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\* CHANGING BURLEY TOBACCO ALLOTMENTS \*  
\* AND OPTIMUM RESOURCE USE \*  
\* ON KENTUCKY INNER BLUEGRASS FARMS \*  
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By Irvin Overall and James F. Thompson

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CHANGING BURLEY TOBACCO ALLOTMENTS AND OPTIMUM RESOURCE USE  
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The profitability of tobacco production in the Inner Bluegrass area of Kentucky has led many farmers in this area to specialize in tobacco production. The selection of farm enterprises, landlord-tenant contractual arrangements, farmland values, and many other aspects of Inner Bluegrass agriculture are affected by the tobacco enterprise. A "typical" Inner Bluegrass tobacco-livestock farm in 1964, as defined by the U.S. Department of Agriculture, had cash receipts of \$14,078, of which \$8,693 came from tobacco.<sup>1/</sup>

In such a farming situation, it is reasonable to expect any changes in the demand and price structure for tobacco to have substantial effects on the most profitable systems of farming. Changes in tobacco acreage allotments have occurred often, and many of the changes have been substantial. When allotments are decreased, farmers face the problem of making changes in enterprise combinations to offset the loss in income from tobacco. When allotments are increased, they must decide which enterprises can be best reduced to provide the resources necessary for increasing tobacco production. There is always the possibility that large changes, upward or downward, will need to be made in tobacco production. This raises questions as to how Inner Bluegrass farmers could best adjust to such changes.

The purpose of this study was to provide information useful in answering questions such as those just raised. In particular, the information provided by this study consists of most-profitable farming systems for important resource situations in the Inner Bluegrass based on the assumption that large upward and downward changes are to be made in tobacco production. These programs are also compared with "most-profitable" programs, with tobacco production at about current levels.

Area of Study

In this study, the Inner Bluegrass was defined as that area of north central Kentucky surrounding Lexington and extending out to the Eden Shale soil types (Fig. 1).

The soils within this area range from Maury and Lauridale through Mercer and Salvisa. Most of them are moderately acid, very high in phosphorus, and are from low-to-medium in potash. Those soils in the outer ring generally bordering on the Eden Shale show a topography somewhat like the inner part, but are more acid and less fertile. They are gently undulating, with a maximum slope in most places of approximately 12 percent. Most of the area, except stream escarpments and areas immediately adjacent to the Eden Shale, has slopes of less than 8 percent.

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<sup>1/</sup>U. S. Department of Agriculture, Economic Research Service, Costs and Returns, Commercial Tobacco Livestock Farms, Bluegrass Area, Kentucky, 1964, p. 5.



Procedure

Synthetic Farms

Synthetic farms representative of others in important respects were created as units for this study.<sup>2/</sup> The term "synthetic farms" as used in this study means farms that have been created as models on the basis of usual resource levels found on actual Inner Bluegrass farms. They are not actual farms but hypothetical farms having the essential characteristics of the actual farms they represent. To determine the resource situations which are most typical, a personal interview survey of a sample of Inner Bluegrass farms was carried out. The "sample" farms were selected by random methods from selected areas in Jessamine and Woodford counties.<sup>3/</sup> Data concerning resources and enterprises were obtained from 101 farms.

Choice of Size of Farms

The characteristics of the sample farms were the basis for the selection of the resource situations to be analyzed.

The average size of the sample farms is somewhat larger than the census average of farms for the counties in the sample. This is due, in part, to the fact that only farms of 20 acres or larger were included. This study was concerned with commercial farms and the utilization of resources on them.<sup>4/</sup> The smaller farms in this area of the state are predominantly nonfarm residences and have only nominal agricultural activity.

Elimination of extreme cases and the selection of levels that would be typical of the bulk of the commercial farms in the area resulted in a choice of the following farm sizes for analysis: 75 acres, 150 acres, 250 acres, and 400 acres.

Table 1. - Sample Farms by Size with Number of Farms, Total Land and Average Size for Each Group, 101 Inner Bluegrass Farms, 1963.

Size (Acres)	Number of Farms	Land (Acres)	Average Size (Acres)
20-99	37	2,195	59.32
100-199	26	3,718	143.00
200-299	14	3,470	247.86
300-399	16	5,473	342.06
400-499	4	1,817	454.25
500-599	1	550	550.00
600-699	1	636	636.00
700-799	2	1,505	752.50
Total	101	19,364	191.72

<sup>2/</sup>The selection of actual farms as typical of the area and the development of programs based on these were considered. However, the study of actual cases, while giving more realistic answers, for those specific cases, has less possibilities for application to farms in the area generally.

<sup>3/</sup>Relatively few variations from soil types and farm operations typical of the area are to be found there.

<sup>4/</sup>Farms specializing in the production of horses were also excluded from the sample.

Thirteen farms in 1963 were between 20 and 50 acres in size and four were larger than 500 acres.

Table 2. - Sample Farms by Size with Total Land, Average Size and Relative Importance of Groups when Extremes are Eliminated from Inner Bluegrass Sample, 1963

Size Range (Acres)	Number of Farms	Total Land (Acres)	Percent of Acres for All Farms in Sample	Average Size (Acres)
50-99	24	1,758	9.08	73.3
100-199	26	3,708	19.15	142.6
200-299	14	3,470	17.92	247.9
300-499	20	7,286	37.63	364.3
Total	84	16,223	82.98	193.1

Although the 75-acre "synthetic" farm represents only about 9 percent of the total land resources, it represents about 24 percent of the number of farms. At the other extreme, less than 20 percent of the farms are in the 400-acre group; 38 percent of the acreage is in this group.

