Effect of Burley Tobacco Prices and Allotment Levels On Profitable Farm Adjustments In Four Areas of Kentucky

By

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PREFACE

This study is the first of two studies dealing with optimum adjustments to changing conditions in the four major burley-tobacco producing areas of Kentucky. The research on which this publication is based was a part of a joint effort between the U. S. Department of Agriculture and twelve Land Grant colleges under Southern Regional Project S-42, "An Economic Appraisal of Farming Adjustment Opportunities to Meet Changing Conditions." These studies were to determine and evaluate the agricultural adjustments needed in the Southern Region. The methods and procedures used in each of the states are similar so that comparisons of the results may be made among states.

Regional Project S-42 is financed in part from Research and Marketing Act funds and is a cooperative effort of the following state Agricultural Experiment Stations: Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia; the Economic Research Service, and the Cooperative State Experiment Station Service, Department of Agriculture. Dr. John W. White, Vice President for Agriculture, University of Arkansas, is administrative advisor for the project, and Dr. James White, University of Arkansas, is chairman of the project regional technical committee.

The Southern Farm Management Research Committee, sponsored by the Farm Foundation and the Southern Agriculture Experiment Stations, was helpful in the development of this regional project.

For purposes of studying adjustments needed in the burley belt, a Burley Tobacco Subcommittee consisting of agricultural economists from the Kentucky, Tennessee, and Virginia Agricultural Experiment Stations and the Southern Field Group, Farm Production Economics Division, Economic Research Service, U. S. Department of Agriculture, was established. This subcommittee developed the general framework for the analysis of adjustments in the burley-tobacco area.

The authors gratefully acknowledge the services of Wayne F. Ewbank and others at the University of Kentucky, who contributed to this project. The valuable criticisms and suggestions of the Review committees at the University of Kentucky and the Economic Research Service are acknowledged.

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EFFECT OF BURLEY TOBACCO PRICES ON ALLOTMENT LEVELS ON PROFITABLE FARM ADJUSTMENTS IN FOUR AREAS OF KENTUCKY

by

*Verner N. Grise and James F. Thompson**

INTRODUCTION

Burley tobacco is a major enterprise on many farms in Kentucky. Forty to forty-five per cent of the gross income from agriculture in Kentucky is derived from this crop. Any variation in prices and allotments of tobacco, therefore, has a very important effect on Kentucky agriculture and resources devoted to it.

Purpose and Objectives

The purpose of this publication is to present and evaluate optimum farm adjustments under alternative price and allotment combinations in four major burley-tobacco producing areas of Kentucky. Optimum farm adjustments are defined as farm organizations in which the enterprises and the resources used in producing these enterprises are combined in such a manner that returns to resident labor and management, and land are maximized. Information concerning optimum farm adjustments is useful to farmers, policymakers, and the general public in the sense that it can be used as a general guideline in decision-making.

In this study, estimates of the optimum enterprise levels, the resources used and the net returns obtained from the resources of resident labor and management, and land were investigated for 15 different tobacco allotment and/or price combinations. These included three sets of estimates for three tobacco prices without allotment restrictions. In addition, 12 sets of estimates were determined for four

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tobacco prices together with prespecified acreage allotments. The effects of the changes in tobacco allotments and/or prices are evaluated in terms of their effects on enterprise levels, resource use, and net returns to resident labor and management, and land.

This study has three major objectives:

1. To determine the nature and magnitude of resource-use adjustments which would achieve the most profitable system of farming under alternative price and allotment levels of burley tobacco and the effects of these adjustments on the aggregate output and income of the Kentucky areas under study.

2. To determine the effect upon total agricultural production, farm income, and the labor and land used in agriculture for the four Kentucky areas under consideration, if all farmers adjusted to their most profitable farming systems.

3. To estimate optimum representative farm relationships and to aggregate these to determine production, income, and resource-use estimates for each of the four areas under study.

METHODOLOGY AND PROCEDURES

Several articles have been written concerning methods for estimating supply functions.[1] The two techniques most often used to estimate supply are: (1) regression of time-series data, and (2) linear programming. Regression techniques have been used mainly in the analysis of short-run supply response concerning phenomena for which historical data are available. Linear programming is used largely in evaluating the effects of variables for which there is little or no historical basis for estimating supply response. Several regional adjustment studies have used linear programming as a basis for estimating regional outputs, income, and resource use or, in essence, supply response. The procedure used in this study consists of:

1. Stratifying the region into areas that are similar with respect to production alternatives, resources, and techniques of production.

2. Using a sample survey in each area, together with information from the Agricultural Stabilization and Conservation Service, to estimate the labor and land resources.

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[1]See: Marc Nerlove and K. L. Bachman, "The Analysis of Changes in Agricultural Supply: Problems and Approaches," *Journal of Farm Economics*, XLII:531-554, August 1960; and R. Barker and B. F. Stanton, "Estimation Aggregation of Firm Supply Functions," *Journal of Farm Economics*, 47:701-712, August 1965.

3. Constructing representative farms.

4. Solving representative farm linear-programming models with a series of alternative tobacco allotments and prices to obtain optimum enterprise and resource-use levels.

5. Summing the enterprise and resource-use levels of the individual representative farms to obtain aggregate or regional estimates.

A description of the above steps is presented in this section. The major difference in the procedure used in this study and other S-42 studies is the method used in constructing representative farms. The use of labor-land ratios, discussed subsequently, is designed to reduce aggregation error.

Description of the Study Areas

The areas covered in this report are the Bluegrass region and the Western Pennyroyal region of Kentucky. The Bluegrass region is divided into three parts: the Inner, Intermediate, and Outer Bluegrass areas. Although all four areas are well suited to burley-tobacco production, they are different in such respects as topography, soil types, farm sizes, enterprise combinations, labor availability, and burley allotment sizes. Because of these differences, each area is considered separately with different production and cost coefficients, land-labor ratios and allotment restrictions. The four areas are shown in Fig. 1.

Inner Bluegrass

The Inner Bluegrass is the most productive part of the Bluegrass region. This is a gently sloping upland area of approximately 1,700 square miles centrally located in the Bluegrass region. The surface soil of the Inner Bluegrass is a brown or faintly reddish-brown silt loam, grading into a reddish-brown silty clay beneath. Phosphatic fertilizers are not needed in this area due to the high phosphatic content of the Maury silt and Mercer soils dominating the area.

Almost all the Inner Bluegrass can be used for either cropland or pasture. About 41 per cent of the farmland is suited to row-crop production, about 75 per cent can be used for small grain production, and about 95 per cent can be used for hay and pasture. Burley allotments are larger relative to farm size in the Inner Bluegrass than any of the other three areas.

Intermediate Bluegrass

The Intermediate Bluegrass is a thoroughly dissected plateau of approximately 3,300 square miles consisting of many narrow, winding

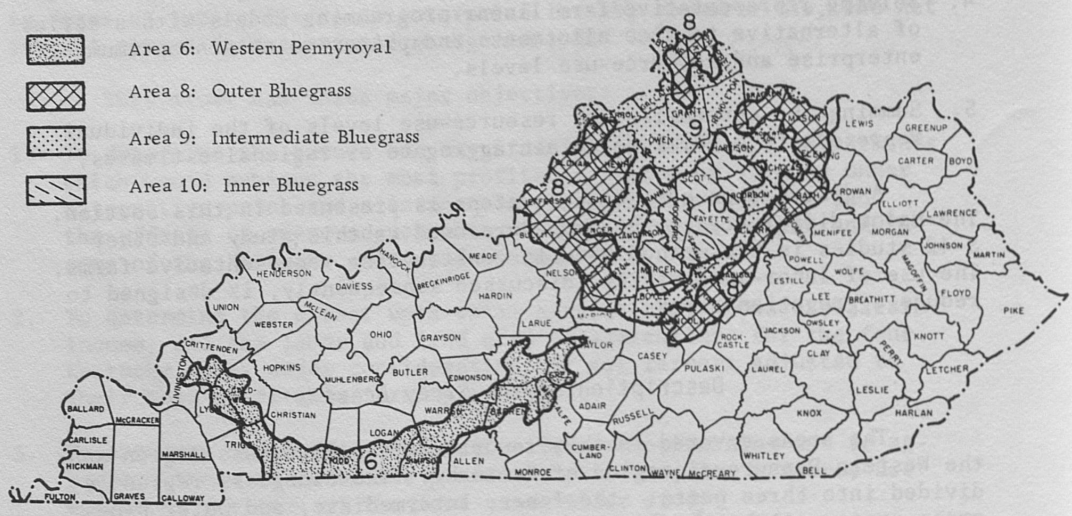

FIG. 1.--The Area of Study, Bluegrass and Western Pennyroyal Areas, Kentucky.

ridges and valleys. This is a hilly area with the hills ranging in slopes from 25 to 35 per cent. Eden and Fairmount silty clay loams are the main soil types of this area. These soils are fairly high in phosphorus and high in lime and potassium. Unlike the Inner Bluegrass, only about 9 per cent of this area can be used for row crops and only 21 per cent for small grains. About 65 per cent of this region can be used for hay and pasture. The remaining 35 per cent consists of timber and wasteland. Burley-tobacco allotments in this area are smaller than the two other Bluegrass areas, but larger than the Western Pennyroyal area.

Outer Bluegrass

The Outer Bluegrass consists of 3,000 square miles which encircle the Inner and Intermediate Bluegrass areas on the west, south, and east in a horseshoe fashion. This area is quite similar to the Inner Bluegrass except that the topography is more rolling, the soils contain less calcium phosphate, and the internal drainage of the subsoil is not as good. The important soil types of this area are Shelbyville and Lowell silt loams. These soils are brown silt loams on the

surface and shade into brownish-yellow silty clay loam to silty clay underneath. Approximately 29 per cent of the farmland in the Outer Bluegrass is suited to row-crop production, and about 44 per cent is usable for small grains. Approximately 79 per cent of this area can be used for hay and pasture crops. The other 21 per cent consists of wasteland and forest. The burley allotments in this area are generally smaller than those in the Inner Bluegrass but larger than those in the Intermediate Bluegrass and Western Pennyroyal areas.

Western Pennyroyal

The Western Pennyroyal area consists of 4,200 square miles forming a broad horseshoe with the bend at the southern boundary of the Western half of the state and the ends extending north, except that the east end is discontinuous. The important soil types of this area are Baxter, Pembroke, Decatur, and Dixon. The area is undulating to rolling with many sinkholes and is well adapted to general farming when the soil is limed and phosphated. Approximately 50 per cent of this area is suited to row-crop production and 70 per cent to small-grain production. Almost the entire area is suited to some sort of farming or pasture production. The burley allotments for this area are much smaller than those of the other study areas included in this analysis.

Sampling Methods, the Farm Sample, and the Use of Agricultural Stabilization and Conservation Service Data

Sample "communities" were selected from Agricultural Stabilization and Conservation Service (hereafter referred to as ASCS) records for each of the study areas. All farms with 20 or more acres were then completely enumerated by farm size. This enumeration provided estimates of the relative importance of different sizes of farms.

Following this enumeration, a random sample of farms was surveyed in the four study areas to obtain information on present farm sizes and resident labor supplies. Two counties were selected from each study area as representative of that area. Each county was divided into area segments the boundaries of which were determined largely by natural landmarks. Each of the segments was numbered and random procedures were used to determine those to be used in the survey. Once a segment was selected, all farms within it were enumerated. More than 100 observations were obtained from each of the four study areas with a total of 445 drawn for the entire study area.

Since the sampling rate was quite small, the farm sizes obtained in the sample of farms are subject to considerable sampling error. For this reason the much more extensive information provided by the ASCS records was used to determine the importance of different farm sizes. The ASCS data, however, contained no information on labor

supplies, so sample data alone were used to determine the amounts of resident labor available on farms of different sizes. ASCS farm-size data were used to compute weights which were then applied to the relative farm-size frequencies obtained from the sample survey data. Thus, the relative farm-size frequencies from ASCS data were imposed on the sample data while, within each farm-size class, the distribution by resident labor was left unchanged.

