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Counties

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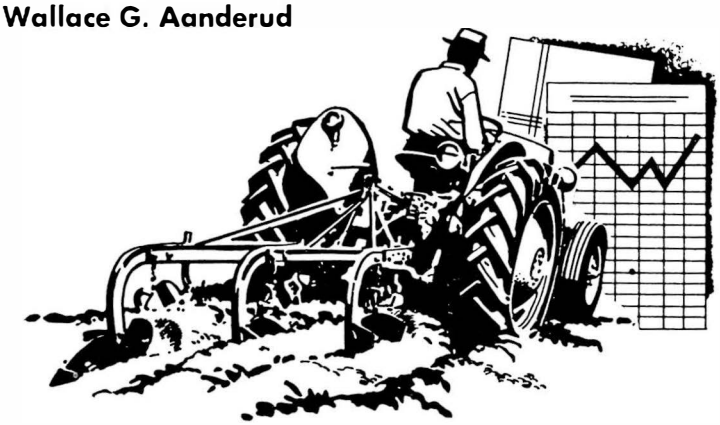
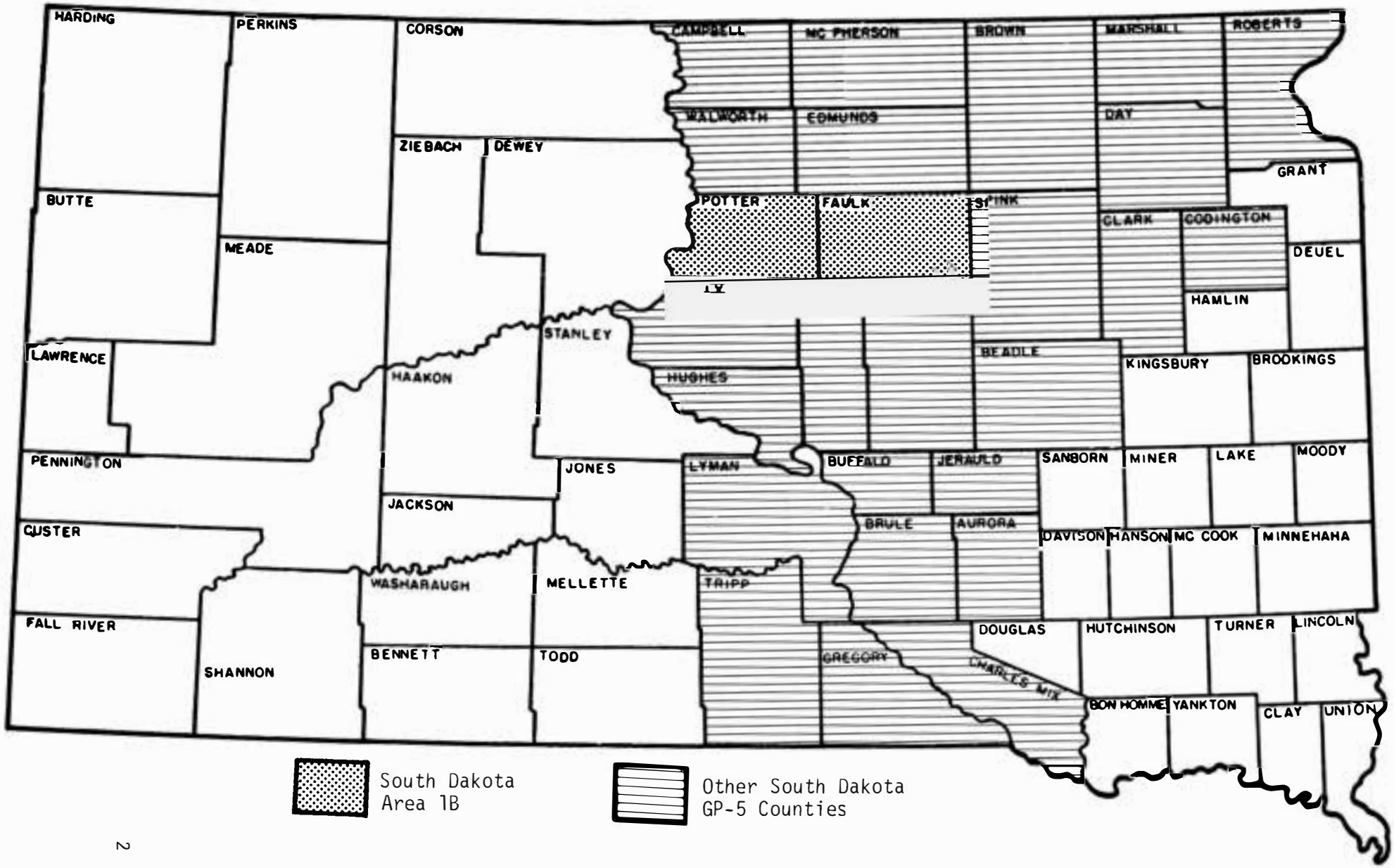


Figure 1. South Dakota GP-5 Study Area



PREFACE

The data presented in this report were gathered and compiled in a cooperative research project between the South Dakota Agricultural Experiment Station and the Farm Production Economics Division, Economic Research Service, U.S. Department of Agriculture. This research contributes to a larger project--GP-5, "Economic Problems in the Production and Marketing of Great Plains Wheat."

