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410
FARM MANAGEMENT LABORATORY MANUAL

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1968-69 Edition

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THE DECISION ROUTE

Goal of $ + Satisfaction

Farm

Hog

Own Beef

Grain

Rent Dairy

Professional Manager

Hog
Beef
Grain
Dairy
Professional Manager

Goal of $ + Satisfaction

Not Farm

Holstein { Raise Replacements

Jersey { Buy Replacements

C-0-M

C-0-M-M

C-C-0-M

Fertilizer Rates

Plow Down

In Row

Side Dress

Own Machinery

Production Methods

New

Bank Finance

Used

Dealer Finance

Pay Cash

Hire Custom Work

Sell Direct

Sell Coop

Stanchion

Loose Housing

Side Open

Herring Bone
Management is the human element in the farm business which determines what enterprises and production activities will be carried on, organizes the farm firm to carry out these production activities, initiates the production process, makes the decisions, and bears the responsibility for the farm firm and its activities. Management may be thought of as the adhesive force which binds the farm firm together.

The goals and objectives of management include personal values and considerations of the farm family as well as dollar income goals for the financial support of the family. The non-monetary goals of the farm family are an important influence on economic performance of the farm business.

There appears to be two basic patterns of goals among farm families. One group places dominant emphasis on economic goals and secondary importance on personal or non-monetary values. Another group stresses the personal values of life with economic goals being of secondary importance.

Managers are typically found to have a mixture of economic and satisfaction or personal goals. The importance of goal attributes to an individual manager may be influenced by: age, education, experience, capital, stage of family cycle, family composition, etc.

Management of a family farm is usually influenced by several persons, each having some influence on how controlled resources can be employed. In some instances, one individual tends to dominate but other members have some influence in managerial responsibilities. Farm operations controlled (owned and/or operated) by more than one family often have an even more complicated management complex. This is found true with father-son partnerships and share leasing arrangements.
Actually, the farm resources are committed and used to maximize whatever goals the managerial complex considers to be important. Consequently, two families with different goal orientation, possessing comparable resources, may be utilizing them entirely differently. Management able to satisfactorily achieve established goals would be considered successful. Sometimes management will over or under commit resource availabilities.

In a recent study of farm managers, dollar income goals were found to be the best single indicator of economic efficiency. In this study managerial ability was defined as the individual operator's potential for maximizing economic performance within the farm business as influenced by his personal abilities and goals. Total resource availabilities were determined and those reserved for non-farm business use were removed and the remaining resources were determined to be available for farm use. Economic efficiency of available farm resources was used as the criterion for managerial performance.

It was found that managerial performance of farm managers could be predicted from scores achieved for the following characteristics:

1. The farm family's dollar income goal (economic orientation)
2. The dominance of the manager in making farm decisions (decisiveness)
3. The ability of the operator to recognize alternatives and opportunities
4. The extent of social activities participated in by the farm family (off-farm activities)

The way a farm manager spent his time in handling the farm business was found to have a more important influence on economic efficiency than the hours of time devoted to the farm business.
Goals are quite important influences on managerial performance as they relate to both the economic desires of the farm family and to how the family's resources (land, labor, capital, and managerial ability) are used.

Two different types of responsibility confronting a manager may be categorized as organizational and operational activities. Organizational responsibilities are oriented toward obtaining resources and programming their use in a production process to achieve a desired goal. The operational responsibility on the other hand requires that a manager execute the program with appropriate modifications in the most desirable manner. Operationally, managers with measurable superior performance in four areas were found to have higher incomes after the influence of other factors had been removed. The areas were:

1. Level of technical knowledge
2. Timeliness
3. Attention to detail
4. Knowledge of own farm business

Managers excelling in these areas were found to have significantly higher incomes than others.
Table 6. Household and Personal Expenses for Those Farms Which Kept Complete Accounts of These Expenses, 1965.

<table>
<thead>
<tr>
<th>Items</th>
<th>Average of 66 farms</th>
<th>13 most profitable farms</th>
<th>13 least profitable farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of persons--family</td>
<td>4.9</td>
<td>6.3</td>
<td>5.3</td>
</tr>
<tr>
<td>Number of adult equivalents--family other*</td>
<td>4.0</td>
<td>4.8</td>
<td>4.4</td>
</tr>
<tr>
<td>EXPENSES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food and meals bought</td>
<td>$1172</td>
<td>$1555</td>
<td>$1050</td>
</tr>
<tr>
<td>Operating and supplies</td>
<td>376</td>
<td>525</td>
<td>285</td>
</tr>
<tr>
<td>Furnishings and equipment</td>
<td>302</td>
<td>321</td>
<td>332</td>
</tr>
<tr>
<td>Clothing and clothing materials</td>
<td>487</td>
<td>632</td>
<td>348</td>
</tr>
<tr>
<td>Personal care and spending</td>
<td>153</td>
<td>198</td>
<td>119</td>
</tr>
<tr>
<td>Education and recreation</td>
<td>448</td>
<td>443</td>
<td>275</td>
</tr>
<tr>
<td>Gifts and special events</td>
<td>161</td>
<td>289</td>
<td>89</td>
</tr>
<tr>
<td>Medical and hospital insurance</td>
<td>546</td>
<td>545</td>
<td>516</td>
</tr>
<tr>
<td>Church and welfare</td>
<td>331</td>
<td>434</td>
<td>297</td>
</tr>
<tr>
<td>Personal share of auto expense</td>
<td>247</td>
<td>299</td>
<td>204</td>
</tr>
<tr>
<td>Upkeep on dwelling</td>
<td>54</td>
<td>113</td>
<td>10</td>
</tr>
<tr>
<td>Pers. share of tel. &amp; elec. expense</td>
<td>127</td>
<td>140</td>
<td>112</td>
</tr>
<tr>
<td>Total cash living expense</td>
<td>$4404</td>
<td>$5494</td>
<td>$3637</td>
</tr>
<tr>
<td>Personal share of new autos</td>
<td>190</td>
<td>224</td>
<td>104</td>
</tr>
<tr>
<td>New dwelling</td>
<td>201</td>
<td>431</td>
<td>151</td>
</tr>
<tr>
<td>Taxes</td>
<td>461</td>
<td>372</td>
<td>235</td>
</tr>
<tr>
<td>Life insurance</td>
<td>572</td>
<td>620</td>
<td>503</td>
</tr>
<tr>
<td>Other savings and investments</td>
<td>185</td>
<td>124</td>
<td>21</td>
</tr>
<tr>
<td>Total household &amp; pers. cash expense</td>
<td>$6013</td>
<td>$7265</td>
<td>$4651</td>
</tr>
<tr>
<td>Family living from the farm</td>
<td>266</td>
<td>377</td>
<td>329</td>
</tr>
<tr>
<td>Total cash expense &amp; perquisites</td>
<td>$6279</td>
<td>$7642</td>
<td>$4980</td>
</tr>
<tr>
<td>RECEIPTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return to capital and family labor</td>
<td>$10568</td>
<td>$20999</td>
<td>$2990</td>
</tr>
<tr>
<td>Income from outside investments</td>
<td>163</td>
<td>205</td>
<td>99</td>
</tr>
<tr>
<td>Other personal income</td>
<td>728</td>
<td>389</td>
<td>303</td>
</tr>
</tbody>
</table>

* Hired help or others boarded.
Table 7. Family Living from the Farm, 1965

<table>
<thead>
<tr>
<th>Items</th>
<th>Your farm</th>
<th>Average of 156 farms</th>
<th>Your farm</th>
<th>Average of 156 farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of adult equivalents:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td></td>
<td>3.9</td>
<td></td>
<td>$35.15</td>
</tr>
<tr>
<td>Other*</td>
<td></td>
<td>.2</td>
<td></td>
<td>.67</td>
</tr>
<tr>
<td>Whole milk</td>
<td></td>
<td>395 qts.</td>
<td></td>
<td>165.05</td>
</tr>
<tr>
<td>Cream</td>
<td></td>
<td>2 pts.</td>
<td></td>
<td>.14</td>
</tr>
<tr>
<td>Cattle</td>
<td></td>
<td>768 lbs.</td>
<td></td>
<td>52.94</td>
</tr>
<tr>
<td>Hogs</td>
<td></td>
<td>272 lbs.</td>
<td></td>
<td>5.47</td>
</tr>
<tr>
<td>Sheep</td>
<td></td>
<td>1 lbs.</td>
<td></td>
<td>12.28</td>
</tr>
<tr>
<td>Poultry</td>
<td></td>
<td>50 lbs.</td>
<td></td>
<td>10.50</td>
</tr>
<tr>
<td>Eggs</td>
<td></td>
<td>51 doz.</td>
<td></td>
<td>19.15</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$374.50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Hired help or others boarded.

CUMULATIVE EFFECT OF EXCELING IN A NUMBER OF MANAGEMENT FACTORS

Studies of earnings of farmers in this area show that there are seven major management factors causing variations in earnings among farmers within a given year. These seven factors are (1) crop yields, (2) choice of crops, (3) returns from livestock, (4) amount of livestock, (5) size of business, (6) work accomplishments per worker, and (7) control of expenses. The combined or cumulative influence of these seven management factors on earnings is shown in Table 8. The farmer's earnings are determined to a considerable extent by his accomplishments in these seven factors.

Table 8. Relation of Labor Earnings to the Number of Factors In Which the Farmer Excels

<table>
<thead>
<tr>
<th>Number of factors in which farmer excels</th>
<th>Number of farms</th>
<th>Your farm</th>
<th>The length of the shaded lines is in proportion to the average operator’s labor earnings</th>
<th>Average labor earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>None or 1</td>
<td>23</td>
<td>XXXX</td>
<td>$2349</td>
<td>7673</td>
</tr>
<tr>
<td>2 or 3</td>
<td>64</td>
<td>XXXXXXXXX</td>
<td>14909</td>
<td>19152</td>
</tr>
<tr>
<td>4 or 5</td>
<td>53</td>
<td>XXXXXXXXXXXX</td>
<td>14909</td>
<td>19152</td>
</tr>
<tr>
<td>6 or 7</td>
<td>16</td>
<td>XXXXXXXXXXXX</td>
<td>14909</td>
<td>19152</td>
</tr>
</tbody>
</table>

The array in Table 8 indicates that it will be worth while for each cooperator to study carefully his ranking on pages 10 and 11, and learn his standing in respect to each of the above factors and the elements of strength and weakness in his farm business.

Table 4. Net Worth Statement, December 31, 1965, for those Farmers Who Kept a Complete Record of All Assets and Liabilities. (Operator's Share)

<table>
<thead>
<tr>
<th>Items</th>
<th>22 owners</th>
<th>34 part-owners*</th>
<th>19 renters**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total acres in farm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owned</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rented</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total farm capital</td>
<td>$93,835</td>
<td>$89,916</td>
<td>$29,424</td>
</tr>
<tr>
<td>Stocks and bonds</td>
<td>2,480</td>
<td>2,556</td>
<td>3,034</td>
</tr>
<tr>
<td>Life insurance</td>
<td>3,539</td>
<td>3,336</td>
<td>2,156</td>
</tr>
<tr>
<td>Notes and accounts receivable</td>
<td>1,471</td>
<td>1,681</td>
<td>249</td>
</tr>
<tr>
<td>Shares in cooperative organizations</td>
<td>2,265</td>
<td>1,552</td>
<td>368</td>
</tr>
<tr>
<td>Outside real estate</td>
<td>5,270</td>
<td>2,891</td>
<td>2,048</td>
</tr>
<tr>
<td>Cash on hand and in bank</td>
<td>3,060</td>
<td>1,461</td>
<td>659</td>
</tr>
<tr>
<td>Household furnishings and clothing</td>
<td>3,585</td>
<td>3,629</td>
<td>2,530</td>
</tr>
<tr>
<td>Personal share of auto</td>
<td>603</td>
<td>582</td>
<td>377</td>
</tr>
<tr>
<td>Farm dwelling</td>
<td>8,012</td>
<td>5,749</td>
<td></td>
</tr>
<tr>
<td>Total non-farm assets</td>
<td>$30,285</td>
<td>$23,437</td>
<td>$11,421</td>
</tr>
<tr>
<td>Total assets</td>
<td>$124,120</td>
<td>$113,353</td>
<td>$40,845</td>
</tr>
<tr>
<td>Federal Land bank mortgage</td>
<td>3,864</td>
<td>5,001</td>
<td></td>
</tr>
<tr>
<td>Other real estate mortgages</td>
<td>19,543</td>
<td>18,422</td>
<td></td>
</tr>
<tr>
<td>Production Credit Association loans</td>
<td>4,861</td>
<td>3,539</td>
<td>1,741</td>
</tr>
<tr>
<td>Farmers Home Adm. chattel loans</td>
<td>572</td>
<td>--</td>
<td>1,427</td>
</tr>
<tr>
<td>Sealed grain</td>
<td>689</td>
<td>804</td>
<td>309</td>
</tr>
<tr>
<td>Other chattel mortgages</td>
<td>6,805</td>
<td>8,738</td>
<td>7,839</td>
</tr>
<tr>
<td>Notes payable</td>
<td>7,588</td>
<td>8,693</td>
<td>3,719</td>
</tr>
<tr>
<td>Accounts payable</td>
<td>569</td>
<td>2,339</td>
<td>1,695</td>
</tr>
<tr>
<td>Total liabilities</td>
<td>$44,491</td>
<td>$47,479</td>
<td>$16,730</td>
</tr>
<tr>
<td>Farmer's net worth</td>
<td>$79,629</td>
<td>$65,874</td>
<td>$24,115</td>
</tr>
<tr>
<td>Change in net worth</td>
<td>$+7,037</td>
<td>$+7,947</td>
<td>$+4,157</td>
</tr>
</tbody>
</table>

*: 7 rented for cash, 15 cash and crop share, 10 crop share, 2 livestock and crop share.
**: 2 rented for cash, 14 cash and crop share, 1 crop share, 2 livestock and crop share.
Costs of Production
E. T. Shaudys

Individual farmers have experienced wide variations in production costs, over a period of a few years. Within a community and on farms of similar size and type, costs of production may be quite different.

