General Cropland Retirement: Retiring Low-Net-Return Acreage vs. Retiring High-Cost Production

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The probable outcome of a general cropland retirement program based on retiring land having the lowest net return per acre is compared with the probable outcome of a program based on retiring land having the highest unit production costs. Estimates are made of (1) location of the retired cropland, (2) cost to the Government, and (3) impact on production potential after retiring different amounts of cropland nationally with the two programs.

Key words: General cropland retirement, farm programs.

The 1956 Conservation Reserve Program imposed a ceiling on per acre retirement payments. This tended to cause cropland retirement to be concentrated in areas having relatively low net returns per acre.

But retiring cropland having the lowest net return per acre may not be the cheapest means for the Government to obtain reductions in farm production. To achieve this latter objective, that cropland should be retired on which the greatest amount of production is retired per dollar of payment.

This paper describes an analysis of two general cropland retirement programs based on different criteria which the Government could use in selecting cropland for retirement. Both criteria retire cropland and production but the emphases differ. The criteria are:

(1) Retirement of low-net-return acreage, hereafter referred to as the "acreage criterion." With this criterion, the Government seeks to retire that cropland which it can obtain for the lowest cost per acre. It retires the maximum amount of cropland for a given program expenditure.[1]

(2) Retirement of high-cost production, hereafter referred to as the "production criterion." With this criterion, the Government seeks to retire that cropland on which it can obtain the greatest reduction in production per dollar of Treasury cost. Cropland which

has the highest ratio of gross receipts to net returns is retired before any cropland having a lower ratio.[2]

The following example of a wheat budget and a cotton budget illustrates the difference between the two criteria:

Item	Wheat	Cotton
Value of production per acre	$25.00	$150.00
Variable cash costs per acre	15.00	100.00
Net returns per acre	10.00	50.00
Value of production, per dollar of net returns	2.50	3.00

In this example, wheat has a net return per acre of $10, while cotton has a net return per acre of $50. Using the acreage criterion, the Government would choose to retire the wheat acre before the cotton acre because the wheat acre could be obtained for a smaller payment. But in this example, the value of production per dollar of net returns is $2.50 for wheat and $3 for cotton. Using the production criterion, the cotton acre would be retired first because more production (in value terms) is retired per dollar of program cost than for wheat.

The effects of the different retirement criteria are examined in this study by comparing short-term estimates of (1) the amount and location of cropland

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[1] In this analysis, net receipts were assumed to be a proxy for payments which would be required to retire cropland from production.

[2] To make intercrop comparisons, the unit of production was $1 of gross receipts.

retired, (2) remaining production potential after retiring a given amount of cropland, and (3) total Treasury costs.

Analytical Procedure

Two general cropland retirement programs, similar in all respects except in the criterion used to select land for retirement, were assumed to be offered to farmers. With either program, farmers were assumed to be able to participate on a part-farm (individual crop) retirement basis. The programs were assumed to be operated on a national bid system. Under such a system, each farmer competes with every other farmer in the country for participation in the program. The only cropland accepted for retirement was that on which the payment rates were most favorable to the Government, using the appropriate criterion. Cropland retirement in any given county was assumed to be limited to 30 percent of the total cropland (irrigated and nonirrigated) in that county. Such a restraint is likely to be included in any cropland retirement program, to reduce the impact on some areas which might have high participation rates. There was no limit on total program payments to an area.

The United States was divided into 10 production regions (fig. 1). Most regions were subdivided into smaller, more homogeneous production areas. The analysis consisted of 100 production areas in all.

Retirement was assumed to be from a "normal" acreage defined as the planted acreage of 15 major crops in recent years.[3] In addition, land diverted from feed grains, cotton, and wheat production in the past was treated as normal acreage for these crops. Estimates of normal production were based on projected 1970 yields. Only nonirrigated cropland was assumed to be eligible for retirement.[4] An estimated 312 million acres of nonirrigated cropland were included in the analysis.

Farmers' expected net returns over variable cash costs were used as a proxy in this study for the payment necessary to get cropland retired. It was assumed that the minimum retirement payment would be $3 per acre per year. In addition to the retirement payment, all

retired land was assumed to receive a $2-per-acre annual payment to cover costs of conservation practices. The minimum payment that any participant would receive, therefore, was $5 per acre per year.

