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Optimal Farm Organizations for Irrigated Farms in South Central Nebraska

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by

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CONTENTS

SUMMARY

This report discusses some adjustment opportunities on irrigated farms in south central Nebraska. Six types of farms are defined depending on the amount of irrigated land and farm size. Profit maximizing farm organizations are computed for nine sets of product prices. The organizations are conditioned by 1961 available resource supplies. Available resources can be reallocated among enterprises to achieve the most profitable organizations.

Three classes of farms are termed moderately irrigated—the classes are of varying size farms. Similarly, three sizes of farms that are highly irrigated are defined. Alternative price assumptions for feed grains, pork, and beef are considered.

The most profitable organization on any class of farm is conditioned by the price assumptions. The relative amounts of beef and pork produced are influenced by their relative prices as well as the level of the prices.

An expansion of livestock production is noted for all farms at all price combinations. On the small and medium-sized, moderately irrigated farms, purchases of feed grains are found to be profitable. For the large, moderately irrigated farms and for all three sizes of highly irrigated farms, labor limits the size of the livestock enterprises and it is common for feed grains to be sold rather than purchased.

Expanded livestock production requires new investments in certain livestock facilities. Investments vary in proportion to the size of the livestock enterprise which uses them.

Cropping plans do not differ greatly from current operations. The profit-maximizing organizations call for more cropland devoted to roughage production than is found in existing plans.

Return to family operator labor and management is high when contrasted with current earnings. The return is achieved under a framework of assumed prices, high-level technology and management, and resource flexibility.

In addition to indicating possible improvements in farm incomes by specifying optimal resource allocations and farm organizations with existing resources, other knowledge is gained as well. The magnitude of labor available (especially fall labor) relative to other resources is seen to be less than optimal. The supply of fall labor severely limits organizational adjustment in many instances. Further analyses varying the amounts of labor hiring, allowing for purchases of additional land, developing more irrigated land, and considering alternative returns for mortgage capital would be fruitful.

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Melvin D. Skold and A. W. Epp[1]

INTRODUCTION

Agriculture in south central Nebraska has gone through some major changes in the past two decades. Among these changes has been the rapid increase in irrigation. In 1950 only 730 farms had irrigation facilities and they irrigated about 60,000 acres. By 1954 the number of irrigated farms had increased to 1,670, with 134,000 acres irrigated. By 1959 there were 4,900 farms irrigating 526,500 acres. In 1963, 688,800 acres were irrigated.

Along with the trend toward intensified agriculture, farms in this area increased in size from an average of 225 acres in 1950 to 271 acres in 1959.

While the increase in irrigation and growing farm size indicate that farmers have adjusted rapidly to changing economic and technological conditions, other organization possibilities still exist. Rising production costs coupled with downward tendencies in product prices focus attention on efficient patterns of resource allocation.

This study considers possible efficient farm organizations available to farmers in south central Nebraska with given amounts of resources. That is, rather than considering the profitability of adjustments that have occurred, profit maximizing organizations of existing resources are analyzed. Profit maximizing plans are determined for farms of different sizes with varied amounts of land.

Enterprise reorganizations consider only enterprises that are currently common to the area. Both crop and livestock enterprises are included. Optimal enterprise combinations are computed at alternative product prices.

The Area

The area discussed in this report corresponds to Economic Area 5[2] in the 1954 Census of Agriculture. Only farms with irrigated land are considered here.

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[1] Formerly Agricultural Economist, Farm Production Economics Division, Economic Research Service, U.S.D.A., now Agricultural Economist, Kansas Agricultural Experiment Station; and professor of Agricultural Economics, Nebraska Agricultural Experiment Station.

[2] Counties included are Adams, Butler, Clay, *Fillmore*, *Hamilton*, Jefferson, Polk, Saline, Seward, Thayer, and York.

In 1959, 54 percent of the value of all farm products sold came from field crops other than fruits and vegetables. In the same year, the value of livestock products sold, other than poultry and dairy, accounted for about 40 percent of the value of all farm products sold.

Procedure

Under the price and technological conditions assumed, adjustment opportunities are conditioned by the amounts and types of resources available. Amounts and proportions of the various types of resources differ between farms with different organizations. Farms are grouped by size and by the amount of irrigated land. A group of farms with a certain amount of irrigated land and of a given size is termed a farm class. It is assumed that all of the farms within a given class will respond uniquely to an economic stimuli.

While not used as a criteria for defining resource situations in this study, other factors may be relevant as well. The combinations of resources (land, labor, and capital) may vary between farms in different classes. Alternative resource combinations may call for varied adjustments to more profitable organizations.

Six farm classes are defined for this analysis. The classes are:

1. Small farms with 140–259 acres and less than 120 acres irrigated.
2. Medium-sized farms with 260–499 acres and less than 120 acres irrigated.
3. Large farms of 500 acres or larger and less than 120 acres irrigated.
4. Small farms with 140–259 acres and more than 120 acres irrigated.
5. Medium-sized farms with 260–499 acres and more than 120 acres irrigated.
6. Large farms of 500 acres or larger and more than 120 acres irrigated.

Survey

Irrigated farms in the area were classified into one of the six categories. For each farm class about 20 farms were surveyed as to their 1961 organizations and resources.

Linear Programing

Given the quantities of resources available for each class of farms we can consider possible reallocations of these resources among competing enterprises. The resource requirements of each activity considered and the direct costs and product contributions of these activities are established. The profit maximizing farm organizations are

dependent upon available resources and the resource requirements of each enterprise considered.

Solutions obtained reflect a much greater rate of resource allocation flexibility than is true on farms. If farmers had better knowledge about the profitability of the different enterprises, we believe there would be a greater tendency to organize similar to these farm organizations. Aversion to risk limits the adjustments to these profit maximizing plans as well.

Resources Available

Resource levels derived from the survey schedules for each farm class are summarized in Table 1. Estimates in Table 1 represent an average of amounts of resources available on all farms included in the class.

Livestock Facilities

Hog farrowing and feeding equipment indicated on the first two lines of Table 1 are average amounts of facilities found on the farms of a given class. Averages are somewhat misleading in this sense as there is considerable variation in the amount of livestock facilities found on farms of a given class.

Similarly, beef housing and feeding space is not uniformly distributed over all farms in a given class. It may be that there are no large moderately irrigated farms with space for feeding exactly 19 head of beef. Nineteen head is the average amount of feeding space available on all farms sampled in the large, moderately irrigated class, however.

Labor

Labor is divided into two categories: operator-family labor and hired labor. Within each category, four labor periods are defined. Adjustments are made in total amounts of operator-family labor available to account for overhead labor, labor spent on keeping diverted acres maintained at the levels necessary to meet governmental requirements.

Hired labor, as with operator-family labor, is restricted to levels the farmers indicated as being used. Thus, the enterprise combinations obtained from the profit maximizing solutions do not utilize more labor than has been available in the area historically.

Land

Land resources fall into 3 categories: irrigated cropland, dry cropland, and permanent pasture. The amount of dry cropland available

Table 1. Resource restraints used in programing analyses by farm class.

Resource type	Unit	Moderately irrigated			Highly irrigated		
		Small	Medium	Large	Small	Medium	Large
Farrowing facilities	Sow	8	8	6	8	7	7
Hog feeding facilities	Head	7	74	63	63	42	160
Beef housing space	Head	4	31	41	29	34	41
Beef feeding space	Head	1	23	19	38	10	79
Operator-family labor:							
December–March	Hour	571	638	694	469	610	840
April–May	Hour	657	670	801	624	637	885
June–August	Hour	994	979	1,198	994	1,253	1,468
September–November	Hour	475	533	586	399	511	700
Total operator-family	Hour	2,697	2,820	3,279	2,486	3,011	3,893
Cropland (all)	Acre	175	359	466	210	324	651
Irrigated land	Acre	79	84	88	154	180	224
Permanent pasture	Acre	28	67	153	12	20	165
Corn allotment	Acre	104	169	276	124	192	385
Soybean allotment	Acre	44	71	116	52	81	162
Wheat allotment	Acre	31	60	129	36	57	173
Cash account	$100	71.48	103.80	126.19	113.73	130.73	269.93
Real estate mortgage	$100	223.47	308.73	470.59	284.50	389.52	584.08
Chattel mortgage	$100	12.90	32.72	52.06	....	40.14	....
Hired labor:							
December–March	Hour	3	44	70	1	40	229
April–May	Hour	18	47	80	1	36	200
June–August	Hour	29	118	161	160	98	326
September–November	Hour	6	60	163	48	53	231
Total hired labor	Hour	56	269	474	210	227	986

for allocation among the enterprises considered is adjusted to account for cropland diverted under all government contracts. Pasture land available is the average acreage of permanent pasture land in the surveyed farms.

Soybeans are restricted so they cannot occupy more than 25 percent of the total amount of dry cropland on the farm. This is intended to represent a practical or perhaps agronomic restriction on the amount of resources a farmer is willing to devote to soybeans. The feed grain allotment is set at a level 10 percent greater than the 1961 allotment.[3] Thus, we are assuming a lower rate of participation in a feed grain program than existed in 1961.

Capital

The amount of capital available is divided into three types: Cash, real estate mortgage credit, and chattel mortgage credit. The cash account is created by placing a value on all livestock, grain, silage, and hay on hand. Thus, it is assumed that these inventories can be readily liquidated and the cash obtained can be allocated to other enterprises.

The amount of real estate mortgage credit is calculated by taking 50 percent of the total value of land and buildings and subtracting from this figure the amount of real estate debt outstanding in the survey year, 1961. Chattel mortgage credit is estimated in a similar manner. Chattel mortgage estimates in Table 1 represent 50 percent of the value of machinery less the amount of chattel liability.

These resource combinations serve as limitations on the optimal farm organizations computed. A description of the enterprises that require these resource supplies follows.

Enterprises Considered

Hog Activities

The enterprises include the following types of hog farrowing feeding operations:
1. Confinement farrow-confinement feed.
2. Confinement farrow-portable feed.
3. Portable farrow-portable feed.