The general objectives of the research undertaken in South Dakota were (1) to provide economic data needed by farmers and to make adjustments in their farming systems and production practices and (2) to develop a research background for evaluating government farm programs under varying assumptions.

Similar contributing projects to GP-5 are simultaneously being conducted in most of the other Great Plains States. Specific objectives as stated in the regional research project are:

1. To develop information on technical production relationships and opportunities for grain farms in the Great Plains.

2. To determine the nature and magnitude of adjustments needed in specific farm situations which will achieve the most profitable systems of farming under a range of conditions with respect to prices of major products and quantities of available resources such as land, labor and capital and to determine the quantities of resources required to provide selected levels of farm income.

3. To determine the effect upon total agricultural production, farm income, farm organization and resources employed in the Great Plains if selected percentages of all farmers adjust to their most profitable farming systems for various assumed product demand conditions, factor supply conditions and specific agricultural programs and institutional arrangements.

4. To estimate wheat supply potentials for non-domestic wheat producers under varying economic and political conditions in international areas.

The South Dakota study area included 26 counties in Central South Dakota (Figure 1). This area normally accounts for about 68 per cent of the state's wheat acreage, 43 per cent of the feed grain acreage, 60 per cent of the flax acreage and about 55 per cent of the total tame and native hay acreage. For analytical purposes, the GP-5 study area was divided into eight sub-areas on the basis of selected farm and soil characteristics and cropping practices.

The analysis of this study was based on possible adjustments on individual farming units. Thus, model farms were developed to represent a significant number, group or segment of farms within a defined geographic area. Model

farms were grouped on the basis of similar characteristics, plus similar alternative production opportunities.

Determining characteristics for grouping farms into model or typical farms included: Farm size, proportion of cropland to native hay and rangeland, soil characteristics, land use and tillage practices, farm organization and enterprise, labor use and labor availability.

In all, 14 model farms were developed in the eight sub-areas of the 26 county study--characteristics were so similar in four sub-areas that only one model farm was needed in each, but in the remaining areas there existed enough diversity to require three model farms in each of two sub-areas and two model farms in each of the other two.

Data used to develop model farms for each South Dakota study area and costs for crop and livestock enterprises for each model farm were derived from a variety of sources, which included: Farm surveys, Agricultural Stabilization and Conservation Service county office records, county assessor's records, U.S. Agricultural Census, S.D. State-Federal Crop and Livestock Reporting Service statistics, from the South Dakota State University Economics Department, and actual cost data from machine dealers and insurance agents.

HOW THIS DATA MAY BE USED

Information gathered on machine costs for the model farm in Area 1B (Figure 1) for this publication should prove useful in planning and budgeting work and should be helpful in other production and farm management studies.

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DESCRIPTION OF AREA 1B

FAULK AND POTTER COUNTIES

SOILS

The soils of this two-county area are mainly Chestnut. Chestnut soils in the northern Great Plains area have darker soil surface colors than those in southern areas, because in the north oxidation of organic matter is slower.

Three major soil associations are found in the Faulk and Potter County area. The Agar-Williams Association, in the western part, occurs in undulating or sloping landscapes, formed in glacial till and loess. Agar-Williams Association soils are well-drained soils with grayish brown silt loam and loam surface layers. The major problems associated with the Agar-Williams Association soils are: (1) maintenance of organic matter and nitrogen, (2) moisture conservation, and (3) control of run-off. Livestock and general types of farming are performed in the Agar-Williams soils area.

Williams-Zahl soils, found in the central portion of this area, are undulating to steep and are well to excessively drained. These grayish-brown

loams are developed from calcareous glacial till with areas of mixed outwash sediments being common. The major management problems of these soils are similar to those of the Agar-Williams series, namely: (1) maintenance of organic matter and nitrogen, (2) moisture conservation, and (3) control of run-off or water erosion. The land use depends mainly upon topography and includes cash grain, livestock and general farms as well as ranches.

The third major soil series, found in these counties, are Chernozems--the Houdek-Bonilla series. These soils are undulating to nearly level and are well to moderately well drained. Developed from calcareous loam till, these loams are dark grayish-brown and are slightly acid. The major problems in soil and water management are the maintenance of organic matter and the conservation of moisture. Major soil uses are: (1) cash grain production, (2) livestock farming, and (3) general farming.

TYPE OF FARMING CHARACTERISTICS

The average farm in Faulk County was 1,138 acres, compared with 1,327 acres in Potter County, according to the 1964 census. One in four farms were classified as cash grain farms and nearly 60 per cent of the farms were livestock farms and ranches. General farms, poultry, dairy and miscellaneous farms made up the balance of the area's farms.

Although wheat, flax and rye were grown as cash crops, considerable quantities of corn, oats, and barley were sold. Nearly 49 per cent of the oats harvested and 64.4 per cent of the barley was sold off the farm in 1964. Sixty-five per cent of the corn acreage was harvested as grain. One-third of the farms that harvested corn as grain in 1964 sold corn grain (about 34 per cent of the corn grain harvested).

