

RESEARCH BULLETIN 872

NOVEMBER, 1964

UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION

ELMER R. KIEHL, *Director*

Production of Corn, Hogs, and Beef Cattle with Optimal Farm Organizations

*for Representative Farms in
Northeast Missouri—1970*

DALE COLYER



(Publication Authorized November 15, 1964)

COLUMBIA, MISSOURI

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ACKNOWLEDGEMENTS

This bulletin was prepared under the Missouri Agricultural Experiment Station Research Project 509, which is part of the North Central Regional Committee NC-54 project to study Supply Response and Adjustment on Beef Cattle and Hog farms in the Corn Belt. Personnel from the Agricultural Engineering, Animal Husbandry, Field Crops, and Soils Departments contributed to the development of data used for the study and their cooperation is gratefully acknowledged.

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INTRODUCTION

Tremendous changes are occurring on farms, having important effects on both farm organization and total farm output in the state and in the nation. Improved information about the kinds of adjustments that will be made in the next few years should help individual farmers and those who work with farmers to make better adjustment decisions.

Some idea of the aggregative impact of the individual adjustments could aid those interested in agricultural policy in designing programs and policies to meet the problems that the adjustment process entails.

Many approaches are being used to improve the knowledge of both farmers and those interested in farm policy. One approach that has been followed is the development of *supply response estimates* based upon optimal organization of all existing farms, i.e., estimates of total production if every farm operator pursued the objective of adjusting so as to maximize his income. This optimizing procedure is not predictive of what farmers do since relatively few if any persons act in such a single-minded way. However, because the continued existence of a farm operation does depend, to a large extent, on its profitability these optimizing procedures can be useful.

The Agricultural Economics Departments of the North Central Regional Experiment Stations, in cooperation with the United States Department of Agriculture, are conducting one of a number of regional studies using the optimizing approach. The North Central Regional study is concerned with adjustments and supply response related to feed grains, hogs, and beef cattle production. The Agricultural Experiment Station of the University of Missouri is cooperating in the study and this bulletin reports on the results of the study for the northeast part of Missouri.

TECHNIQUES AND ASSUMPTIONS

The basic technique used for this study was the computation of optimal farm organizations for representative farms using parametric linear programming to vary the prices of beef cattle, hogs, and corn. Linear programming is a mathematical method of determining with computing machines the profit-maximizing set of activities from the alternatives available on a farm where resources are limited. Parametric programming permits the prices and resources to be varied from the level used to compute the first maximum profit set of activities and computes a new set for the altered situation. Representative farm situations were developed using data obtained from a random sample survey of commercial farms in northern Missouri taken in 1963 and based on 1962 farm operations.

The survey included 44 non-urban counties in north Missouri. Because of soil and other factors the area was subdivided into census economic areas for the analysis. This report is concerned with Economic Area 2b which consists of 16 counties in the northeast corner of the state.* Non-commercial and specialized poultry, vegetable, and fruit farms were screened out of the sample. Completed schedules were obtained for 223 farm operations in the area. These were subdivided into 14 groups of representative farms on the basis of their resource control and production patterns.

The first subdivision was made on the basis of size using acres of cropland. Since no natural groupings were apparent in the raw data the farms were divided into three size groups—small, medium, and large—with an equal number of farms in each group so far as possible. The production of the various classes of livestock and the resources used for them were then used to further subdivide the sample. Cash grain, mixed livestock, hog, beef, and dairy farms were the classifications used. Because there were relatively few dairy farms in the area only two sizes were defined. These consisted of farms with fewer than 20 cows and those with more than 20 cows.

The resource bases of the representative farms were used to determine the level from which adjustments could take place, i.e., they were used as the foundation for programming optimal plans. These computations were based on expected 1970 relationships. Since it is expected that current trends in production efficiency will continue, the coefficients adopted for the study are very efficient by present standards. However, they are expected to be only average in the 1970's. Uniform livestock production coefficients were developed by the regional committee after consultation with livestock specialists at the various experiment stations. Crop production coefficients were based on local conditions and were developed after consultation with soils and field crops specialists. Some of the more important production coefficients are given in Table 1. Labor requirements for the various activities are summarized in Table 2.

Prices used for the study were based on expectations for the 1970's. Recent averages and trends were used to arrive at the prices for most factors. Since feed

*Bogue, Donald J. and Calvin Beal, *Economic Areas of the United States* (New York: Free Press of Glencoe, 1961).



Figure 1
Economic Area 2b—Northeast Missouri

TABLE 1 - PRODUCTION COEFFICIENTS USED FOR PROGRAMMING

		<u>Crop Yields Per Acre</u>			
Corn		Bushels		75.0	
Wheat		Bushels		34.0	
Oats		Bushels		42.0	
Soybeans		Bushels		24.0	
Hay		Tons		2.8	
		<u>Beef Cattle Requirement Per Head</u>			
Beef Cow Producing a Feeder Calf					
Protein		Cwt.		0.98	
Corn		Bushels		4.8	
Hay		Cwt.		30.0	
Pasture, Stalks, Stubble		Cwt. Hay Equivalent		69.89	
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		-	
<u>Hogs - Per Litter With Farrowing In Quarters Indicated</u>					
Central Farrow & Confinement Feed:		All Quarters			
Protein	Cwt.	11.96			
Corn Equivalent	Bushels	105.8			
Central Farrow & Portable Feed In Quarter:		1	2	3	4
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
Portable Farrow and Feed in Quarter:		1	2	3	4
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>					
		With Silage		Without Silage	
Protein	Cwt.	4.44		2.84	
Corn Equivalents	Bushels	30.70		54.50	
Hay Equivalents	Cwt.	68.06		94.73	
Silage	Tons	4.00		-	
Pasture	Cwt. Hay Equivalent	47.40		47.40	

TABLE 2 - LABOR REQUIREMENTS USED FOR PROGRAMMING
Crop Requirements - Annual Man Hours

	2-Plow Tractor		3-Plow Tractor		4-Plow Tractor	
	Own Harvest	Hire Harvest	Own Harvest	Hire Harvest	Own Harvest	Hire Harvest
Corn/Acre	5.85 ^a	4.45	3.67 ^b	2.97	3.44	2.74
Corn Silage/Acre	-	9.45	7.97	6.97	7.64	6.64
Soybeans/Acre	4.8 ^c	4.05	3.32 ^c	2.57	2.70 ^d	2.34
Wheat/Acre	3.15 ^c	2.40	2.21 ^c	1.85	2.17 ^d	1.42
Oats/Acre	2.10 ^c	1.35	1.95 ^c	1.20	1.51 ^d	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

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

^a1-row corn picker

^c6' PTO combine

^b2-row corn picker

^d12' SP combine

grain, hog, and cattle prices were varied their determination was somewhat different. High, medium, and low price levels were used for the variable price programming. These were based on U. S. average corn prices of \$1.20, \$1.00, and \$0.80 per bushel. The average hog:corn and steer:corn price ratios at Chicago for the period between 1955 and 1960 were used to set hog and beef prices so that historical relationships were maintained at each level. The average corn:hog ratio was 14.8:1 and the steer:corn ratio was 20.8:1. All prices were adjusted by state differentials. For example livestock prices in northeast Missouri were adjusted for differences between St. Louis and Chicago prices. Table 3 contains prices for the more important items used in the analysis.

TABLE 3 - PRICES USED FOR PROGRAMMING

Labor (seasonal)	\$ 1.10	Per Hour
Soybean Oil Meal	3.70	Per Cwt.
Hog Supplement	4.80	Per Cwt.
Nitrogen	0.118	Per Pound
P ₂ O ₅	0.085	Per Pound
K ₂ O	0.052	Per Pound
Soybeans	1.99	Per Bushel
Wheat	1.81	Per Bushel
Corn: Low	.81	Per Bushel
Medium	1.01	Per Bushel
High	1.21	Per Bushel
Hogs: Low (Avg.)	11.49	Per Cwt.
Medium (Avg.)	14.45	Per Cwt.
High (Avg.)	17.41	Per Cwt.
Beef: Low	16.12	Per Cwt.
Medium	20.28	Per Cwt.
High	24.44	Per Cwt.
Milk: Grade A	4.36	Per Cwt.
Grade B	3.38	Per Cwt.

Other major assumptions were made for the basic linear programming model. Among these was an assumption that feed grain and wheat acreages would be limited to that permissible on a farm when minimum compliance with the 1962-63 type of program was observed. Total row crop production was limited to the proportion of land in the area that soils experts indicated was the maximum feasible acreage. It was also assumed that farms could buy or sell feed grains but not forages. The restriction on forage buying resulted from the fact that the model is used to make regional estimates. Thus, while intra-regional movements of forages are possible, transportation costs preclude inter-regional

shipments of any significant size. Capital was limited to that provided by the current resources of the farm and that permitted by borrowing under typical equity lending practices. The purchase of livestock and the building of livestock facilities were assumed to be partially self-financing since they add to the firm's equity. Labor was limited to the quantities currently used on each representative farm, with some limited hiring of seasonal labor.

In addition to the above, it was assumed that farm operators attempt to maximize their income. This is not the case but nearly all farmers must be concerned about profits if they are to stay in business. Implicit in linear programming models is an assumption that all coefficients and prices are known with certainty or that they can be treated as certainty equivalents.

THE PROGRAMMING MODEL

The core model for the study also was developed by the regional committee to provide a uniform treatment for livestock activities. Other phases of the model were developed to fit the circumstances of the local area. The model for the Missouri portion of the study was limited to the basic core program with a few refinements because of limitations in the capacity of the computer equipment available. The basic model used for the Missouri study consisted of 63 activities and 43 equations with three activities and one equation added for the dairy farms.

Crop Activities

Crop activities were limited to five major crops including corn for grain, corn for silage, and alfalfa-grass mixture for hay or meadow, soybeans, wheat, and oats. Single crop activities were used and the solution of the problems then determined what combinations would be most profitable within the restrictions imposed by the assumptions of the study. In addition to the single crop activities there were activities to permit the harvesting of hay or pasturing from the rotation meadow. One activity permitted the fertilization of permanent pasture to increase the forage yield. Activities to permit the buying or selling of corn were included in the program, where corn could be bought at \$0.10 per bushel more than its sale price.

Hog Activities

The model included 12 pig producing activities, eight feeder pig using activities, and four activities to build farrowing and pig feeding facilities. The pig producing activities were single litter systems where pigs could be farrowed in each of four quarters. The activities included central farrowing and confinement feeding, central farrowing and pasture feeding, and portable farrowing and pasture feeding. Feeder pigs could be purchased in each of the four quarters and either fed in confinement or on pasture. Additional central and portable farrowing facilities could be built and confinement and pasture pig feeding capacity also could be added.

Beef Cattle Activities

The beef cattle alternatives included a beef cow herd, eight activities using feeder calves, eight activities using yearling steers, and three activities for building beef housing and feeding facilities. Purchased calves could be fed grain in drylots or on pasture and could be fed with or without corn silage. Calves fed on pasture would be finished with a short drylot feeding period. Yearlings could be purchased in the fall or spring and fed with or without silage in the ration. The beef cow herd produced calves that could be fed in one of the activities or sold as feeder calves. Beef housing and low or high mechanization cattle feeding activities could be built to supplement the existing beef cattle facilities.

Capital and Credit

The existing capital supply for each farm could be supplemented by borrowing either short or long term funds at established interest rates. Both of these activities transfer funds to a cash equation where they can be used for any purpose. Borrowing is limited by the extent of the equity positions of the farm with long term funds limited by the farm's equity in land improvements and short term borrowing by the firm's equity in short term investments. Money on hand, livestock, and crop inventories were treated as cash equivalents available for any use by the farm operator. Livestock purchases and building expansion add to a farm's equity and therefore to its ability to borrow funds.

Labor

The labor availability for the farm was divided into five periods—winter, early spring, spring, summer, and fall—to correspond to the major crop growing activities. Three activities to hire seasonal labor were included in the program. These permitted hiring in the spring when seedbed preparation and crop planting requires extra labor, in the summer for crop care and hay harvest, and in the fall for crop harvesting. The total amount of seasonal labor that could be hired was limited by what had typically been used on each representative farm.

