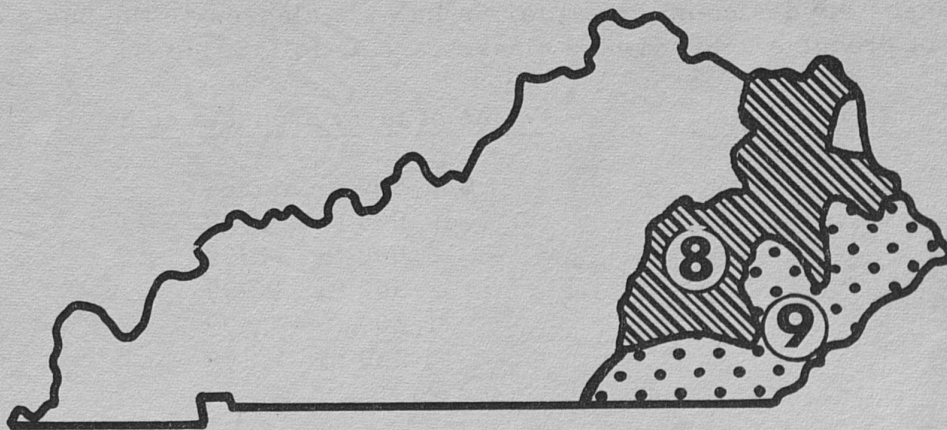


# A General Picture of Commercial Agriculture in Eastern Kentucky

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## A GENERAL PICTURE OF COMMERCIAL AGRICULTURE IN EASTERN KENTUCKY<sup>1/</sup>

By Harald Jensen and Luther Keller

By Census definition, Eastern Kentucky has few commercial farms.<sup>2/</sup> For the area as a whole, in 1950 only 28 percent of the farms were commercial. The data for each of the state's Economic Areas, however, reveal that there were considerably more commercial farms in Area VIII than in IX. In Economic Area VIII, 47 percent of the farms were classified as commercial while only 81 percent of those in Area IX were commercial. Thus, most of the farms in Eastern Kentucky were classified either as part-time or residential farms. Therefore, when we look at commercial agriculture in Eastern Kentucky we are viewing only about one-fourth of the farms, which have less than one-half of the acres of land in farms but which contribute almost 80 percent of the total value of farm product sales.

Our main purpose here is to describe the commercial agriculture of Eastern Kentucky. We might accomplish this task by describing the average or typical commercial farm in this area; but since broad averages always cover up much useful information, a clearer picture can be attained by describing the commercial farms by size groups.

The Census divides commercial farms into six classes on the basis of total value of products sold. These classes are as follows:

<u>Class</u>	<u>Value of farm products sold</u>
I	\$25,000 or more
II	10,000 to 24,999
III	5,000 to 9,999
IV	2,500 to 4,999
V	1,200 to 2,499
VI	250 to 1,199

<sup>1/</sup> Eastern Kentucky is here defined to include Economic Areas VIII and IX as defined by the United States Census of Agriculture, 1950 and as illustrated on the cover page.

<sup>2/</sup> According to the United States Census, 1950, all farms that sold \$1,200 or more of farm products were classified as commercial. In addition, farms with farm product sales of \$250 - \$1,199 were classified as commercial provided that the farm operator worked off the farm less than 100 days and that the income of the farm operator and his family from nonfarm sources was less than the total value of farm products sold.



We shall present the picture of commercial agriculture in Eastern Kentucky by comparing incomes, costs, investments, resource and product combinations for the various classes or sizes of farms.<sup>1/</sup> Since the Census data showed very few Class I farms in Eastern Kentucky, this report will deal with the other five classes of farms.

### Incomes and Costs

According to the 1950 Census, most of the commercial farms in Eastern Kentucky (56 percent) fell into Class VI with sales of only \$250 to \$1,199 (last two columns, Table 1). Class V farms, with sales of \$1,200-\$2,499, had 32 percent, while Class III farms (sales of \$2,500-\$4,999) had about 9 percent. Thus, about 97 percent of all commercial farms in Eastern Kentucky had farm product sales of less than \$5,000 which leaves only 3 percent with sales of \$5,000 or more. With this general background, let us take a closer look at incomes and costs on these farms of varying size (Table 2).

The income or value of total product figures (line 1) includes the value of all farm products sold as well as the value of those used in the home.<sup>2/</sup> These incomes, ranging from \$1,070 on Class VI farms to \$15,189 on Class II farms, have importance only as they are related to inputs or costs. When we observe this relationship we can readily see that farm families on most commercial farms in Eastern Kentucky were not getting much income for the time spent in farming.

### Inputs are high relative to incomes

The total input figures (line 2) include both out-of-pocket and overhead costs. Total inputs ranged from \$1,777 on Class VI farms (farms with incomes of \$1,070) to \$18,281 on Class II farms (farms with incomes of \$15,189). Incomes increased faster than inputs up to Class IV farms, while beyond Class III farms, inputs increased faster than incomes. Larger units are generally expected to be able to operate more efficiently than smaller units, since the larger ones can spread their fixed or overhead costs over more acres and animals. With existing resources and farming patterns, this type of gain for larger units apparently does not extend beyond Class IV farms in Eastern Kentucky.

<sup>1/</sup> The figures for each class are, of course, averages for all farms falling into a particular class. Hence, our presentation too, deals with averages. Incomes, costs, etc., for individual farms within a class, no doubt, deviate considerably from the average. Net incomes on some farms will be higher, others lower than the average. However, our presentation yields more information than a study based on over-all averages for all classes.

<sup>2/</sup> The rental value of the home, however, has not been included.