Table 1 shows the number and per cent of farms in the two-county area that raised and harvested major crops in 1964.

Livestock were found on about 90 per cent of the area's farms, although 25 per cent of the area's farms were classified cash grain farms in the 1964 census. Beef-cow herds were the most common livestock enterprise; most of the herds numbered between 25 and 75 cows. The 1964 Census of Agriculture showed 304 farms with milk cows; however, only two-thirds of these farms sold dairy products. The remaining farms probably kept milk cows for home use purposes.

About 35 per cent of the farms in the area farrowed sows in 1964 (most of these farms had fewer than 10 farrowed litters). The bulk of the farrowings in this area occurred in spring or in early summer.

Thirty-four per cent farms in the area maintained a flock of ewes. About 2 out of 3 farms maintained flocks numbering fewer than 100 ewes. Most of the remaining flocks numbered between 100 and 200 head.

Table 1. Number and Per Cent of Farms That Raised and Harvested Major Grain Crops in 1964 in Faulk and Potter Counties

	Number of Farms	Percentage of Farms	Number of Acres Harvested	Percentage of Acres Harvested
Corn[1/]	714	76.1	89,525	26.8
All Wheat[2/]	798	85.1	133,211	39.8
Oats	754	80.4	80,394	24.0
Barley	109	11.6	6,173	1.8
Flax	76	8.1	4,086	1.2
Rye	162	17.3	15,573	4.6
Others[3/]	---	----	5,491	1.6

1/ Includes corn harvested for grain, silage, and other purposes.
2/ Includes 19,634 acres of winter wheat and 2,833 acres of durum wheat.
3/ Includes proso, emmer and speltz and sorghum.
Source: U.S. Census of Agriculture, 1964.

MODEL WHEAT FARMS AND BASIS FOR MACHINERY COSTS

The farm selected as a typical wheat farm was one of 960 acres (528 acres in cropland and 386 acres in native hay and pasture), despite the fact that the average farm size for the two-county area was calculated at 1,220 acres (260 acres larger than the model wheat farm). It should be pointed out that the average may not depict the most representative size of farms, because the 1964 Census of Agriculture averages together all types of farms, including ranch and livestock farms plus wheat farms. The same census shows 47 per cent of all ranches and farms to be 1,000 acres or larger.

The model farm, serving as the basis for determining machine costs and labor use, had the following crops:

Crop	Acres	Crop	Acres
Hard Spring Wheat	131	Summer Fallow	72
Oats	80	Alfalfa	59
Corn Grain	87	Other Tame Hay and Pasture	47
Corn Silage	27	Native Hay	116
A Combination of Other Small Grain Crops	25	Native Pasture	270

The machinery and implements, listed in Table 2 represent those most frequently found on the group of farms from which the models or representative

farms were determined. Occasionally, in this study, an arbitrary judgment was necessary in selecting the size or type of machinery or implement.

PURCHASE PRICE

The purchase price of machinery (in Table 2) represents the "average" price of major models of the particular implement or machine listed. The price listed assumes only standard equipment was used. Extras or optional features such as power steering on tractors were not included.

USEFUL LIFE

The standard depreciation schedule (see 1964 Agricultural Engineers Yearbook), widely used as a guide by agricultural engineers and others, served as a base in determining depreciation costs.

Since depreciation is a function of use, obsolescence, or a combination of both, depreciation costs were determined either on the hours of use or the useful life in years, whichever was least.

MACHINE COSTS

Farm operators and others concerned with the development of farm budgets must consider two important aspects of machine costs: (1) total annual machine costs and (2) machine costs per unit of production of the various individual crop enterprises.

Total annual machine costs represent a major portion of the total annual farm expenses, and thus are of primary importance in determining net farm income. Annual machine costs include fixed costs (often termed ownership costs) and variable costs. Fixed costs are those which remain relatively constant from year to year, regardless of the amount of use of the machine; variable costs depend directly upon the amount of use.

The allocation of machine costs to individual enterprises requires that these costs be expressed in terms of costs per hour or per acre for the types of machine operations used. Machine costs per unit of individual enterprises are necessary considerations in determining the most profitable organization of the farm business.

Total annual costs for each machine assumed to be used on the 960-acre model farm, as well as per-acre and per-hour machine operations costs are presented in Tables 3 through 8. The costs shown in these tables were determined on the basis of the model farm having 236 acres of small grain, 114 acres of corn, 72 acres of summer fallow, two cuttings of hay from 88 acres of alfalfa, and one cutting on 116 acres of native hay.

FIXED COSTS

Fixed machine costs include depreciation, interest on investment, insurance, and taxes. Total annual fixed costs are constant for any given year, without

regard to the amount of use during that year. However, when this fixed sum is charged as a cost against crops, the cost per hour, per acre, or unit of output may show a variation with the amount of use.