Under each system four farrowings per year are permitted, one litter in each quarter. The litter is assumed to be farrowed at the mid-point of the quarter and eight pigs per litter are obtained. Seven of the pigs are assumed to be fed and marketed along with 400 pounds

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[3] The feed grain allotment restricts the amount of land that can be devoted to corn and sorghums. Oats, a common feed grain, can be grown outside of the allotment as was the case in the 1961 feed grain program.

of cull sow and one-fifteenth of a 450-pound boar. The eighth pig is retained as a replacement gilt.

Investment activities allow the purchase of additional central hog farrowing, portable hog farrowing, central hog feeding or portable hog feeding space.

Beef Activities

Several possible beef feeding operations are also considered. Systems vary as to the type of animal fed and also according to feeding method. Yearling steers can be fed by one of eight methods: 1. high mechanization-silage feeding operation in the first half of the year, 2. high mechanization-silage fed in the second half of the year, 3. high mechanization without silage in the first half of the year, and 4. high mechanization without silage in the second half of the year. These four systems of feeding are repeated under low mechanization feeding conditions.

Eight possible techniques of feeding calves are also considered. Calves, too, can be fed under either high or low mechanization feeding systems. Under each mechanization level it is possible to feed calves by: 1. pasture-silage feeding, 2. pasture-nonsilage feeding, 3. drylot-silage feeding, and 4. drylot-nonsilage feeding operation.

Yearlings are purchased at 700 pounds and sold at 1,100 pounds. Calves can be bought at 430 pounds or can be produced through a beef cow herd enterprise. Calves are sold at 1,050 pounds under the drylot feeding operations and at 1,100 pounds under the pasture feeding operations.

Cropping Activities

Since both irrigated land and dryland are available, crops can be grown under each system. On the dryland portion the farmer is given the choice of producing grain sorghum, sorghum-silage, oats, soybeans, wheat, alfalfa, and rotation meadow. Dryland corn was not included because of the dominance of the sorghum crop in the input-output coefficients. Irrigated crops included are: grain sorghum, corn, corn silage, soybeans, and alfalfa.

Total acreage devoted to sorghums and corn cannot exceed the specified feed grain allotment. Oats, a common feed crop, do not use a feed grain allotment acre but do require an acre of cropland for each acre grown.

Alfalfa can be grown to meet the roughage requirements of cattle feeding enterprises. Rotation meadow can be established for use as a pasture in portable hog feeding activities.

Credit Activities

Real estate mortgage credit can be used up to the limit of its availability (as shown in Table 1) if its use returns enough to pay a 5 percent interest rate. Chattel mortgage credit is charged at a 7½ percent interest rate.

Hired Labor

Hired labor activities correspond to the labor periods used as restrictions. Hiring 1 hour of labor costs $1.27, the average hired labor wage rate for Nebraska in 1961.

Selling and Buying Activities

Feed grains (grain sorghum, corn, and oats) can be either intermediate or final products.[4] That is, the feed grain produced can either be sold as a cash crop or can be used as an input in the livestock enterprises. Feed grains can be purchased if the farm is not able to produce the required amounts with resources available.

Alfalfa hay and the silage crops must be produced on the farm since purchase of these products is not permitted. Buying roughages is not considered feasible on a wide-spread basis.

Soybeans and wheat, which must be produced within their respective allotments, are cash crops. That is, they are not intermediate products such as feed grains or alfalfa that are fed to livestock.

Beef and pork produced on the farm may use some of the farm produced feeds and are then the final product of the farm feed.

Technology and Price Assumptions

Profit maximizing farm organizations depend upon factor and product prices as well as physical input-output transformation relationships assumed. For this analysis, factor prices are held constant and do not vary regardless of the product price level assumed.

Prices

Price assumptions of the study are presented in Table 2. Three price levels for each of three products (feed grains, pork, and beef)

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[4] Here, and throughout this report, the feed grain crops are referred to with the collective term, feed grains. The yields of grain sorghum and oats are transformed into corn equivalent yields. On a per pound basis grain sorghum is considered to be $0.95, that of corn and oats is $0.90 the feed value of corn. Thus when a hundred-weight of feed grains is purchased, sold, or fed it could be 100 pounds of corn, 105 pounds of grain sorghum, or 111 pounds of oats. Prices of grain sorghums and oats are based on feeding value. When corn is $0.94 per bushel, grain sorghums are $0.89 per bushel, and oats $0.48 per bushel.

result in 27 possible price combinations. The results from nine of these price combinations are discussed in this report. Specific price combinations selected will become evident in the results section below.

Livestock prices are derived from the feed grain prices assumed. The 1961 feed grain support price level is considered to be the maximum that can be expected in the near future. With this assumption, the highest price for corn in south central Nebraska is $1.14 per bushel. Prices of other feed grains are related to the corn price on the basis of feeding value. A price range of $0.40 per bushel is considered; hence, the medium feed grain price is $0.94 per bushel and the low feed grain price is $0.74 per bushel.

Pork prices are related to the feed grain prices by assuming the 1955–60 average corn-hog price ratio in Chicago. Applying this ratio and adjusting the pork prices obtained to reflect local conditions, the pork prices are $17.15, $14.28, and $11.40 per hundredweight.

Beef prices are determined similarly. High, medium, and low beef prices are based on the three feed grain price levels and the 1955–60 average beef-corn price ratio. The purchase price for yearling steers fed varies with the beef price used in the particular problem. If the low beef price is used in a given price situation, yearlings are both bought and sold at $15.86 per hundredweight. This is in contrast to the handling of feeder calf prices and sow prices. Regardless of the price assumed for beef ($15.86, $20.02 or $24.18), 430-pound calves are assumed to be purchased for $110. Similarly, sows are priced at $52 per head at all pork price levels. Calf and sow prices were handled in this manner for reasons of expediency in the variable price programing operations.

Technology

Physical input-output relationships assumed influence optimal enterprise combinations as well as prices. Physical production data are assumed to be representative of product transformation experienced by the top 25 percent of farm operators. Inquiries were made of agronomists and animal scientists for their estimates of input-output data for various enterprises at such management levels.

Current Organizations

Levels of various enterprises present on farms in the survey year, 1961, are presented in Table 3. The farms are not intensive livestock farms, but the farrowing of pigs or feeding of beef is not uncommon. Only limited amounts of oats, barley, and soybeans are grown. Wheat is generally produced at near allotment levels.

Table 2. Price assumptions of the study.

Product	Level	Unit	Price
			Dollars
	High	Bu.	1.14
Corn	Medium	Bu.	.94
	Low	Bu.	.74
	High	Cwt.	17.15
Pork	Medium	Cwt.	14.28
	Low	Cwt.	11.40
	High	Cwt.	24.18
Beef	Medium	Cwt.	20.02
	Low	Cwt.	15.86
Soybeans		Bu.	2.05
Wheat		Bu.	1.80
Beef Calves		Head	110.00
Sows		Head	52.00

All farms are net sellers of feed grains. Beef cows are common to all representative farm situations. Only small amounts of the mortgage credit potential is used.

RESULTS

Profit maximizing farm plans are presented in two tables for each farm class. The first table presents levels of various crop and livestock enterprises, farm purchases and sales, and an estimate of net return from optimal organizations. The second table indicates new investments necessary to achieve the profit maximizing plans. Also indicated in the second table is the value imputed to the last unit of the different resource restraints or the amount of that restraint left idle as the case may be. If a dollar-and-cents figure appears in the table it represents the amount by which profits would be reduced if one unit less of that resource were available. Other tabular entries show the number of units of resources remaining idle at the profit maximizing solution.

Solutions are obtained for each farm class at alternative produce prices. Columns in the tables representing solutions for the price situation stated at the top of the column are numbered for easier reference throughout the discussions of the results. Price situations presented vary over a considerable range and the impact of each on the farm organizations can be seen. The farm plans generated may be thought of as profit maximizing plans under different price expectations. If the farmer expected relatively low feed grain prices and moderate livestock prices, the price situation represented by the second column in the tables may be appropriate. A more optimistic farmer may expect future prices more like those indicated in the last column of the tables, which are relatively high for all products.

Table 3. Current (1961) farm organizations by class of farm.

Enterprise	Unit	Moderately irrigated			Highly irrigated		
		Small	Medium	Large	Small	Medium	Large
Litters farrowed	No.	9	8	4	8	10	5
Pigs fed	Head	0	8	14	10	5	17
Beef cows	Head	6	11	25	4	6	12
Cattle fed	Head	9	22	15	38	9	91
Feed grain allotment	Acre	95	154	251	113	175	350
Corn grown	Acre	83	96	107	108	130	188
Corn produced	Cwt.	3,858	3,965	3,913	5,118	6,351	8,810
Silage produced	Ton	17	15	22	54	2	5
Corn sold (net)	Cwt.	1,954	2,920	2,295	2,505	2,449	4,849
Grain sorghum	Acre	12	31	63	13	39	83
Sorghum sold	Cwt.	264	365	1,556	165	1,262	2,594
Sorghum silage	Ton	22	9	31	3	5	160
Barley	Acre	2	2	2	0	0	0
Oats	Acre	1	4	5	0	4	0
Wheat allotment	Acre	31	60	131	36	58	173
Wheat grown	Acre	31	60	129	36	57	173
Soybeans grown	Acre	0	1	2	5	8	7
Improved hay	Acre	2	67	2	2	0	12
Credit used:							
Real estate	Dol.	1,636	2,474	2,737	2,794	5,894	7,150
Chattel	Dol.	1,957	2,686	1,473	4,541	3,171	11,061

Small Farms - Moderate Irrigation

Farms in this class have from 140 to 259 acres and have less than 120 acres under irrigation. As shown in Table 4 with corn at $0.74 per bushel, hogs at $11.40 per hundredweight, and beef at $15.86 per hundredweight (column 1), the farm would sell 1,397 hundredweight of pork, 181 hundredweight of beef, purchase 28 head of calves for feeding, and buy 3,543 hundredweight of feed grains.

The 79 acres of irrigated cropland is used to produce 55 acres of grain sorghum, 22 acres of corn, and 2 acres of corn silage. Dry cropland is divided between soybeans, wheat, alfalfa, and rotation meadow. Wheat is grown up to the limit of the wheat allotment. Enough alfalfa is grown to meet roughage requirements of the calves fed and rotation meadow serves as pasture for hogs under the portable hog systems. Return to family-operator labor and management is $5,620.