Table 1. - The Number of Commercial Farms by Size Classes,  
Economic Areas 8 and 9, Kentucky, 1949 (Source: U. S. Census and Estimates)

Class of Farms	Acres Per Farm	Gross Sales	Total Capital Invested	Total inputs Used during Year	Number of Farms	Percent Farms in Each Class
I	631	\$25,000 and over	\$102,532	\$53,282	7	-- 1/
II	597	10,000 - 24,999	50,908	18,281	67	-- 1/
III	266	5,000 - 9,999	27,650	7,446	360	2
IV	188	2,500 - 4,999	13,535	3,930	1439	9
V	126	1,200 - 2,499	7,845	2,576	5076	32
VI	86	250 - 1,199	4,133	1,777	8855	56

1/ Less than 0.5 of 1 percent

Table 2. - Income and Costs for Commercial Farms in Economic Areas 8 and 9, Kentucky, 1949.  
(Source: U. S. Census and Estimates)

Class of Farm 1/	VI	V	IV	III	II	Average 4/
1. Total product	\$1,070	\$2,153	\$3,771	\$7,151	\$15,189	\$1,880
2. Total inputs	1,777	2,576	3,930	7,446	18,281	2,453
a. Cash farm expenses 2/	180	439	1,000	2,832	9,625	450
b. Interest on building and livestock	116	261	482	946	1,945	225
c. Interest on land	110	183	297	558	1,030	169
d. Depreciation on buildings and machinery	93	244	467	929	1,973	204
e. Labor costs 3/	1,279	1,450	1,685	2,110	3,703	1,406
3. Income above cash farm expenses	890	1,714	2,771	4,319	5,564	1,430
4. Residual to labor	571	1,026	1,525	1,886	616	832
5. Residual to management	-708	-424	-160	-224	-3,087	-574

1/ Class I farms have been omitted from the analysis since the small number of farms (7) in this class may cause the data for this class to be unreliable.

2/ Includes all cash farm operating costs except hired labor costs.

3/ Includes operator, family and hired labor.

4/ The average values in this column and in subsequent tables include those for all commercial farms in the area including Class I farms.

All size groups failed to show any returns to management

Total inputs (Table 2) were broken down to show the amounts for cash farm expenses; interest on buildings, machinery and livestock; interest on



land; depreciation on buildings and machinery; and labor costs. Of all the inputs included here, actually only farm expenses and hired labor cost involved a cash outlay. A charge for operator and family labor and the interest on investment were included as inputs to show how net farm income compares with the returns which could be realized were the operator to put all his capital (land included) out at the going rate of interest and to hire out all his labor.

Before interest, depreciation and labor inputs are subtracted, all size groups had some income, which ranged from \$890 on Class VI farms to \$5,564 on Class II farms (Table 2). These figures indicate that all size groups were able to pay "cash farm expenses" (such items as machine hire and repair, fuel and oil, seeds, fertilizer, and feed, livestock and poultry purchases) and have something left over for interest, depreciation and labor charges.

Likewise, before labor inputs were subtracted (but after all other inputs have been subtracted) all size groups had some income. As indicated by "residual to labor," these amounts ranged from \$571 on Class VI farms to \$1,886 on Class III farms (Table 2). These amounts represent what is left as payment to labor and management.

After labor and all other input items except management were subtracted, none of the groups showed a profit or a positive return to management. Class VI farms had a negative return of \$708; they were short that much after paying cash farm expenses plus reasonable charges for labor and capital investment. Class IV farms were short only \$160, while Class II farms lacked \$3,087. Figure 1 shows graphically these shortages. Here the ratio of the value of the total product to the value of the total input is plotted against the value of the total inputs for the five classes of farms. A ratio of 1.0 on the vertical axis represents the break-even point or where the value of the total product is exactly equal to the value of the total input. Thus, the horizontal line drawn at 1.0 has special significance. All farms below this line show a loss.

In Table 2 all the groups of farms show negative management returns. All of the groups are also below the horizontal line at 1.0 (Fig. 1). The fact that these farms show losses does not mean they are going into debt or that the families on them are starving. It does mean that they failed to make cash farm expenses together with the conservative wage (\$947 per mature worker) and investment costs which were charged against their labor and capital. 1/ If the farm families on commercial farms in Eastern Kentucky were entirely motivated by profit they would transfer their labor and capital into employment other than farming. 2/ Economically the losses on these

1/ The \$947 was the annual average wage for hired farm labor in Kentucky, 1949.

2/ Of course, money income and the goods and services it will buy are only one of the goals which make up the complex of family satisfactions.