Depreciation--Depreciation in this study is recognized as a cost since "wear and tear" due to use necessitates eventual replacement. New innovations and methods of tillage, planting, or harvesting also necessitate replacement of outmoded or obsolete machinery.

Interest--Interest often is not easily recognized or understood as a cost, unless funds are borrowed and an interest rate actually is charged for the use of borrowed money. In this study, a 7 per cent interest rate was charged on the "average annual investment" as a cost of machine ownership. Even if a farm operator has full equity in an implement or machine, and thus pays no direct interest charge, his capital is frozen. Normally, there are alternative uses for these funds, either in other farm enterprises or in non-farm investments, which may yield an even greater rate of return. This could be especially true with respect to harvesting equipment, particularly if the harvested acreage is relatively small and custom harvesting can be obtained when needed. For example, the investment in the cornpicker assumed for the model farm (Table 2) freezes the purchase cost of $2,728. If placed in a savings account, this would return about $123 per year at an interest rate of 4½ per cent. Perhaps, after adding up the earned interest and costs

Table 2. Machinery Complement, Purchase Cost, Useful Life, and Annual Use of Machinery on a Hypothetical 960-Acre Model Farm in Faulk and Potter Counties[1/]

Machine	Size	Purchase Price[2/]	Useful Life[3/]		Annual Use	
		Dollars	Years	Hours	Acres	Hours
Tractor	2-Plow	2,886	25	12,000	729	126
Tractor	3-Plow	3,545	25	12,000	1,444	303
Tractor	4-Plow	4,590	21	12,000	1,848	561
Moldboard Plow	4-14-Inch	816	16	2,500	350	154
Tandem Disc	10-Foot	765	19	2,500	438	132
Field Cultivator	14-Foot	892	20	2,000	273	55
Drag Harrow	6-Sect.	178	30	2,500	478	38
Press Drill	12-Foot	1,940	22	1,200	236	54
Swather (pull type) PTO	15-Foot	1,193	20	1,200	236	38
Combine (pull type)	12-Foot	6,008	15	2,000	236	75
Corn Planter	4-Row	1,228	25	1,200	114	23
Corn Cultivator	4-Row	459	20	2,500	228	46
Cornpicker	2-Row	2,728	15	2,000	87	52
Mower	7-Foot	485	20	2,000	293	88
Side Rake		561	25	2,500	112	20
Dump Rake	12-Foot	306	30	2,500	181	27
Farmhand & Attachments		816	25		266	80
Two Trailers or Wagons		612	25		143	72
Sprayer	30-Foot	459	30	1,500	350	35

1/ Representative farm size is 960 acres with 528 acres of cropland.
2/ Approximate new cost in 1964.
3/ Based on Agricultural Engineers Yearbook.

of the forage harvest operation (including the prorated tractor costs) the farm operator will find it more economical to hire the job done.

Insurance and Taxes--Insurance and personal property taxes are cash costs which do not vary with the amount a machine is used during the year, and thus are considered fixed costs. Insurance, as such, is not a required expenditure. However, since losses do occasionally occur, and if insurance is not actually carried, an amount sufficient to cover the expected annual rate of loss must be included as a cost.

Allocation of Fixed Costs--Each category of fixed costs can be allocated to individual enterprises in the same manner. The allocation of annual depreciation costs, for example, among individual enterprises requires a conversion of the annual cost to an hourly depreciation cost, which is based upon the expected number of hours of use of the machine during the year. Hourly depreciation charges, coupled with machine time requirements per acre, are then used to establish depreciation charges per acre for each crop enterprise.

Fixed Costs on the Model Farm--Fixed costs, with few exceptions, are considerably higher than variable costs for individual machines and implements. This may be illustrated by the examples in the following tabulation:

FIXED COSTS EXAMPLES

Implement	Purchase Price	Number of Acres Covered	Per Cent of Total Costs Per Acre	
			Fixed	Variable
Moldboard Plow	$ 816	350	35.4	64.6
Field Cultivator	892	273	62.3	37.7
Drag Harrow	178	478	43.6	56.4
Press Drill	1,940	236	81.2	18.8
Combine	6,008	236	76.8	23.2
Corn Planter	1,228	114	85.7	14.3
Corn Cultivator	459	228	61.8	38.2
Cornpicker	2,728	87	82.9	17.1
Side Rake	561	112	84.6	15.4

Recovering fixed machine costs to insure a profitable long run operation is not important over the short-run. It is important in the long run, however, that fixed costs be covered from the standpoint of replacing worn-out and obsolete machinery. In an era of increasing costs and rapidly changing technology it becomes increasingly important to reduce machine costs as much as possible; particularly so, for machine items which have a high original cost such as tractors and harvesting equipment. Since total annual fixed costs remain the same, fixed-machine costs can effectively be reduced per acre or per unit of production by spreading these costs over as many acres as possible.