Dairy Activities

For the representative farms where dairying is currently important two activities were included to permit dairy operations. One utilized silage in the ration and one did not. Average production per cow was set at 10,000 pounds per year and a one to four grain to roughage ration was used. An activity was included to permit the building of additional dairy facilities. Both typical farms in the area produced manufacturing (Grade B) milk and used stanchion facilities.

Variations from the Basic Model

The basic model was set up to determine regional supply responses and therefore restrictions were built into the model which are not very realistic for

some individual farmers. One of these was the restriction of corn acreage to that which would result with minimum compliance with the 1962 type of feed grain program. While many individual farmers do overplant their bases others underplant. Because of this, computations were made at medium corn, hog, and beef prices with the corn acreage permitted to expand up to the row crop acreage limitation.

Since many farmers do not buy feed grains the inclusion of such an activity may be unrealistic. To compensate for this, solutions were computed where corn buying was not permitted. These, also, were obtained for medium corn, hog, and beef prices and the results are reported along with those for the basic model. Computations included both the restricted and expanded corn acreage limitations.

RESULTS OF OPTIMALITY COMPUTATIONS

Optimal farm plans were computed for the 27 price situations that result from all possible combinations of three corn, hog, and beef cattle price levels and for three variations from the basic model. The results of these computations for each representative farm are given in the following pages along with a description of the representative farm as it was organized in 1962. The plans given represent an equilibrium adjustment and would not result from year to year changes in price ratios.

Since the 27 solutions obtained were to make estimates of regional supply response surfaces, not all are relevant to the purposes of this publication. Those which are most useful have been selected for presentation. The model used for a benchmark is the one with medium corn, hog, and beef cattle prices. Others of interest are those with lower hog or beef prices relative to other prices in the model. These results indicate what could be expected if the prices of either hogs or cattle were to depart from the historical ratios for other than relatively short, cyclical reasons. They also indicate the type of organizations someone more efficient in one type of livestock production would find useful as a guide. The results with all low and with all high corn, hog, and beef cattle prices are also presented. These indicate what could be expected with a shift in the level of all these prices relative to other farm products and inputs.*

Three variations from the basic model were computed. They involved changes in the model to prevent the purchase of corn and to permit the expansion of the acreage of corn that could be grown. One model variation prevented corn buying with the restricted corn acreage limit, a second prevented corn buying while allowing for the expansion of the corn acreage limit, while the third allowed the purchase of corn and the expansion of the corn acreage limit. These

*Note that the characteristics of linear programming are such that if all prices of the model were varied proportionately the solution would be exactly the same as before the price level was changed except for the profit level.

were computed at the medium price levels for each of the 14 representative farms described below.

The descriptions of the representative farms are based on the types of operations they had in 1962. Under the optimal plans each would be reorganized and the descriptive title would no longer be applicable. However, the title is retained for purposes of identification; it represents the basis from which the adjustment would be made and not the resultant optimal organization. The resources of the typical representative farm are average (or for some factors modal) values for the several farms in a category. Thus considerable variation in resource ownership within a group designated as representative is possible, although the basic factors of cropland and livestock facilities are similar for all farms within a class. In the results reported in the following sections the farms will be grouped by small, medium, and large classes. The dairy farms, however, will be reported on in a separate section.

Small Farms

There were 69 non-dairy farms in the sample survey that were classified as small operations. These farms had an average of 160 acres with about 75 acres of cropland. About 60 percent were operated by full owners, with only about 10 percent operated by tenants. The remaining 30 percent of the operators were part-owners. The representative farms averaged between \$22,000 and \$32,000 in assets with debts from less than \$300 to about \$2,800. The debt-to-asset ratio varied from under 1 percent to about 10 percent. The equipment on the small farms consisted primarily of 2-plow tractors and complementary equipment but relatively few farms had combines, corn pickers, or other major machines. In general, about one man year equivalent of labor was available to operate the farms and relatively little seasonal labor was hired. Typically, the farms grew corn, soybeans, oats, wheat, and meadow but the acreages grown on the different types of farms varied considerably. The resource bases of the four representative small farms are summarized in Table 4.

Small, Cash Grain Farms. There were relatively few small farms in northeast Missouri that could be classified as cash grain operations in 1962. Those that were in the category had a relatively high proportion of cropland to total acreage with 80 acres of cropland and 120 acres of land in the farm. They tended to concentrate on soybean production with lesser acreages of corn, wheat, oats, and meadow. They kept very little livestock and had about one man year of full-time labor available. Debts were very low and thus a favorable debt to asset ratio prevailed.

If converted to the computed optimal plans (see Table 5), these farms would shift to a heavy concentration in livestock production with emphasis on hog output. Usually a small beef cow herd or a feeder cattle enterprise would be combined with a large hog enterprise. The calves from the cow herd would be either sold as feeders or fed out on the farm. With beef prices high relative

TABLE 4 - ORGANIZATION OF SMALL FARMS IN NORTHEAST MISSOURI - 1962

	Cash Grain Farms	Mixed Livestock Farms	Beef Farms	Hog Farms
Number of Farms	7	31	7	24
All Land (Acres)	120	166.4	144.3	159.6
Cropland (Tillable Acres)	80	76.2	57.4	78.4
Permanent Pastureland (Acres)	24	79.8	79.9	70.2
Full Owners (Number)	4	19	6	13
Part Owners (Number)	2	9	1	7
Tenants (Number)	1	3	0	4
Feed Grain Base (Acres)	17	22.8	10.3	35.3
Wheat Allotment (Acres)	12	9	5.3	9.6
Crops: Corn (Acres)	11	18.6	3.1	21.4
Corn Silage (Acres)	0	13.8	0	0.1
Soybeans (Acres)	44.3	14.8	3.1	10.4
Oats (Acres)	0.6	2.5	0	1.0
Wheat (Acres)	8.6	6.4	0.7	4.4
Hay (Acres)	3.7	16.2	16.1	11.5
Net Corn Sales (Bushels)	418.6	-247.4	-200.0	-30.0
Dairy Capacity (Number Cows)	1.1	1.7	0.7	0.2
Feeder Pigs Purchased (Number)	0	15	3	29
Farrowing Capacity (Sows)	3	8	2	11
Sows (Head)	1	6	1	9
Pigs Farrowed	4	56	9	146
Beef Cow Capacity (Head)	12	17	18	14
Feeder Calf Sales (Head)	1	4	7	2.1
Beef Cows (Head)	1	10	16	6
Feeder Cattle Purchased	0	3	5	2
Size of Tractor	2-plow	2-3 plow	2-plow	2-plow
Average Number of Tractors	1.7	1.4	1.2	1.5
Combine	5' PTO	None	None	6' PTO
Corn Picker	None	1-row	None	1-row
Baler Owned?	No	No	No	No
Labor Available (Man Months)	11.2	15.5	7.7	12.8
Season Hired Labor: (Days)	1	5.9	10	7.8
Assets (\$)	22,195	26,774	32,795	25,381
Debts (\$)	612	1,378	274	2,876

TABLE 5 - CURRENT OPTIMAL FARM ORGANIZATIONS FOR SMALL, CASH GRAIN FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	With	With	With	With	With	Without	Without	With	Organ-
Corn Acres:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	ization
Corn for Grain (Acres)	14	14	14	14	14	14	48	48	11
Corn Purchased (Cwt.)	3,784	3,666	4,545	3,784	4,013	-	-	3,246	-419
Oats (Acres)	4.82	5.15	-	4.82	4.29	-	-	4.01	0.6
Wheat (Acres)	15.0	15	15	15	15	15	13.41	15.0	8.6
Soybeans (Acres)	34.0	34	24.56	34	34	33.21	-	-	44.3
Rotation Meadow (Acres)	9.18	8.85	23.44	9.18	9.71	14.79	15.59	9.99	3.7
Hay Harvested (Tons)	19.1	18.0	61.6	19.1	19.1	40.6	40.6	18.8	6.7
Permanent Pastureland (Acres)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Pastureland Fertilized (Acres)	-	-	-	-	-	24.0	24.0	-	N.A.
Beef Cow Herd (Head)	9	12	-	9	9	27	27	9	1
Feeder Calves Sold (Head)	-	10	-	-	-	21	21	-	1
Feeder Calves Bought (Head)	-	-	85	-	-	-	-	-	-
Calves Fed in Drylot (Head)	-	-	36	-	-	-	-	-	-
Calves Fed on Pasture (Head)	7	-	49	7	7	-	-	7	-
Litters Farrowed (No. Sows)	69	71	42	69	73	8	32	83	1
Quarters in Which Farrowed	1 & 4	1 & 4	1 & 4	1 & 4	1, 2 & 4	1 & 4	1 & 4	1, 2 & 4	N.A.
Hogs Marketed (Head)	486	497	294	486	511	56	234	581	6
Income Minus Variable Costs (\$)	8,858	8,586	5,696	5,825	12,001	4,694	7,456	10,561	1,737 ^b
Capital Borrowed (\$)	25,355	24,788	30,473	25,355	22,849	7,733	13,546	23,722	612
Beef Housing Built (Cows)	2	-	43	2	2	15	15	2	12 ^c
L. M. Feeding Capacity Built (Steers)	-	-	70	-	-	-	-	-	15 ^c
Farrowing Capacity Built (Sows)	32	33	18	32	22	1	13	25	3 ^c
Pig Feeding Capacity Built (Pigs)	532	547	312	532	368	44	235	421	21 ^c
Seasonal Labor Hired (Hours)	-	-	10	-	-	-	-	-	10

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bNet Income, 1962.

^cCapacity in 1962.

to hog prices, feeder calves would be purchased and fed grain on pasture using the low mechanization feeding system. With the variations with respect to the corn activities, the same general pattern would result except that where corn purchasing is not permitted the size of the beef cow herd would be increased and the calves would be sold as feeders.

The acreage of corn would be expanded under all the optimal plans to the maximum permitted by either the acreage base or row crop limits. The soybean acreage would be reduced from the 1962 levels but, where the acreage base restricted the corn acreage, soybeans generally would make up the difference between the corn acreage and the permitted row crop acreage. However, with beef prices high relative to hog prices, soybean acreages would be reduced and the acreage of rotation meadow increased. Wheat generally would be grown to the extent permitted by the acreage allotment and forages to the extent needed by the livestock in the optimal plans. Oats would be grown on non-row-crop land that could not be planted to wheat and would not be needed for hay or pasture.

A relatively large amount of additional capital would have to be borrowed to finance the expanded size of the farm business. Additions of about \$14,000 to \$43,000 would be required to implement the optimal plans. Thus the capital-to-labor ratio would be raised considerably, as would the income level for the farms. The primary uses of the added capital would be for acquiring livestock, building facilities for the added livestock, and purchasing corn to feed them.

Small, Mixed Livestock Farms. The mixed livestock producing farms were the most numerous of the small farms and they were characterized by the production and sale of corn, soybeans, wheat, hogs, and cattle in 1962. The production of hogs was the largest single enterprise. These farms exceeded their corn acreage bases as corn was produced for both grain and silage. However some corn also was bought on the typical farm. These farms had an average of 166 acres of land, but only 76 of these acres were used for cropland; most of the rest was in permanent pasture. The average farm had about one and one-fourth man-year equivalents of labor available and had favorable debt-to-asset ratio since their average debt levels were very low.

Under the optimal plans (see Table 6) with the basic model the corn acreage would be reduced because of the acreage base restriction. Without the restriction the corn acreage would be increased to the row crop limit. In general a larger acreage of rotation hay and pasture would be raised with the acreage varying with the types of livestock enterprises. The soybean acreage would average about the same as in the 1962 operations but would vary considerably as the acreage of forages increased or decreased. The wheat acreage would stay near the allotment limit but would be reduced as beef cattle prices increased causing more forage crops to be produced.