Due to the large number of different farm sizes and the variations in the amounts of resident labor associated with them, the entire array is not presented here. Instead, the number of farms, the land in farms, the resident labor on farms, and the range in the supply of resident labor to farms is broken down by farm-size groups for each area (Tables 1-4).

Method of Developing Representative Farms

In this study, a universe of farms was delineated. A number of farms were then selected to represent the entire universe of farms. Optimum enterprise and resource-use levels were developed for each of the farms selected to represent the universe of farms. The enterprise and resource-use levels obtained by linear-programming procedures on the representative farms were then expanded to obtain aggregates for the universe. The difference between the results obtained by this procedure and those obtained by programming all farms is defined as aggregation error.

An attempt was made to reduce aggregation error by grouping farms on the basis of homogeneous resources.[2] Farms were classified on the basis of the amounts of resident labor and land available to them since these resources tend to be the most immobile resources. In making this classification, it is assumed that, with a given level of management, farms with similar resource bases use similar technology.

Groups of "qualitatively homogeneous" farms were determined for each area. Qualitatively homogeneous farms are defined as those that contain the same enterprises in their optimum programs.[3] From each of the groups of farms containing the same enterprises a single

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[2]See: James F. Thompson, *Defining Typical Resource Situations*, Southern Cooperative Series Bulletin 56, pp. 32-43, 1958; G. E. Frick and R. A. Andrews, "Aggregation Bias and Four Methods of Summing Supply Functions," *Journal of Farm Economics*, 47:696-700, 1965. Also, for an overall review of studies relating to the aggregation problem see: Thomas A. Miller, "Aggregation Error in Representative Farm Linear Programming Supply Estimates," unpublished Ph.D. Thesis, Iowa State University, 1967.

[3]See Miller, *Ibid.*, for a discussion of "qualitatively homogeneous" farms.

TABLE 1

LAND AND LABOR AVAILABLE ON FARMS
IN THE INNER BLUEGRASS--1959

Farm Size[a] (acres)	Number of Farms	Land in Farms[b] (acres)	Resident Labor on Farms (1,000 hrs.)	Range in Resident Labor Available to Farms[c] (hours)
20 - 49	1,022	36,039	1,841	590 - 2,950
50 - 74	730	43,233	1,341	590 - 3,245
75 - 99	529	45,201	1,560	885 - 5,900
100 - 139	839	98,139	2,584	1,475 - 5,900
140 - 179	547	85,108	2,213	1,180 - 7,375
180 - 219	273	54,296	1,134	2,950 - 6,785
220 - 259	347	80,900	2,758	3,540 - 11,800
260 - 499	694	235,778	4,691	1,475 - 13,275
Total	4,981	678,694	18,122	

[a] *Farms with less than 20 acres and more than 500 acres were excluded. Farms with less than 20 acres were considered to be basically rural residences and not apt to adjust. Farms with more than 500 acres were excluded due to the fact that the low sampling rate used in the survey resulted in unreliable estimates of the needed data for such farms.*

[b] *Approximately 95 per cent of this land is open land.*

[c] *Each man-equivalent was assumed to supply 2,950 hours of labor per year.*

TABLE 2

LAND AND LABOR AVAILABLE ON FARMS IN THE INTERMEDIATE BLUEGRASS--1959

Farm Size[a] (acres)	Number of Farms	Land in Farms[b] (acres)	Resident Labor on Farms (1,000 hrs.)	Range in Resident Labor Available to Farms[c] (hours)
20 - 49	2,356	85,516	5,629	885 - 3,245
50 - 74	2,181	134,226	5,113	885 - 3,835
75 - 99	2,393	205,459	5,066	885 - 6,785
100 - 139	2,954	347,559	9,025	885 - 6,785
140 - 179	1,829	290,976	7,229	885 - 7,080
180 - 219	1,020	201,980	4,247	1,475 - 5,900
220 - 259	669	160,229	2,824	2,950 - 8,850
260 - 499	1,195	405,293	7,389	1,475 - 12,685
Total	14,597	1,831,238	46,522	

[a] *Farms with less than 20 acres and more than 500 acres were excluded. Farms with less than 20 acres were considered to be basically rural residences and not apt to adjust. Farms with more than 500 acres were excluded due to the fact that the low sampling rate used in the survey resulted in unreliable estimates of the needed data for such farms.*

[b] *Approximately 65 per cent of this land is open land.*

[c] *Each man-equivalent was assumed to supply 2,950 hours of labor per year.*

TABLE 3

LAND AND LABOR AVAILABLE ON FARMS
IN THE OUTER BLUEGRASS--1959

Farm Size[a] (acres)	Number of Farms	Land in Farms[b] (acres)	Resident Labor on Farms (1,000 hrs.)	Range in Resident Labor Available to Farms[c] (hours)
20 - 49	1,844	58,826	2,419	590 - 2,950
50 - 74	1,844	116,674	4,318	590 - 5,900
75 - 99	939	87,757	2,311	590 - 3,805
100 - 139	1,977	233,347	6,047	855 - 6,755
140 - 179	1,307	214,213	4,417	855 - 5,900
180 - 219	939	181,988	4,050	1,180 - 11,800
220 - 259	636	150,626	2,845	2,950 - 5,900
260 - 499	1,174	395,050	6,332	2,950 - 11,800
Total	10,660	1,438,481	32,739	

[a] *Farms with less than 20 acres and more than 500 acres were excluded. Farms with less than 20 acres were considered to be basically rural residences and not apt to adjust. Farms with more than 500 acres were excluded due to the fact that the low sampling rate used in the survey resulted in unreliable estimates of the needed data for such farms.*

[b] *Approximately 79 per cent of the land is open land.*

[c] *Each man-equivalent was assumed to supply 2,950 hours of labor per year.*

TABLE 4

LAND AND LABOR AVAILABLE ON FARMS IN THE WESTERN PENNYROYAL--1959

Farm Size[a] (acres)	Number of Farms	Land in Farms[b] (acres)	Resident Labor on Farms (1,000 hrs.)	Range in Resident Labor Available to Farms[c] (hours)
20 - 49	2,193	97,015	2,349	295 - 2,950
50 - 74	1,005	86,460	3,192	885 - 2,950
75 - 99	1,348	119,403	4,948	1,180 - 7,375
100 - 139	1,851	216,841	5,812	1,180 - 6,785
140 - 179	1,165	159,950	3,740	1,475 - 8,260
180 - 219	776	157,421	4,074	2,360 - 8,850
220 - 259	434	105,604	2,071	1,475 - 5,900
260 - 499	1,074	361,307	6,950	2,950 - 14,750
500 - 660	184	104,056	1,562	5,900 - 13,570
Totals	10,030	1,408,057	34,698	

[a] *Farms with less than 20 acres and more than 660 acres were excluded. Farms with less than 20 acres were considered to be basically rural residences and not apt to adjust. Farms with more than 660 acres were excluded due to the fact that the low sampling rate used in the survey resulted in unreliable estimates of the needed data for such farms.*

[b] *Approximately all this land is open land.*

[c] *Each man-equivalent was assumed to supply 2,950 hours of labor per year.*

farm was selected to represent all the others. A parametric programming procedure was used to isolate ranges in the relative combinations of resident land and labor within which the enterprises in the optimum programs did not change.

The procedure used in determining the ranges over which the relative combinations of resident labor and land could vary without any change occurring in optimum programs or the marginal value product of land was to set resident labor equal to two man-equivalents and to examine the range over which the quantity of land could vary without affecting the enterprises contained in the optimum program. With slightly more land than that at which the enterprise composition changed, and with resident labor held constant at two man-equivalents, a new solution was generated. Solutions were generated with slightly more land than that at which the enterprise composition changed for each enterprise-composition change until the marginal value product of land reached zero. Beyond this point no additional land is used and no further changes occur in the optimum enterprise composition. This procedure is graphically shown for the 58.8-cent tobacco price in the Outer Bluegrass area (Fig. 2).

All the farms with land-labor ratios falling between two boundary lines (lines I, II, etc. in Fig. 2) contain the same enterprises. The optimum enterprise levels associated with each land and labor level within the boundary lines depend on the point within the boundary lines at which these land and labor levels fall. However, if the resources of the farms falling between two boundary lines are averaged and an optimum program determined by means of linear programming for the average resources, this program can be multiplied by the number of farms in the group and the results will be the same as if optimum programs had been determined for the farms separately and added together. When the boundaries were very close, some combinations were made in constructing average land-labor ratios. The procedure described above provides a basis for linear aggregation that greatly reduces error in the aggregation process itself.

It should be pointed out, however, that the technical coefficients used in the programming are those for average-sized farms within each area. To the extent that coefficients on large farms are different from those on small farms and these in combination do not equal those of average-sized farms, aggregation error arises.

The parametric programming procedure described above was carried out for each of the four tobacco price levels in each study area since the resource ratios over which the optimum programs remain constant change as prices are varied. Consequently, four sets of representative farms were used in each study area. Six to thirteen representative farms were used for each price, depending on the resource ratios over which the optimum programs did not change.

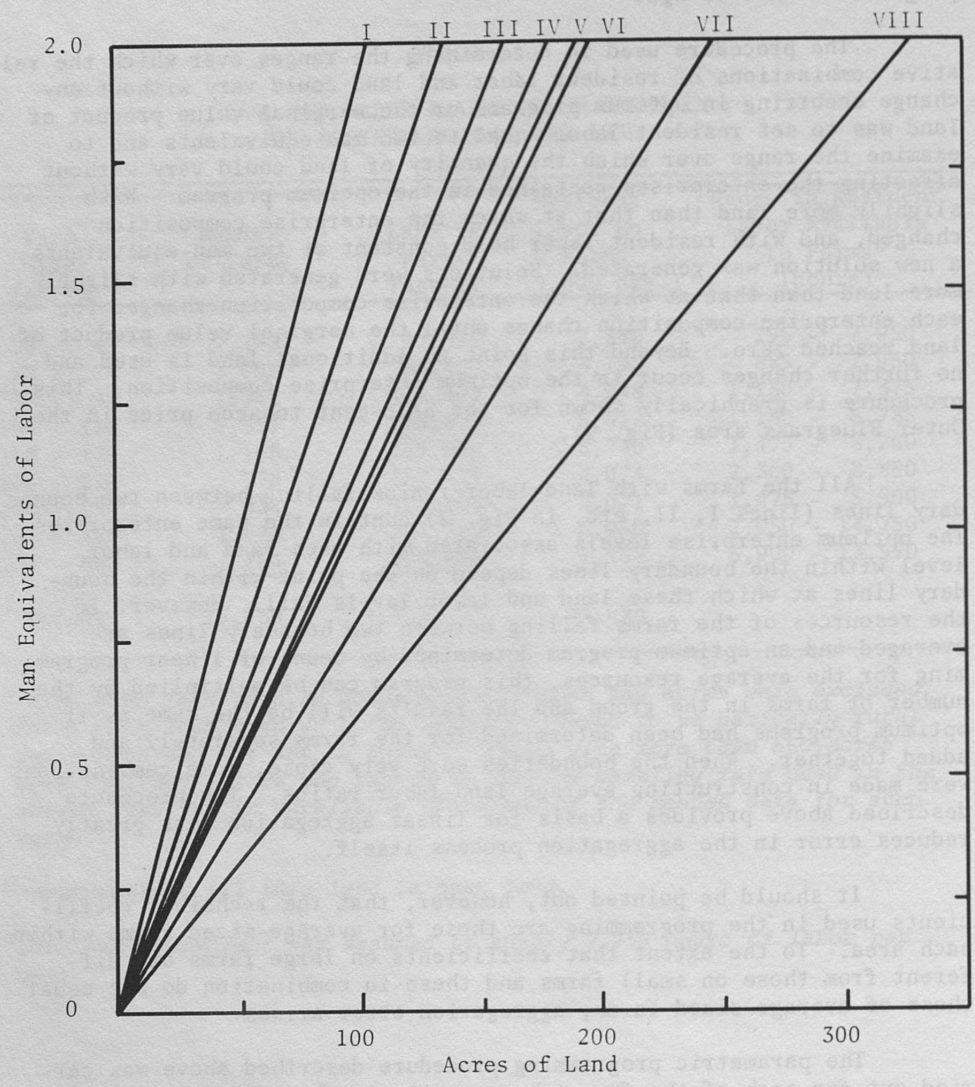

Figure 2.--Qualitatively Homogeneous Groups of Farms

Aggregation Procedure

The aggregation procedure used in this study involved the translation of representative farm estimates into area estimates. The mechanics of the aggregation procedure involved estimation of the aggregation weights in such a way that the aggregate acreage in the farms as determined by the use of these weights was approximately equal to the total acreages as determined for the ASCS data. The sum of land in farms in each qualitatively homogeneous group was expressed as a percentage of the land in all farms in the survey for each study area. The total acreage in the study area represented by each qualitatively homogeneous group was then obtained by multiplying the total land in farms of the study area by the respective group percentages. The amounts thus determined were divided by the acreage of the single representative farm of each study group to determine the number of such farms which could be included in each qualitatively homogeneous group. The aggregate enterprise levels were then estimated by multiplying the optimum enterprise levels for each representative farm by the number of farms represented by it and summing overall representative farms to obtain the aggregates for each study area. The area aggregates were then totaled to estimate the production for all the areas included in the study.