Net returns for each major crop in each of the 100 production areas were estimated from Economic Research Service budget data.[5] A total of 568 crop net return estimates were developed for the analysis. Since the study was concerned with part-farm retirement, net returns were computed as those over variable cash costs rather than over total cost. No charge was made for land costs, operator and unpaid family labor, or machinery depreciation. Estimates of net returns were based on 1970 expected prices, costs, and yields. Estimates of farmers' expected market prices for major crops in 1970 were based on 1967 and 1968 market prices and expected 1969 prices. Prices used in the analysis were: Corn, $1.06 per bushel; wheat, $1.25 per bushel; oats, $0.62 per bushel; barley, $0.92 per bushel; sorghum, $0.99 per bushel; soybeans $2.15 per bushel; and cotton, $0.20 per pound.

The analysis was done with a simple accounting model. The model first selected the cropland to be retired using each criterion. Then the amounts of cropland and production potential retired were accumulated by region and by crop at different national retirement levels. Expected net returns and value of the potential production on retired acreage also were accumulated.[6] Acreages and production potential for each crop on the unretired cropland were estimated by subtracting retired acreages and production potential from normal acreages and production potential.

The analysis was not an equilibrium analysis. Prices of farm products were introduced only as farmers' expectations. The model only simulated a first-year response to a general cropland retirement program. Any supply-demand imbalance caused by land retirement in the first year is not fed back into the analysis.

Results

The results are highlighted in the accompanying figures and tables. Cost per acre of retiring land goes up sharply as more acres are retired (fig. 2). Retiring a given amount of land using the production criterion costs

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[3]The crops are cotton, corn grain, corn silage, sorghum grain, sorghum silage, soybeans, barley, oats, winter wheat, durum wheat, other spring wheat, rye, flax, edible beans, and hay. Cropland planted to other crops was assumed not to participate in a land retirement program.

[4]Retirement of irrigated cropland without retirement of irrigation water would not have very much impact on crop production. The water could be diverted to other cropland, thereby increasing its production and offsetting the reduction in production from retiring the irrigated cropland.

[5]Budget data used in this study were developed by field staff personnel of the Farm Production Economics Division, ERS, for use in the Division's Aggregate Production Analysis System.

[6]The actual value of production depends on the market price which, in turn, depends on the amount of each crop produced. In this study, "expected" 1970 yields times "expected" 1970 prices were used as an approximation of crop values.

