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# Resource Requirements for Different Levels of Income on Faulk County, South Dakota Farms and Ranches

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Bulletin 547

October 1968

# RESOURCE REQUIREMENTS

for Different Levels of Income  
on Faulk County Farms and Ranches

Economics Department  
Agricultural Experiment Station  
South Dakota State University, Brookings

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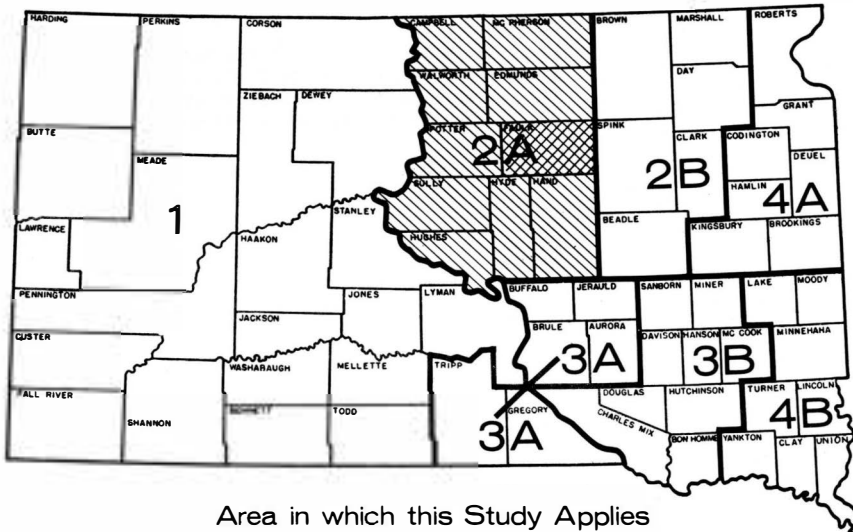
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## HIGHLIGHTS

The purpose of this study was to determine the minimum resources (land, labor, cash or credit) required to earn \$3,000, \$5,000 or \$10,000 annual labor income in Faulk and nearby counties with comparable land.



Area in which this Study Applies

Linear programming determined that some or all of the following crops should be included in the most profitable plans: corn, wheat, oats, flax, corn silage and alfalfa.

Fattening of purchased feeder calves was determined to be the most profitable enterprise. However, few ranchers include this enterprise, perhaps because of high risk. If a rancher restricts himself to a beef cow herd he would require 6,000 acres additional land to net the same income. If he neither buys calves or stockers for fattening nor raises hogs he will need 1,600 acres more land. If he doesn't buy calves or stockers for fattening he will need over 300 acres more land.

Changing land values as they affect the acres required to earn various levels of labor income are as follows:

For \$3,000 --

\$0 per acre land requires 578 acres;  
\$30 per acre land requires 728 acres;  
\$60 per acre land requires 1,016 acres;  
\$75 per acre land requires 1,370 acres.

For \$5,000 --

\$0 per acre land requires 836 acres;  
\$30 per acre land requires 1,001 acres;  
\$60 per acre land requires 1,613 acres;  
\$75 per acre land requires 2,279 acres.

For \$10,000 --

\$0 per acre land requires 1,564 acres;  
\$30 per acre land requires 2,131 acres;  
\$60 per acre land requires 3,280 acres;  
\$75 per acre land requires 4,843 acres.

# RESOURCES REQUIRED FOR DIFFERENT LEVELS OF INCOME ON FAULK COUNTY, SOUTH DAKOTA FARMS AND RANCHES

Dwaine E. Umberger and Rex D. Helfinstine<sup>1 2 3</sup>

Most farmers and ranchers in Faulk County, as well as in other counties, are interested in learning the minimum amount of resources (land, labor and cash or credit) needed to earn different incomes. This bulletin presents the results and implications of comprehensive and speedy linear programming work that determined the minimum resources required by a farmer or rancher to earn a labor income of \$3,000, or \$5,000 or \$10,000 per year in Faulk County. Later reports are planned to present the results of similar work for other areas of South Dakota.

Faulk County is a transition area between farms and ranches with each being interspersed with the other. Accordingly, the term ranch as used later, will refer to either farm or ranch.

Current developments in electronic computing allow us to readily compute the best way to organize given ranch resources for the highest profit or, alternatively, the minimum resources to earn a given income. Linear programming as a technique for solving ranch management problems means adaptation of electronic data processing to the budgeting process long used in solving ranch management problems. Both the computer and budgeting process involve trial and error methods of comparing alternatives to find the best plan. However, the speed of electronic data processing allows comparison of almost unlimited alternatives rather than just for a few as in budgeting. This means greater assurance of obtaining the most profitable alternative.

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<sup>1</sup>Formerly research assistant, Economics Department, Agricultural Experiment Station, South Dakota State University, and Professor of Economics, Agricultural Experiment Station, South Dakota State University, respectively.

<sup>2</sup>Umberger, Dwaine Edward, "Minimum Resource Requirements for Specified Levels of Income in Faulk County, South Dakota," South Dakota State University M.S. thesis, 1967.

<sup>3</sup>Special acknowledgment is given to Professors John T. Sanderson and Wallace G. Aanderud of the Economics Department for advice and guidance on this study.



Linear programming requires a more precise mathematical statement of all requirements. Both methods require the same type of basic figures - labor, equipment, capital requirements for each enterprise, and production rates for each crop and livestock enterprise.

## PRESENT AGRICULTURE

Faulk County, the specific area under study, is located in State Economic Area 2A (figure 1). This area includes Campbell, Edmunds, Faulk, Hand, Hughes, Hyde, McPherson, Potter, Sully, and Walworth Counties. Results of the study apply specifically to Faulk County, but may apply in a general way to other counties with similar soils and resources.

### Present Farming

Major crops grown in Faulk County include wheat, oats, corn, and alfalfa. Land considered not suited for cultivation is used for native hay and pasture. Types of ranches range from primarily livestock to cash-grain, depending upon the relative proportion of cropland and preference of the operator.

Feeder cattle raising has been the chief livestock enterprise since it adapts itself to using both the native pasture and hay. Feed grains are used by some ranchers for fattening cattle or raising hogs or sheen.

The average size of ranch in Faulk County has been increasing since the 1930's. This may reflect the pressure to commensate for declining profits per unit from higher fixed investment in equipment. Higher fixed investment in equipment has arisen from substitution of equipment for labor as encouraged by improved technology and high labor costs. Ranchers find that unit costs may be reduced and total profits increased by enlarging their ranches. Changes in number of farms (ranches) and average size of farms in Faulk County are illustrated by the following U.S. Census figures:

| Census Year | Number of Farms | Average size, acres |
|-------------|-----------------|---------------------|
| 1890        | --              | 237                 |
| 1900        | --              | 660                 |
| 1910        | --              | 476                 |
| 1920        | --              | 586                 |
| 1930        | --              | 575                 |
| 1940        | 302             | 709                 |
| 1950        | 766             | 734                 |
| 1959        | 602             | 1005                |
| 1964        | 528             | 1138                |

## Soils

Faulk County lies on an undulating glacial plain that becomes less undulating from west to east.<sup>4</sup> Claypan and poorly drained soils are found more frequently toward the western part of the County. This situation means that the proportion of cropland decreases as one travels from east to west.

Soil fertility on cropland, although generally adequate, may need replenishment with nitrogen fertilizer and organic matter. A few areas have a water erosion problem arising from slope and character of the soil.

## Climate

Extreme change characterizes the weather in Faulk County. Temperatures have ranged from 20° to 40° below zero in winter to more than 100° in July and August. Winds up to 60 miles an hour are not uncommon. Hailstorms may wipe out a crop in minutes. At Faulkton, the county seat, 102 hailstorms of varying intensities have occurred in the 56-year period 1900 - 1956. Annual precipitation at the Faulkton weather station has averaged nearly 18 inches for the past 45 years. But the extreme variation in annual precipitation -- from 10 to more than 27 inches -- results in similar variation in crop yields.

## PRODUCTION REQUIREMENTS

Determination of minimum ranch resources required to earn given income levels by linear programming necessitates that production and cost requirements for crops and livestock be mathematically specified. Assumptions, which are required to be made, may not describe precisely any one ranch in Faulk County. However, the physical and financial results from using such assumptions should be useful for indicating the level of profitability from alternative ranching systems.