Qualitatively Homogeneous Resource Groups 58.8-Cent Tobacco Price, Outer Bluegrass

Nine qualitatively homogeneous resource groups were shown in Fig. 2 for the 58.8-cent tobacco price in the Outer Bluegrass area. The average quantity of land, the total acreage of land, the average quantity of labor, the number of farms represented by each qualitatively homogeneous resource group, and the average quantity of land available for each man-equivalent of labor is shown below (Table 5).

ASSUMPTIONS

The results of a study of this nature and the conclusions which it yields are highly conditioned by the major assumptions on which it is based. The assumptions with respect to the variables analyzed, resources, enterprises considered, and the coefficient assumptions and derivations are presented below.

Variables Analyzed

The analysis in this publication is centered on the effects of tobacco price and allotment variations on optimum enterprise combinations, returns, and resource-use levels. Three burley-tobacco price levels were considered under the assumption that tobacco production was not restricted

TABLE 5

LAND AND LABOR COMPOSITION OF QUALITATIVELY HOMOGENEOUS RESOURCE GROUPS AT THE 58.8-CENT TOBACCO PRICE IN THE OUTER BLUEGRASS AREA

Group Identification (unit)	Average Farm Size (acres)	Total Land (acres)	Average Labor (man-equiv.)	Number of Farms	Average Land per Man-Equivalent of Labor (acres)
Group I	61.19	59,600	1.5	975	1.7
Group II	75.20	40,455	1.2	538	2.6
Group III	114.56	92,447	1.6	807	3.1
Group IV, V, and VI[a]	102.80	107,222	1.2	1,043	3.6
Group VII	101.80	256,740	0.9	2,522	4.7
Group VIII	160.53	215,911	1.1	1,345	5.9
Group IX	194.18	666,046	0.8	3,430	10.3

[a]These three groups were combined.

by institutional controls (allotments). In addition, four price levels were combined with five allotment levels for a total of twelve price-allotment combinations (Table 6).

Resources

Land Use

Soil Conservation Service data were used to obtain the percentage of total land in each land use-capability class in each study area.[4] Each representative farm used for analytical purposes was assumed to have the same distribution of land among capability classes as the entire study area. Row-crop, small-grain, and total land-use restrictions were derived from rotations based on the relative importance of the land-use classifications in each study area.

Labor Use and Availability

Only resident labor was assumed to be available for farm use in this study.[5] The amount of labor available to each representative farm

[4]Kentucky Conservation Needs Committee, "Kentucky Soil and Water Conservation Needs Inventory" (unpublished material compiled by SCS, July 1962.)

[5]The profitable use of hired labor will be discussed in the second study mentioned in the preface.

TABLE 6

BURLEY PRICES AND ALLOTMENT SITUATIONS INCLUDED IN THE ANALYSIS

Assumed Burley Price[a]		Assumed Tobacco Allotment Levels[b]					
Cents per pound	Percent of base price	Percent of 1963 allotment 85	100	115	130	145	No allotments
42.0	100			X	X	X	X
50.4	120		X	X	X		X
58.8	140	X	X	X	X		X
67.2	160	X	X				

[a] *Projected base price to 1975 assuming no allotment restraints.*

[b] *X's denote tobacco price-allotment combinations investigated in this analysis.*

was assumed to be the average man-equivalents for the farms in each qualitatively homogeneous group as determined from the survey data. The only provision for hired labor was for custom harvesting of some crops. It was assumed that the farm operator could not profitably own a combine, cornpicker, baler, or forage harvester.

Each man-equivalent was assumed to furnish 2,950 hours of labor per year. The annual seasonal labor supply was divided on a seasonal basis into six periods and each period was treated as a separate resource in the programming analysis. The 2,950 hours of labor were distributed seasonally as follows:

November-January	675 hours
February-April	700 hours
May-June	525 hours
July	275 hours
August	275 hours
September-October	500 hours

Seasonal weather patterns, day length, and types of farm operations performed in each period were used as a basis for determining the labor availability for each period.

Capital Use and Availability

Capital use was not assumed to be a limiting factor in resource allocation. Capital use included that in both operating and investment categories. The amount of operating capital was equivalent to the total

operating expenses. The average period of use of the operating capital items was assumed to be one-half the production period. Investment capital was assumed to amount to one half of the original cost of the asset involved or, when applicable, salvage value plus one-half the difference between original cost and salvage value. Since returns were taken as the net returns to resident labor, management, and land, land values were not included in investment capital. Interest at the rate of 6 per cent on both operating and investment capital was included as an expense in the budgets regardless of whether the capital was owned or borrowed. The capital-use aggregates obtained in this analysis are the optimum levels of capital use at the assumed interest rate.

Management And Technology

A high level of managerial ability and an improved level of technology were assumed for this analysis. The input-output conditions reflect the average conditions expected to exist in 1975, the approximate target date set for the supply estimates derived in this study. The input-output coefficients derived for use in this study are based on practices followed by the more successful farmers in each area of study and the recommendations of soil technicians, agronomists, animal husbandrymen, and agricultural engineers.

Enterprise Budgets

Budgets were prepared for all major enterprises considered applicable for these four study areas. Crop enterprises considered were corn, barley, corn silage, lespedeza, orchard grass, bluegrass, red clover, alfalfa, and sudan grass. Cash crops considered were wheat and burley tobacco. Livestock enterprises considered were dairying, beef cow-calf production, beef-feeding programs, production of market hogs, production of feeder pigs, and production of spring lambs. Variations in herd size and management programs were considered as different enterprises with separate budgets developed for each.

Price and Cost Estimates

Input and Output Prices

The prices used for inputs and outputs in this analysis were the projected prices obtained from *Agricultural Price and Cost Projections for Use in Making Benefit and Cost Analysis of Land and Water Resource Projects* (United States Department of Agriculture, 1957).[6] Where applicable, the projected prices were adjusted for area

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[6]See Appendix C.

differentials and seasonal variation. All prices remained constant throughout the analysis except for the variations in burley prices discussed earlier.

Input Costs

The costs of machinery and other depreciable facilities were included as costs to each enterprise. In handling expenses of assets shared by a number of enterprises, or multiple units of enterprises, allocation of these expenses poses a problem. These joint expenses were handled by calculating a total annual cost for each asset involved and prorating this cost over the assumed level of use for each asset. This provided a cost per unit of use for each asset involved. The cost to the enterprise was then calculated by multiplying the number of units of use required of each asset times its per-unit cost. In this way each enterprise was allocated its estimated proportion of the annual cost of each input factor involved.

AGGREGATION RESULTS FOR STUDY AREAS

The remainder of this publication presents the aggregate production and resource-use estimates for the four study areas separately and then as a whole. Furthermore, the interrelationships between enterprise levels at different tobacco price and allotment levels will be analyzed. The changes in enterprise combinations and resources used when tobacco allotments are imposed, in contrast to the results when tobacco allotments were not in effect, will also be examined. (See Table 6 for tobacco price and allotment levels.)

General Adjustments to Different Burley Price and Allotment Levels in Four Study Areas

The profitable adjustments to variations in tobacco prices and allotment levels in given resource situations depend largely on the competition of specific enterprises for labor with the quantity of land also playing an important role.

A very distinct supplementary labor-use pattern exists between tobacco and wheat production and winter feeding of steers (system 3A); and alfalfa production displays a weaker, but noticeable, supplementary relationship with tobacco.[7] Contrariwise, the hog, corn, barley, red clover, sudan grass, and bluegrass enterprises usually displayed competitive relations in labor use with tobacco production. The relationships described above result primarily from the fact that August is a high labor-use period for burley tobacco. The winter steer-feeding

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[7]See Appendix A for a description of the livestock enterprises.

enterprise is a program which uses no August labor. By the same token, the production of alfalfa hay is much less competitive for August labor than is red clover due to the differences in the cutting schedules. Conversely, the dairying, barley, red clover, corn, and hog enterprises compete more strongly with tobacco for labor in August as well as in other periods.

The extent of competition for labor between a given livestock-feed grain program and tobacco depends heavily on the land-labor ratio. Corn and hog production were most competitive in high labor-low land resource situations, while the dairying and beef-feeding enterprises were the major competitors with tobacco for labor as labor became less abundant and land more plentiful. The supplementarity in labor use between tobacco and wheat tended to disappear as tobacco production increased in response to higher prices and the actual land in crop production was reduced (Appendix D).

The resident labor supply was a very important factor in determining the optimum enterprise combinations especially in the Bluegrass areas. The tobacco allotments in these areas were generally larger in relation to the labor available than in the Western Pennyroyal. Consequently, the amount of tobacco which would be produced and the amounts and types of other enterprises, both with and without allotments, were importantly determined by the availability of labor.

Aggregate Price Response of Burley Tobacco Production

The estimated production response of tobacco to price increases between the base price and 140 per cent of base was generally elastic when allotments were not imposed. Furthermore, a preponderance of elastic responses occurred even when allotments were imposed, especially in the Bluegrass area. Here the tobacco allotments are larger relative to the labor supply than in other areas. In contrast, the estimated production response for prices between 140 and 160 per cent of base was generally inelastic.[8] If tobacco allotments were not imposed or were ineffective, i.e., larger than the optimum acreage of tobacco, resource shifts associated with tobacco production depended on such factors as input-output price ratios, the technical coefficients of production, and the labor-land ratio with the latter being the dominant factor.

If allotments were effective in determining the amount of tobacco produced, production could not respond at all to price changes. However, tobacco allotments were restrictive only in situations where labor was abundant relative to land. Consequently, the full price-response of tobacco production would be largely realized even when

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[8]The Outer Bluegrass was an exception.

allotments were imposed. Using the formula, $\frac{\frac{Q_2 - Q_1}{Q_1 + Q_2}}{\frac{(P_2 - P_1)}{(P_1 + P_2)}}$ the arc elasticities of supply for burley tobacco between the five tobacco prices were computed. These estimates for the four study areas are shown in Table 7.

The arc-elasticity is the percentage change in tobacco production resulting from a one-per cent change in tobacco price. Since the resident labor supply was often too small to permit the full utilization of tobacco allotments, the allotments were often ineffective. Consequently, the elasticity estimates were substantially greater than zero even when allotments were imposed except with the price variation from 140 per cent to 160 per cent of base in three of the four areas.

