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# EFFECTS OF LAND ACQUISITION ALTERNATIVES ON OPTIMAL FARM PLANS FOR NORTH MISSOURI

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# EFFECTS OF LAND ACQUISITION ALTERNATIVES ON OPTIMAL FARM PLANS FOR NORTH MISSOURI

SAM T. COOPER  
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## INTRODUCTION

Today's farm operators, who have a wider variety of resources under their control and more decisions to make, are making greater changes than ever before in the history of man. Even greater use of resources, more decisions and more changes are likely to be present in the coming years. In the face of these various factors, farm operators need guidelines to use in planning resource use and the possible expansion of their farm enterprises.

In line with these needs, the Agricultural Experiment Stations of the states in the North Central Region are conducting a study concerned with supply responses and adjustments for beef cattle and hog farms in the Corn Belt. This bulletin reports on one phase of that study for three areas in North Missouri.

## OBJECTIVES

The primary objective of this study was to examine the types of adjustments that representative farms in northern Missouri could profitably make if additional land could be acquired by purchase and/or rental. Specifically, the objectives were to determine for various sizes and types of representative farms:

1. if it is profitable to expand the acreage operated
2. the type of land acquisition activity or activities which are most profitable
3. the size and extent of the possible expansion
4. the crop and livestock enterprises that would be used with the expanded farm acreages
5. the amount and types of credit needed for the adjustments indicated as profitable, and
6. the extent to which the current resource bases of typical farms are adequate to support expanded operations.

A study similar to this but with land considered constant has been done previously and this study can be considered a supplement.<sup>1</sup>

<sup>1</sup> Dale Colyer, "Production of Corn, Hogs, and Beef Cattle With Optimal Farm Organizations for Representative Farms in Northeast Missouri." Missouri Agricultural Experiment Station, Research Bulletin 872. Reports for North-Central and Northwest Missouri are being processed for publication.

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### **Northeast Missouri**

The 16 counties in the Northeast area have predominantly Lindley and Putnam type soils. These soils are rolling forest land and level prairie land respectively. The prairie is level and moderately fertile but requires man-made drainage systems to remove excess surface water. It responds well to fertilizer applications. The Lindley soils are mostly loessial hills and unsuitable for intensive cropping. Primarily they provide either permanent pasture for grazing or they are in woodland. With such a large proportion of the land in hay or pasture, there is less corn and other grain crops grown here than in most corn belt areas.

### **North-Central Missouri**

The 16 counties in the North-Central area have mostly Shelby soils. The land is rolling with hilly areas and it is low in natural fertility. Because of the topography and poor conservation practices in the past much of the top soil is eroded. Although the farms are equal in acreage to the average corn belt farm, the topography and poor soil demand that much of the land be used for pasture or soil-holding small grains. Thus, the proportion of land that can be planted to row crops is relatively small—only about 50 percent of the crop-land in the area.

### **Northwest Missouri**

The most striking characteristic of this area is that ten of the twelve counties lie along the Missouri River. Three distinct sets of farming conditions affecting farm practices exist: (1) flat river bottoms allowing intensive agricultural use, (2) valley slopes and bluffs used primarily for livestock grazing and wheat production, and (3) rolling prairies of rich but loose soils requiring erosion control practices. Within the river valley, cash-crop farming is mixed with livestock farming. In the upland areas most of the farming consists of corn-hog-cattle operations.

Because much of the land is valley slopes or rolling prairie, 38 percent of the total farmland is in pasture and an additional 14 percent is in hay crops. Corn, wheat, and oats are the principal tilled crops grown. The area is typically corn belt with 80 percent of the farm income derived from the sale of livestock and 20 percent from the sale of crops for cash. From a farm income point of view, this area is the most prosperous of the three included in this study.

## **METHOD AND PROCEDURE**

Data on the farms used in this study were obtained from a farm sample survey made in 1963. The data collected were based on 1962 farm operations. The total sample of 591 farms was used, with 223 from the Northeast, 178 from the North-Central, and 190 from the Northwest areas. Farms classified as noncom-

mercial<sup>3</sup> and specialized poultry, fruit, and vegetable farms, were excluded from the study because they contributed little if anything to the production of hogs and beef cattle. Survey information was obtained concerning farm income, farm output, farm organization, possibilities for farm adjustment, and availability of resources. This information was used to classify farms into representative groups and to form a base from which resource combinations and production alternatives were developed.

The sample survey farms from these areas were grouped by *size* and by *type of farming classifications*. The five farm classifications were based on the proportion of products sold in 1962; a farm had to obtain 50 percent or more of its income from the source by which it was classified. If no single type of enterprise produced 50 percent or more of the farm income, it was classed as a mixed livestock farm. The types of farms were *hog, beef cattle, cash grain, mixed livestock, and dairy farms*.

The sizes of the representative farms, with the exception of dairy farms, were determined by dividing the number of farms in each area into equal numbers *small, medium, and large* categories based on tillable acres. While arbitrary this method was used because the data showed no natural size groupings. Dairy farms were divided into two size groups based on the number of cows—under 20 cows, and 20 cows and over.

In order to arrive at the resource levels for typical farms, e.g., acres of cropland, number of tractors, and amounts of capital, the characteristics of farms were listed by type and size. From this list either average or modal values were used depending on the particular characteristic. For resources which were divisible, e.g., cropland and credit, the average values were used, but with "lumpy" inputs, such as machinery, modal or typical values were used.

The resource levels of the sample farms were used as a base from which adjustments were calculated. Production efficiency trends were projected to expected 1970 relationships and these levels were used for deriving production coefficients. Because of this, some of the coefficients may seem ultra efficient by today's standards. Crop yields were arrived at by consulting the soils and field crops experts at the University of Missouri. Livestock feed requirements were estimated by a subcommittee of the NC-54 Regional Research Committee with the assistance of livestock specialists at the various experiment stations. The more important coefficients are shown in Appendix Tables 1 and 2. The resource levels for the representative farms are summarized in Appendix Tables 3, 4, and 5.

Linear programming with variable prices for corn, hogs, and beef was used to calculate the optimal organization from a profit maximizing standpoint for each representative farm. In each of the three areas the results for a major type

<sup>3</sup>Noncommercial farms are those: (1) with less than 10 acres and less than \$250 in annual sales of farm products, (2) with 10 acres or more but less than \$50 in annual sales of farm products, (3) less than \$2,500 in annual sales of farm products where the operator worked off the farm 100 or more days and/or where nonfarm income exceeded farm income, and, (4) where an operator 65 years of age or older received less than \$2,500 from sales of farm products.

of farming operation are reported in this bulletin. Space does not permit a complete listing of results and the optimal plans had similar traits regardless of the type of farm used for the base situation.

Optimal farm organizations for cash grain farms in Northwest, mixed livestock farms in North-Central, and hog farms in Northeast Missouri were computed at three price levels for corn, hogs, and beef. This yielded results for 27 price combinations, but not all combinations were required for this analysis. The plans with prices of all three enterprises at medium price levels were used as a benchmark and for the main analysis. Other plans, representing departures from the recent price of relationships of hogs and beef cattle, relative to other farm inputs, are presented for the purpose of comparison and analysis of the effects of such price shifts.

One phase of the study examined alternative methods of land acquisition. The methods were contract purchase, mortgage, and renting cropland. A comparison also was made with the results from earlier studies with land fixed in quantity. Finally the situation with an unlimited land purchase alternative was examined to determine the maximum size to which these typical farms can be profitably expanded with the resource bases they possessed in 1962.

## PRICES AND COSTS

A linear regression equation, based on the least squares method with average per acre farmland prices for the years 1950-1963, was used to develop the trend in Missouri land values. The resultant formula was used to estimate future land values for the state by a straight line projection. Values for the three areas were computed by use of the ratio of the weighted average values by counties for each area to the average land price for the state using 1959 census data. The projected land values were: Northeast, \$152.60 per acre; North-Central \$133.00 per acre; and Northwest, \$208.60 per acre.

Since the study is based on conditions projected for the year 1970, other prices and costs used were extrapolations based on recent trends and averages. The prices for corn, hogs, and beef, however, were varied with three levels—high, medium, and low—considered. These were based on expected United States average corn prices of \$1.20, \$1.00, and \$0.80, respectively. Hog and beef prices were computed from the prices of corn by use of average hog:corn and steer:corn ratio for the years 1955-60. The hog:corn ratio was 14.8:1 and the steer:corn ratio was 20.8:1. Prices were adjusted to compensate for the transportation differentials between Missouri markets and Chicago. (See Appendix Table 6 for specific prices and costs used in this study.)

## THE PROGRAMMING MODEL

The linear programming model used for this study consisted of 58 activities and 45 equations. The major features of the model are described:

## Land Buying Activities

Acquisition of additional land could take any of three forms—land buying with a mortgage, land buying with a contract, and land renting. Either mortgage buying or contract buying could be used in conjunction with land renting. The amount of land which could be purchased was determined by areas. The acreages which farmers reported could be purchased and rented in their areas were used. Land purchased with a mortgage required a one-third down payment; however, land purchased on contract required no down payment.

Land rented in north Missouri is typically on a crop share basis with 50 percent of the crop being paid in rent. The landlord usually pays for half the fertilizer, seed, and insecticides. For the programming model it was assumed that only cropland could be rented and that the usual rental conditions would prevail. The rental payment, however, was treated as a cash payment based on the crop production that could be expected from a typical acre of rented cropland. These rates per acre were \$29.35 for the Northeast, \$21.42 for the North-Central, and \$30.77 for the Northwest area.

(Table 1 shows the coefficients for the land acquisition activities.)

Feed grains and wheat acreage limits were based on those permissible with minimum compliance with the 1962-63 type of government programs. Total row crop production was limited to that which would be considered feasible for the respective soil types in each area. In the Northeast area 60 percent of the cropland could be in row crops while the comparable figures for the North-Central and Northwest areas were 50 percent and 72 percent, respectively.

## Hog Activities

Hog enterprises and related activities considered were twelve pig producing activities to add farrowing and feeding facilities. Pigs could be produced independently using central or portable farrowing and feeding facilities in each of four quarters using a single litter system. The four quarters were January - March, May - June, July - September, and October - December. Activity requirements including facilities vary from quarter to quarter and are given in Appendix Table 1. The typical litter size was eight pigs with seven sold and one gilt kept as a replacement. Hogs were assumed to be marketed at 225 pounds with 300 pounds of cull sow sold per litter.