## Land

It was assumed that each acre of land was typical of Faulk County. This assumption allows one to determine the minimum acres of land required for different levels of living and use of the size ranch so determined for programming minimum

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<sup>4</sup>For more details see: Fred C. Westin et al, "Soils of South Dakota", Soil Survey Series Pamphlet No. 3, Agronomy Department, (Revised July 1967), South Dakota State University, Brookings, South Dakota, 1959.

other resources. Each acre was assumed to be made up as follows:<sup>5</sup>

|                                       |        |
|---------------------------------------|--------|
| Cropland                              | 43.4%  |
| Class a (most favorable)              | (10.4) |
| Class b (Subject to erosion)          | (20.9) |
| Class c (Unfavorable soil conditions) | ( 9.5) |
| Class d (Excess water problems)       | ( 2.6) |
| Native hay and pasture                | 12.5%  |
| Range                                 | 39.8%  |
| Other                                 | 4.3%   |
| TOTAL                                 | 100.0% |

## Crops

Recommended cropping practices were assumed to be followed on the ranches under study. Average yields under this assumption were estimated by South Dakota State University agronomists for the average acre of crop land planted in Faulk County as follows:

|                        |       |
|------------------------|-------|
| Corn, bu.              | 23.7  |
| Corn silage, T.        | 4.5   |
| Oats, bu.              | 36.2  |
| Barley, bu.            | 25.1  |
| Wheat on cropland, bu. | 16.1  |
| Wheat on fallow, bu.   | 17.5  |
| Flax, bu.              | 9.7   |
| Alfalfa Hay, ton       | 1.3   |
| Native Hay, ton        | 0.67  |
| Native pasture, A.U.M. | 0.55. |

Other assumed figures and additional details for crops on average prices paid and received, costs of machinery and equipment, overhead costs and labor requirements are presented in appendix tables A-1, A-2, A-3 and A-4.

Crop enterprises considered in the analysis included wheat, corn grain, corn silage, oats, flax, barley and alfalfa hay. These crops were considered in rotations practiced in the area and recommended by agronomists at South Dakota State University. Continuous one-crop systems were not considered since they are not recommended nor practiced to any extent.

## Livestock

Livestock enterprises considered included 11 different beef cattle or calf systems and one hog system. A 92% calf crop was assumed for the cow-calf enterprise with one-sixth of the cows replaced annually. Average annual sales were one-sixth of a 1,000-pound cull cow and 76% of a 430-pound calf, with calves weaned the latter part of October.

<sup>5</sup>South Dakota Conservation Needs Committee, South Dakota Soil and Water Conservation Needs Inventory, May 1962.

Other livestock enterprises included feeding steer calves on alternative rations and weights for different lengths of time. A stocker enterprise wintered 430-pound calves on a ration of either silage or grain plus hay, followed by pasturing to a 700-pound weight in late summer. Four calf feeding systems involved obtaining 430-pound steer calves in October, wintering and feeding in drylot with or without silage to a 1,050-pound choice grade the following October. An alternative involved pasturing for 3 months and marketing as a 1,100 pound choice steer.

The hog enterprise included a gilt with 7.5 pigs weaned per litter, pigs farrowed in the spring and sold as 225-pound market hogs in the fall, with one gilt retained for replacement.

Further assumptions on costs, prices and production are given in appendix tables A-1, A-9, A-10, and A-11.

#### Basis of Analysis

Estimated future prices and costs used in the analysis are basic to the results one obtains. Those used in this study represent an estimate of future prices and are considered to be internally consistent.

Prices paid and received by ranchers in Faulk County were assumed to be as given in table 1.

### DETERMINATION OF MINIMUM RESOURCES FOR DIFFERENT LABOR INCOMES

Land in Faulk County was considered to be the most limiting resource since ranchers have little opportunity to rent or buy additional land at prevailing prices. Accordingly the programming was set up to minimize land requirements but allow labor and capital to be used up to the level where returns equal costs. Important factors other than land in determining minimum resources required by a typical Faulk County rancher for earning labor incomes of \$3,000, \$5,000 or \$10,000 include income goals, level of management, production rates, available labor, costs and prices, and availability of other resources.<sup>6</sup>

Important assumptions in the analysis include:

1. Operators desire maximum labor income.
2. Labor supply: operator furnishes up to 3,000 man-hours per year, additional labor may be hired at \$1.25 per hour.

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<sup>6</sup>Labor income is defined as residual returns for operator labor and management after market rates have been paid for all other resources.

3. Managerial ability: adequate to allow adoption of improved practices.
4. Resource ownership: all assets, including land, machinery, equipment and livestock are fully owned with no rent or interest paid out.
5. Wheat acreage limited to county average allotments.

### For Various Income Levels

Minimum resources required to earn \$3,000 labor income are indicated in tables 2 and 3. Land requirements are 1,016 acres; labor requirements 3,122 hours; and total capital requirements \$100,136. A labor income of \$3,000 required an annual gross income of \$34,109. The most profitable source of income, representing 91% of gross sales, was from feeding purchased calves.

Minimum resources for earning \$5,000 labor income are likewise shown in tables 2 and 3. Land requirements come to 1,613 acres; labor requirements to 4,269 hours; and capital requirements to \$155,546. This labor income of \$5,000 required an annual gross income of \$54,320 with 90% of gross sales accounted for by fat cattle.

Table 1. Assumed Average Prices Paid and Received by Farmers,  
Faulk County, South Dakota

| Item                                   | Unit | Price     |
|--|------|-----------|
|  |      | (Dollars) |
| <u>Prices Paid:</u>                    |      |           |
| Livestock:                             |      |           |
| Yearling steer purchased (April)       | cwt. | 23.26     |
| Yearling feeder steer bought (October) | cwt. | 23.08     |
| Steer Calf bought (October)            | cwt. | 25.28     |
| Gilt (breeding Stock)                  | unit | 60.00     |
| <u>Prices Received:</u>                |      |           |
| Crop products:                         |      |           |
| Wheat                                  | bu.  | 1.82      |
| Oats                                   | bu.  | .53       |
| Barley                                 | bu.  | .81       |
| Flax                                   | bu.  | 2.75      |
| Corn                                   | bu.  | 1.09      |
| Livestock products:                    |      |           |
| Choice steer sold (October)            | cwt. | 24.15     |
| Choice steer sold (April)              | cwt. | 23.97     |
| Yearling Stocker steer (October)       | cwt. | 23.08     |
| Steer calf (October)                   | cwt. | 25.28     |
| Cull cow                               | cwt. | 13.04     |
| Market sows (farrowed once)            | unit | 54.57     |
| Butcher hogs (late spring litter)      | cwt. | 15.82     |

Minimum resources necessary for earning a \$10,000 labor income are tabulated in tables 2 and 3. For this return 3,180 acres of land, 7,146 hours of labor and \$298,651 are required. This labor income required a \$98,766 gross income of which 80% was derived from fat cattle sales, 7% from hogs and 13% from wheat and flax sales.

Table 2. Land Use and Livestock as Programmed For Minimum Resource Requirements for Different Labor Incomes

|                            | Level of Labor Income |         |          |
|----------------------------|-----------------------|---------|----------|
|                            | \$3,000               | \$5,000 | \$10,000 |
| Corn, acres                | 166                   | 264     | 528      |
| Oats, acres                | 106                   | 168     | 224      |
| Barley, acres              | 0                     | 0       | 0        |
| Wheat, acres               | 78                    | 124     | 370      |
| Flax, acres                | 25                    | 39      | 80       |
| Corn silage, acres         | 9                     | 15      | 4        |
| Alfalfa, acres             | 49                    | 77      | 213      |
| Fallow                     | 9                     | 14      | 5        |
| Total, crop acres          | 442                   | 701     | 1424     |
| Native hay, acres          | 75                    | 119     | 179      |
| Rangeland, acres           | 464                   | 738     | 1441     |
| Other, acres               | 35                    | 55      | 136      |
| Total, all land, acres     | 1016                  | 1613    | 3180     |
| Feed calves, drylot, head  | 36                    | 58      | 16       |
| Feed calves, pasture, head | 83                    | 131     | 279      |
| Gilt and litter, litters   | 0                     | 0       | 21       |

Table 3. Financial Highlights of Programs for Minimum Resource Requirements for Different Labor Incomes

|                                 | Level of Labor Income |         |          |
|---------------------------------|-----------------------|---------|----------|
|                                 | \$3,000               | \$5,000 | \$10,000 |
| Investment                      |                       |         |          |
| Land and Buildings, dol.        | 64,044                | 101,637 | 206,742  |
| Machinery and Equipment, dol.   | 11,640                | 14,732  | 19,621   |
| Operating capital, dol.         | 24,452                | 39,177  | 72,288   |
| Total capital, dol.             | 100,136               | 155,546 | 298,651  |
| Income and Expenses             |                       |         |          |
| Gross Income, dol.              | 34,109                | 54,320  | 98,766   |
| Expenses, dol. <sup>a</sup>     | 25,583                | 40,039  | 71,925   |
| Land charges, dol. <sup>b</sup> | 3,352                 | 5,323   | 10,824   |
| Machinery costs, dol.           | 3,246                 | 3,958   | 6,017    |
| Labor Income, dol.              | 3,000                 | 5,000   | 10,000   |

<sup>a</sup> Includes operating and overhead expenses with 7% interest on capital

<sup>b</sup> Assumes land value of \$60 per acre and 5.5% interest charge. Land charges and other interest charges are available for living expenses.

## General Considerations

The most profitable cropping plans for the different income levels included all crops considered except barley. A small change in resource requirements, yield relationships, or prices, would allow barley to replace oats.