To own and use machinery with a capacity greater than is actually needed, on a given acreage, will needlessly raise both the fixed and variable costs. Whether or not the reduction in the amount of labor and machine time will offset the increase in machine costs is questionable. To illustrate the increase in per acre machine costs which results when larger machines are used without an increase in acreage, the following tabulation contains machine costs for selected sizes of tractors and combines:

EXAMPLES

Machine	Acres Covered	Machine Costs 1/ Annual	Machine Costs 1/ Per Acre	Per Cent Increase
Tractor, 3-Plow	1,256	$ 563.74	$0.45	
Tractor, 4-Plow	1,256	715.89	.57	26.7
Tractor, 5-Plow	1,256	890.92	.71	57.8
Combine, 6-Foot	187	350.98	1.88	
Combine, 9-Foot	187	483.09	2.58	37.2
Combine, 12-Foot	187	790.01	4.22	124.5
Combine, 14-Foot S.P.	187	1,158.76	6.20	229.8

1/ Includes depreciation, interest, taxes, insurance and repairs.

VARIABLE COSTS

In contrast to fixed costs, annual variable costs depend directly upon the amount of use during the year. When machine use increases from, 800 acres to 1,000 acres, the variable costs per acre will remain the same but total annual variable costs will increase by 25 per cent. This is in contrast to fixed costs which are reduced 20 per cent on the per acre basis while total annual fixed costs remain the same.

Variable machine costs include repairs, fuel, oil, and lubricants. These costs have been first expressed as hourly costs for each machine or type of operation. Time requirements for each operation and machine are then used to convert the variable costs of each enterprise into per acre costs and total annual variable costs.

MACHINE COSTS BY CROPS

The cost-data and machine-time requirements can be used to determine the costs per acre (or unit of production) for each crop.

The costs for the 960-acre farm (Tables 4 through 8) were used in preparation of Table 9. These costs are subject to change as the acreage of small grains, row crops, summer fallow and hay changes. With only a small change in acreage, there will only be a negligible increase or decrease in the fixed costs, hence the cost data will still be reasonably accurate.

Table 9 was produced using specific assumptions with regard to tillage practices. A governing assumption was one of "minimum tillage," which included fall or spring plowing and a tandem discing for small grains and row crops, and two cultivations on row crops. Other assumptions included a discing for row crops harvested for grain and fall plowing of alfalfa.

SUMMARY

Machine costs for this "representative wheat farm" were developed under assumptions which included specific crop acreages, tillage practices, and purchase costs of new machinery. Significant changes in fixed costs per acre will result from a significant change in cropland acreage, number of tillage operations, or machinery prices. Consequently, the machine costs presented cannot be construed as being representative of 960-acre farms in this two-county area, although they should be somewhat similar. However, the usefulness of these costs need not be impaired since they provide a basis for estimating machine costs and, also, offer a basis for comparing costs of operating varying sizes and types of machines and implements.

Table 3. Annual Machine Costs by Machine or Implement Used for 960-Acre Model Farm; Faulk and Potter Counties

Machine	Size	Annual Use Acres	Annual Use Hours	Depreciation	Insurance & Taxes	Interest	Repairs	Fuel, Oil, & Lubricant	Total
Tractor	2-Plow	729	126	$ 103.88	$ 49.03	$ 111.13	$ 43.21	$ 10.71[1]	$ 317.96
Tractor	3-Plow	1,444	303	127.60	59.84	136.50	82.25	22.73[1]	428.92
Tractor	4-Plow	1,848	561	196.71	77.97	176.72	259.66	31.25[1]	742.31
Moldboard Plow	4-14-Inch	350	154	45.88	13.86	31.42	50.80	115.50	257.46
Tandem Disc	10-Foot	438	132	36.21	12.96	29.45	14.52	62.04	155.18
Field Cultivator	14-Foot	273	55	40.15	15.66	34.34	7.70	46.75	144.60
Drag Harrow[2]	6-Sect.	478	38	5.37	3.03	6.85	.76	19.00	35.01
Press Drill[3]	12-Foot	236	54	79.36	32.91	74.69	22.14	21.06	230.16
Swather PTO[3]	15-Foot	236	38	53.70	20.28	45.93	9.50	21.28	150.69
Combine	12-Foot	236	75	360.53	102.10	231.31	90.00	120.00	903.94
Corn Planter[2]	4-Row	114	23	44.20	20.80	47.16	7.13	11.50	130.79
Corn Cultivator	4-Row	228	46	20.70	7.81	17.67	3.22	25.30	74.70
Cornpicker	2-Row	87	52	163.66	46.38	105.03	28.60	36.40	380.07
Mower[2]	7-Foot	293	88	21.85	8.25	18.67	15.84	29.40	94.01
Side Rake[4]		112	20	20.20	9.61	21.60	3.80	5.60	60.81
Dump Rake[4]	12-Foot	181	27	9.20	5.21	11.78	1.35	7.29	34.83
Front End Loader & Attachments[2]		26	80	29.36	13.86	31.42	12.80	48.00	135.44
Two Trailers or Wagons[5]		143	72	22.04	10.40	23.55	7.88	38.32	102.19
Sprayer[4]	30-Foot	350	35	13.46	7.81	17.67	3.15	14.00	56.09
Total Costs				$1,394.06	$517.77	$1,172.89	$664.31	$686.13	$4,435.16

[1] Overhead maintenance.
[2] Used with a 3-plow tractor.
[3] Used jointly with a 3- and 4-plow tractor.
[4] Used with a 2-plow tractor.
[5] Used jointly with a 2- and 3-plow tractor.