#### Resources and Their Present Use on Inner Bluegrass Farms

Table 3 shows the average amounts of resources and the uses being made of them in four different farm size groups. These figures are those reported by the farm operators. The acres in farm, number of head of livestock, or the acres of tobacco are well known by the farmers. The acres of cropland, open land, acres in pasture, and in many cases, gross income, are probably less accurate but are the best estimates which the respondents could make.

#### The Land Resource and Its Use

Pasture land is land that was being used for pasture only; land in small grains and hay was often used for pasture as well. Some farms carried no livestock or did not have either crops or livestock on parts of the farms. For this reason, the total land used is less than either the total farmland or the open land. The acreage of pasture land reported and that available for pasture, though not reported as such, is very high in proportion to the livestock numbers.

The average farm sizes approximate very closely those in the synthetic farms. In all groups land resources are employed at less-than-maximum intensity.

The full allotment of tobacco was grown on the sample farms. For Groups I, II and III, allotments are slightly higher than average; and for Group IV, slightly lower.<sup>5/</sup>

#### Livestock Enterprises and Facilities

Beef production was the livestock enterprise most frequently found in all farm size groups, with beef cows producing feeder calves as the main type of enterprise.

<sup>5/</sup>Op cit., p. 5.

Table 3. - Characteristics of Farms in Four Size Groups, Inner Bluegrass, 1963

	I (50-99 acres)	II (100-199 acres)	III (200-299 acres)	IV (300-499 acres)
Average farm size (acres)	73.25	142.62	247.86	364.50
Open land (acres)	69.50	135.38	224.43	314.25
Cropland (acres)	61.33	117.69	194.07	273.15
Crop acreages				
Tobacco	3.46	6.50	9.76	13.58
Corn	2.54	5.27	13.90	7.95
Silage	0	1.00	2.28	1.75
Small grain	1.63	3.73	5.57	5.85
Hay (all kinds)	19.40	31.80	53.50	66.20
Pasture	32.00	62.58	111.36	179.40
Total land used	59.03	110.88	196.37	274.73
Livestock				
Beef cows and calves	5.00	15.66	13.64	33.45
Beef feeders	0.24	8.46	15.07	20.30
Sheep	2.10	8.73	21.43	35.15
Sows	0.96	2.73	2.64	3.80
Feeder pigs produced	6.16	20.35	4.36	37.40
Fat hogs produced	1.30	10.96	7.00	4.00
Dairy cows	2.00	4.10	4.10	2.80
Gross income, 1962	\$ 5,683	\$12,987	\$17,936	\$26,368
Labor supply (months)	9.54	15.40	24.80	27.60

There were only seven Grade C dairies on the 84 farms. One Grade A dairy of 30 cows, since it would affect only one group, was not included in the tabulations. Fifteen unused milking parlors found on 101 farms indicated that many farmers had recently left the dairy business.

#### Buildings

Corn and hay storage facilities were available on practically all farms and generally were under-utilized. Only 4 farms lacked corn cribs; yet 44 of the 84 farms grew no corn. This again indicates changes that have occurred on farms in the area and shows facilities are present for enterprises not now being used.

A comparison of tobacco housing capacity (Table 4) with present acreage (Table 3) indicates that because of existing facilities, some expansion in production could be handled.<sup>6/</sup> A 25 percent increase in tobacco for all farm sizes could be housed. A 50 percent increase could be housed on the 75-acre farm and nearly so on the 150- and 250-acre farms but would require added facilities for the 400-acre farm.

<sup>6/</sup>The fact that excess tobacco housing capacity exists does not necessarily indicate that the facilities would provide optimum conditions for curing tobacco.

Table 4. - Facilities Available on Farms in Four Different Size Groups, Inner Bluegrass, 1963

	I (50-99 acres)	II (100-199 acres)	III (200-299 acres)	IV (300-499 acres)
Number of farms in group	24	26	14	20
Tobacco housing capacity (acres at current yields)	4.79	7.40	13.96	17.45
Hay storage capacity (tons)	37.79	85.08	127.50	156.85
Corn storage capacity (bushels)	407	1,006	1,059	1,751
Number of livestock barns	0.67	0.73	1.29	1.80

#### Land, Labor and Capital Relationships

The land resource on the farms included in the sample could be used much more intensively. Not only was there land unused on these farms, but additional land was underused. Less than 1 acre in 10 of cropland (as defined by the farmer) was in row crops and there was less than one unit of pasture-consuming livestock for 5 acres of potential pasture.

Labor and capital supplies would probably need to be increased to bring the land into full use. The labor supplies shown in Table 3 were those resident on the farms. Additional labor was hired during critical periods, and the use of capital to further expand labor supplies might be profitable on these farms. Row crop acreages and livestock numbers could be increased only if more capital were invested in the farm operations. To determine whether an expanded use of capital and a more intensive use of land would be profitable and to what extent it could be profitably carried out was a purpose of this study.