## Beef Cattle Activities

Beef cattle activities included a beef cow herd, eight activities using feeder calves, eight activities using yearling steers and three activities for building additional housing and feeding facilities. Calves can be fed with or without silage and either on pasture or in drylots, and yearlings can be fed with or without silage in drylots and in either of two six-month periods. Requirements of the beef alternatives are given in Appendix Table 2. Beef housing and low or highly mechanized feeding facilities can be added to supplement the existing facilities.

TABLE 1 - CHANGES IN RESOURCES AVAILABLE PER ACRE  
OF LAND RENTED OR PURCHASED\*

	Land Buying Mortgage	Rental Cropland	Land Buying Contract
NORTHEAST			
Cropland (acres)	.642	1	.642
Permanent Pasture (acres)	.325	-	.325
Row Crop Limit (acres)	.39	.60	.39
Cash Equivalent ( \$ )	-152.60	-	-15.00
NORTH-CENTRAL			
Cropland (acres)	.56	1	.56
Permanent Pasture (acres)	.39	-	.39
Row Crop Limit (acres)	.28	.50	.28
Cash Equivalent ( \$ )	-133.00	-	-13.30
NORTHWEST			
Cropland (acres)	.59	1	.59
Permanent Pasture (acres)	.31	-	.31
Row Crop Limit (acres)	.42	.72	.42
Cash Equivalent ( \$ )	-208.60	-	-20.86

\*The addition of one acre of land adds or uses resources as indicated by the sign preceding the coefficient, e.g., one acre of land purchased under mortgage adds .642 acres of cropland.

The cow herd produced 400 pound feeder calves which could be sold or used in one of the feeding enterprises. A 95 percent calf crop is assumed with a 16 2/3 percent rate of cow replacement (with 162 pounds of cull cow sold per cow in the herd). All figures include requirements for replacement livestock which are assumed to be raised. Charges of \$3.55 per cow for the bull are included in the miscellaneous expense of \$12.09 per cow. Feeder calves are purchased in October at 400 pounds and are sold at 1050 pounds if fed in drylot and at 1100 pounds if fed in pasture. Yearling steers are purchased at 700 pounds and sold when weighing about 1100 pounds.

### Capital Activities

All capital-requiring activities were financed by the operators' available cash. When funds were borrowed the amounts obtained were transferred to the cash

equation so that any cash-using activity could be financed by use of borrowed capital. Livestock feed inventories as well as operating capital were included in the original amount of available cash, i.e., no livestock or feed were assumed to exist in the standing inventory.

### Labor Activities

Labor use was divided into five periods, winter, early spring, spring, summer and fall, to coincide with the major needs for crops on a north Missouri farm. In addition to the available family and permanent hired labor, seasonal labor could be hired in the spring, summer, and fall. The labor hiring limits were those indicated by the typical farm situation. A reservation price of \$1.10 per labor hour was placed on operator and family labor.

### Other Activities

Land selling and nonfarm investment activities were available if called for in the optimal solution. However, in no instance was either activity used.

## RESULTS OF PROGRAMMING

Optimal farm plans for the assumed conditions were obtained at various price levels for the three types and sizes of farms. The results showed that acquisition of some additional land was profitable for all the representative farms and at all price combinations. At the medium price levels, used as a benchmark, all of the land available to the program was purchased with the purchasing done on contract. The land renting limit was fully utilized in most cases. However, when labor became limited, as was typical in the larger farms, the quantity of land rented was reduced and sometimes eliminated. In most instances hogs became the major livestock enterprise. At the other price combinations it generally was profitable for the representative farms to acquire all the land available.

The major features of the optimal plans for each representative farm at selected price combinations are presented in the following pages. Important features of the representative farm, as it existed in 1962, are given so that the extent of the adjustments can be seen. The computed optimal plans also are reproduced in Tables 2 through 10.

### Small Hog Farms in Northeast Missouri

Twenty-four of the Northeast Missouri hog farms were classified as small. In 1962 these consisted of 160 acres of land of which 78 acres were cropland. The average wheat allotment was 9.6 acres and the feed grain base was 35.3 acres. In 1962 they raised twenty-one acres of corn, ten acres of soybeans, one acre of oats, four acres of wheat, and an additional 108 bushels of corn were purchased. Nine sows were kept and 146 pigs farrowed. Some farmers purchased feeder pigs while others sold some. Central farrowing facilities were used but the pigs were

fed on pasture by most operators. A six cow beef herd was kept with most of the calves sold as fat stock. Some steers were bought and resold as feeders. Total assets were \$25,381 and total capital available was \$20,714.

In the optimal solutions, at all price levels, land acquisitions were utilized to the maximum limits for both renting and purchasing land with land purchased under contract (See Table 2). With MMM<sup>4</sup> prices grain acreages were expanded, with 97 acres of corn, 93 acres of oats, 27 acres of wheat, and 8 acres of soybeans raised. Twenty-two head of steers were fed, making construction of 22 units of high mechanization beef feeding capacity necessary. The hog enterprise was expanded to 83 litters for which 30 units of portable farrowing capacity and 572 units of feeding capacity were added. Both long and short term credit were used with more short term due to expansion of the livestock activities.

The effect of relatively more favorable beef prices on the organization of the typical small hog farm was to convert these farms entirely to calf feeding operations with no hogs or beef cows. Corn purchases were much larger, due to the feed requirements of the cattle, and extra labor was purchased in the summer. High mechanization beef feeding facilities were added at MLM, and at MMH both high mechanization and low mechanization beef feeding facilities were added. Also, approximately twice as much credit was used as with the MMM prices, a result of the large capital requirement for purchasing feeder cattle. Only a small amount of seasonal labor was hired at MLM, but 41 hours of summer labor were hired at MMH prices due to use of low mechanization feeding facilities.

When MML and MHM prices were used, cattle dropped completely from the solutions. Over 90 litters of pigs were farrowed at each of those sets of prices with feeding and farrowing facilities added to handle them. Less credit was used with these prices than any other combination and no labor was hired. Oats replaced meadow in the cropping systems except for a small acreage used for the portable farrowing and pasture feeding of the hogs.

The LLL and HHH price combinations gave results similar to the MMM solution, except fewer litters of pigs farrowed at the LLL prices and more at the HHH prices. With HHH prices 140 fewer units of portable pig feeding capacity were built because farrowing shifted to more than two periods. Also, at HHH levels, \$1,100 less of short term funds were used.

### Medium-Size Hog Farms in Northeast Missouri

The typical medium-size hog farm in 1962 consisted of 291.5 acres with 187.3 acres of cropland. The wheat allotment averaged 14.2 acres and the feed grain base was 78.2 acres. About 23 sows were kept and 297 pigs farrowed annually on the typical farm. A 15 cow beef herd was also kept with most of the calves sold as feeders. The typical total debt was \$3,492 with total available capital of \$53,812. This put the farm in an excellent position to borrow for expansion.

<sup>4</sup>The letters L, M, and H will be used for low, medium, and high prices with corn, hogs, and beef listed in that order. Thus MMM refers to medium corn, medium hog, and medium beef cattle prices.

TABLE 2 - OPTIMAL FARM ORGANIZATIONS FOR SMALL HOG FARMS  
IN NORTHEAST MISSOURI

	Prices for Corn, Hogs, and Beef Cattle*						
	LLL	MLM	MML	MMM	MMH	MHM	HHH
Gross Profit	8373	11650	13465	13596	16968	18902	18863
Corn-Acres	97	97	97	97	97	97	97
Corn Purchased-Cwt.	377	1182	260	377	1275	443	624
Oats-Acres	93	56	98	93	55	98	94
Wheat-Acres	27	27	27	27	27	27	27
Soybeans-Acres	8	8	8	8	8	8	8
Rotation Meadow-Acres	8	46	3	8	46	4	8
Hay Harvested-Tons	14	1275	-	14	129	-	14
Perm. Pasture Fert.-Acres	-	81	-	-	84	-	-
Calves Bought-Feeders	22	190	-	22	193	-	22
Calves Fed on Pasture-Head	22	190	-	22	193	-	22
Total Cattle Fed No.-Number	22	190	-	22	193	-	22
Litters of Hogs-Quarter 1	40	-	40	41	-	32	33
Litters of Hogs-Quarter 2	-	-	12	-	-	32	33
Litters of Hogs-Quarter 4	40	-	40	41	-	32	33
Total Litters Produced	81	-	92	82	-	96	87
Beef Housing Built-Head	-	110	-	-	111	-	-
Low Mech. Beef Cap. Built-Head	-	-	-	-	31	-	18
High Mech. Beef Cap. Built-Head	22	190	-	22	162	-	4
Port. Farrowing Cap. Built-Sows	30	-	29	30	-	21	22
Port. Pig Feeding Cap. Built-Pigs	572	-	558	572	-	425	435
Short Term Funds Borrowed-\$	12189	20833	10310	12189	21080	9085	10955
Long Terms Funds Borrowed-\$	9670	19809	9117	9670	19296	9117	9289
Hire Spring Labor-Hours	-	-	-	-	-	-	1
Hire Summer Labor-Hours	-	2	-	-	41	-	-
Land Renting-Acres	100	100	100	100	100	100	100
Land Buying on Contract-Acres	98	98	98	98	98	98	98

\*L = Low, M = Medium, and H = High Prices

Under the optimal organization with MMM prices (Table 3), available land was rented (89.26 acres) and bought under contract (98.4). The corn acreage was increased to 128.8 acres and soybeans to 92.0 acres. Other crops were increased but not to the same extent. Oats did come into production although they were not raised in 1962 on the typical farm. The livestock enterprises, both for cattle and hogs, were expanded. However, hogs became relatively less dominant and with the medium price combinations no beef cows entered the solution. Beef housing, high mechanization beef feeding capacity, and portable hog feeding and farrowing facilities were added to handle the extra livestock. Both short and long-term credit were used much more extensively than in the base situation. Most of the credit used was for purchasing land, building beef and hog facilities, and purchasing livestock.