The level of livestock output would be greatly increased under the optimal plans with hogs dominating, except when beef prices were high relative to hog prices. Generally, pigs would be farrowed in the first and fourth quarters with

TABLE 6 - CURRENT AND OPTIMAL FARM ORGANIZATIONS FOR SMALL, MIXED LIVESTOCK FARMS

Prices ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	With	With	With	With	With	Without	Without	With	Organ-
Corn Acres:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	ization
Corn for Grain (Acres)	19.0	19.0	17.59	19.0	19.0	19.0	46.0	46.0	18.6
Corn for Silage (Acres)	-	-	1.41	-	-	-	-	-	-
Corn Purchased (Cwt.)	4,453.0	4,544.0	6,382.0	4,466.0	4,689.0	-	-	4,097.0	247
Oats (Acres)	-	-	-	-	-	-	-	-	2.5
Wheat (Acres)	15.0	15.0	2.44	15.0	15.0	4.59	-	14.82	6.4
Soybeans (Acres)	12.98	27.0	-	13.67	12.78	-	-	-	14.8
Rotation Meadow (Acres)	25.02	11.0	50.56	24.33	25.23	48.41	26.0	11.18	16.2
Hay Harvested (Tons)	63.6	22.9	140.9	61.65	63.7	135.3	70.5	22.8	32.4
Permanent Pastureland (Acres)	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
Pastureland Fertilized (Acres)	-	-	80.0	-	-	80.0	3.5	-	N.A.
Beef Cow Herd (Head)	31	15	-	30	31	90	47	11	10
Feeder Calves Sold (Head)	-	12	-	-	-	71	37	-	4
Feeder Calves Bought (Head)	-	-	206	-	-	-	-	-	3
Calves Fed in Drylot (Head)	-	-	42	-	-	-	-	-	-
Calves Fed on Pasture (Head)	25	-	164	24	25	-	-	9	3 ^b
Litters Farrowed (No. Sows)	73	84	13	74	77	9	30	96	8
Quarters in Which Farrowed	1 & 4	1 & 4	1 & 4	1 & 4	1,2 & 4	1 & 4	1 & 4	1 & 4	N.A.
Hogs Marketed (Head)	511	588	91	518	329	63	210	672	41
Income Minus Variable Costs (\$)	10,657	10,171	8,247	6,751	14,659	6,313	8,053	12,130	2,162 ^c
Capital Borrowed (\$)	29,805	27,475	43,545	29,645	29,213	22,220	14,210	27,607	1,378
Beef Housing Built (Cows)	31	-	117	29	31	73	30	-	17 ^d
L. M. Feeding Capacity Built (Steers)	1	-	181	-	1	-	-	-	24 ^d
Farrowing Capacity Built (Sows)	30	37	-	30	19	-	8	41	8 ^d
Pig Feeding Capacity Built (Pigs)	530	651	51	535	357	-	166	707	64 ^d
Seasonal Labor Hired (Hours)	-	-	-	-	-	-	-	-	78

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bFed cattle marketed in 1962.

^cNet income in 1962.

^dCapacity in 1962.

some farrowed in the second under some price situations. Beef cow herds, generally with the calves fed out, would be the main beef enterprise except when beef prices were high relative to hog and/or corn prices. Then calves would be purchased and fed grain on pasture or in drylots, occasionally with silage included in the ration for an optimal plan. A low mechanization, high labor using feeding system would be used for the activity. With beef prices low relative to grain prices and the buying of corn not allowed, the optimum beef enterprise would be a cow herd with feeder calves sold.

A large amount of capital would have to be borrowed to finance the expansion of the farm business which the optimality computations indicate would be profitable. This would be used for livestock, livestock facilities, and feed. However, farm income could be increased substantially with the optimal plans. The smallest income increase (of the plans shown) would be for the plan where corn could not be bought and acreage was restricted. The largest income increase would occur with the corn acreage expanded and corn purchased.

Small, Beef Cattle Farms. The small beef cattle farms had the smallest acreage of cropland (57 acres) of any of the representative farms and they had a relatively large acreage of permanent pastureland. They also had the smallest feed grain acreage base and grew only small acreages of crops other than hay. The labor available for use on these farms averaged only about two-thirds of a man-year equivalent and they had relatively little machinery and equipment. More seasonal labor was used than on any of the other types of small farms. The primary enterprise was a beef cow herd and this averaged less than 20 cows per farm. Calves were either sold as feeders or in some cases fed out on the farm. Purchased feeder cattle were fed out on some of the farms.

Under the computed optimal plans (see Table 7) the organizations would be shifted toward more intensive livestock enterprises and generally would combine feeder cattle and hog production. Only with corn buying limited or with beef prices very low relative to hog or corn prices would beef cow herds be included in the optimal solutions. The limited labor supply largely accounted for those results—the feeder calf enterprises all would utilize high mechanization feeding systems whereas low mechanization systems would be utilized on the other small farms which have high available labor to capital ratios. Hog enterprises still would be important in the optimal plans but would not dominate the solutions. Generally, farrowing would occur in more than two quarters—often in all four quarters.

As usual for the optimal calculations, corn would be grown to the maximum extent permitted by the acreage restrictions. Hay and rotation pasture would be grown to the extent required by the livestock, wheat to the acreage allotment limit except in systems with a large beef enterprise. Soybeans would be grown on the row-crop land not utilized by corn except where beef cattle requirements would force hay onto some of the row-crop land.

A large amount of corn, up to 5,000 hundredweights, would have to be purchased to feed the livestock in the optimum farm plans. Together with acquiring

TABLE 7 - CURRENT AND OPTIMAL FARM ORGANIZATIONS FOR SMALL BEEF CATTLE FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	Corn Buying:	With	With	With	With	With	Without	Without	With
Corn Acres:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	Organ- ization
Corn for Grain (Acres)	10.0	10.0	10.0	10.0	10.0	10.0	34.0	34.0	3.1
Corn Purchased (Cwt.)	5,548.0	4,763.0	4,975.0	4,398.0	5,595.0	-	-	4,067.0	200.0
Wheat (Acres)	15.0	15.0	5.61	15.0	15.0	15.0	7.1	13.62	0.7
Soybeans (Acres)	9.54	26.79	-	21.14	8.67	6.95	-	-	3.1
Rotation Meadow (Acres)	20.46	3.21	39.39	8.86	21.33	23.05	15.89	9.38	16.1
Hay Harvested (Tons)	51.7	-	109.9	18.6	54.3	64.1	42.4	18.6	21.7
Permanent Pastureland (Acres)	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80
Pastureland Fertilized (Acres)	-	-	80.0	-	-	-	-	-	N.A.
Beef Cow Herd (Head)	-	-	-	-	-	43	28	-	16
Feeder Calves Sold (Head)	-	-	-	-	-	34	22	-	7
Feeder Calves Bought (Head)	77	-	164	28	81	-	-	28	5
Calves Fed on Pasture (Head)	77	-	164	28	81	-	-	28	2 ^b
Litters Farrowed (No. Sows)	59	86	4	66	58	5	22	76	1
Quarters in Which Farrowed	1, 3 & 4	1, 2, 3, & 4	1 & 4	1 & 4	1, 3 & 4	1 & 4	1 & 4	1, 2, 3, & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	3
Hogs Marketed (Head)	413	602	28	462	406	35	154	532	2
Income Minus Variable Costs (\$)	8,409	8,219	5,838	5,045	11,979	4,337	5,900	9,036	1,832 ^c
Capital Borrowed (\$)	32,538	21,491	37,178	22,803	33,366	6,844	7,027	22,192	275
Beef Housing Built (Cows)	32	-	89	-	35	25	10	-	18 ^d
H. M. Feeding Capacity Built (Steers)	77	-	164	28	81	-	-	28	25 ^e
Farrowing Capacity Built (Sows)	24	29	-	31	25	1	25	9	2 ^d
Pig Feeding Capacity Built (Pigs)	407	485	18	510	403	25	410	164	16 ^d
Seasonal Labor Hired (Hours)	104	104	104	-	104	4	21	104	104

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bFed cattle marketed in 1962.

^cNet Income in 1962.

^dCapacity in 1962.

^eLow mechanized capacity in 1962.

the livestock and building facilities, this would result in the necessity to borrow large quantities of funds. However, the returns would pay the cost of borrowing and result in increased income. The optimal plans for this representative farm also would require the hiring of seasonal labor under most circumstances because of the relatively limited amount of family labor available.

Small Hog Farms. The small hog farms were the second most important type of this size found in the sample survey. They had a larger feed grain base in 1962 than the other farms and they planted corn and soybeans as the major crops. Each raised an average of about 21 litters of hogs per year and also purchased several feeder pigs. The typical representative farm also had a small beef cow herd. These farms were better equipped and had an average debt level higher than the other small farms. The debt-to-asset ratio, however, was still very favorable which indicates that the farms were in a favorable position to acquire additional capital.

Under the optimal organizations shown in Table 8 hogs would still dominate, but at a greatly expanded level. Beef cattle would be in the solution, too, with cow herds from which the calves were fed out in most price situations. With beef prices favorable relative to hogs, feeder calves would be purchased and fed and with beef prices very unfavorable relative to hog or corn prices feeder calves would be produced and sold. In some price situations (not shown in Table 8) no beef cattle enterprises would be in the optimal solutions. In plans without corn buying the size of the cow herd would be increased and the calves would be sold as feeder stock.

Corn, as for other representative farms, would be produced up to the maximum extent permitted by the acreage restrictions. With large beef cattle enterprises some of the corn would be used for silage. Soybeans, meadow, and in some solutions oats would make up the balance of the crops produced. Since the feed grain base was larger, these farms would produce more corn and have to buy less than for other small representative farms. The quantity of additional capital required would be large for these farms since large numbers of livestock would have to be purchased and additional facilities would have to be built to care for them.

TABLE 8 - CURRENT AND OPTIMAL FARM ORGANIZATIONS FOR SMALL, HOG FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	Corn Buying: Corn Acres:	With Restricted	With Restricted	With Restricted	With Restricted	With Restricted	Without Restricted	Without Expanded	With Expanded
Corn for Grain (Acres)	28.0	28.0	26.82	28.0	28.0	28.0	47.0	47.0	21.4
Corn for Silage (Acres)	-	-	1.19	-	-	-	-	-	-
Corn Purchased (Cwt.)	2,934.0	2,960.0	4,392.0	2,934.0	3,116.0	-	-	2,421.0	30.0
Oats (Acres)	2.13	14.08	-	2.13	1.82	-	-	8.92	1.0
Soybeans (Acres)	19.0	19.0	5.0	19.0	19.0	3.49	-	-	10.4
Rotation Meadow (Acres)	21.87	9.92	38.0	21.87	22.18	39.51	31.0	22.08	11.5
Hay Harvested (Tons)	55.9	21.0	10.52	58.9	55.9	109.0	83.91	55.88	21.5
Permanent Pastureland (Acres)	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Pastureland Fertilized (Acres)	-	-	70.0	-	-	58.7	29.1	-	N.A.
Beef Cow Herd (Head)	28	14	-	28	28	73	56	28	6
Feeder Calves Sold (Head)	-	11	-	-	-	57	44	-	2
Feeder Calves Bought (Head)	-	-	157	-	-	-	-	-	2
Calves Fed in Drylot (Head)	-	-	14	-	-	-	-	-	-
Calves Fed on Pasture (Head)	22	-	143	22	22	-	-	22	3 ^b
Litters Farrowed (No. Sows)	56	71	11	56	60	16	30	62	21
Quarters in Which Farrowed	1 & 4	1 & 4	1	1 & 4	1, 2, & 4	1 & 4	1 & 4	1 & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	29
Hogs Marketed (Head)	392	497	77	392	420	112	210	434	135
Income Minus Variable Costs (\$)	9,304	8,833	7,492	5,998	12,687	6,625	8,278	10,484	1,380 ^c
Capital Borrowed (\$)	22,068	20,133	32,439	22,068	20,846	19,176	17,277	22,695	2,876 ^d
Beef Housing Built (Cows)	28	-	88	28	28	59	42	28	14 ^d
L. M. Feeding Capacity Built (Steers)	1	-	136	1	1	-	-	22	21 ^d
Farrowing Capacity Built (Sows)	17	25	-	17	9	-	4	20	11 ^d
Pig Feeding Capacity Built (Pigs)	362	482	-	362	229	43	155	412	88 ^d
Seasonal Labor Hired (Hours)	-	-	16.5	-	-	-	-	-	78

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bFed cattle marketed in 1962.

^cNet income in 1962.

^dCapacity in 1962.