A tobacco price increase from the base price to 120 per cent of base resulted in relatively greater increases in tobacco production in the Intermediate Bluegrass and Western Pennyroyal areas. Conversely, the greatest increase in tobacco production would come over the 120-140 per cent price range in the Inner and Outer Bluegrass areas.

The estimated tobacco supply response in the Inner Bluegrass was elastic over the 100-120 per cent price range and over the 120-140 per cent range both with and without allotments. However, the advantages of shifts to tobacco would be about exhausted at the 140-per cent tobacco price as indicated by the small increase in tobacco production when the price was increased to 160 per cent of base.

The estimated supply response in the Outer Bluegrass displays a more gradual shift to tobacco production in response to higher prices than does that in the other three study areas. On the other hand, the price response in the Western Pennyroyal area was very large when the tobacco price was increased from base to 120 per cent of base price and was much smaller over the other price ranges. This area possesses alternative production possibilities which, at the base tobacco price, use its resources more profitably than burley production. Although the tobacco allotments are much smaller in the Western Pennyroyal area and are fully used at many of the higher labor-land situations, the elasticity of production was still quite high. This is because greater production of tobacco becomes profitable at lower labor-land resource situations for the 120-per cent tobacco price. Since these resource situations have relatively heavy weights, they have substantial effects on the aggregate supply estimates for this area.

In the Bluegrass areas, the amount of tobacco grown when allotments were imposed was about as large as when allotments were not

TABLE 7

ARC PRICE-ELASTICITIES OF BURLEY PRODUCTION, FOUR AREAS SEPARATELY AND COMBINED

Price Range[a]	Allotment Level[b]	Arc Price-Elasticities				
		Inner Bluegrass	Intermediate Bluegrass	Outer Bluegrass	Western Pennyroyal	Four Areas Combined
100-120 per cent price range	without allotment	1.38	1.48	1.05	4.28	2.03
120-140 per cent price range	without allotment	2.33	0.93	1.26	0.88	1.18
140-160 per cent price range	85 per cent allot.	0.17	0.09	1.28	0.66	0.48
120-140 per cent price range	100 per cent allot.	2.51	0.98	1.34	1.05	1.32
140-160 per cent price range	100 per cent allot.	0.27	0.14	1.30	0.56	.50
100-120 per cent price range	115 per cent allot.	1.44	1.59	1.18	4.16	1.90
120-140 per cent price range	115 per cent allot.	2.42	0.98	1.29	1.10	1.30
100-120 per cent price range	130 per cent allot.	1.20	1.52	1.29	4.23	1.84
120-140 per cent price range	130 per cent allot.	2.40	0.95	1.07	1.26	1.25

[a]Price stated in percentage of base price of 42 cents per pound.

[b]Burley allotment stated in percentage of 1963 allotment.

imposed. The labor supply was a much more important determinant of tobacco acreages here than were tobacco allotments.

The smallest aggregate acreages of tobacco for any price-allotment combination were 8,591 acres, 25,944 acres, 16,102 acres, and 6,568 acres for the Inner, Intermediate, Outer, and Western Pennyroyal areas, respectively; a total of 57,205 acres for the four areas combined (Tables 8-11). These acreages occurred when the base tobacco price was combined with the 115-per cent allotment level in all of the areas. Comparatively, the largest acreages of tobacco for the four areas were 16,804 acres, 42,597 acres, 28,081 acres, and 31,702 acres, in the Inner, Intermediate, Outer, and Western Pennyroyal areas, respectively, or a total of 119,184 acres.

The reduction in tobacco production resulting from the imposition of allotments ranged from nil when the base price was combined with the 115-per cent allotment level to a 1,701-acre reduction when the 140-per cent price was combined with the 85-per cent allotment situation.[9] In the Intermediate Bluegrass the effect of tobacco allotments was to decrease tobacco acreage by as little as 566 acres with the base price and 145-per cent allotments and by as much as 5,799 acres with the 140-per cent price and 85-per cent allotments. In the Outer Bluegrass, the reduction in tobacco acreage resulting from imposing allotments ranged from 940 acres with the base price and 145-per cent allotments to 4,536 acres with the 140-per cent price and 85-per cent allotments. Tobacco allotments were much more effective in determining tobacco acreages in the Western Pennyroyal area. Here, allotments reduced tobacco acreage by as little as 4,720 acres with the base price and 145-per cent allotments to as much as 18,393 acres with the 140-per cent price and 85-per cent allotments. For the four areas combined, burley allotments reduced tobacco production by as little as 6,225 acres with the base price and 145-per cent allotments to as much as 30,329 acres with the 140-per cent price and 85-per cent allotments.

Aggregate Response of Other Products

Inner Bluegrass

The nature of the response of other enterprises to increases in tobacco prices was about the same with allotments as without them. It was mostly in the form of increased cash-crop production and decreased livestock and feed-grain production (Table 8).

The pattern of enterprise adjustment to increased tobacco prices, both with and without allotments, was consistent in nature between the base price and 140 per cent of base. The tobacco and wheat

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[9]The 160-per cent tobacco price was not investigated except in combination with allotments.

TABLE 8

OPTIMUM AGGREGATE LEVELS OF SPECIFIED ENTERPRISES FOR 15 PRICE-ALLOTMENT COMBINATIONS, INNER BLUEGRASS AREA, KENTUCKY[a]

Enterprise	Burley Tobacco	Corn	Barley	Wheat	Alfalfa Hay	Red Clover	Sudan Grass	Blue-grass
	1,000 acres							
42¢ price								
No allotments	9.1	124.2	47.3	31.7	17.3	78.7	33.6	252.4
115% allot. level	8.6	124.6	47.3	31.7	17.3	78.7	33.6	252.5
130% allot. level	9.1	124.2	47.3	31.7	17.3	78.7	33.6	252.4
145% allot. level	9.1	124.2	47.3	31.7	17.3	78.7	33.6	252.4
50.4¢ price								
No allotments	11.7	83.3	42.8	40.3	38.2	48.9	32.9	246.8
100% allot. level	10.7	84.2	42.8	40.3	37.6	48.9	33.0	247.4
115% allot. level	11.2	83.8	42.8	40.3	37.6	48.9	33.0	247.3
130% allot. level	11.3	83.7	42.8	40.3	38.0	48.9	32.9	246.9
58.8¢ price								
No allotments	16.8	78.7	0	142.6	37.1	5.0	22.7	170.8
85% allot. level	15.1	79.9	0	142.6	37.5	5.0	23.2	174.3
100% allot. level	15.8	79.6	0	142.6	36.5	5.0	22.8	171.4
115% allot. level	16.3	79.2	0	142.6	36.6	5.0	22.8	171.3
130% allot. level	16.4	79.1	0	142.6	37.0	5.0	22.8	170.8
67.2¢ price								
No allotments	Not considered							
85% allot. level	15.5	83.2	0	137.8	45.8	0	22.2	166.7
100% allot. level	16.3	82.3	0	137.8	46.8	0	22.1	165.6

(Continued)

[a] *These aggregates are for the resources included in this study only.*

TABLE 8--*Continued*

Enterprise	Grade A Dairy	Beef Feeders 3A[b]	Beef Feeders 6A[b]	Market Hogs
	1,000 cows	-------1,000 steers--------		1,000 sows
42¢ price				
No allotments	87.3	8.7	51.3	27.1
115% allot. level	87.3	8.7	51.3	27.3
130% allot. level	87.3	8.7	51.3	27.1
145% allot. level	87.3	8.7	51.3	27.1
50.4¢ price				
No allotments	85.2	7.2	61.3	11.0
100% allot. level	85.2	0	61.3	12.8
115% allot. level	85.2	1.0	61.3	12.8
130% allot. level	85.2	5.6	61.3	12.1
58.8¢ price				
No allotments	66.4	8.1	0	15.1
85% allot. level	66.5	1.0	1.0	16.7
100% allot. level	66.5	1.0	0	17.0
115% allot. level	66.5	1.0	1.0	16.6
130% allot. level	66.4	1.0	0	15.6
67.2¢ price				
No allotments	----------Not considered----------			
85% allot. level	61.2	16.9	19.2	12.7
100% allot. level	60.3	20.2	22.5	11.8

[b]*See Appendix A for a description of the livestock enterprises.*

TABLE 9

OPTIMUM AGGREGATE LEVELS OF SPECIFIED ENTERPRISES FOR 15 PRICE-ALLOTMENT COMBINATIONS, INTERMEDIATE BLUEGRASS AREA, KENTUCKY[a]

Enterprise	Burley Tobacco	Corn	Barley	Alfalfa Hay	Red Clover	Lespedeza	Sudan Grass	Bluegrass
	1,000 acres							
42¢ price								
No allotments	28.2	38.2	34.5	67.3	128.6	19.9	89.4	720.2
115% allot. level	25.9	38.2	34.5	65.4	128.6	19.9	91.6	722.2
130% allot. level	27.4	38.2	34.5	67.4	128.6	19.9	90.2	720.1
145% allot. level	27.6	38.2	34.5	67.4	128.6	19.9	90.0	720.1
50.4¢ price								
No allotments	36.9	43.0	73.5	231.9	29.6	16.8	75.7	618.9
100% allot. level	33.4	43.0	73.5	229.0	29.6	16.8	79.3	621.7
115% allot. level	34.7	43.0	73.5	230.3	29.6	16.8	77.9	620.5
130% allot. level	36.2	43.0	73.5	232.3	29.6	16.8	76.4	618.5
58.8¢ price								
No allotments	42.6	33.2	132.2	204.1	0	0	67.0	552.6
85% allot. level	36.7	33.0	114.7	213.8	0	0	73.1	560.3
100% allot. level	38.8	32.3	132.4	202.0	0	0	70.6	555.6
115% allot. level	40.4	32.3	132.2	203.1	0	0	69.2	554.5
130% allot. level	41.9	32.3	132.2	205.0	0	0	67.8	552.5
67.2¢ price								
No allotments	Not considered							
85% allot. level	36.8	33.6	107.6	213.9	0	0	72.8	557.6
100% allot. level	39.1	33.8	125.0	201.2	0	0	70.3	552.9

(Continued)

[a]These aggregates are for the resources included in this study only.

[a]These aggregates are for the resources included in this study only.

