for Cultivated Cropland

Information provided in the 1982 National Resource Inventory (U.S. Soil Conservation Service. Kentucky's Land Resource: Conditions and Trends. September 1985) was used to determine the number of continuously cultivated cropland acres in each land class across the state. Estimating tillage needs for "cultivated cropland" did not include the sod land in a sod-based rotation or exclude land currently enrolled in the CRP.

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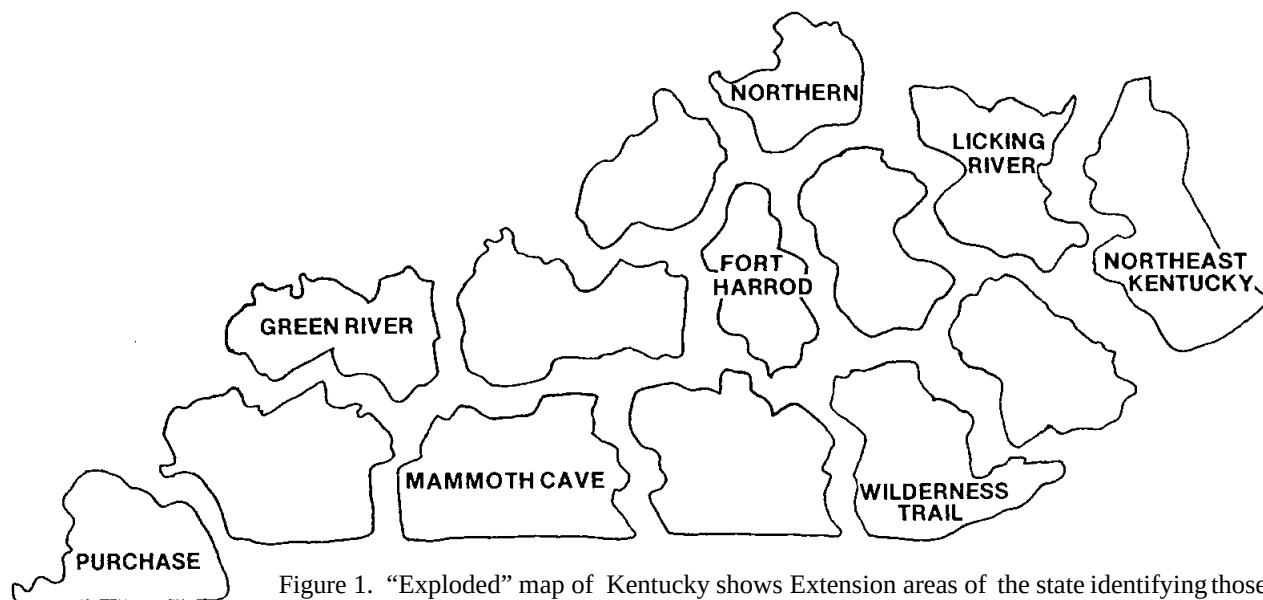


Figure 1. "Exploded" map of Kentucky shows Extension areas of the state identifying those selected areas designated in Table 2.

The type of tillage system required by land class for Conservation Compliance was derived from the SCS Technical Guide, Section 3, *Guidelines for Planning Alternative Conservation Compliance Systems*. (U.S. Soil Conservation Service. June, 1987). Conventional tillage was considered acceptable on all cultivated Class I, IIw, IIs, IIIw, IVw, and IVs land. Reduced tillage would be required on all Class IIe land and 22 percent of the Class IIIe land (estimated acreage in doublecropping after wheat). No-tillage would be necessary on 100 percent of the Class IIIe and IVe land. The "cultivated" cropland acres for each tillage system were totaled and divided by the total cultivated cropland acres to give the required distribution of tillage system for Conservation Compliance.

(B) Method using Sod-based Rotation and the CRP

An attempt was made to adjust the estimates made by Method A for land enrolled in CRP and land managed in a sod-based rotation. To begin, all "cropland" acres in land Classes IIIe, VIe, VIIe, and 25 percent of IIe land were considered eligible for the CRP. The distribution of currently enrolled CRP acres by land class was assumed to be proportional to the distribution of eligible CRP acres. This results in most of the CRP acres being assigned to the IIIe and IVe land classes. The enrolled CRP acres were then subtracted from the appropriate cropland land class resulting in "CRP Adjusted Cropland Acres."