Column 2 in Table 4 shows the optimal organization with higher livestock prices but feed grains remaining at $0.74 per bushel. The amount of pork produced remains about the same as with lower livestock prices. Calf feeding increases so that 99 head are fed. More irrigated land is devoted to roughages, seven acres of corn silage, and five acres of irrigated alfalfa as the result of the increased calf feeding. Other irrigated land is placed in grain sorghum production. Dryland is divided between the wheat, alfalfa, and rotation meadow enterprises. The return is $10,839.

For the third set of prices (column 3), livestock prices are at the lowest level considered and the price of feed grain is at the medium price of $0.94 per bushel.

Hog production increases slightly over the two previously discussed solutions and there is no beef production. The higher price of feed grain makes dryland grain sorghum a profitable enterprise. Other dryland is allocated to wheat and rotation meadow. All irrigated land is placed in corn production.

Rather than being a net purchaser of feed grains the farm sells 1,467 hundredweight of feed grains. The return is $5,916.

Next, in column 4, consider the situation of the medium feed grain price, low pork price, and medium beef price. Hog production is reduced but not eliminated from the profit maximizing plan. A total of 157 calves are fed. Dryland grain sorghum and irrigated corn are produced. Some irrigated land is used to produce corn silage. Wheat is not grown due to the expanded dryland alfalfa acreage necessary to provide roughage for calves on feed. Return with this set of prices is $8,192.

If the farmers expect medium pork prices but low beef prices along with the medium feed price (column 5), beef disappears from the farm plan. A total of 76 litters of pigs are suggested. All irrigated land is allocated to producing corn, and 25 acres of dryland grain

Table 4. Profit maximizing organizations for small, moderately irrigated farms in south central Nebraska at alternative price levels.

Enterprise	Unit	Feed grain Pork Beef	(1) $ 0.74 11.40 15.86	(2) $ 0.74 14.28 20.02	(3) $ 0.94 11.40 15.86	(4) $ 0.94 11.40 20.02	(5) $ 0.94 14.28 15.86	(6) $ 0.94 14.28 20.02	(7) $ 0.94 17.15 24.18	(8) $ 1.14 14.28 20.02	(9) $ 1.14 17.15 24.18
							Product Prices				
Litters farrowed	No.		66	65	71	9	76	65	52	67	58
Cattle fed	Head		28	99	0	157	0	46	124	28	96
Grain sorghums (dryland)	Acre		0	0	21	10	25	8	13	25	25
Grain sorghums (irrigated)	Acre		55	67	0	0	0	0	0	0	0
Corn (irrigated)	Acre		22	0	79	67	79	76	70	77	72
Sorghum silage (dryland)	Acre		0	0	0	0	0	0	0	0	0
Corn silage (irrigated)	Acre		2	7	0	12	0	3	9	2	7
Oats (dryland)	Acre		0	0	0	0	0	0	0	0	0
Soybeans (dryland)	Acre		13	0	0	0	2	0	0	0	0
Soybeans (irrigated)	Acre		0	0	0	0	0	0	0	0	0
Wheat (dryland)	Acre		31	31	31	0	31	31	0	20	0
Alfalfa (dryland)	Acre		10	26	0	57	0	16	45	10	35
Alfalfa (irrigated)	Acre		0	5	0	0	0	0	0	0	0
Rotation meadow (dryland)	Acre		15	12	16	2	11	14	11	14	9
Pork sold	Cwt.		1,397	1,206	1,482	189	1,593	1,353	1,095	1,395	1,218
Beef sold	Cwt.		181	606	0	959	0	290	758	181	590
Feed grain purchased[a]	Cwt.		3,543	1,947	−1,467	0	−1,258	0	1,439	− 955	596
Return to operator- family labor & mgmt.	Dol.		5,620	10,839	5,916	8,192	10,299	10,818	16,426	10,748	16,001

[a] A negative feed grain purchase indicates selling of feed grains.

sorghum are produced. These two crops exhaust the feed grain allot-
ment and wheat is grown up to the limit of its allotment. After the
rotation meadow necessary to support the hog enterprises is accounted
for, 2 acres of cropland are placed in soybean production. The farm
sells 1,258 hundredweight of feed grains and the return is $10,299.

The next price situation considered (column 6) is the medium price
for all products. Both hogs and beef are included in the plan. The
cropping pattern follows the general order of previous solutions. The
farm neither buys nor sells feed grains and the return is $10,818.

The last solution considered with medium feed prices (column 7)
is with high livestock prices. High livestock prices relative to medium
livestock prices call for producing more beef but less pork. Wheat is
not grown because of the expanded alfalfa requirements of additional
calf feeding. The return is $16,426.

The last two solutions presented consider high feed grain prices—
prices at the 1961 support levels. The solution in column 8 considers
medium livestock prices and the other, high livestock prices. The same
pattern occurs in column 9 with high feed prices as appeared with
medium feed prices (column 8). With high feed prices and medium
livestock prices relatively more pork than beef is produced. When high
livestock prices are considered the beef enterprise increases relative to
the pork enterprise. The farm sells feed grains at medium livestock
prices but at high livestock prices, feeding shows enough profit to cause
the purchase of 596 hundredweight of feed grains. There is almost a
$5,000 difference in return between the two livestock price situations.

Investments and Resource Values

As indicated in Table 5, investments in additional hog farrowing
facilities do not vary to any great extent from one price situation to
another. An exception is when feed is at its medium price, the pork
price is at its low level, and a medium price is assumed on beef
(column 4). The same is true for new investments in hog feeding facili-
ties. In the same instance in which there was no new investment in
farrowing facilities, available hog feeding facilities are sufficient.

The beef enterprise is not as stable as the hog enterprise as reflected
in the variable amounts of new investments required in beef housing
and feeding facilities. The last unit of dry cropland adds from $23.33
to $38.96 to net returns. Under the first set of prices (column 1 of
Table 5), if 68 acres of dry cropland were available rather than 69
acres, the return would be $27.08 lower. Marginal returns for an acre
of irrigated land vary from $22.68 to $51.51. In column 1 the value
is $28.50. In some cases marginal returns from an acre of irrigated
land are relatively low. In these cases labor was more restricting than
land. The last acre of pasture adds $2.01 to the return at the price
situation presented in column 1. Also in column 1, there are 31 acres

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Table 5. Additional investments required, marginal resource values and/or unused resource supplies on small, moderately irrigated farms at alternative price levels.[a]

Item	Feed grain Pork Beef	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	$ 0.74 / 11.40 / 15.86	$ 0.74 / 11.40 / 15.86	$ 0.74 / 14.28 / 20.02	$ 0.94 / 11.40 / 15.86	$ 0.94 / 11.40 / 20.02	$ 0.94 / 14.28 / 15.86	$ 0.94 / 14.28 / 20.02	$ 0.94 / 17.15 / 24.18	$ 1.14 / 14.28 / 20.02	$ 1.14 / 17.15 / 24.18
Investments:										
Farrowing facilities		44	36	46	0	48	44	35	46	38
Hog feeding facilities		470	404	428	0	465	396	377	476	411
Beef housing		3	21	0	2	0	0	27	3	20
Beef feeding		28	99	0	150	0	46	124	28	96
Purchases:										
Feeder calves		28	99	0	157	0	46	124	28	96
Yearlings		0	0	0	0	0	0	0	0	0
Resource data:										
Cropland		$ 27.08	$ 28.90	$ 32.28	$ 37.33	$ 23.33	$ 31.35	$ 31.69	$ 35.58	$ 38.96
Irrigated land		$ 28.50	$ 22.68	$ 36.10	$ 38.37	$ 33.60	$ 38.28	$ 37.32	$ 45.40	$ 51.51
Pasture		$ 2.01	$ 9.28	28 acres	$ 17.94	28 acres	$ 6.91	$ 13.98	$ 3.28	$ 7.54
Soybean allotment		31 acres	44 acres	44 acres	44 acres	42 acres	44 acres	44 acres	44 acres	44 acres
Feed grain allotment		25 acres	30 acres	3 acres	15 acres	$ 2.81	17 acres	12 acres	$ 2.63	$ 2.97
Wheat allotment		$ 10.53	$ 4.02	$ 5.95	31 acres	$ 11.60	$ 3.56	31 acres	11 acres	31 acres
Capital		$10,145	$ 1,774	$11,754	$ 1,001	$ 4,657	$ 9,115	$ 1,746	$ 8,669	$ 1,701
Hired labor:										
December–March		$ 0.96	$ 5.32	3 hrs.	3 hrs.	$ 6.17	$ 3.92	$ 8.92	$ 3.50	$ 6.92
April-May		18 hrs.	18 hrs.	18 hrs.	18 hrs.	18 hrs.	18 hrs.	18 hrs.	18 hrs.	18 hrs.
June–August		29 hrs.	29 hrs.	29 hrs.	$ 0.63	29 hrs.	29 hrs.	$ 2.23	29 hrs.	29 hrs.
September–November		$ 2.13	$ 3.87	$ 1.49	6 hrs.	$ 4.95	$ 4.61	$ 3.06	$ 4.27	$ 6.26

[a] In the resource data section of the table, a dollar-and-cents figure refers to a marginal resource value and an even figure indicates the amount of an unused resource.

of the soybean allotment unused and 25 acres of the feed grain allotment not used. The wheat allotment has a value of $10.53 placed on the last acre, indicating that a one acre reduction in the wheat allotment would reduce the return by that amount. Since soybean and feed grain allotments were not completely utilized, zero values are associated with the marginal unit of these restrictions. In column 1, the soybean allotment could be reduced by 31 acres and the feed grain allotment by 25 acres and the return or organization would not be affected.

The soybean allotment is never restricting on these small, moderately-irrigated farms. Only in three instances is the feed grain allotment completely utilized (columns 5, 8 and 9) so that a reduction in the feed grain allotment would affect the profit maximizing plan.

Capital is not a limiting resource at any price situation. Land and labor become limiting before the capital restriction becomes effective.