Specific cropping plans varied with land class and income level. Class "a" cropland had corn-wheat and corn silage-wheat rotations for the three income levels. Class "b" cropland rotations included corn-oats for the \$3,000 and \$5,000 levels, and corn-oats and corn-wheat for the \$10,000 level.

Class "c" cropland rotation included wheat-corn-flax and 3 years of alfalfa for the three income levels. The rotation on class "d" cropland included flax-wheat-fallow for all three levels. The wheat allotment restriction, representing the average allotment for the County, proved to be a restriction only at the \$10,000 income level. Other resources could be used more advantageously in alternate enterprises.

Labor requirements varied seasonally according to crop planting, cultivating and harvesting requirements. Operator labor was considered available by periods as follows:

|                               |            |
|-------------------------------|------------|
| 1. November 16 to March 15 -  | 508 hours  |
| 2. March 16 to April 30 -     | 210 hours  |
| 3. May 1 to July 15 -         | 493 hours  |
| 4. July 16 to September 30 -  | 583 hours  |
| 5. October 1 to November 15 - | 306 hours. |

It was profitable to hire additional labor during period 2 and 3 at the three income levels. In addition it was profitable to hire labor at higher income levels in other labor periods. The number of hours of labor to be hired during the different periods was as follows:

| Period                     | Income Level |         |          |
|----------------------------|--------------|---------|----------|
|                            | \$3,000      | \$5,000 | \$10,000 |
| 1. November 16 - March 15  | 0            | 0       |          |
| 2. March 16 - April 30     | 128          | 320     | 793      |
| 3. May 1 - July 15         | 229          | 654     | 1676     |
| 4. July 16 - September 30  | 0            | 271     | 929      |
| 5. October 1 - November 15 | 0            | 116     | 547      |
| TOTAL                      | 357          | 1361    | 4095     |

Appendix table A-6 presents crop labor requirements and seasonal distribution.

### Changing Livestock Enterprises As It Affects Resource Requirements

Previous programming results indicated generally that the most profitable ranch organization included the fattening of purchased feeder calves. However, few Faulk County ranchers fatten purchased feeder calves, according to a recent survey of a group of 40 ranchers in the county. Perhaps the explanation lies in the risks associated with cattle feeding. Either or both crop production and prices fluctuate from year-to-year resulting in unpredictable high, low or intermediate income. Large amounts of capital or credit are required to be available to an operator if he is to continue in business.

Many operators in Faulk County apparently tried to diversify their enterprises in order to reduce risk. The effects of likely changes in livestock enterprises upon minimum resources and net incomes were examined.

Three different organizations were programmed:

1. An organization not allowing the purchase of feeder calves nor stockers (B);
2. An organization not allowing the purchasing of feeder calves nor stockers nor hog raising (C);
3. An organization allowing only a beef cow herd as a livestock enterprise (D).

Programming results to attain a \$3,000 labor return for these different organizations, assuming a \$60 land price, are presented in tables 4 and 5. Land requirements increase from 1,016 acres for the basic organization to 1,349 for B, to 2,604 for C and to 6,109 for D. Total capital requirements increase from \$100,136 for the basic organization to \$133,358 for B, to \$217,451 for C, and to \$494,113 for D.

Implications of these results for Faulk County ranchers are important. If a rancher decides he will not buy calves or stockers for fattening (B), he will need approximately a half section more land to make the same \$3,000 income. If he decides he will neither buy calves or stockers for fattening nor raise hogs (C), he will need an additional 1,600 acres. On the other hand, if only a beef cow herd will be kept (D), more than 6,000 additional acres will be required to make \$3,000 net labor income. The cost of restricting the enterprises a rancher will consider is readily apparent.

Similar results and implications are apparent in programming minimum resources for a \$5,000 income (Tables 6 and 7). Land requirements (\$60 land) increase from 1,613 acres for the basic organization to 2,246 acres for B, to 4,760



for C. to 11,164 for D. Increases in land requirements when enterprise choices are restricted are apparent.

Programmed results for \$3,000 and \$5,000 labor incomes are presented in tables 8, 9, 10 and 11.

Table 4. Programmed Land Use and Livestock with Different Livestock Organizations for Minimum Resources to Earn \$3,000 Labor Income (\$60 Land Price)

|                                       | Basic | Livestock Organization |                | D <sup>3</sup> |
|---------------------------------------|-------|------------------------|----------------|----------------|
|                                       |       | B <sup>1</sup>         | C <sup>2</sup> |                |
| Corn, acres                           | 166   | 243                    | 308            | 721            |
| Oats, acres                           | 106   | 141                    | -              | 305            |
| Barley, acres                         | 0     | 0                      | 130            | 0              |
| Wheat, acres                          | 78    | 103                    | 294            | 690            |
| Flax, acres                           | 25    | 34                     | 158            | 371            |
| Corn silage, acres                    | 9     | -                      | -              | -              |
| Alfalfa, acres                        | 49    | 64                     | 124            | 292            |
| Fallow                                | 9     | 1                      | 117            | 274            |
| Total, crop acres                     | 442   | 586                    | 1,131          | 2,653          |
| Native hay, acres                     | 75    | 79                     | 124            | 289            |
| Rangeland, acres                      | 464   | 627                    | 1,238          | 2,907          |
| Other, acres                          | 35    | 57                     | 111            | 260            |
| Total, all land, acres                | 1,016 | 1,349                  | 2,604          | 6,109          |
| Beef cow and calf, head               | 0     | 34                     | 67             | 204            |
| Feed calves: drylot, silage, head     | 36    | 0                      | 0              | 0              |
| Feed calves: pasture, no silage, head | 83    | 26                     | 51             | 0              |
| Gilt and litter, litters              | 0     | 50                     | 0              | 0              |

Table 5. Financial Highlights of Programming Minimum Resource Requirements to Earn \$3,000 Labor Income with Different Livestock Organizations (\$60 Land Price)

|                               | Basic   | Livestock Organization |                | D <sup>3</sup> |
|-------------------------------|---------|------------------------|----------------|----------------|
|                               |         | B <sup>1</sup>         | C <sup>2</sup> |                |
| Investment                    |         |                        |                |                |
| Land and Buildings, dol.      | 64,044  | 86,943                 | 160,201        | 374,606        |
| Machinery and Equipment, dol. | 11,640  | 15,002                 | 18,154         | 32,028         |
| Operating capital, dol.       | 24,452  | 31,413                 | 39,096         | 88,479         |
| Total capital, dol.           | 100,136 | 133,358                | 217,451        | 494,113        |
| Income and Expenses           |         |                        |                |                |
| Gross Income, dol.            | 34,109  | 26,911                 | 47,173         | 79,804         |
| Expenses, dol.                | 25,583  | 14,462                 | 30,634         | 47,640         |
| Land charges, dol.            | 3,352   | 4,452                  | 8,593          | 20,158         |
| Machinery Costs, dol.         | 3,246   | 3,651                  | 4,946          | 9,006          |
| Labor Income, dol.            | 3,000   | 3,000                  | 3,000          | 3,000          |

<sup>1</sup> Livestock organization not allowing the purchase of feeder calves or stockers.

<sup>2</sup> Livestock organization not allowing the purchase of feeder calves or stockers nor hog raising.

<sup>3</sup> Livestock organization allowing only a beef cow herd as a livestock enterprise.

Table 6. Programmed Land Use and Livestock with Different Livestock Organizations for Minimum Resources to Earn \$5,000 Labor Income (\$60 Land Price)

|                                       | Basic | Livestock Organization |                | D <sup>3</sup> |
|---------------------------------------|-------|------------------------|----------------|----------------|
|                                       |       | B <sup>1</sup>         | C <sup>2</sup> |                |
| Corn, acres                           | 264   | 388                    | 562            | 1,319          |
| Oats, acres                           | 168   | 235                    | 238            | 558            |
| Barley, acres                         | 0     | 0                      | 0              | 0              |
| Wheat, acres                          | 124   | 173                    | 539            | 1,262          |
| Flax, acres                           | 39    | 58                     | 289            | 678            |
| Corn silage, acres                    | 15    | -                      | -              | -              |
| Alfalfa, acres                        | 77    | 107                    | 227            | 533            |
| Fallow                                | 14    | 15                     | 214            | 501            |
| Total, crop acres                     | 701   | 976                    | 2,069          | 4,851          |
| Native hay, acres                     | 119   | 129                    | 227            | 529            |
| Rangeland, acres                      | 738   | 1,059                  | 2,471          | 5,812          |
| Other, acres                          | 55    | 97                     | 205            | 480            |
| Total, all land, acres                | 1,613 | 2,246                  | 4,760          | 11,164         |
| Beef cow and calf, head               | 0     | 57                     | 123            | 372            |
| Feed calves: drylot, silage, head     | 50    | 0                      | 0              | 0              |
| Feed calves: pasture, no silage, head | 131   | 43                     | 93             | 0              |
| Gilt and litter, litters              | 0     | 110                    | 0              | 0              |