#### Assumptions

##### Labor

Since seasonal hiring of labor is often done in the area, the farms analyzed were assumed to be able to hire all the labor which would be profitable at a wage of \$1.00 per hour during most of the year, with a \$1.50 per hour rate during the tobacco harvesting season. The labor resource was measured in hours, as were enterprise labor requirements. It was classified by the period of the year in which it was available. Labor availability varied from season to season, principally because of changing length of day and differences in availability of school children for farm work. The main seasonal labor needs in this area are for the following uses:

- January-April 15 - Livestock feeding
- April 15-June 30 - Spring planting and hay harvesting
- July 1-August 15 - Hay harvesting
- August 15-September 30 - Tobacco and hay harvesting
- October 1-31 - Corn harvesting and fall planting
- November 1-December 31 - Tobacco stripping and marketing

### Excluded Enterprises

Because of the limited market for the products, some enterprises, such as production of rye straw and hay for sale, were excluded, although both the "know-how" and the facilities are available. A few individuals might do well if engaged in such specialized production. However, a mass entrance into enterprises whose products have such a limited market that additional supplies from the Inner Bluegrass area could cause significant price reductions would not provide a solution to the need of the area as a whole. Horse breeding, boarding and training were excluded from consideration for this reason, as was the production of Grade A milk. In the latter case, a large increase in production would have to be diverted from fluid consumption to manufacturing uses with a consequent fall in the average price received by producers. It is possible that Inner Bluegrass farmers could profitably export milk to other areas; however, this is not now being done even through production of Grade A milk under the Louisville-Lexington marketing order is well above the amounts that consumers will buy as fluid milk at current prices. The national and international demand for products of the enterprises considered is such that a large change in the output from an area such as the Inner Bluegrass would have little or no effect on the price structure for these products.

### Pasture Periods

The pasture supply was divided into periods based on the seasonal pattern of pasture production. May through July is the time when most of the output from pastures is forthcoming. August and September in the late summer, October and November in the fall and March through April in the spring, are periods in which some grazing is available. Hay was allowed to substitute for pasture during these periods, as farmers often feed hay when expansion of livestock enterprises is limited by pasture supplies.

### Tobacco Allotments

Tobacco acreage allotments for farms were established in the early 1930's on the basis of cropping history. They are controlled and restricted by a government price-support and production-control program which provides considerable price stability.<sup>7/</sup> It is assumed that price stabilization will continue through changes in acres produced, that is, in acreage allotments. In this study, optimum programs were derived for five levels of tobacco acreage allotments. These were:

	50 percent of the 1963 allotment				
75	"	"	"	"	"
100	"	"	"	"	"
125	"	"	"	"	"
150	"	"	"	"	"

A price of \$64.00 per hundredweight for tobacco was used in this study. This is an average for the Lexington market over the 5-year period, 1957 through 1961.<sup>8/</sup> Prices during this period ranged from \$61.03 to \$67.47, with a low in 1957 and a high in 1958. Changes in acres required to maintain the price at this given level will depend on changes in demand and in production per acre.

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<sup>7/</sup> Glenn L. Johnson, Burley Tobacco Control Programs, Ky. Agr. Exp. Sta. Bul. 580, 1952, p. 80.

<sup>8/</sup> U.S. Department of Agriculture, Agricultural Marketing Service, Annual Report on Tobacco Statistics, 1962, Washington, D. C., Statistical Bulletin 330, April 1963, p. 36.

### Wheat Prices

Wheat prices for this study presented a difficult problem. A change in the federal wheat program took place while the budgets for this study were being prepared and before a new price level could be established. A price of \$1.25 per bushel for wheat was assumed since this is approximately the world price (less transportation costs).

### Feed Grains and Hay

It was assumed that feed grains and hay were produced on the farm for farm use. Purchase or sale of these feeds was not considered as an alternative.

## MAXIMUM INCOME PROGRAMS ON TYPICAL INNER BLUEGRASS FARMS

The best uses of resources on farms in the Inner Bluegrass area of Kentucky are presented here for the situations described earlier. The optimum programs with unlimited capital are presented first and those for the restricted capital situations second. All resource situations were analyzed with 1963 tobacco allotments, and with increases and decreases of both 25 and 50 percent from 1963 allotments. The presentation is in the order of the size of farms studied, beginning with the 75-acre farm.

### Programs with Unlimited Capital<sup>9/</sup>

#### 75-Acre Farm; One-Half Man-Equivalent

The programs for this situation differ considerably from those actually found on similar farms in the sample. All of the land resource would be used and land-use intensity extended to the limits set by the conservation restrictions. All row-crop land not planted in tobacco would be devoted to corn. Some small grain would be produced for feed; however, small grain acreages would be less than conservation considerations would have permitted. The remainder of the land, with the exception of a small amount of wasteland, would be devoted to hay and pasture production. Beef enterprises that utilize relatively large amounts of grain and good quality hay were found to be most profitable in this situation.

The amount of capital which could be profitably used was slightly over \$200 per acre for this farm. This was the largest capital use per acre of any situation analyzed.

Changes in tobacco allotments have little effect on the best pattern of resource use. This is due to: (1) the relatively insignificant land requirement of the tobacco enterprise, (2) the assumption that (in this study) capital supplies were unlimited at current interest rates, and (3) the fact that no restriction was placed on the hiring of labor. Thus, when the acreage allotment is increased, the necessary amounts of capital and labor need not be diverted from other enterprises on the farm. Under all allotment situations, the land would be fully used. Labor also would be fully used except in the

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<sup>9/</sup>In all situations, the capital shown is that required for the operation of the enterprises in the optimum program except for investments in land which was assumed to be in fixed supply.

winter and early spring. Capital requirements would increase gradually as allotments increased. Enterprise levels would vary only slightly in response to changes in tobacco allotments. A slight shift to barley when increases in tobacco acreage removed row-crop land from corn would keep livestock numbers at approximately the same level.

A significant change in net returns would occur when tobacco acreages were changed. On the average, net income would decrease by about \$735 for every acre by which tobacco allotments were decreased.