The marginal value or unused portion of hired labor is all that is presented here. Similar data exist for operator-family labor. Whenever hired labor is restricting and bears a positive marginal value product, operator-family labor for that same period will also be completely utilized. The marginal value product for operator-family labor is proportionately higher since it is used first and no change is made for its use.

In general, fall labor (September, October, November) is the most limiting. Winter labor (December–March) is limiting in seven of the nine price situations discussed. In the instance where there are only nine litters of pigs farrowed and cattle fed is the major livestock enterprise (column 4, Table 4) it is summer labor (June, July, August) that is limiting rather than fall or winter labor. One can see from the size of values imputed to the last hour of labor that hiring additional labor with idle capital could add much to farm return.

Medium Sized Farms - Moderate Irrigation

The farms of this class have between 260 and 499 acres of land. The average amount of irrigated land is 84 acres and there is an average of 151 acres of dry cropland.

Under the first price situation (column 1) we see in Table 6 that 66 litters of pigs are farrowed and 67 head of calves are fed. Pasture available limits the amount of calf feeding since the 67 head of calves fed on a deferred feeding system just exhaust the pasture supply. Most of the irrigated land is placed in corn production; however, four acres of corn silage are produced. Wheat is grown up to the limit of its allotment and alfalfa and rotation meadow production are in proportion to the level of the beef and pork enterprises, respectively. With the low feed grain price dryland soybeans preclude production

Table 6. Profit maximizing organizations for medium-sized, moderately irrigated farms in south central Nebraska at alternative price levels.

Enterprise	Unit	Feed grain Pork Beef	(1) $ 0.74 11.40 15.86	(2) $ 0.74 14.28 20.02	(3) $ 0.94 11.40 15.86	(4) $ 0.94 11.40 20.02	(5) $ 0.94 14.28 15.86	(6) $ 0.94 14.28 20.02	(7) $ 0.94 17.15 24.18	(8) $ 1.14 14.28 20.02	(9) $ 1.14 17.15 24.18
Litters farrowed	No.		66	64	77	9	83	67	63	68	64
Cattle fed	Head		67	112	0	201	0	86	115	67	103
Grain sorghums (dryland)	Acre		0	0	72	43	71	43	45	84	54
Grain sorghums (irrigated)	Acre		0	10	0	0	0	0	0	0	0
Corn (irrigated)	Acre		80	67	84	70	84	79	76	80	77
Sorghum silage (dryland)	Acre		0	0	0	0	0	0	0	0	0
Corn silage (irrigated)	Acre		4	7	0	14	0	5	8	4	7
Oats (dryland)	Acre		0	0	0	0	0	0	0	0	0
Soybeans (dryland)	Acre		49	32	0	0	0	0	0	0	0
Soybeans (irrigated)	Acre		0	0	0	0	0	0	0	0	0
Wheat (dryland)	Acre		60	60	60	35	60	60	49	25	43
Alfalfa (dryland)	Acre		24	40	0	71	0	30	41	24	37
Alfalfa (irrigated)	Acre		0	0	0	0	0	0	0	0	0
Rotation meadow (dryland)	Acre		18	18	18	2	19	17	16	17	16
Pork sold	Cwt.		1,397	1,335	1,611	181	1,741	1,419	1,323	1,640	1,351
Beef sold	Cwt.		432	704	0	1,224	0	544	718	432	650
Feed grain purchased[a]	Cwt.		694	1,902	−2,985	0	−2,585	0	548	−1,765	0
Return to operator- family labor & mgmt.	Dol.		7,955	14,267	8,158	11,112	13,127	14,151	20,761	14,327	20,658

[a] A negative feed grain purchase indicates selling of feed grains.

of dryland grain sorghum. Return to operator-family labor and management is $7,955.

With low feed grain and medium livestock prices (column 2, Table 6) adjustment response is the same as on small farms. A slight reduction in pork production occurs and beef production shows a sizable increase. The most profitable cropping plan calls for 10 acres of grain sorghum, 67 acres of corn, and seven acres of corn silage on irrigated land. Dryland is used by soybeans, wheat alfalfa, and rotation meadow. Soybean acreage is reduced relative to the first set of prices because of expanded alfalfa acreage. The farm buys 1,902 hundredweight of feed grains and the return is $14,267.

In column 3, when the price of feed grain increases so that corn is $0.94 per bushel, 77 litters of pigs are farrowed and no cattle feeding occurs. The higher feed grain price does introduce dryland grain sorghums (72 acres) into the farm plan. All irrigated land is placed in corn production. Wheat is grown up to its allotment limitation and 18 acres of rotation meadow are needed to support the hog enterprise. The farm sells 2,985 hundredweight of feed grains.

Pork production is reduced to nine litters when the pork price is at its lowest level and feed and beef prices are at the medium level (column 4). A total of 201 calves are fed. Grain sorghum, wheat alfalfa, and rotation meadow are the dryland crops. Corn and corn silage occupy the irrigated cropland. Expansion of cattle feeding and alfalfa acres reduces wheat production below the allotment level. Feed grains are neither bought nor sold and the return is $11,112.

In column 5 the pork and beef price situation is reversed so pork is at its medium price level and beef prices are low. No beef is produced. The crops are: 71 acres of dryland grain sorghum, 84 acres of irrigated corn, 60 acres of wheat, and 19 acres of rotation meadow. Feed grains are sold at this price situation just as they were sold on the small farm.

As indicated for the small farm, the amount of beef produced relative to the amount of pork produced increases when one goes from the medium price situation for all products (column 6) to the medium feed grain-high livestock price situation (column 7). With medium livestock prices the farm just produces all of its feed grain requirements but at high livestock prices 548 hundredweight of feed grains are purchased.

This same phenomenon holds true at the high feed grain (columns 8 and 9). As livestock prices increase from medium to high levels, the amount of beef relative to the pork produced increases. At high feed grain and medium livestock prices profitability of livestock feeding is not sufficient to feed all of the feed grains produced and some are sold. At high livestock prices, however, livestock feeding just exhausts the farm-produced feed grains.

Table 7. Additional investments required, marginal resource values and/or unused resource supplies on medium-sized, moderately irrigated farms at alternative price levels.[a]

Item	Feed grain / Pork / Beef	(1) $ 0.74 / 11.40 / 15.86	(2) $ 0.74 / 14.28 / 20.02	(3) $ 0.94 / 11.40 / 15.86	(4) $ 0.94 / 11.40 / 20.02	(5) $ 0.94 / 14.28 / 15.86	(6) $ 0.94 / 14.28 / 20.02	(7) $ 0.94 / 17.15 / 24.18	(8) $ 1.14 / 14.28 / 20.02	(9) $ 1.14 / 17.15 / 24.18
Investments:										
Farrowing facilities		54	54	53	0	64	56	53	57	54
Hog feeding facilities		441	430	480	0	551	453	422	460	431
Beef housing		0	0	0	18	0	0	0	0	0
Beef feeding		67	112	64	178	0	86	115	67	103
Purchases:										
Feeder calves		67	112	0	195	0	86	115	67	103
Yearlings		0	0	0	6	0	0	0	0	0
Resource data:										
Cropland		$ 25.56	$ 21.94	$ 32.27	$ 34.06	$ 24.63	$ 29.29	$ 28.11	$ 34.93	$ 30.13
Irrigated land		$ 29.49	$ 26.59	$ 36.09	$ 35.24	$ 32.65	$ 35.47	$ 34.97	$ 43.36	$ 41.23
Pasture		$ 3.20	$ 11.84	67 acres	$ 14.34	67 acres	$ 9.73	$ 15.32	$ 3.63	$ 11.25
Soybean allotment		22 acres	39 acres	71 acres	71 acres	71 acres	71 acres	71 acres	71 acres	71 acres
Feed grain allotment		85 acres	85 acres	13 acres	43 acres	14 acres	42 acres	40 acres	1 acre	31 acres
Wheat allotment		$ 11.79	$ 9.49	$ 5.95	25 acres	$ 9.92	$ 4.28	11 acres	35 acres	17 acres
Capital		$19,541	$14,799	$22,393	$26,521	$19,560	$18,101	$16,131	$18,975	$17,703
Hired labor:										
December–March		34 hrs.	$ 4.21	44 hrs.	44 hrs.	$ 4.97	$ 3.93	$ 6.14	$ 0.97	$ 2.63
April–May		47 hrs.	7 hrs.	47 hrs.	47 hrs.	40 hrs.	22 hrs.	$ 2.22	$ 1.74	$ 5.34
June–August		118 hrs.	102 hrs.	118 hrs.	$ 1.17	118 hrs.	72 hrs.	$ 2.41	118 hrs.	43 hrs.
September–November		$ 2.42	$ 3.02	$ 1.49	47 hrs.	$ 5.35	$ 3.46	$ 3.45	$ 4.96	$ 6.63

[a] In the resource data section of the table, a dollar-and-cents figure refers to a marginal resource value and an even figure indicates the amount of an unused resource.

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Investments and Resource Values

As shown in Table 7, new investments in hog farrowing and feeding facilities are again quite uniform except for the one situation in which pork production is slight (column 4). New investments in beef equipment follow the levels of the beef feeding enterprises.

Both dry and irrigated cropland become restricting resources. Pasture is limiting in all but two cases (columns 3 and 5). Neither soybean nor feed grain allotments are effective. In most instances, feed grain and soybean acreage allotments could be reduced considerably before any effect on return would have been felt.

Capital is again in abundant supply relative to labor and land. Fall and winter labor most severely limit the adjustments, indicating that if more labor were available, livestock enterprises would become more intensive.

Large Farms - Moderate Irrigation

The average farm in this class has 88 acres of irrigated land, 297 acres of dry cropland, and 153 acres of permanent pasture.

As shown in Table 8, at a given price situation large farms do not produce as much pork as small or medium-sized farms because of the labor restriction. They do tend to feed more beef, which requires relatively less labor than pork. On small and medium-sized farms grain sorghums were not grown at the situations with low feed grain prices (columns 1 and 2 in Tables 4 and 6). On the large farm there are 72 acres of dryland grain sorghums in one instance (column 1) and 91 acres in the other (column 2).