Most people agree that all production costs must be paid by someone sometime. Costs can be paid for from three sources: (1) earnings from past income, (2) present earnings, and (3) mortgaged future income. To break even, the returns from crop or livestock activities must be sufficient to pay the total cost of all inputs consumed in production. If income is inadequate, the costs of production must be met from other sources.

Costs - Two Kinds

Let's look at the costs that must be paid in the production of an agricultural commodity such as corn. The production of corn requires the use of seed, fertilizer, fuel, labor, power, equipment, land and storage facilities. The cost of these inputs can be classified in two ways: operating and investment expenses. Operating costs must be paid during each production cycle. Seed, fertilizer, fuel, equipment repairs, and hired labor or custom services must be paid if the crop is to be produced. If we do not or cannot pay for these (variable cost) items, some of the necessary production inputs will not be available. These items are used up during the production of the crop and the supply must be replenished for the next crop season.

Other production inputs have a more enduring life, lasting several years. Investment in land, power, equipment and buildings is vital to the production of the corn crop. In addition, a return is needed in order to support the farm family and for the labor and managerial contribution to the production of corn.

Annual costs for the use of these inputs can be paid for in terms of interest, depreciation, taxes and money for family living. Some farm operations have continued to produce several years without meeting all production costs. However, when one of the essential factors of production, such as a corn planter, wears out, production will stop unless sufficient capital or credit has been accumulated or can be obtained for its replacement.

Individual Farm Costs Differ

In estimating production costs, think of what would have to be paid if a family were to enter into farming for the first time this spring and were to continue at the same level of effectivity until the resources were fully consumed. In actual practice, this does not occur as many farm operators obtained the use of inputs such as land and equipment at another time and at a different price. Land and equipment may have been purchased 10 years ago by one farmer at 60 per cent of the value of land
purchased last year by his neighbor. Consequently, these two farmers operating side by side, doing comparable jobs, may experience widely different costs. A similar situation exists for most other resources not completely used up during one production cycle.

One of three different bases for establishing value can be used by an individual farm operator when attempting to evaluate the cost of using "fixed resource inputs": (1) the actual purchase price paid, (2) the cost of replacing with an identical facility, and (3) the cost of securing an asset of equal utility but in a different form.

An ongoing firm must establish production activities and/or modify them as if the farm operation were to continue as a going concern indefinitely. To do this we must receive returns above cash cost that can be set aside for equipment replacement, interest, and for the support of the family.

Earnings Must Replace Facilities

Machinery and land may have been purchased from previous earnings, inherited money or borrowed capital. Part of our earnings must be set aside to replace other facilities, to repay debt or to build up family savings. If no depreciation reserve is accumulated in the form of bank balance or borrowing ability as a result of debt payment, the farmer may be forced to stop production when some capital item such as a building, machine, or fence must be replaced.

Interest differs from depreciation in the time and way it must be paid. Interest on borrowed money must be paid at a stated time. Most farmers have considerable equity in their facilities. The rent on his own money is determined by the farm operator but he must remember that other competitive investment opportunities exist. Farmers should remember off-farm opportunities exist that will yield a return for their capital. The possible return from other alternatives should be considered as the cost of the farmer's capital invested in his own operation.

Family labor and management also have costs that must eventually be paid. The family must have sufficient income from one month or year to the next if it is to provide labor and management needed. The production activity must provide sufficient returns above other costs to enable the family to buy essential food, clothing, shelter, etc; otherwise, some members of the family will be forced to seek other employment. As a going concern, the family should receive an income comparable to what could be received for comparable efforts employed elsewhere.

Change

No two farm producers operate at the same level of efficiency. Technology is constantly changing. With the adoption of new ways of doing things, cost-return relationships are affected. Some farmers are able to use their production facilities more completely than others. This is the result of distributing input costs over more units of product, be it a tractor, storage facilities or labor. A bushel of corn, pound of milk or pork would have imbedded in it a smaller part of the total input costs if more bushels or pounds were produced per unit of fixed resource.
Cost and Making Decisions

As managers, we need to know what costs have to be paid from current income and what costs can be delayed but eventually must be paid. After examination, if we find we are in difficulty, (i.e. returns are insufficient to cover all costs) some changes are necessary.

Consider These Things:

1. All costs of production must eventually be paid. Costs can be paid from past, present, or future earnings.

2. Cost of one activity can be paid with returns gained from others. As a going concern, each enterprise or farm activity should yield sufficient returns to cover all of its own costs.

3. Operations can be continued in the short run (one production cycle or season), if only cash costs are paid.

In one cycle, the costs that must be paid are those that would stop if production were discontinued. When a resource must be replaced, operation can be continued only when sufficient reserves in cash or credit have been accumulated to make the replacement.

4. In some instances, good management dictates that production be continued with full knowledge that total cost will not be paid.

For example, if production were such that corn would gross $50 per acre and cost would be $55 per acre, should we continue production? Part of the costs, $30 per acre, are cash expenses for seed, fertilizer, fuel and repairs. The other $25 cost is of an investment or fixed nature. Yet production should continue because $20 per acre is available for machine replacement, family living and interest. If production were stopped, no return would be available to cover the $25 investment cost. However, if the gross return dropped to $28 per acre, we would stop producing as we would lose $2 of our operating costs and all of our investment cost.

As long as operating expenses are met with some residual for fixed expenses, production can be continued until a resource must be replaced. Then if no reserve has been accumulated, production stops. Similar cost return relationships exist for most production activities.

5. No two farmers experience the same cost-return relationship. The time and method of obtaining the use of resources, volume of business and alternative opportunities determine the best use of available resources.
Lack of Land, Capital and Management
Ability Keep Many Out of Farming

Ly L.L. Arnold
Extension Economist

To become established as a farm operator, a person needs managerial ability, labor, capital, and the use of land. The passing of each farm generation results in a transfer of the management and the control of farm units to a new generation of farm operators.

There are no legal obstacles to becoming a farmer; however, barriers such as obtaining access to land, accumulating the required capital, and the individual's management ability eliminate many prospective farm operators each year.

Opportunities Are Limited

It has been generally established that sufficient capital is available to finance the present demands of agriculture. Opportunities for getting started in farming are restricted more by the limited amount of land available. In addition to fewer farms, beginners meet intense competition from present farm operators who are trying to add more land to their unit.

If the number of farmers were to stay constant and if each farmer actively operated his farm for an average of 40 years, we would need to replace about 2.5 percent of the farm operators each year. However, an annual decline in the number of farms reduces the number of new farming opportunities. In Ohio the demand for replacements is estimated to be about 1.5 percent of the farm operators each year.

On the basis of Ohio's present estimated 125,000 farms, this means that the state has opportunities for some 1,875 beginners to start operating farms this year. Commercial farm operator replacements are considerably fewer.

Capital and Labor Must Be Balanced

Capital requirements for starting to farm vary from one area to another. In the case of a tenant farmer, much of the total capital is supplied by the landlord in the form of real estate. When in a short capital position, the beginner must make the most efficient use of his labor in relation to the capital available.

Labor requirements vary with different types of farms. In order to fully utilize one man's labor, a much larger acreage would be needed on a commercial wheat farm than on an intensive livestock farm.
Management Requirement High

Management requirements increase as farms become larger, more highly mechanized, and use greater amounts of invested capital. Decisions on the use of capital become more and more important. In many instances, uncertainty as to profit prospects limits the use of borrowed funds.

Family Assistance Important

Family help, of some sort, is a major factor in helping many new farmers get started. The assistance may take the form of making land available, supplying some capital, and assisting in management decisions. It has been well established that 75 to 80 percent of the new farmers getting started receive a substantial amount of family assistance in some form.

Part-Time Farming Might Help

Part-time farming may be a goal in itself or a means of becoming established as a full-time farm operator. It may minimize the capital and land requirement at the time of getting started. However, it is often a slow and difficult route in making the complete change to a full-time farming operation.

Problem of Obtaining Land

Finding a farm is the key factor for a young family getting started in farming. This is a greater problem with those who do not have substantial family assistance available. Most of the beginning farmers start as tenants in the more commercial agricultural areas.

In recognizing the risk associated with tenure while renting, families must decide whether to: (1) use some of their limited capital to purchase real estate in order to reduce tenure uncertainty but at the same time increase the risk of being short of operating capital or (2) face tenure risk and use their available capital for operating purposes and to expand volume of business.

Obviously there is no adequate answer to this question. The family must decide upon: (1) how to use labor to the fullest extent, (2) how to lower the unit cost of production, (3) where and how to invest dollars to get the greatest return, and (4) an adequate and fair leasing arrangement.

Nonreal Estate Capital

Beginning farmers have three primary sources of operating capital at the start:

1. Accumulated savings out of earnings
2. Gifts and inheritance
3. Borrowed funds
The net worth of families when starting to farm is accumulated largely from savings earned at home and from nonagricultural work. Many young men go away from home to nonagricultural jobs to accumulate capital before starting to farm themselves. This indicates that in many instances the home farm is not large enough to give the young man the start that is necessary.

Credit Used by Many

Money borrowed to get started in farming is often the first important credit experience for many young families. Relatives, commercial banks, and Production Credit Associations are important sources of credit used by those who start farming with substantial family assistance.

In addition to help from P.C.A.'s and commercial banks, research has shown that many of those who start without family assistance receive a substantial amount of credit from a land owner willing to lend (substantial) assistance to a young family. A high percentage of the credit used by beginning farmers is intermediate term credit to be paid off over periods greater than one year.

Capital Needs Can Be Minimized

The beginning farm family can minimize capital requirements necessary to get started in farming by: (1) leasing land whereby the landlord furnishes the capital represented by the investment in land and buildings, (2) substituting labor for capital, (3) exchanging labor, machine use or by jointly owning machinery with neighbors, and (4) buying good used machinery and equipment.

In all probability, farms will continue to get larger, employ more capital, become more specialized, and will require higher levels of management. These facts will add to the beginning farmers' problems.

Becoming established in farming is more than just getting started. Getting started is the initial step but becoming established means obtaining security of tenure, either by owning or renting land, on a farm with a potential for an adequate volume of business to meet the family's needs. In addition, the farm family must have management control and be in a sound financial position.
Good Planning Can Increase Flexibility of Farm Operation

Donald C. Huffman

Success in farming comes with planning. The job of planning is becoming more complex with the addition of new alternatives presented by technological developments and the constantly narrowing margin between costs and return. Recognition and evaluation of the alternative opportunities are essential to sound decisions. Systematic planning will aid in recognizing and evaluating these alternatives.

There are two general phases to planning: organizational and operational. The organizational phase is long-run planning for the efficient use of fixed resources such as land, buildings, and machinery. The operational phase is short-run planning to determine the proper amount of variable resources such as hired labor, feed, and fertilizer to be combined with the fixed resources and how and when to carry out the many operations for the most profitable level of production. A good job of planning in both phases must be carried out if maximum returns are to be obtained.

Good Plans Stimulate Profit

A good business organization is profitable only if the daily operations are well planned. Likewise, good daily planning can show profit only if the over-all organization is efficient.

Farmers face a difficult problem in deciding how far into the future plans should be made. This is a very important decision because the length of the planning period chosen establishes the framework within which all subsequent decisions must be made.