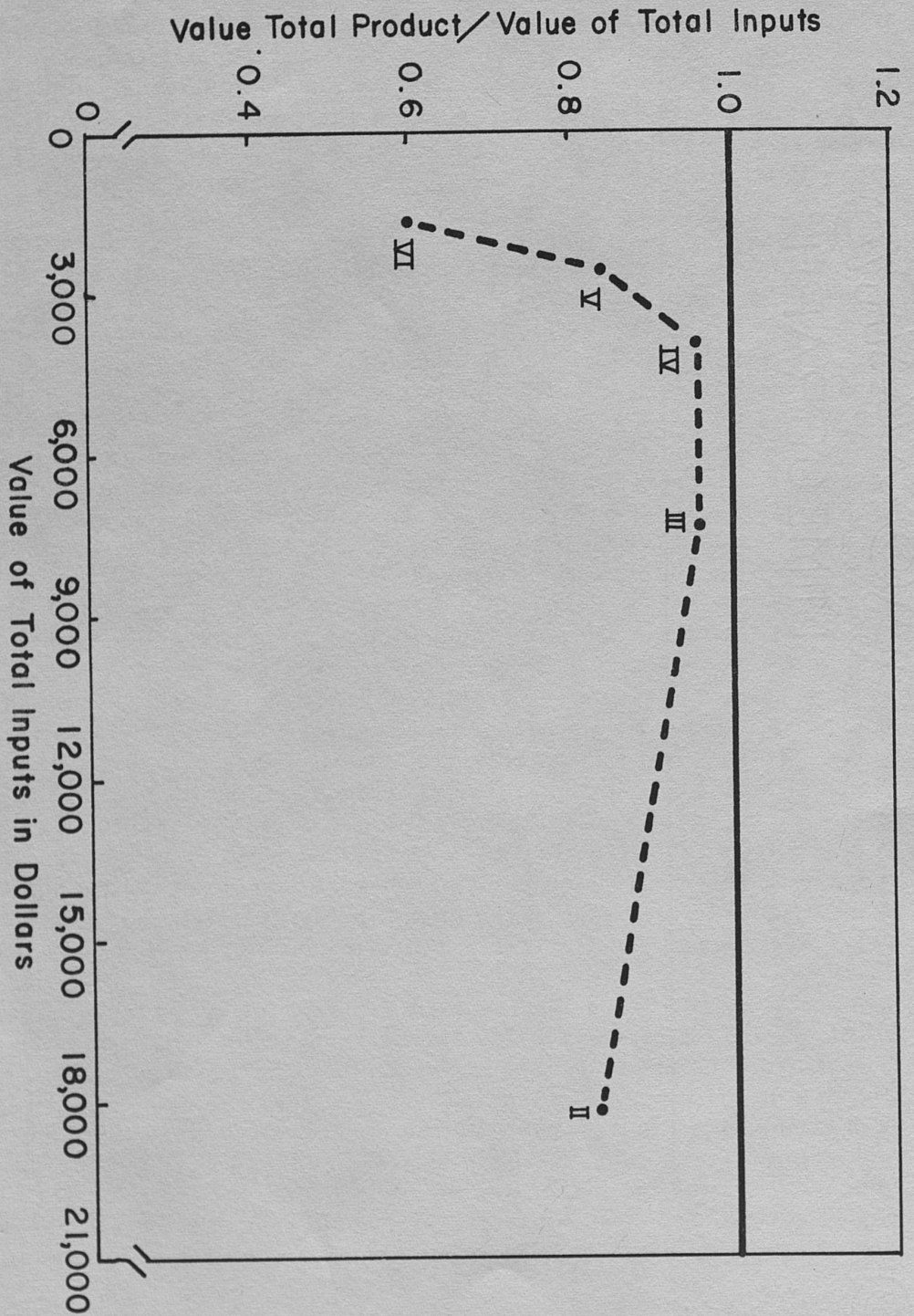


Fig. 1. - The Ratio of the Value of Total Product to the Value of Total Inputs in Relation to Value of Total Inputs by Classes of Farms, Economic Areas VIII and IX, Kentucky, 1949. (Source: U. S. Census and Estimates)



farms mean that the labor and capital employed here did not earn as much as it could in industry -- a point which will be illustrated more fully later.

Some economies are associated with increases in farm size

By connecting the values for the various classes of farms (Fig. 1) with a broken line, one can more readily visualize the economies of size available to farms in Eastern Kentucky. One sees that the economies of size (average efficiency) increased from Class VI (with gross sales of \$250-\$1,199) to Class IV farms (with gross sales of \$2,500 to \$4,999); Class III farms showed about the same efficiency as Class IV farms, while the average efficiency on Class II farms dropped below that for Classes IV and III.

The ratios in Fig. 1 have important implications in the long-run planning for commercial farming in Eastern Kentucky. Perhaps product combinations and market outlets other than the existing ones will need to be developed to improve incomes over time.

Labor returns less than a conservative wage

In the short-run, of vital importance in farming, is whether out-of-pocket costs can be met. When a farmer cannot pay out-of-pocket cash costs he must sooner or later quit farming. To see whether returns were large enough to pay all out-of-pocket costs (hired labor costs included) and a conservative wage to operator and family labor, total costs or inputs were broken down to show returns after paying all out-of-pocket costs and to show residual returns to operator and family labor (Table 3). All size groups of farms were able to pay

Table 3. - Income and Costs for Commercial Farms in Economic Areas 8 and 9, Kentucky, 1949.  
(Source: U. S. Census and Estimates)

Class of Farms	VI	V	IV	III	II	Average
1. Total product	\$1,070	\$2,153	\$3,771	\$7,151	\$15,189	\$1,880
2. Total inputs	1,777	2,576	3,930	7,446	18,281	2,453
a. Out-of-pocket costs <u>1/</u>	207	533	1,212	3,537	12,401	549
b. Overhead costs other than operator and family labor	319	688	1,245	2,433	4,948	598
c. Operator and family labor	1,251	1,355	1,473	1,405	931	1,307
3. Returns after paying out-of-pocket costs	863	1,620	2,559	3,614	2,788	1,331
4. Residual returns to operator and family labor	544	932	1,314	1,181	-2,160	733

1/ Includes cash farm operating expenses plus hired labor costs.

out-of-pocket costs and have something left over. What was left over was sufficient to pay the conservative wage charged to operator and family labor on each of the classes of farms except Class VI. What was left over (residual returns to operator and family labor) after paying all out-of-pocket costs plus overhead costs other than operator and family labor was insufficient to pay the wage charged to operator and family labor on all classes of farms.

Before we examine how productive various resources were on different sizes of farms, let us see what the different size groups of farms produced and what resource combinations were used to get this production.

#### Production and Resource Combinations

Field crops and home-consumed products as sources of farm income decreased in importance with increases in size of farm (Fig. 2). On the other hand, dairy and livestock other than dairy and poultry increased in importance as size of farm increased. Thus, on the smaller farms field crops along with home-consumed products contributed most to farm income. On the larger farms, field crops, dairy and livestock other than dairy, and poultry contributed most.