Irrigated grain sorghums and corn silage occupy the irrigated land with the first set of prices. Dryland is used by grain sorghum, wheat, alfalfa, rotation meadow, and soybean enterprises. The farm is self-sufficient in feed grains and the return is $10,497.

As livestock prices increase from the low to medium levels between the first and second price situations, production of both livestock products increases. More grain sorghum is produced, both on dry and irrigated cropland than at the first price combination. Less silage is produced and roughage needs are met by an increased alfalfa acreage. Wheat is again grown up to the allotment limitation. The return is $17,790. It is necessary to purchase 152 hundredweight of feed grains in addition to the amount produced on the farm.

At the medium feed grain price and low livestock prices found in column 3, there is no beef produced on the large farms. The same was found on the small and medium-sized farms at this price situation. There are 148 acres of dryland grain sorghum, 20 acres of rotation meadow on dryland, and the allotted 129 acres of wheat. Irrigated

Table 8. Profit maximizing organizations for large, moderately irrigated farms in south central Nebraska at alternative price levels.

Enterprise	Unit	Feed grain Pork Beef	(1) $ 0.74 11.40 15.86	(2) $ 0.74 14.28 20.02	(3) $ 0.94 11.40 15.86	(4) $ 0.94 11.40 20.02	(5) $ 0.94 14.28 15.86	(6) $ 0.94 14.28 20.02	(7) $ 0.94 17.15 24.18	(8) $ 1.14 14.28 20.02	(9) $ 1.14 17.15 24.18
							Product Prices				
Litters farrowed	No.		46	53	79	8	87	54	55	33	90
Cattle fed	Head		153	164	0	256	0	158	160	153	153
Grain sorghums (dryland)	Acre		72	91	148	109	144	101	95	188	155
Grain sorghums (irrigated)	Acre		79	87	0	0	0	79	79	0	79
Corn (irrigated)	Acre		0	0	70	70	88	0	0	79	0
Sorghum silage (dryland)	Acre		0	0	0	0	0	0	0	0	0
Corn silage (irrigated)	Acre		9	1	18	18	0	9	9	9	9
Oats (dryland)	Acre		0	0	0	0	0	0	0	0	0
Soybeans (dryland)	Acre		28	0	0	0	0	0	0	9	0
Soybeans (irrigated)	Acre		0	0	0	0	0	0	0	0	0
Wheat (dryland)	Acre		129	129	129	93	129	129	129	47	80
Alfalfa (dryland)	Acre		54	65	0	94	0	50	57	45	54
Alfalfa (irrigated)	Acre		0	0	0	0	0	0	0	0	0
Rotation meadow (dryland)	Acre		14	12	20	2	24	11	11	9	9
Pork sold	Cwt.		983	1,117	1,666	166	1,838	1,159	1,173	990	1,241
Beef sold	Cwt.		987	1,053	0	1,687	0	1,020	1,029	987	987
Feed grain purchased[a]	Cwt.		0	152	0	0	−4,861	− 246	0	−3,774	−1,800
Return to operator- family labor & mgmt.	Dol.		10,497	17,790	10,927	15,729	16,172	17,807	25,403	18,224	25,697

[a] A negative feed grain purchase indicates selling of feed grains.

land is used for corn and corn silage. The farm is self-sufficient in feed grains.

As the price of beef increases in column 4 to its medium level along with the medium feed grain price and with the pork price remaining low, only eight litters of pigs are farrowed. A total of 256 cattle are fed.

Irrigated land is allocated to corn and corn silage. There are 109 acres of grain sorghum, 94 acres of alfalfa, and 2 acres of rotation meadow. Due to the large alfalfa acreage, 93 acres of wheat are produced, a level below the allotment.

When pork and beef prices switch their relative positions in column 5, pork production increases to 1,838 hundredweight from 87 litters and no beef feeding occurs. All irrigated land is placed in corn, and 144 acres of grain sorghum, 24 acres of rotation meadow, and 129 acres of wheat are produced. The farm produces more feed grains than can be fed with existing labor supplies, so 4,861 hundredweight of feed grains are sold.

The next two price combinations (columns 6 and 7), both with medium feed prices but one with medium livestock prices and the other with high livestock prices, are about identical in livestock production. Only slight differences exist in the profit maximizing cropping patterns. With medium livestock prices in column 6 more dryland grain sorghums are grown and less alfalfa than with higher livestock prices. Some feed grains are sold from the farm at the price situation encountered in column 6. At high livestock prices (column 7) the farm produces more alfalfa and less grain sorghum and the farm is just self-sufficient in feed grains.

At the two situations with high feed grain prices (columns 8 and 9) beef feeding is limited by the pasture acreage to the number that can be fed on a deferred feeding system. Pork production increases as livestock prices increase.

Wheat is produced at levels below the allotted acreage in both of these price sets. High feed grain prices induce the sale of feed grains in both cases. The returns are $18,224 and $25,697, respectively.

Investments and Resource Values

Judging by the relative sizes of marginal resource values in Table 9, one can see evidence that labor is of more critical supply relative to other resources than was the case on the small and medium-sized farms. Marginal values of land are smaller for the large farms than on the two previously discussed farm classes. On the other hand, marginal value products of labor are high on large farms.

In one instance (medium feed and high livestock prices) there is idle cropland. The feed grain allotment is effective only in the case of high feed grain and medium livestock prices (column 8). Capital is again ample relative to amounts of land and labor available.

Table 9. Additional investments required, marginal resource values and/or unused resource supplies on large, moderately irrigated farms at alternative price levels.[a]

Item	Feed grain Pork Beef	(1) $ 0.74 11.40 15.86	(2) $ 0.74 14.28 20.02	(3) $ 0.94 11.40 15.86	(4) $ 0.94 11.40 20.02	(5) $ 0.94 14.28 15.86	(6) $ 0.94 14.28 20.02	(7) $ 0.94 17.15 24.18	(8) $ 1.14 14.28 20.02	(9) $ 1.14 17.15 24.18
Investments:										
Farrowing facilities		40	47	64	0	79	48	49	41	54
Hog feeding facilities		313	359	533	0	626	375	380	317	410
Beef housing		0	0	0	23	0	0	0	0	0
Beef feeding		153	164	0	259	0	158	160	153	153
Purchases:										
Feeder calves		153	164	0	256	0	158	160	153	153
Yearlings		0	0	0	22	0	0	0	0	0
Resource data:										
Cropland		$ 20.78	$ 4.36	$ 31.84	$ 30.41	$ 24.63	$ 12.90	4 acres	$ 25.70	$ 14.15
Irrigated land		$ 25.36	$ 15.89	$ 35.79	$ 31.42	$ 32.65	$ 23.60	$ 14.26	$ 37.23	$ 27.77
Pasture		$ 0.94	$ 8.27	153 acres	$ 15.72	153 acres	$ 7.60	$ 12.31	$ 0.36	$ 10.40
Soybean allotment		88 acres	116 acres	116 acres	116 acres	116 acres	116 acres	116 acres	116 acres	116 acres
Feed grain allotment		115 acres	97 acres	40 acres	79 acres	44 acres	87 acres	92 acres	$ 2.02	33 acres
Wheat allotment		$ 10.38	$ 11.00	$ 5.98	36 acres	$ 9.92	$ 7.60	$ 2.71	83 acres	49 acres
Capital		$38,818	$33,147	$39,696	$39,851	$36,866	$31,177	$31,356	$32,958	$26,268
Hired labor:										
December–March		70 hrs.	67 hrs.	70 hrs.	70 hrs.	$ 4.98	66 hrs.	59 hrs.	70 hrs.	40 hrs.
April–May		80 hrs.	80 hrs.	80 hrs.	80 hrs.	76 hrs.	80 hrs.	80 hrs.	38 hrs.	$ 2.91
June–August		130 hrs.	$ 1.57	161 hrs.	$ 2.34	161 hrs.	$ 0.60	$ 4.38	161 hrs.	$ 1.99
September-November		$ 6.00	$ 19.17	$ 1.91	$ 1.63	$ 5.35	$ 15.91	$ 26.30	$ 12.79	$ 19.50

[a] In the resource data section of the table, a dollar-and-cents figure refers to a marginal resource value and an even figure indicates the amount of an unused resource.

Small Farms - Highly Irrigated

Small farms which are highly irrigated have a total of 182 cropland acres, of which 154 acres are irrigated.

With the first set of prices, the data in Table 10 indicate 29 litters of pigs are produced and 114 head of calves are fed. Crops are 116 acres of irrigated grain sorghum, eight acres of irrigated corn silage, 26 acres of wheat, 23 acres of irrigated alfalfa, and eight acres of rotation meadow. Notice that total acreage of irrigated crops is less than the 154 acres available. Only 147 acres of irrigated crops are grown but the remaining seven acres are farmed as dryland so that the entire 182 acres of cropland is cropped. Fall labor shortages do not permit full use of available irrigated land.

The farm sells 2,311 hundredweight of feed grains. The return is $5,946.

Beef and pork production both increase between the first and second price sets. Expansion of the relatively more labor intensive livestock enterprises causes even more irrigated land to be farmed as dryland, however. The farm raises 93 acres of grain sorghum, 10 acres of corn silage, and 34 acres of alfalfa under irrigation. Dryland crops include 36 acres of wheat and nine acres of rotation meadow. A total of 17 acres of potentially irrigable cropland is farmed dry due to the fall labor shortage and the more intensive livestock operations. The farm feeds all feed grains produced, so feed is neither bought nor sold.

The profit maximizing plan calls for 40 litters of pigs and feeding of 12 calves under the medium feed grain-low livestock price situation in column 3. The plans call for 124 acres of irrigated corn, 27 acres of irrigated soybeans, and three acres of irrigated alfalfa. Thus, all 154 acres of irrigated land is used. Dryland is placed in wheat and rotation meadow. The farm sells a sizable amount of feed grains, 5,168 hundredweight, and the return to operator-family labor and management is $7,538.

Only seven litters of hogs are farrowed when pork sells for $11.40 per hundredweight and beef is priced at $20.02 as in column 4. In column 5, with beef at $15.86 and pork at $14.28, there is no beef produced. Cropping patterns reflect the relative amounts of pork and beef produced. When beef is the dominant livestock enterprise, relatively more roughage (silage and alfalfa) is produced and when beef drops from the picture acreages of corn, soybeans, and wheat increase. Prices favoring the beef enterprise utilize all of the available irrigated land but at the low beef-medium pork price (column 5), nine acres of the irrigated land is farmed dry. Under both price situations the plans call for selling feed grains.