The nature of the farm business may require a different length of planning periods (horizons) for each farm situation; depending upon the age and amount of the labor supply, condition of existing buildings and machinery, financial situation, etc. Every farm manager has a different set of resources with which to work, but the following considerations may help decide how to plan for the future.

Since short-run decisions are operational, they are dependent to some extent upon the organization of the business. Some typical short-run decisions are: "How much and what analysis of fertilizer should (or can) I use?" "Should I use 22 or 36 percent supplement?" "Should I sell my cattle this year at 950 pounds or hold them to 1,025 pounds?" The time period involved in these decisions is one production cycle and many of the decisions may be based upon current prices and/or prices expected to prevail during the production period.

The length of the production cycle may vary with the way livestock are handled and whether crops are sold at harvest or stored. The problem involved in short-run decisions is essentially one of making adjustments in the long-run plan to take advantage of existing conditions and prices.
The long-run planning period may be a shorter time period than the length of time for which the manager plans to stay in business. It is the shortest period of time for which he can plan and obtain efficient use of his durable assets such as machinery, equipment, and buildings. Changing the use or availability of these durable assets may require changing the entire organization of the business. As this implies, the farmer may have several overlapping long-run planning periods existing at the same time.

**Flexibility Geared to Long-Run Plans**

Flexibility of the farm business is geared to the long-run planning period. The choice of the long-run period determines how soon the manager will be economically able to make changes in the organization of the farm business to take advantage of new technological improvements. For example, the farmer who recently purchased a new conventional corn picker and built storage for ear corn will not be economically able to switch to a picker-sheller and in-storage drying until he has recovered a large portion of his investment. This may take several years during which time he may be foregoing an alternative which could have been profitable if he hadn't had the previous commitment. In a dynamic agriculture such as ours, success or failure may well depend upon the degree of flexibility maintained in the farm business.

**Technology Forces Specialization**

Technological improvements, such as new types of harvesting machinery, tend to force specialization. A large volume of business is required for efficient use because of relatively large capacity and high fixed cost. A loss of some flexibility may accompany the use of specialized equipment and a long time period may be required to obtain the necessary volume to recover the investment.

Risk of the machine or equipment obsolescence before the investment cost is recovered increases with the time period. To reduce this risk one needs to program as short a time period as is necessary to recover the investment cost.

The following example illustrates the effect of long-term commitments compared to short-term commitments.

Let us assume the farmer wishes to build a farrowing house which will accommodate 10 sows. He plans to farrow in this house four times a year. A farrowing house which will last 10 years can be built for $1,000, or one which will last 30 years can be built for $1500. Which one should he build? If he builds the house with a 10-year life, he would have an average investment cost of $2.50 per litter:

\[
\frac{1000}{10 \text{ sows} \times 4 \text{ farrowings} \times 10 \text{ years}} = \$2.50
\]
An average investment cost of $1.25 per litter would be experienced with the 30-year building:

\[
\frac{\$1500}{10 \text{ sows } \times 4 \text{ farrowings } \times 30 \text{ years}} = \$1.25
\]

However, if he only used the 30-year building for 10 years, the average investment cost per litter would be $3.75:

\[
\frac{\$1500}{10 \text{ sows } \times 4 \text{ farrowings } \times 10 \text{ years}} = \$3.75
\]

This is $1.25 per litter more than for the 10-year building.

The 30-year building would have to be used at least 20 years to obtain the same per unit cost as the 10-year building. The actual cost per unit is the total cost divided by the number of units for which the facility is actually used, not what the average cost would be if the facility were used to capacity for its entire life. This point is frequently overlooked in planning, and the result is a loss of flexibility which might have otherwise been obtained.

**Actual Use Sets Cost**

A relatively long period of time may be needed to put enough units through the facility to reduce the per unit cost to a price the farmer can afford to pay. Even though longer-lived equipment may have a potentially lower per unit cost at full utilization, shorter-lived equipment may reach the price he can afford to pay much sooner. This would give the operator the opportunity to take advantage of technological innovations through reorganization of the business and to use some of the released capital elsewhere in the farm business.

In our earlier example, if the farmer had purchased a used picker and temporary cribs as compared to a new picker and ear crib storage, he would have been able to take advantage of the picker-sheller much sooner. Thus, shorter-lived equipment adds flexibility by reducing the length of the long-run planning period.

Flexibility may also be achieved by selecting equipment or building design with a view toward alternative uses. For example, a feeder cattle operation may appear most profitable now, but there is some question as to how long it will remain so. The building design and arrangement planned for feeder cattle could be so designed that they may be used as a confined hog unit or dairy loafing unit with a minimum expense for alteration. In this way a large portion of the unused investment could be salvaged by using it for another enterprise, permitting reorganization before the original enterprise has completely recovered the investment.
Operator Should Study Alternatives

Before adopting any practice or set of facilities the operator needs to analyze closely all the possible alternatives. How long are these likely to remain profitable alternatives? Is a break-through in technology likely to occur in the near future? How large a price change would change the relative profitability of the various alternatives? There is a risk associated with the adoption of any new technology. However, before it is adopted the costs are only theoretical. After it is adopted the costs are real and must be paid. We can stop paying operating costs by discontinuing production, but costs associated with the investment are contracted with the adoption of the practice for the projected life of the asset.

By carefully evaluating all possible alternatives, recognizing the costs associated with each, and taking account of the present position within general trends, the farm manager may be able to make a wise decision with respect to his choices. To do this he must consider both the long and short run planning horizons as they exist for his farm situation.

Cost Per Unit of Use For Two Farrowing Barns
(40 Litters Per Year)

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<th>30</th>
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30 year life ($1500)

10 year life ($1000)
RESPONSE PATTERNS AND RESOURCE USE

Lab Problem No. __________ Due Date __________

Problem: To determine the most profitable level of use of fertilizer, seed or other production inputs, and to develop an understanding of response patterns to facilitate estimates where precise input-output data are unavailable.

Procedure:

1. Study Table A of cabbage problem. Observe that the best (most profitable) level of fertilization can be determined either by calculation of net return or by comparison of marginal cost and marginal return.

2. Note that in Table B the optimal level of fertilizer use is interpolated between the input levels (20 pound increments) in Table A. Also note that optimal levels are presented for several combinations of fertilizer cost and cabbage price, in the graphs on page 2.5.

3. Find an example of diminishing marginal returns in your own experience. This may be drawn from research data, magazine articles, textbooks, Ohio Handbook of Agronomy, etc. or (with advance approval) from your own observation and estimation.

   Present in tabular form the total output of product (y) at each level of input (x). Show the marginal input and output in physical quantities and the value of these increments or decrements.

   Graph the total output and marginal output curves. Indicate the zone of economic decision.

   Locate the point where mc=mr on the graph. Write a paragraph explaining why you would use this much of the input (x) but no more.

4. Using the input=output data provided for fertilizer and corn or for oats seed and yield in Tables C & D, p. 2.2, compute marginal costs, marginal returns and net returns, and determine the optimal level of use of the inputs. Present in Table form. Draw graphs of total, marginal and average returns for these data. Locate on the graphs the zone of economic decision (zone of rationality) and the marginal cost--marginal revenue point. Present in tabular and graphic forms the amount of input that would be most profitable to apply with prices of inputs and products as indicated.

5. Interpret these data so that they can be understood by a farmer. In your interpretation, point out the conditions and assumptions required for your conclusion to be valid, and other factors which must be considered by a farmer, in addition to the response patterns, in deciding how much of an input factor to use.
Diminishing Returns in Fertilizer Use:  
An Example From Cabbage Production

A MAJOR PROBLEM faced by farmers in the use of fertilizer is determining the most profitable rate of application. The most profitable fertilizer rate is found by increasing the amount as long as the cost of the last increment is less than the additional revenue obtained.

However, before this can be determined, it is necessary to know the increase in yield resulting from successive increases in amount of fertilizer applied. The maximum has not been attained as long as the yield continues to increase with addition of another increment of fertilizer, even though increases grow smaller.

To obtain data on these points, a cabbage fertilizer test was conducted on Harlingen clay soil at Weslaco in the lower Rio Grande Valley of Texas. Rates of nitrogen varied from 0 to more than 260 pounds to the acre, where other nutrients were present in adequate amounts. At all levels of application, half the nitrogen was banded below the seed zone as a preplant application; the remaining half was applied as a side dressing later in the growing season. Yield responses to Nitrogen fertilizer are indicated in Table A.

Before a farm manager can select the most desirable nitrogen fertilizer application, it is necessary that cost of the added nitrogen be compared with the value of the extra cabbage produced. In order to do this, it is necessary that the price of nitrogen and cabbage be estimated. Both prices vary and over the past several years, the cost of nitrogen (including application) has ranged from 10 cents to 16 cents and the farm price received for cabbage from 6 to 18 dollars per ton. The most probable cost of nitrogen is 12 cents per pound and the most probable price of cabbage is 15 dollars per ton. Costs and returns for these price levels are shown in Table A.

Response of Corn to Applications of Nitrogen  
(Hypothetical Data)

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<th>Lbs. of N</th>
<th>Yield Bu. per A</th>
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<td>70</td>
</tr>
<tr>
<td>20</td>
<td>76</td>
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<tr>
<td>180</td>
<td>101</td>
</tr>
<tr>
<td>200</td>
<td>100</td>
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</table>

Price of Nitrogen: _________ cents per pound.
Price of Corn: _________ per bushel.

Oats Rate of Seeding and Yield  
(Based on Experimental Data)

<table>
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<tr>
<th>Pecks of Seed</th>
<th>Yield Bu. per A</th>
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<tr>
<td>14</td>
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</table>

Price of Seed: _________ per bushel.
Price of Oats: _________ per bushel.
Table A

Effect of Nitrogen on Cabbage Yields on Harlingen Clay Soil, Rio Grande Valley, Texas

<table>
<thead>
<tr>
<th>No.</th>
<th>N per acre</th>
<th>Marginal cost of appl. N</th>
<th>Marginal cost of N</th>
<th>Cumulated yield</th>
<th>Value per acre crop²</th>
<th>Net return over N last unit</th>
<th>Yield from last unit</th>
<th>Marginal due to phys. return N product</th>
<th>Output Av.</th>
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<tr>
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<td>339.90</td>
<td>-.06</td>
<td>-.90</td>
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</table>

1/ N @ 12¢/lb.
2/ Cabbage @ 15.00/ton
OUTPUT CURVES SHOWING RESPONSE OF CABBAGE TO NITROGEN FERTILIZER
Optimal Levels of N Fertilization at 4 Price Levels for N Input & Cabbage Output

Table B

<table>
<thead>
<tr>
<th>Cabbage, Per Ton</th>
<th>Nitrogen Fertilizer per lb.</th>
<th>10¢</th>
<th>12¢</th>
<th>14¢</th>
<th>16¢</th>
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![Graph of Optimal Levels of N Fertilization at 4 Price Levels for N Input & Cabbage Output]

Price of Cabbage

Cost of N per Lb.
Principle of Equimarginal Returns
(Returns per $100 Invested Are Hypothetical)

<table>
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<th>Capital Unit</th>
<th>Amount</th>
<th>Corn</th>
<th>Soybeans</th>
<th>Swine</th>
<th>Feeder Cattle</th>
<th>Wheat</th>
<th>Bonds</th>
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<tr>
<td>5</td>
<td>100</td>
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<td>6</td>
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<td>7</td>
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<td>102</td>
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<td>8</td>
<td>100</td>
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<td>95</td>
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<tr>
<td>11</td>
<td>100</td>
<td>104</td>
<td>96</td>
<td>83</td>
<td>94</td>
<td>92</td>
<td>104</td>
</tr>
</tbody>
</table>

1. If you had _____ to invest, how much would you invest in each project?
   Corn _____  Soybeans _____  Swine _____  Feeder Cattle _____
   Wheat _____  Bonds _____

2. A. What is your return over the above investment? _____
   B. Is it possible to increase your returns from the above amount of capital, if these are the only investment opportunities? _____

3. If you had _____ to invest, how much would you invest in corn _____, soybeans _____, swine _____, feeder cattle _____, wheat _____, bonds _____? (Assume an unlimited amount of capital may be invested in bonds at 4% return.)

4. Assume your banker would loan you up to _____ at 6 percent interest. How much would you borrow to invest in corn _____, soybeans _____, swine _____, feeder cattle _____, wheat _____, bonds _____?