To round out the picture, we need to know what resources were required to get the production for different classes or sizes of farms (Fig. 3). The percentage contribution of each input or resource item was based on the estimated annual use value of these inputs or resources. Thus, the annual contribution of land was estimated at five percent of the total land investment. The annual contribution of labor was the number of mature workers times the going wage in agriculture. Capital included cash farm expenses, interest on buildings, machinery and livestock and depreciation on buildings and machinery.

Percentagewise, land was about equally important on all farms, irrespective of size. For all size groups it made up a relatively small portion (6 to 8 percent) of the total annual inputs.

Labor inputs ranked highest on small farms while capital ranked highest on large farms

On the smallest farms (Classes VI and V) labor inputs, relative to other inputs, were the most important. In fact, on Classes VI and V farms, labor inputs were more important than all other inputs combined. In contrast, on the larger farms (Classes III and II) capital was the most important input item. The decreasing importance of labor and the increasing importance of capital as farms increase in size, is clearly illustrated in Fig. 3. This means that the amount of capital used per worker increased as farm size increased. For any one input or resource to be productive it must have enough of other inputs or resources to go with it. Moreover, for any single resource to be really



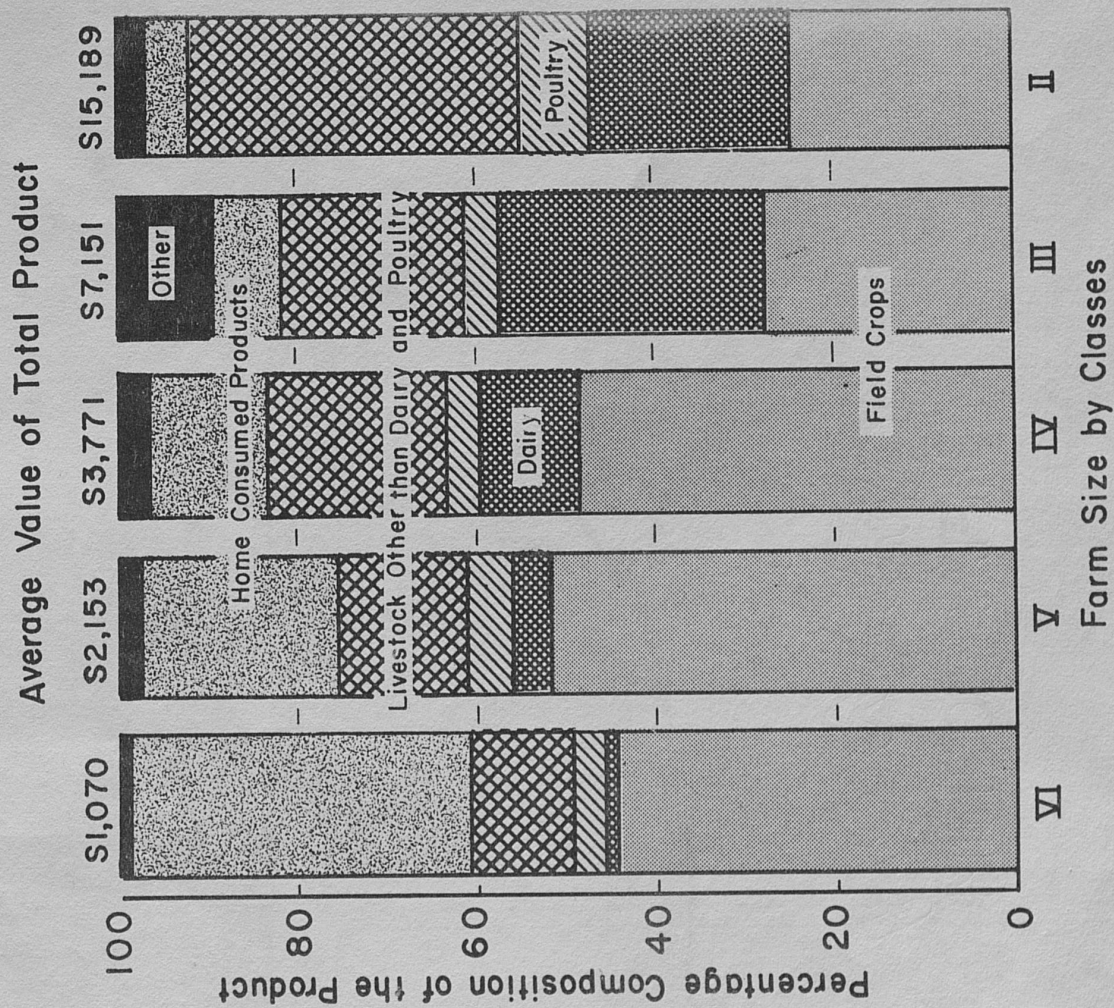


Fig. 2. - The Percentage Composition of the Product for Classes of Farms in Economic Areas VIII and IX, Kentucky, 1949. (Source: U. S. Census and Estimates)