Table 5. - Optimum Resource Use and Enterprise Levels, Five Levels of Tobacco Allotments, 75-Acre Farm, Unlimited Capital and One-Half Man-Equivalent Labor Supply

	Tobacco Allotments (Percent of 1963)				
	50	75	100	125	150
Land use (acres)					
Tobacco	1.33	1.91	2.62	3.32	3.93
Corn	21.17	20.58	19.87	19.16	18.56
Barley	3.92	4.52	5.25	5.96	6.59
Alfalfa	23.04	22.73	22.36	21.99	21.67
Renovated pasture	19.66	19.39	19.07	18.75	18.47
Permanent pasture	2.11	2.09	2.06	2.03	2.00
Total	71.23	71.22	71.23	71.21	71.22
Livestock enterprises (head)					
Beef cows producing choice steers and heifers	7	7	7	6	6
Steers (choice) Wintered and fed	43	42	41	41	40
Labor hired (days)					
Jan.-April 15	0	0	0	0	0
April 15-June	3	6	9	12	14
July-Aug. 15	4	6	7	8	10
Aug. 15-Sept.	23	28	35	41	45
Oct.	4	7	10	14	17
Nov. and Dec.	0	6	15	23	30
Capital requirements	\$15,202	\$15,640	\$16,173	\$16,698	\$17,156
Net returns	\$ 3,558	\$ 3,991	\$ 4,509	\$ 5,020	\$ 5,465

75-Acre Farm; One Man-Equivalent

Here again an optimum operation involves full use of land resources. In comparison with the one-half man-equivalent situation, a slight substitution of labor for capital would take place; thus about \$760 less capital would be required in the optimum programs.

The big difference between the two situations is in the pattern of resource utilization. For all allotment levels except for the 50 percent increase, the maximum permissible acreage would be devoted to small grain. A 50 percent increase over the 1963 tobacco allotments would lead to an enterprise combination much like that for the farm with a one-half man-equivalent labor supply. For all others, however, beef enterprises requiring less grain would become profitable. The extra grain produced, as well as that saved by changing the system of beef production, would be utilized in feeder pig production.

Making appropriate adjustments in resource use would not restore all of the income lost from allotment reductions. A change of \$880 in net returns was observed when the allotment was changed by one acre. This is even more severe than for the same farm with half as much labor.

Capital use on this farm would be approximately the same for both labor levels analyzed. For the one-man level, allotment reductions led to feeder pig production and, consequently, higher capital requirements. This was the only situation analyzed in which capital would increase as tobacco production decreased.

Table 6. - Optimum Resource Use and Enterprise Levels, Five Levels of Tobacco Allotments, 75-Acre Farm, Unlimited Capital and One Man-Equivalent Labor Supply

	Tobacco Allotments (Percent of 1963)				
	50	75	100	125	150
Land use (acres)					
Tobacco	1.33	1.92	2.63	3.33	3.94
Corn	21.17	20.58	19.87	19.17	18.56
Barley	15.00	15.00	14.99	15.00	6.94
Alfalfa	13.22	13.31	15.77	15.84	21.43
Renovated pasture	14.27	14.25	14.98	14.94	18.32
Permanent pasture	<u>6.24</u>	<u>6.18</u>	<u>2.99</u>	<u>2.95</u>	<u>2.04</u>
Total	71.23	71.24	71.23	71.23	71.23
Livestock enterprises (head)					
Sows					
Producing feeder pigs	23	22	13	12	0
Beef cows					
Producing heavy feeders	7	7	0	0	0
Producing choice steers and heifers	0	0	5	5	6
Steers (choice) Wintered and fed	17	17	28	28	40
Labor hired (days)					
Jan. -April 15	0	0	0	0	0
April 15-June	0	0	0	0	0
July-Aug. 15	0	0	0	0	0
Aug. 15-Sept.	0	5	12	18	25
Oct.	0	0	1	4	2
Nov. and Dec.	0	0	0	0	0
Capital required	\$15,679	\$16,025	\$15,460	\$15,913	\$16,348
Net returns	\$ 3,987	\$ 4,526	\$ 5,154	\$ 5,763	\$ 6,279

150-Acre Farm; One Man-Equivalent

The optimum program for the 150-acre synthetic farm with a one man-equivalent labor supply might be expected to be simply twice as large in all respects as the optimum program for the 75-acre farm with one-half man-equivalent. This would not be the case though because the larger farm provides a better opportunity to spread fixed costs over more units of output. Thus, the increase in farm size would tend to favor the enterprises having relatively high fixed costs. Feeder pigs would be in the optimum program for the larger farm at all allotment levels. The pigs, steers and a few beef cows would constitute the livestock enterprises for this farm.

Table 7. - Optimum Resource Use and Enterprise Levels, Five Levels of Tobacco Allotments, 150-Acre Farm, Unlimited Capital and One Man-Equivalent Labor Supply

	Tobacco Allotments (Percent of 1963)				
	50	75	100	125	150
Land use (acres)					
Tobacco	2.63	3.94	5.25	6.58	7.88
Corn	42.37	41.06	39.75	38.42	37.12
Barley	29.79	29.77	29.75	29.73	28.19
Alfalfa	32.68	32.87	33.06	33.25	34.43
Renovated pasture	<u>35.01</u>	<u>34.84</u>	<u>34.67</u>	<u>34.50</u>	<u>34.86</u>
Total	142.48	142.48	142.48	142.48	142.48
Livestock enterprises (head)					
Sows					
Producing feeder pigs	30	29	27	25	21
Beef cows					
Producing choice steers and heifers	10	10	10	10	11
Steers (choice) Wintered and fed	56	56	57	57	60
Labor hired (days)					
Jan. -April 15	0	0	0	0	0
April 15-June	18	21	26	31	36
July-Aug. 15	5	8	11	14	18
Aug. 15-Sept.	43	55	68	80	93
Oct.	28	33	39	44	49
Nov. and Dec.	9	23	38	53	67
Capital required	\$29,931	\$30,831	\$31,719	\$32,645	\$33,580
Net returns	\$ 8,933	\$ 9,910	\$10,886	\$11,878	\$12,844

The stability of the optimum enterprise combination as allotment levels were changed on the 150-acre farm indicates that adjustments in use of resources would not nearly offset losses from tobacco income. Net returns would drop by about \$750 should the tobacco allotment be reduced by one acre.