Consideration was then given to the cropland acres that are managed in a sod-based rotation. For this estimate an assumption was made that all cropland in a sod-based rotation followed a 2-year row crop/2-year grass rotation. According to SCS planning guidelines, cropland in a sod-based rota-

tion can be cultivated more intensively. This allows more tillage on the rotated portion of the IIe and IIIe land classes. Applying these guidelines to cropland adjusted for CRP and sod-based rotations, conventional tillage was estimated to be acceptable on 100 percent of the cultivated land in Class I, IIw, IIs, IIIw, IVw, IVs, and 15 percent of the IIe adjusted cropland. Reduced tillage would be required on 70 percent of the Class IIe and 38 percent of the IIIe land. No-tillage would be necessary on 50 percent of the IIIe land and 65 percent of the IVe land. Table 1 depicts the required tillage distribution of land in Classes IIe, IIIe, and IVe.

Estimated Tillage Change

To determine possible changes in tillage brought about by the FSA, we compared our estimated tillage requirements to current tillage use (as reported by the 1986 Conservation Tillage Information Center Tillage Survey (Table 2). Actual

Table 1. Distribution of tillage required by 1985 FSA on land classes IIe, IIIe, and IVe.

Land class	Tillage system	Adjusted cropland % of acres	Land use
IIe	None	15	Rotated in Grass
	Conventional	15	Rotated in Crop
	Reduced	70	Continuous Crop
IIIe	None	25	Rotated in Grass
	Reduced	25	Rotated in Crop
	No-till	50	Continuous Crop
	Reduced	12.5	Seedbed Prep. for Wheat
IVe	None	35	Rotated in Grass
	No-till	35	Rotated in Crop
	No-till	30	Continuous Crop

use of no-tillage above what was required was credited to reduced tillage. Table 2 shows the average tillage change calculated for selected geographical extension areas across the state and also shows counties with extremes in each area. Figure 1 shows the location of the areas within the state.

The unadjusted estimate (A) appears to more accurately predict the tillage changes necessary for compliance in the western part of the state. (Several county and area personnel were contacted to obtain “ground truth” on these estimates.

The percentage of cultivated cropland acres that will require a tillage change is smallest in western Kentucky and much higher in the central and eastern part. However, since the actual number of cultivated acres in central and eastern Kentucky is small, the magnitude of change may not be as great as the percentage indicates.

In most western counties the actual need for change may be underestimated. The Adjusted Estimate (B) appears to better reflect the situation in central and eastern Kentucky. For

Table 2. Estimated impact of the 1985 Food Security Act on tillage use for cultivated cropland in selected areas and counties in Kentucky.

	Required tillage Irrespective of rotations and CRP ¹			Required tillage adjusted for rotations and CRP ²			1986 Tillage use ³			Possible changes ⁴	
	Conv. tillage	Reduced tillage	No tillage	Conv. tillage	Reduced tillage	No tillage	Conv. tillage	Reduced tillage	No tillage	Method A	Method B
	%			%			%			%	
State	34.82	40.67	24.51	42.32	38.99	17.70	40.10	37.30	22.60	5.00	0.00
PURCHASE AREA											
Area*	54.18	25.91	19.90	65.37	23.56	11.05	27.09	44.74	28.16	1.13	0.00
Ballard	61.22	22.91	15.88	70.21	20.74	9.05	10.10	64.65	25.25	0.00	0.00
Marshall	46.81	26.25	26.94	61.48	23.28	15.24	14.24	63.73	22.03	5.00	0.00
GREEN RIVER AREA											
Area	69.55	19.03	11.40	74.09	17.46	8.45	57.86	31.83	10.22	4.42	2.00
McLean	83.36	10.60	6.04	86.02	9.67	4.31	61.63	32.14	6.22	0.00	0.00
Ohio	56.87	22.28	20.84	63.80	21.52	14.67	71.66	16.90	11.44	15.00	8.00
MAMMOTH CAVE AREA											
Area	19.98	51.16	28.85	29.64	50.89	19.46	42.06	38.82	19.11	24.70	16.50
Logan	24.21	63.38	12.41	36.72	55.96	7.31	26.54	42.68	30.78	2.00	0.00
Metcalfe	14.73	56.90	28.37	24.54	54.63	20.83	66.95	24.10	8.95	52.00	42.00
NORTHERN KENTUCKY AREA											
Area	18.77	43.12	38.10	25.69	43.83	30.47	71.36	11.60	16.92	54.00	45.75
Carroll	60.81	35.90	3.29	67.17	30.64	2.19	69.24	25.93	4.83	8.00	2.00
Grant	4.36	28.85	66.79	9.34	24.87	65.79	71.13	5.00	23.07	68.00	62.00
FORT HARROD AREA											
Area	14.64	49.53	35.81	22.64	49.73	27.61	47.63	17.82	34.54	36.00	27.12
Franklin	51.10	42.70	6.19	58.93	35.06	6.00	41.05	12.37	46.58	10.00	0.00
Jessamine	2.97	71.26	25.77	14.08	67.12	18.08	80.25	9.88	9.88	77.00	65.00
LICKING RIVER AREA											
Area	31.62	33.76	34.61	37.31	32.81	29.86	56.71	24.07	19.20	37.20	31.20
Bath	59.66	19.13	21.21	62.97	19.14	17.89	57.46	22.39	20.15	1.00	0.00
Lewis	36.74	63.26	0.00	47.90	52.10	0.00	85.71	10.24	4.05	49.00	38.00
NORTHEAST KENTUCKY AREA											
Area	74.74	15.03	10.22	77.38	13.77	8.84	75.25	21.98	2.76	15.50	12.88
Boyd	100.00	0.00	0.00	100.00	0.00	0.00	90.00	0.00	10.00	0.00	0.00
Martin	56.10	0.00	43.90	56.10	0.00	43.90	7.14	91.14	1.71	42.00	42.00
WILDERNESS TRAIL AREA											
Area	59.49	24.28	16.22	63.68	23.85	12.46	63.20	24.95	11.83	17.25	14.00
Bell	100.00	0.00	0.00	100.00	0.00	0.00	46.67	40.00	13.33	0.00	0.00
Laurel	25.12	30.71	44.17	29.80	35.74	34.46	78.87	6.35	14.78	54.00	49.00