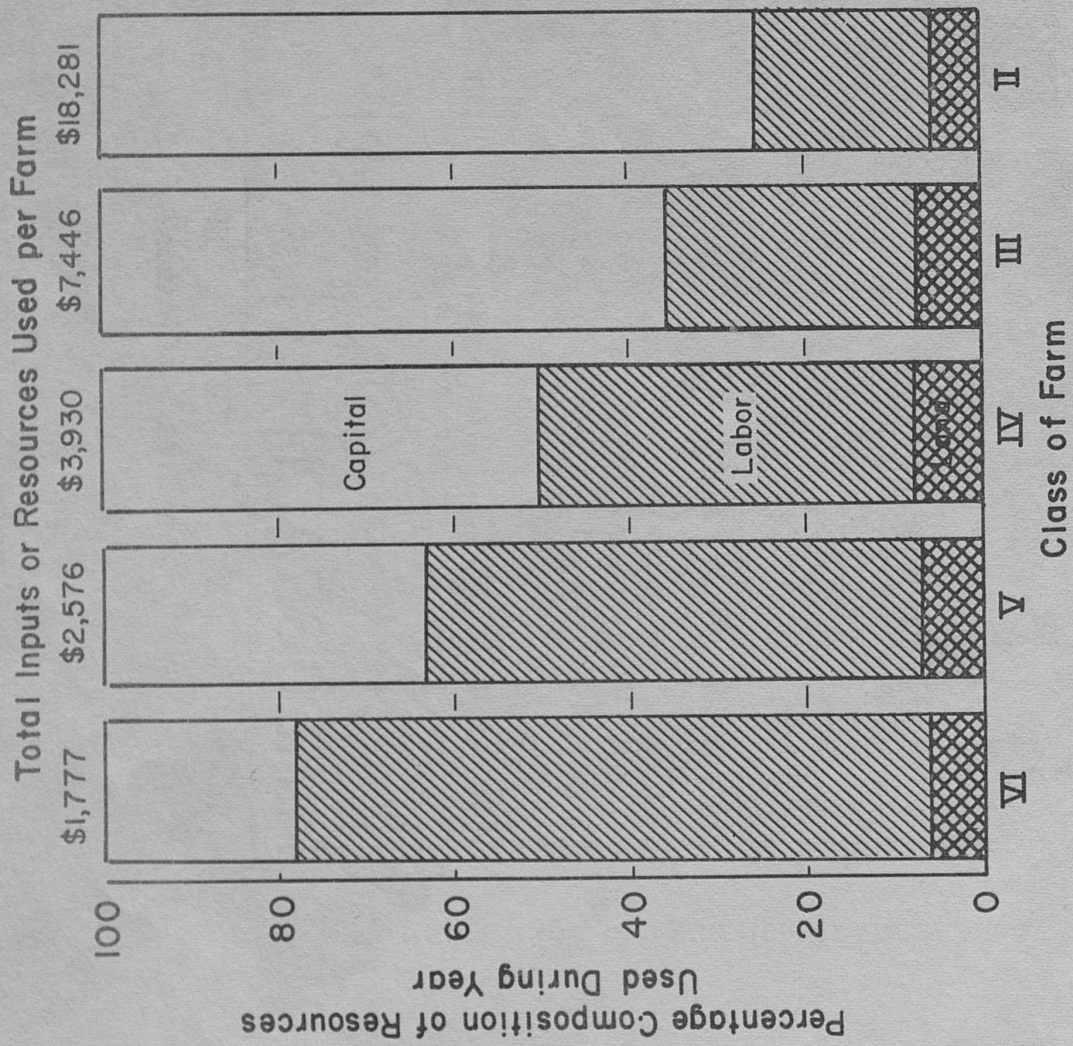


Fig. 3. - The Percentage Composition of Inputs or Resources Used Per Year by Classes of Farms in Economic Areas VIII and IX, Kentucky, 1949. (Source: U. S. Census and Estimates)



productive, it must have not only enough of other resources to go with it, but the quality of these other inputs must also be high. Thus, high quality labor when combined with plenty of good quality of land, machinery, livestock, and other resources is going to be more productive than when combined with small amounts of other resources, particularly if these other resources are also of low quality.

Of course, sometimes the productiveness of a resource can be lowered if there are too many of other resources to go with it. For example, evidence presented earlier suggests that the addition of land and capital to labor beyond Class IV farms does not increase the productivity of farm labor in Eastern Kentucky. In fact, beyond Class III farms, more land and capital per worker appears to decrease the productivity of labor.

#### Productivity of Labor, Land and Capital

We have already talked about residual returns to labor. We defined residual returns to labor as what is left after subtracting all inputs (including a fair return to land and capital), except labor inputs, from gross farm income. This gives a rough estimate of what labor is worth. Heretofore we figured the residual return to all labor or to all operator and family labor. However, since large farms employ more workers than small farms, we need to compute the residual returns to labor per worker to find out how productive labor was on farms of varying size. Hence, we first computed the average number of workers per farm and then the residual returns per worker for the five classes of farms (lines 1 and 2, Table 4).

#### Returns to labor per worker were highest on Class IV farms

Notice that the average number of workers per farm increased from 1.35 on Class VI farms to 3.91 on Class II farms. At the same time residual returns per worker increased from Class VI to Class IV farms and then declined with further increases in size.

Earlier (Fig. 3) we indicated how the combinations of land, labor and capital changed with changes in farm size. Now note how acres per worker, investment per worker and land and capital inputs per worker increased throughout from Class VI to Class II farms (Table 4). As land and capital per worker increased from Class VI to Class IV farms, net returns per worker (residual to labor per worker) also increased (Fig. 4). In other words, within this range, the productivity of labor increased as it was combined with more land and capital. However, the addition of land and capital per worker beyond the levels on Class IV farms does not appear to make labor more productive. In fact, adding land and capital beyond levels existing on Class III farms seems to lower the productivity of labor. The cash farm expenses and investment costs associated with the additional land and capital apparently more than offset any increases in returns from these additions.