Medium Size Farms

There were 67 non-dairy farms in the medium size category in the sample survey. These had about 290 acres per farm with about 185 acres of cropland. The tenure of the farms was nearly equally divided between owners, part-owners, and full tenants, although the breakdown varied considerably from one type of farm to another. The average level of debts was about \$4,000 per farm and assets were about \$50,000. Debt-to-asset ratios on the representative farms varied from about 5 percent to 15 percent. The representative farms were well equipped with an average of two tractors per farm—of which at least one was 3-plow size. Typically, a medium size farm also had a power takeoff combine, a 2-row corn picker, and a hay baler. They had from one to one and one-third man-year equivalents of labor available, primarily from the operator and his family. The 1962 resource bases of these farms are summarized in Table 9 and the optimality calculations for each representative farm are given below.

Medium Size, Cash Grain Farms. Cash grain farms were an important portion of the medium sized farms of northeast Missouri in 1962—about 23 percent. They had as much cropland as other farms of the same size but had much smaller acreages of permanent pasture. The representative farm grew relatively large acreages of soybeans and corn with smaller acreages of oats and hay. The corn acreages grown were considerably lower than the allotment base as most participated in the acreage diversion program. The farms had small hog enterprises and many also had a beef cow herd. They were well equipped and had low debts relative to their assets, but their asset level was considerably lower than other medium size farms because their livestock inventory was very small.

Under the optimal plans for the basic model the acreage of corn would be increased to that permitted by minimum compliance with feed grain allotment (see Table 10). Wheat would be grown to the acreage allotment limit while the soybean acreage would be reduced. Oats and meadow would be grown on the remainder of land with the acreage of meadow determined by the quantity of livestock in the solutions. Livestock output would be increased substantially with hog and feeder cattle enterprises in most solutions. The hog enterprise would tend to dominate except with beef prices high relative to hog prices. Frequently, at high hog prices, hog production would force beef cattle out of the solutions. Beef cow herds would enter the solutions only with feed grain prices high relative to both beef cattle and hog prices. With corn buying prohibited relatively large beef cow herds with feeder calves sold would enter the plans. However, hog production would still dominate with the size of enterprise determined by the amount of corn produced.

Substantial increases in income could be achieved by adopting the optimal plans. This would require the borrowing of large quantities to finance the purchase of livestock and feed and to build the required facilities. It should be noted that considerably less capital would be required for the plans with corn buying restricted. However, under these latter plans income levels also would be reduced relative to other plans at comparable price levels.

TABLE 9 - ORGANIZATIONS AND RESOURCES OF MEDIUM SIZE FARMS IN
NORTHEAST MISSOURI - 1962

	Cash Grain Farms	Mixed Livestock Farms	Beef Farms	Hog Farms
Number of Farms	16	19	10	22
All Land (Acres)	251.8	309.8	311.0	291.5
Cropland (Tillable Acres)	193.9	185.2	172.2	187.3
Permanent Pastureland (Acres)	43.9	113.0	128.1	94.7
Full Owners (Number)	3	9	4	7
Part Owners (Number)	7	6	2	10
Tenants (Number)	6	4	4	5
Feed Grain Base (Acres)	71.7	66.1	37.9	79.3
Wheat Allotment (Acres)	21.6	18.3	13.9	14.2
Crops: Corn (Acres)	34.2	50.6	21.3	61.0
Corn Silage	0.6	1.2	0	2.8
Soybeans (Acres)	79.2	37.7	29.3	22.9
Oats (Acres)	0	5.4	6.3	8.2
Wheat (Acres)	13.4	13.5	7.7	8.2
Hay (Acres)	14.0	35.3	45.4	21.0
Net Corn Sales (Bushels)	1,395.0	282.0	73.0	-329.0
Dairy Capacity (Number Cows)	2.9	1.8	1.8	1.1
Dairy Cows (Number)	1	1.2	0.6	1.1
Farrowing Capacity (Sows)	4	12	5	15
Sows (Head)	5	9	4	23
Pigs Farrowed (Head)	30	104	39	297
Feeder Pigs Purchased (Head)	11	6	11	52
Beef Cow Capacity (Head)	26	35	52	35
Feeder Calf Sales (Head)	4	6	19	6.6
Beef Cows (Head)	7	23	28	16
Feeder Cattle Purchased (Head)	0	4	5	6
Size of Tractor	3-plow	3-plow	3-plow	3-plow
Average Number of Tractors	2.0	2.3	2.0	2.2
Combine	6' PTO	6' PTO	5' PTO	6' PTO
Corn Picker	2 row	1 row	2 row	2 row
Balers Owned?	No	Yes	Yes	Yes
Labor Available (Man Months)	13.7	14.7	15.9	16.6
Permanent Hired Labor (Man Mo.)	0	0	1.5	1.8
Seasonal Labor Hired (Days)	9.5	22.2	11.3	7.9
Assets (\$)	35,527	61,297	55,575	45,092
Debts (\$)	2,335	5,533	7,690	2,414

TABLE 10 - CURRENT AND OPTIMAL FARM ORGANIZATIONS FOR MEDIUM SIZE CASH GRAIN FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	Corn Buying: Corn Acres:	With Restricted	With Restricted	With Restricted	With Restricted	With Restricted	Without Restricted	Without Expanded	With Expanded
Corn for Grain (Acres)	57.0	57.0	54.56	57.0	57.0	57.0	102.0	102.0	34.2
Corn for Silage (Acres)	-	-	2.44	-	-	-	-	-	0.6
Corn Purchased (Cwt.)	6,247.0	5,520.0	6,651.0	5,753.0	6,264.0	-	-	5,065.0	-1,395.0
Oats (Acres)	41.26	50.81	-	42.24	41.22	27.81	52.36	53.52	-
Wheat (Acres)	22.0	22.0	22.0	22.0	22.0	22	22	22	13.4
Soybeans (Acres)	45.0	45.0	45.0	45.0	45.0	45	-	-	79.2
Rotation Meadows (Acres)	14.74	5.19	56.0	13.77	14.78	28.21	17.64	16.48	14.0
Hay Harvested (Tons)	26.8	-	152.7	26.8	26.8	74.8	41.7	30.5	26.2
Permanent Pastureland (Acres)	44.0	44.0	44.0	44.0	44.0	44	44	44	44
Pastureland Fertilized (Acres)	-	-	44.0	-	-	44	5	-	N.A.
Beef Cow Herd (Head)	-	-	-	-	-	50	28	-	7
Feeder Calves Sold (Head)	-	-	-	-	-	39	22	-	4
Feeder Calves Bought (Head)	40	-	210	40	40	-	-	45	-
Calves Fed in Drylot (Head)	-	-	119	-	-	-	-	-	-
Calves Fed on Pasture (Head)	40	-	91	40	40	-	-	45	-
Litters Farrowed (No. Sows)	132	143	44	124	133	43	81	143	4
Quarters in Which Farrowed	1 & 4	1, 2, & 4	1 & 4	1 & 4	1, 2, & 4	1 & 4	1 & 4	1, 2, 3 & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	11
Hogs Marketed (Head)	924	1,001	308	868	931	301	567	1,001	27
Income Minus Variable Costs (\$)	18,176	17,878	12,502	11,866	24,669	12,882	16,728	20,393	2,991 ^b
Capital Borrowed (\$)	38,022	36,972	58,896	41,387	37,891	18,394	21,025	40,139	2,335
Beef Housing Built (Cows)	-	-	110	-	-	24	2	4	26 ^c
L. M. Feeding Capacity Built (Steers)	-	-	-	-	1	-	-	-	37 ^c
H. M. Feeding Capacity Built (Steers)	3	-	200	39	2	-	-	45	-
Farrowing Capacity Built (Sows)	38	54	15	55	37	15	34	38	4 ^c
Pig Feeding Capacity Built (Pigs)	661	914	293	933	650	292	592	669	32 ^c
Seasonal Labor Hired (Hours)	84	-	-	-	94	-	-	84	95

^aPrices: For corn, hogs, and beef respectively: L-Low, M-Medium, H-High.

^bNet income for 1962.

^cCapacity in 1962.

Medium Size, Mixed Livestock Farms. The representative medium sized mixed livestock farm had an average of 310 acres of land of which 185 were cropland and 113 were permanent pastureland. These farms grew more corn and less soybeans than the cash grain farms but on an average still did not completely utilize their feed grain bases. They sold some corn as well as wheat and soybeans, but received the largest share of their cash receipts from hogs raised on the farm and from a beef cow herd. Calves were sold as feeders from some farms and as fat stock from others. The representative farm had sizeable livestock facilities and was well equipped. Debt levels were low relative to assets, indicating that the representative farm operation was in a favorable position for borrowing capital.

Under the optimal plans (see Table 11) with corn acreage restricted the representative farm would grow slightly more corn than with the 1962 operations. Soybean acreages would be increased considerably except with unfavorable beef cattle price ratios, but with prices favoring beef cattle, forage production would replace soybeans to some extent. Hog production and cattle feeding would be the main livestock enterprises without either dominating the plans with normal price relationships. Beef cow herds would be relatively unimportant except with plans not allowing corn buying. Then sizable cow herds would be in the optimal plans with the calves sold as feeders (or fed on the farm in some situations).

Incomes could be increased substantially under the optimal plans but the borrowing of large quantities of capital, as much as \$70,000, would be required to implement them. The plans with corn purchasing not permitted would not require as much capital, but they also would not produce as much income as other plans at the same price levels. The high level of assets plus low debts of the representative farm permitted a large expansion in the operation by use of borrowed funds.

Medium Size Beef Farms. There were fewer beef production farms than other types among the medium sized farms in northeast Missouri. The main enterprise on the representative beef cattle farm was a cow herd from which feeder calves were sold. A small hog enterprise was also typical. Although these farms had about as much cropland as other medium sized farms they did not grow as large an acreage of row crops and they had a relatively low feed grain base. They did grow larger acreages of hay. They also had relatively higher debts, but were still in a favorable financial position and thus could acquire the funds needed for expansion under normal lending procedures.

Under the optimal plans (shown in Table 12) corn production would be increased to the maximum acreage permitted, but with beef cattle prices high relative to hog prices, silage would be made from part of the corn. The soybean acreage would be increased substantially under the optimal plans with the corn acreage restricted to compliance with the feed grain program. The remainder of the cropland would be divided between wheat, hay, and oats, with wheat grown to the acreage allotment limit, hay to the extent required by the livestock, and oats on the remaining cropland.

TABLE 11 - CURRENT AND OPTIMAL FARM ORGANIZATIONS FOR MEDIUM SIZE MIXED LIVESTOCK FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	With	With	With	With	With	Without	Without	With	Organ-
	Corn Acres:	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	ization
Corn for Grain (Acres)	53.0	53.0	50.04	53.0	53.0	53.0	111.0	111.0	50.6
Corn for Silage (Acres)	-	-	2.96	-	-	-	-	-	1.2
Corn Purchased (Cwt.)	9,891.0	8,039.0	9,315.0	8,108.0	9,891.0	-	-	6,631.0	-282.0
Oats (Acres)	-	36.25	-	11.12	-	7.53	7.53	21.43	5.4
Wheat (Acres)	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	13.5
Soybeans (Acres)	58.0	58.0	37.62	58.0	58.0	58.0	-	-	37.7
Rotation Meadow (Acres)	43.0	6.75	63.37	31.88	43.0	35.47	23.25	34.57	35.3
Hay Harvested (Tons)	109.0	-	71.9	78.0	109.0	95.9	58.3	84.8	72.8
Permanent Pastureland (Acres)	113.0	113.0	113.0	113.0	113.0	113.0	113.0	113.0	113.0
Pastureland Fertilized (Acres)	45.1	-	113.0	-	45.1	-	-	9.85	N.A.
Beef Cow Herd (Head)	-	-	-	-	-	64	29	-	23
Feeder Calves Sold (Head)	-	-	-	-	-	50	-	-	6
Feeder Calves Bought (Head)	163	-	259	116	163	-	-	126	4
Calves Fed in Drylot (Head)	-	-	27	-	-	-	-	-	7.6 ^b
Calves Fed on Pasture (Head)	163	-	232	116	163	-	23	126	-
Litters Farrowed (No. Sows)	116	177	57	114	116	34	71	125	15
Quarters in Which Farrowed	1, 2, 3 & 4	1, 2, 3, & 4	1 & 4	1, 2, & 4	1, 2, 3, & 4	1 & 4	1 & 4	1, 3 & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	6
Hogs Marketed (Head)	812	1,239	399	798	812	238	497	875	142
Income Minus Variable Costs (\$)	20,264	19,150	14,921	12,798	27,948	13,617	17,620	21,703	3,167 ^c
Capital Borrowed (\$)	62,982	37,836	70,514	50,816	62,982	13,408	14,763	50,165	5,533 ^d
Beef Housing Built (Cows)	71	-	133	41	71	29	8	47	35 ^d
H. M. Feeding Capacity Built (Steers)	163	-	259	116	163	-	23	126	51 ^e
Farrowing Capacity Built (Sows)	35	39	17	39	35	6	24	31	12 ^d
Pig Feeding Capacity Built (Pigs)	650	715	364	727	65	19	475	594	96 ^d
Seasonal Labor Hired (Hours)	222	222	222	68	222	-	-	222	222

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bFed cattle marketed in 1962.