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REGIONAL BOUNDARIES FOR GENERAL CROPLAND RETIREMENT ANALYSIS

NORTHWEST

NORTHERN PLAINS

LAKE STATES

NORTHEAST

CORN BELT

CENTRAL PLAINS

SOUTHWEST

SOUTHEAST

DELTA

SOUTHERN PLAINS

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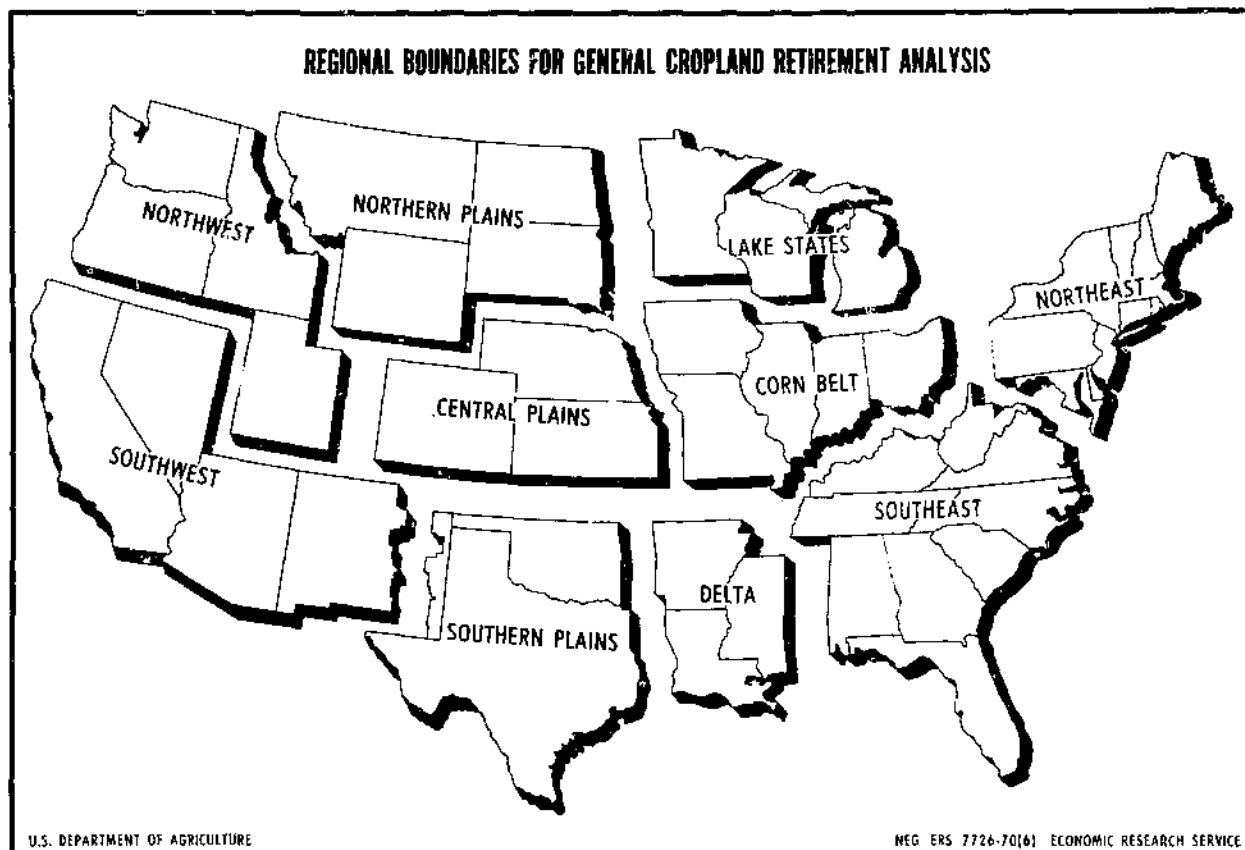NEG ERS 7726-70(6) ECONOMIC RESEARCH SERVICE

Figure 1

about twice as much per acre as retiring the same amount of land using the acreage criterion. If the objective of a general cropland retirement program is to

ESTIMATED ANNUAL COST OF RETIRING CROPLAND

By Two Criteria, United States, 1970

COST PER ACRE RETIRED ($)

Production criterion

Acreage criterion

MIL. ACRES RETIRED

U.S. DEPARTMENT OF AGRICULTURE

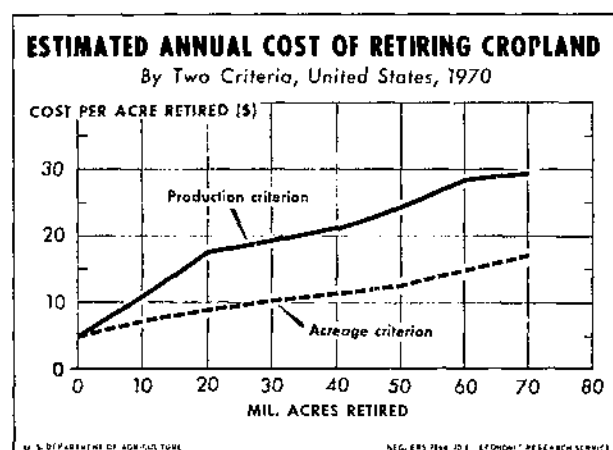NEG. ERS 7154-70 E ECONOMIC RESEARCH SERVICE

Figure 2

maximize acres retired per dollar of program expenditure, the acreage criterion obviously does the better job.