5. Show graphically the returns by units of capital investment for corn, soybeans, swine, feeder cattle, wheat and bonds and the optimal level of investment, assuming that capital has a 6% interest cost.
| CROP ENTERPRISE RELATIONSHIPS AND FORAGE-GRAIN SUBSTITUTION RATES | Yield and Production | Value of Production<sup>1/</sup> |
|---|---|---|---|---|---|---|---|
| | Corn | Wheat | Total Grain | Hay | Rate of Subst.<sup>2/</sup> | Price Level "A" | Price Level "B" |
| Continuous Corn | 100 0 per A | 87 | 100 | 0 | | $8700 | $8700 | $8700 | $8700 |
| Acres | 100 | | | | | | | | |
| Total | 8,700 | | | | | | | | |
| Pounds | 487,200 | | 487,200 | | | | | | |
| C-C-C-W-A | 80 20 Per A | 89 | 30 | 3.2 | | 6420 | $1440 | 7860 | 6120 | $1920 | 8040 |
| Acres | 60 | 20 | 80 | 20 | | | | | | |
| Total | 5,340 | 600 | 64 | | | | | | |
| Pounds | 299,040 | 36,000 | 335,040 | 128,000 | 1.19 | | | | |
| C-W-A | 67 33 Per A | 93 | 40 | 3.0 | | 5499 | 2250 | 7749 | 4833 | 3000 | 7833 |
| Acres | 33+ | 33+ | 67+ | 33+ | | | | | | |
| Total | 3,100 | 1,333 | 100 | | | | | | |
| Pounds | 173,600 | 80,000 | 253,600 | 200,000 | 1.13 | | | | |
| C-C-W-A-A | 60 40 Per A | 93 | 33 | 4.0 | | 4908 | 3600 | 8508 | 4578 | 4800 | 9378 |
| Acres | 40 | 20 | 60 | 40 | | | | | | |
| Total | 3,720 | 660 | 160 | | | | | | |
| Pounds | 208,320 | 39,600 | 247,920 | 320,000 | .05 | | | | |
| C-W-A-A | 50 50 Per A | 110 | 36 | 3.6 | | 4370 | 4050 | 8420 | 3920 | 5400 | 9320 |
| Acres | 25 | 25 | 50 | 50 | | | | | | |
| Total | 2,750 | 900 | 180 | | | | | | |
| Pounds | 154,000 | 54,000 | 208,000 | 360,000 | 1.00 | | | | |

<sup>1/</sup> Price levels A B
Corn 1.00 bu. 100
Wheat 1.80 bu. 130
Hay 2250 ton 300

<sup>2/</sup> Pounds of grain reduction per pound of hay increase.

Source: Unpublished data, Ohio Agr'1 Exp. Station; and estimates from these data.
In a recent experiment, the same quantity of pork was produced using the above combinations of protein supplement and corn. The optimal combination depends on the prices of protein supplement and corn as realized by a farm operator.

Hand In:

1. A graph of the pork isoquant based on the above data. Indicate on the graph:
   a) the price line for protein supplement @ $_______/cwt. and corn @ $_______/bu.
   b) the price line for protein supplement @ $_______/cwt. and corn @ $_______/bu.

2. Indicate the economic optimum in terms of pounds of protein supplement and corn for each of the above price relationships.

3. Interpret what this information means to a farm manager.
Fertilizer can be used to substitute for land in the production of potatoes as well as many other crops. In the above experiment 450 hundredweight of potatoes was produced with selected amounts of fertilizers and land area. These quantities have been plotted on the graph as an isoquant, i.e. equal quantities of potatoes are produced with any of the combinations of fertilizer and land areas shown.

The optimum combination can be located by ascertaining the price relationship of fertilizer and land. For example, 1 acre of land is worth $20 rent and is of equal value to 3.3 units of fertilizer at $6.00 per unit. The economic optimum is located where the price line and the isoquant are tangent. Note that this point is located between 2 and 3 units of fertilizer and between 1.1 and 1.3 acres of land.
Partial Budgets

Partial budgeting is the most widely used decision-making technique used by farm managers. Successful operation of a farm business is dependent on well formulated plans and making correct decisions. Most farm activities can be handled in a variety of ways. However, one method is usually superior to all others. The selection of the most economically desirable method of handling an activity can be accomplished objectively with the partial budget technique.

The execution of a partial budget requires the inclusion of items that will change the costs or returns. Items of cost that will remain unchanged among the alternatives considered will have no influence on the outcome and thus do not need to be included. An accurate evaluation for decision-making does require the inclusion of every item of cost and every item of returns that will be affected by the change. The validity of the partial budget (as with any other of the decision-making tools) is dependent upon the use of realistic and reasonable standards in estimating changes in costs or income.

Production costs are composed of two types, part of the costs are fixed while others are variable. Taxes and depreciation are examples of fixed costs that remain the same regardless of the number of units produced or serviced. These costs, associated with an existing facility, are not included in a partial budget.

Variable costs, or those costs that are incurred when a production activity is undertaken, are the second type of costs involved in total costs. Fuel, fertilizer, feed, etc., are examples of costs that vary with the level and scale of production. The manager must be careful to ascertain the input costs that are appropriate for the expected level and scale of production.

In addition the quality and quantity of products yielded from the production activity may differ among the alternatives considered. The variation in the values of product must be evaluated objectively by the manager in order to make the correct selection.

Partial Budget Example

Mr. A. F. Slack is attempting to decide if he would gain more profit by replacing corn with soybeans on a part of his grain acreage. In the past he had been using a corn-corn-small grain-meadow rotation. This rotation has permitted the land on his farm to be used at a desirable level of intensity. The two years of corn in the rotation produced the quantity of feed needed for the numbers of livestock fed each year during the past decade.

Mr. Slack plans to reduce the number of corn consuming livestock because of health and the desire to have some time for leisure and travel during the winter months. He has been hauling a part of the corn crop to the local elevator for storage and hauled it back to the farm as needed for feeding. He estimates that one year of corn in the existing rotation will furnish all of the corn needed for the revised livestock program. Thus the second year of corn would be available for sale or soybeans could be produced in place of part or all of the field. Mr. Slack wants to know if he would maximize his income from the second year by substituting soybeans for corn or by continuing to produce corn.
1. Seed cost: corn $11.00/bu; soybeans $3.50/bu.

2. Seeding rate: corn 16#/acre; soybeans—one bushel/acre

3. Fertilizer: corn 350# of 6-24-12 @ $96.00/ton; plus 80 pound of N applied as anhydrous ammonia @ $164/ton (Anhydrous contains 82% elemental N thus 2000 pound has 1640 pounds of N) or 10¢/pound; soybeans 250 pounds of 0-20-20 @ $68.00/ton

4. Labor per acre corn: 4.7 hours; soybeans 4.2 hours. Labor is valued at $1.50 per hour by Mr. Slack.

5. Machine use for equipment owned by Mr. Slack (He has all of the necessary tillage, planting, harvesting equipment and power) corn 4.6 hours per acre; soybeans 4.2 hours per acre. Variable cost of using equipment is estimated at 50¢ per hour.

6. Yields are estimated as follows: corn 90 bushels; soybeans 30 bushels

7. Prices at harvest: corn 97¢/bu; soybeans $2.40/bu.

Note that in this example the fixed costs such as land rental, machinery and power and crop storage are identical for the alternatives considered.

Cost and Returns for One acre of Corn or Soybeans on Mr. Slack's farm

<table>
<thead>
<tr>
<th>Items</th>
<th>Corn</th>
<th>Soybeans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs (Variable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed (3.5A/bu.)</td>
<td>$3.14</td>
<td>$3.50</td>
</tr>
<tr>
<td>Fertilizer (350# @ $.96/ton +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80# X 10¢)</td>
<td>24.80</td>
<td>8.50</td>
</tr>
<tr>
<td>Labor (4.7 X $1.50)</td>
<td>7.05</td>
<td>6.30</td>
</tr>
<tr>
<td>Machine cost (4.6 X $.50)</td>
<td>2.30</td>
<td>2.10</td>
</tr>
<tr>
<td>Total</td>
<td>$37.29</td>
<td>$20.40</td>
</tr>
</tbody>
</table>

Returns

<table>
<thead>
<tr>
<th></th>
<th>Corn</th>
<th>Soybeans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield 90 bu.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price 97¢</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total return per acre</td>
<td>$87.30</td>
<td>$72.00</td>
</tr>
<tr>
<td>Net over variable cost</td>
<td>$50.01</td>
<td>$51.60</td>
</tr>
<tr>
<td>Advantage (per acre)</td>
<td></td>
<td>$1.59</td>
</tr>
</tbody>
</table>
Partial Budget Problem # 1

Mr. Amos Crabtree is trying to decide if he should purchase a new or used combine with picker head to harvest his corn, soybean and small grains or to hire a custom operator. Several of his neighbors custom hire part or all of their harvesting done. In the past he has picked his own corn but hired the combining done. His picker is worn out and he has converted to shelled corn storage. If he does not purchase a combine equipped with a grain header and corn attachment he will custom hire his corn and other grains combined. Good custom operators are available in the community.

Typically Mr. Crabtree follows a 5 year rotation of corn-corn-corn or soybeans-small grain-meadow and has 140 acres of corn, 70 acres of soybeans, 35 acres of wheat the 35 acres of oats to harvest each year. He is or will be equipped to handle the grain harvest operations with the exception of the combine. The alternative choices have been narrowed down to the purchase of a 10 foot self-propelled combine and a two row picker attachment or to hire a neighbor with comparable equipment.

Information Assembled By Mr. Crabtree

1. A local machinery dealer has a one year old 10' S.P. combine with picker head that can be bought for $7000. This machine was used by a neighbor who traded it for a larger machine. It had been used to harvest a total of 550 acres and is in excellent condition. A comparable new combine with picker head would cost him $9200.

2. Amos estimates that he would keep the new combine for 6 years, or the used one for 5 years. Each would have a trade-in value of $2000.

3. The interest rate on money borrowed from the local P.C.A. is 6.5 percent. Several opportunities exist for improving farm efficiency, however, most require additional capital. He feels the 6.5 percent interest rate is a realistic charge for his situation.

4. If he purchased the machine he would have to pay personal property tax on it. This tax would be $86.00 for the used, or $1.05 for the new machine as an average over the machine life.

5. Insurance against fire and storm damage losses as estimated by Amos could be purchased on up to 80 percent of the mid-value for $4.00/$1000 of value.

6. Housing is estimated at 1% of the purchase price of the machine each year.

7. Repairs are estimated to equal 4% (for the new) and 5.5% (for the used) of the purchase price of the machine each year.

8. Fuel, oil and grease: This machine can harvest 2 acres per hour of operation and consumes 2.5 gallons of fuel per hour. The net cost of gasoline is 25 cents per gallon and the oil and grease is estimated to cost 10% as much as the fuel.
9. If he purchases a machine he will have to hire one man to help with the harvesting operation at an estimated cost of $1.50/hr.

10. Small grain and soybeans can be harvested by a custom operator for $6.00 per acre.

11. Custom corn combining would cost 10 cents per bushel. Amos estimates his yield to be 95 bushels per acre. This estimate is based on the corn stored and fed from the acreage produced during the past 3 years. He expects his yields to improve.

12. Ownership of machine and doing the combining himself would reduce some of the crop loss experienced if a custom operator were employed. Based on his observations and the opinions of his neighbor he is sure he could increase realized yields if the machine were owned as follows: corn 2 bu/acre, soybeans 1 bu/acre, wheat 1 bu/acre and oats 2 bu/acre. Harvest time prices are established at $1.00/bu. for corn, $2.50/bu. for soybeans, $1.45/bu for wheat and $.65/bu for oats.

Problem: a) Ascertain in a logical, rational and orderly manner if Mr. Amos Crabtree should purchase the new or the used combine and corn attachment and do his own harvesting or hire the work done by a custom operator. b) Explain what other factors should be considered by Amos in making the decision.

Note: In making a partial budget keep these facts in mind.

1. Include every item of cost affected by the change.

2. Include every item of income affected by this change.

3. Make sure the standards and prices used are realistic and reasonable.

4. It is desirable to consider fixed costs separate from variable costs for an accurate evaluation of the alternative choices.

Partial Budget Problem # 2

Mr. E. Newlin Brown has capacity to feed 100 head of steers. The existing facilities are old but have been well maintained and he estimates will be satisfactory for at least 10 years. Admittedly more labor is required than would be needed if a more modern facility were installed. For example, a more completely automated silage unloading and feeding system would reduce feeding time and eliminate many hours of hard physical work.

Mr. Brown has modified his rotation so that he will have enough corn to feed an additional 100 head of beef steers. He usually purchases his steers at 450 pounds, and markets them at 950 pounds. In order to handle the additional 100 head of animals it is necessary to improve the feed handling system, add a silo, and add the shed and paved lot area needed.
Problem: To determine whether it would be more profitable to add the facilities needed to handle the cattle and feed, or to continue with the existing feeding operations and to sell the extra 5,000 bushels of corn at time of harvest.