Production plans for the medium feed-medium livestock (column 6) and medium feed-high livestock (column 7) price situations are highly similar. Greater differences are seen under high feed prices

Table 10. Profit maximizing organizations for small, highly irrigated farms in south central Nebraska at alternative price levels.

Enterprise	Unit	Feed grain Pork Beef	(1) $ 0.74 11.40 15.86	(2) $ 0.74 14.28 20.02	(3) $ 0.94 11.40 15.86	(4) $ 0.94 11.40 20.02	(5) $ 0.94 14.28 15.86	(6) $ 0.94 14.28 20.02	(7) $ 0.94 17.15 24.18	(8) $ 1.14 14.28 20.02	(9) $ 1.14 17.15 24.18
							Product Prices				
Litters farrowed	No.		29	33	40	7	65	43	42	55	42
Cattle fed	Head		114	141	12	191	0	99	114	38	113
Grain sorghums (dryland)	Acre		0	0	0	0	0	0	0	0	0
Grain sorghums (irrigated)	Acre		116	93	0	0	0	116	115	0	115
Corn (irrigated)	Acre		0	0	124	109	124	0	0	121	0
Sorghum silage (dryland)	Acre		0	0	0	0	0	0	0	0	0
Corn silage (irrigated)	Acre		8	10	0	15	0	8	9	3	9
Oats (dryland)	Acre		0	0	0	0	0	0	0	0	0
Soybeans (dryland)	Acre		0	0	0	0	0	0	0	0	0
Soybeans (irrigated)	Acre		0	0	27	0	21	0	0	16	0
Wheat (dryland)	Acre		26	36	17	11	34	32	31	28	31
Alfalfa (dryland)	Acre		0	0	0	15	0	0	0	0	0
Alfalfa (irrigated)	Acre		23	34	3	30	0	20	23	8	23
Rotation meadow (dryland)	Acre		8	9	11	2	3	6	4	6	4
Pork sold	Cwt.		621	706	836	153	1,353	904	878	1,164	879
Beef sold	Cwt.		694	854	77	1,154	0	602	689	231	688
Feed grain purchased[a]	Cwt.		–2,311	0	–5,168	–1,690	–4,083	1,982	1,623	–3,483	–1,624
Return to operator- family labor & mgmt.	Dol.		5,946	10,992	7,538	10,598	10,902	11,676	17,074	12,497	17,626

[a] A negative feed grain purchase indicates selling of feed grains.

and medium (column 8) or high livestock prices (column 9). With the high feed-medium livestock (column 8) price 55 litters of hogs are farrowed and 38 head of calves are fed. There are 121 acres of irrigated corn, 3 acres of irrigated corn silage, 16 acres of irrigated soybeans, and 8 acres of irrigated alfalfa. Not all available irrigated land is farmed as such, but 6 acres are farmed dry to give 28 acres of wheat and 6 of rotation meadow.

Relatively more beef is produced when all product prices are at their high levels as in column 9. Irrigated grain sorghums, corn silage, and alfalfa occupy the irrigated acres. Again 7 acres of irrigated land are farmed dry, so there are 31 acres of wheat and 4 acres of rotation meadow.

Investments and Resource Values

One can see from Table 11 that for most price situations there is not sufficient labor on these small farms with considerable irrigation to complement the other resources adequately. With seven of the nine price situations labor shortages prevent full use of the irrigated land. Labor shortages are also reflected in the size of the marginal values of labor. Fall labor is limiting at every price situation. In most cases there are greater returns per hour of fall labor by allocating labor to dryland wheat than by using scarce fall labor on irrigated soybeans or an irrigated feed crop.

The feed grain allotment restriction is limiting in all but one price situation (column 2, Table 11). The allotment is used entirely to produce irrigated feed grains. The soybean allotment (which applies only to soybeans grown on dryland) is never limiting. The wheat allotment is limiting at only one price situation (column 2) where the feed grain allotment was not limiting.

Capital is of ample supply relative to the amounts of labor and land.

Medium Sized Farms - Highly Irrigated

These farms have an average of 260 acres of cropland of which 180 is irrigated and 80 is dryland. In Table 12, it can be seen that with low prices for all products (column 1), 53 litters of hogs are produced and 20 calves are fed. All irrigated land is placed in grain sorghum and wheat is grown on dryland up to the 57 acre limit of its allotment. Remaining dryland is allocated 8 acres to alfalfa and 15 acres to rotation meadow. The farm sells 7,074 hundredweight of corn and the return is $7,112.

The price situation in column 2 of medium livestock prices and low feed prices results in relatively more beef and less pork produced than for the situation just discussed. The farm farrows 34 litters of

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Table 11. Additional investments required, marginal resource values and/or unused resource supplies on small, highly irrigated farms at alternative price levels.[a]

Item	Feed grain / Pork / Beef	(1) $ 0.74 / 11.40 / 15.86	(2) $ 0.74 / 14.28 / 20.02	(3) $ 0.94 / 11.40 / 15.86	(4) $ 0.94 / 11.40 / 20.02	(5) $ 0.94 / 14.28 / 15.86	(6) $ 0.94 / 14.28 / 20.02	(7) $ 0.94 / 17.15 / 24.18	(8) $ 1.14 / 14.28 / 20.02	(9) $ 1.14 / 17.15 / 24.18
Investments:										
Farrowing facilities		21	25	31	0	50	35	33	47	33
Hog feeding facilities		176	209	248	0	428	284	274	296	374
Beef housing		0	0	6	0	19	0	0	0	0
Beef feeding		114	141	12	191	0	99	114	38	113
Purchases:										
Feeder calves		114	141	12	191	0	999	114	38	113
Yearlings		0	0	0	0	0	0	0	0	0
Resource data:										
Cropland		$ 29.64	$ 7.09	$ 36.16	$ 31.89	$ 33.74	$ 20.68	$ 0.62	$ 29.19	$ 10.25
Irrigated land		7 acres	17 acres	$ 6.61	$ 26.21	9 acres	10 acres	7 acres	6 acres	7 acres
Pasture		$ 5.41	$ 7.43	$ 0.39	$ 13.62	12 acres	$ 6.43	$ 10.96	$ 6.62	$ 9.28
Soybean allotment		52 acres	52 acres	52 acres	52 acres	52 acres	52 acres	52 acres	52 acres	52 acres
Feed grain allotment		$ 1.08	21 acres	$ 21.88	$ 2.08	$ 21.41	$ 16.73	$ 5.32	$ 43.21	$ 31.24
Wheat allotment		10 acres	$ 6.41	19 acres	25 acres	2 acres	4 acres	5 acres	8 acres	5 acres
Capital		$21,984	$17,546	$25,469	$20,682	$ 6,102	$13,361	$11,245	$ 9,253	$11,232
Hired labor:										
December–March		1 hr.	1 hr.	1 hr.	1 hr.	$ 3.80	1 hr.	1 hr.	$ 0.83	$ 0.71
April–May		1 hr.	1 hr.	1 hr.	1 hr.	$ 0.68	1 hr.	1 hr.	1 hr.	1 hr.
June–August		160 hrs.	$ 1.16	160 hrs.	$ 1.14	160 hrs.	68 hrs.	$ 4.01	160 hrs.	$ 2.22
September–November		$ 10.19	$ 21.56	$ 3.67	$ 2.27	$ 5.97	$ 16.64	$ 28.88	$ 9.72	$ 22.67

[a] In the resource data section of the table, a dollar-and-cents figure refers to a marginal resource value and an even figure indicates the amount of an unused resource.

pigs and feeds 184 head of calves. Irrigated land is divided 112 acres to grain sorghum, 13 acres to corn silage, and 38 acres to alfalfa. Wheat is grown to the limit of its allotment. The plan also calls for 9 acres of rotation meadow. The farm is self-sufficient in feed grain.

Next, in column 3, consider medium feed prices and low livestock prices. The plan favors pork production over beef production with 48 litters of pigs and no beef feeding. All irrigated land is placed in corn. Dryland is divided between grain sorghum, wheat and rotation meadow. The farm sells 8,836 hundredweight of corn and the return is $9,794.

When a medium beef price is considered along with the medium feed and low pork prices as in column 4, only 3 litters of pigs are produced. At the same time 217 calves are fed. The cropping plan calls for 163 acres of irrigated corn and 17 acres of irrigated corn silage. To feed 217 head of calves, 79 acres of alfalfa are needed and the 3 litters of pigs require 1 acre of rotation meadow. As a result all land is committed and no wheat is grown.

With medium pork and feed prices along with low beef prices (column 5) beef production is discontinued. The plan calls for 63 litters of pigs, 180 acres of irrigated grain sorghum, 8 acres of dryland grain sorghum, 57 acres of wheat, and 15 acres of rotation meadow. The farm sells 7,404 hundredweight of feed grains.

At the medium price level for all commodities (column 6) 41 litters of hogs and 110 calves are fed. Irrigated land is used for grain sorghums, corn silage, and alfalfa. Dryland is used for wheat, alfalfa, and rotation meadow.

In column 7 livestock prices increase to their high level and the price of feed remains the same. With this price situation, pork production decreases and beef production increases. Cropland is allocated slightly more towards roughage production to match this shift in livestock production.

With high feed prices and medium livestock prices (column 8) 57 litters of pigs are farrowed and 20 head of calves are fed. Irrigated land is allocated mostly to corn but 1 acre of silage is grown. Dryland is split between grain sorghum, wheat, alfalfa, and rotation meadow.

Again, with high livestock prices and high feed prices (column 9), there is a shift from pork production to beef production. At the same time more land is placed in roughage (silage and alfalfa) production.

Investments and Resource Values

Investments vary considerably depending upon the price situation considered. In two instances in Table 13 cropland is not limiting. With low feed prices and medium livestock prices (column 2) and with medium feed and high livestock prices (column 7) there is idle crop-

Table 12. Profit maximizing organizations for medium-sized, highly irrigated farms in south central Nebraska at alternative price levels.