¹ Method 1: Distribution of basic tillage systems by percent cultivated cropland as proposed by SCS “Guidelines for Planning Alternative Conservation Compliance Systems.” Cultivated cropland acres derived from SCS 1982 NRI. Does not include acres in some type of sod-based rotation and does not eliminate those acres currently enrolled in the CRP.

² Method 2: Distribution of basic tillage systems by percent cultivated cropland as proposed by SCS guidelines. Cultivated cropland acres are adjusted for acres in a sod-based rotation and acres enrolled in CRP.

³ Distribution of basic tillage systems by percent cultivated cropland as reported by the Conservation Tillage Information Center. Refer to the 1986 National Survey of Conservation Tillage Practices - Kentucky County Summary.

⁴ Percentage of change in tillage use that will be necessary to satisfy the Conservation Provisions of the 1985 FSA. Method 1: Possible % change when comparing the 1986 Tillage Survey to the Required Tillage irrespective of Rotations and CRP. Method 2: Possible % change when comparing 1986 Tillage Survey to Required Tillage Adjusted for Rotation and CRP.

*Extension Area values represent averages for all counties within the area. Counties identified in each area represent the extremes within that area.

counties with long-term sod-based rotations, the percent change needed may be over-estimated.

Why Variations Exist

Several conditions may cause a county's actual need for tillage change to vary from the two estimates.

(1) Most fields contain several different soil types. According to the Conservation Compliance guidelines, the most highly erodible one-third of the field dictates the tillage system for the entire field. Consequently, some land not classed as highly erodible will receive the same conservation treatment as the highly erodible part of the field. This situation will likely be more common in western Kentucky.

(2) A substantial portion of the no-till acres currently reported by some counties is (as a result of no-till double-crop soybeans) being planted on soils which may not be classified as highly erodible. This situation is probably more common in western Kentucky.

(3) Some counties have a high percentage of cropland in a sod-based rotation. Where this is the case, cultivated cropland will be permitted to use less conservation tillage than would typically be required for continuous cultivated cropland. This situation is probably more common in central and eastern Kentucky.

(4) The definition of reduced tillage may change. Reduced tillage, as defined by the CTIC, may not always provide adequate soil loss protection as required by the Conservation Compliance Guidelines.

(5) The most highly erodible land, often a producer's less profitable land, is generally the acreage enrolled in USDA programs which idle the land. Increased participation in these programs will tend to decrease the need for no-till and reduced tillage.

Conclusion

Based on our calculations, the amount of tillage change required statewide by the 1985 FSA appears surprisingly small. However, after examining individual counties' current tillage status, we see that many counties are exceeding the conservation compliance guidelines by practicing conservation tillage on additional land not classified as highly erodible. This situation has compensated for other counties that are substantially below the Conservation Compliance standard. Therefore, although Kentucky appears very close to compliance in its total number of acres using conservation tillage, many counties will need large changes in tillage use. The variation among farmers within a county will even be greater and many farms will require large changes.