A 150-acre farm with a two man-equivalent labor supply was also analyzed, but the results were about the same as those for the same acreage with a one-man labor supply. The enterprise combination would remain essentially the same. Capital use would be reduced to the extent that hired labor could be replaced by resident labor. A two-man labor supply would result in slightly increased returns, but these would be divided between two operators instead of one.

#### 250-Acre Farm; Two and Three Man-Equivalents

With the 250-acre synthetic farm, relative stability of the enterprise combination with regard to changes in allotments was again observed. However, slight adjustments of resources and enterprises were observed on this farm when the three man-equivalents labor supply was compared with the two-man level.

A comparison of Tables 8 and 9 shows the small variation that would occur. The most significant effect of the increase in resident labor would be a slight decrease in capital requirements and a corresponding increase in net returns. From \$1,300 to \$1,600 of additional income would be available to pay for the added resident labor. The difference in amount of hired labor accounts for the differences in capital used and net returns. The two-man labor level would be sufficient to meet the needs of the farm for many periods of the year without any hired labor.

Once again, for all tobacco acreages and for both levels of labor, the entire land resource would be used quite intensively.

Reductions in allotments would reduce net returns on the two-man farm by \$774 for each acre of allotment subtracted and additions to present allotments would increase net returns by \$740 for each additional acre of allotment. For the three-man farm, the impact of allotment changes would be more severe—about \$900 per acre for reductions and \$830 for additions to 1963 allotments. Although there would be a difference in net returns between the two labor levels, the difference would not seem to warrant the employment of the extra man.

#### 400-Acre Farm; Four Man-Equivalents

The last resource situation considered was the 400-acre, four-man synthetic farm. In general, the results were about the same as for the smaller farms. All land resources would be used in the most-profitable programs and full row-crop and small-grain potentials employed. Livestock enterprises would be such as to make efficient use of the grain produced. Land released from tobacco when allotments are reduced would be planted in corn.

Livestock enterprises in the program for the 400-acre farm would be the same as those for the 150- and 250-acre farms. The sow and feeder pig operation for the 250- and 400-acre farms would be at approximately the same level. The additional resources available on the 400-acre farm would be best used in an expanded beef-feeding operation.

Table 8. - Optimum Resource Use and Enterprise Levels, Five Levels of Tobacco Allotments, 250-Acre Farm, Unlimited Capital and Two Man-Equivalents Labor Supply

	Tobacco Allotments (Percent of 1963)				
	50	75	100	125	150
Land use (acres)					
Tobacco	4.38	6.56	8.75	10.94	13.13
Corn	70.62	68.43	66.25	64.06	61.87
Barley	49.75	49.69	49.63	49.57	50.00
Alfalfa	54.73	55.06	55.38	55.70	49.07
Renovated pasture	58.01	57.74	57.48	57.21	55.59
Renovated pasture cut for hay	0	0	0	0	7.83
Total	237.49	237.49	237.49	237.49	237.49
Livestock enterprises (head)					
Sows					
Producing feeder pigs	49	46	43	40	39
Beef cows					
Producing choice steers and heifers	17	17	17	17	17
Steers (choice)					
Wintered and fed	93	94	95	96	93
Labor hired (days)					
Jan. -April 15	0	0	0	0	0
April 15-June	0	8	16	25	33
July-Aug. 15	0	0	0	0	0
Aug. 15-Sept.	49	70	92	113	134
Oct.	20	30	39	49	59
Nov. and Dec.	0	17	41	65	90
Capital required	\$46,525	\$47,989	\$49,528	\$51,067	\$52,117
Net returns	\$15,871	\$17,609	\$19,286	\$20,964	\$22,530

Summary of Programs with Unlimited Capital

For all farm sizes with the 1963 tobacco allotment, the optimum farm programs would use non-real estate capital at the rate of approximately \$200 per acre. The figure is slightly larger for the smaller farm than for the larger but is essentially the same for all farm sizes. With unlimited capital, all land resources would be used to the limit of the conservation restrictions.

The assumption that labor could be hired as long as it was profitable meant that capital could be substituted for resident labor as long as this was profitable. This would occur in all of the programs devised for the unlimited capital situations.

Table 9. - Optimum Resource Use and Enterprise Levels, Three Levels of Tobacco Allotments, 250-Acre Farm, Unlimited Capital and Three Man-Equivalents<sup>a/</sup>  
Labor Supply

	Tobacco Allotments (Percent of 1963)		
	50	100	150
<b>Land use (acres)</b>			
Tobacco	4.38	8.75	13.13
Corn	70.62	66.25	61.87
Barley	49.75	49.63	49.51
Alfalfa	54.73	55.38	56.03
Renovated pasture	58.01	57.48	56.95
Total	237.49	237.49	237.49
<b>Livestock enterprises (head)</b>			
Sows			
Producing feeder pigs	49	43	36
Beef cows			
Producing choice steers and heifers	17	17	17
Steers (choice) Wintered and fed	93	95	97
<b>Labor Hired (days)</b>			
Jan. -April 15	0	0	0
April 15-June	0	0	0
July-Aug. 15	0	0	0
Aug. 15-Sept.	5	48	90
Oct.	0	10	29
Nov. and Dec.	0	0	30
Capital required	\$45,839	\$48,311	\$51,102
Net returns	\$16,557	\$20,503	\$24,144

<sup>a/</sup> Farm enterprises are the same as for the two man-equivalent farm except when allotments are increased by 50 percent. Some changes in capital use and net returns occur, but differences are so minor that only the extremes are presented in this table.