TABLE 9--*Continued*

Enterprise	Purchase Corn[b]	Sell Hay	Grade A Dairy	Beef Feeders 6A[c]	Feeder Pigs
	1,000,000 bu	1,000 ton	1,000 cows	1,000 steers	1,000 head
42¢ price					
No allotments	8.2	7.6	237.2	14.7	26.2
115% allot. level . . .	12.3	7.6	232.1	14.7	34.0
130% allot. level . . .	8.6	7.6	237.2	14.7	32.3
145% allot. level . . .	8.5	7.6	237.2	14.7	30.6
50.4¢ price					
No allotments	5.7	392.8	199.1	28.4	26.2
100% allot. level . . .	12.3	392.6	190.8	28.4	121.9
115% allot. level . . .	9.7	392.6	194.0	28.4	33.6
130% allot. level . . .	6.1	392.6	199.2	28.4	31.9
58.8¢ price					
No allotments	3.9	242.4	174.3	37.2	26.2
85% allot. level . . .	13.6	286.3	165.1	37.2	156.4
100% allot. level . . .	10.5	241.1	166.1	37.2	121.9
115% allot. level . . .	8.0	241.1	169.3	37.2	33.6
130% allot. level . . .	4.3	241.1	174.4	37.2	31.9
67.2¢ price					
No allotments	----------Not considered----------				
85% allot. level . . .	13.6	301.9	150.8	32.2	156.4
100% allot. level . . .	10.5	258.0	146.8	32.2	121.9

[b]*Owing to the rough topography of the Intermediate Bluegrass area it has historically been a corn-deficit area; consequently, corn purchasing from the outside was allowed at $1.30 per bushel.*

[c]*See Appendix A for a description of the livestock enterprises.*

TABLE 10

OPTIMUM AGGREGATE LEVELS OF SPECIFIED ENTERPRISES FOR 15 PRICE-ALLOTMENT COMBINATIONS, OUTER BLUEGRASS AREA, KENTUCKY[a]

Enterprise	Burley Tobacco	Corn	Wheat	Alfalfa Hay	Red Clover	Sudan Grass	Blue-grass	Hay Sold
	1,000 acres							1,000 tons
42¢ price								
No allotments	18.2	217.0	58.2	37.1	125.1	59.1	444.6	13.9
115% allot. level	16.1	219.4	58.2	37.1	125.1	59.2	444.6	13.9
130% allot. level	16.7	218.8	58.2	37.1	125.1	59.2	444.6	13.9
145% allot. level	17.3	218.2	58.2	37.1	125.1	59.2	444.6	13.9
50.4¢ price								
No allotments	22.1	180.3	122.7	29.9	93.7	51.5	387.8	16.8
100% allot. level	19.2	182.9	122.7	30.7	93.7	51.9	390.4	0
115% allot. level	20.0	182.4	122.7	29.9	93.7	51.5	387.8	0
130% allot. level	21.1	181.3	122.7	29.9	93.7	51.5	387.8	0
58.8¢ price								
No allotments	26.8	125.1	223.5	56.3	47.4	47.4	357.3	0
85% allot. level	22.4	128.2	219.0	60.0	47.4	48.9	367.5	0
100% allot. level	23.6	127.8	223.5	56.0	47.4	48.0	361.0	0
115% allot. level	24.4	127.4	223.5	55.2	47.4	47.6	358.4	0
130% allot. level	24.9	126.8	223.5	53.3	47.4	47.6	356.5	0
67.2¢ price								
No allotments	Not considered							
85% allot. level	26.6	112.7	171.3	97.9	0	44.1	330.6	0
100% allot. level	28.1	111.5	171.3	100.3	0	43.8	328.2	0

(Continued)

[a] *These aggregates are for the resources included in this study only.*

[a]*These aggregates are for the resources included in this study only.*

TABLE 10--*Continued*

Enterprise	Grade A Dairy	Beef Feeders 3A[b]	Beef Feeders 6A[b]	Market Hogs
	1,000 cows	--------1,000 steers-------		1,000 sows
42¢ price				
No allotments	155.5	8.1	87.4	39.9
115% allot. level	155.4	8.1	87.4	40.7
130% allot. level	155.4	8.1	87.4	40.5
145% allot. level	155.4	8.1	87.4	40.3
50.4¢ price				
No allotments	146.0	20.5	0	40.7
100% allot. level	146.9	0	21.1	58.3
115% allot. level	145.9	0	20.5	58.3
130% allot. level	146.0	0	20.5	57.8
58.8¢ price				
No allotments	135.9	23.9	12.4	19.7
85% allot. level	137.8	0	33.6	21.5
100% allot. level	136.9	0	24.4	23.0
115% allot. level	135.9	0	23.9	23.1
130% allot. level	135.9	.1	23.9	22.9
67.2¢ price				
No allotments	----------Not considered----------			
85% allot. level	116.5	0	56.2	18.9
100% allot. level	113.5	0	53.1	17.2

[b]*See Appendix A for a description of the livestock enterprises.*

TABLE 11

OPTIMUM AGGREGATE LEVELS OF SPECIFIED ENTERPRISES FOR 15 PRICE-ALLOTMENT COMBINATIONS, WESTERN PENNYROYAL AREA, KENTUCKY[a]

Enterprise	Burley Tobacco	Corn	Barley	Wheat	Alfalfa Hay	Red Clover	Lespedeza	Sudan Grass	Bluegrass
	1,000 acres								
42¢ price									
No allotments	12.2	254.8	0	320.9	13.6	252.0	18.3	59.7	448.1
115% allot. level	6.6	264.2	0	320.9	15.0	245.6	18.3	59.9	449.2
130% allot. level	7.0	263.7	0	320.9	15.3	245.6	18.3	59.8	449.0
145% allot. level	7.5	263.3	0	320.9	15.6	245.6	18.3	59.8	448.6
50.4¢ price									
No allotments	27.7	161.3	5.6	714.5	38.2	116.9	18.3	34.7	262.4
100% allot. level	13.0	219.8	4.9	517.7	7.6	183.9	18.3	48.7	365.7
115% allot. level	14.5	208.6	13.8	529.2	7.6	177.6	18.3	48.2	361.8
130% allot. level	15.8	199.9	13.8	539.6	8.6	175.2	18.3	48.0	360.4
58.8¢ price									
No allotments	31.7	116.7	55.7	578.3	42.4	46.4	0	39.2	294.4
85% allot. level	13.3	222.7	0	453.8	7.6	171.1	0	50.3	377.2
100% allot. level	15.3	204.1	5.9	448.4	7.6	152.1	0	50.6	379.8
115% allot. level	17.2	189.4	5.8	450.9	7.6	136.0	13.5	50.5	379.1
130% allot. level	19.2	170.4	27.7	437.6	8.0	118.5	16.5	51.0	383.0
67.2¢ price									
No allotments	Not considered								
85% allot. level	14.5	179.6	56.4	511.5	12.8	155.6	0	38.3	431.4
100% allot. level	16.5	171.5	44.2	508.9	12.9	135.8	0	37.1	419.7

(Continued)

[a] *These aggregates are for the resources included in this study only.*

TABLE 11--*Continued*

Enterprise	Hay Sold	Grade A Dairy	Beef Feeders 3A[b]	Beef Feeders 6A[b]	Market Hogs	Feeder Pigs
	1,000 tons	1,000 cows	------1,000 steers-----		1,000 sows	1,000 head
42¢ price						
No allotments	262.0	144.1	0	157.1	43.4	0
115% allot. level	262.0	138.4	0	157.1	29.1	61.2
130% allot. level	262.0	138.9	0	157.1	30.8	54.9
145% allot. level	262.0	139.4	0	157.1	32.4	48.8
50.4¢ price						
No allotments	0	87.9	36.2	78.3	25.5	0
100% allot. level	193.4	120.3	0	83.9	32.5	48.2
115% allot. level	193.4	119.5	0	84.6	30.4	47.9
130% allot. level	193.4	119.8	0	81.9	27.7	47.5
58.8¢ price						
No allotments	8.6	116.9	52.5	0	21.9	0
85% allot. level	141.5	129.6	0	61.4	34.9	48.6
100% allot. level	109.7	136.6	0	33.3	32.8	48.2
115% allot. level	87.4	141.7	0	8.1	30.6	47.9
130% allot. level	39.9	145.2	0	0	28.2	47.5
67.2¢ price						
No allotments	----------Not considered----------					
85% allot. level	78.1	115.8	0	22.3	14.6	76.1
100% allot. level	80.5	123.0	0	15.3	21.3	72.6

[b]*See Appendix A for a description of the livestock enterprises.*

enterprises, being supplementary in labor use, increased together in response to tobacco price increases over this range. Hog and corn production, dairying, and steer-feeding generally declined. These decreases were mostly due to the competition for labor between tobacco and wheat production on the one hand, and livestock and feed-grain production on the other.

Tobacco supply response between 140 per cent and 160 per cent of base price was quite inelastic. Here, the changes in livestock and feed-grain production did not follow the consistent pattern that occurred at lower tobacco prices. The competition for peak-season labor between dairying and market-hog production on the one hand, and tobacco production on the other, resulted in declines in the levels of the dairying and market-hog enterprises. However, since sufficient labor was available in surplus-labor periods, substantial increases in two beef-feeding enterprises made productive use of this labor. Wheat production was also reduced a small amount at 160 per cent of base price.

The reduction in tobacco acreages associated with the imposition of tobacco allotments resulted in an increase in corn and hog production at the base and 120 per cent of base tobacco prices. Hog and corn production was substituted for the winter-spring beef-feeding program at these lower tobacco-allotment levels.

Tobacco allotments became more effective in limiting tobacco acreages at the higher tobacco prices. Consequently, larger differences between the optimum programs with and without allotments were noted. Not only did corn and hogs increase in importance when allotments were imposed, but also dairying and the associated hay and pasture acreages. Again, hogs were substituted for steers when reduced tobacco acreages freed the August labor needed by the hog enterprise.

Intermediate Bluegrass

Owing to the topography of the Intermediate Bluegrass, the hay and pasture enterprises (including hay produced for cash sale) were much more important in this area than in the other three study areas. As in the Inner Bluegrass, the production of cash crops increased at higher tobacco prices while the livestock-feeding enterprises declined. However, the cash crop was hay in the Intermediate Bluegrass and wheat in the Inner Bluegrass (Table 9).

Outer Bluegrass

In the Outer Bluegrass the adjustments were much the same as in the Inner Bluegrass. Tobacco and wheat acreages increased with higher tobacco prices except that wheat acreages did not increase between the 140 and 160 per cent tobacco prices. Owing to more resources being

used in strictly cash-crop enterprises, the livestock, pasture, and hay enterprises tended to decrease as tobacco prices were increased; dairying consistently decreased. The steer and market-hog enterprise levels varied with the land-labor ratio. The changes in hay, pasture, and grain production depended upon the changes in the livestock enterprises and their feed needs (Table 10).

Again, as in the other two study areas, increased production of hogs and corn and reduced feeding of winter-spring steers were the major changes resulting from the imposition of tobacco allotments at the base and the 120 per cent of base tobacco price. At the 140-per cent price, a larger number of resource situations were affected by the imposition of tobacco allotments than at the two lower tobacco prices. The most profitable use of resources freed from tobacco production was, in every case, some type of livestock feed program. Increased hog and corn production was the dominant mode of adjustment when labor was abundant relative to land, with deferred summer feeding of steers (system 6A) and dairying dominating when labor was scarce relative to land. The levels of the pasture, hay, and grain enterprises fluctuated according to the requirements of the livestock enterprises in the optimum programs.

Western Pennyroyal

In this area, the enterprise shifts in response to tobacco price increases were of the same general nature both with and without allotments. The magnitude of variation in enterprise levels, however, was much less when allotments were imposed. The reductions in the corn, red clover, and steer-feeding enterprises were much smaller when allotments were imposed (Table 11). Furthermore, the reduced acreages of tobacco resulting from allotments resulted in increases in dairying and a year-round beef-feeding program (system 6A). This is in contrast to the predominance of cash sales of wheat and the winter beef-feeding programs (system 3A) when allotments were not imposed.

Due to the smaller tobacco allotments in the Western Pennyroyal region, allotments were much more effective here in limiting tobacco acreages. Consequently, when allotments were imposed, the adjustments in other enterprises were more drastic than in the Bluegrass areas.

The optimum adjustments associated with reduced tobacco acreages at the base tobacco price involved primarily the substitution of corn and the purchase and feeding of pigs for tobacco. There was a slight reduction in dairying at the base tobacco price and the hay and pasture acreages varied depending on the levels of the livestock enterprises.

The reduced tobacco acreages with allotments at both the 120 and 140 per cent tobacco prices resulted in a substantial increase in dairying. Unlike the base tobacco-price situation, representative

farms large enough to adequately meet the hay and pasture needs of the dairy enterprise were affected by tobacco allotments at these two prices. Furthermore, feeder-pig production, deferred feeding of steers, market-hog production, and hay-selling became more profitable with the reduced tobacco acreages at these two prices. The supplementarity of labor use between wheat, winter steer-feeding, and alfalfa production on the one hand, and tobacco production on the other, resulted in decreases in these enterprises as tobacco acreages were decreased. Pasture, hay, and grain acreages responded to decreases in tobacco in a manner consistent with the most profitable use of labor and land. The corn, red clover hay, alfalfa, and pasture acreages were reduced substantially.