Information Assembled by Mr. Brown

1. The corn can be sold at harvest at net price of $.90 per bushel at the elevator.

2. He does not have storage at home for the additional 5,000 bushels of corn. If he is to feed it he must store corn at the local elevator. The conditioning charge is 8 cents per bushel and storage 1.5 cents per bushel per month.

3. The expectation is that the market price will not exceed the $.90 price plus the cost of conditioning and storage.

4. Hauling corn to the elevator costs 5 cents per bushel each way.

5. A concrete stave silo of the size needed for the 100 head of cattle could be erected for $3,250 and the unloader would cost $1,100. The silo and unloader is estimated to have a 25 year life. Cost estimates are as follows: Taxes 1.5 percent of mid-life value; Interest, 6 percent of mid value; Insurance, .5 percent of mid value; silo repairs 1 percent of cost; unloader repairs, 4 percent of cost.

6. He estimates that he would need 40 square feet of covered space and 50 square feet of concrete lot per extra steer. The building is estimated to cost $1.25/sq. ft. and the concrete including grading and finishing 55 cents/sq. ft. In his situation a 25 year life is the maximum time period he wants to consider. In addition to depreciation; taxes, insurance, interest and repairs must be evaluated. Repairs are estimated at 2 percent, tax at 1.5 percent, interest at 6 percent and insurance at .5 percent, mid-value.

7. He would have to build a new feed bunk at a cost of $2,500, including auger ($1,500). The bunk has an estimated life of 20 years and the auger, 10 years. Repair estimates are 1% for the bunk and 4% for the auger, interest, insurance and taxes are the same as for the building.

8. Feed costs have been $17.50 per 100 pounds of gain, including value of corn. Feed costs other than corn have been $5.95 per cwt. of gain.

9. Death loss has averaged 2 percent occurring usually the first 2 weeks after purchase and veterinary $1.00 per head purchased.

10. He estimates the 1 hour of labor per 100 pounds of gain with present system will be reduced to ½ hour with the new system. Labor is valued at $1.25 per hour.

11. Cattle can be purchased at 27 cents and sold at 26 cents per pound.
Partial Budget Problem # 3

Mr. D. J. VanHouse has feed cattle for the past 25 years. During this long period of feeding experience he has feed cattle of all qualities and weights. He has the capital required, the labor and facilities to handle 80 head of feeders. A livestock dealer has offered Mr. VanHouse some yearling feeders that grade choice and some common holstein yearling feeders of comparable weight. He has fed holsteins and has also fed some choice grade cattle in the past and is willing to feed either grade. Assume that it is October 1 and that you are Mr. VanHouse.

Problem: Determine if you should purchase choice grade or holstein yearling feeders or if he should leave his feed lot empty this year. Explain why you selected your course of action.

Information Assembled by Mr. VanHouse

1. Purchase price of cattle: choice feeder average 790 pound and can be acquired for a delivered cost of 26.0 cents per pound. The holsteins the dealer has offered average 830 pounds and would cost 21.0 cents per pound.

2. He would feed the same ration to either lot of cattle and based on his past experience would feed an average of 22 pound of grain per day for the choice cattle and 26 pounds per day to the holsteins for the feeding period. The ration he is using has a cost of 2.1 cents per pound.

3. Based on past experience he expects the choice feeders to gain an average of 2.5 pounds per day and the holstein to gain an average of 3.6 pounds per day. He plans to sell the choice cattle at 1050 pounds and to sell the holsteins at 1100 pounds.

4. Death loss is estimated at 1 1/4 percent interest at 6 percent on beginning investment for the portion of the year (assume 3 months of interest) the cattle were on the farm. Insurance, taxes and repairs would be the same for either quality of cattle.

5. The sale price of the choice cattle is projected to be 25.0 cents and for holsteins 22.0 cents per hundredweight.

6. The cost of marketing and opportunity to sell the cattle are equal.
LAND USE

Problem: To determine the best long-time land use for the class problem farm.

A. The general category of land use—cropland, pasture, woodland, service areas, or wasteland—within which a particular tract or area should be used should be decided on the basis of the characteristics of that tract and its relationship to other parts of the farm. Consideration should be given to land capability factors of soil type, texture, topography, erodability, drainage, and flooding, and also to past cropping and management history, size and shape of the tract, its accessibility, and amenability to change in these factors.

On a map of the farm, indicate land use area boundaries. The same management practices (drainage improvement, tillage methods, fertilizer treatment, etc.) will be used for all the land within each land use area. Decide what is the best long time use category for each area.

B. The category "cropland" includes all land subject to plowing and/or cultivation. The intensity of use may vary from occasional tillage to continuous row crops. Designate the intensity of rotation for each area of cropland. Intensity should be expressed as the percent of intertilled or row crops in the rotation. For example, a 4-year rotation of corn, oats and 2 years of alfalfa would be 25 percent intertilled crops.

C. Write a statement of about 200 words explaining what factors and conditions cause you to believe this is the best possible use of the land for this farm.

ENTERPRISE SELECTION

Problem: To select the livestock and crop enterprises that will make the most profitable long-time use of the resources on the class problem farm.

Lectures, discussions and/or reading assignments have brought out the factors that affect one's choice of farm enterprises. Study carefully the inventory and appraisal of the resources available on the class problem farm, and the pattern for use of the land resources developed in the previous problem. Consider acreage, quality of land, availability of capital, the quantity and quality of the operator's labor and management, and the various ways in which these factors of production might be utilized.

A. Determine the enterprise or the combination of enterprises which you believe will make the best long-run use of this composite of resources. List the enterprises you have chosen, with sufficient description to show the relationship between enterprises. Indicate the existence and extent of specialization or diversification. In a statement of 200-300 words discuss and defend your selection.
Characteristics of Livestock Enterprises Affecting Enterprise Combinations on Ohio Farms

<table>
<thead>
<tr>
<th></th>
<th>Dairy</th>
<th>Hogs</th>
<th>Fat Cattle</th>
<th>Beef Cow Herd</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labor</strong></td>
<td>Utilizes large quantities of family labor. Uniform requirement throughout the year.</td>
<td>Moderate labor requirement. Size of operation easily adapted to balance the labor situation.</td>
<td>Relatively small labor requirements. Makes good use of winter labor.</td>
<td>Small labor requirements.</td>
</tr>
<tr>
<td><strong>Feeds</strong></td>
<td>Markets large quantities of high quality forages and moderate amounts of grain.</td>
<td>Markets large quantity of feed grains.</td>
<td>Markets large quantities of grain and small amounts of forage.</td>
<td>Markets large quantities of medium and some low quality roughage. Small quantities of grain.</td>
</tr>
<tr>
<td><strong>Capital</strong></td>
<td>High capital requirement for livestock and facilities. Medium rate of capital turnover.</td>
<td>Low to medium capital requirements depending upon management system. Fast capital turnover.</td>
<td>High capital requirement for feed and animals. Low to medium for facilities depending on system. Fast capital turnover.</td>
<td>Low capital requirement. Slow capital turnover.</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td>Monthly or bi-weekly income.</td>
<td>Income once to 12 times a year dependent on system.</td>
<td>Generally income once or twice per year.</td>
<td>Income only once per year.</td>
</tr>
<tr>
<td><strong>Returns</strong></td>
<td>$1.95 return per $1.00 feed fed.</td>
<td>$1.40 return per $1.00 feed fed.</td>
<td>$1.25 return per $1.00 feed fed.</td>
<td>$1.30 return per $1.00 feed fed.</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td>Adapted primarily as a major enterprise.</td>
<td>Adapted as either major or supplementary enterprise.</td>
<td>Adapted as either major or supplementary enterprise</td>
<td>Adapted primarily as a supplementary enterprise under Ohio conditions.</td>
</tr>
<tr>
<td>Breeding Ewes</td>
<td>Feeder Lambs</td>
<td>Poultry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Labor</strong></td>
<td>Relatively low labor requirements.</td>
<td>Moderate labor requirements but work well as supplemental enterprises to utilize family labor.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low labor requirement except during lambing period which is usually late winter or early spring.</td>
<td></td>
<td>May be used to market home grown grains or commercial feed grains,</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Feeds</strong></td>
<td>Markets large quantities of grain.</td>
<td>Low to medium capital requirements. Fast capital turnover.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market low to medium quality roughage efficiently.</td>
<td></td>
<td>Very high risk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Capital</strong></td>
<td>Medium capital requirement. Fast capital turnover.</td>
<td>Income weekly to once a year depending on system and poultry enterprise.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low capital requirement. Moderate capital turnover.</td>
<td></td>
<td>Adapted as either supplemental or major enterprise - especially if capital is limited.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Risk</strong></td>
<td>Very high risk.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low risk.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td>Income once a year.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income twice a year.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Returns</strong></td>
<td>$1.60 return per $1.00 feed fed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$1.50 return per $1.00 feed fed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td>Adapted primarily as a supplemental enterprise.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adapted primarily as a supplemental enterprise.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Problem:

To develop the crop program that will make optimum long-time use of available resources of the class problem farm, and will best fit the type of farming and land use pattern already selected for that farm.

Procedure:

A. Determine the rotation or rotations for your farm. Study carefully the factors discussed in class and in references, with respect to the class problem farm. Consider the selection of intertilled, transition and soil building crops.

B. Work out a desirable field layout using outline maps provided. Consider efficiency of field operations, including distance and accessibility from operations center and slope and size of fields; consider also fence requirements, livestock travel and access to water for livestock.

C. Develop a crop production schedule, and indicate the sequence of crops to be grown in each field for a complete cycle of the rotation.

D. Determine the maintenance fertilizer and lime applications needed after the necessary build-up applications have been made. Amount, analysis and method and/or time of application must be decided for each crop. Consult soil test information and fertilizer recommendations.

E. Determine the seeding rates for each crop and the total amount of seed that will have to be purchased or saved each year. Indicate variety of each crop; for corn indicate the length of season (days to maturity). Determine method of harvest to be used, considering the type of storage that will be required for the method you select. Indicate your expected yield level and total production each year.

F. Specify your tillage, cultural and harvest methods. Consider other soil and crop management practices such as weed, disease and insect control, clipping contour stripping, waterways, tile, diversions, terraces, etc. Indicate on map and describe those practices which you include in your agronomic program.

Much of the foregoing can be presented on the forms provided. In addition, your report should include a summary statement of about 300 words indicating how these pieces fit together to make a cropping program which integrates resources, practices and yields. Special management features should be described. State why your plan makes the best use of the available resources.
Crop Production Program

<table>
<thead>
<tr>
<th>Rot. #1</th>
<th>Rot. #2</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Field number</th>
<th>Acres</th>
<th>1st. yr.</th>
<th>2nd. yr.</th>
<th>3rd. yr.</th>
<th>4th. yr.</th>
<th>5th. yr.</th>
<th>6th. yr.</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

Total crop A.

Perm. past.

Woods

F.S. & other

Total

**Lime Applications**

(Based on agricultural ground limestone)

<table>
<thead>
<tr>
<th></th>
<th>Initial</th>
<th></th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acres</td>
<td>T/</td>
<td>Total Tons</td>
</tr>
<tr>
<td>Cropland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pasture</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total</td>
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<td>XXX</td>
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</tbody>
</table>

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<p>| | | | | | | |
| | | | | | | |</p>
<table>
<thead>
<tr>
<th>Crop</th>
<th>Permanent Pasture</th>
<th>Rotation (1)</th>
<th>Meadow (2)</th>
<th>Wheat</th>
<th>Oats</th>
<th>Soybeans</th>
<th>Rotation Corn</th>
<th>Continuous Corn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Acres</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Elements Needed</td>
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<td></td>
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<tr>
<td>Analysis To Be Used</td>
<td></td>
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<tr>
<td>Method of Application</td>
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<tr>
<td>Expected Yield</td>
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<tr>
<td>Total Yield</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Crops, Seeding Rates, Varieties and Methods of Harvest Used

<table>
<thead>
<tr>
<th>Crop</th>
<th>Acres</th>
<th>Seeding rate/A.</th>
<th>Total seed needed</th>
<th>Variety¹</th>
<th>Method of harvest²</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

¹/ For corn, indicate length of growing season, preferably expressed in days to maturity.

²/ For meadow crops, the alternatives are hay, haylage, ensilage, pasture, green manure, sale to dehydrater, etc.