Because tobacco production requires large amounts of labor, the hiring of labor would increase rapidly as tobacco allotments were increased. Therefore, one of the first steps in adjusting to decreases in tobacco allotments is reducing the amount of labor hired. Since the next best use of resources is grain and livestock production, which have low labor requirements relative to tobacco, the reduction in labor used on the farm might be rather severe. Inasmuch as the land resource used by tobacco is relatively small in comparison with the labor required, only small changes in corn and livestock production can occur when tobacco allotments are altered. Therefore, an optimum program of farm enterprises is little affected by changes in tobacco allotments when capital is not restricted.

Table 10. - Optimum Resource Use and Enterprise Levels, Five Levels of Tobacco Allotments, 400-Acre Farm, Unlimited Capital and Four Man-Equivalents Labor Supply

	Tobacco Allotments (Percent of 1963)				
	50	75	100	125	150
Land use (acres)					
Tobacco	7.00	10.50	14.00	17.50	21.00
Corn	113.00	109.50	106.00	102.50	99.00
Barley	80.00	80.00	80.00	80.00	80.00
Alfalfa	131.44	123.27	115.10	109.33	109.95
Renovated pasture	48.59	56.77	64.95	70.73	70.12
Total	380.03	380.04	380.05	380.06	380.07
Livestock enterprises (head)					
Sows					
Producing feeder pigs	48	50	51	50	45
Beef cows					
Producing choice steers and heifers	11	19	28	34	34
Steers (choice)					
Wintered and fed	241	220	200	185	186
Labor hired (days)					
Jan. -April 15	0	0	0	0	0
April 15-June	0	0	0	5	19
July-Aug. 15	0	0	0	2	12
Aug. 15-Sept.	89	117	145	174	209
Oct.	30	46	61	77	91
Nov. and Dec.	0	0	17	60	99
Capital required	\$72,502	\$76,007	\$79,648	\$83,165	\$85,724
Net returns	\$27,792	\$30,896	\$33,865	\$36,566	\$39,187

Programs with Limited Capital

The same land and labor situations described above were next analyzed under the assumption that the supply of capital would be limited to approximately half the amount which could be profitably used. The amounts of capital actually being used on the sample farms approach this level. The programs derived under this assumption should serve as a guide for adjustments in restricted-capital situations. Only one level of resident labor for each farm size was considered. Since labor could be hired as it was profitable, the effect of changing resident labor levels would be largely the same as altering the capital level.

The equity positions of the farmers interviewed were such that they could probably obtain all the capital which they could profitably use. For individual farms, an analysis of restricted capital situations seems worthwhile since capital use is often limited by the farm operators for non-monetary reasons.

The one level of labor most usual for each farm size was the one selected for analysis with limited capital. The farm sizes and labor levels considered for the synthetic farms were:

	75-Acre Farm	—One-half Man-Equivalent			
150-	"	"	—One	"	"
250-	"	"	—Two	"	"
400-	"	"	—Four	"	"

75-Acre Farm; One-Half Man-Equivalent

The optimum combination of enterprises for the 75-acre synthetic farm with \$8,000 of available capital differs considerably from that for the same farm with unlimited capital.

The full utilization of land resources would no longer be profitable. From 15 to 28 acres of land would not be used and the full row-crop potential would not be reached.<sup>11/</sup> As tobacco acreages are reduced, small grain production would be increased to the point where it would be restricted by land conservation considerations. The small grain produced would be wheat for sale rather than barley to be used as feed. Furthermore, corn grown for feed would fall sharply.

The livestock program would use little pasture and virtually no hay. The sow and feeder-pig enterprise, with a relatively low capital requirement per dollar of income, would be the only direct source of income other than tobacco.

Once more, it would not be possible to prevent a large loss of income when tobacco allotments are reduced. The reduction in net income would be \$675 for each acre by which allotments are reduced. This was \$60 less than with unrestricted capital. This smaller effect of allotment changes on net returns is due to the fact that capital released from tobacco production would find productive uses. When capital was unlimited these alternative uses for capital had already been exploited. It is of interest to note that, in the limited capital situation, about \$8,000 more capital would increase net income by about 20 percent.

150-Acre Farm; One Man-Equivalent

For the 150-acre farm, the restriction on capital, although about the same on a per-acre basis, would result in an optimum resource use pattern sharply different from that on the 75-acre farm. The greater total capital available would enable the farm to utilize all the row-crop and small-grain land, although a considerable amount of the remaining land is not used. Wheat for sale continues to have an advantage over barley for feed since profitable use of the barley would require investments in livestock and facilities for which no capital would be available.

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<sup>11/</sup> Unused land suitable for harvested crops or pasture is not often observed on actual farms. It appears instead as underused land, i. e., as unimproved pasture.