Table 4. Machine Costs Per Hour of Use by Machine and Implement Used, 960-Acre Model Farm; Faulk and Potter Counties

Machine or Implement	Size	Annual Use Hours	Dollar Cost Per Hour[1/] Depreciation	Insurance & Taxes	Int.	Repairs	Total
Moldboard Plow	4-14-Inch	154	$0.30	$0.09	$0.20	$0.33	$0.92
Tandem Disc	10-Foot	132	.27	.10	.22	.11	.70
Field Cultivator	14-Foot	55	.73	.30	.62	.14	1.79
Drag Harrow	6-Sect.	38	.14	.08	.18	.02	.42
Press Drill	12-Foot	54	1.47	.62	1.38	.41	3.88
Swather PTO	15-Foot	38	1.41	.53	1.21	.25	3.40
Combine	12-Foot	75	4.81	1.36	3.08	1.20	10.45
Corn Planter	4-Row	23	1.92	.90	2.05	.31	5.18
Corn Cultivator	4-Row	46	.45	.17	.38	.07	1.07
Cornpicker	2-Row	52	3.15	.89	2.02	.55	6.61
Mower	7-Foot	88	.25	.09	.21	.18	.73
Side Rake		20	1.01	.48	1.08	.19	2.76
Dump Rake	12-Foot	27	.34	.19	.44	.05	1.02
Front End Loader & Attachments		80	.37	.17	.39	.16	1.09
Two Trailers or Wagons		71	.31	.15	.33	.11	.90
Sprayer (trailer)	30-Foot	35	.38	.22	.50	.09	1.19

1/ Costs include only machine or implement.

Table 5. Tractor, Machine, and Implement Costs Per Hour of Use, 960-Acre Model Farm; Faulk and Potter Counties

Machine or Implement	Size	Dollar Cost Per Hour Depreciation	Insurance & Taxes	Int.	Repairs	Fuel, Oil, & Lubricant	Total
Moldboard Plow	4-14-Inch	$0.65	$0.23	$0.52	$0.79	$0.81	$3.00
Tandem Disc	10-Foot	.62	.20	.54	.57	.53	2.46
Field Cultivator	14-Foot	1.08	.44	.94	.60	.91	3.97
Drag Harrow[1/]	6-Sect.	.56	.28	.50	.53	.57	2.44
Press Drill	12-Foot	1.82	.76	1.70	.87	.41	5.56
Press Drill[1/]	12-Foot	1.89	.82	1.83	.68	.37	5.59
Swather PTO	15-Foot	1.76	.67	1.53	.71	.59	5.26
Swather PTO[1/]	15-Foot	1.83	.73	1.66	.52	.54	5.28
Combine	12-Foot	5.16	1.50	3.40	1.66	1.64	13.36
Corn Planter[1/]	4-Row	2.34	1.10	2.37	.82	.57	7.20
Corn Cultivator	4-Row	.80	.31	.70	.63	.61	3.05
Cornpicker	2-Row	3.50	1.03	2.34	1.01	.76	8.64
Mower[1/]	7-Foot	.67	.29	.53	.69	.40	2.58
Side Rake[2/]		1.83	.87	1.96	.53	.37	5.56
Dump Rake[2/]	12-Foot	1.16	.58	1.32	.39	.36	3.81
Front End Loader & Attachments[1/]		.79	.37	.71	.67	.67	3.21
Two Trailers or Wagons[1/]		.73	.35	.78	.62	.54	3.02
Two Trailers or Wagons[2/]		1.13	.54	1.21	.45	.53	3.86
Sprayer[2/]	30-Foot	1.20	.61	1.38	.43	.49	4.11

1/ Used with a 3-plow tractor.
2/ Used with a 2-plow tractor.

Table 6. Tractor Costs Per Acre of Use for Specific Machines and Implements, 960-Acre Model Farm; Faulk and Potter Counties

Machine or Implement	Size	Dollar Cost Per Acre					
		Depre-ciation	Insurance & Taxes	Int.	Repairs	Fuel, Oil, & Lubricant	Total
Moldboard Plow	4-14-Inch	$0.154	$0.061	$0.139	$0.204	$0.025	$0.583
Tandem Disc	10-Foot	.105	.004	.095	.139	.017	.360
Field Cultivator	14-Foot	.070	.028	.063	.093	.012	.266
Drag Harrow[1/]	6-Sect.	.034	.016	.036	.022	.008	.116
Press Drill	12-Foot	.081	.032	.072	.106	.013	.304
Press Drill[1/]	12-Foot	.097	.045	.104	.062	.017	.325
Swather PTO	15-Foot	.056	.022	.050	.074	.009	.211
Swather PTO[1/]	15-Foot	.067	.032	.072	.043	.013	.227
Combine	12-Foot	.112	.044	.101	.148	.018	.423
Corn Planter[1/]	4-Row	.084	.040	.090	.054	.015	.283
Corn Cultivator	4-Row	.070	.028	.063	.093	.011	.265
Cornpicker	2-Row	.210	.083	.189	.278	.034	.794
Mower[1/]	7-Foot	.126	.059	.135	.081	.022	.423
Side Rake[2/]		.148	.070	.159	.062	.015	.454
Dump Rake[2/]	12-Foot	.124	.058	.132	.051	.012	.377
Front End Loader & Attachments[1/]		.126	.059	.135	.081	.022	.423
Two Trailers or Wagons[1/]		.211	.099	.225	.136	.034	.705
Two Trailers or Wagons[2/]		.412	.194	.441	.171	.047	1.265
Sprayer[2/]	30-Foot	.082	.039	.088	.034	.007	.250