For corn, harvest may be for silage, ear corn, shelled corn, hogged down, etc. For small grains, combine harvest, silage, hay, pasture or green manure.
Harvest Dates and Days to Maturity for Central Ohio

<table>
<thead>
<tr>
<th>Crop</th>
<th>Days to Maturity</th>
<th>Harvest Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn, Grain</td>
<td>100 to 140</td>
<td>Oct. 15 - Nov. 25</td>
</tr>
<tr>
<td>Corn, Silage</td>
<td>100 to 140</td>
<td>Sept 10 - Oct. 15</td>
</tr>
<tr>
<td>Soybeans</td>
<td>110 to 130</td>
<td>Sept 25 - Nov. 5</td>
</tr>
<tr>
<td>Wheat</td>
<td>280 to 300</td>
<td>July 5 - July 31</td>
</tr>
<tr>
<td>Barley</td>
<td>265 to 280</td>
<td>June 15 - July 5</td>
</tr>
<tr>
<td>Oats</td>
<td>145 to 155</td>
<td>Aug. 10 - Aug. 25</td>
</tr>
<tr>
<td>Meadow</td>
<td>First crop</td>
<td>May 25 - June 10</td>
</tr>
<tr>
<td></td>
<td>second crop*</td>
<td>July 5 - July 20</td>
</tr>
<tr>
<td></td>
<td>third crop*</td>
<td>Aug. 15 - Sept 5 **</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>75 to 90</td>
<td>Aug. 10 - Oct. 15</td>
</tr>
<tr>
<td>Potatoes</td>
<td>110 to 125</td>
<td>Sept 5 - Oct. 15</td>
</tr>
<tr>
<td>Sugar Beet</td>
<td>130 to 140</td>
<td>Sept 20 - Nov. 20</td>
</tr>
</tbody>
</table>

* Days to maturity after first crop harvested.

** Last cutting of a meadow crop should be made before September 5 if plans to carry stand for another year.
AFFECT OF SHAPE OF FIELD ON MAN LABOR REQUIREMENTS

A - To plow a 10 acre square field with 2-14" bottom tr. plow
   Number of rounds required 141
   Number of turns required 564
   1/4 minute lost per turn - the total turning time lost is 2.35 hrs.

B - To plow a 10 acre rectangular field 20 x 80 rods with 2-14" bottom tractor plow
   Number of rounds 70.5
   Number of turns 282
   1/4 minute lost per turn - the total turning time lost is 1.17 hrs.

C - To farm an irregular shape (many point rows) according to an Ohio Agricultural Experiment Station study requires 10-12% more man hours than regular fields of same size.

AFFECT OF DISTANCE FROM BARN TO FIELD ON COST OF OPERATION PER ACRE PER YEAR

Based on a detailed cost study made in Greene County in 1920-25 when horse power predominated, a man made 7 trips to the field per acre each year. It is estimated that with tractor power and larger machines, 3 trips are made to the field per acre per year in the typical rotation, (corn, small grain and one year of hay rotation).

Case I. Field entrance 200 feet from barn, and one gate to open and close.

Travel cost per acre per year $ .11

Case II. Field entrance 1/2 mile from barn (length of regular 80 acre farm), with 2 gates to open and close.

3 round trips per acre = 3 miles travel with a man and tractor

Time required at 4 miles per hour = .75 hr. per acre

$.75 man hour x 80¢ = $ .60
$.75 tractor hour x 90¢ = .67

Total travel cost $1.27

Conclusion - Difference between Case I $.11 and Case II $1.27 is $1.16.
   Capitalized at 5% = $23.20 per acre greater value for land at building than land 1/2 mile from barn.
### FARM FIELD LAYOUT AND ITS AFFECT ON FENCE COSTS AND LABOR REQUIREMENTS

**Size of Farm and Rods of Fence Per Acre**  
*(Indiana Bulletin 423, 1937)*

<table>
<thead>
<tr>
<th>Size of Farm (Acres)</th>
<th>Average rods per acre</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>48-97</td>
<td>9.09</td>
<td>12.14</td>
<td>7.73</td>
</tr>
<tr>
<td>98-147</td>
<td>7.49</td>
<td>9.74</td>
<td>5.64</td>
</tr>
<tr>
<td>148-197</td>
<td>8.15</td>
<td>9.39</td>
<td>4.55</td>
</tr>
<tr>
<td>198-247</td>
<td>7.12</td>
<td>9.26</td>
<td>5.35</td>
</tr>
<tr>
<td>248 or more</td>
<td>6.58</td>
<td>8.39</td>
<td>4.68</td>
</tr>
</tbody>
</table>

Average rods per acre 7.69

* Share of line fence only ÷ all internal and road fence = "owned fence."

### Relation of Size of Farm to Size of Field  
*(Indiana Bulletin 423, 1937)*

<table>
<thead>
<tr>
<th>Size of farm</th>
<th>No. of fields per farm</th>
<th>Average sizes per field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 100 acres</td>
<td>6.7</td>
<td>11.7</td>
</tr>
<tr>
<td>100-219 acres</td>
<td>8.7</td>
<td>17.0</td>
</tr>
<tr>
<td>220-339 acres</td>
<td>11.1</td>
<td>24.6</td>
</tr>
<tr>
<td>340 acres and more</td>
<td>13.0</td>
<td>37.6</td>
</tr>
<tr>
<td>Average all farms</td>
<td>8.8</td>
<td>18.1</td>
</tr>
</tbody>
</table>

### Relation of the Average Size of Fields to the Number of Rods of Fence Required Per Acre  
*(Indiana Bulletin 423, 1937)*

<table>
<thead>
<tr>
<th>Average size of field</th>
<th>No. of fields</th>
<th>Average no. rods per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-13 acres</td>
<td>88</td>
<td>9.3</td>
</tr>
<tr>
<td>13-19 acres</td>
<td>55</td>
<td>7.3</td>
</tr>
<tr>
<td>19 or more acres</td>
<td>80</td>
<td>6.3</td>
</tr>
</tbody>
</table>

### The Affect of Size and Shape of Field on Amount of Fence Required to Completely Enclose It

<table>
<thead>
<tr>
<th>Shape</th>
<th>Size</th>
<th>Total Rods</th>
<th>Rods Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square</td>
<td>1 acre</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Square</td>
<td>10 acres</td>
<td>120</td>
<td>16</td>
</tr>
<tr>
<td>Square</td>
<td>20 acres</td>
<td>226</td>
<td>11.3</td>
</tr>
<tr>
<td>Square</td>
<td>40 acres</td>
<td>320</td>
<td>8.0</td>
</tr>
<tr>
<td>Rectangle</td>
<td>29 x 56 rods</td>
<td>170</td>
<td>17.0</td>
</tr>
<tr>
<td>Rectangle</td>
<td>20 x 80 rods</td>
<td>200</td>
<td>20.0</td>
</tr>
<tr>
<td>Rectangle</td>
<td>40 x 80 rods</td>
<td>240</td>
<td>12.0</td>
</tr>
</tbody>
</table>
FENCE COSTS

Average Total Cost of Constructing a 40 Rod Stretch of Common a/ Woven Wire Fence by 100 Farmers and by 20 Custom Builders in Central Indiana, 1949

<table>
<thead>
<tr>
<th></th>
<th>Farmer Built</th>
<th>Custom Built By the Rod</th>
<th>Custom Built By the Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>$100.90</td>
<td>$100.90</td>
<td>$100.90</td>
</tr>
<tr>
<td>Hauling equipment and materials</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>Removing old fence</td>
<td>7.60</td>
<td>12.67</td>
<td>7.01</td>
</tr>
<tr>
<td>Erecting</td>
<td>$16.60 b/</td>
<td>31.68</td>
<td>25.64</td>
</tr>
<tr>
<td>Total for 40 rods</td>
<td>$126.60</td>
<td>$146.75</td>
<td>$135.05</td>
</tr>
<tr>
<td>Total per rod</td>
<td>3.14</td>
<td>3.67</td>
<td>3.36</td>
</tr>
</tbody>
</table>

a/ 47-9-11-6 fence with one barbed wire, including braced and anchored end assemblies, assuming cost of one end post (but not the bracing) charged to adjacent fence.

b/ Labor costs and use of fence and miscellaneous equipment. (Data taken from Purdue Experiment Station Bulletin 570, 1951)

Total Annual Use Cost, by Selected Type of Fence

<table>
<thead>
<tr>
<th>Type of Fence</th>
<th>Annual Use Cost Per Rod</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Woven Wire</td>
<td>$.26</td>
</tr>
<tr>
<td>Barb Wire</td>
<td>.19</td>
</tr>
<tr>
<td>Temporary Woven Wire</td>
<td>.37</td>
</tr>
<tr>
<td>Electric 1/</td>
<td>.19</td>
</tr>
</tbody>
</table>

1/ Electricity cost 10¢ per month.

Note: Gates had an average annual use of $1.00 per year.

From: Purdue Experiment Station Bulletin 570, 1951.

Relation of Size of Farmstead to Amount of Farmstead Fencing on 40 Central Indiana Farms in 1947 1/

<table>
<thead>
<tr>
<th>Size of farmstead, acres</th>
<th>Number of Farms</th>
<th>Total rods of farmstead fencing</th>
<th>Rds. of Farmstead fencing per acre of farmstead</th>
</tr>
</thead>
<tbody>
<tr>
<td>range average</td>
<td>Range Average</td>
<td>Range</td>
<td>Average</td>
</tr>
<tr>
<td>0.6-2.5</td>
<td>1.9</td>
<td>13</td>
<td>47-113</td>
</tr>
<tr>
<td>2.6-4.0</td>
<td>3.2</td>
<td>14</td>
<td>74-157</td>
</tr>
<tr>
<td>4.1-6.0</td>
<td>4.5</td>
<td>13</td>
<td>103-210</td>
</tr>
<tr>
<td>Total</td>
<td>3.2</td>
<td>40</td>
<td>47-210</td>
</tr>
</tbody>
</table>

1/ Purdue Bulletin 542.
### Characteristics and Potential Yields of Selected Ohio Soil Types