Table 11. - Optimum Resource Use and Enterprise Levels, Five Levels of Tobacco Allotments, 75-Acre Farm, \$8,000 Capital and One-Half Man-Equivalent Labor Supply

	Tobacco Allotments (Percent of 1963)				
	50	75	100	125	150
Land use (acres)					
Tobacco	1.33	1.93	2.64	3.34	3.95
Corn	17.42	16.51	14.61	12.50	10.24
Wheat	18.75	18.43	17.23	15.81	14.16
Permanent pasture	18.98	12.67	11.21	11.66	15.24
Unused	14.75	21.69	25.53	27.90	27.63
Total	71.23	71.23	71.22	71.21	71.22
Livestock enterprises (head)					
Sows					
Producing feeder pigs	19	19	17	14	10
Labor hired (days)					
Jan. -April 15	0	0	0	0	0
April 15-June	0	0	0	0	0
July-Aug. 15	0	0	0	0	0
Aug. 15-Sept.	6	11	17	22	27
Oct.	8	10	12	14	15
Nov. and Dec.	0	6	13	19	25
Net returns	\$ 2,882	\$ 3,285	\$ 3,761	\$ 4,229	\$ 4,637

The most profitable livestock enterprises with 1963 tobacco allotments would be sows with pigs fed for market and cattle feeding to utilize the corn produced. This differs sharply from the program for a similar farm with maximum capital (compare Tables 7 and 12).

When a farm is operated under a severe capital limitation, changes in tobacco allotments bring substantial changes in the most-profitable farm program. These changes are in sharp contrast to the stability of the enterprise combinations when capital was unlimited.

Periods in which some labor would be left unused are more numerous when capital is limited. Not only is less labor hired, but resident labor is sometimes underemployed. The effect of capital levels on the amount of labor hired and the utilization of labor are further indications of the needs for sufficient capital for an optimum farm operation. Through much of the year the return to the operator for his own labor would be less than the \$1.00 per hour required to hire labor. Perhaps of greater significance, the addition of \$15,000 in capital would increase the net returns for the 150-acre farm by \$1,583— a return of 10.6 percent.

Table 12. - Optimum Resource Use and Enterprise Levels, Five Levels of Tobacco Allotments, 150-Acre Farm, \$15,000 Capital and One Man-Equivalent Labor Supply

	Tobacco Allotments (Percent of 1963)				
	50	75	100	125	150
Land use (acres)					
Tobacco	2.63	3.94	5.25	6.58	7.88
Corn	42.37	41.05	39.75	38.42	33.12
Wheat	30.00	30.00	30.00	30.00	34.00
Permanent pasture	12.59	10.55	12.09	5.62	4.01
Unused	<u>54.90</u>	<u>56.94</u>	<u>55.39</u>	<u>61.87</u>	<u>63.48</u>
Total	142.49	142.48	142.48	142.49	142.49
Livestock enterprises (head)					
Steers (choice)					
Wintered and fed	0	0	8	0	0
Sows					
Producing market hogs	6	8	13	14	12
Producing feeder pigs	32	21	0	0	0
Labor hired (days)					
Jan. -April 15	0	0	0	0	0
April 15-June	0	0	0	0	0
July-Aug. 15	0	0	0	0	0
Aug. 15-Sept.	20	32	43	53	63
Oct.	25	30	36	41	47
Nov. and Dec.	0	0	8	22	37
Net returns *	\$ 7,269	\$ 8,306	\$ 9,302	\$10,223	\$11,018

The effect on incomes of allotment changes would be somewhat different from that for a similar farm with unrestricted capital. If the tobacco allotment were reduced by one acre, net returns would decrease by approximately \$780, about the same as in the case of unrestricted capital. As tobacco allotments were increased by 50 percent, however, the increase in net income would be at the rate of \$656 per acre of additional allotment.

#### 250-Acre Farm: Two Man-Equivalents

The 250-acre farm with restricted capital, organized for maximum returns with changing tobacco allotments, showed the least stable enterprise combination of any yet considered.

Should capital be needed for added tobacco production, other crop acreages would be decreased in order to obtain the needed capital. The result would be that some land would be left idle. However, all row-crop land would be utilized in row crops. Grains, up to the conservation restrictions, would be grown for sale. Unused land would increase in direct proportion to the decrease in pasture and hay acreages. In keeping with this use of land, livestock enterprises requiring less forage and labor would come into the program.

Table 13. - Optimum Resource Use and Enterprise Levels, Five Levels of Tobacco Allotments, 250-Acre Farm, \$25,000 Capital and Two Man-Equivalents Labor Supply

	Tobacco Allotments (Percent of 1963)				
	50	75	100	125	150
Land use (acres)					
Tobacco	4.36	6.56	8.75	10.95	13.15
Corn	70.62	68.43	66.25	64.06	61.87
Wheat	50.00	50.00	50.00	50.00	50.00
Alfalfa	10.97	9.46	12.21	6.24	0
Permanent pasture	69.51	55.96	52.68	26.84	7.88
Unused	32.00	47.07	47.59	79.40	104.61
Total	237.46	237.48	237.48	237.49	237.51
Livestock enterprises (head)					
Steers (choice)					
Wintered and fed	25	22	28	15	0
Sows					
Producing market hogs	7	11	19	20	22
Producing feeder pigs	46	31	0	0	0
Labor hired (days)					
Jan. -April 15	0	0	0	0	0
April 15-June	0	0	0	0	0
July-Aug. 15	0	0	0	0	0
Aug. 15-Sept.	6	25	48	65	82
Oct.	15	21	27	38	46
Nov. and Dec.	0	0	6	31	55
Net returns	\$12,936	\$14,470	\$15,883	\$17,129	\$18,312

The addition of \$25,000 capital would have increased net returns by more than 28 percent at all levels of tobacco allotments and by about 23 percent if the tobacco allotment were 150 percent of the 1963 level. This percentage return would be larger than for the 150-acre farm where proportionately less labor was available for utilization.