The effect of allotments at the highest tobacco price was that less idle land and a larger wheat acreage were included than was the case at the 140-per cent price, and less hay was sold. Other changes were decreases in the corn, red-clover, sudan-grass, dairying, and beef-steer enterprises. The levels of the alfalfa, burley, Bluegrass, and feeder-pig enterprises were increased (Table 11).

Aggregate Enterprise Levels--Four Areas Combined

The aggregate shifts in enterprise levels in response to tobacco price increases, both with and without allotments, generally took the form of increases in tobacco and wheat (Table 12). The levels of the dairying and deferred steer-feeding (system 6A) enterprise generally declined. The levels of the other enterprises varied between these two situations depending on which resources were the most restrictive at the different tobacco prices. The extent to which tobacco allotments were an effective limit on tobacco acreage as well as the profitability of the alternatives to tobacco production importantly determined the mode of adjustment both at and between tobacco prices.

For the four study areas, the aggregate adjustments in increases in tobacco allotments at the different price levels were generally increases in grade-A dairying, wheat, and alfalfa production. The market-hog, feeder-pig, red-clover, and corn activities generally declined.

At higher tobacco prices an increased number of resource situations were affected by tobacco allotments. Changing the allotment level from 85 per cent of base to base at the 140-per cent price level resulted in an increase of approximately 6,000 acres of tobacco and 7,000 dairy cows at the expense of declines in most of the other major enterprises. Essentially the same adjustments resulted when allotments were increased from the base to the 115 per cent of base level and then to the 130-per cent level. Tobacco and grade-A dairying showed the greatest increases, and feeder-pig production decreased the most. Deferred steer-feeding decreased markedly and market hogs decreased slightly. Feed grains, hay, and pasture acreages were adjusted depending on the feed requirements of the changing livestock enterprises.

TABLE 12

OPTIMUM AGGREGATE LEVELS OF SPECIFIED ENTERPRISES FOR 15 PRICE-ALLOTMENT COMBINATIONS, BLUEGRASS AND WESTERN PENNYROYAL AREAS COMBINED[a]

Enterprise	Burley Tobacco	Corn	Barley	Wheat	Alfalfa Hay	Red Clover	Lespedeza
	1,000 acres						
42¢ price							
No allotments	67.7	634.2	81.8	410.8	135.3	584.4	38.2
115% allot. level	57.2	646.4	81.8	410.8	134.8	578.0	38.2
130% allot. level	60.2	644.9	81.8	410.8	137.1	578.0	38.2
145% allot. level	61.5	643.9	81.8	410.8	137.4	578.0	38.2
50.4¢ price							
No allotments	98.4	467.9	121.9	877.5	338.2	289.1	35.1
100% allot. level	76.3	529.9	121.2	680.7	304.9	356.1	35.1
115% allot. level	80.4	517.8	130.1	692.2	305.4	349.8	35.1
130% allot. level	84.4	507.9	130.1	702.6	308.8	347.4	35.1
58.8¢ price							
No allotments	117.9	353.7	187.9	944.4	339.9	98.8	0
85% allot. level	87.5	463.8	114.7	815.4	318.9	223.5	0
100% allot. level	93.5	443.8	138.3	814.5	302.1	204.5	0
115% allot. level	98.3	428.3	138.0	817.0	302.5	188.4	13.5
130% allot. level	102.4	408.6	159.9	803.7	303.3	170.9	16.5
67.2¢ price							
No allotments	Not considered						
85% allot. level	93.4	409.1	164.0	820.6	370.4	155.6	0
100% allot. level	100.0	399.1	169.2	818.0	361.2	135.8	0

(Continued)

[a]*These aggregates are for the resources included in this study only.*

TABLE 12--*Continued*

Enterprise	Sudan Grass	Blue-grass	Grade A Dairy	Beef Feeders 3A[b]	Beef Feeders 6A[b]	Market Hogs	Feeder Pigs
	---1,000 acres---		1,000 cows	--1,000 steers--		1,000 sows	1,000 head
42¢ price							
No allotments	241.8	1,865.3	624.1	16.8	310.5	110.4	26.2
115% allot. level	244.3	1,868.5	613.2	16.8	310.5	97.1	95.2
130% allot. level	242.8	1,866.1	618.8	16.8	310.5	98.4	87.2
145% allot. level	242.6	1,865.7	619.3	16.8	310.5	99.8	79.4
50.4¢ price							
No allotments	194.8	1,515.9	518.2	63.9	168.0	77.2	26.2
100% allot. level	212.9	1,625.2	543.2	0	194.6	103.2	170.1
115% allot. level	210.6	1,617.4	544.6	1.0	194.8	101.5	81.5
130% allot. level	208.8	1,613.6	550.2	5.6	192.1	97.6	79.4
58.8¢ price							
No allotments	176.3	1,375.1	493.5	85.6	49.6	56.7	26.2
85% allot. level	195.5	1,479.3	499.0	1.0	133.2	73.1	205.0
100% allot. level	192.0	1,467.8	506.1	1.0	94.9	72.8	170.1
115% allot. level	190.1	1,463.3	513.4	1.0	70.2	70.3	81.5
130% allot. level	189.2	1,462.8	521.9	1.1	61.1	66.7	79.4
67.2¢ price							
No allotments	----------Not considered----------						
85% allot. level	177.4	1,486.3	444.3	16.9	129.9	46.2	232.5
100% allot. level	173.3	1,466.4	443.6	20.2	123.1	50.3	194.5

[b]*See Appendix A for a description of the livestock enterprises.*

The changes in enterprise levels as allotments were increased from 85 per cent to the base level at the 160-per cent price were similar to those experienced at the 140-per cent price.

A clear-cut pattern of adjustment did not occur throughout the range of allotment variations. Both the labor-land ratio and the extent to which tobacco allotments were effective in limiting tobacco acreages were important in determining the enterprise combinations at different allotment levels. The most clearly defined adjustments to allotment increases were more tobacco and dairying, with fewer feeder pigs. Small allotments combined with high labor-land ratios were favorable to feeder-pig production. However, as allotments together with farm sizes were increased, the more land-extensive dairy enterprise became more profitable than feeder pigs.

Resource Use

Aggregate Capital Used

The aggregate capital used in each of the study areas was generally inversely related to the tobacco price (Appendix D). This is due to the smaller capital requirements of the tobacco enterprise as compared to the alternative enterprises. The low and high average capital-use estimates on a per-farm basis were: $17,506 and $22,796 in the Inner Bluegrass; $14,265 and $16,682 in the Intermediate Bluegrass; $14,970 and $18,297 in the Outer Bluegrass; and $17,225 and $21,073 in the Western Pennyroyal.

The capital-use estimates when allotments were imposed were generally smaller than those with no allotments, although this was not true in all cases. In the Inner Bluegrass, for example, a beef-feeding enterprise requiring relatively smaller amounts of capital came into the optimum programs when tobacco allotments effectively restricted tobacco acreages.

Resident Labor Use

The amount of resident labor used in the optimum programs obtained in this study was usually inversely related to the tobacco price (Appendix D). The greater amounts of labor utilized at the lower tobacco prices results from the greater incidence of labor-extensive enterprises in the optimum program at those prices. However, more labor was used in the peak tobacco periods as the tobacco price and tobacco production increased. At the same time, however, labor was released in other seasons by the reductions in other enterprises. For example, August, the harvest period for tobacco, was the most restrictive labor period in the production of this crop. November-January labor was restrictive in some cases, although not to the extent that August labor was. The November-January labor is used largely in

tobacco-stripping and caring for livestock. The September-October labor (the harvest period for most crops) was heavily utilized and was the limiting resource in crop production in many cases when tobacco acreages were limited by allotments.

Restricting labor to that residing on farms was a very important restraint in the determination of the optimum programs. Assuming that labor could be hired at a reasonable wage rate, tobacco allotments would have been more fully utilized and, consequently, returns to resources larger.

Land Use

Land use was largely a function of the tobacco prices, tobacco allotment levels, and the ratios of labor and land associated with the different qualitatively homogeneous resource situations. With the restriction of labor use to that resident on farms, tobacco price increases lead to more intensive labor use through increased production of tobacco. In resource situations containing a large supply of land relative to labor, the profitability of using labor more intensively at higher tobacco prices results in smaller acreages of land being used (Appendix D).

Net Returns to Resident Labor and Management, and Land

Net-returns estimates for each study area and for the four study areas combined were made for each of the 15 different tobacco price-allotment situations (Appendix D). Three tobacco prices without allotments were considered, as were 12 tobacco price-allotment situation combinations. Estimates of net returns to resident labor, management, and land, and of net returns to resident labor and management are presented separately. Returns to land were imputed at 5 per cent of the land value for each area in calculating the latter income measure. The per-acre land values assumed for each of the study areas were: $400, $100, $227, and $210 for the Inner, Intermediate, Outer, and Western Pennyroyal areas, respectively.

The proportion of net returns associated with tobacco production ranged from a low of 6.14 per cent to a high of 53.22 per cent of total net returns in the Western Pennyroyal and Intermediate Bluegrass areas, respectively. Net returns with tobacco allotments were below those without allotments to the extent that tobacco allotments were effective in reducing acreage. These reductions ranged from nil at the base price and 145-per cent allotment situation to $7.5 million at the 140 per cent of base price and 85-per cent allotment situation in the Inner Bluegrass and Western Pennyroyal regions, respectively. The average net returns per farm to land, labor and management varied from $6,948 to $8,229 in the Inner Bluegrass; from $4,022 to $5,132 in the Intermediate Bluegrass, from $5,738 to $6,814 in the Outer Bluegrass,

and from $6,306 to $7,378 in the Pennyroyal. Average net returns were the lowest at the base tobacco price and 115-per cent allotment level when allotments were imposed, and the highest at the 160-per cent price and base allotment level. Without allotment restrictions, but with lower prices, only the Western Pennyroyal had higher net returns when tobacco production was not restricted by allotments than at the 160-per cent price and base allotment level.

The highest reduction in net returns due to allotments came at the 140-per cent price and 85-per cent allotment situation, with the smallest reduction coming at the base price and 145-per cent allotment situation. These reductions were nil and $303, $49 and $153, $121 and $208, $269 and $748, in the Inner, Intermediate and Outer Bluegrass areas and the Western Pennyroyal, respectively.

Resource Use--Four Areas Combined

Aggregate Capital Used

The capital-use pattern evolving in the four study areas as tobacco prices increased centered on the allocation of more and more of the limited labor resource to tobacco production as tobacco production increased in response to the price incentive (Appendix D, Table 5). As other enterprises were reduced to provide labor for tobacco, their capital requirements fell by more than enough to offset the increased tobacco capital requirements. The average capital used per farm for the 15 situations considered ranged from a low of $16,111 in the 140-per cent tobacco price and 130-per cent allotment situation to a high of $18,908 in the base tobacco price and 115-per cent allotment situation.

Resident Labor Used

The estimated 40,268 farms in the four areas studied had 44,773 man-equivalents of labor, or an average of 1.11 man-equivalents per farm. Of the total labor used in the 15 situations for which aggregate data were compiled, the range in the amount of labor used was from 77.87 per cent of the amount available in the 160-per cent price and 85-per cent allotment situation to a high of 81.09 per cent in the base tobacco price and 145-per cent allotment situation. (See Appendix D for the aggregate labor use estimates.)

Land Used

The total land in farms in the four areas was 5,356,470 acres of which 4,379,600 acres was open land. This is an average of 133 acres per farm for the estimated 40,268 farms. For conservation reasons, definite limits were set on the amount of land which could be

used for small-grain and row crops. The small-grain restriction limited small-grain production only in high land-labor resource situations. Tobacco allotments rendered the row-crop restriction effective in a greater number of resource situations than with tobacco production unrestricted by allotments. The reason for this was that livestock enterprises requiring grain were substituted for decreased tobacco acreages when allotments were imposed.

Unused pasture and cropland increased at the higher tobacco price levels (Appendix D, Table 5). The profitability of the more labor-intensive tobacco enterprise at higher tobacco prices resulted in larger acreages of total land being unused. Long-term adjustments would, however, probably result in shifts in the combinations of labor and land so that all available cropland would be utilized.