<table>
<thead>
<tr>
<th>Soil name</th>
<th>Color</th>
<th>Texture</th>
<th>Drainage</th>
<th>Topography</th>
<th>Potential production* **</th>
<th>Corn (bu.)</th>
<th>Soybeans (bu.)</th>
<th>Wheat (bu.)</th>
<th>Hay (T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roselms</td>
<td>Light</td>
<td>Silty clay loam</td>
<td>Very poor</td>
<td>Level</td>
<td></td>
<td>45</td>
<td>22</td>
<td>25</td>
<td>2.2</td>
</tr>
<tr>
<td>Paulding</td>
<td>Dark</td>
<td>Clay</td>
<td>Very poor</td>
<td>Level</td>
<td></td>
<td>80</td>
<td>33</td>
<td>33</td>
<td>3.5</td>
</tr>
<tr>
<td>Nappanee, Fulton</td>
<td>Light</td>
<td>Silt loam</td>
<td>Imperfect</td>
<td>Level</td>
<td></td>
<td>78</td>
<td>31</td>
<td>32</td>
<td>3.2</td>
</tr>
<tr>
<td>Belmore</td>
<td>Light</td>
<td>Sandy loam</td>
<td>Good</td>
<td>Sloping</td>
<td></td>
<td>78</td>
<td>30</td>
<td>38</td>
<td>4.0</td>
</tr>
<tr>
<td>Tidrow, Rimer</td>
<td>Light</td>
<td>Sandy loam</td>
<td>Imperfect</td>
<td>Level</td>
<td></td>
<td>73</td>
<td>28</td>
<td>30</td>
<td>3.5</td>
</tr>
<tr>
<td>Hoytville</td>
<td>Dark</td>
<td>Clay</td>
<td>Very poor</td>
<td>Level</td>
<td></td>
<td>113</td>
<td>40</td>
<td>40</td>
<td>4.6</td>
</tr>
<tr>
<td>Toledo</td>
<td>Dark</td>
<td>Silty clay loam</td>
<td>Very poor</td>
<td>Level</td>
<td></td>
<td>113</td>
<td>40</td>
<td>40</td>
<td>4.5</td>
</tr>
<tr>
<td>Granby, Wauseon</td>
<td>Dark</td>
<td>Sandy loam</td>
<td>Very poor</td>
<td>Level</td>
<td></td>
<td>112</td>
<td>37</td>
<td>37</td>
<td>4.6</td>
</tr>
<tr>
<td>Blount</td>
<td>Light</td>
<td>Silt loam</td>
<td>Imperfect</td>
<td>Rolling</td>
<td></td>
<td>78</td>
<td>28</td>
<td>32</td>
<td>3.2</td>
</tr>
<tr>
<td>Pewamo</td>
<td>Dark</td>
<td>Clay loam</td>
<td>Very poor</td>
<td>Level</td>
<td></td>
<td>107</td>
<td>35</td>
<td>30</td>
<td>4.5</td>
</tr>
<tr>
<td>Celina</td>
<td>Light</td>
<td>Silt loam</td>
<td>Fair</td>
<td>Sloping</td>
<td></td>
<td>105</td>
<td>29</td>
<td>36</td>
<td>3.4</td>
</tr>
<tr>
<td>Crosby</td>
<td>Light</td>
<td>Silt loam</td>
<td>Perfect</td>
<td>Level</td>
<td></td>
<td>97</td>
<td>30</td>
<td>36</td>
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</tr>
<tr>
<td>Brookston</td>
<td>Dark</td>
<td>Silty clay loam</td>
<td>Very poor</td>
<td>Level</td>
<td></td>
<td>115</td>
<td>35</td>
<td>30</td>
<td>4.5</td>
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<tr>
<td>Fox, Ockley, Wea</td>
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<td>Good</td>
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<td></td>
<td>102</td>
<td>28</td>
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<td>Xenia</td>
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<td>Fair</td>
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<td></td>
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<td>3.2</td>
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<td>Dark</td>
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<td>Very poor</td>
<td>Level</td>
<td></td>
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<td>35</td>
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<tr>
<td>Avonburg, Clermont</td>
<td>Light</td>
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<td>Poor</td>
<td>Level</td>
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<td>Silt loam</td>
<td>Imperfect</td>
<td>Rolling</td>
<td></td>
<td>98</td>
<td>28</td>
<td>34</td>
<td>3.4</td>
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<td>Brattom</td>
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<td>Silt loam</td>
<td>Good</td>
<td>Rolling</td>
<td></td>
<td>90</td>
<td>26</td>
<td>32</td>
<td>3.4</td>
</tr>
<tr>
<td>Burgin</td>
<td>Dark</td>
<td>Silt loam</td>
<td>Poor</td>
<td>Level</td>
<td></td>
<td>100</td>
<td>32</td>
<td>28</td>
<td>4.5</td>
</tr>
<tr>
<td>Caneadea</td>
<td>Light</td>
<td>Silt loam</td>
<td>Imperfect</td>
<td>Level</td>
<td></td>
<td>85</td>
<td>27</td>
<td>32</td>
<td>3.0</td>
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<tr>
<td>Lorain</td>
<td>Dark</td>
<td>Silty clay loam</td>
<td>Very poor</td>
<td>Level</td>
<td></td>
<td>105</td>
<td>35</td>
<td>30</td>
<td>4.5</td>
</tr>
<tr>
<td>Olmsted</td>
<td>Dark</td>
<td>Silt loam</td>
<td>Very poor</td>
<td>Level</td>
<td></td>
<td>110</td>
<td>35</td>
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<td>Fair</td>
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<td>Silt loam</td>
<td>Imperfect</td>
<td>Level</td>
<td></td>
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<td>27</td>
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<td>Marengo</td>
<td>Dark</td>
<td>Silty clay loam</td>
<td>Very poor</td>
<td>Level</td>
<td></td>
<td>110</td>
<td>30</td>
<td>38</td>
<td>4.6</td>
</tr>
<tr>
<td>Trumbull, Mahoning</td>
<td>Light</td>
<td>Silt loam</td>
<td>Poor</td>
<td>Level</td>
<td></td>
<td>79</td>
<td>26</td>
<td>31</td>
<td>2.6</td>
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<tr>
<td>Venango, Cambridge</td>
<td>Light</td>
<td>Silt loam</td>
<td>Imperfect</td>
<td>Level</td>
<td></td>
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<td>26</td>
<td>34</td>
<td>3.1</td>
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<td>Wadsworth, Rittman</td>
<td>Light</td>
<td>Silt loam</td>
<td>Imperfect</td>
<td>Sloping</td>
<td></td>
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<td>26</td>
<td>34</td>
<td>2.9</td>
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<tr>
<td>Wooster, Canfield</td>
<td>Light</td>
<td>Silt loam</td>
<td>Good</td>
<td>Rolling</td>
<td></td>
<td>103</td>
<td>29</td>
<td>40</td>
<td>4.0</td>
</tr>
<tr>
<td>Hanover</td>
<td>Light</td>
<td>Silt loam</td>
<td>Good</td>
<td>Rolling</td>
<td></td>
<td>84</td>
<td>23</td>
<td>35</td>
<td>3.3</td>
</tr>
<tr>
<td>Muskingum, Wellston</td>
<td>Light</td>
<td>Silt loam</td>
<td>Good</td>
<td>Rolling</td>
<td></td>
<td>87</td>
<td>28</td>
<td>37</td>
<td>3.2</td>
</tr>
<tr>
<td>Keene</td>
<td>Light</td>
<td>Silt loam</td>
<td>Good</td>
<td>Rolling</td>
<td></td>
<td>73</td>
<td>18</td>
<td>30</td>
<td>3.6</td>
</tr>
<tr>
<td>Westmoreland</td>
<td>Light</td>
<td>Silty clay loam</td>
<td>Good</td>
<td>Rolling</td>
<td></td>
<td>87</td>
<td>30</td>
<td>40</td>
<td>4.0</td>
</tr>
<tr>
<td>Upshur, Meigs</td>
<td>Light</td>
<td>Clay loam</td>
<td>Good</td>
<td>Rolling</td>
<td></td>
<td>77</td>
<td>--</td>
<td>31</td>
<td>3.5</td>
</tr>
<tr>
<td>Westmoreland</td>
<td>Light</td>
<td>Silty clay loam</td>
<td>Good</td>
<td>Rolling</td>
<td></td>
<td>68</td>
<td>--</td>
<td>34</td>
<td>3.8</td>
</tr>
<tr>
<td>Muskingum, Meigs</td>
<td>Light</td>
<td>Silt loam</td>
<td>Good</td>
<td>Rolling</td>
<td></td>
<td>66</td>
<td>--</td>
<td>32</td>
<td>2.7</td>
</tr>
</tbody>
</table>

* Information compiled by the Agronomy Department of The Ohio State University.
<table>
<thead>
<tr>
<th>Crop</th>
<th>Pounds of Seed per Bushel</th>
<th>Rate to plant per acre (lbs.)</th>
<th>Date to Plant In Northern Ohio</th>
<th>Date to Plant In Southern Ohio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa*</td>
<td>60</td>
<td>10-12</td>
<td>Mar. 10-Apr. 20 or July 1-Aug. 15</td>
<td>Mar. 1-Apr. 15 or July 1-Sept. 1</td>
</tr>
<tr>
<td>Barley, winter</td>
<td>48</td>
<td>30-100</td>
<td>Sept. 15-Oct. 5</td>
<td></td>
</tr>
<tr>
<td>Bird'sfoot trefoil</td>
<td>60</td>
<td>4-6</td>
<td>Mar. 10-Apr. 20</td>
<td>Mar. 1-Apr. 15</td>
</tr>
<tr>
<td>Bromegrass*</td>
<td>14</td>
<td>6</td>
<td>Aug. 1-Sept. 15 or March-April</td>
<td>Aug. 1-Sept. 30 or March-April</td>
</tr>
<tr>
<td>Corn, dent</td>
<td>56</td>
<td>10-15</td>
<td>May 10-June 5</td>
<td>May 1-May 31</td>
</tr>
<tr>
<td>Corn, sweet</td>
<td>45</td>
<td>8-12</td>
<td>May 1-June 25</td>
<td>Apr. 20-June 25</td>
</tr>
<tr>
<td>Corn, pop</td>
<td>56</td>
<td>4-6</td>
<td>May 10-June 5</td>
<td>May 1-May 31</td>
</tr>
<tr>
<td>Clover, alsike*</td>
<td>60</td>
<td>4-5</td>
<td>March-April or July 15-Aug. 15</td>
<td>March or August</td>
</tr>
<tr>
<td>Clover, medium* or mammoth red</td>
<td>60</td>
<td>8-10</td>
<td>March-April or July 15-Aug. 15</td>
<td>March or August</td>
</tr>
<tr>
<td>Clover, ladino</td>
<td>60</td>
<td>1-2</td>
<td>March-April</td>
<td>March or August</td>
</tr>
<tr>
<td>Fescue, tall</td>
<td>40-45</td>
<td>6-12</td>
<td>Do not use</td>
<td>Feb. 15-Mar. 31</td>
</tr>
<tr>
<td>Lespedeza, Korean</td>
<td>32</td>
<td>50-80</td>
<td>Mar. 15-Apr. 20</td>
<td>Mar. 1-Apr. 15</td>
</tr>
<tr>
<td>Rye</td>
<td>56</td>
<td>84-112</td>
<td>Sept. 1-Oct. 15</td>
<td>Sept. 10-Oct. 20</td>
</tr>
<tr>
<td>Ryegrass</td>
<td>--</td>
<td>15-20</td>
<td>June 15-Aug. 15 or March-April</td>
<td>June 15-Oct. 1 or March-April</td>
</tr>
<tr>
<td>Sorghum</td>
<td>50</td>
<td>5-8</td>
<td>June 1-20</td>
<td>May 20-June 30</td>
</tr>
<tr>
<td>Soybeans</td>
<td>60</td>
<td>30-60 in rows drilling 90-120</td>
<td>May 10-31</td>
<td>May 1-June 10</td>
</tr>
<tr>
<td>Sweetclover, scarified</td>
<td>60</td>
<td>10-12</td>
<td>Mar. 15-Apr. 30 (Yellow also in June-July)</td>
<td>Mar. 15-Apr. 15 (Yellow also in June-July)</td>
</tr>
<tr>
<td>Sudangrass</td>
<td>--</td>
<td>25</td>
<td>June 1-20</td>
<td>May 20-June 30</td>
</tr>
<tr>
<td>Wheat</td>
<td>60</td>
<td>90-120</td>
<td>Sept. 22-Oct. 10</td>
<td>Sept. 28-Oct. 15</td>
</tr>
<tr>
<td>Timothy*</td>
<td>45</td>
<td>5 (fall or 10 spring)</td>
<td>August-Sept. or March-April</td>
<td>August-Oct. 15 or March-April</td>
</tr>
</tbody>
</table>

* The rates for these forage crops when seeded alone are higher than those recommended in meadow crop mixtures. For detailed information on seeding rates in mixtures, consult Extension Bulletin 380 "Meadow and Pasture Seedings," reprinted, 1959.
### Comparative Cost and Returns Per Acre From West Central Ohio Land Farmed With a Four Year Rotation, 1965

<table>
<thead>
<tr>
<th>Item</th>
<th>Corn</th>
<th>Soybeans</th>
<th>Wheat</th>
<th>1 Cutting</th>
<th>3 Cuttings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield</td>
<td>100 bu.</td>
<td>30 bu.</td>
<td>32 bu.</td>
<td>1.6 T.</td>
<td>3.3 T.</td>
</tr>
<tr>
<td>Receipts$^1/$</td>
<td>$100.00</td>
<td>$75.00</td>
<td>$44.80</td>
<td>$32.00</td>
<td>$66.00</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor$^2/$</td>
<td>12.20</td>
<td>8.35</td>
<td>5.70</td>
<td>5.45</td>
<td>11.50</td>
</tr>
<tr>
<td>Power</td>
<td>9.80</td>
<td>7.10</td>
<td>4.55</td>
<td>2.85</td>
<td>5.85</td>
</tr>
<tr>
<td>Machinery</td>
<td>8.30</td>
<td>7.00</td>
<td>6.00</td>
<td>5.05$^3/$</td>
<td>10.35$^3/$</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>20.00</td>
<td>5.20</td>
<td>10.25</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Lime</td>
<td>1.25</td>
<td>1.25</td>
<td>1.25</td>
<td>1.25</td>
<td>1.25</td>
</tr>
<tr>
<td>Seed</td>
<td>3.30</td>
<td>3.55</td>
<td>5.10</td>
<td>4.50</td>
<td>5.60</td>
</tr>
<tr>
<td>Spray</td>
<td>1.00</td>
<td>5.00</td>
<td>---</td>
<td>---</td>
<td>1.00</td>
</tr>
<tr>
<td>Land</td>
<td>19.00</td>
<td>19.00</td>
<td>19.00</td>
<td>19.00</td>
<td>19.00</td>
</tr>
<tr>
<td>Total</td>
<td>$74.85</td>
<td>$56.45</td>
<td>$51.85</td>
<td>$39.10</td>
<td>$54.55</td>
</tr>
<tr>
<td>Profit</td>
<td>$25.15</td>
<td>$18.55</td>
<td>-$7.05</td>
<td>-$7.10</td>
<td>$11.45</td>
</tr>
</tbody>
</table>

1/ Prices used: corn $1.00 per bu., soybeans $2.50 per bu., wheat $1.40 per bu., hay $20.00 per T.
2/ $1.50/hour.
3/ Includes twine.