^cNet income in 1962.

^dCapacity in 1962.

^eLow mechanization capacity in 1962.

TABLE 12 - CURRENT AND OPTIMAL FARM ORGANIZATIONS FOR MEDIUM SIZE BEEF FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	With	With	With	With	With	Without	Without	With	Organ-
Corn Buying:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	ization
Corn Acres:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	
Corn for Grain (Acres)	30.0	30.0	8.36	30.0	30.0	30.0	103.0	103.0	21.3
Corn for Silage (Acres)	-	-	21.64	-	-	-	-	-	-
Corn Purchased (Cwt.)	11,283.0	9,694.0	11,374.0	10,681.0	11,481.0	-	-	8,868.0	40.0
Oats (Acres)	9.34	52.0	-	9.74	-	1.31	22.04	2.3	7.7
Wheat (Acres)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	6.3
Soybeans (Acres)	73.0	73.0	50.7	73.0	11.12	73.0	-	-	29.3
Rotation Meadow (Acres)	36.56	7.05	67.84	36.26	87.29	44.69	31.96	51.69	45.4
Hay Harvested (Tons)	88.2	-	187.4	88.3	243.0	123.8	84.6	134.7	83.7
Permanent Pastureland (Acres)	128.0	128.0	128.0	128.0	128.0	128.0	128.0	128.0	128.0
Pastureland Fertilized (Acres)	-	-	128.0	-	-	17.8	-	67.4	N.A.
Beef Cow Herd (Head)	-	-	-	-	-	83	42	-	28
Feeder Calves Sold (Head)	-	-	-	-	-	65	-	-	19
Feeder Calves Bought (Head)	132	-	304	132	323	-	-	201	5
Calves Fed in Drylot (Head)	-	-	39	-	192	-	33	-	-
Calves Fed on Pasture (Head)	132	-	265	132	131	-	-	201	11 ^b
Litters Farrowed (No. Sows)	142	190	55	133	97	17	58	110	6
Quarters in Which Farrowed	1, 2, 3, & 4	1, 2, 3, & 4	1 & 4	1, 2, 3, & 4	3 & 4	1, 3, & 4	1, 2 & 4	1, 3, & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	11
Hogs Marketed (Head)	994	1,237	385	931	679	119	406	770	43
Income Minus Variable Costs (\$)	20,243	18,953	14,632	12,507	35,580	11,927	16,795	22,296	2,876 ^c
Capital Borrowed (\$)	62,403	43,787	87,508	60,060	80,404	14,247	16,110	77,649	7,690 ^d
Beef Housing Built (Cows)	33	-	146	34	158	31	11	79	52 ^d
H. M. Feeding Capacity Built (Steers)	132	-	299	132	323	-	33	201	79 ^e
Farrowing Capacity Built (Sows)	43	47	21	43	92	2	23	35	5 ^d
Pig Feeding Capacity Built (Pigs)	656	700	340	634	622	22	314	512	40 ^d
Seasonal Labor Hired (Hours)	113	50	113	113	87	-	-	113	113

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bFed cattle marketed in 1962.

^cNet income in 1962.

^dCapacity in 1962.

^eLow mechanization capacity in 1962.

The livestock enterprises would consist of cattle feeding and hog raising without one being dominant at normal price relationships, although hog production appeared to be slightly more profitable, i.e., reducing hog prices would lower income more than reducing beef cattle prices. Beef cows would be important only with corn prices high and hog prices low relative to beef cattle prices, and with corn buying not permitted. As is typical of the optimal solutions, income would be increased substantially and this would be accomplished by the use of large quantities of borrowed capital for acquiring livestock, feed, and feeding facilities. Those plans with feeder cattle dominating would use considerably more capital than plans with hogs dominant since purchasing cattle requires a large outlay of funds.

Medium Size Hog Farms. The medium sized farms that specialized in hog production were the most numerous group of this size in the area. These farms produced a relatively large acreage of corn and smaller acreages of soybeans, hay, wheat, and oats. In addition the representative farm also bought some corn for feeding to livestock. The typical farm had a relatively large hog enterprise and a small beef cow herd and on the average farm several feeder pigs were purchased. The farms had relatively low debt and high asset levels and consequently were in a favorable financial situation for making adjustments.

Under the computed optimal plans (see Table 13), the farms would grow about the same corn acreage as in 1962, except when compliance with the feed grain base was not required. In this case the corn acreage would be increased to that permitted by the row crop limitation. Wheat would be grown to the acreage allotment limit, forage to the extent required by the livestock, soybeans on the residual row cropland and oats on the remaining cropland, if any. Under most price situations the livestock grown would be a combination of purchased calves fed on pasture and hogs raised on the farms, with hog production tending to dominate. Beef cows would be important in the optimal plans only with corn and beef prices high relative to hog prices (not shown in Table 13) and when corn buying is not permitted. In some of these latter plans feeder calves would be sold and in others the calves would be fed on the farms.

Large income increases could be achieved by making the adjustments indicated. However, it would take a large increase in borrowed capital to finance the added livestock, feed, and facilities. The expansion in beef feeding facilities would always be of the type that involves the use of highly mechanized systems. The existing low mechanized facilities would not be used. Farm plans without cattle feeding and those without corn buying would require considerably less capital than plans including these activities.

TABLE 13 - CURRENT AND OPTIMAL ORGANIZATIONS FOR MEDIUM SIZE HOG FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	With	With	With	With	With	Without	Without	With	Organ-
Corn Acres:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	ization
Corn for Grain (Acres)	64.0	64.0	58.3	64.0	58.3	64.0	112.0	112.0	61.0
Corn for Silage (Acres)	-	-	5.7	-	5.7	-	-	-	2.8
Corn Purchased (Cwt.)	10,064.0	8,824.0	10,288.0	8,715.0	10,843.0	-	-	8,072.0	329.0
Oats (Acres)	14.88	36.67	-	15.28	-	6.94	30.54	24.23	8.2
Wheat (Acres)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	8.2
Soybeans (Acres)	48.0	48.0	31.19	48.0	48.0	48.0	-	-	22.9
Rotation Meadow (Acres)	29.12	7.33	60.81	28.72	44.0	37.06	29.46	29.17	21.0
Hay Harvested (Tons)	65.17	-	161.8	65.2	110.5	99.7	76.0	65.2	48.5
Permanent Pastureland (Acres)	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
Pastureland Fertilized (Acres)	-	-	95.0	-	74.2	22.9	-	-	N.A.
Beef Cow Herd (Head)	-	-	-	-	-	66	38	-	16
Feeder Calves Sold (Head)	-	-	-	-	-	52	3	-	7
Feeder Calves Bought (Head)	97	-	246	97	174	-	-	97	6
Calves Fed in Drylot (Head)	-	-	51	-	-	-	-	-	-
Calves Fed on Pasture (Head)	97	-	195	97	174	-	28	97	9 ^b
Litters Farrowed (No. Sows)	164	198	89	143	135	43	59	165	42
Quarters in Which Farrowed	1, 2, 3 & 4	1, 2, 3, & 4	1 & 4	1, 2 & 4	1, 2, 3 & 4	1 & 4	1 & 4	1, 2, 3 & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	52
Hogs Markted (Head)	1,148	1,386	623	1,001	945	301	413	1,155	224
Income Minus Variable Costs (\$)	21,977	20,995	15,430	13,491	30,598	14,222	17,715	22,759	3,589 ^c
Capital Borrowed (\$)	56,628	42,575	77,319	52,159	69,927	16,393	17,657	52,140	2,414 ^d
Beef Housing Built (Cows)	27	-	124	27	77	30	20	27	35 ^e
H. M. Feeding Capacity Built (Steers)	97	-	246	97	174	-	28	97	53 ^e
Farrowing Capacity Built (Sows)	35	38	29	38	33	7	19	29	15 ^d
Pig Feeding Capacity Built (Pigs)	679	731	591	721	650	227	430	589	120 ^d
Seasonal Labor Hired (Hours)	79	21	79	50	79	-	-	79	79

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bFed cattle marketed in 1962.

^cNet income in 1962.

^dNet income in 1962.

^eLow mechanization capacity in 1962.

Large Farms

The sample survey included 73 operations classified as large non-dairy farms with 16 cash grain, 19 mixed livestock, 14 beef cattle, and 24 hog farms. The average representative farm had over 600 acres of land per farm of which about 450 were cropland. Part ownership was the major type of tenancy with only about 18 percent of the farms operated by full tenants and 30 percent by full owners. On the average, total and relative debts were higher than for the smaller farms; average debt level was about \$15,000 per farm and debt-to-asset ratios ranged from 8 to 40 percent for the representative farms. Generally, the farms were very well equipped with 3- or 4-plow, and in many cases even larger, tractors. The typical farm had about two man-years of labor equivalents available and hired a sizeable amount of seasonal labor. Most of the permanent labor was furnished by the operator, his partners, and family. Relatively few had full time hired help. The 1962 resource bases of the large representative farms are summarized in Table 14.

Large Cash Grain Farms. The representative large cash grain farm had 655 acres of land with 509 acres of cropland and 139 acres of permanent pasture. These farms grew relatively large acreages of corn and soybeans with smaller amounts of wheat and hay. They also had a small hog enterprise and a beef cow herd, but received the major share of their income from the sale of cash crops. They were well equipped with an average of more than two tractors per farm with at least one 4-plow or larger tractor, a self-propelled combine, a 2-row picker, and a hay baler. The debt-to-asset ratio was relatively high on these farms since the mortgage debt of one farm was very large because of a recent expansion. The typical farm in the group, however, had a relatively low debt-to-asset ratio and thus was in a favorable position to acquire added capital. Because of this the farm with the highest debt level was left out of the calculations in determining the credit limits for the optimality calculations.

The results of these calculations are shown in Table 15. With the optimal plans the large cash grain farms would shift to livestock operations with hogs tending to dominate at the historical price ratios. Feeder cattle enterprises would also be included with calves purchased and fed on pasture. Beef cow herds would come into solutions with cattle prices low relative to hog prices. Drylot feeding of purchased calves would come into the plans in addition to pasture feeding with beef cattle prices high relative to hog prices. Since labor was not overly restrictive on this type of farm low mechanization beef feeding systems sometimes would be utilized. Large quantities of corn would have to be purchased and extra facilities built to handle the livestock the plans indicate would be most profitable.