Aggregate Net Returns to Resident Labor and Management, and Land for Four Study Areas Combined

Aggregate net returns for the 15 different situations analyzed varied from $217.7 million to $257.7 million with the base tobacco price and 115-per cent allotment level and the 160-per cent price and base allotment situation, respectively (Appendix D). Of each aggregate net-returns estimate, $54.8 million was attributed to land on the basis of the assumed 5-per cent return to the average per-acre investment in land for each study area.

The proportion of net returns associated with the production of tobacco increased as a result of each tobacco price and/or allotment increase. This percentage ranged from 16 per cent with the base price and 115-per cent allotment level to 43 per cent in the 160-per cent price and base allotment situation.

The reductions in net returns stemming from effective tobacco allotments ranged from $3.0 million with the base price and 145-per cent allotment level to $16.5 million with the 140-per cent price and 85-per cent allotment level. The average reduction in net returns per farm ranged from $75 to $409 at the base price and 145-per cent allotment situation and 140-per cent price and 85-per cent allotment situation, respectively.

SUMMARY AND CONCLUSIONS

This study is the first of two studies dealing with the effects of various burley tobacco price-allotment combinations on farm production, income, and resource use in three Bluegrass areas and the Western Pennyroyal area of Kentucky.

The procedure used in this study involved the linear programming of various resource situations at different burley-tobacco price and allotment combinations. The optimum level of enterprises and resources used was determined for a range of representative farms which were posited to represent all the farms of the different study areas. Aggregate estimates were then determined. These estimates were derived for 15 sets of conditions, which included 3 tobacco prices without tobacco allotments and 12 tobacco price-allotment combinations.

Three sets of estimates derived for this study included burley prices of 42.0 cents, 50.4 cents, and 58.8 cents (base, 120 per cent of base, and 140 per cent of base price) with no tobacco allotments. Twelve sets of estimates were obtained for various tobacco allotment levels. These included the 42-cent burley-tobacco price and 115, 130, and 145 per cent of the 1963 burley-tobacco allotment level in each of the study areas; the 58.8-cent burley-tobacco price, with 85, 100, 115, and 130 per cent of the 1963 burley-tobacco allotment in each of the study areas; the 67.2-cent burley tobacco price with 85 and 100 per cent of the 1963 burley-tobacco allotment level of each of the study areas. The prices of other commodities were held constant at specified levels. By varying the tobacco prices and allotment levels and deriving optimum programs for each combination, the production, income, and resource-use effects of various price-allotment combinations were determined.

Representative farms were determined for each of the study areas on the basis of the ratio of resident labor to available land. The information needed for the derivation of the representative farms was obtained by a sample survey of each area from Agricultural Stabilization and Conservation Service records and parametric programming procedures.

The labor supply was assumed to be limited to resident labor. Results of this study indicate that with this assumption the burley-tobacco acreage would be generally limited by resident labor rather than by tobacco allotments. Burley tobacco was generally produced to the full extent allowed by the labor supply in the most limiting labor period (generally August--the harvest period for tobacco). When tobacco allotments were an effective restraint on tobacco production, feeder pigs generally made profitable use of the resources which otherwise would have been used for tobacco in situations with abundant labor relative to land. Dairying and beef production and, in some cases, the sale of hay replaced the reduced tobacco acreages resulting from effective allotments when labor was scarce relative to land. Tobacco price increases resulted in larger acreages of tobacco being grown with a concomitant increase in the acreage of wheat since wheat in labor use is supplementary with tobacco. The usual result of tobacco price increases, both with and without tobacco allotments, was an increase in cash crops and a decline in livestock programs.

Income increased with higher tobacco prices. The amount of capital used declined with increased tobacco prices because tobacco

and wheat enterprises use relatively less capital than the livestock enterprises and their supporting feed-crop enterprises. There was a general tendency for the amount of labor used to decrease with tobacco price increases; however, this was not always the case. The most restrictive labor period, when tobacco allotments were not imposed or were ineffective, was August labor. An hour of labor for this period had marginal values as high as $14.69. At lower tobacco prices and in situations where tobacco allotments effectively controlled tobacco acreage, the November-January and September-October labor periods were most limiting. This was due to the peak labor requirements of livestock and feed crops.

Within the framework of the assumptions of this study, the following implications can be drawn concerning the effects of various burley-tobacco price and allotment changes on the aggregate net returns, enterprise levels, and resources used in the three Bluegrass areas and the Western Pennyroyal.

First, with labor restricted to that resident on the farms of the study areas, substantial acreages of unused tobacco allotments occur at all tobacco prices and allotment levels. There was a substantial tobacco-supply response to tobacco price increases between the base price (42 cents per pound) and the 140-per cent tobacco price (58.8 cents per pound). However, most of the potential for increasing tobacco acreage was exhausted at the 58.8-cent price except in the Outer Bluegrass area. The greatest supply response to increased tobacco prices came between the base (42 cents per pound) and 120 per cent of base (50.4 cents per pound) in the Intermediate Bluegrass and Western Pennyroyal areas and between the 120- and 140-per cent prices in the other areas.

Second, this analysis indicates that the optimum farm organization of the study areas would include considerably greater acreages of corn, wheat, and barley at all tobacco price and allotment levels than are presently being produced in the study area. Livestock enterprises, especially Grade A dairying, would be increased considerably above existing levels.

Third, the imposition of tobacco allotments at levels low enough for them to be effective generally resulted in increased levels of feeder-pig and market-hog production and the deferred beef-feeding programs as well as in corn, alfalfa, and barley acreages. The dairying, winter beef-feeding program, wheat, and hay-selling activities generally declined as a result of allotments.

Fourth, the aggregate net-returns estimates were affected directly by the level of the burley tobacco price and allotment level.

APPENDIX A

Description of Livestock Enterprises[a]

Grade-A Dairy Enterprise

Size of herd, 25 cows; 1,200-pound cow producing 10,000 pounds of 4 per cent fat-corrected milk; one yearling heifer and one heifer calf held back as replacements for each six cows each year; artificial breeding; 4-stall parlor, milk room, loafing barn and bulk tank; feed requirements based on Tables 6 and 9, ration 11, *Feeding Dairy Cows*, Kentucky Agricultural Experiment Station Circular 474R.

Market Hog Enterprise

Size of herd, 12 sows; 6-stall farrowing quarters; 1 boar; multiple farrowing; 16 pigs raised per sow per year, 15 sold and 1 saved for replacement; hogs sold at 220 pounds and sows sold at 400 pounds.

Feeder Pig Enterprises

Size of herd, 25 sows; 8-stall farrowing quarters; 2 boars; multiple farrowing; 16 pigs raised per sow per year; 15 sold at 40 pounds and 1 saved for replacement.

Beef Cow-Calf Enterprises

Beef Cow Herd (1): Calves dropped in January; sold at 500 pounds in October as feeder calves; creep fed, choice.

Beef Cow Herd (2): Calves dropped in April; pastured, wintered, pastured; sold at 850 pounds in October as heavy feeders, choice.

Beef Cow Herd (3): Calves dropped in January; pastured, put in drylot in November; sold at 1,000 pounds in April for slaughter; choice.

Beef Cow Herd (4): Calves dropped in January; pastured, roughed through winter, pastured with grain; sold at 1,000 pounds in September for slaughter; choice.

Beef Cow Herd (5): Calves dropped in February and March; pastured, roughed through winter, pastured, placed on grain in drylot August 1 for 60-day feed; sold at 1,000 pounds for slaughter; choice.

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[a]*Average fixed costs and labor requirements for each enterprise are based on the assumed size of herd and permanent facilities.*

APPENDIX A--*Continued*

Beef Cow Herd (6): Calves dropped in February and March; pastured, roughed through winter, pastured, placed on grain in drylot June 1; sold at 1,050 pounds for slaughter; prime.

Beef Feeding Enterprises

Steers (2a): Choice calves bought October 1 at 450 pounds; wintered, pastured, sold October 1 at 850 pounds for further feeding; choice.

Steers (3a): Choice calves bought in October at 600 pounds; fed in drylot; sold in April at 1,000 pounds for slaughter; choice.

Steers (4a): Choice calves bought October 1 at 600 pounds; wintered, fed grain on pasture; sold in September at 1,000 pounds for slaughter; choice.

Steers (5a): Choice calves bought October 1 at 500 pounds; wintered, pastured, put in drylot August 1 for 60 day feed; sold at 950 pounds for slaughter; choice.

Steers (6a): Choice calves bought October 1 at 500 pounds; wintered, pastured, put in drylot June 15, sold at 1,050 pounds for slaughter, prime.

Steers (7a): Choice steers bought September 1 at 800 pounds; full fed in drylot; sold in December at 1,000 pounds for slaughter; choice.

Steers (8a): Good calves bought October 1 at 550 pounds; wintered; sold in May at 775 pounds for further feeding or slaughter; good grade.

Steers (9a): Choice calves bought in September at 375 pounds; wintered, pastured without grain for May and June; pastured with full grain feed July through November; sold at 950 pounds for slaughter; choice.

Sheep Enterprise

Size of flock, 50 ewes producing spring lambs, 2 rams; 1.2 lambs sold per ewe at 80 pounds.

APPENDIX B

ASSUMED YIELDS PER ACRE OF SPECIFIED CROP ENTERPRISES FOR SELECTED AREAS OF KENTUCKY

Crop	Unit	Area			
		Inner Bluegrass	Intermediate Bluegrass	Outer Bluegrass	Western Pennyroyal
Corn, for grain	bu	85	70	85	85
Corn silage	ton	17	14	17	17
Wheat	bu	35	28	35	35
Barley	bu	45	40	45	45
Alfalfa hay	ton	4.0	3.0	4.0	4.0
Red clover hay	ton	3.0	2.6	3.0	3.0
Lespedeza hay	ton	1.75	1.50	1.75	1.75
Burley tobacco	lb	2,150	1,850	2,100	2,000

APPENDIX C

TABLE 1

ASSUMED PRICES RECEIVED BY FARMERS, BLUEGRASS AND WESTERN PENNYROYAL AREAS, KENTUCKY

Product	Unit	Price
Crops:		
Burley tobacco[a]	lb	$ 0.42
Wheat	bu	1.25
Livestock and livestock products:		
Cull dairy cows	cwt	15.00
Dairy calves	head	5.00
Surplus dairy heifers	head	125.00
Grade-A milk	cwt	4.75
Grade-C milk	cwt	3.30
Blend price for milk[b]	cwt	4.24
Market hogs	cwt	15.00
Feeder pigs	head	11.00
Boars	head	125.00
Cull sows	cwt	11.50
Lambs	cwt	20.00
Wool	lb	0.51
Cull ewes	head	6.00
Rams	head	45.00
Feeder calves (500 lb)	cwt	20.37
Feeder steers (775 lb)	cwt	19.40
Feeder cattle (850 lb)	cwt	18.43
Choice steers (950-1,000 lb)	cwt	21.63
Prime steers (1,050 lb)	cwt	22.88
Cull beef cows	cwt	15.00
Bulls (beef)	head	400.00

[a] *This is the base price assumed in this study. In addition, 120, 140, and 160 per cent of the base price were used.*

[b] *Based on 65 per cent Class I utilization. 0.65($4.75) + 0.35($3.30) = $4.24.*