Enterprise	Unit	Feed grain / Pork / Beef	(1) $ 0.74 / 11.40 / 15.86	(2) $ 0.74 / 14.28 / 20.02	(3) $ 0.94 / 11.40 / 15.86	(4) $ 0.94 / 11.40 / 20.02	(5) $ 0.94 / 14.28 / 15.86	(6) $ 0.94 / 14.28 / 20.02	(7) $ 0.94 / 17.15 / 24.18	(8) $ 1.14 / 14.28 / 20.02	(9) $ 1.14 / 17.15 / 24.18
							Product Prices				
Litters farrowed	No.		53	34	48	3	63	41	33	57	16
Cattle fed	Head		20	184	0	217	0	110	164	20	190
Grain sorghums (dryland)	Acre		0	0	9	0	8	0	0	8	0
Grain sorghums (irrigated)	Acre		180	112	0	0	180	158	134	0	118
Corn (irrigated)	Acre		0	0	180	163	0	0	0	179	47
Sorghum silage (dryland)	Acre		0	0	0	0	0	0	0	0	0
Corn silage (irrigated)	Acre		0	13	0	17	0	8	13	1	15
Oats (dryland)	Acre		0	0	0	0	0	0	0	0	0
Soybeans (dryland)	Acre		0	0	0	0	0	0	0	0	0
Soybeans (irrigated)	Acre		0	0	0	0	0	0	0	0	0
Wheat (dryland)	Acre		57	57	57	0	57	57	57	57	57
Alfalfa (dryland)	Acre		8	0	0	79	0	16	0	7	69
Alfalfa (irrigated)	Acre		0	38	0	0	0	14	33	0	0
Rotation meadow (dryland)	Acre		15	9	14	1	15	7	6	8	3
Pork sold	Cwt.		1,134	724	1,036	67	1,336	866	707	1,214	347
Beef sold	Cwt.		129	1,118	0	1,316	0	672	997	129	1,155
Feed grain purchased[a]	Cwt.		−7,074	0	−8,836	−4,705	−7,404	−4,323	−1,959	−7,683	−4,347
Return to operator-family labor & mgmt.	Dol.		7,112	12,783	9,794	12,751	13,439	13,863	19,625	16,063	20,749

[a] A negative feed grain purchase indicates selling of feed grains.

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land. In the first case irrigated land as well as dryland is left idle. Pasture land is limiting whenever beef feeding is included in the plan. Neither soybean nor feed grain allotments are effective but the wheat allotment is limiting in all but two price situations.

There is a surplus of capital relative to the amount of labor in all cases. Labor severely limits the adjustment opportunities as is evidenced in the large marginal value productivities on labor.

Large Farms - Highly Irrigated

By now our results are fairly predictable. Especially consistent are the results to the three sizes of highly irrigated farms. The large, highly irrigated farm at the low price level for all products is organized much like the small and medium-sized farms at these prices. In Table 14, column 1 we see that the large farm has 19 litters of pigs and feeds 160 head of calves. There are relatively fewer pigs and more beef than was found on the two small classes, a reflection of a more limited labor supply. All available irrigated land is allocated to grain sorghums. Dryland is used by wheat to the limit of its allotment, alfalfa and rotation meadow. The remaining 83 acres of dryland are placed in soybean production. The farm sells 7,401 hundredweight of feed grains and has a return of $14,394.

With higher livestock prices (pork = $14.28 and beef = $20.02 per hundredweight) and the low feed grain price (column 2), production of both types of livestock increases. Irrigated land is placed mostly in grain sorghum production but some corn silage and alfalfa are grown. The wheat allotment is planted on dryland along with 15 acres of rotation meadow.

The large farm, like the two smaller farms at this price combination, is just self-sufficient in feed grains.

At the medium feed grain, low livestock price situation in column 3 there are 58 litters of pigs produced and no beef. All irrigated land is placed in corn. There are 136 acres of dryland grain sorghum, 173 acres of wheat, and 16 acres of rotation meadow. The farm sells 15,034 hundredweight of feed grains and the return is $18,061.

As the beef price increases in column 4 to $20.02 and pork remains at $11.40 along with the medium feed price, no pork is produced but 262 calves are fed. Irrigated land is divided between grain sorghum and corn silage. Grain sorghum, wheat, and alfalfa occupy the dryland.

The medium feed price coupled with medium pork and low beef prices in column 5 calls for 95 litters of pigs. All irrigated land is placed in grain sorghums and there are 140 acres of dryland grain sorghum, 173 acres of wheat, and 12 acres of rotation meadow.

When prices are at the medium levels for all products (column 6) there are 37 litters of pigs and 165 calves fed. Most irrigated land is placed in grain sorghum but 2 acres of corn silage are produced. Dry-

Table 13. Additional investments required, marginal resource values and/or unused resource supplies on medium sized highly irrigated farms at alternative price levels.[a]

Item	Feed grain Pork Beef	Product Prices (1) $ 0.74 11.40 15.86	(2) $ 0.74 14.28 20.02	(3) $ 0.94 11.40 15.86	(4) $ 0.94 11.40 20.02	(5) $ 0.94 14.28 15.86	(6) $ 0.94 14.28 20.02	(7) $ 0.94 17.15 24.18	(8) $ 1.14 14.28 20.02	(9) $ 1.14 17.15 24.18
Investments:										
Farrowing facilities		46	27	41	0	56	34	19	50	9
Hog feeding facilities		392	236	345	0	468	291	230	417	91
Beef housing		0	12	0	20	0	0	7	0	14
Beef feeding		20	184	0	217	0	110	164	20	190
Purchases:										
Feeder calves		20	184	0	217	0	110	164	20	190
Yearlings		0	0	0	0	0	0	0	0	0
Resource data:										
Cropland		$ 17.01	31 acres	$ 29.43	$ 29.31	$ 12.31	$ 21.11	17 acres	$ 28.89	$ 23.52
Irrigated land		$ 12.26	17 acres	$ 34.11	$ 25.79	$ 25.51	$ 17.15	$ 4.29	$ 39.15	$ 23.35
Pasture		$ 4.41	$ 9.98	20 acres	$ 14.57	20 acres	$ 7.14	$ 12.13	$ 1.46	$ 10.49
Soybean allotment		81 acres	81 acres	81 acres	81 acres	81 acres	81 acres	81 acres	81 acres	81 acres
Feed grain allotment		12 acres	67 acres	3 acres	12 acres	4 acres	26 acres	45 acres	4 acres	12 acres
Wheat allotment		$ 12.24	$ 10.54	$ 6.17	57 acres	$ 14.28	$ 4.40	$ 3.18	$ 0.51	49 acres
Capital		$35,971	$29,744	$38,009	$34,110	$31,462	$29,332	$28,615	$25,749	$32,755
Hired labor:										
December–March		40 hrs.	40 hrs.	40 hrs.	40 hrs.	40 hrs.	40 hrs.	40 hrs.	40 hrs.	40 hrs.
April–May		36 hrs.	3 hrs.	36 hrs.	36 hrs.	$ 4.33	$ 2.96	$ 2.84	$ 1.79	$ 9.29
June–August		89 hrs.	$ 2.63	98 hrs.	$ 2.09	98 hrs.	98 hrs.	$ 3.89	98 hrs.	$ 0.08
September–November		$10.93	$ 21.90	$ 4.25	$ 4.01	$ 13.73	$ 14.14	$ 26.88	$ 10.78	$ 13.87

[a] In the resource data section of the table, a dollar-and-cents figure refers to a marginal resource value and an even figure indicates the amount of an unused resource.

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Table 14. Profit maximizing organizations for large, highly irrigated farms in south central Nebraska at alternative price levels.

Enterprise	Unit	Feed grain / Pork / Beef	(1) $ 0.74 / 11.40 / 15.86	(2) $ 0.74 / 14.28 / 20.02	(3) $ 0.94 / 11.40 / 15.86	(4) $ 0.94 / 11.40 / 20.02	(5) $ 0.94 / 14.28 / 15.86	(6) $ 0.94 / 14.28 / 20.02	(7) $ 0.94 / 17.15 / 24.18	(8) $ 1.14 / 14.28 / 20.02	(9) $ 1.14 / 17.15 / 24.18
Litters farrowed	No.		19	57	58	0	95	37	72	40	49
Cattle fed	Head		160	230	0	262	0	165	165	77	165
Grain sorghums (dryland)	Acre		0	0	136	57	140	83	0	161	155
Grain sorghums (irrigated)	Acre		224	169	0	208	224	222	199	0	214
Corn (irrigated)	Acre		0	0	224	0	0	0	0	220	0
Sorghum silage (dryland)	Acre		0	0	0	0	0	0	0	0	0
Corn silage (irrigated)	Acre		0	5	0	16	0	2	10	4	10
Oats (dryland)	Acre		0	0	0	0	0	0	0	0	37
Soybeans (dryland)	Acre		83	0	0	0	0	0	0	0	0
Soybeans (irrigated)	Acre		0	0	0	0	0	0	0	0	0
Wheat (dryland)	Acre		173	173	173	173	173	173	173	131	71
Alfalfa (dryland)	Acre		65	0	0	95	0	65	30	28	58
Alfalfa (irrigated)	Acre		0	50	0	0	0	0	15	0	0
Rotation meadow (dryland)	Acre		5	15	16	0	12	4	13	6	4
Pork sold	Cwt.		410	1,207	1,210	0	1,991	794	1,525	856	1,033
Beef sold	Cwt.		1,030	1,458	0	1,651	0	1,064	1,064	494	1,064
Feed grain purchased[a]	Cwt.		−7,401	0	−15,034	−7,251	−12,255	−8,719	−3,204	−14,401	−10,660
Return to operator-family labor & mgmt.	Dol.		14,394	21,310	18,061	22,582	22,481	23,514	31,084	26,907	33,518

[a] A negative feed grain purchase indicates selling of feed grains.

land is divided between grain sorghum, wheat, alfalfa, and rotation meadow.

At the medium feed grain-high livestock price combination (column 7) 72 litters of pigs and 165 calves are fed. All irrigated cropland is utilized but 109 acres of dryland are left idle. Relatively high livestock prices induce livestock production which takes labor away from crop enterprises.