Table 7. Financial Highlights of Programming Minimum Resource Requirements to Earn \$5,000 Labor Income with Different Livestock Organizations (\$60 Land Price)

|                               | Basic   | Livestock Organization |                | D <sup>3</sup> |
|-------------------------------|---------|------------------------|----------------|----------------|
|                               |         | B <sup>1</sup>         | C <sup>2</sup> |                |
| Investment                    |         |                        |                |                |
| Land and Buildings, dol.      | 101,637 | 146,928                | 292,854        | 684,597        |
| Machinery and Equipment, dol. | 14,732  | 16,378                 | 27,920         | 49,480         |
| Operating capital, dol.       | 39,177  | 61,632                 | 73,630         | 163,888        |
| Total capital, dol.           | 155,546 | 224,938                | 394,404        | 897,965        |
| Income and Expenses           |         |                        |                |                |
| Gross Income, dol.            | 54,320  | 52,259                 | 67,740         | 145,862        |
| Expenses, dol.                | 40,039  | 35,095                 | 39,648         | 89,496         |
| Land charges, dol.            | 5,323   | 7,412                  | 15,706         | 36,841         |
| Machinery Costs, dol.         | 3,958   | 4,752                  | 7,386          | 14,525         |
| Labor Income, dol.            | 5,000   | 5,000                  | 5,000          | 5,000          |

<sup>1</sup> Livestock organization not allowing the purchase of feeder calves or stockers.

<sup>2</sup> Livestock organization not allowing the purchase of feeder calves or stockers nor hog raising.

<sup>3</sup> Livestock organization allowing only a beef cow herd as a livestock enterprise.

Table 8. Programmed Land Use and Livestock with Different Livestock Organizations for Minimum Resources to Earn \$3,000 Labor Income (0 Land Price)

|                                       | Basic | Livestock Organization |                |                |
|---------------------------------------|-------|------------------------|----------------|----------------|
|                                       |       | B <sup>1</sup>         | C <sup>2</sup> | D <sup>3</sup> |
| Corn, acres                           | 100   | 105                    | 150            | 162            |
| Oats, acres                           | 91    | 95                     | 59             | 64             |
| Barley, acres                         | 9     | 0                      | 0              | 0              |
| Wheat, acres                          | 4     | 15                     | 98             | 106            |
| Flax, acres                           | 4     | 15                     | 21             | 23             |
| Corn silage, acres                    | 0     | -                      | -              | -              |
| Alfalfa, acres                        | 28    | 29                     | 41             | 45             |
| Fallow                                | 15    | 5                      | 8              | 8              |
| Total, crop acres                     | 251   | 264                    | 377            | 408            |
| Native hay, acres                     | 66    | 39                     | 59             | 45             |
| Rangeland, acres                      | 251   | 283                    | 404            | 456            |
| Other, acres                          | 10    | 21                     | 29             | 32             |
| Total, all land, acres                | 578   | 607                    | 869            | 941            |
| Beef cow and calf, head               | 0     | 15                     | 28             | 32             |
| Feed calves: drylot, no silage, head  | 41    | 0                      | 21             | 0              |
| Feed calves: pasture, no silage, head | 42    | 12                     | 0              | 0              |
| Gilt and litter, litters              | 0     | 37                     | 0              | 0              |

Table 9. Financial Highlights of Programming Minimum Resource Requirements to Earn \$3,000 Labor Income with Different Livestock Organizations (0 Land Price)

|                               | Basic  | Livestock Organization |                |                |
|-------------------------------|--------|------------------------|----------------|----------------|
|                               |        | B <sup>1</sup>         | C <sup>2</sup> | D <sup>3</sup> |
| Investment                    |        |                        |                |                |
| Land and Buildings, dol.      | 2,133  | 36,420                 | 52,140         | 54,460         |
| Machinery and Equipment, dol. | 9,260  | 11,185                 | 11,310         | 11,230         |
| Operating capital, dol.       | 15,431 | 17,373                 | 14,961         | 12,896         |
| Total capital, dol.           | 26,829 | 68,843                 | 80,058         | 81,851         |
| Income and Expenses           |        |                        |                |                |
| Gross Income, dol.            | 21,940 | 14,656                 | 13,589         | 12,911         |
| Expenses, dol.                | 17,204 | 8,998                  | 7,526          | 6,758          |
| Land charges, dol.            | 0      | 0                      | 0              | 0              |
| Machinery Costs, dol.         | 2,375  | 2,658                  | 3,063          | 3,753          |
| Labor Income, dol.            | 3,000  | 3,000                  | 3,000          | 3,000          |

<sup>1</sup>Livestock organization not allowing the purchase of feeder calves or stockers.

<sup>2</sup>Livestock organization not allowing the purchase of feeder calves or stockers nor hog raising.

<sup>3</sup>Livestock organization allowing only a beef cow herd as a livestock enterprise.

Table 10. Programmed Land Use with Different Livestock Organizations for Minimum Resources to Earn \$5,000 Labor Income (0 Land Price)

|                                       | Basic | Livestock Organization |                | D <sup>3</sup> |
|---------------------------------------|-------|------------------------|----------------|----------------|
|                                       |       | B <sup>1</sup>         | C <sup>2</sup> |                |
| Corn, acres                           | 137   | 154                    | 213            | 157            |
| Oats, acres                           | 87    | 140                    | 84             | 66             |
| Barley, acres                         | 0     | 0                      | 0              | 0              |
| Wheat, acres                          | 64    | 22                     | 139            | 150            |
| Flax, acres                           | 7     | 22                     | 30             | 81             |
| Corn silage, acres                    | 8     | -                      | -              | -              |
| Alfalfa, acres                        | 40    | 43                     | 58             | 63             |
| Fallow                                | 20    | 6                      | 11             | 60             |
| Total, crop acres                     | 363   | 387                    | 535            | 577            |
| Native hay, acres                     | 62    | 57                     | 84             | 63             |
| Rangeland, acres                      | 395   | 415                    | 573            | 632            |
| Other acres                           | 16    | 32                     | 42             | 56             |
| Total, all land, acres                | 836   | 891                    | 1234           | 1328           |
| Beef cow and calf, head               | 0     | 22                     | 39             | 44             |
| Feed calves: drylot, silage, head     | 30    | 0                      | 0              | 0              |
| Feed calves: drylot, no silage, head  | 0     | 0                      | 30             | 0              |
| Feed calves: pasture, no silage, head | 68    | 17                     | 0              | 0              |
| Gilt and litter, litters              | 0     | 54                     | 0              | 0              |

Table 11. Financial Highlights of Programming Minimum Resource Requirements to Earn \$5,000 Labor Income with Different Livestock Organizations (0 Land Price)

|                               | Basic  | Livestock Organization |                | D <sup>3</sup> |
|-------------------------------|--------|------------------------|----------------|----------------|
|                               |        | B <sup>1</sup>         | C <sup>2</sup> |                |
| Investment                    |        |                        |                |                |
| Land and Buildings, dol.      | 2,519  | 53,460                 | 74,040         | 79,680         |
| Machinery and Equipment, dol. | 10,650 | 11,525                 | 12,900         | 12,750         |
| Operating capital, dol.       | 19,630 | 25,892                 | 21,245         | 17,642         |
| Total capital, dol.           | 32,799 | 96,508                 | 110,498        | 110,812        |
| Income and Expenses           |        |                        |                |                |
| Gross Income, dol.            | 28,154 | 21,496                 | 19,296         | 17,642         |
| Expenses, dol.                | 20,101 | 13,409                 | 10,899         | 8,850          |
| Land charges, dol.            | 0      | 0                      | 0              | 0              |
| Machinery Costs, dol.         | 3,053  | 3,087                  | 3,397          | 3,501          |
| Labor Income, dol.            | 5,000  | 5,000                  | 5,000          | 5,000          |

<sup>1</sup> Livestock organization not allowing the purchase of feeder calves as stockers.

<sup>2</sup> Livestock organization not allowing the purchase of feeder calves or stockers nor hog raising.

<sup>3</sup> Livestock organization allowing only a beef cow herd as a livestock enterprise.

## Changing Land Prices As It Affects Resource Requirements

Previous analysis assumed an average land price of \$60 per acre. It may be of interest to determine the effects of different land prices upon minimum resource requirements. Land prices were assumed to be zero, \$30 and \$75 per acre for comparison with \$60. Zero land prices do not occur, but represent a situation of unencumbered ownership where the owner does not consider a return from land necessary.

Programming results show that for a \$3,000 labor income, land requirements are 578 acres with zero land value, 728 acres with \$30 land, 1,016 acres with \$60 land and 1,370 acres with \$75 land (table 12). Corn acreage similarly ranges from 100 to 224. Total capital requirements range from \$26,829 to \$154,537 (table 13).

For a \$5000 labor income land requirements are 836 acres with zero land value, 1,081 acres with \$30 land, 1,613 acres with \$60 land, and 2,279 acres with \$75 land (table 14). Acres of corn range from 137 to 387 (table 14). Total capital requirements vary from \$32,799 to \$247,261 (table 15).