Variations in price from historical ratios caused the most divergent results on this type and size farm of any in the study. Though all of the available land was purchased, land rentals showed little of the relation to price found in other parts of the study. Credit use did not follow the normal pattern either.

When beef cattle were priced high relative to hogs, cattle feeding became the dominant but not the only livestock enterprise. At MLM 15 litters of pigs were farrowed and at MMH 89 litters were farrowed. The cattle enterprise consisted of 285 head at MLM and 264 head at MMH of steers fed on high mechanization facilities. The long-term credit needs were similar and as usual greater than the MMM credit needs. However, the short-term credit needs for MLM and MMM approximated one another, but short-term credit needs for MMH were roughly four times as large. This was due to the large additions of hog feeding and farrowing facilities. At MLM prices all the rentable land was used, but at MMH only nine acres were rented. The same quantities of labor were hired at both sets of prices.

When hogs were priced high relative to beef, land usually was not rented to the extent permitted. Only 68 acres of land were rented at MML prices and no land was rented at MHM prices. The use of spring and fall hired labor to their limits could account for no land rented since this indicates there was insufficient labor available to utilize all available land. Beef cattle did not enter the solution, but hog production was expanded along with farrowing and feeding facilities. Credit use was lower relative to plans including beef production.

When all three variable prices were raised or lowered together, the quantity of land rented declined at the higher prices. This is the result of expanded livestock production which utilized all available labor in two seasons. The cattle enterprise was larger with HHH prices and the hog enterprise got progressively larger with higher prices, as did the use of credit. With labor limited the livestock enterprises could not be expanded if all available land was rented.

### Large Hog Farms in Northeast Missouri

There were 24 farms of this type. They typically operated about 600 acres of land of which 420 acres were cropland. They produced 104 acres of corn, 64 acres

TABLE 3 - OPTIMAL FARM ORGANIZATIONS FOR MEDIUM SIZE HOG FARMS  
IN NORTHEAST MISSOURI

	Prices for Corn, Hogs, and Beef Cattle*						
	LLL	MLM	MML	MMM	MMH	MHM	HHH
Gross Profit	15897	20476	22923	23993	30340	33886	32795
Corn-Acres	133	131	120	129	89	91	100
Corn Silage-Acres	-	2	-	-	6	-	--
Corn Purchased-Cwt.	3998	4115	5145	5340	9719	7633	8465
Oats-Acres	40	7	49	37	-	24	-
Wheat-Acres	27	27	25	27	21	20	22
Soybeans-Acres	98	98	92	96	63	80	84
Rotation Meadow-Acres	35	68	6	35	64	7	41
Hay Harvested-Tons	89	189	-	89	171	-	104
Perm. Pasture Fert.-Acres	-	127	-	-	127	-	22
Calves Bought-Feeders	132	285	-	132	264	-	155
Calves Fed in Dry Lot-Head	-	22	-	-	-	-	-
Calves Fed on Pasture-Head	132	263	-	132	264	-	155
Total Cattle Fed-Number	132	285	-	132	264	-	155
Litters of Hogs-Quarter 1	50	-	54	48	13	55	51
Litters of Hogs-Quarter 2	-	-	23	-	-	44	-
Litters of Hogs-Quarter 3	-	-	46	21	-	39	27
Litters of Hogs-Quarter 4	50	15	54	48	76	55	51
Total Litters Produced	99	15	178	116	89	195	129

Beef Housing Built-Head	50	149	-	50	135	-	65
High Mech. Beef Cap. Built-Head	132	285	-	132	265	-	155
Central Farrowing Cap. Built-Sows	-	-	-	-	-	24	-
Port Farrowing Cap. Built-Sows	35	-	39	33	61	16	36
Port Pig Feeding Cap. Built-Pigs	673	-	745	647	597	767	696
Short Term Funds Borrowed-\$	5389	9168	-	9466	36830	4341	19808
Long Term Funds Borrowed-\$	42785	51947	36748	42824	50744	41292	44155
Hire Spring Labor-Hours	65	79	-	66	79	45	69
Hire Summer Labor-Hours	-	-	-	-	-	45	10
Hire Fall Labor-Hours	-	-	79	13	-	34	-
Land Renting-Acres	100	100	68	89	9	-	22
Land Buying on Contract-Acres	98	98	98	98	98	98	98

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\*L = Low, M = Medium, and H = High Prices

of soybeans, 11 acres of oats, 22 acres of wheat and 52 acres of hay. The hog enterprise averaged 43 sows with 621 pigs. Their farrowing facilities were both central and portable and their finishing facilities were pasture. They typically had a cow beef herd with about 36 cows. Total debts were \$13,125 leaving \$57,229 in total capital available. This debt-asset relationship is favorable for acquiring funds for adjustment.

The optimum plan at all price levels made maximum use of the land acquisition activities (Table 4). At MMM prices this land was used to expand the grain acreages. Soybean acreage was nearly double and corn acreage was more than doubled. Oats increased five times the original acreage, but from a relatively low base. The beef cow herd was increased to 76 cows and the 60 head of calves produced were fed out. Hog production was increased to 171 litters. These increases in livestock production necessitated the addition of 72 units of beef housing, 57 units of portable farrowing capacity and 1,114 units of portable pig feeding capacity. These income increasing adjustments call for greatly expanded levels of capital which could be acquired by borrowing. However, in none of the situations was hired labor used.

With beef prices high relative to hog prices, the farms crop activities were quite similar to those at the MMM prices except that forage crops replaced the oats. However, at MLM prices 473 steers were fed out while only 463 were fed at MMH prices and no hogs were raised at MLM prices, but 28 litters were farrowed at MMH prices. High mechanization cattle feeding facilities were added at MLM but at MMH prices 75 percent of the facilities built were of the low mechanization type. Credit use was more extensive at the MLM prices because of the greater total expansion in the livestock enterprise. At both sets of prices considerably more credit was used than at the MMM prices because of feeder cattle purchases.

When hogs were relatively high-priced the farm organizations were quite similar to those at other price levels with respect to crops grown, but less meadow was raised and no beef cattle enterprises were in the solutions. A few more pigs were farrowed at the MLM prices than at the MML prices and at MML prices 33 more units of farrowing capacity and 520 more units of feeding capacity were built than was added at the MHM prices. Farrowing was in only two quarters at the lower price but in three quarters at the higher price which allowed more efficient use of the facilities. This also was the main cause of the large difference in the credit requirements.

When the variable prices were raised simultaneously, the results were similar to raising hog prices alone, except that beef was not completely eliminated. The hog enterprises grew progressively larger as prices increased. The farrowing practices at LLL and MMM prices were similar to those of MML prices and those at HHH prices similar to those at MHM.

TABLE 4- OPTIMAL FARM ORGANIZATIONS FOR LARGE HOG FARMS  
IN NORTHEAST MISSOURI

Prices for Corn, Hogs, and Beef Cattle\*

	LLL	MLM	MML	MMM	MMH	MHM	HHH
Gross Profit	31526	38899	43268	43891	52439	56434	56398
Corn-Acres	247	239	247	247	241	247	247
Corn Silage-Acres	-	8	-	-	6	-	-
Corn Purchased-Gwt.	1152	4369	1667	1355	5698	2401	1919
Oats-Acres	50	-	104	50	-	102	49
Wheat-Acres	55	55	55	55	55	55	55
Soybeans-Acres	124	124	124	124	124	124	124
Rotation Meadow-Acres	61	111	8	61	111	9	63
Hay Harvested-Tons	155	312	-	155	309	-	155
Perm. Pasture Fert.-Acres	-	192	-	-	192	-	-
Beef Cows-Head	76	-	-	76	-	-	76
Calves Bought-Feeders	-	473	-	-	463	-	-
Calves Fed in Dry Lot-Head	-	76	-	-	66	-	-
Calves Fed on Pasture-Head	60	397	-	60	397	-	60
Total Cattle Fed-Number	60	473	-	60	463	-	60
Litters of Hogs-Quarter 1	84	-	111	85	28	78	60
Litters of Hogs-Quarter 2	-	-	-	-	-	78	60
Litters of Hogs-Quarter 4	84	-	111	85	-	78	60
Total Litters Produced	168	-	222	171	28	235	181
Beef Housing Built-Head	72	263	-	72	257	-	72
Low Mech. Beef Cap. Built-Head	-	-	-	-	300	-	-
High Mech. Beef Cap. Built-Head	60	473	-	-	93	-	-
Port Farrowing Cap. Built-Sows	56	-	83	57	-	50	32
Port Pig Feeding Cap. Built-Pigs	1117	-	1555	1144	-	1031	741
Short Term Funds Borrowed-\$	27425	47024	22264	27765	46682	17444	24059
Long Term Funds Borrowed-\$	39499	60228	34151	37948	51317	34151	37948
Land Renting-Acres	100	100	100	100	100	100	100
Land Buying on Contract-Acres	98	98	98	98	98	98	98

\*L = Low, M = Medium, and H = High Prices

### Small Mixed Livestock Farms in North-Central Missouri

There were 18 farms in the small mixed livestock group. The typical farm operation in 1962 was comprised of 194 acres, of which 95 acres were cropland. The wheat allotment was 5.2 acres and the feed grain base was 27 acres. On the typical farm 11.5 acres of corn were raised along with 11 acres of soybeans and 31 acres of hay crops. Typically four sows were kept and 32 pigs fed out. The beef enterprise consisted of 11 cows with the calves sold as feeders. On some farms steers were purchased and these were either sold as stockers or fed out. Total capital available was over \$18,000, providing for possible acquisition of funds for adjustments.

In the optimum plans, at all prices (Table 5) all the land available was acquired by purchase under contract and by rental. At MMM prices the corn acreage was increased to 77 acres, oats to 40 acres, wheat to 25 acres, and soybeans to 90 acres. Pigs farrowed were increased to 84 litters, requiring the addition of 25 units of farrowing facilities and 465 units of portable pig feeding capacity. Cattle fed out increased to 33 head and 8 additional units of beef housing were built. The beef cow herd was increased to 15 head, providing part of the calves fed out. In this situation no seasonal labor was hired. The optimal would increase income considerably, but large amounts of credit must be used to make the adjustments which converted the farm primarily to a hog-producing operation.