Figure 3 illustrates the relationship between the amount of production potential retired and the cost of retiring that production. For example, using the production criterion and retiring $500 million of production potential, the average cost of land retirement is only $0.21 per dollar of gross value retired. This average increases to $0.48 per dollar of gross value retired when retiring $2.5 billion of gross value. When using the acreage criterion, the average cost is $0.54 per dollar of production retired when retiring $500 million of gross value, and $0.58 when retiring $2.5 billion of gross value. If the major objective of a general cropland retirement program is to maximize production retired rather than acres retired, the production criterion obviously is the better one to use.

The two criteria are further evaluated by comparing Government costs for land retirement under three programs: (1) Retiring a given amount of cropland (50 million acres nationally), (2) retiring a given value of
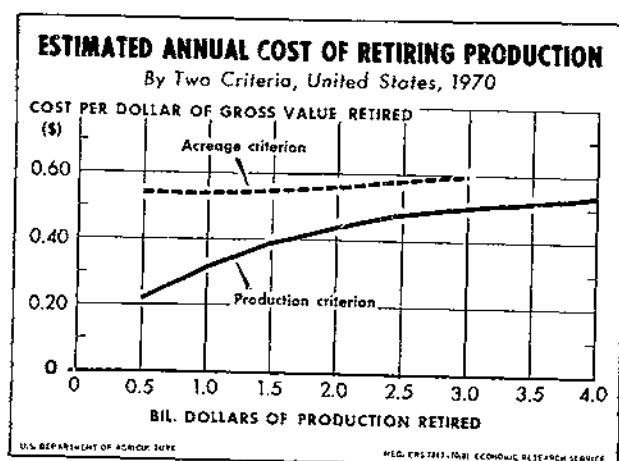
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ESTIMATED ANNUAL COST OF RETIRING PRODUCTION
By Two Criteria, United States, 1970

Figure 3

production ($2.5 billion), and (3) spending a given Government outlay ($1.25 billion) on retirement payments. The results are summarized in table 1.

Suppose a general retirement program were designed to retire $2.5 billion worth of production. The results indicate that a program based on the acreage criterion would require retiring about 50 percent more acres and a total Treasury cost about 20 percent higher than a program based on the production criterion. Thus, although the production criterion program has a higher cost per acre, it can obtain a given amount of reduction in production more cheaply.

Suppose an upper limit of $1.25 billion is placed on expenditures for a general cropland retirement program. Under the acreage criterion, 72 million acres or $2.2 billion of gross value can be retired for $1.25 billion; whereas under the production criterion only 50.7 million acres, but $2.6 billion of gross value, can be retired.

Payment rates per acre also differ substantially between the two criteria. For example, when 50 million acres are retired nationally using the acreage criterion, the average payment per acre is $12.60, and no acre receives more than $22. Using the production criterion, the average retirement payment per acre is $24.40, and the retirement payment on some cropland (primarily corn and cotton) is more than $50 per acre.

Cropland Retirement Pattern

There is a major difference in the regional distribution of retired land with the two retirement criteria. These differences are illustrated in table 2. Retired acres are more concentrated in small-grains producing areas such as the Great Plains under the acreage criterion than under the production criterion. For example, when 50 million acres are retired nationally, with the acreage criterion, 54 percent of the retired land is in the Northern and Central Great Plains. The Southeast and Delta States account for only 11 percent of the retired land at this level of national retirement. With 50 million acres retired nationally using the production criterion, only about one-fourth of the retired acres are located in the Northern and Central Great Plains. The remaining three-fourths are about equally divided among (a) the Southeast and Delta States, (b) the North Central States, and (c) the remaining regions. When more than 40 million acres are retired with the acreage criterion, land retirement in many Great Plains areas reaches its 30 percent maximum. Then most of the additional retirement comes from other regions, especially the Corn Belt, the Lake States, and the Southeast. This points out that most of the land with low net returns per acre is located in the Great Plains, and only after this low-net-return

Table 1.—Estimated annual total cost, cost per acre, and value of production foregone at three levels of land retirement under two retirement criteria, United States, based on estimated 1970 yields and prices