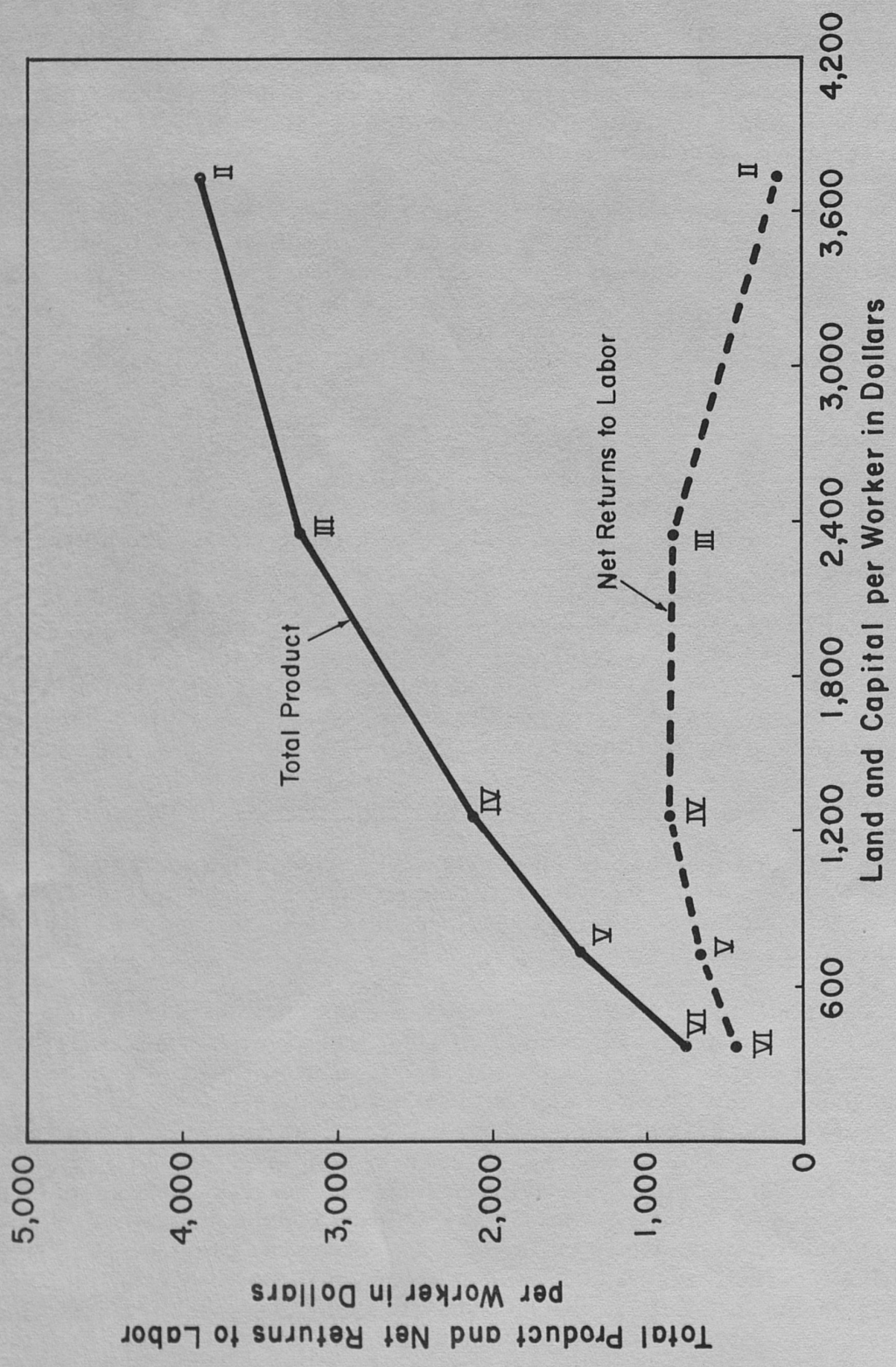


Fig. 4. - Productivity of Land and Capital, Economic Areas VIII and IX, Kentucky, 1949.  
(Source: U. S. Census and Estimates)



Table 4. - Resource and Product Ratios for Productivity of Land, Labor, and Capital  
Economic Areas 8 and 9, Kentucky, 1949 (Source: U. S. Census and Estimates)

Class of Farms	VI	V	IV	III	II	Average
Number of workers (man years of all labor)	1.35	1.53	1.78	2.23	3.91	1.48
Residual to labor per worker	\$423	\$671	\$857	\$846	\$158	\$562
Acres per worker	64	82	106	119	153	77
Total investment per worker <u>1/</u>	\$3,061	\$5,127	\$7,603	\$12,399	\$13,020	\$4,722
Land and capital inputs per worker <u>2/</u>	370	737	1262	2361	3727	708
Total product per worker	\$793	\$1,407	\$2,119	\$3,207	\$3,885	\$1,270

1/ Includes investment in land, buildings, livestock and machinery.

2/ These are the annual inputs not the investments themselves, and include cash farm expenses, interest on land, buildings, machinery and livestock, together with depreciation on buildings and machinery.

Increases in gross returns from additions of land and capital continue throughout, from Class VI to Class II farms ((total product per worker, Fig. 4). The total product per worker increased from \$793 on Class VI farms to \$3,885 on Class II farms. At the same time, land and capital inputs per worker increased from \$370 to \$3,727. Note that the rate of increase in total product per worker fell off as land and capital inputs per worker increased. One would expect this rate of increase to fall off since the farm operator on a Class II farm had a more difficult job of managing \$3,727 per worker in other resources than the operator on Class VI farms who managed only \$370 per worker in other resources.

The total cost of producing \$1 in product was more than \$1 for all classes of farms

High profits in relation to costs is a measure of over-all efficiency or productivity. For farms to show a profit, the cost of producing \$1 in product must be less than \$1. For all size groups of commercial farms in Eastern Kentucky it cost more than \$1 to produce \$1 in product. Even for the most efficient groups (Classes IV and III) the cost was \$1.04 per \$1 of product (Fig. 5). This \$1.04 includes all inputs -- cash farm expenses, interest on land, buildings, livestock and machinery, depreciation on buildings and machinery plus a charge for hired, operator and family labor. Of course, we know that these farms did not pay operator and family labor and their investment inputs at the going rate of return. For farms that do not have to pay for their own labor and their investment inputs, cash farm ex-

penses per \$1 of product may be more meaningful, at least in the short run. It is when cash farm expenses cannot be met that farm families sooner or later must give up farming.