When beef cattle were priced high relative to hogs, cattle feeding enterprises became the main source of income. Hog enterprises were eliminated at the MLM prices and only seven litters were produced at the MMH prices. Both high and low mechanization beef feeding facilities were used. More debt was required at these prices than at the medium price levels as a result of using more purchased feeder cattle.

With hog prices high relative to beef prices, hog production increased and beef cattle were dropped from the plans. The amount of borrowed funds also was less at both price combinations than at MMM prices or when beef prices were relatively high. Without beef cattle less forages were required and oats replaced meadow crops in the rotation.

When corn, hog, and beef prices were varied simultaneously in the same direction, the resultant plans were similar to those with all medium prices. However, at the LLL price levels the beef enterprises were de-emphasized somewhat with fewer purchased calves fed out. The HHH organization was practically identical to the MMM organization, only with a higher income. Credit use was about the same for both the LLL, MMM, and HHH price solutions.

### Medium-Size Mixed Livestock Farms in North-Central Missouri

There were seventeen medium-size mixed livestock farms for North-Central Missouri and in 1962 they had an average of 253 acres with 142 acres of cropland. The wheat allotment was 11.8 acres and the feed grain base was 46 acres. They averaged 30 acres of corn, 39 acres of soybeans, 3 acres of oats, 5 acres of wheat and 35 acres of hay crops. A small surplus of corn was produced by the repre-

TABLE 5- OPTIMAL FARM ORGANIZATIONS FOR SMALL MIXED LIVESTOCK FARMS  
IN NORTH-CENTRAL MISSOURI

Prices for Corn, Hogs, and Beef Cattle\*

	LLL	MLM	MML	MMM	MMH	MHM	HHH
Gross Profit	8278	11128	12692	13009	16784	18112	17838
Corn-Acres	77	77	77	77	77	77	77
Corn Purchased-Cwt.	1671	2951	1508	1756	3014	1766	1756
Oats-Acres	45	9	46	40	11	44	40
Wheat-Acres	25	25	25	25	25	25	25
Soybeans-Acres	9	9	9	9	9	9	9
Rotation Meadow-Acres	9	45	8	13	42	10	13
Hay Harvested-Tons	19	134	16	31	127	19	31
Perm. Pasture Fert.-Acres	-	50	-	-	42	-	-
Beef Cows-Head	8	-	11	15	-	13	15
Calves Bought-Feeders	3	200	-	-	189	-	-
Calves Fed on Pasture-Head	10	200	-	12	189	-	12
Total Cattle Fed Number	10	200	-	12	189	-	12
Litters of Hogs-Quarter 1	42	-	44	33	-	31	33
Litters of Hogs-Quarter 2	-	-	-	19	-	31	19
Litters of Hogs-Quarter 4	42	-	44	33	7	31	33
Total Litters Produced	84	-	88	85	7	93	85
Beef Housing Built-Head	-	115	-	8	108	-	8
Low Mech. Beef Feed Cap. Built-Head	-	84	-	-	90	-	-
High Mech. Beef Feed Cap. Built-Head	-	90	-	-	73	-	-
Port Farrowing Facilities Built-Sows	35	-	37	26	-	24	26
Port Pig Feeding Cap. Built-Pigs	622	-	644	465	-	433	465
Short Term Funds Borrowed-\$	12268	21234	12529	11359	20407	10894	11359
Long Term Funds Borrowed-\$	9625	19763	9625	10049	18753	9625	10049
Hire Spring Labor-Hours	-	59	-	-	61	-	-
Hire Summer Labor-Hours	-	33	-	-	30	-	-
Land Renting-Acres	34	34	34	34	34	34	34
Land Buying on Contract-Acres	75	75	75	75	75	75	75

\*L = Low, M = Medium, and H = High Prices

TABLE 6- OPTIMAL FARM ORGANIZATIONS FOR MEDIUM MIXED LIVESTOCK FARMS  
IN NORTH-CENTRAL MISSOURI

Prices for Corn, Hogs, and Beef Cattle\*

	LLL	MLM	MML	MMM	MMH	MHM	HHH
Gross Profit	10655	13115	15197	15636	18366	21232	21091
Corn-Acres	61	61	61	61	61	61	61
Corn Purchased-Cwt.	2085	1510	2626	2085	2365	2905	2357
Oats-Acres	47	7	75	47	20	75	51
Wheat-Acres	21	21	21	21	21	21	21
Soybeans-Acres	48	48	48	48	48	48	48
Rotation Meadow-Acres	31	71	3	31	58	3	24
Hay Harvested-Tons	87	213	-	87	174	-	66
Perm. Pasture Fert.-Acres	-	119	-	-	119	-	-
Beef Cows-Head	49	91	-	49	53	1	34
Calves Bought-Feeders	-	37	-	-	101	-	-
Calves Sold-Feeders	19	-	-	19	-	2	-
Calves Fed on Pasture-Head	20	74	-	20	143	-	26
Calves Fed in Dry Lot-Head	-	35	-	-	-	-	-
Total Cattle Fed Number	20	108	-	20	143	-	26
Litters of Hogs-Quarter 1	37	9	51	37	9	36	40
Litters of Hogs-Quarter 2	-	-	-	9	-	36	-
Litters of Hogs-Quarter 4	37	-	51	28	-	36	40
Total Litters Produced	74	9	102	74	9	108	80
Beef Housing Built-Head	45	144	-	45	128	-	29
High Mech. Beef Feed Cap. Built-Head	-	89	-	-	123	-	-
Port Farrowing Facilities Built-Sows	28	-	42	28	-	27	31
Port Pig Feeding Cap. Built-Pigs	52	-	742	522	-	479	546
Short Term Funds Borrowed-\$	14846	17928	10794	14846	18432	8629	13238
Long Term Funds Borrowed-\$	13670	22425	11301	13671	22952	11701	13556
Land Renting-Acres	34	34	34	34	34	34	34
Land Buying on Contract-Acres	75	75	75	75	75	75	75

\*L = Low, M = Medium, and H = High Prices

sentative farm. The typical farm had 7 sows and 64 pigs were fed out. Central farrowing facilities were used and the pigs were finished on dry lot. A 16 cow beef herd was kept with most of the calves sold as feeders. The farms generally were better equipped mechanically than small farms of the same type. Total debt averaged \$6900 and total capital available was about \$21,300. This is a favorable but not an exceptionally strong asset position.

Under the computed optimal plans the maximum land acreage allowed was acquired in all price situations (See Table 6). At MMM prices corn production was expanded to 61 acres, oats to 47 acres, wheat to 21 acres, and soybeans to 48 acres. A 49 cow beef herd was kept with 19 calves sold as feeders and the remainder fed out. Forty-seven litters of pigs were farrowed and this increased pig production necessitated the addition of 28 units of portable farrowing facilities and 522 units of portable pig feeding capacity. The expansion of land use and the addition of hog facilities required extensive use of credit.

At price combinations favorable for beef relative to hogs, little pork was produced. The beef cow herd was nearly doubled at MLM prices and slightly increased at MMH. However, 37 calves were purchased at MLM prices and 101 calves were purchased at MMH prices. Larger amounts of corn were purchased than at MMM prices. Extensive use of credit was needed to finance these operations due to the feeder cattle purchases. As could be expected, the MLM yielded a lower income than the MMM prices and the MMH a higher income.

With favorable price combinations for hogs, oats were substituted for most of the forage crops and corn purchases were larger. This can be attributed to the fact that about 50 percent more litters of pigs were raised. No beef production activities entered the solutions and the use of credit was less than for the other price combinations reported on in this bulletin.

A shift in prices to LLL had no effect on the farm organization relative to the MMM solution. However, when all prices were raised together the same effect as raising hog prices resulted although not carried to the same extent. It brought about a 30 percent reduction in the cow herd, farrowings were increased and hog feeding and farrowing facilities were expanded.

### Large Mixed Livestock Farms in North-Central Missouri

The 17 large mixed livestock farms averaged 524 total acres with 343 acres of cropland in 1962. The feed grain base was 99 acres and the wheat allotment was 24 acres. In that year 80 acres of corn, 59 acres of soybeans, 10 acres of oats, 15 acres of wheat and 37 acres of forage crops were raised. The typical farm had net corn sales of 900 bushels. Fifteen sows were kept and 181 pigs fed out. An average of 34 beef cows were kept and some farms sold feeder calves while others purchased some to feed out with those raised. The farms were generally well mechanized with three-plow and two-row equipment. Total assets were \$56,052 and total debts were \$6968, a good position to acquire funds for adjustments.

In the optimum solutions at all price levels but one (Table 7), all the land available was acquired. At MMM prices the corn acreage was increased to 135

TABLE 7 - OPTIMAL FARM ORGANIZATIONS FOR LARGE MIXED LIVESTOCK FARMS  
IN NORTH-CENTRAL MISSOURI

	Prices for Corn, Hogs, and Beef Cattle*						
	LLL	MLM	MML	MMM	MMH	MHM	HHH
Gross Profit	17547	22630	23841	24918	30091	33041	32468
Corn-Acres	135	135	135	135	116	135	135
Corn Purchased-Cwt.	1385	1221	3180	1568	3261	4151	4542
Oats-Acres	119	97	51	117	84	-	-
Wheat-Acres	36	36	36	36	31	36	36
Soybeans-Acres	74	74	74	74	76	74	74
Rotation Meadow-Acres	35	57	5	37	58	5	35
Hay Harvested-Tons	100	172	-	105	171	-	97
Perm. Pasture Fert.-Acres	-	77	-	-	76	-	-
Calves Bought-Feeders	149	256	-	157	256	-	145
Calves Fed on Pasture-Head	149	256	-	157	256	-	145
Total Cattle Fed Number	149	256	-	157	256	-	145
Litters of Hogs-Quarter 1	32	-	51	31	-	56	46
Litters of Hogs-Quarter 2	-	-	-	-	-	13	-
Litters of Hogs-Quarter 3	-	-	51	-	-	35	-
Litters of Hogs-Quarter 4	32	-	51	31	18	56	46
Total Litters Produced	64	-	154	62	18	161	93

Beef Housing Built-Head	63	133	-	68	132	-	60
High Mech. Beef Feed Cap. Built-Head	149	256	-	157	256	-	145
Port Farrowing Facilities Built- Sows	14	-	33	13	-	38	28
Port Pig Feeding Cap. Built-Pigs	364	-	678	352	-	755	599
Short Term Funds Borrowed-\$	-	4476	-	1175	9808	478	11248
Long Terms Funds Borrowed-\$	34494	42450	28696	35077	42400	25304	34234
Hire Spring Labor-Hours	105	102	14	114	110	95	183
Hire Summer Labor-Hours	133	178	71	142	169	4	21
Hire Fall Labor-Hours	21	-	195	24	1	181	77
Land Renting-Acres	34	34	34	34	-	34	34
Land Buying on Contract-Acres	75	75	24	75	75	75	75
Land Buying on Mortgage-Acres	-	-	51	-	-	-	-

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\*L = Low, M = Medium, and H = High Prices

acres, but additional corn also was purchased. The oats acreage was increased to about 117, wheat to 35, soybeans to 74 and rotation meadow to 37. Total cattle fed out amounted to 157 head requiring additional units of beef housing and high mechanization beef feeding facilities. Hog production was increased to 62 litters requiring more farrowing and pig feeding capacity. Capital use was extensive but the funds available for borrowing were not completely utilized.