Item	Acreage criterion			Production criterion		
	50 million acres retired	$2.5 billion value of production foregone	$1.25 billion program cost	50 million acres retired	$2.5 billion value of production foregone	$1.25 billion program cost
Acres retired .... mil.	50.0	77.6	72.0	50.0	49.3	50.7
Total annual cost .... mil. dol.	630	1,444	1,250	1,220	1,190	1,250
Cost per acre .... dol.	12.60	18.62	17.36	24.40	24.12	24.64
Value of production foregone .... mil. dol.	1,180	2,500	2,219	2,540	2,500	2,596
Cost per dollar of gross value retired .... dol.	0.53	0.58	0.56	0.48	0.48	0.48

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Table 2.—Regional distribution of estimated cropland acreages retired at four levels of land retirement nationally, under two retirement criteria, United States, based on estimated 1970 prices and yields

Region	Million acres retired nationally under acreage criterion				Million acres retired nationally under production criterion			
	10	30	50	70	10	30	50	70
	Million acres				Million acres			
Northeast	-	-	.	4.0	-	-	2.2	[a]4.0
Southeast	1.5	2.1	4.3	7.6	4.0	[a]8.2	[a]8.2	[a]8.2
Delta States	0.6	0.6	1.4	3.8	1.1	3.7	[a]4.2	[a]4.2
Corn Belt	.	-	2.5	6.4	-	2.6	8.7	18.1
Lake States	-	0.1	1.2	4.5	0.1	1.6	4.2	7.8
Northern Plains	2.3	10.1	13.6	14.4	-	3.2	5.8	8.2
Central Plains	2.3	9.4	13.2	14.2	0.1	2.0	5.2	6.1
Southern Plains	3.3	6.8	9.7	9.9	4.2	7.9	9.1	9.3
Southwest	0.2	0.2	[b]0.6	[b]0.6	0.2	0.2	[b]0.6	[b]0.6
Northwest	-	0.7	3.5	4.6	-	0.6	1.8	3.5
United States	10.0	30.0	50.0	70.0	10.0	30.0	50.0	70.0

[a]Indicates the 30 percent limit on land retirement within the region.
[b]Only 0.6 million acres of dryland cropland were assumed to be eligible for retirement in the Southwest.

acreage is retired and the payment rate increases, is more cropland retired in other regions.

Production Adjustment

The analysis can be used to give a rough indication of the acreage and production of crops that might be expected on the unretired land. These figures must be used with caution. In this study, acreage and production potential after retiring cropland are estimated by subtracting estimates of retired acres and production potential from projections of the 1970 "normal" acreages and production potentials. The analysis does not permit substitution of crops on the unretired land. The crop production figures are useful, however, to indicate some maladjustment problems that might arise if large quantities of cropland were retired.

Compared with the acreage criterion, the production criterion puts more emphasis on retiring corn and cotton production and less emphasis on retiring wheat production. With 50 million acres retired using the acreage criterion, production of feed grains and cotton is substantially higher than during recent years (table 3). Wheat and soybean production are less than recent use levels. When 50 million acres are retired using the production criterion, feed grain, wheat, and cotton production are nearer recent utilization.

The reason for this shift of retirement among crops is that, relative to other crops, wheat grown in the Great Plains has a low net return per acre. In the analysis using the acreage criterion, wheatland is some of the first to be retired. But our data show that Great Plains wheat also has a high net return per dollar of gross value relative to other crops. In the analysis using the production criterion, acreage having the highest ratio of gross value to net returns is retired first. Using this criterion, Great Plains wheat tends to be selected for retirement *after* corn and cotton acreage. Our data show that, in general, it takes a higher payment to retire $1 worth of wheat in the Great Plains than it does to retire either $1 worth of corn in the Corn Belt or $1 worth of cotton in the Cotton Belt.

Changing the Product Price Relationships

Commodity prices used in the analysis were assumed to represent farmers' price expectations. A change in any one of the commodity prices in the analysis changes the expected net returns for that commodity. Furthermore, a change in expected net returns causes a change in the payment needed to retire that acre. A large change in expected price for any one commodity could cause shifts in the regional location of retired acres from the patterns reported above. Crop production on the unretired land would also be affected.