For the last two price situations, columns 8 and 9, with high feed grain prices, crop enterprises can compete with livestock for the scarce labor and crops are produced up to the limit of land availability.

Investments and Resource Values

New investments as shown in Table 15 are self-explanatory in that they tend to follow the enterprise levels. Investment levels and enterprise levels do not correspond one-to-one because of the multiple use possibilities of certain investments, that is, use at different times of the year.

As with the medium-sized farms with large amounts of irrigation, land is a limiting factor in all but two price combinations. Cropland (dry) is left idle at low feed grain-medium livestock prices (column 2) and at medium feed grain-high livestock prices (column 7). The soybean and feed grain allotments are generally not effective as the feed grain allotment was limiting in only one instance (column 8). The wheat allotment is completely utilized except in the high feed grain price situations in columns 8 and 9.

While considerable winter labor is available, fall and sometimes summer labor are of quite limited supply. Capital is ample relative to the amounts of labor available.

LIMITATIONS OF THE ANALYSES

Optimal farm organizations obtained from the above progressing operations are achieved under a special set of assumptions. Results should be interpreted accordingly.

The organizations are obtained in a framework of complete certainty. Relationships between input and output are assumed to be known for both the crop and livestock activities. There is no uncertainty about input or product prices. Results imply that immediate adjustments could be made to the profit maximizing plans. In reality, even if the coefficients and prices were known with certainty, response toward the more profitable organizations may be gradual.

Managerial knowledge and ability is not considered to be a limiting factor. Many farmers do not have experience in livestock production, however, and probably would not be able to achieve the input-output relationships assumed here until they become more experienced.

Table 15. **Additional investments required, marginal resource values and/or unused resource supplies on large, highly irrigated farms at alternative price levels.**[a]

Item	Feed grain Pork Beef	(1) $ 0.74 11.40 15.86	(2) $ 0.74 14.28 20.02	(3) $ 0.94 11.40 15.86	(4) $ 0.94 11.40 20.02	(5) $ 0.94 14.28 15.86	(6) $ 0.94 14.28 20.02	(7) $ 0.94 17.15 24.18	(8) $ 1.14 14.28 20.02	(9) $ 1.14 17.15 24.18
Product Prices										
Investments:										
Farrowing facilities		12	50	50	0	87	31	65	33	42
Hog feeding facilities		0	245	292	0	698	145	421	168	235
Beef housing		0	17	0	25	0	0	0	0	0
Beef feeding		160	230	0	262	0	165	165	77	165
Puchases:										
Feeder calves		160	230	0	262	0	165	165	77	165
Yearlings		0	0	0	0	0	0	0	0	0
Resource data:										
Cropland		$ 9.93	137 acres	$ 28.43	$ 9.68	$ 10.97	$ 6.99	109 acres	$ 24.30	$ 3.94
Irrigated land		$ 10.96	$ 0.82	$ 33.56	$ 22.26	$ 23.19	$ 20.69	$ 4.85	$ 36.49	$ 22.11
Pasture		5 acres	$ 9.76	165 acres	$ 5.65	165 acres	$ 2.96	$ 11.02	88 acres	$ 2.12
Soybean allotment		79 acres	162 acres	162 acres	162 acres	162 acres	162 acres	162 acres	162 acres	162 acres
Feed grain allotment		161 acres	211 acres	25 acres	104 acres	21 acres	78 acres	176 acres	$ 2.97	6 acres
Wheat allotment		$ 13.47	$ 10.76	$ 6.36	$ 7.73	$ 10.34	$ 9.07	$ 0.54	42 acres	102 acres
Capital		$62,997	$48,636	$61,614	$56,869	$36,812	$49,583	$42,072	$56,215	$42,677
Hired labor:										
December–March		229 hrs.	229 hrs.	229 hrs.	229 hrs.	229 hrs.	229 hrs.	229 hrs.	229 hrs.	229 hrs.
April–May		200 hrs.	147 hrs.	200 hrs.	200 hrs.	165 hrs.	156 hrs.	91 hrs.	200 hrs.	$ 1.61
June–August		247 hrs.	$ 2.52	326 hrs.	$ 0.15	4 hrs.	$ 0.39	$ 4.85	326 hrs.	$ 2.24
September–November		$ 14.16	$ 21.92	$ 5.26	$ 20.14	$ 16.37	$ 21.03	$ 27.54	$ 13.57	$ 29.72

[a] In the resource data section of the table, a dollar-and-cents figure refers to a marginal resource value and an even figure indicates the amount of an unused resource.

IMPLICATIONS AND CONCLUSIONS

Six types of farms have been programed at nine sets of product prices. Results indicate the importance of product prices on the profit maximizing farm organizations. Computations reported in this bulletin have some important implications for irrigated farms in south central Nebraska with respect to future adjustments.

A farmer, whose farm falls within a given type classification, say a small, moderately irrigated farm, can find what to expect regarding product prices in the near future and plan adjustments accordingly. For example, if expected prices are at the medium price level for each product ($0.94 for feed grain, $14.28 for pork, and $20.02 for beef) adjustments can be directed toward adding space for farrowing an additional 44 litters of pigs, facilities for feeding an additional 396 pigs, and expanding the feed lot to handle 46 calves. At this set of prices the cropping plan is not greatly different from the current cropping pattern (Table 3). The expanded beef feeding operation requires more cropland to produce roughage than does the current organization.

Several combinations considered probably would not occur over a prolonged period. Hence, it is questionable whether these price situations are relevant for investment decisions. The three price situations most probable are typified in columns 1, 6 and 9. These price sets keep product prices in line with the historical feed-livestock product price ratio. As to which of these sets is most likely to occur in the future is beyond the scope of this analysis.

Price situations represented in the other 6 columns are important to the analysis as well. These represent feed-livestock product price ratios that have occurred in the past (although for only a few weeks or months). Analyses at these prices gives us insight into the stability of investment decisions at the price levels that are more likely to occur.

At all price combinations considered, results indicate additional livestock can be included profitably in the farm plan. Livestock enables the farmer to utilize more fully his available labor and this labor earns a profitable return.

Adjustments implied for medium-sized, moderately irrigated farms closely parallel adjustments indicated for small farms. There is a tendency for medium-sized farms to produce slightly more beef relative to the amount of pork at a given price situation than occurs on small farms. The smaller amount of labor relative to land and capital on medium-sized farms forces the organizations toward the less labor intensive livestock enterprises. General organizational patterns are about the same at a given price combination for the two classes of farms, however. Net purchases or sales of feed grains (or self-sufficiency) occur at the same price combinations for the two farm classes.

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Importance of the labor-land and labor-capital ratios on the relative amounts of beef and pork produced at a given price situation is demonstrated further in the results to the large moderately-irrigated farms. Labor, being even more scarce relative to other resources on these large farms than on the small and medium-sized farms, tends to bring in the less labor intensive livestock enterprises. Feed grain is purchased at only one price situation and then in a small amount. This, too, reflects the labor shortage. First, the crops in the plan make their claims on the labor supply and labor in excess of the crop requirements is allocated to livestock. In about half of the cases there is not enough labor available to feed even the farm-produced concentrates, and feed grains are sold. In one case, where livestock prices are high relative to feed prices (feed grains at $0.94, pork at $17.15, and beef at $24.13), livestock enterprises out-compete crop enterprises for the scarce labor input and four acres of cropland are left idle.

The acute supply of labor relative to other resources becomes even more pronounced on highly irrigated farms.

For small, highly-irrigated farms there are only two price situations for which all available irrigated cropland is used. The two situations are those in which the medium feed grain price is associated with low pork prices. The short labor supply is also apparent through large values imputed to marginal units of labor, especially in the fall period. On the small farms all land is farmed at every price situation but irrigated land is farmed as dryland due to the labor shortage. Dryland wheat returns more per hour of scarce fall labor than does irrigated soybeans. With the second price situation (low feed and medium livestock prices), dryland wheat is also more profitable than feed grain crops.

Feed grains are sold in all cases except the second price situation (mentioned above). Increasing the amount of labor would have the effect of increasing livestock production to consume farm produced feeds.

On medium-sized, highly irrigated farms a similar pattern emerges with respect to feed grain sales. Feed grains are sold (in sizeable quantities) in all cases except the low feed grain-medium livestock price situation. Sufficient labor exists to utilize all cropland except at the low feed-medium livestock and medium feed-high livestock price situations. Only in the former is irrigated land idled.

Large, highly irrigated farms exhibit the same pattern as small and medium-sized farms that are highly irrigated. The farms sell feed grains in all instances except the low feed-medium livestock price situation. At low feed-medium livestock and medium feed-high livestock price combinations there is idle cropland.

On all farms there are two price situations for which beef feeding is a relatively weak enterprise: the medium feed—low livestock and the medium feed-medium pork-low beef price combinations. In all other

instances beef feeding is included—generally at a level sufficient to utilize all available pasture land. Marginal values for pasture land in the odd-numbered tables reflect the cases in which pasture land is completely utilized.

Under the assumptions of our study, capital does not appear to be a limiting factor in adjustments on these south central Nebraska irrigated farms. Farmers may prefer to withhold capital for a higher return than we have assumed (5-percent for real estate mortgage and $7\frac{1}{2}$-percent for chattel mortgage), however. Even with this in mind, the farms appear to have an abundance of capital relative to labor.

Return to labor and management computed for each farm class at each price situation is quite favorable. It should be remembered that this return is realized in a framework of 1. assumed prices, 2. high-level management, and 3. complete resource flexibility.

Results indicate considerable potential for expanding livestock enterprises on farms analyzed. This can be done with the restriction of using only resources currently available to the farm.

Marginal resource values obtained in achieving the profit maximizing organizations also indicate something about potential adjustments outside of the currently available resources assumption. Fall labor is generally of limited supply and in many cases the supply of winter and summer labor is also short. Cropland (both dryland and irrigated) is also limiting at most price combinations. Further analyses are needed to explore the possibilities for 1. hiring additional labor, 2. acquiring more land, and 3. developing more irrigated cropland to appraise more completely the adjustment opportunities of these farms.