At the MMH price levels the beef feeding enterprise was increased greatly but no land was rented. This can be attributed to a lack of labor which would not permit the large expansion in both cattle feeding and the acreage handled. Aside from that, the solutions for MLM and MMH prices were similar. The crop acres of the MMH prices were less because land was not rented. The number of steers fed were identical but hogs were raised with MMH prices and not with MLM prices. Much more capital was used when beef cattle were priced high relative to hogs than at the MMM price levels.

When hogs were priced high relative to beef, no beef cattle entered the solution. Also, no hay was harvested. A larger number of hogs were raised at MHM than at MML prices and corn purchases were larger at MHM prices. The oats harvested at MML prices were a factor in this, as were the larger hog enterprises. No short-term credit was used at the MML price levels and only a small amount at MHM. Credit use was lower relative to enterprises emphasizing beef cattle. It should be noted that although all the land available was acquired at these two price levels, land was purchased by both mortgage and contract; whereas, for most other representative farms only contract purchases were utilized. The use of a mortgage in land purchase can be attributed to a surplus of long-term funds.

When all prices fell together the effect upon the cropping system relative to that at MMM prices was negligible. All the land available was acquired, as it was when prices rose. The size of the beef cattle enterprise decreased and hog production increased slightly. A general rise in prices resulted in oats leaving the solution and corn purchases increasing. The beef enterprise was reduced slightly but hog production increased considerably. A large quantity of short-term credit was used but long-term credit use was equal to that at the LLL and MMM prices.

### **Small Cash Grain Farms in Northwest Missouri**

There were eight survey farms in this group, with an average size of 153 acres in 1962. They had an acreage of 121 acres of cropland. The feed grain base was 44 acres and the wheat allotment 20 acres. Twenty-six acres of corn and two acres of corn silage were grown. Also, 15 acres of soybeans and 11 acres of wheat were raised, but no oats were included in the typical organization. Normally some corn as well as beans and wheat were sold. An average of four sows were kept with 18 pigs farrowed. The farms were well equipped with crop handling machinery. Their total assets were \$30,035 and total debts were \$8487.

The optimum plans at all price levels resulted in acquisition of all the land permitted, both by purchase and rental (See Table 8). At MMM prices this was used to expand the acres grown to 91 for corn, 45 for wheat, 45 for soybeans, and 9 for rotation meadow. No corn was purchased or oats raised. No beef cows were kept, but 38 head of steers were purchased and fed out. This required the addition of three units of beef housing. Forty-two litters of pigs were farrowed and this created a need for 12 units of portable farrowing capacity and 207 units of portable pig feeding capacity. Extensive use of credit was required for these adjustments, but could be borrowed using the farm's equity as security.

With prices favorable to beef relative to hogs, cattle feeding became the dominant enterprise and no beef cows were kept. Hogs were never completely eliminated from the organization, but only two litters were raised at each price combination. Meadow acreages were increased and permanent pastures were improved to meet the forage requirements. Also, the rotations provided enough grain so that no corn was purchased. High and low mechanization feeding facilities were used with the MLM prices and low mechanization facilities with the MMH prices. Considerably more credit was used than at MMM prices, due to the cost of financing the cattle feeding enterprise.

When hogs were priced high relative to beef, that is with the MML and MMH price combinations, beef cattle were eliminated from the solutions. The organizations at those two sets of prices were identical. Less grain was produced than with MMM prices and no hay was harvested. Pig farrowing was increased by 17 litters over the MMM solution and additional portable feeding and farrowing facilities were required in both situations.

The HHH, LLL, and MMM results were similar. Some differences were found in the number of animals produced, the quarters in which hogs were farrowed, and the amount of short-term funds borrowed. Minor differences also occurred in the acreage of crops grown. Calves fed increased from 34 head at LLL to 72 head at HHH prices. However, at LLL prices 39 litters of pigs were farrowed and at HHH 31 were produced. With LLL prices all pigs were farrowed in the first and fourth quarters, while at MMM and HHH prices, farrowings were divided evenly between the first, second, and fourth quarters. Credit use increased as prices rose as a result of the expanded cattle feeding operation.

### Medium-Size Cash Grain Farms in Northwest Missouri

The average 1962 size of the 14 farms in medium-size cash grain group was 251 acres of which cropland amounted to 166 acres. Wheat allotments averaged 23 acres and the feed grain base was about 70 acres. In 1962 crops produced were: corn, 50 acres; soybeans, 38 acres; oats, 4 acres; wheat, 18 acres; and grain sorghums, 9 acres. Typically, about 1,500 bushels of corn was sold. A small hog enterprise and a beef cow herd with feeder calves also were enterprises on the typical farm. A few steers were purchased and fed out. The typical farm was well equipped for field work and the debt to asset ratio was low.

Optimally, at all price levels, all the land allowed was purchased and rented

TABLE 8 - OPTIMAL FARM ORGANIZATIONS FOR SMALL CASH GRAIN FARMS  
IN NORTHWEST MISSOURI

Prices for Corn, Hogs, and Beef Cattle \*

	LLL	MLM	MML	MMM	MMH	MHM	HHH
Gross Profit	12443	14805	15271	15899	18750	18684	19688
Corn-Acres	76	91	78	91	91	78	91
Corn Purchased-Cwt.	-	-	-	-	343	-	-
Wheat-Acres	45	45	39	45	45	39	45
Soybeans-Acres	62	29	45	45	27	45	39
Rotation Meadow-Acres	8	25	2	9	27	2	15
Hay Harvested-Tons	23	86	-	25	93	-	48
Perm. Pasture Fert.-Acres	-	27	-	-	35	-	-
Calves Bought-Feeders	34	128	-	38	139	-	72
Calves Fed on Pasture-Head	34	128	-	38	139	-	72
Total Cattle Fed Number	34	128	-	38	139	-	72
Litters of Hogs-Quarter 1	20	2	20	14	2	20	10
Litters of Hogs-Quarter 2	-	-	20	14	-	20	10
Litters of Hogs-Quarter 4	20	-	20	14	-	20	10
Total Litters Produced	40	2	60	42	2	60	30
Beef Housing Built-Head	-	61	-	3	68	-	25
Low Mech. Beef Feed Cap. Built-Head	-	25	-	-	101	-	34
High Mech. Beef Feed Cap. Built-Head	-	64	-	-	-	-	-
Port Farrowing Cap. Built-Sows	18	-	18	12	-	18	8
Port Pig Feeding Cap. Built-Pigs	299	-	301	207	-	300	152
Short Term Funds Borrowed-\$	-	14129	6693	8817	15121	6698	11091
Long Term Funds Borrowed-\$	6401	12341	6401	6544	10623	6401	7906
Land Renting-Acres	47	47	47	47	47	47	47
Land Buying on Contract-Acres	108	108	64	108	108	64	108

\*L = Low, M = Medium, and H = High Prices

(See Table 9). With MMM prices, crop acreages were increased to 106 acres of corn, 15 acres of oats, 39 acres of wheat, 93 acres of soybeans, and 99 acres of rotation meadows. Twenty-six calves were purchased and fed out with pig farrowings increased to 140 litters. These increases in the livestock enterprises required the addition of 26 units of high mechanization beef feeding facilities, 61 units of portable pig farrowing capacity, and 1,050 units of portable pig feeding facilities. Seasonal labor was hired in the spring. Credit was used quite extensively and a considerable debt increase was necessary to achieve the optimal income.

When beef cattle were priced high relative to hogs, the farms became primarily cattle feeding operations. There were 208 head of cattle fed at both price levels, with 18 litters of pigs farrowed at MLM and 52 litters farrowed at MMH prices. The addition of the large hog enterprise at the MMH prices required a large quantity of purchased corn and the addition of extra feeding and farrowing facilities. The purchased calves were fed on pasture and because of the large cattle feeding enterprises credit use increased by a large amount relative to plans without cattle feeding.

When hogs were priced high relative to beef, cattle feeding was completely eliminated from the solutions, making the farms specialized hog operations. The two price situations favoring hogs had nearly identical credit needs, indicating the over-all similarity between the organizations. The acres used for meadow in the high beef price solutions were converted to oats and soybean production for the plans with hogs.

When corn, hog, and beef prices shifted up or down together, the farm organizations were quite similar to the solutions at MMM prices. The significant differences were that the livestock enterprises were larger with HHH prices and pig farrowing was spread over the first, second, and fourth quarters with HHH prices instead of in the first and fourth quarters as at LLL prices. Also, approximately twice the amount of spring labor was hired at HHH prices than at LLL prices.

### Large Cash Grain Farms in Northwest Missouri

The 19 large cash grain farms had an average of 457 acres of which 353 acres were cropland in 1962. A 49 acre wheat allotment and 168 acre feed grain base were available for the representative farm. Crops grown included 114 acres of corn, 94 acres of soybeans, 2 acres of oats, 35 acres of wheat and 16 acres of forages. Net sales of corn amounted to about 4,200 bushels. Four sows were kept and 23 pigs farrowed in 1962 and a beef herd of about 12 cows was maintained with the calves sold as feeders. Total capital available was not as great as on the medium-size farms of this type but, the situation was still favorable, with \$25,209 in total capital available. Both the average assets and debts were higher than was typical for medium-size farms.