In programming for a \$10,000 labor income land requirements were determined to be 1,564 acres with zero land value, 2,131 acres with \$30 land,

Table 12. Programmed Land Use and Livestock with Different Land Prices and for Minimum Resource Requirements to Earn \$3000 Labor Income

|                                       | \$0 | Land Price Per Acre |      |      |
|---------------------------------------|-----|---------------------|------|------|
|                                       |     | \$30                | \$60 | \$75 |
| Corn, acres                           | 100 | 113                 | 166  | 224  |
| Oats, acres                           | 91  | 114                 | 106  | 143  |
| Barley, acres                         | 9   | 11                  | 0    | 0    |
| Wheat, acres                          | 4   | 6                   | 78   | 106  |
| Flax, acres                           | 4   | 6                   | 25   | 22   |
| Corn silage, acres                    | 0   | 13                  | 9    | 13   |
| Alfalfa, acres                        | 28  | 35                  | 49   | 65   |
| Fallow                                | 15  | 16                  | 9    | 26   |
| Total, crop acres                     | 251 | 314                 | 442  | 599  |
| Native hay, acres                     | 66  | 70                  | 75   | 101  |
| Rangeland, acres                      | 251 | 329                 | 464  | 636  |
| Other, acres                          | 10  | 15                  | 35   | 34   |
| Total, all land, acres                | 578 | 728                 | 1016 | 1370 |
| Feed calves, drylot, no silage, head  | 41  | 0                   | 0    | 0    |
| Feed calves, drylot silage, head      | 0   | 50                  | 36   | 49   |
| Feed calves, pasture, no silage, head | 42  | 56                  | 83   | 111  |

3,280 acres with \$60 land and 4,843 acres with \$75 land (table 16). Acres of corn ranged from 255 to 836 (table 16). Capital requirements vary from \$57,201 to \$524,832 (table 17).

Table 13. Financial Highlights of Programming Minimum Resource Requirements to Earn \$3000 Labor Income with Different Land Prices

|                                 | \$0    | Land Price Per Acre |         | \$75    |
|---------------------------------|--------|---------------------|---------|---------|
|                                 |        | \$30                | \$60    |         |
| Investment                      |        |                     |         |         |
| Land and Buildings, dol.        | 2133   | 24,564              | 64,044  | 106,859 |
| Machinery and Equipment, dol.   | 9260   | 9,850               | 11,640  | 14,602  |
| Operating capital, dol.         | 15,431 | 20,394              | 24,452  | 33,076  |
| Total capital, dol.             | 26,829 | 54,808              | 100,136 | 154,537 |
| Income and Expenses             |        |                     |         |         |
| Gross Income dol.               | 21,940 | 27,900              | 34,109  | 46,143  |
| Expenses, dol. <sup>a</sup>     | 17,204 | 20,887              | 25,583  | 33,828  |
| Land charges, dol. <sup>b</sup> | 0      | 1,201               | 3,352   | 5,651   |
| Machinery costs, dol.           | 2,375  | 2,813               | 3,246   | 3,664   |
| Labor Income, dol.              | 3,000  | 3,000               | 3,000   | 3,000   |

<sup>a</sup> Includes operating and overhead expenses with 7% interest in capital.

<sup>b</sup> Assumes 5.5% interest charge.

Table 14. Programmed Land use and Livestock with Different Land Prices and for Minimum Resource Requirements to Earn \$5000 Labor Income

|                                       | \$0 | Land Price Per Acre |      | \$75 |
|---------------------------------------|-----|---------------------|------|------|
|                                       |     | \$30                | \$60 |      |
| Corn, acres                           | 137 | 172                 | 264  | 387  |
| Oats, acres                           | 87  | 123                 | 168  | 238  |
| Barley, acres                         | 0   | 10                  | 0    | 0    |
| Wheat, acres                          | 64  | 73                  | 124  | 177  |
| Flax, acres                           | 7   | 26                  | 39   | 56   |
| Corn silage, acres                    | 8   | 11                  | 15   | 6    |
| Alfalfa, acres                        | 40  | 52                  | 77   | 109  |
| Fallow                                | 20  | 8                   | 14   | 19   |
| Total, crop acres.                    | 363 | 475                 | 701  | 992  |
| Native hay, acres                     | 62  | 82                  | 119  | 135  |
| Rangeland, acres                      | 395 | 486                 | 738  | 1073 |
| Other, acres                          | 16  | 38                  | 55   | 79   |
| Total, all land, acres                | 836 | 1081                | 1613 | 2279 |
| Feed calves, drylot, silage, head     | 30  | 43                  | 50   | 22   |
| Feed calves, pasture, no silage, head | 68  | 87                  | 131  | 192  |
| Gilt and litters, litters             | 0   | 0                   | 0    | 26   |

Table 15. Financial Highlights of Programming Minimum Resource Requirements to Earn \$5000 Labor Income with Different Land Prices

|                                 | \$0    | <u>Land Prices Per Acre</u> |         | \$75    |
|---------------------------------|--------|-----------------------------|---------|---------|
|                                 |        | \$30                        | \$60    |         |
| <b>Investment</b>               |        |                             |         |         |
| Land and Buildings, dol.        | 2,519  | 35,771                      | 101,637 | 178,489 |
| Machinery and Equipment, dol.   | 10,650 | 11,850                      | 14,732  | 15,382  |
| Operating capital, dol.         | 19,630 | 26,647                      | 39,177  | 53,490  |
| Total capital, dol.             | 32,799 | 74,268                      | 155,546 | 247,261 |
| <b>Income and Expenses</b>      |        |                             |         |         |
| Gross Income, dol.              | 28,154 | 36,966                      | 54,320  | 71,019  |
| Expenses, dol. <sup>a</sup>     | 20,101 | 6,851                       | 40,039  | 51,744  |
| Land charges, dol. <sup>b</sup> | 0      | 1,784                       | 5,323   | 9,401   |
| Machinery costs, dol.           | 3,053  | 3,331                       | 3,958   | 4,874   |
| Labor Income, dol.              | 5,000  | 5,000                       | 5,000   | 5,000   |

<sup>a</sup> Includes operating and overhead expenses with 7% interest on capital.

<sup>b</sup> Assumes 5.5% interest charge.

Table 16. Programmed Land Use and Livestock with Different Land Prices and for Minimum Resource Requirements to Earn \$10,000 Labor Income

|                                       | \$0  | <u>Land Price Per Acre</u> |      | \$75 |
|---------------------------------------|------|----------------------------|------|------|
|                                       |      | \$30                       | \$60 |      |
| Corn, acres                           | 255  | 349                        | 628  | 836  |
| Oats, acres                           | 163  | 222                        | 224  | 506  |
| Barley, acres                         | 0    | 0                          | 0    | 0    |
| Wheat, acres                          | 120  | 163                        | 370  | 371  |
| Flax, acres                           | 38   | 63                         | 80   | 718  |
| Corn silage, acres                    | 15   | 19                         | 4    | 0    |
| Alfalfa, acres                        | 75   | 102                        | 213  | 213  |
| Fallow                                | 13   | 13                         | 5    | 40   |
| Total, crop acres                     | 679  | 925                        | 1424 | 2104 |
| Native hay, acres                     | 116  | 155                        | 179  | 256  |
| Rangeland, acres                      | 715  | 946                        | 1441 | 1735 |
| Other, acres                          | 54   | 79                         | 136  | 168  |
| Total, all land acres                 | 1564 | 2131                       | 3280 | 4843 |
| Feed calves, drylot, silage, head     | 56   | 72                         | 16   | 0    |
| Feed calves, pasture, no silage, head | 127  | 173                        | 279  | 413  |
| Gilt and litters, litters             | 0    | 2                          | 21   | 74   |

Table 17. Financial Highlights of Programming Minimum Resource Requirements to Earn \$10,000 Labor Income with Different Land Prices

|                                 | <u>Land Prices Per Acre</u> |         |         |         |
|---------------------------------|-----------------------------|---------|---------|---------|
|                                 | \$0                         | \$30    | \$60    | \$75    |
| Investment                      |                             |         |         |         |
| Land and Buildings, dol.        | 4,676                       | 70,387  | 206,742 | 379,735 |
| Machinery and Equipment, dol.   | 14,705                      | 14,928  | 19,621  | 30,824  |
| Operating capital, dol.         | 37,820                      | 52,041  | 72,288  | 714,273 |
| Total capital, dol.             | 57,201                      | 137,356 | 298,651 | 524,832 |
| Income and Expenses             |                             |         |         |         |
| Gross Income, dol.              | 52,667                      | 71,344  | 98,766  | 146,871 |
| Expenses, dol. <sup>a</sup>     | 39,046                      | 53,234  | 71,925  | 108,962 |
| Land Charges, dol. <sup>b</sup> | 0                           | 3,515   | 10,824  | 19,976  |
| Machinery costs, dol.           | 3,621                       | 4,595   | 6,017   | 7,976   |
| Labor Income, dol.              | 10,000                      | 10,000  | 10,000  | 10,000  |

<sup>a</sup> Includes operating and overhead expenses with 7% interest in capital.