With exclusion of the corn buying activity, the optimal plans would be altered. With the restricted corn acreage, a large hog operation and a beef cow herd would be the livestock enterprises. Some calves from the herd would be sold as feeders and some would be fed on the farm. Corn, oats, wheat, soybeans, and rotation meadow crops would be grown. However, when the corn acreage

TABLE 14 - ORGANIZATION AND RESOURCES OF LARGE FARMS IN
NORTHEAST MISSOURI - 1962

	Cash Grain Farms	Mixed Livestock Farms	Beef Farms	Hog Farms
Number of Farms	16	19	14	24
All Land (Acres)	655	594.4	647.1	599.1
Cropland (Acres)	509	433.5	400.3	420.3
Permanent Pastureland (Acres)	139	146.9	226.8	159.7
Owners	1	5	9	7
Part-Owners	13	9	4	12
Tenants	2	5	1	5
Feed Grain Base (Acres)	218.7	102.6	111.8	222.5
Wheat Allotment (Acres)	39.4	42.2	42.5	43.3
Crops Grown: Corn (Acres)	158.8	95.2	93.5	104.2
Corn Silage (Acres)	3.3	7.7	17.1	8.6
Soybeans (Acres)	183.0	87.3	36.6	63.7
Oats (Acres)	9.5	7.1	16.1	10.8
Wheat (Acres)	31.6	35.0	24.4	22.4
Hay (Acres)	32.8	36.8	94.9	51.7
Net Corn Sales (Bushels)	5,592	1,430	742	-1,270
Dairy Capacity (Cows)	1.6	2.6	7	1.5
Dairy Cows (Head)	1.8	2.9	1.1	2.9
Farrowing Capacity (Sows)	11.0	19	10	28
Sows	13.0	22	15	44
Pigs Farrowed	114.0	212	101	622
Feeder Pigs Bought	22.0	28	16	6
Beef Cow Capacity	29	47	113	44
Beef Cows (Head)	20	20	34	36
Feeder Calves Sold	11	3	5	15
Feeder Cattle Purchased	2	42	94	6
Size of Largest Tractor	4-plow	4-plow	3-plow	4-plow
Number of Tractors	2.6	2.9	2.9	2.9
Combine	10' SP	10' SP	10' SP	6- PTO
Corn Picker	2-row	2-row	2-row	2-row
Baler Owned?	Yes	Yes	Yes	Yes
Field Chopper Owned?	No	No	Yes	No
Labor Available (Man Months)	25.9	24.6	20.4	27.1
Permanent Hired Labor (Man Mo.)	2.0	2.5	3.0	3.0
Seasonal Labor Hired (Days)	43.2	12.5	45.6	29.9
Assets (\$)	88,476	69,789	138,236	97,519
Debts (\$)	39,707	11,631	11,386	20,353

TABLE 15 - CURRENT AND OPTIMAL FARM PLANS FOR LARGE CASH GRAIN FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	With	With	With	With	With	Without	Without	With	Organ-
Corn Buying:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	ization
Corn Acres:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	
Corn for Grain (Acres)	170.0	170.0	165.63	170.0	170.0	170.0	305.0	305.0	158.8
Corn for Silage (Acres)	-	-	4.37	-	-	-	-	-	3.3
Corn Purchased (Cwt.)	7,145.0	6,175.0	9,089.0	6,877.0	7,308.0	-	-	4,058.0	-5,592.0
Oats (Acres)	97.04	104.7	-	82.08	94.1	77.22	144.96	122.67	9.5
Wheat (Acres)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	31.6
Soybeans (Acres)	135.0	135.0	135.0	135.0	135.0	135.0	-	-	183.0
Rotation Meadow (Acres)	24.96	17.3	122.0	39.92	27.86	44.78	20.04	42.33	32.8
Hay Harvested (Tons)	48.2	23.44	339.5	95.97	56.1	115.6	33.5	95.6	72.8
Permanent Pastureland (Acres)	139.0	139.0	139.0	139.0	139.0	139.0	139.0	139.0	139.0
Pastureland Fertilized (Acres)	-	-	139.0	-	-	-	-	-	N.A.
Beef Cow Herd (Head)	-	16	-	1	-	71	8	-	20
Feeder Calves Sold (Head)	-	12	-	-	-	42	-	-	11
Feeder Calves Bought (Head)	72	-	478	139	84	-	27	143	2
Calves Fed in Drylot (Head)	-	-	193	-	-	-	-	-	-
Calves Fed on Pasture (Head)	72	-	285	140	84	14	33	143	30 ^b
Litters Farrowed (No. Sows)	216	244	25	177	217	125	167	232	16
Quarters in Which Farrowed	1, 2, & 4	1, 2, & 4	1 & 4	1 & 4	1, 2, 3 & 4	1, 2, 3, & 4	1, 2, 3, & 4	1, 2, 3, & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	22
Hogs Marketed (Head)	1,512	1,708	175	1,239	1,519	875	1,169	1,624	73
Income Minus Variable Costs (\$)	38,536	37,905	32,262	26,503	50,769	33,070	42,204	44,441	4,500 ^c
Capital Borrowed (\$)	61,162	57,130	106,401	73,332	61,920	41,924	45,678	72,846	39,707 ^d
Beef Housing Built (No. Cows)	18	-	282	64	26	51	-	64	29 ^d
L. M. Feeding Capacity Built (Steers)	26	-	120	-	38	-	-	-	46 ^d
H. M. Feeding Capacity Built (Steers)	-	-	312	95	-	14	33	143	-
Farrowing Capacity Built (Sows)	64	70	1	78	60	46	63	58	11 ^d
Pig Feeding Capacity Built (Pigs)	1,119	1,214	176	1,331	1,042	824	1,095	1,009	88 ^d
Seasonal Labor Hired (Hours)	-	-	433	-	35	-	-	16	432

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bFed cattle marketed in 1962.

^cNet income in 1962.

^dCapacity in 1962.

restriction is removed the corn acreage would be increased and soybean production would be eliminated. The amount of borrowed capital required would be substantially reduced where corn is not purchased.

Large Mixed Livestock Farms. In 1962 the representative farm for the large, mixed livestock class had about 594 acres of land with 433 acres of cropland and 147 acres of permanent pasture. These farms had smaller average feed grain acreage bases and grew less corn and soybeans than the cash grain farms. They did produce more corn than they fed and thus sold corn as well as wheat and soybeans. The typical farm had about three tractors with at least one 4-plow tractor and in the major equipment category also had a self-propelled combine, a 2-row picker and a baler. They averaged about \$70,000 in assets and \$11,000 in debts, indicating that their financial position was favorable for acquiring additional capital. They also had the equivalent of about two man-year equivalents of labor available, most of which was labor of the operator, his family, and, in some cases, a partner. The average farm received most of its income from a medium sized hog enterprise and from feeding cattle—both purchased calves and those raised on the farm.

Under the optimal plans shown in Table 16 the representative farms would continue to raise hogs and feed cattle—but at greatly expanded levels and using purchased calves almost exclusively. Beef cows would enter the solutions only with corn prices high relative to both cattle and hog prices, or with corn buying not allowed. Multiple period farrowing would be used for the hogs with pigs farrowed in all four quarters under many price situations. Purchased calves would be fed on pasture except with beef cattle prices high relative to hog prices; in this case, some cattle would also be fed in drylot. The high mechanization feeding systems would be used for the cattle feeding even though the existing low mechanization facilities would not be used. With labor limited on these farms, a greater volume could be handled by building new facilities that reduce the labor input.

Corn would be grown to the maximum extent permitted, with some used for silage with relatively high cattle prices. In addition, large quantities of corn would be purchased. Wheat would be grown to the acreage allotment limit and forages to the extent required by the livestock. Soybeans would be grown on the row-crop land not used by corn except at relatively high beef cattle prices where forage growing forced the soybeans out. Oats would be grown on any residual cropland.

When corn buying is not permitted, hogs dominate the optimal plans, with some beef cattle also produced. With the corn acreage restricted, a relatively large beef cow herd with feeder calves being sold would be included, but with the corn acreage expanded a small cow herd with the calves being fed out would be supplemented by purchased feeder cattle. A larger corn supply accounts for the elimination of the sale of feeder calves as an enterprise.

TABLE 16 - CURRENT AND OPTIMAL FARM PLANS FOR LARGE MIXED LIVESTOCK FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962 Farm Organ- ization
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	
	With	With	With	With	With	Without	Without	With	
	Corn Acres: Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	
Corn for Grain (Acres)	82.0	82.0	68.82	82.0	68.82	82.0	260.0	260.0	95.2
Corn for Silage (Acres)	-	-	13.18	-	13.18	-	-	-	7.7
Corn Purchased (Cwt.)	14,545.0	11,878.0	12,495.0	12,076.0	14,680.0	-	-	7,977.0	-1,430.0
Oats (Acres)	29.57	100.85	4.81	67.45	61.69	64.18	106.63	-	7.1
Wheat (Acres)	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	35.0
Soybeans (Acres)	178.0	178.0	178.0	178.0	178.0	178.0	-	-	87.3
Rotation Meadow (Acres)	44.31	10.15	106.19	43.55	45.71	46.82	25.37	44.74	36.8
Hay Harvested (Tons)	101.1	-	293.7	101.0	105.8	124.7	52.5	101.1	80.2
Permanent Pastureland (Acres)	147.0	147.0	147.0	147.0	147.0	147.0	147.0	147.0	147.0
Pastureland Fertilized (Acres)	-	-	147.0	-	26.2	-	-	-	N.A.
Beef Cow Herd (Head)	-	-	-	-	-	83	9	-	20
Feeder Calves Sold (Head)	-	-	-	-	-	66	-	-	3
Feeder Calves Bought (Head)	151	-	444	151	178	-	52	151	42
Calves Fed in Drylot (Head)	-	-	142	-	-	-	-	-	-
Calves Fed on Pasture (Head)	151	-	302	151	178	-	59	151	29 ^b
Litters Farrowed (No. Sows)	225	274	38	195	218	67	174	234	30
Quarters in Which Farrowed	1, 2, 3 & 4	1, 2, 3 & 4	1 & 4	1, 3 & 4	1, 2, 3 & 4	1 & 4	1, 2 & 4	1, 2, 3 & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	28
Hogs Marketed (Head)	1,575	1,918	266	1,365	1,526	469	1,218	1,638	215
Income Minus Variable Costs (\$)	35,654	34,173	28,075	23,920	47,945	25,487	36,930	39,917	4,629 ^c
Capital Borrowed (\$)	91,429	56,902	104,337	72,863	92,093	21,096	30,533	70,426	11,631 ^d
Beef Housing Built (Cows)	51	-	242	51	69	36	-	51	47 ^d
H. M. Feeding Capacity Built (Steers)	151	-	444	151	178	-	59	151	70 ^e
Farrowing Capacity Built (Sows)	49	52	-	47	82	15	39	52	19 ^d
Pig Feeding Capacity Built (Pigs)	939	984	152	907	840	385	774	785	152 ^d
Seasonal Labor Hired (Hours)	125	119	125	37	125	-	-	125	125

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bFed cattle marketed in 1962.

^cNet income in 1962.

^dCapacity in 1962.

^eLow mechanization capacity in 1962.

Large Beef Cattle Farms. The representative large beef cattle farm had 647 acres of land with 400 acres of cropland and 227 acres of permanent pastureland. These farms had a relatively small feed grain acreage base, 112 acres, and they grew corn on about that acreage. They also grew smaller acreages of wheat, oats, and soybeans but large acreages of hay. The livestock enterprise was concentrated on beef cattle with a small cow herd and purchased feeder cattle enterprises. A small hog enterprise was maintained on the typical farm. In addition to the major equipment typical of the other large farms—tractors, combine, corn picker, and baler—the beef cattle farms had a forage chopper. Because of their investment in livestock they had a larger value of assets than the other large farms and they had lower debts as well and thus were in very favorable financial condition. They had less labor available with only about one and two-thirds man-year equivalents, but they hired more seasonal labor than the other large farms.

Under the optimal plans (see Table 17) computed for the large beef farms, these firms would expand the output beef cattle and hog production with cattle tending to dominate. Cattle feeding, using steers fed grain on pasture, would dominate the solutions with normal price relationships and with relatively high beef prices. Only with corn priced high relative to both beef and hogs would beef cows enter the solutions (with corn buying allowed). Corn and wheat would be grown to the maximum acreage permitted, but, since the corn acreage base is relatively small, a large acreage of soybeans would be grown under most price relationships. Hay and rotation pasture would be grown to the extent required by the livestock and oats would be grown on the residual acreage. The corn acreage would produce insufficient quantities of feed for the livestock that could profitably be handled and thus large quantities of corn would have to be purchased. To finance the added livestock, feed, and livestock facilities, large sums would have to be borrowed—frequently more than \$100,000. With cattle feeding as an important enterprise more capital would be required to purchase the feeder animals and their feed than would be required for plans with other types of livestock enterprises.

If corn buying is restricted, the optimal plans are altered considerably for this type of farm. Beef cow herds would enter the solutions and hog production would become much more important. With the corn acreage restricted, feeder calves would be sold but, with an expanded corn acreage, the calves would be fed and additional calves also would be purchased and fed. This latter plan would be similar to that with corn buying at the same price relationships and would be more profitable, although somewhat smaller enterprises would prevail. Considerably less capital borrowing would be required if corn were not purchased. The plan with corn buying allowed along with the expanded corn acreage, indicates that it would still be profitable to buy corn to expand the size of business.