In the optimal plans, at all price levels used, the maximum amount of land was acquired (Table 10). At MMM prices the crops grown were: 198 acres of

TABLE 9 - OPTIMAL FARM ORGANIZATIONS FOR MEDIUM CASH GRAIN FARMS  
IN NORTHWEST MISSOURI

Prices for Corn, Hogs, and Beef Cattle\*

	LLL	MLM	MML	MMM	MMH	MHM	HHH
Gross Profit	16204	18119	23421	23501	26752	32284	30884
Corn-Acres	106	106	106	106	106	106	106
Corn Purchased-Cwt.	4194	2861	4103	4194	4915	4251	4452
Oats-Acres	15	-	20	15	-	20	15
Wheat-Acres	39	39	39	39	39	39	39
Soybeans-Acres	-	77	93	93	76	93	93
Rotation Meadow-Acres	9	41	4	9	42	5	9
Hay Harvested-Tons	18	141	-	18	141	-	18
Perm. Pasture Fert., -Acres	-	93	-	-	93	-	-
Calves Bought-Feeders	25	210	-	25	210	-	26
Calves Fed on Pasture-Head	26	210	-	26	210	-	26
Total Cattle Fed Number	26	210	-	26	210	-	26
Litters of Hogs-Quarter 1	70	9	69	70	26	62	62
Litters of Hogs-Quarter 2	-	-	15	-	-	32	20
Litters of Hogs-Quarter 4	70	9	69	70	26	62	62
Total Litters Produced	140	18	153	140	52	156	144
Beef Housing Built-Head	-	120	-	-	120	-	-
High Mech. Beef Cap. Built-Head	26	210	-	26	186	-	9
Port Farrowing Cap. Built-Sows	61	-	60	61	17	53	53
Port Pig Feeding Cap. Built-Pigs	1050	72	1036	1050	346	918	923
Short Term Funds Borrowed-\$	18823	15179	16647	18823	26627	15552	17710
Long Term Funds Borrowed-\$	25934	39575	24922	25934	38628	24922	25282
Hire Spring Labor-Hours	42	-	72	42	80	120	120
Land Renting-Acres	47	47	47	47	47	47	47
Land Buying on Contract-Acres	108	108	108	108	108	108	108

\*L = Low, M = Medium, and H = High Prices

TABLE 10 - OPTIMAL FARM ORGANIZATIONS FOR LARGE CASH GRAIN FARMS  
IN NORTHWEST MISSOURI

Prices for Corn, Hogs and Beef Cattle\*

	LLL	MLM	MML	MMM	MMH	MHM	HHH
Gross Profit	24262	28835	32166	32642	37091	40661	41334
Corn-Acres	173	198	188	198	198	188	195
Corn Purchased-Cwt.	-	128	-	-	262	-	-
Oats-Acres	21	-	24	20	-	24	20
Wheat-Acres	68	68	64	68	68	68	67
Soybeans-Acres	161	113	134	136	113	134	135
Rotation Meadow-Acres	9	53	5	10	53	5	10
Hay Harvested-Tons	19	179	-	19	179	1	19
Perm. Pasture Fert.-Acres	-	118	-	-	118	-	-
Calves Bought-Feeders	28	267	-	28	267	1	28
Calves Fed on Pasture-Head	28	267	-	28	267	1	28
Total Cattle Fed Number	28	267	-	28	267	1	28
Litters of Hogs-Quarter 1	61	7	49	45	7	49	44
Litters of Hogs-Quarter 2	-	-	49	45	-	49	44
Litters of Hogs-Quarter 3	-	-	-	-	-	-	7
Litters of Hogs-Quarter 4	61	5	49	45	7	49	44
Total Litters Produced	121	12	148	135	14	147	138
Beef Housing Built-Head	-	156	-	-	156	-	-
High Mech. Beef Cap. Built-Head	232	267	-	5	241	-	2
Port Farrowing Cap. Built Sows	54	-	42	38	-	42	37
Port Pig Feeding Cap. Built-Pigs	113	40	732	661	58	730	645
Short Term Funds Borrowed-\$	17886	38650	14229	15745	28766	14300	15668
Long Term Funds Borrowed-\$	16425	34329	15528	15740	33301	15528	15595
Hire Spring Labor-Hours	-	15	115	153	50	117	149
Hire Fall Labor-Hours	-	-	-	44	-	-	66
Land Renting-Acres	47	47	47	47	47	47	47
Land Buying on Contract-Acres	108	108	81	108	108	81	102

\*L = Low, M = Medium, and H = High Prices

corn, 20 acres of oats, 68 acres of wheat, 138 acres of soybeans, and 10 acres of rotation meadow. Twenty-eight calves were purchased and fed out. Hog production was increased to 135 litters requiring a large addition to the portable farrowing and pasture feeding facilities. Spring and fall labor was hired. Credit needs for these adjustments were large with about equal amounts coming from long term and short funds.

When beef cattle were priced high relative to hogs, beef became the dominant enterprise and at those price combinations corn was purchased to supplement the grain raised. The cropping systems were similar to the MMM organization except all oat land was used for forage production. A large number of feeder calves were purchased and fed out. Hogs remained in the solutions with 12 litters farrowed at MLM prices and 14 at MMH prices. The large quantities of purchased corn and feeder cattle required very extensive use of credit. Also, each required the addition of high mechanization beef feeding facilities and pasture pig feeding capacity.

The solutions with high hog prices relative to beef and corn prices were similar to those at MMM prices with respect to their cropping systems. However, at both sets of prices, MML and MHM, 147 litters of pigs entered the solutions requiring more units of portable farrowing capacity, and pig feeding capacity were added than at the MMM prices. Beef cattle were of no practical importance in the solution. The use of borrowed funds was quite similar in both plans with less used than for the other price combinations.

With LLL and HHH prices crop acreages varied only slightly from the solution with MMM prices. The same number of cattle were fed, but at LLL only 12 litters of pigs were farrowed compared with 135 at the medium and high price levels. At HHH prices pigs were farrowed in all four quarters, in three quarters at MMM, and in two quarters at LLL. At the higher this required the addition of farrowing and feeding facilities and consequently a more extensive use of borrowed funds. Because of the larger hog enterprises seasonal labor was hired in the spring and fall at MMM and HHH prices.

### UNLIMITED LAND PURCHASE

Some farm operators may be able to purchase more land than the average used for this study. To evaluate those cases the land purchase limit was expanded, with an additional 1000 acres made available. Solutions for the MMM price levels were computed. Land acquisition was expanded beyond the original limits in all cases (Table 11). For one, the large hog farm, the limit was purchased and for another, the large cash grain farm, the increase was very small. Land also was rented in three instances.

The expanded acreages provided for all feed grain requirements so that for all farm corn purchases were reduced to zero. For the three farms in the Northwest and the large farms in the North-Central area it was profitable to expand corn production beyond feed requirements and market corn for cash. The other

TABLE 11 - ACRES OF LAND WITH UNLIMITED CONTRACT PURCHASES

	Small		Medium		Large	
	Purchased	Rented	Purchased	Rented	Purchased	Rented
Northeast						
Hog	300	-	436	-	1098	-
North-Central						
Mixed Livestock	282	-	387	34	504	-
Northwest						
Cash Grain	235	47	379	-	120	47

major cropping change was an expansion in soybean acreages. In the Northeast area on the large farms, soybean production was increased by five times its acreage with land restricted to the 1962 base. There were smaller relative increases on the other representative farms.

Livestock enterprises were altered, farms in the Northeast area were almost completely converted to cattle production while those in the North-Central tended toward hogs on the small and medium-size farms and mixed livestock and grain on the large farms. In the Northwest area results were quite divergent. On the small farm steers were fed out and corn was sold, but on the medium-size farm only hogs were fed and no corn was sold. The livestock enterprise on the large farms was unchanged from the original solutions but some corn was sold.

From this it can be concluded that if land were available and acquired in large quantities, a general shift of emphasis could be expected. *Cattle feeding would become more important in the Northeast, hogs in the North-Central, and cash grain in the Northwest.* However, it should be emphasized that land acquisition of the size indicated would require the purchase of additional machinery and equipment on most farms and that these would require additional capital.

### LAND PURCHASED ON MORTGAGE

In the optimal solutions found in this study, land has been purchased on contract which requires considerably less initial capital than purchasing with a mortgage. To evaluate those situations in which land is not available for purchase under contract and must be purchased with a mortgage if at all, the base problem was recomputed with only mortgage purchases and renting possible. Because the solutions with purchases under contract were the optimal organizations, those using mortgages were less profitable. Solutions were obtained for MMM prices and will be discussed relative to the original solutions of this study.

The solutions showed no uniformity of results by area; however, farms of the same size in different areas yielded similar results. The small farms because of

limited credit were forced to reduce land purchases while increasing the amount of borrowed capital used. The land rental activity was fully utilized. Livestock production generally declined, cattle numbers declined 30 percent, and hogs 10 percent, as did the amount of corn purchased.

The medium-size farms maintained the size of their acquisitions, but in the face of increased capital needs for land, livestock production was reduced about 16 percent. Accompanying the decline in livestock production was a reduction in corn purchases. The reduction in capital requiring livestock and corn purchasing allowed the addition of the maximum amount of land.

The large farms expanded the use of borrowed capital and for all but those in the northwestern area all allowed land was acquired. The cattle feeding enterprise did not decline in the North-Central and Northwest area but did in the Northeast area. The hog activities were reduced in the Northeast and Northwest areas but remained constant in the North-Central area. Because all livestock production declined in the Northeast area, corn purchases declined while remaining unchanged in the other areas where little or no corn was purchased.

Although purchasing land on mortgage rather than contract was less profitable, it was found to be superior to no expansion at all. It usually required more borrowed capital while reducing livestock production and corn purchases. On many farms, especially those with extensive capital assets, the adjustments required from forcing mortgage purchases were minor.

### PLANS WITH NO LAND ACQUISITION

Optimal plans for the representative farms used for this study previously were computed with land fixed at the base acreage. The results of those computations are published in Missouri Agricultural Experiment Station Bulletins 872, 886, and 890. The main characteristics of those plans are compared with the results of this study in Table 12. Identical models were used except that land acquisition was not permitted in the original study, feeder pig alternatives are not included, and a reservation price was placed on the operators' labor in the model used for the current study.