[1/] Used with a 3-plow tractor.
[2/] Used with a 2-plow tractor.

Table 7. Costs Per Acre by Machine and Implement Used, 960-Acre Model Farm; Faulk and Potter Counties

Machine or Implement	Size	Annual Use in Acres	Dollar Cost Per Acre					
			Depre-ciation	Insurance & Taxes	Int.	Repairs	Fuel, Oil, & Lubricant	Total
Moldboard Plow	4-14-Inch	350	$0.131	$0.040	$0.090	$0.145	$0.330	$0.736
Tandem Disc	10-Foot	438	.083	.030	.067	.033	.142	.355
Field Cultivator	14-Foot	273	.147	.057	.126	.028	.171	.529
Drag Harrow	6-Sect.	478	.011	.006	.014	.002	.040	.073
Press Drill	12-Foot	236	.336	.139	.316	.094	.089	.974
Swather PTO	15-Foot	236	.228	.086	.195	.040	.090	.639
Combine	12-Foot	236	1.528	.433	.980	.381	.508	3.830
Corn Planter	4-Row	114	.388	.182	.414	.062	.101	1.147
Corn Cultivator	4-Row	228	.091	.034	.078	.014	.111	.328
Cornpicker	2-Row	87	1.881	.533	1.207	.329	.418	4.368
Mower	7-Foot	293	.074	.028	.064	.054	.099	.319
Side Rake		112	.180	.086	.193	.034	.050	.543
Dump Rake	12-Foot	181	.051	.029	.065	.007	.040	.192
Front End Loader & Attachments		266	.110	.052	.118	.048	.180	.508
Two Trailers or Wagons		143	.154	.073	.165	.055	.268	.715
Sprayer	30-Foot	350	.038	.022	.050	.009	.040	.159

Table 8. Tractor, Machine and Implement Costs Per Acre of Use, 960-Acre Model Farm; Faulk and Potter Counties

Machine or Implement	Size	Annual Use in Acres	Dollar Cost Per Acre: Depreciation	Insurance & Taxes	Int.	Repairs	Fuel, Oil, & Lubricant	Total
Moldboard Plow	4-14-Inch	350	$0.285	$0.101	$0.229	$0.349	$0.355	$1.319
Tandem Disc	10-Foot	438	.188	.034	.162	.172	.159	.715
Field Cultivator	14-Foot	273	.217	.085	.189	.121	.183	.795
Drag Harrow[1/]	6-Sect.	478	.045	.022	.050	.024	.048	.189
Press Drill	12-Foot	118	.417	.171	.388	.200	.095	1.271
Press Drill[1/]	12-Foot	118	.433	.184	.420	.156	.086	1.279
Swather PTO	15-Foot	118	.284	.108	.245	.114	.095	.846
Swather PTO[1/]	15-Foot	118	.295	.118	.267	.083	.088	.851
Combine	12-Foot	236	1.640	.477	1.081	.529	.526	4.253
Corn Planter[1/]	4-Row	114	.472	.222	.504	.116	.116	1.430
Corn Cultivator	4-Row	228	.161	.062	.141	.107	.122	.593
Cornpicker	2-Row	87	2.091	.616	1.396	.607	.452	5.162
Mower[1/]	7-Foot	293	.200	.087	.199	.135	.121	.742
Side Rake[2/]		112	.328	.156	.352	.096	.065	.997
Dump Rake[2/]	12-Foot	181	.175	.087	.197	.058	.052	.569
Front End Loader & Attachments[1/]		266	.236	.111	.253	.129	.202	.931
Trailer or Wagon[1/]		57	.235	.298	.390	.191	.263	1.377
Trailer or Wagon[2/]		86	.566	.267	.606	.226	.267	1.932
Sprayer[2/]	30-Foot	350	.120	.061	.138	.043	.047	.409

1/ Used with a 3-plow tractor.
2/ Used with a 2-plow tractor.