<sup>b</sup> Assumes 5.5% interest charge.

## IMPLICATIONS FOR ADJUSTMENTS

It is evident from the programming results that ranchers in Faulk County may earn a \$3,000 return with somewhat less land than included on the average ranch in Faulk County (1,138 acres according to the 1964 census). However, in order for a rancher to earn a \$5,000 labor income, land requirements are nearly 600 acres above the average size. If \$10,000 is considered necessary labor income, land requirements would nearly triple over the \$3,000 level (tables 12, 13, 14, 15, 16, 17).

In general, the increase in minimum resources to obtain higher income levels requires nearly the same enterprise combination for the different levels. Particularly, there is little change from the \$3,000 to the \$5,000 level. At the \$10,000 income level with corn and wheat increased in relation to other crop enterprises, the hog enterprise becomes profitable to have in place of some of the dry-lot calf feeding.

It may be noted that the minimum resource ranch had a slightly higher percentage of crop acreage devoted to corn production, with corn replacing



small grain. Perhaps, higher production of corn reflects the type of livestock enterprise included in the plan.

The greatest contrasts in organization of the minimum resource ranch compared with a typical ranch (as shown by the U.S. Census for Faulk County) are in the livestock enterprises. The programmed organization included only a livestock activity of buying calves and selling choice fat cattle. However, few ranchers in Faulk County presently include similar livestock enterprises. Perhaps, the reason may be that large amounts of capital and more managerial ability are required by the enterprise. Also, cattle feeding involves more risk than other livestock enterprises.

Perhaps, one reason cattle feeding is not prevalent in the area may be lack of capital or credit for carrying out such an enterprise. One observes that credit institutions are reluctant to loan money for cattle feeding when neither they nor the applicant has much knowledge of the profits and risks of cattle feeding. Still it would appear that livestock feeding by the better operators could be a desirable way to increase incomes.

# APPENDIX

## Appendix Tables

|            |   |
|------------|---|
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Table A-1 Assumed Average Prices Paid and Received by Farmers,  
Faulk County, South Dakota

| Item                                   | Unit | Price     |
|--|------|-----------|
|  |      | (Dollars) |
| <u>Prices Paid:</u>                    |      |           |
| Seeds:                                 |      |           |
| Wheat                                  | bu.  | 2.65      |
| Barley                                 | bu.  | 1.76      |
| Oats                                   | bu.  | 1.33      |
| Corn (hybrid)                          | bu.  | 12.90     |
| Flax                                   | bu.  | 3.50      |
| Alfalfa                                | cwt. | 44.02     |
| Livestock:                             |      |           |
| Yearling steer purchased (April)       | cwt. | 23.26     |
| Yearling feeder steer bought (October) | cwt. | 23.08     |
| Steer Calf bought (October)            | cwt. | 25.28     |
| Gilt (breeding Stock)                  | unit | 60.00     |
| Labor                                  | hour | 1.25      |
| Custom Rates:                          |      |           |
| Combine, small grain                   | acre | 3.50      |
| Haystack moving                        | unit | 6.00      |
| Fuel and Lubricants:                   |      |           |
| Gasoline                               | gal. | .25       |
| Motor oil                              | gal. | 1.25      |
| Lubricant                              | lb.  | .22       |
| <u>Prices Received:</u>                |      |           |
| Crop products:                         |      |           |
| Wheat                                  | bu.  | 1.82      |
| Oats                                   | bu.  | .53       |
| Barley                                 | bu.  | .81       |
| Flax                                   | bu.  | 2.75      |
| Corn                                   | bu.  | 1.09      |
| Livestock products:                    |      |           |
| Choice steer sold (October)            | cwt. | 24.15     |
| Choice steer sold (April)              | cwt. | 23.97     |
| Yearling Stocker steer (October)       | cwt. | 23.08     |
| Steer calf (October)                   | cwt. | 25.28     |
| Cull cow                               | cwt. | 13.04     |
| Market sows (farrowed once)            | unit | 54.57     |
| Butcher hogs (late spring litter)      | cwt. | 15.82     |

Table A-2 Estimated Operating and Ownership Cost of Machine Complement, 1280 Acre Farm, Faulk County

| Machine                          | Years <sup>a</sup><br>Useful<br>Life | Hours <sup>b</sup><br>Useful<br>Life | Average <sup>c</sup><br>Annual<br>Investment | Annual <sup>d</sup><br>Fixed<br>Cost | Per Acre <sup>e</sup><br>Annual<br>Fixed Cost | Per Acre <sup>f</sup><br>Variable<br>Cost |
|----------------------------------|--------------------------------------|--------------------------------------|--|--------------------------------------|---|---|
|                                  | (Years)                              | (Hours)                              | (Dollar)                                     | (Dollar)                             | (Dollar)                                      | (Dollar)                                  |
| Tractor, 4 plow                  | 20                                   | 12,000                               | 2,400  | 473                                  | .387  | .979                                      |
| Tractor, 3 plow                  | 20                                   | 12,000                               | 1,825  | 359                                  | .295  | .929                                      |
| Moldboard Plow, 4-14"            | 15                                   | 2,500                                | 438  | 112                                  | .330  | .103                                      |
| Tandem Disc, 12'                 | 20                                   | 2,500                                | 416  | 91                                   | .139  | .027                                      |
| Spike Tooth Harrow, 5 Section    | 25                                   | 2,500                                | 81   | 16                                   | .013  | .004                                      |
| Press drill-Fert. attach., 10'6" | 20                                   | 1,200                                | 765  | 168                                  | .594  | .038                                      |
| Boom Type Sprayer, 30'           | 15                                   | 1,000                                | 225  | 46                                   | .006  | .008                                      |
| Corn Planter, 4R                 | 20                                   | 1,200                                | 630  | 124                                  | .409  | .051                                      |
| Corn Cultivator, 4R              | 20                                   | 1,200                                | 472  | 103                                  | .368  | .036                                      |
| Corn Picker, 2R                  | 15                                   | 2,000                                | 1,300  | 320                                  | 1.554   | .187                                      |
| Windrower-pto, 12'               | 18                                   | 2,500                                | 450  | 104                                  | .145  | .080                                      |
| Mower, 9'                        | 18                                   | 2,000                                | 292  | 67                                   | .133  | .095                                      |
| Rake, Side Delivery              | 18                                   | 2,500                                | 281  | 65                                   | .123  | .031                                      |
| Loader and Attachments           | 15                                   | 2,500                                | 540  | 136                                  | .268  | .225 <sup>g</sup>                         |
| Combine, pto.                    | 15                                   | 2,000                                | 1,600  | 380                                  | 1.171   | .197                                      |
| Total                            |                                      |                                      | 11,715                                       | 2,564                                |   |   |

<sup>a</sup>Estimates based on survey of Faulk County Farmers and ASAE 1965 Agricultural Engineers Yearbook.

<sup>b</sup>Estimates from 1965 Agricultural Engineers Yearbook.

<sup>c</sup>Estimates based on Official 1965 Tractor and Farm Equipment Guide.

<sup>d</sup>Interest on investment, depreciation, insurance and taxes.

<sup>e</sup>Estimates assume machine used enough to wear out during its useful life, i.e. minimum cost estimates.

<sup>f</sup>Repair and service cost of machine only.

<sup>g</sup>Variable cost per hour.

Table A-3 Assumed Per Acre Overhead Costs in the Model of this Study, Faulk County

| Item                                 | Cost      |
|--------------------------------------|-----------|
|                                      | (Dollars) |
| Interest on land <sup>a</sup>        | 3.30      |
| Land Tax                             | .81       |
| Insurance (liability)                | .004      |
| Depreciation and Maintenance, fences | .29       |
| Total overhead cost per acre         | 44.04     |

<sup>a</sup>When assumed land price is 60 dollars and interest rate is 5.5 percent.

Table A-4 Assumed Nonallocated Annual Overhead Costs for a 1280 Acre Farm, Faulk County

| Item                                 | Investment | Annual Cost        |
|--------------------------------------|------------|--------------------|
|                                      |            | (Dollars)          |
| Machinery Fixed Costs:               |            |                    |
| Machine Set                          |            | 1,145 <sup>a</sup> |
| Pick-up Truck, 1/2 ton               | 1350       |                    |
| Interest on investment               |            | 98                 |
| Depreciation                         |            | 330                |
| Gas, oil, and lubrication            |            | 265                |
| Repairs                              |            | 80                 |
| Insurance                            |            | 60                 |
| License                              |            | 20                 |
| Wagons (2) with hoist                | 430        | 92                 |
| Fuel Tank (300 gal.)                 | 90         | 8                  |
| Tools and equipment                  | 300        | 50                 |
| Miscellaneous:                       |            |                    |
| Telephone and electricity            |            | 175                |
| Tax service and bookkeeping supplies |            | 50                 |
| Insurance (liability and employee)   |            | 52                 |
| Total specified overhead costs       |            | 2,227              |

<sup>a</sup>Includes interest, insurance, and taxes from Table 14.