All the solutions with land acquisition permitted have higher incomes than the plans with land fixed. The original size of farm did not seem to affect the amount by which income was increased, but the area in which a farm is located was a factor with those in Northwest Missouri experiencing the greatest increases and those in North-Central Missouri the smallest. The farms with the greatest increases in income increased their use of credit over that with land fixed. The farms in the Northwest area increased their cattle feeding enterprises which accounts for the increased credit use. This area also has the best land and greater quantities of other resources which results in superior income levels.

Livestock enterprise levels in the plans with increased acreages were almost the same as in the plans with land limited although sizable shifts would occur for individual farms. In the Northeast area on the small farms, hogs and fed cat-

TABLE 12 - OPTIMIZATION COMPARISONS WITH AND WITHOUT LAND PURCHASE AT MMM PRICES

Northeast Missouri Hog Farms						
	Without Land Purchase			With Land Purchase		
	Small	Medium	Large	Small	Medium	Large
Income (\$)	9304	21977	35458	13596	23992	43891
Capital Borrowed (\$)	22068	56628	63948	21859	52290	65715
Acres of Land	160	291	599	358	479	797
Calves Fed Out (Head)	22	97	97	41	132	60
Litters of Pigs Farrowed	56	164	164	83	116	170
Corn Purchased (Cwt.)	2934	10064	5023	377	5340	1355
North-Central Mixed Livestock Farms						
	Without Land Purchase			With Land Purchase		
	Small	Medium	Large	Small	Medium	Large
Income (\$)	10231	13451	23067	13009	15636	24918
Capital Borrowed (\$)	24423	26672	45137	21408	31217	36252
Acres of Land	194	253	524	303	362	633
Calves Fed Out (Head)	28	20	150	12	20	157
Litters of Pigs Farrowed	57	76	74	84	74	62
Corn Purchased (Cwt.)	3315	3478	5648	1756	2085	1568
Northwest Missouri Cash Grain Farms						
	Without Land Purchase			With Land Purchase		
	Small	Medium	Large	Small	Medium	Large
Income (\$)	8992	19759	28690	15899	23501	32642
Capital Borrowed (\$)	16162	42448	32003	15361	44757	31485
Acres of Land	153	251	457	309	407	613
Calves Fed Out (Head)	12	8	12	38	26	28
Litters of Pigs Farrowed	44	143	128	42	140	135
Corn Purchased (Cwt.)	1434	6371	1909	-	4194	-

tle both increased considerably. On the medium-size farms of this area, cattle feeding was increased at the cost of 30 percent of the pig farrowings, but on the large farms the hog production was increased while beef cattle feeding declined. Major changes on the representative farms in the North-Central area were made in the livestock enterprises only on the small and large farms. In the first instance hog production was increased and beef production was decreased. In the latter case steers fed were increased slightly while the hog enterprise was reduced. In the Northwest area beef cattle fed out more than doubled on all three farm sizes. On the small and medium-size farms pig farrowing was reduced slightly but on the large farms was increased a little. With increased farm sizes the relative livestock production, i.e., production per acre, decreased.

One of the most significant differences was found in corn purchases. In all cases corn purchases were reduced with the reduction ranging from 30 percent to 100 percent. The increased acreage permitted a higher level of corn production and permitted the general increase in livestock production. It was less expensive and used less credit to acquire land to grow additional feed than to buy feeds. The credit made available from reducing corn purchases was used to expand livestock which caused the increase in income. Although credit use increased for some farms, credit use per dollar of income declined in all solutions with the acreages expanded beyond the base situation limits (See Table 13). Thus, where land is available for purchase or rent it will usually be more profitable for an individual farm to expand by enlarging the acreage operated rather than by purchasing extra feed.

TABLE 13 - AMOUNT OF CREDIT USED PER DOLLAR OF INCOME\*

	Income	
	Without Land Acquisition (Dollars)	With Land Acquisition (Dollars)
Northeast Area		
Small	2.37	1.61
Medium	2.58	2.18
Large	1.80	1.50
North Central Area		
Small	2.39	1.70
Medium	1.98	1.32
Large	1.96	1.63
Northwest Area		
Small	1.69	0.97
Medium	2.15	1.85
Large	1.12	0.96

\*Income is net of the variable costs for purchased feed, fertilizer, fuel, machinery and equipment repairs, veterinarian services, miscellaneous supplies, interest on borrowed funds, taxes on livestock, wages for seasonal labor and custom machine work.

## SUMMARY AND CONCLUSIONS

This study determined the optimum combination of enterprises for the given resource levels on three types of farms in three areas of northern Missouri. In the Northeast area the study was done for hog farms, in the North-Central Area for mixed livestock farms, and in the Northwest area for cash grain farms. Three different sizes of each type of farm were included in the analysis. Resource levels were developed for each representative farm on the basis of sample survey made in 1962. Solutions using linear programming were computed at various price levels for corn, hogs, and beef cattle to obtain optimal farm organizations where land acquisition was permitted. Coefficients used for the calculations were for high levels of efficiency and the prices used were projected to 1970. In nearly all cases the maximum amount of land permitted was acquired. Land was acquired through contract purchase and renting. To determine the effect of using mortgages in acquiring land, the problem was resolved using only mortgage buying and renting as alternatives. This caused reduced income and smaller livestock enterprises. The allowance for unlimited land purchase possibilities was then made. It was found that under the conditions that the representative farms in the Northwest continued as cash grain farms, those in the North-Central became hog producing farms, and those in the Northeast cattle feeding farms.

The optimal solutions contain many implications for farm adjustments in north Missouri. The potential for adjustment is very great, indicating that the rapid changes of recent years will continue. Other major conclusions are listed below:

1. Under the assumed conditions, farms of the type studied in north Missouri could increase their income considerably by a reorganization along lines indicated by the optimal plans. This was true whether land was held constant or allowed to vary. Expanded output of livestock was found to be the key to higher incomes along with a reorientation between beef and hog enterprises with but a few exceptions, the exclusion of beef cow herds, and increased hog and beef cattle feeding enterprises. Hog production tends to dominate under most of the optimal solutions.
2. Farms were not fully utilizing all resources. In this area the use of credit deserves special note. In the representative situations there usually was a very favorable debt-to-asset ratio indicating that the typical operators could borrow considerably more than they do and consequently use their other available resources more efficiently. Despite greatly expanded levels of borrowing, capital would continue to be a limiting factor on all but some of the larger farms. Although it appears more profitable many farmers are unwilling to accept the risk which accompanies borrowed money or are simply unwilling to borrow for personal reasons. Furthermore, some individual farmers may

have high debt-to-asset ratios and the resulting low equities make it difficult for them to borrow any additional funds.

3. With the coefficients and prices used in this study, farms were not as large as they should be to maximize profits. This needs special notice, for the size of a farm which can be profitably operated by an individual may not be limited so much by price relationships and available resources as by managerial ability. The manner in which land was acquired was significant only in that contract purchases yielded higher income than mortgage financed purchases. However, if land is available only by purchasing under a mortgage, it is still profitable to make the acquisitions. Expansion by rental of additional land is also profitable but is less desirable than purchasing the land.

4. It is more profitable to have a livestock enterprise through which grain is marketed than to sell the grain if the enterprise is operated efficiently. This is profitable for the individual; however, if all farms in the study were so organized the increased marketing of livestock and the decreased marketing of grain might cause reversals in the price-cost relationships. In this event, it might be more profitable to sell feed grains.

5. It is profitable to purchase corn or other feed grains to expand livestock production but where land is available, limited capital is more profitably employed purchasing the land and growing grain to expand livestock output.

6. Livestock production per farm tends to be about as large with expanded acreages as with land fixed. However, since the size of farm is increased production per acre is reduced considerably which means that total livestock output for the study area would be less under the optimal plans with expanded acreages than those with fixed land limits. This results from the fact that less corn is imported into the area for plans with expanded land resources since the limited capital is used for land purchases rather than corn purchases. With land fixed, all typical farms would purchase corn under the computed optimal plans, including formerly cash grain producing farms. Therefore, if the plans were adopted, grain would have to be shipped into the area.

APPENDIX TABLE 1 - PRODUCTION COEFFICIENTS USED FOR PROGRAMMING

		Crop Yields Per Acre		
		Northwest	North-Central	Northeast
Corn	Bushels	81.0	74.0	75.0
Wheat	Bushels	40.0	35.0	34.0
Oats	Bushels	50.0	45.0	42.0
Soybeans	Bushels	31.0	26.0	24.0
Hay	Tons	3.4	3.0	2.8

## Beef Cattle Requirements Per Head

Beef Cow Producing a Feeder Calf:

Protein	Cwt.	0.98
Corn	Bushels	4.8
Hay	Cwt. Hay	30.0
Pasture, Stalks, Stubble	Equivalent	69.99

Calves Fed Without Silage:

		Drylot (620 lbs. gain)	Pasture (670 lbs. gain)
Protein	Cwt.	3.22	2.5
Corn	Bushels	53.8	56.0
Hay	Cwt.	16.18	13.4
Pasture	Cwt. Hay Equivalent	-	22.0

Calves Fed With Silage:

		Drylot (620 lbs. gain)	Pasture (670 lbs. gain)
Protein	Cwt.	3.62	2.8
Corn	Bushels	44.9	49.4
Hay	Cwt.	12.18	11.15
Silage	Tons	1.5	1.1
Pasture	Cwt. Hay Equivalent	-	22.0

Yearlings Fed:

		With Silage	Without Silage
Protein	Cwt.	2.88	1.6
Corn	Bushels	40.0	48.6
Hay	Cwt.	3.2	7.2
Silage	Tons	1.2	-

Hogs - Per Litter With Farrowing in Quarters IndicatedCentral Farrow and Confinement Feed:

		All Quarters
Protein	Cwt.	11.96
Corn Equivalent	Bushels	105.8

APPENDIX TABLE 1 (Continued)