Table 9. Machine Costs Per Acre by Crop and by Type of Operation on 960-Acre Model Farms; Faulk and Potter Counties

Crop	Type of Operation	Machine Time Hours Per Acre	Dollar Cost Per Acre: Depreciation	Insurance & Taxes	Int.	Repairs	Fuel, Oil, & Lubricant	Total
Summer Fallow	Tillage	1.04	$0.94	$0.36	$0.80	$0.71	$0.90	$ 3.71
Small Grain After Summer Fallow	Tillage	.33	.25	.08	.23	.17	.22	.95
	Planting	.23	.43	.18	.40	.18	.09	1.28
	Spraying	.10	.12	.06	.14	.04	.05	.41
	Harvest	.48	1.93	.59	1.34	.63	.62	5.11
	Total	1.14	2.73	.91	2.11	1.02	.98	7.75
Small Grain After Small Grain or Corn Silage	Tillage	.82	.52	.16	.44	.55	.56	2.23
	Planting	.23	.43	.18	.40	.18	.09	1.28
	Spraying	.10	.12	.06	.14	.04	.05	.41
	Harvest	.48	1.93	.59	1.34	.63	.62	5.11
	Total	1.63	3.00	.99	2.32	1.40	1.32	9.03
Small Grain After Corn Grain	Tillage	1.12	.71	.19	.60	.72	.72	2.94
	Planting	.23	.43	.18	.40	.18	.09	1.28
	Spraying	.10	.12	.06	.14	.04	.05	.41
	Harvest	.48	1.93	.59	1.34	.63	.62	5.11
	Total	1.93	3.19	1.02	2.48	1.57	1.48	9.74
Small Grain After Alfalfa	Tillage	1.20	.75	.21	.65	.74	.77	3.12
	Planting	.23	.43	.18	.40	.18	.09	1.28
	Spraying	.10	.12	.06	.14	.04	.05	.41
	Harvest	.48	1.93	1.02	1.34	.63	.62	5.54
	Total	2.01	3.23	1.47	2.53	1.39	1.53	10.31
Corn After Summer Fallow	Tillage	.86	.60	.20	.54	.43	.50	2.27
	Planting	.20	.47	.22	.50	.12	.12	1.43
	Spraying	.10	.12	.06	.14	.04	.05	.41
	Subtotal	1.16	1.19	.48	1.18	.59	.67	4.11
Corn Grain	Harvest	.60	2.09	.62	1.42	.61	.45	5.19
	Total	1.76	3.28	1.10	2.60	1.20	1.12	9.30
Corn Silage	Harvest (custom hired)							5.10
	Total	1.16	1.19	.48	1.18	.59	.67	9.21
Corn After Small Grain	Tillage	1.30	.89	.30	.77	.78	.85	3.59
	Planting	.20	.47	.22	.50	.12	.12	1.43
	Spraying	.10	.12	.06	.14	.04	.05	.41
	Subtotal	1.60	1.48	.58	1.41	.94	1.02	5.43
Corn Grain	Harvest	.60	2.09	.62	1.42	.61	.45	5.19
	Total	2.20	3.57	1.20	2.83	1.55	1.47	10.62
Corn Silage	Harvest (custom hired)							5.10
	Total	1.60	1.48	.58	1.41	.94	1.02	10.53
Corn After Corn Grain	Tillage	1.62	1.14	.31	.98	.99	1.06	4.48
	Planting	.20	.47	.22	.50	.12	.12	1.43
	Spraying	.10	.12	.06	.14	.04	.05	.41
	Subtotal	1.92	1.73	.59	1.62	1.15	1.23	6.32
Corn Grain	Harvest	.60	2.09	.62	1.40	.61	.45	5.17
	Total	2.52	3.82	1.21	3.02	1.76	1.68	11.49
Corn Silage	Harvest (custom hired)							5.10
	Total	1.92	1.73	.59	1.62	1.15	1.23	11.42
Corn After Corn Silage	Tillage	1.32	.95	.27	.82	.82	.90	3.76
	Planting	.20	.47	.22	.50	.12	.12	1.43
	Spraying	.10	.12	.06	.14	.04	.05	.41
	Subtotal	1.62	1.54	.55	1.46	.98	1.07	5.60
Corn Grain	Harvest	.60	2.09	.62	1.40	.61	.45	5.17
	Total	2.22	3.63	1.17	2.86	1.59	1.52	10.77
Corn Silage	Harvest (custom hired)							5.10
	Total	1.62	1.54	.55	1.46	.98	1.07	10.70
Corn After Alfalfa	Tillage	1.49	.93	.30	.80	.85	.89	3.77
	Planting	.20	.47	.22	.50	.12	.12	1.43
	Spraying	.10	.12	.06	.14	.04	.05	.41
	Subtotal	1.79	1.52	.58	1.44	1.01	1.06	5.61
Corn Grain	Harvest	.60	2.09	.62	1.40	.61	.45	5.17
	Total	2.39	3.61	1.20	2.84	1.62	1.51	10.78
Corn Silage	Harvest (custom hired)							5.10
	Total	1.79	1.52	.58	1.44	1.01	1.06	10.71
Alfalfa Hay[1/]	Mow, Rake, Bale[2/]	.48	.53	.24	.55	.23	.12	9.07[2/]
	Mow, Rake, Stack	.78	.76	.35	.80	.36	.39	2.66
Native Hay[1/]	Mow, Rake, Stack	.75	.61	.29	.65	.32	.24	2.11

1/ Per cutting per acre.
2/ Custom baling charge is included only in total cost.