#### Small farms have the lowest cash costs per \$1 of product

Our study shows that the small farms had the lowest cash farm expenses per \$1 of product (Fig. 5), amounting to only \$0.17 on Class VI farms, \$0.20 on Class V farms and \$0.63 on Class II farms. It is the low cash farm expenses that make it possible for operators of many small farms to stay in business. They can take care of these cash outlays and still have some income left over for themselves. However, when we consider all inputs, all classes of commercial farms in Eastern Kentucky, as they are presently organized, definitely come out short. This fact becomes very apparent when we compare returns in farming with the opportunity returns in industry.

#### Opportunity Returns to Farm Labor and Capital

To compare the returns to labor and investment in capital and land in farming with the opportunity return for these resources in industry, we first need to arrive at suitable wage and interest rates as a basis for figuring the opportunity returns. An annual wage of \$2,900 was figured as a reasonable wage for farm labor in nonagricultural employment and 5 percent was chosen as a fair interest rate. <sup>1/</sup> The top line (Fig. 6) shows the opportunity returns to Kentucky farm labor and capital as figured on the basis of these rates. The opportunity returns for one man without any capital (only his labor) in industry is \$2,900. The opportunity return in industry for one man with \$6,000 of capital invested and earning 5 percent is \$2,900 plus \$300 or \$3,200. Thus, the top line represents the real cost (opportunity returns) of using labor and capital in farming. These opportunity returns are then compared with the value actually added per worker by these resources when used on the various classes of farms (the broken line, Fig. 6). Note that the value added per worker when he employed his resources in farming fell below the "opportunity-returns-in-industry line" for all classes of farms. In terms of income only, families on these farms would be better off working for wages in industry and letting their capital out at 5 percent.

#### Summary

Specifically, this study showed that nearly all commercial farms in Eastern Kentucky had farm product sales of less than \$5,000. Moreover, when we consider all costs, out-of-pocket plus overhead (depreciation on buildings and machinery; interest on investments in land, buildings, machinery, and livestock; and charges to operator and family labor) all size classes of commercial farms failed to show a profit or a positive return to management. Finally some cost economies were associated with increases in size of farm from Class VI to Class IV.

<sup>1/</sup> \$2,900 was computed as a simple average of the average weekly wage in manufacturing in Michigan, Indiana, Illinois and Tennessee times 52. (From U.S. Department of Labor, Bureau of Labor Statistics, Monthly Labor Review, Vol. 79, 1959, Table C-5)