The results reported above show that with 50 million acres retired under either criterion, feed grain production is much larger than recent utilization. With this in

Table 3.—Estimated production of major crops after 50 million acres are retired, United States, based on estimated 1970 prices and yields

Crop	1969 utilization[a]	Acreage criterion	Production criterion
Corn . . . . mil. bu.	4,667	6,152	5,305
All feed grains . mil. tons	176	214	190
Soybeans . . . . . mil. bu.	1,201	1,034	986
Wheat . . . . mil. bu.	1,380	1,029	1,205
Cotton . . . . . . mil. bales	10.7	14.2	11.5

[a]Preliminary estimate of domestic consumption plus net exports.

mind, feed grain prices were reduced 15 percent to determine the impact of a lower feed grain price on the production adjustment and the land retirement patterns of the two general cropland retirement programs. The national average corn price was reduced to $0.90 per bushel from $1.06 per bushel, and similar reductions were made for grain sorghum, oats, and barley. Prices of all other crops remained unchanged.

The results under both the acreage criterion and the production criterion show more feed grain acreage retired and less cotton and wheat acres retired when feed grain prices are reduced. There is still a production imbalance, however, between feed grains, cotton, and wheat when using the acreage criterion, similar to that which occurred with the higher feed grain prices. But, using the production criterion and retiring 50 million acres, corn production is reduced to 4.7 billion bushels; cotton production is 11.7 million bales; soybeans production is 1.0 billion bushels; and wheat production is 1.3 billion bushels. This production mix is close to the 1969 utilization.

Policy Implications

A major policy implication of this study is that crop production and the location of retired acres can be affected substantially by the criterion used in selecting which cropland to retire in a general cropland retirement program. Another policy implication is that, if a general cropland retirement program is to achieve the greatest possible reduction in production per dollar of program cost, there can be no very restrictive limit on per acre retirement payments.

One question which this study does not answer is, which criterion is the better? The answer depends upon the objectives of the program. How well do the two programs considered here achieve the following objec-tives: (1) Long-run resource adjustment, (2) maintenance of farm income, (3) minimizing Government costs of agricultural programs, and (4) minimizing the social and economic disruptions of the program on farming communities?

The acreage criterion, by definition, minimizes the Government cost of obtaining a given amount of land retirement, but this does not mean that the acreage criterion gives the most desirable pattern of permanent long-run resource adjustment. This question is receiving further study by the authors.

The production criterion, by definition, gives the greatest amount of reduction in production for a given Treasury expenditure. Consequently, the larger boost of farm prices and income can be obtained per dollar of Treasury expenditure using the production criterion. If a general cropland retirement program were to be the only method of retiring cropland from production, the results show that the production criterion would give a remaining production mix more in line with recent utilization levels.

The nonfarm sector of a community may have to bear the greatest adjustment burden of a general cropland retirement program. Landowners generally would be completely compensated for retiring cropland and giving up the income they might normally expect from their fixed investment. Agricultural supply, marketing, and service firms are not reimbursed in the same manner. If a general cropland retirement program substantially reduces farming activity in a given community, incomes to the nonfarm segments of the local economies are reduced—especially if farming is a major part of that community's economic base.

Compared with the acreage criterion, the production criterion tends to shift land retirement from the Great Plains to the Corn Belt and the Lake States. This geographical shift in land retirement may reduce the social and economic disruption of a general cropland retirement program. Agriculture provides a much larger proportion of the total economic base in the Great Plains than in other regions. For example, in 1968 personal income from farming was 10.1 percent of total income in the Great Plains, but only 2.6 percent in the Corn Belt and 2.5 percent in the Lake States.[7] Moreover, a high proportion of other income in the Great Plains is derived from the farm supply, marketing, and service industries whose business would be curtailed by a substantial amount of land retirement.

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[7]U.S. Department of Commerce, Office of Business Economics. Survey of Current Business. Vol. 49, No. 8, Aug. 1969.

It also would be more difficult for Great Plains farmers to shift to off-farm employment because they do not have as many such opportunities as farmers do in other areas. A much higher proportion of the total income of farm families in the Great Plains is from farming than is the case in other major regions such as the Lake States, the Corn Belt, and the United States as a whole.[8]

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[8] Based on special tabulations by Internal Revenue Service for ERS.