TABLE 17 - CURRENT AND OPTIMAL FARM ORGANIZATIONS FOR LARGE BEEF FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	With	With	With	With	With	Without	Without	With	Organ-
Corn Acres:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	ization
Corn for Grain (Acres)	89.0	89.0	89.0	89.0	89.0	89.0	240.0	240.0	93.5
Corn for Silage (Acres)	-	-	-	-	-	-	-	-	17.1
Corn Purchased (Cwt.)	11,538.0	9,678.0	11,165.0	11,182.0	12,865.0	-	-	3,261.0	-742.0
Oats (Acres)	34.36	86.4	-	34.56	-	37.69	69.71	57.29	16.1
Wheat (Acres)	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	24.4
Soybeans (Acres)	151.0	151.0	136.64	151.0	151.0	151.0	-	-	36.6
Rotation Meadow (Acres)	60.64	8.6	109.36	60.44	60.8	57.31	47.29	59.71	94.9
Hay Harvested (Tons)	156.5	-	305.4	156.5	156.5	156.3	122.7	156.4	156.6
Permanent Pastureland (Acres)	227.0	227.0	227.0	227.0	227.0	227.0	227.0	227.0	227.0
Pastureland Fertilized (Acres)	-	-	216.0	-	-	-	-	-	N.A.
Beef Cow Herd (Head)	-	-	-	-	-	85	13	-	34
Feeder Calves Sold (Head)	-	-	-	-	-	24	-	-	5
Feeder Calves Bought (Head)	234	-	456	234	234	-	143	234	94
Calves Fed in Drylot (Head)	-	-	-	-	-	-	-	-	-
Calves Fed on Pasture (Head)	234	-	456	234	234	43	153	234	83 ^b
Litters Farrowed (No. Sows)	140	239	10	134	153	44	102	112	15
Quarters in Which Farrowed	1, 3 & 4	1, 2, 3, & 4	4	1 & 4	1, 3, & 4	1 & 4	1 & 4	1, 3, & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	-
Hogs Marketed (Head)	980	1,673	70	938	1,071	308	714	784	106
Income Minus Variable Costs (\$)	32,396	30,117	27,362	22,054	42,854	24,998	34,158	36,170	4,065 ^c
Capital Borrowed (\$)	91,874	64,687	108,200	83,668	102,877	12,361	31,822	52,972	11,386 ^d
Beef Housing Built (Cows)	39	-	183	39	39	-	-	39	112 ^d
H. M. Feeding Capacity Built (Steers)	234	-	456	234	234	43	153	234	160 ^e
Farrowing Capacity Built (Sows)	56	65	-	57	98	12	41	43	10 ^d
Pig Feeding Capacity Built (Pigs)	977	1,114	-	989	1,100	270	734	765	80 ^d
Seasonal Labor Hired (Hours)	376	221	456	347	280	151	293	456	456

^aPrices: For corn, hogs, and beef respectively: L-Low, M-Medium, H-High.

^bFed cattle marketed in 1962.

^cNet income in 1962.

^dCapacity in 1962.

^eLow mechanization capacity in 1962.

Large Hog Farms. The representative farm for the large hog producers had 599 acres of land of which 420 acres were cropland and 160 were permanent pastureland. These farms had an average feed grain base of 223 acres with a 43-acre wheat allotment. Typically, they produced 113 acres of corn, 64 acres of soybeans, 22 acres of wheat, 52 acres of hay, and 71 acres of oats. They also purchased corn to supplement that raised on the farm. The major enterprise was hog production with about 90 litters produced in 1962. Typical farms also had a 36-cow beef herd from which they sold feeder calves or fat stock. The farms were well equipped but were the only large farms which typically did not have a self-propelled combine. They had more than two man-year equivalents of labor available and hired about 30 days of seasonal help. The average level of debts was \$20,000 but assets were about five times that amount so that the financial position was relatively favorable and would allow substantial expansion by borrowing on equity of the farms.

Under the optimal plans (see Table 18) the farms would increase the output of both beef cattle and hogs, but hog production would continue to dominate the operations. With the historical price relationships, a combination of a beef cow herd with the calves fed out plus some purchased feeder calves would be the typical beef enterprise on these farms. Since the corn acreage could be expanded substantially on these farms, less corn would be purchased than for the optimal plans on the other large farms. The typical acreage of soybeans would also be lower on these farms because more of the cropland could be in corn.

With corn buying not permitted the plans would shift toward a larger beef cow herd with the calves either sold as feeders or fattened on pasture. Somewhat fewer hogs would be produced but the reduction in the size of business would not be as great as when corn buying is restricted on the other representative farms because of the larger feed grain base. Capital was more restrictive on these hog farms and thus limited the expansion sooner than on the other representative farms. However, the operators would borrow relatively large quantities to expand the size of business and thereby increase their incomes.

TABLE 18 - CURRENT AND OPTIMAL FARM PLANS FOR LARGE HOG FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	With	With	With	With	With	Without	Without	With	Organ-
Corn Acres:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	ization
Corn for Grain (Acres)	178.0	178.0	173.58	178.0	178.0	178.0	252.0	252.0	104.0
Corn for Silage (Acres)	-	-	4.42	-	-	-	-	-	8.6
Corn Purchased (Cwt.)	5,023.0	3,777.0	7,388.0	4,741.0	4,747.0	-	-	8,689.12	1,270.0
Oats (Acres)	35.95	49.78	-	32.37	28.21	26.17	88.09	76.07	10.8
Wheat (Acres)	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	22.4
Soybeans (Acres)	74.0	74.0	64.74	74.0	74.0	74.0	-	-	63.7
Rotation Meadow (Acres)	44.05	30.21	89.25	47.65	51.79	53.83	36.91	48.92	51.7
Hay Harvested (Tons)	107.8	66.0	245.0	118.0	125.8	138.8	86.72	110.25	102.4
Permanent Pastureland (Acres)	160.0	160.0	160.0	160.0	160.0	160.0	160.0	160.0	160.0
Pastureland Fertilized (Acres)	-	-	160.0	-	-	3.6	-	-	N.A.
Beef Cow Herd (Head)	28	44	-	38	55	93	43	-	36
Feeder Calves Sold (Head)	-	35	-	-	-	73	-	-	15
Feeder Calves Bought (Head)	75	-	369	60	20	-	-	165	6
Calves Fed in Drylot (Head)	-	-	40	-	-	-	-	-	-
Calves Fed on Pasture (Head)	97	-	329	91	64	-	34	165	8 ^b
Litters Farrowed (No. Sows)	164	196	56	161	174	126	175	307	89
Quarters in Which Farrowed	1 & 4	1 & 4	1 & 4	1 & 4	1, 2 & 4	1 & 4	1 & 4	1, 2, 3 & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	6
Hogs Marketed (Head)	1,148	1,372	392	1,127	1,218	882	1,225	2,149	489
Income Minus Variable Costs (\$)	35,458	34,240	29,682	24,610	46,474	32,846	38,536	43,886	5,306 ^c
Capital Borrowed (\$)	63,948	59,985	87,371	64,463	69,425	31,365	33,324	76,757	20,353 ^d
Beef Housing Built (Cows)	48	-	196	53	53	49	21	63	44 ^d
L. M. Feeding Capacity Built (Steers)	27	-	191	21	-	-	-	-	70 ^d
H. M. Feeding Capacity Built (Steers)	-	-	108	-	-	-	34	165	-
Farrowing Capacity Built (Sows)	54	70	-	53	30	35	60	64	28 ^d
Pig Feeding Capacity Built (Pigs)	1,085	1,342	224	1,066	705	782	1,178	1,243	224 ^d
Seasonal Labor Hired (Hours)	-	-	229	-	209	-	-	229	299

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bFed cattle marketed in 1962.

^cNet income in 1962.

^dCapacity in 1962.

Dairy Farms

There were 14 operations in the sample survey that were classified as dairy farms. Since the number of cows is a more meaningful measure of size for dairy operations, that was the criterion used to divide dairy farms into size categories. Only two size classes were used in the analysis—those with less than 20 cows and those with more than 20 cows. Representative farms of these two classes were similar with respect to cropland operated and both sold Grade B (manufacturing) milk. However, they were very different with respect to other measures and characteristics. There were eight small dairy farms with an average of 16 cows per farm and six larger farms with an average of 27 cows. The resource bases of the representative dairy farms are summarized in Table 19.

Small Dairy Farms. The small dairy farms had an average of 223 acres in 1962 of which 158 acres were cropland and 60 were permanent pastureland. The representative farms had 16 stanchions and milked an average of 16 cows. A small hog enterprise was also typical on these farms and some had a few beef cows. They grew sizeable acreages of corn, soybeans, and hay with smaller wheat and oat acreages. The representative farm was well equipped although the typical tractor was of only 2-plow size. Other major equipment included power take-off combine, corn picker, and a pickup baler. They had an average of one and one-third man-year equivalents of labor available and, typically, were in a favorable financial condition with around \$33,800 in assets and \$6,000 in debts.

Under the optimal plans (see Table 20), these farms would continue to operate dairy enterprises but also would increase hog and beef cattle production. The dairy enterprise would be operated at levels near the capacity of the facilities when beef and hog prices were medium. However, with lower livestock prices the dairy facilities would be expanded and the dairy herd expanded. With higher hog and/or beef cattle prices (plans not shown) the dairy herd would be reduced in size and sometimes eliminated. Relatively large hog or feeder cattle enterprises would be combined with the dairy herd. Beef cows would not enter the optimal solutions with corn buying permitted but small herds would be in the plans if corn buying was prohibited.

Corn would be grown to the maximum extent permitted by the acreage restrictions, but in all plans with dairy cows some of the corn acreage would be used for silage. Wheat, oats, soybeans, and hay or meadow would be grown in the optimal plans at most price levels. When the corn acreage is allowed to expand beyond the acreage base, soybeans are eliminated from the optimal plans. The optimal plans would result in increased income levels. However, relatively large amounts of capital would have to be borrowed to finance the purchase of livestock, feed, and livestock facilities.

Large Dairy Farms. The large representative dairy farms had 285 acres of land with 154 acres of cropland and 125 acres of permanent pastureland. The average farm had 36 stanchions and kept 27 cows. These farms had a larger feed grain base and grew more than the small dairy farms but grew smaller acreages

TABLE 19 - ORGANIZATIONS AND RESOURCES OF DAIRY FARMS IN
NORTHEAST MISSOURI - 1962

	Small	Large
Number of Farms	8	6
All Land (Acres)	223	285
Cropland (Tillable Acres)	158	154
Permanent Pasture (Acres)	60	125
Full Owners (Number)	5	1
Part Owners (Number)	2	4
Tenants (Number)	1	1
Feed Grain Base (Acres)	43.7	69.2
Wheat Allotment (Acres)	12.9	2.0
Crops: Corn for Grain (Acres)	31.2	45.0
Corn For Silage (Acres)	2.8	14.0
Soybeans (Acres)	44.2	30.0
Oats (Acres)	8.5	6.0
Wheat (Acres)	4.9	4.0
Hay (Acres)	26.6	28.0
Net Corn Sales (Bushels)	374	-118
Dairy Capacity (Cows)	16	36
Dairy Cows (Head)	16	27
Farrowing Capacity (Sows)	4	5
Sows on Hand (Head)	3	5
Pigs Farrowed (Number)	16	74
Feeder Pigs Bought (Number)	4	8
Beef Housing Capacity (Cows)	19	13
Beef Cows (Head)	5	1
Feeder Calf Sales (Head)	3	1
Size of Tractor	2-plow	3-plow
Number of Tractors	1.9	2
Combine	6' PTO	10' SP
Corn Picker	2-row	2-row
Baler Owned?	Yes	Yes
Total Man Months of Labor Available	16.7	19.2
Permanent Hired Labor (Man Months)	0	2.5
Seasonal Labor Hired (Days)	5.8	32.3
Assets (\$)	33,850	50,762
Debts (\$)	6,374	9,010