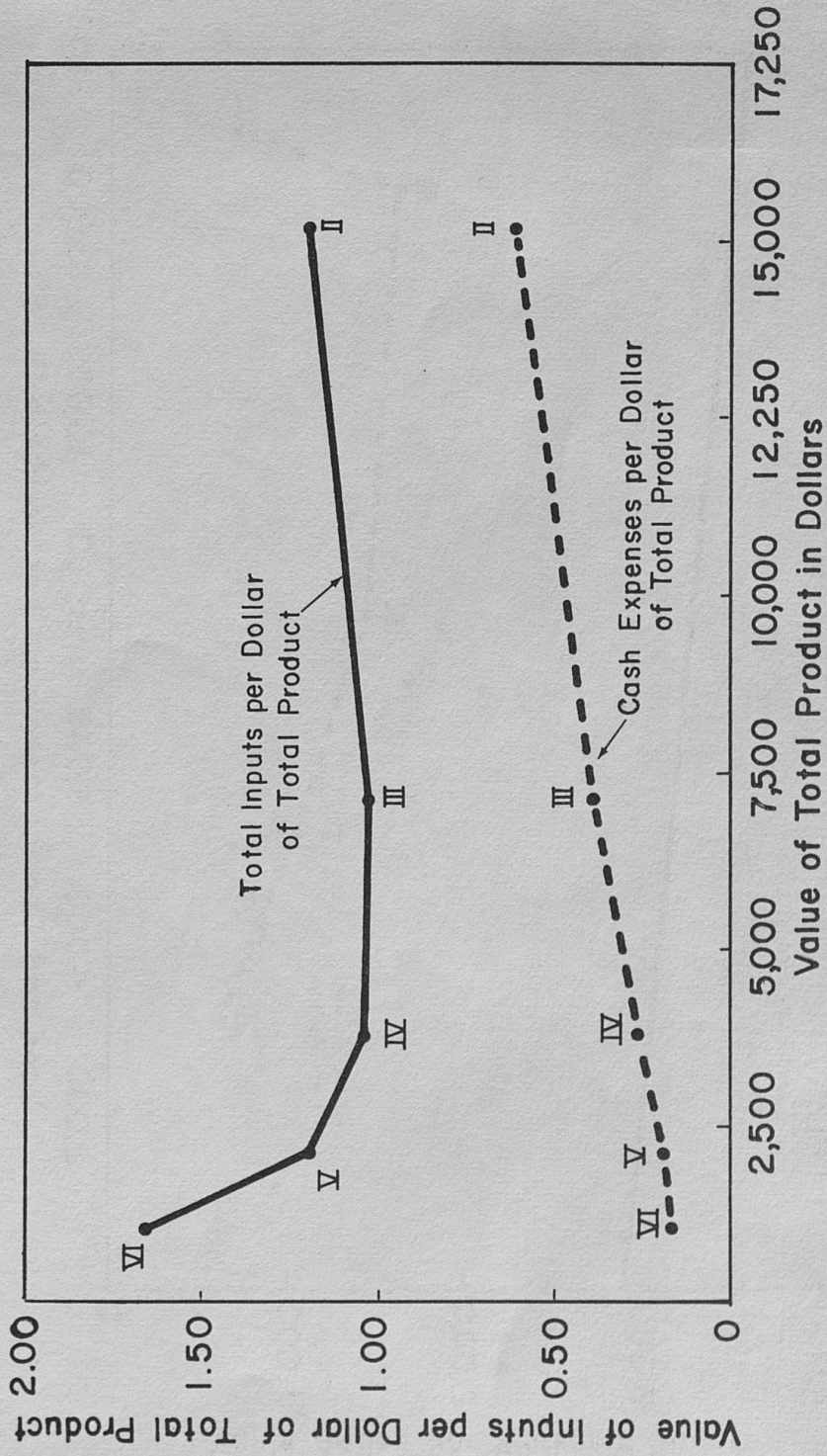


Fig. 5. - Value of Inputs in Relation to Value of Product for Classes of Farms in Economic Areas VIII and IX, Kentucky, 1949. (Source: U. S. Census and Estimates)

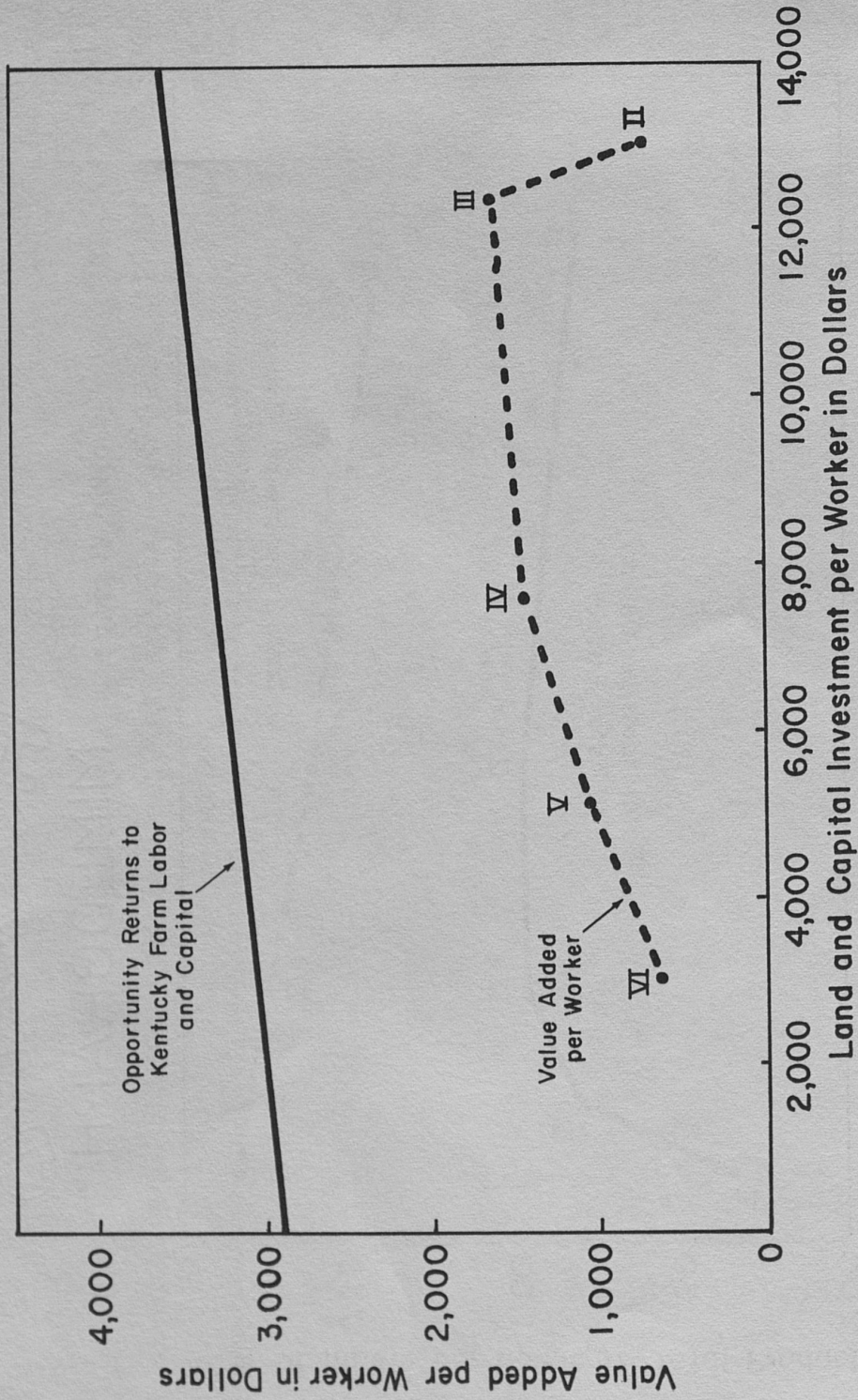


Fig. 6. - Opportunity Returns Compared with Value Added Per Worker in Relation to Land and Capital Investment Per Worker, Economic Areas VIII and IX, Kentucky, 1949. (Source: U. S. Census and Estimates)



In general, this study suggests that farm families on many commercial farms in Eastern Kentucky are not getting much income for the time spent in farming. Furthermore, increasing the size of the farm by the addition of more land and capital does not appear as a complete and satisfactory solution to the farm income problem on these commercial farms. Adding more land and capital per worker can be expected to improve incomes and resource efficiency only on the smallest commercial farms (Classes VI and V). Thus, increasing the size of commercial farm operations furnishes only limited opportunity for increasing incomes and living levels. Determining the exact extent of this opportunity awaits a more thorough analysis. As we pointed out earlier, this study is based on average incomes and costs for various classes or sizes of farms. There are, of course, commercial farms with returns above these averages, but at the same time there are also commercial farms with returns below these averages.