APPENDIX C--*Continued*

TABLE 2

ASSUMED PRICES PAID BY FARMERS, BLUEGRASS AND WESTERN PENNYROYAL REGIONS, KENTUCKY

Item	Unit	Price
Seed:		
Alfalfa	lb	$ 0.45
Red clover	lb	0.45
Ladino clover	lb	0.65
Crimson clover	lb	0.25
Korean lespedeza	lb	0.14
Bluegrass	lb	0.80
Orchard grass	lb	0.32
Sudan grass	lb	0.13
Wheat, certified	bu	3.00
Barley, certified	bu	2.50
Corn, certified	bu	10.00
Vetch	lb	0.09
Rye	bu	2.25
Feed:		
Wheat bran	cwt	3.50
16% dairy feed	cwt	3.75
Cottonseed meal	cwt	4.70
Soybean meal	cwt	4.75
Salt	cwt	1.80
Bone meal	cwt	6.63
Limestone	cwt	0.50
Pig starter	cwt	5.20
Mixed mineral	cwt	3.00
Fertilizer:		
Nitrogen	lb	0.11
K_2O	lb	0.043
P_2O_5	lb	0.0675
Limestone, spread	ton	2.75

(Continued)

APPENDIX C--*Continued*

TABLE 2--*Continued*

Item	Unit	Price
Livestock:		
Boars	head	$125.00
Bulls	head	400.00
Rams	head	75.00
Ewes	head	23.00
Feeder steers (375 lb)	cwt	23.26
Feeder steers (450 lb)	cwt	20.90
Feeder steers (500 lb)	cwt	20.37
Feeder steers (550 lb)	cwt	19.88
Feeder steers (600 lb)	cwt	19.40
Feeder steers (800 lb)	cwt	18.81

APPENDIX D

TABLE 1

RESOURCE AVAILABILITY, RESOURCE USE, AND AGGREGATE RETURNS FOR 15 TOBACCO PRICE-ALLOTMENT COMBINATIONS INNER BLUEGRASS AREA, KENTUCKY

Resources Available			
Capital	Resident Labor	Land in Farms	Open Land
(1,000,000 dollars)	(1,000,000 hours)	1,000 acres	
Unlimited	18.15	678.7	644.8

Enterprises	Resources Used			Net Returns		
	Capital	Resident Labor	Open Land	To Labor Management and Land	To Land	To Labor and Management
	1,000,000 dollars	1,000,000 hours	1,000 acres	1,000,000 dollars		
42¢ price						
No allotments	113.55	15.81	594.3	34.92	13.57	21.35
115% allot. level	113.32	15.33	594.3	34.61	13.57	21.04
130% allot. level	113.55	15.81	594.3	34.92	13.57	21.35
145% allot. level	113.55	15.81	594.3	34.92	13.57	21.35
50.4¢ price						
No allotments	106.52	15.51	544.9	36.66	13.57	23.09
100% allot. level	105.44	15.21	544.9	35.93	13.57	22.36
115% allot. level	105.77	15.36	544.9	36.32	13.57	22.75
130% allot. level	106.20	15.39	544.9	36.36	13.57	22.79
58.8¢ price						
No allotments	88.19	14.67	473.7	39.32	13.57	25.75
85% allot. level	87.32	14.23	477.6	37.81	13.57	24.24
100% allot. level	87.11	14.38	473.7	38.41	13.57	24.84
115% allot. level	87.44	14.53	473.7	38.88	13.57	25.31
130% allot. level	87.87	14.56	473.7	38.93	13.57	25.36
67.2¢ price						
No allotments	Not obtained					
85% allot. level	87.20	14.00	471.2	40.29	13.57	26.72
100% allot. level	87.93	14.24	470.2	40.99	13.57	27.42

APPENDIX D--*Continued*

TABLE 2

RESOURCE AVAILABILITY, RESOURCE USE, AND AGGREGATE RETURNS FOR 15 TOBACCO PRICE-ALLOTMENT COMBINATIONS, INTERMEDIATE BLUEGRASS AREA, KENTUCKY

Resource Available			
Capital	Resident Labor	Land in Farms	Open Land
(1,000,000 dollars)	(1,000,000 hours)	----------1,000 acres----------	
Unlimited	46.52	1,831.2	1,190.3

Enterprises	Resources Used			Net Returns		
	Capital	Resident Labor	Open Land	To Labor Management and Land	To Land	To Labor and Management
	1,000,000 dollars	1,000,000 hours	1,000 acres	-------1,000,000 dollars----------		
42¢ price						
No allotments . . .	233.16	34.58	1,126.3	59.43	10.07	49.36
115% allot. level . . .	243.51	37.07	1,126.3	58.71	10.07	48.64
130% allot. level . . .	234.12	36.48	1,126.3	59.13	10.07	49.06
145% allot. level . . .	233.81	36.50	1,126.3	59.21	10.07	49.14
50.4¢ price						
No allotments . . .	225.77	37.53	1,126.3	64.82	10.07	54.75
100% allot. level . . .	242.98	38.44	1,126.3	63.14	10.07	53.07
115% allot. level . . .	236.18	38.04	1,126.3	63.80	10.07	53.73
130% allot. level . . .	226.79	37.45	1,126.3	64.43	10.07	54.36
58.8¢ price						
No allotments . . .	208.23	36.26	1,041.7	70.91	10.07	60.84
85% allot. level . . .	232.91	37.55	1,041.7	67.42	10.07	57.35
100% allot. level . . .	230.43	37.19	1,041.7	68.68	10.07	58.61
115% allot. level . . .	218.63	36.79	1,041.7	69.56	10.07	59.49
130% allot. level . . .	209.24	36.20	1,041.7	70.41	10.07	60.34
67.2¢ price						
No allotments . . .	----------Not obtained----------					
85% allot. level . . .	232.73	37.56	1,032.3	73.29	10.07	63.22
100% allot. level . . .	225.26	37.19	1,032.3	74.92	10.07	64.85

APPENDIX D--*Continued*

TABLE 3

RESOURCE AVAILABILITY, RESOURCE USE, AND AGGREGATE RETURNS FOR 15 TOBACCO PRICE-ALLOTMENT COMBINATIONS OUTER BLUEGRASS AREA, KENTUCKY

Resources Available			
Capital	Resident Labor	Land in Farms	Open Land
(1,000,000 dollars)	(1,000,000 hours)	----------1,000 acres----------	
Unlimited	32.74	1,438.5	1,136.4

Enterprises	Resources Used			Net Returns		
	Capital	Resident Labor	Open Land	To Labor Management and Land	To Land	To Labor and Management
	1,000,000 dollars	1,000,000 hours	1,000 acres	-------1,000,000 dollars---------		
42¢ price						
No allotments . . .	195.07	27.97	959.7	62.46	16.33	46.13
115% allot. level . . .	194.04	27.35	959.7	61.17	16.33	44.84
130% allot. level . . .	194.33	27.43	959.7	61.53	16.33	45.20
145% allot. level . . .	194.61	27.70	959.7	61.88	16.33	45.55
50.4¢ price						
No allotments . . .	180.37	27.55	888.0	65.80	16.33	49.47
100% allot. level . . .	179.37	26.75	891.5	63.56	16.33	47.23
115% allot. level . . .	179.35	26.93	888.0	64.07	16.33	47.74
130% allot. level . . .	179.92	27.28	888.0	64.60	16.33	48.27
58.8¢ price						
No allotments . . .	167.85	26.90	883.8	70.42	16.33	54.09
85% allot. level . . .	166.03	25.71	893.4	66.47	16.33	50.14
100% allot. level . . .	165.65	25.99	887.3	67.52	16.33	51.19
115% allot. level . . .	165.61	26.16	883.8	68.16	16.33	51.83
130% allot. level . . .	165.90	26.33	883.8	68.66	16.33	52.33
67.2¢ price						
No allotments . . .	----------Not obtained----------					
85% allot. level . . .	159.51	25.32	783.2	71.23	16.33	54.90
100% allot. level . . .	159.58	25.57	783.2	72.64	16.33	56.31

APPENDIX D--*Continued*

TABLE 4

RESOURCE AVAILABILITY, RESOURCE USE, AND AGGREGATE RETURNS FOR 15 TOBACCO PRICE-ALLOTMENT COMBINATIONS, WESTERN PENNYROYAL AREA, KENTUCKY

Resources Available			
Capital	Resident Labor	Land in Farms	Open Land
(1,000,000 dollars)	(1,000,000 hours)	----------1,000 acres----------	
Unlimited	34.70	1,408.1	1,408.1

Enterprises	Resources Used			Net Returns		
	Capital	Resident Labor	Open Land	To Labor Management and Land	To Land	To Labor and Management
	1,000,000 dollars	1,000,000 hours	1,000 acres	----------1,000 dollars----------		
42¢ price						
No allotments . . .	211.45	28.11	1,379.6	65.94	14.78	51.16
115% allot. level . . .	210.25	26.95	1,379.6	[illegible].25	14.78	48.47
130% allot. level . . .	210.43	26.82	1,379.6	63.48	14.78	48.70
145% allot. level . . .	210.49	27.10	1,379.6	[illegible].71	14.78	48.93
50.4¢ price						
No allotments . . .	174.23	26.04	1,379.6	69.17	14.78	54.39
100% allot. level . . .	191.41	26.04	1,379.6	64.98	14.78	50.20
115% allot. level . . .	190.11	26.24	1,379.6	65.52	14.78	50.74
130% allot. level . . .	189.35	26.46	1,379.6	66.06	14.78	51.28
58.8¢ price						
No allotments . . .	172.77	27.86	1,204.8	74.00	14.78	59.22
85% allot. level . . .	190.85	26.44	1,296.1	66.50	14.78	51.72
100% allot. level . . .	189.07	27.01	1,263.8	67.61	14.78	52.83
115% allot. level . . .	186.66	27.47	1,250.1	68.09	14.78	53.31
130% allot. level . . .	185.73	27.91	1,244.0	68.89	14.78	54.11
67.2¢ price						
No allotments . . .	----------Not obtained----------					
85% allot. level . . .	189.26	25.97	1,400.1	68.23	14.78	53.45
100% allot. level . . .	185.01	26.46	1,346.6	69.20	14.78	54.42

APPENDIX D--*Continued*

TABLE 5

RESOURCE AVAILABILITY, RESOURCE USE, AND AGGREGATE RETURNS FOR 15 TOBACCO PRICE-ALLOTMENT COMBINATIONS, BLUEGRASS AND WESTERN PENNYROYAL AREAS, KENTUCKY-COMBINED

Resources Available			
Capital	Resident Labor	Land in Farms	Open Land
(1,000,000 dollars)	(1,000,000 hours)	1,000 acres	
Unlimited	132.08	5,356.5	4,379.6

Enterprises	Resources Used			Net Returns		
	Capital	Resident Labor	Open Land	To Labor Management and Land	To Land	To Labor and Management
	1,000,000 dollars	1,000,000 hours	1,000 acres	1,000 dollars		
42¢ price						
No allotments . . .	753.23	106.47	4,059.9	222.75	54.75	168.00
115% allot. level . . .	761.12	106.70	4,059.9	217.74	54.75	162.99
130% allot. level . . .	752.28	106.50	4,059.9	219.05	54.75	164.30
145% allot. level . . .	752.46	107.11	4,059.9	219.72	54.75	164.97
50.4¢ price						
No allotments . . .	686.89	106.63	3,938.8	236.35	54.75	181.60
100% allot. level . . .	719.20	106.44	3,942.3	227.66	54.75	172.91
115% allot. level . . .	711.41	106.57	3,938.8	229.71	54.75	174.96
130% allot. level . . .	702.26	106.58	3,938.8	231.45	54.75	176.70
58.8¢ price						
No allotments . . .	637.04	105.69	3,604.0	254.65	54.75	199.90
85% allot. level . . .	677.11	103.93	3,708.8	238.20	54.75	183.45
100% allot. level . . .	672.26	104.57	3,666.5	242.22	54.75	187.47
115% allot. level . . .	658.34	104.95	3,649.3	244.69	54.75	189.94
130% allot. level . . .	648.74	105.00	3,643.2	246.94	54.75	192.19
67.2¢ price						
No allotments . . .	Not obtained					
85% allot. level . . .	668.70	102.85	3,686.8	253.04	54.75	198.29
100% allot. level . . .	657.78	103.46	3,632.3	257.75	54.75	203.00