TABLE 20 - CURRENT AND OPTIMAL FARM PLANS FOR SMALL DAIRY FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	With	With	With	With	With	Without	Without	With	Organ-
Corn Buying:	With	With	With	With	With	Restricted	Expanded	Expanded	ization
Corn Acres:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded
Corn for Grain (Acres)	30.44	30.44	29.29	30.26	31.49	27.9	90.7	91.14	31.2
Corn for Silage (Acres)	4.56	4.56	5.71	4.74	3.50	7.09	4.29	3.86	2.8
Corn Purchased (Cwt.)	4,011.0	4,011.0	2,428.0	3,542.0	-	-	-	3,090.0	-374.0
Oats (Acres)	16.03	16.03	-	14.42	41.27	24.08	15.24	18.79	8.5
Wheat (Acres)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	4.9
Soybeans (Acres)	54.3	54.3	51.94	60.0	33.04	39.8	-	-	44.2
Rotation Meadow (Acres)	28.67	28.67	47.06	24.58	24.68	35.12	32.76	29.21	26.6
Hay Harvested (Tons)	73.6	73.6	131.5	61.9	59.8	96.7	87.5	72.4	45.1
Permanent Pastureland (Acres)	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Pastureland Fertilized (Acres)	-	-	60.0	-	-	-	-	-	N.A.
Beef Cow Herd (Head)	-	-	-	-	-	10	-	-	5
Feeder Calves Sold (Head)	-	-	-	-	-	8	-	-	3
Feeder Calves Bought (Head)	32	32	98	11	29	-	31	42	-
Calves Fed in Drylot (Head)	-	-	-	-	-	-	-	-	-
Calves Fed on Pasture (Head)	32	32	98	11	29	-	31	42	-
Yearlings Fed (Period 1)	-	-	-	-	-	-	-	-	-
Yearlings Fed (Period 2)	-	-	-	-	-	-	-	-	-
Litters Farrowed (No. Sows)	70	70	4	73	85	17	43	92	2
Quarters in Which Farrowed	1 & 4	1 & 4	4	1 & 4	1, 2 & 4	1 & 4	1 & 4	1, 2, 3 & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	4
Hogs Marketed (Head)	490	49	28	511	595	119	301	644	16
Dairy Cows (Head)	15	15	19	16	12	24	18	13	16
Income Minus Variable Costs (\$)	16,092	16,092	13,311	14,921	19,658	13,102	17,091	18,745	2,537 ^b
Capital Borrowed (\$)	26,491	26,491	25,512	10,172	24,059	12,442	15,350	26,899	6,374
Beef Housing Built (Cows)	-	-	40	-	-	-	-	6	19 ^c
H. M. Feeding Capacity Built (Steers)	32	32	98	-	-	-	31	42	29 ^d
Farrowing Capacity Built (Sows)	31	31	-	32	24	5	18	23	4 ^c
Pig Feeding Capacity Built (Pigs)	532	532	-	550	419	106	324	405	32 ^c
Dairy Facilities Built (Stanchion)	-	-	3	-	-	8	2	-	16 ^c
Seasonal Labor Hired (Hours)	58	58	-	58	58	58	55	58	58

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bNet income in 1962.

^cCapacity in 1962.

^dLow mechanization capacity in 1962.

of soybeans. They also had a small hog enterprise and utilized feeder pigs as well as pigs farrowed on the farm. The farms were equipped with a 3-plow tractor and self-propelled combine. They had an average of more than one and two-thirds man-year equivalents of labor available and typically hired more than a month of seasonal labor. The large dairy farms had more assets than the small farms but also maintained a heavier debt load. Their financial condition, however, was favorable for the acquisition of additional funds.

Under the computed optimal plans with normal price relationships dairy operations would continue (see Table 21), but would be at levels considerably lower than the dairy capacity. Only with relatively low hog and beef cattle prices and with corn buying prohibited would the dairy herd size approach the capacity limits. With high livestock prices (plans not shown) the dairy enterprise would be eliminated. A feeder cattle and/or hog enterprise would be combined with the dairy enterprise. Usually the value of the livestock produced would exceed the value of the dairy products. Beef cow herds would enter the solutions only at high corn and low livestock prices (plans not shown).

Corn and corn silage would be produced to the maximum acreage permitted by the acreage restrictions. However large quantities of corn also would be purchased in those plans where not prohibited. Wheat, soybeans, and hay also would be produced. In plans with large numbers of feeder cattle or dairy cows—or both—the soybean acreage would be reduced or eliminated and the hay acreage increased. In some plans the wheat acreage would also be reduced in order to grow the forages required for the livestock.

A relatively large amount of capital would have to be borrowed to finance the expansion in the size of business that the optimal plans indicate would be profitable. Livestock and feed would have to be purchased and livestock facilities would have to be built to carry out the expansion. However, these procedures would enable the representative farm to increase its income substantially.

TABLE 21 - CURRENT AND OPTIMAL ORGANIZATIONS FOR LARGE SIZE DAIRY FARMS

Prices: ^a	Optimal Organizations for Varied Conditions								1962
	MMM	MML	MLM	LLL	HHH	MMM	MMM	MMM	Farm
	With	With	With	With	With	Without	Without	With	Organ-
Corn Acres:	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Expanded	Expanded	ization
Corn for Grain (Acres)	50.54	55.0	39.14	45.22	51.05	45.22	83.53	88.08	45.0
Corn for Silage (Acres)	4.46	-	15.85	9.78	3.95	9.78	8.47	3.92	14.0
Corn Purchased (Cwt.)	6,309.0	6,115.0	5,402.0	-	6,486.0	-	-	5,747.0	118.0
Oats (Acres)	-	-	-	-	-	-	-	-	6.0
Wheat (Acres)	15.0	15	7.61	15	15.0	15.0	15	15	4.0
Soybeans (Acres)	37.0	37	-	24.69	37.0	24.69	-	-	30.0
Rotation Meadow (Acres)	33.0	33	81.39	45.31	33.0	45.31	47.0	47.0	28
Hay Harvested (Tons)	80.0	78.4	227.9	125.7	80.0	125.7	128.9	121.10	56
Permanent Pastureland (Acres)	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0
Pastureland Fertilized (Acres)	-	-	125.0	-	-	-	-	-	N.A.
Feeder Calves Bought (Head)	43	-	223	20	52	20	47	109	-
Calves Fed in Drylot (Head)	-	-	-	-	-	-	-	-	-
Calves Fed on Pasture (Head)	43	-	223	20	52	20	47	109	-
Litters Farrowed (No. Sows)	114	133	-	12	114	12	26	97	10
Quarters in Which Farrowed	1, 2 & 4	1, 2, 3 & 4	-	1, 2, & 4	1, 2, & 4	1, 2, & 4	1, 2 & 4	1, 2 & 4	N.A.
Feeder Pigs Bought (Head)	-	-	-	-	-	-	-	-	5
Hogs Marketed (Head)	798	931	-	84	798	84	182	679	-
Dairy Cows (Head)	15	17	26	33	13	33	29	14	27
Income Minus Variable Costs (\$)	19,788	19,511	17,367	15,095	25,305	16,252	14,893	21,058	3,833 ^b
Capital Borrowed (\$)	36,049	30,973	54,074	7,041	36,611	7,041	13,531	44,633	9,010
Beef Housing Built (Cows)	15	-	132	-	21	-	18	58	13 ^d
H. M. Feeding Capacity Built (Steers)	43	-	223	20	34	20	47	109	18 ^d
Farrowing Capacity Built (Sows)	33	34	-	-	33	-	4	27	5 ^c
Pig Feeding Capacity Built (Pigs)	569	583	-	40	564	40	97	475	40 ^c
Dairy Capacity Built (Stanchion)	-	-	-	-	-	-	-	-	36
Seasonal Labor Hired (Hours)	60	124	-	145	56	145	135	102	323

^aPrices: For corn, hogs, and beef respectively L-Low, M-Medium, H-High.

^bNet Income in 1962.

^cCapacity in 1962.

^dLow mechanization capacity in 1962.

General Characteristics of the Optimal Solutions

The most outstanding feature of the computed plans is the large increase in livestock production that is feasible with the farms current resource bases plus the additional capital that the farms could acquire by borrowing under normal equity lending practices. The level of efficiency, for both labor and feed use, would have to be improved considerably to implement the types of plans found most profitable. However, even at the lower price levels it would be profitable to increase livestock production, which indicates that at the medium and higher prices somewhat less efficient operators could profitably increase the size of their livestock enterprises, too.

Hog production and purchased feeder cattle would be the primary livestock enterprises used for the increased output, although beef cow herds would be important on some representative farms and under some circumstances. Hog production enterprises would tend to dominate in the solutions with normal (historical) price ratios. As expected, increasing the relative price for one type of enterprise would result in increasing its level of output and reducing the level of competing enterprises.

The hog enterprise generally would utilize multiple period farrowing, with pigs farrowed in at least two quarters and frequently in three or all four quarters. The expansion in hog production generally would be made using portable farrowing facilities with the pigs fed out on pasture. Only under the unusual circumstances of high hog and low corn and beef cattle prices would feeder pigs be utilized. This indicates that the efficient farm operator would find it more profitable to raise his own pigs than to purchase them.

Both feeder cattle enterprises and beef cow herds are important in the optimal solutions but the increase in the use of feeder cattle is greater than that for beef cow herds. Generally, beef cow herds would be used on the smaller farms, at price ratios unfavorable to beef cattle or when corn buying is limited. Thus beef cow herds would be used as a supplement to the major enterprise—hogs. Relatively large amounts of forages are available on all the representative farms and a beef cow herd is an excellent enterprise for using roughages.

Under the most typical plans the feeder cattle systems would utilize purchased calves, wintering them and then feeding them grain on pasture, followed by a short drylot finishing period. The existence of relatively large acreages of permanent pasture on all of the representative farms accounts for the use of the pasture feeding system. Drylot feeding would be used when beef feeding was so profitable that the size of enterprise exceeded the capacity of the pasture. This usually occurs when beef prices are relatively high and under these circumstances yearling steers also are utilized on some of the representative farms. On the smaller farms where labor is relatively abundant, low levels of mechanized feeding would be used for the cattle enterprises but on the larger farms and where labor is a limiting factor, highly mechanized systems would be built and used. This would occur even where relatively large feeding facilities of an inefficient labor using type would be left idle.

The basic model used for the computations permitted corn purchasing and in nearly all of the optimal plans large quantities of corn would be purchased. Only when the corn price was high relative to both hogs and beef cattle would corn not be purchased. When the land acreage is fixed for a farm the purchasing of corn represents a way to increase the size of business. Although buying large quantities of corn is not typical of most northeast Missouri farms, it is an alternative and is feasible since large surplus corn producing areas are adjacent to the north and east of the area.

If corn buying is not an alternative open to a farm the optimal organization is altered considerably. The feed grain produced on the farm would be used for hog production on most representative farms. Beef cow herds with sale of their calves as feeders would be included to utilize the roughage. On farms with larger corn acreages the calves from the cow herd would be fed out and if the feed grain supply was large enough feeder calves might be purchased and fed, too.

A final feature of the optimal plans which should be noted is the large increase in capital that would be required to finance their implementation. Normally a farm will have to borrow this added capital. The optimal plans were computed under the assumption that capital could be borrowed until limited by equity of the farm. The capital used for expansion was charged for at prevailing interest rates and thus any funds borrowed earned at least an amount sufficient to meet the interest payments. Because most farms currently operate with low debt levels, relatively large amounts could be borrowed. Despite this, capital was a limitational factor in the majority of the computed plans. Thus, nearly all of the representative farms could profitably employ even larger amounts of capital. That farms do not use such large amounts is probably due to risk and uncertainty factors which are not considered by the type of model used for this study.

SOME AGGREGATIVE CONSIDERATIONS

The increased output from a larger and more efficient operation by an individual farmer will not affect the total supply of a farm product to any significant degree. However, widespread adjustments do have very important effects on the total supply and hence the price of farm products. Thus some consideration must be given to the supply effects that any significant adoption of the types of plans computed for the representative farms in this study would have.

If all farms in northeast Missouri were to adopt the types of plans most suitable for their resources as determined above, the total supply of hogs and beef cattle from the area would be greatly increased. For example, at medium corn, hog, and beef cattle prices and with corn purchasing permitted, hog and feeder cattle production could be increased by five times the 1962 output of the area. Even if no corn is purchased and the corn acreage is restricted the increased levels of efficiency would permit more than a doubling of hog production and an increase in total beef cattle production in the area. Such changes in supply would affect the prices of farm products and hence the profitability of the farms in the area. The plans computed as optimal assume that the prices used will prevail. With greatly expanded levels of livestock output the prices could be expected to be considerably lower than those assumed for the model.