Table A-5 Estimated Average Yields Per Acre Using Recommended Cropping Practices, By Land Class, Faulk County

| Item               | Unit | Yield by Land Class |      |     |     | Weighted Average <sup>a</sup> |
|--------------------|------|---------------------|------|-----|-----|-------------------------------|
|                    |      | a                   | b    | c   | d   |                               |
| Crop:              |      |                     |      |     |     |                               |
| Corn               | bu.  | 30                  | 23   | 24  | 20  | 23.7                          |
| Corn Silage        | cwt. | 116                 | 86   | 90  | 76  | 90.0                          |
| Oats               | bu.  | 40                  | 36   | 34  | 30  | 36.2                          |
| Barley             | bu.  | 30                  | 26   | 20  | 17  | 25.1                          |
| Wheat <sup>b</sup> | bu.  | 19                  | 15.5 | 15  | 13  | 16.1                          |
| Wheat on fallow    | bu.  | 21                  | 17   | 16  | 14  | 17.5                          |
| Flax               | bu.  | 11                  | 9    | 10  | 9   | 9.7                           |
| Alfalfa Hay        | bu.  | 1.6                 | 1.3  | 1.1 | 1.3 | 1.3                           |

Native Hay -- Estimated yield was .67 Ton

Native Pasture -- Estimated yield was .55 AUM

<sup>a</sup>The weighted average is the sum of the average yield for each land class times the percent that land class is of the total.

<sup>b</sup>Assumes wheat on row crop or small grain.

Table A-6 Estimated Per Acre Labor Requirements and Seasonal Distribution for Selected Dryland Crops

| Crop               | Man-hours per acre <sup>a</sup> | Percent Distribution of Labor by Period <sup>b</sup> |                  |                         |                          |
|--------------------|---------------------------------|--|------------------|-------------------------|--------------------------|
|                    |                                 | March 16 to April 30                                 | May 1 to July 15 | July 16 to September 30 | October 1 to November 15 |
| Corn grain         | 2.74                            | 0  | 62               | 0                       | 38                       |
| Corn silage        | 2.25 <sup>c</sup>               | 0  | 76               | 24                      | 0                        |
| Oats               | 1.65                            | 32   | 10               | 58                      | 0                        |
| Barley             | 1.65                            | 32   | 10               | 58                      | 0                        |
| Wheat <sup>d</sup> | 1.65                            | 34   | 10               | 56                      | 0                        |
| Flax               | 2.79                            | 19   | 35               | 46                      | 0                        |
| Alfalfa hay        | 1.98 <sup>d</sup>               | 0  | 52               | 45                      | 3                        |
| Native hay         | 1.04 <sup>d</sup>               | 0  | 0                | 96                      | 4                        |
| Fallow             | .81                             | 0  | 0                | 100                     | 0                        |

<sup>a</sup>Tractor hours are approximately 10 percent lower.

<sup>b</sup>Distribution will vary if fall plowing is assumed.

<sup>c</sup>Does not include time for custom chopping and hauling.

<sup>d</sup>Does not include time for custom stack-moving.

Table A-7 Average Dates for Selected Cropping Operations,  
Faulk County

| Item                           | Date                                      |
|--------------------------------|---|
| Start field work               | April 10                                  |
| Start seeding spring wheat     | April 16                                  |
| Finish seeding spring wheat    | May 10                                    |
| Finish seeding oats and barley | May 17                                    |
| Finish seeding flax            | May 22                                    |
| Plow for corn                  | May 17                                    |
| Plant corn                     | May 24 to<br>June 5                       |
| Small grain spraying           | June 7                                    |
| Row crop spraying              | June 21                                   |
| First row crop cultivation     | June 14                                   |
| Second row crop cultivation    | July 12                                   |
| Start summer fallow            | June 14                                   |
| First crop tame hay            | June 14                                   |
| Second crop tame hay           | August 10                                 |
| Harvest native hay             | August 18                                 |
| Swath spring wheat             | August 10                                 |
| Swath oats                     | August 5                                  |
| Swath barley                   | August 6                                  |
| Swath flax                     | August 20                                 |
| Start cutting corn silage      | September 14                              |
| Pick corn                      | October 1                                 |
| Start fall field work          | September 17<br>and continue into October |

Source: Compiled by Erwin Ullrich from records of the Crop and  
Livestock Reporting Service.

Table A-8 Assumed Per Acre Variable and Overhead Costs for Average Crop Yield, Faulk County

|                           | Corn<br>grain | Corn<br>silage | Wheat | Wheat<br>after<br>fallow | Oats  | Barley | Flax  | Fallow | Alfalfa<br>hay | Native<br>hay |
|---------------------------|---------------|----------------|-------|--------------------------|-------|--------|-------|--------|----------------|---------------|
|                           | (Dollars)     |                |       |                          |       |        |       |        |                |               |
| Variable Costs:           |               |                |       |                          |       |        |       |        |                |               |
| Tractor power             | 2.62          | 1.88           | 1.86  | 1.86                     | 1.86  | 1.86   | 2.03  | 1.29   | 1.16           | 1.57          |
| Repairs                   | .75           | .44            | .51   | .51                      | .51   | .51    | .57   | .04    | .54            | .25           |
| Seed                      | 1.81          | 1.81           | 2.65  | 2.65                     | 2.05  | 2.20   | 2.62  |        | 1.10           |               |
| Chemical                  | 2.45          | 2.45           | .36   | .36                      | .10   | .30    | .28   | .36    | .43            |               |
| Fertilizer                | 3.25          | 3.92           | 2.98  | 1.08                     | 2.75  | 2.63   | 4.90  |        | 1.23           |               |
| Custom                    |               | 6.00           |       |                          |       |        |       |        | 1.25           | 1.20          |
| Interest                  | .76           | .94            | .59   | .45                      | .52   | .53    | .73   | .05    | .40            | .14           |
| Overhead Costs:           |               |                |       |                          |       |        |       |        |                |               |
| Depreciation              | 2.69          | 1.61           | 2.03  | 2.03                     | 2.00  | 2.00   | 2.37  | .30    | .98            | .49           |
| I. T. and S. <sup>a</sup> | .79           | .45            | .64   | .64                      | .64   | .64    | .79   | .06    | .36            | .18           |
| Total specified costs     | 15.12         | 19.60          | 11.62 | 9.58                     | 10.53 | 10.67  | 14.29 | 1.10   | 7.45           | 2.83          |

<sup>a</sup>Insurance, Taxes and Shelter.

Table A-9 Specified Variable Costs and Capital Requirements per Unit of Livestock Enterprises, Faulk County

| Item                    | Beef cow | Stocker steer-silage | Feeder steer-drylot | Amount per head Feeder steer-pasture | Drylot yearlings period 1 | Drylot yearlings period 1 and period 2 | Gilt and litter |
|-------------------------|----------|----------------------|---------------------|--------------------------------------|---------------------------|--|-----------------|
| Dollars                 |          |                      |                     |                                      |                           |  |                 |
| Variable Costs:         |          |                      |                     |                                      |                           |  |                 |
| Supplement <sup>a</sup> | 6.66     | 2.35                 | 20.07               | 13.15                                | 13.51                     | 27.02                                  | 60.39           |
| Veterinary              | 4.75     | 2.78                 | 3.78                | 3.78                                 | 3.78                      | 7.56                                   | 7.00            |
| Taxes                   | 4.56     | 2.17                 | 2.17                | 2.17                                 | 3.23                      | 6.49                                   | 1.20            |
| Equipment               | 3.63     | 6.03                 | 8.41                | 7.86                                 | 7.11                      | 12.26                                  | 11.87           |
| Total                   | 21.40    | 14.33                | 30.70               | 26.96                                | 26.63                     | 51.33                                  | 80.46           |
| Livestock               | 228.15   | 108.70               | 108.70              | 108.70                               | 161.56                    | 324.38                                 | 60.00           |
| Building and Equipment  | 39.54    | 25.70                | 30.18               | 30.18                                | 30.18                     | 30.18                                  | 80.18           |
| Capital <sup>b</sup>    | 289.09   | 148.73               | 169.58              | 165.85                               | 218.57                    | 405.89                                 | 241.26          |

<sup>a</sup> Protein, salt, and mineral requirements are for silage feeding. When silage was not included in the ration, protein requirements were smaller.

<sup>b</sup> Capital is the sum of total variable costs, livestock investment and average buildings and equipment investment.