<u>Central Farrow and Portable Feed in Quarter:</u>		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Protein	Cwt.	11.86	11.86	12.30	11.68
Corn Equivalents	Bushels	106.0	105.9	112.1	108.4
Pasture	Animal Unit Days	20	19	13	15
<u>Portable Farrow and Feed in Quarter:</u>		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Protein	Cwt.	11.86	11.86	12.3	11.68
Corn Equivalent	Bushels	106.0	105.9	112.1	108.4
Pasture Days	Animal Unit Days	20	25	19	15
<u>Dairy - Per Cow and Replacement</u>					
		<u>With Silage</u>		<u>Without Silage</u>	
Protein	Cwt.	4.44		2.84	
Corn Equivalent	Bushels	30.70		54.50	
Hay Equivalents	Cwt.	68.06		94.73	
Silage	Tons	4.00		-	
Pasture	Cwt. Hay Equivalent	47.40		47.40	

APPENDIX TABLE 2 - LABOR REQUIREMENTS USED FOR PROGRAMMING  
CROP REQUIREMENTS - ANNUAL MAN HOURS

	<u>2-Plow Tractor</u>		<u>3-Plow Tractor</u>		<u>4-Plow Tractor</u>	
	<u>Own Harvest</u>	<u>Hire Harvest</u>	<u>Own Harvest</u>	<u>Hire Harvest</u>	<u>Own Harvest</u>	<u>Hire Harvest</u>
Corn/Acre	5.85 <sup>a</sup>	4.45	3.67 <sup>b</sup>	2.97	3.44	2.74
Corn Silage/Acre	-	9.45	7.97	6.97	7.64	6.64
Soybeans/Acre	4.8 <sup>c</sup>	4.05	3.32 <sup>c</sup>	2.57	2.70 <sup>d</sup>	2.34
Wheat/Acre	3.15 <sup>c</sup>	2.40	2.21 <sup>c</sup>	1.85	2.17 <sup>d</sup>	1.42
Oats/Acre	2.10 <sup>c</sup>	1.35	1.95 <sup>c</sup>	1.20	1.51 <sup>d</sup>	1.15
Rotation Meadow/Acre	2.3	-	1.7	-	1.4	-
Hay Harvest/Ton	2.525	2.275	2.525	2.275	2.525	2.275

<sup>a</sup>1-row corn picker<sup>b</sup>2-row corn picker<sup>c</sup>6' PTO combine<sup>d</sup>12' SP combine

APPENDIX TABLE 2 (Continued)  
BEEF CATTLE REQUIREMENTS - MAN HOURS PER HEAD

Beef Cows With Herd Size Varied

<u>Small</u>	<u>Medium</u>	<u>Large</u>
20	16	14

Calves

	<u>Low Mechanization</u>	<u>High Mechanization</u>
Drylot	12.06	4.79
Pasture	10.42	3.88

Yearlings

<u>Low Mechanization</u>	<u>High Mechanization</u>
6.65	2.63

HOG REQUIREMENTS - MAN HOURS PER LITTER

	<u>Quarter 1</u>	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u>
Central Farrow, Confinement Feed	13.33	13.33	13.33	13.33
Central Farrow, Pasture Feed	14.38	14.68	13.63	13.33
Portable Farrow, Pasture Feed	14.72	15.02	13.97	13.67

DAIRY COWS - MAN HOURS PER HEAD

	<u>With Silage</u>	<u>Without Silage</u>
Small Herds	88.92	87.11

APPENDIX TABLE 3 - ORGANIZATIONS AND RESOURCES OF HOG FARMS IN  
NORTHEAST MISSOURI - 1962

	Small	Medium	Large
Number of Farms	24	22	24
All Land (Acres)	160	291	599
Cropland (Tillable Acres)	78	187	420
Permanent Pastureland (Acres)	70	95	160
Full Owners (Number)	13	7	7
Part Owners (Numbers)	7	10	12
Tenants (Number)	4	5	5
Feed Grain Base (Acres)	35	79	222
Wheat Allotment (Acres)	10	14	43
Crops: Corn (Acres)	21	61	104
Corn Silage	0	3	9
Soybeans (Acres)	10	23	64
Oats (Acres)	1	8	11
Wheat (Acres)	4	8	22
Hay (Acres)	1	21	52
Net Corn Sales (Bushels)	-108	-329	-1270
Dairy Capacity (Number Cows)	0	1	1
Dairy Cows (Number)	1	2	6
Farrowing Capacity (Sows)	11	15	28
Sows (Head)	9	23	43
Pigs Farrowed (Head)	146	297	621
Feeder Pigs Purchased (Head)	29	52	6
Beef Cow Capacity (Head)	14	34	43
Feeder Calf Sales (Head)	2	7	15
Beef Cows (Head)	6	15	36
Feeder Cattle Purchased (Head)	2	6	6
Size of Tractor	2 plow	3 plow	4 plow
Average Number of Tractors	1	2	3
Combine	1	1	1
Corn Picker	1	1	1
Balers Owned	0	1	1
Labor Available (Man Months)	13	17	23
Permanent Hired Labor (Man Mo.)	-	1	4
Seasonal Labor Hired (Days)	8	8	30
Assets (\$)	2,173	45,454	73,181
Debts (\$)	2,876	3,492	13,125

APPENDIX TABLE 4 - ORGANIZATIONS AND RESOURCES OF MIXED LIVESTOCK FARMS IN NORTH CENTRAL MISSOURI - 1962

	Small	Medium	Large
Number of Farms	18	17	17
All Land (Acres)	194	253	524
Cropland (Tillable)	95	143	343
Permanent Pastureland (Acres)	106	90	150
Full Owners (Number)	8	6	3
Part Owners (Number)	5	6	13
Tenants (Numbers)	5	5	1
Feed Grain Base (Acres)	27	46	99
Wheat Allotment (Acres)	5	12	24
Crops: Corn (Acres)	11	30	78
Corn Silage	1	2	0
Soybeans	11	39	59
Oats (Acres)	0	3	10
Wheat (Acres)	1	5	15
Hay (Acres)	31	35	81
Net Corn Sales (Bushels)	-204	27	903
Dairy Capacity (Number)	4	5	7
Diary Cows (Number)	7	15	10
Farrowing Capacity (Sows)	8	9	18
Sows (Head)	4	7	14
Pigs Farrowed (Head)	43	63	157
Feeder Pigs Purchased (Head)	11	8	4
Beef Cow Capacity (Head)	15	17	20
Feeder Cattle Purchased (Head)	8	6	15
Feeder Calf Sales (Head)	11	16	34
Beef Cows (Head)	5	0	7
Size of Tractor	2 plow	3 plow	3 plow
Average Number of Tractors	1	2	2
Combine	0	1	1
Corn Picker	0	1	1
Balers Owned	0	0	0
Labor Available (Man Months)	14	18	15
Permanent Hired Labor (Man Months)	0	0	1
Seasonal Labor Hired (Days)	9	9	28
Assets ( \$ )	22,720	27,734	28,021
Debts ( \$ )	1,355	6,917	6,968

APPENDIX TABLE 5 - ORGANIZATIONS AND RESOURCES OF CASH GRAIN FARMS IN NORTHWEST MISSOURI - 1962

	Small	Medium	Large
Number of Farms	8	14	19
All Land (Acres)	153	251	457
Cropland (Tillable Acres)	87	166	353
Permanent Pastureland (Acres)	41	59	84
Full Owners (Numbers)	3	1	0
Part Owners (Numbers)	3	4	9
Tenants (Numbers)	2	9	10
Feed Grain Base (Acres)	44	70	168
Wheat Allotment (Acres)	20	23	49
Crops: Corn (Acres)	26	50	114
Corn Silage	2	0	1
Soybeans (Acres)	15	38	94
Oats (Acres)	0	4	2
Wheat (Acres)	11	18	35
Hay (Acres)	7	0	16
Net Corn Sales (Bushels)	503	1519	4195
Dairy Capacity (Number)	1	1	1
Dairy Cows (Number)	3	2	2
Farrowing Capacity (Sows)	2	9	7
Sows (Head)	4	8	3
Pigs Farrowed (Head)	18	64	22
Feeder Pigs Purchased (Head)	0	4	4
Beef Cow Capacity (Head)	22	17	18
Feeder Calf Sales (Head)	1	4	9
Beef Cows (Head)	2	7	12
Feeder Cattle Purchased (Head)	0	5	0
Size of Tractor	3 plow	3 plow	3 plow
Average Number of Tractors	3	2	2
Combine	1	1	1
Corn Picker	0	1	1
Balers Owned	0	0	0
Labor Available (Man Months)	19	14	17
Permanent Hired Labor (Man Mo.)	0	1	2
Seasonal Labor Hired (Days)	9	12	29
Assets ( \$ )	24,210	17,969	27,862
Debts ( \$ )	8,481	6,389	8,237

APPENDIX TABLE 6 - PRICES USED FOR PROGRAMMING

	<u>Northeast</u>	<u>North-Central</u>	<u>Northwest</u>	
Labor (seasonal)	\$1.10	1.10	1.10	Per Hour
Soybean Oil Meal	3.70	3.70	3.70	Per Cwt.
Hog Supplement	4.80	4.80	4.80	Per Cwt.
Nitrogen	0.118	0.118	0.118	Per Pound
P <sub>2</sub> O <sub>5</sub>	0.085	0.085	0.085	Per Pound
K <sub>2</sub> O	0.052	0.052	0.052	Per Pound
Soybeans	1.99	1.95	1.95	Per Bushel
Wheat	1.81	1.82	1.85	Per Bushel
Corn:				
Low	0.81	0.80	0.81	Per Bushel
Medium	1.01	1.00	1.00	Per Bushel
High	1.21	1.20	1.20	Per Bushel
Hogs:				
Low (Avg.)	11.49	11.34	11.34	Per Cwt.
Medium (Avg.)	14.45	14.31	14.31	Per Cwt.
High (Avg.)	17.41	17.26	17.26	Per Cwt.
Beef, (Choice Steers)*				
Low	16.12	15.72	15.72	Per Cwt.
Medium	20.28	19.88	19.88	Per Cwt.
High	24.44	24.04	24.04	Per Cwt.

\*Feeder cattle prices were assumed to be for good to choice cattle and were \$1.13 over the sale price for 400 pound feeder calves and \$0.89 less than the sale price for 700 pound yearlings. Cull cow prices were assumed to be 63.24 per cent of the fat cattle price.