Table 14. - Optimum Resource Use and Enterprise Levels, Five Levels of Tobacco Allotments, 400-Acre Farm, \$40,000 Capital and Four Man-Equivalent Labor Supply

	Tobacco Allotments (Percent of 1963)				
	50	75	100	125	150
<b>Land use (acres)</b>					
Tobacco	7.00	10.50	14.00	17.50	21.00
Corn	113.00	109.50	106.00	102.50	99.00
Barley	9.97	80.00	80.00	80.00	0
Wheat	70.02	0	0	0	80.00
Alfalfa	44.41	14.78	6.35	22.08	12.50
Permanent pasture	92.47	43.56	28.42	51.75	34.26
Unused	43.11	121.65	145.21	106.17	133.25
Total	379.98	379.99	379.98	379.99	380.01
<b>Livestock enterprises (head)</b>					
Steers (choice)					
Wintered and fed	95	30	11	47	26
Sows					
Producing market hogs	27	49	51	29	31
<b>Labor hired (days)</b>					
Jan. -April 15	0	0	0	0	0
April 15-June	0	0	0	0	0
July-Aug. 15	0	0	0	0	0
Aug. 15-Sept.	0	17	43	80	106
Oct.	13	32	47	57	72
Nov. and Dec.	0	0	0	2	42
Net returns	\$21,812	\$24,551	\$27,217	\$29,779	\$32,065

The effects of tobacco allotment changes on net returns were measured at the extremes of 50 percent above and 50 percent below the 1963 level. These show a loss of \$670 for each acre by which allotments are reduced and a \$550 increase for each acre by which they are increased.

#### 400-Acre Farm; Four Man-Equivalents

The last farm situation analyzed was the 400-acre farm with four man-equivalents labor supply and capital limited to \$40,000. Of particular interest are the changes in land use in response to changing allotments under a capital restriction.

The demands for capital under these circumstances lead to unstable enterprise combinations with respect to capital and feed potentials. Should tobacco allotments be reduced, the capital released would be used to feed heavy cattle, while market hog

production would be reduced. Should capital be needed for increased tobacco production, hogs would replace cattle and barley would be grown to meet the increased feed demands. At the highest allotment level, wheat for sale would replace barley and the livestock program would be reduced in size. Once, again, the limit on capital would make the full use of land resources unprofitable. Additional capital above the \$40,000 level would earn returns of more than 15 percent by allowing full use of the land and other profitable adjustments.

Per-acre effects of tobacco allotment changes show losses of \$775 in net returns when allotments are reduced by an acre and gains of \$720 when allotments are increased by an acre.

#### Summary of Programs with Restricted Capital

The obvious effect of restricting capital is more selective use of capital with emphasis on enterprises with relatively high returns to capital. These would be tobacco, grain for sale and/or for use in livestock having relatively low pasture and hay requirements. Capital, at the level assumed, would generally be sufficient to utilize the row-crop and small-grain land to the limits set by conservation restrictions.

The proportion of capital to land would be approximately the same in the optimum programs for all farm sizes analyzed; however, the total amount of capital available influences the optimum enterprise combinations. The larger farms could profitably employ their resources in the production of proportionately larger numbers of feeder steers and feeder pigs. The smaller farms would emphasize market hog production.

It would be more profitable to produce wheat for sale instead of barley for feed when capital is restricted. The total number of livestock would be much lower than when capital is not restricted and use of land for hay and pasture greatly reduced.

#### SUMMARY AND CONCLUSIONS

The resource use adjustments which this study indicates to be profitable may be divided into (1) those which would be profitable if tobacco allotments are unchanged and (2) those which could profitably be made in response to changes in tobacco allotments.

With regard to the first group, the direction of the adjustments is the same with both limited and unlimited capital. In both cases, it would be profitable to increase production of corn and small grain at the expense of hay and pasture crops. This is true of all resource situations considered. The main difference is that, in the case of limited capital, about a third of the land would not be used or would be used as unimproved pasture. Correspondingly, the profitable changes in the livestock programs would lead to increased emphasis on grain-consuming rather than forage-consuming livestock. Thus, the shift would be from the production of feeder calves and lambs toward beef feeding as well as feeder-pig and fat-hog production.

The adjustments to changes in tobacco allotments depended heavily on whether capital was assumed to be limited. There was a slight tendency for these adjustments to be away from grain and grain-consuming livestock and toward forage and forage-consuming livestock as tobacco acreages were increased. This would mean that increases in tobacco acreages would shift the optimum programs in the direction of the programs now in effect on Inner Bluegrass farms.

By far the most striking changes resulting from changes in tobacco acreages were in the net returns. Increases in tobacco acreages lead to substantial increases in incomes. When tobacco acreages were reduced, relatively small fractions of the resulting income losses could be recovered by making the best changes in resource use.

The results of this study emphasize the importance to Inner Bluegrass farmers of the tobacco enterprise and of policy decisions affecting the tobacco price support and production control program.

Though the optimum programs generated in this study indicate that, with 1963 tobacco allotments, it would be profitable to shift farming programs toward more grain production, it appears probable that the largest unrealized production potential is in the area of forage production.<sup>12/</sup> This indicates that a program of research into the forage production process and the economics of forage production and use is needed if the potential for forage production is to be developed into a potential for income production.

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<sup>12/</sup> E. M. Fergus, "Present and Potential Feed Production in Kentucky," unpublished paper presented to the Forage Seminar, University of Kentucky, November 1960.