Table A-10 Resource Restrictions Used in Initial Tableau for Representative Farm Situation, Faulk County

| Item                         | Row | Unit       | Initial Level |
|------------------------------|-----|------------|---------------|
| Class a land                 | R01 | Acre       | 0.0           |
| Class b land                 | R02 | Acre       | 0.0           |
| Class c land                 | R03 | Acre       | 0.0           |
| Class d land                 | R04 | Acre       | 0.0           |
| Native Hay                   | R05 | Acre       | 0.0           |
| Native Pasture               | R06 | AVM        | 0.0           |
| Wheat Allotment              | R07 | Acre       | 0.0           |
| Period One Labor             | R08 | Hour       | 508.0         |
| Period Two Labor             | R09 | Hour       | 210.0         |
| Period Three Labor           | R10 | Hour       | 493.0         |
| Period Four Labor            | R11 | Hour       | 583.0         |
| Period Five Labor            | R12 | Hour       | 306.0         |
| Total Capital                | R13 | Dollar     | 0.0           |
| Annual Capital               | R14 | Dollar     | 0.0           |
| Hay to Harvest               | R15 | Ton        | 0.0           |
| Feed Grain Transfer          | R16 | CWT. C. E. | 0.0           |
| Wheat Transfer               | R17 | Bushe1     | 0.0           |
| Flax Transfer                | R18 | Bushe1     | 0.0           |
| Grain to Feed                | R19 | CWT. C. E. | 0.0           |
| Hay Equivalent               | R20 | CWT.       | 0.0           |
| Silage                       | R21 | CWT.       | 0.0           |
| Calf Transfer                | R22 | Animal     | 0.0           |
| Period One Yearling Transfer | R23 | Animal     | 0.0           |
| Period Two Yearling Transfer | R24 | Animal     | 0.0           |
| Livestock for Sale           | R25 | CWT.       | 0.0           |
| Income Requirement           | R26 | Dollar     | Varies        |



Table A-11 Description of Activities Considered for Representative Farm Situation, Faulk County

| Activity Description   |   | Unit of Measure |
|------------------------|---|-----------------|
| <u>Cropland</u>        |   |                 |
| Class a Land Rotations |   |                 |
| P01                    | Corn-wheat                                    | Acre            |
| P02                    | Corn silage-wheat                             | Acre            |
| P03                    | Corn-barley                                   | Acre            |
| P04                    | Corn silage-barley                            | Acre            |
| P05                    | Corn-oat                                      | Acre            |
| P06                    | Wheat-oat-fallow                              | Acre            |
| P07                    | Wheat-wheat-fallow                            | Acre            |
| P08                    | Flax-wheat-fallow                             | Acre            |
| P09                    | Barley-corn-oat-alfalfa (3 years)             | Acre            |
| P10                    | Wheat-corn-barley-alfalfa (3 years)           | Acre            |
| P11                    | Wheat-corn-corn silage-oat-alfalfa (3 years)  | Acre            |
| P12                    | Wheat-corn-corn silage-oat-alfalfa (3 years)  | Acre            |
| P13                    | Wheat-corn silage-corn-flax-alfalfa (3 years) | Acre            |
| P14                    | Wheat-corn-flax-fallow                        | Acre            |
| P15                    | Wheat-corn-oat-fallow                         | Acre            |
| P16                    | Barley-corn-barley-alfalfa (3 years)          | Acre            |
| P17                    | Barley-corn silage-barley-alfalfa (3 years)   | Acre            |
| P18                    | Oat-corn-oat-alfalfa (3 years)                | Acre            |
| Class b Land Rotations |   |                 |
| P19                    | Corn-wheat                                    | Acre            |
| P20                    | Corn-barley                                   | Acre            |
| P21                    | Corn silage - barley                          | Acre            |
| P22                    | Corn-oats                                     | Acre            |
| P23                    | Wheat-wheat-fallow                            | Acre            |
| P24                    | Flax-wheat-fallow                             | Acre            |
| P25                    | Wheat-corn-oat-alfalfa (3 years)              | Acre            |
| P26                    | Wheat-corn silage-oat-alfalfa (3 years)       | Acre            |
| P27                    | Flax-corn-oat-alfalfa (3 years)               | Acre            |
| P28                    | Barley-corn-oat-alfalfa (3 years)             | Acre            |
| P29                    | Corn silage-oat-alfalfa (3 years)             | Acre            |
| P30                    | Barley-corn-barley-alfalfa (3 years)          | Acre            |
| P31                    | Barley-corn silage-barley-alfalfa (3 years)   | Acre            |
| P32                    | Oat-corn-oats-alfalfa (3 years)               | Acre            |
| Class c Land Rotations |   |                 |
| P33                    | Wheat-corn-flax-alfalfa (3 years)             | Acre            |
| P34                    | Wheat-corn-oat-alfalfa (3 years)              | Acre            |
| P35                    | Flax-corn-oat-alfalfa (3 years)               | Acre            |
| P36                    | Corn-oats-alfalfa (3 years)                   | Acre            |
| P37                    | Corn silage-oats-alfalfa (3 years)            | Acre            |
| P38                    | Wheat-corn silage-oat-alfalfa (3 years)       | Acre            |
| P39                    | Wheat-oat-alfalfa (4 years)                   | Acre            |
| P40                    | Wheat-oat-alfalfa (3 years)                   | Acre            |
| P41                    | Oat-corn-oat-alfalfa (3 years)                | Acre            |
| P42                    | Oat-corn silage-oat-alfalfa (3 years)         | Acre            |
| P43                    | Barley-corn-barley-alfalfa (3 years)          | Acre            |
| Class d Land Rotations |   |                 |
| P44                    | Wheat-wheat-fallow                            | Acre            |
| P45                    | Flax-wheat-fallow                             | Acre            |

Table A-11 continued.

| Activity Description  | Unit of Measure |
|---|-----------------|
| <u>Cropland (continued)</u>                                       |                 |
| P <sub>46</sub> Wheat-corn-oat-alfalfa (3 years)                  | Acre            |
| P <sub>47</sub> Wheat-corn silage-oat-alfalfa (3 years)           | Acre            |
| P <sub>48</sub> Flax-corn-oat-alfalfa (3 years)                   | Acre            |
| P <sub>49</sub> Barley-corn-oat-alfalfa (3 years)                 | Acre            |
| P <sub>50</sub> Barley-corn silage-oats-alfalfa (3 years)         | Acre            |
| P <sub>51</sub> Oat-alfalfa (3 years)                             | Acre            |
| P <sub>52</sub> Oat-corn-oat-alfalfa (3 years)                    | Acre            |
| P <sub>53</sub> Oat-corn silage-oat-alfalfa (3 years)             | Acre            |
| P <sub>54</sub> Barley-corn-barley-alfalfa (3 years)              | Acre            |
| P <sub>55</sub> Native Hay  | Acre            |
| <u>Livestock Enterprises</u>                                      |                 |
| P <sub>56</sub> Beef-cow and calf                                 | Cow - Calf      |
| P <sub>57</sub> Stockers, silage-hay ration                       | Head            |
| P <sub>58</sub> Stockers, grain-hay ration                        | Head            |
| P <sub>59</sub> Feed calves in drylot, silage-hay                 | Head            |
| P <sub>60</sub> Feed calves in drylot, grain-hay                  | Head            |
| P <sub>61</sub> Feed calves on pasture, silage-hay                | Head            |
| P <sub>62</sub> Feed calves on pasture, grain-hay                 | Head            |
| P <sub>63</sub> Feed yearlings: period one, silage-hay            | Head            |
| P <sub>64</sub> Feed yearlings: period one, no silage-hay         | Head            |
| P <sub>65</sub> Feed yearlings: period one and two,<br>silage-hay | Two head        |
| P <sub>66</sub> Feed yearlings: period one and two,<br>grain-hay  | Two head        |
| P <sub>67</sub> Gilt and one litter                               | Sow-litter      |
| <u>Purchase and Sale of Livestock</u>                             |                 |
| P <sub>68</sub> Sell feeder calf                                  | Head            |
| P <sub>69</sub> Buy feeder calf                                   | Head            |
| P <sub>70</sub> Sell stocker                                      | Head            |
| P <sub>71</sub> Buy period one yearling                           | Head            |
| P <sub>72</sub> Buy period two yearling                           | Head            |
| P <sub>73</sub> Sell Livestock                                    | Hundred weight  |
| <u>Hire Labor</u>   |                 |
| P <sub>74</sub> Hire period one labor                             | Hour            |
| P <sub>75</sub> Hire period two labor                             | Hour            |
| P <sub>76</sub> Hire period three labor                           | Hour            |
| P <sub>77</sub> Hire period four labor                            | Hour            |
| P <sub>78</sub> Hire period five labor                            | Hour            |
| P <sub>79</sub> Borrow capital                                    | Dollar          |
| P <sub>80</sub> Feed feed grain                                   | Corn equivalent |
| P <sub>81</sub> Sell feed grain                                   | Corn equivalent |
| P <sub>82</sub> Sell wheat  | Bushe1          |
| P <sub>83</sub> Sell flax   | Bushe1          |
| P <sub>84</sub> Feed hay  | Ton             |
| P <sub>85</sub> Buy land  | Acre            |