Adapted from OSU Extension Bulletin 423.
Comparative Costs and Returns From One Acre of Corn in West Central Ohio, 1965

<table>
<thead>
<tr>
<th>Item</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receipts(^1)</td>
<td>$60.00</td>
<td>$80.00</td>
<td>$100.00</td>
<td>$120.00</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor(^2)</td>
<td>$10.35</td>
<td>$11.30</td>
<td>$12.20</td>
<td>$13.20</td>
</tr>
<tr>
<td>Power</td>
<td>$8.50</td>
<td>$9.15</td>
<td>$9.80</td>
<td>$10.45</td>
</tr>
<tr>
<td>Machinery</td>
<td>$7.00</td>
<td>$7.65</td>
<td>$8.30</td>
<td>$9.00</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>$12.00</td>
<td>$15.00</td>
<td>$20.00</td>
<td>$30.00</td>
</tr>
<tr>
<td>Lime</td>
<td>$.75</td>
<td>$1.00</td>
<td>$1.25</td>
<td>$1.50</td>
</tr>
<tr>
<td>Seed</td>
<td>$2.00</td>
<td>$2.75</td>
<td>$3.30</td>
<td>$4.00</td>
</tr>
<tr>
<td>Spray</td>
<td>$.00</td>
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<td>Land</td>
<td>$15.00</td>
<td>$17.00</td>
<td>$19.00</td>
<td>$21.00</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$55.60</td>
<td>$64.35</td>
<td>$74.85</td>
<td>$90.65</td>
</tr>
<tr>
<td>Profit</td>
<td>$4.40</td>
<td>$15.65</td>
<td>$25.15</td>
<td>$29.35</td>
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</table>

\(^1\) At $1.00 per bushel for corn.
\(^2\) $1.50/hour.
Adapted from OSU Extension Bulletin 423.
Contour Strip Cropping Increases Grain Yields But Increases Costs and Makes Pasturing Difficult
R. H. Blosser

Soil and water conservation has received considerable attention during the last 20 years. As a result many farmers have adopted strip cropping which consists of alternate strips of grain and meadow crops. These strips usually run at right angles to the slope--on the contour. Although this practice increases crop yields, it also makes pasturing of the meadow strips difficult. Usually these strips are less than 100 feet in width.

Problems Disclosed

Some of the problems connected with pasturing contoured meadow strips were disclosed in a recent study made in the east-central part of the state. Information was obtained from 45 Coshocton County farmers using this practice. Several had contour strip cropped for more than 10 years. Soils on these farms erode easily when cropped because most slopes range from 10-20 percent. On many of these farms one-half to three-fourths of the original topsoil has been lost because of farming whole fields in grain crops too often.

The accompanying chart shows the arrangement of strips when a rotation of corn, wheat, and two years of meadow is applied on two units of land. This system of contour strip cropping was followed by most of the farmers in this study. One unit consisted of corn and meadow strips; the other, wheat and meadow. One or more areas could make a unit, but each unit should be approximately the same size if the acreage of each crop is to be about the same every year.

To make contour strip cropping most effective, meadows should always separate the grain strips. By using two units of land and the four year rotation, corn acreage was kept high by having a meadow strip between each grain strip. Rotations having less than 50 percent meadow crops would place corn and wheat strips together occasionally.

Only 3 of the 45 farmers pastured all their meadow strips. Strips next to wheat were pastured after harvesting the wheat and the first crop of hay without building additional fences. However, good pasture management was needed to protect the new meadow seedings from over-grazing. Before the strips next to corn could be pastured, fencing was necessary. This was accomplished on the three farms by building electric fences after making the first crop of hay.

Only Part Pastured

Forty-two of the farmers pastured only the meadow strips next to wheat. In many cases this amount to using less than one-half the available pasture. Reasons given by these farmers for not pasturing the strips next to corn were: (1) too much bother to build needed fence and (2) no water available for the livestock. A large amount of fence per acre of pasture was needed on these farms because most strips were only about 75 feet in width. In some cases water could be provided for livestock by connecting the strips to a permanent pasture field. But, in other cases, water could be provided only by driving the livestock to the farm buildings.
Calculations in the accompanying table show that less than one-half of the available pasture could be used when no strips were fenced. These computations are based on making one cutting of hay and pasturing the remainder of the season. These figures serve to compare the probable returns from grazing fenced and unfenced strips if the alfalfa-grass strips yielded at the rate of three tons of hay per acre.

<table>
<thead>
<tr>
<th>UNIT 1</th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CORN</td>
<td>WHEAT</td>
<td>MEADOW</td>
<td>CORN</td>
</tr>
<tr>
<td></td>
<td>MEADOW</td>
<td>MEADOW</td>
<td>MEADOW</td>
<td>WHEAT</td>
</tr>
<tr>
<td></td>
<td>CORN</td>
<td>WHEAT</td>
<td>MEADOW</td>
<td>CORN</td>
</tr>
<tr>
<td></td>
<td>MEADOW</td>
<td>MEADOW</td>
<td>MEADOW</td>
<td>WHEAT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT 2</th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WHEAT</td>
<td>MEADOW</td>
<td>MEADOW</td>
<td>CORN</td>
</tr>
<tr>
<td></td>
<td>MEADOW</td>
<td>CORN</td>
<td>WHEAT</td>
<td>MEADOW</td>
</tr>
<tr>
<td></td>
<td>WHEAT</td>
<td>MEADOW</td>
<td>MEADOW</td>
<td>WHEAT</td>
</tr>
<tr>
<td></td>
<td>MEADOW</td>
<td>CORN</td>
<td>WHEAT</td>
<td>MEADOW</td>
</tr>
</tbody>
</table>

(How contour strip cropping works with a two-unit system using a rotation of corn, wheat, and two years of meadow.)

Under the prevailing rotation of corn, wheat, and two years of meadow, first year meadows should always come next to the corn strips in a two-unit system. Second year meadows should always come next to the wheat strips on which the new meadow seedings are made.

Can Pasture Lambs

Strip next to corn seldom produce any pasture when they are not fenced. A possible exception would be the pasturing of lambs. But when they are fenced, they can be pastured up to September 10 without injuring the standard for the second year.

Strip next to wheat should not be pastured after September 1 unless they are fenced. Otherwise, the new meadow seeding on the adjoining strips may be damaged. But when these meadow strips are fenced, they can be pastured into November because they will go to corn the following year. If the unfenced meadow strips next to wheat cannot be pastured in July without injuring the new meadow seedings, only about one-fourth of the available pasture on all strips could be grazed without fencing.
This study showed four ways of handling the forage produced on contoured meadow strips. One was to pasture all meadow strips after making the first crop of hay. This method was ideal from the standpoint of a balanced pasture program. It provided sufficient rotation pasture to supplement the permanent bluegrass pasture. It also provided about the right amount of hay to balance the rotation pasture. The main disadvantages of this system were discussed previously.

**Harvest Second Crop**

Another way was to harvest the second crop of hay on the strips next to corn and feed hay or silage during the July and August to supplement the pasture on the strips next to wheat. This system of handling forage eliminated the need for building temporary fences. However, hay and silage are usually more costly than pasture from non-stripped fields. None of the farmers in this study harvested any forage and fed it green. If they had done so, additional equipment would have been needed in most cases.

**Small Areas Seeded**

On a few farms small areas of permanent pasture were seeded to alfalfa-grass mixtures which were used in place of pasturing the meadow strips next to corn. This method had to disadvantages. It could not be used on farms having a small acreage in permanent pasture because all of this crop was needed in the spring and fall. Satisfactory stands were often difficult to obtain unless heavy applications of lime and fertilizer were used and necessary precautions taken in preparing a proper seedbed.

Several farmers in this study failed to provide their livestock with sufficient forage during the summer months. They relied only on pasturing the permanent fields and the meadow strips next to wheat. Both were inadequate for the amount of animals kept. These farmers preferred less production from the livestock to the inconveniences and additional costs necessary to use all of the forage produced on the contoured meadow strips.

**High Yields Offset Cost**

Contour strip cropping is usually found on farms where forage is the principal crop. On this type of land forage utilization is important in maximizing farm income. Yet contour strip cropping makes pasturing more difficult. Under these conditions, higher grain yields resulting from this practice may be offset by higher costs of harvesting the forage crops. The labor and power costs are increased 12 to 15 percent over western Ohio farm cost. This increase is attributed to the rolling topography, small narrow fields with numerous point rows.
Problem: To determine logically the types and numbers of livestock to be kept that will best utilize available feed and other resources on this farm. The livestock system includes how the animals will be handled, fed and marketed.

Procedure

1. Review the amounts and kinds of home produced feeds available for livestock. It is important to consider the form in which and the time when these feed nutrients will be available.

2. Consider the efficiency of feed conversion by livestock with respect to the amount and kind of feed available, and its value and importance to the overall farming program. Consider the profitability of processing feeds through livestock compared with direct sale.

3. Determine the numbers of livestock by each class to be fed during the year, (i.e., cows, heifers, steers, calves, bulls, etc.). Determine each type of feed that will be needed by livestock classes. Total the requirements for each type of feed and subtract from the amount available. It is usually desirable to allow for some carryover of home-produced feeds. A suggested minimum carryover is 5 percent for grains and 10 percent for harvested forages.

4. Plan for disposal of excess feed and for the acquisition required to meet expected deficits. Remember, preserved forage crops are difficult and, in some instances, impractical to buy or sell.

5. Determine the rate of production which you anticipate from your L. S. (pigs per sow, milk per cow, amount and rate of gain per lamb or per steer, etc.) and the total amount of L. S. products you will have for sale.

6. Determine the production practices to be used which you expect will result in the rates of production indicated in (5). If above average production or price is anticipated, correspondingly good management and marketing practices in handling the animals should be programmed.

Hand In:

A. A brief description of your livestock program, using tables where appropriate and indicating species, type, number, production, amount for sale and general method of handling.
B. Tables showing feed consumed in your plan, per head and total for the farm. (Forms are provided.)
C. Explanation of your handling of surplus or deficit of feeds.
D. Description and explanation of special features of your program, particularly the production practices which justify your expectation of rates of production planned.
E. A statement of 300 words or less on why your L. S. program best utilizes the available resources (including feed).
F. A brief statement on why your L. S. program stops where it does. If feed supply is the limiting factor, indicate the changes necessary in order to further expand. If some other factor imposes the ceiling on L. S., indicate what it is.
### Annual Feed Requirements for One Unit of Livestock

<table>
<thead>
<tr>
<th>No.</th>
<th>Species and class of livestock</th>
<th>Corn bu.</th>
<th>Oats bu.</th>
<th>Cwt. of supplement Dairy</th>
<th>Hay tons</th>
<th>Silage, tons Corn</th>
<th>Silage, tons Grass</th>
<th>Pasturel/Tot. days</th>
<th>Aug. days</th>
</tr>
</thead>
</table>

1/ Animal unit grazing days or the amount of nutrients needed by a 1000-pound cow in one day to produce 20 pounds of 4 per cent milk or about 15 pounds of total digestible nutrients.
Total Annual Feed Requirements for Livestock

<table>
<thead>
<tr>
<th>No.</th>
<th>Species and class of livestock</th>
<th>Corn bu.</th>
<th>Oats bu.</th>
<th>Cwt. of supplement</th>
<th>Hay Tons</th>
<th>Silage, tons</th>
<th>Pasture 1/</th>
<th>Feed produced on farm</th>
<th>Feed required</th>
<th>Surplus or deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total days</td>
<td>Aug. days</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1/ Animal unit grazing days or the amount of nutrients needed by a 1000-pound cow in one day to produce 20 pounds of 4 per cent milk or about 15 pounds of total digestible nutrients.
### TABLE I  
**Livestock Feed Requirements:**
A guide for use in farm planning (Assumes good management)

<table>
<thead>
<tr>
<th></th>
<th>Corn bu.</th>
<th>Protein 1 sup. #</th>
<th>Hay 2 #</th>
<th>Silage 3 #</th>
<th>A. U. 4 Days of Pasture</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dairy Cow - 1200# body wt.:</strong> 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10,000# milk 3.5% BF</td>
<td>27</td>
<td>---</td>
<td>11,000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>10,000# milk 3.5% BF</td>
<td>22</td>
<td>100</td>
<td>7,500</td>
<td>11,000</td>
<td>---</td>
</tr>
<tr>
<td>12,000# milk 3.5% BF</td>
<td>51</td>
<td>---</td>
<td>11,000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>12,000# milk 3.5% BF</td>
<td>46</td>
<td>300</td>
<td>7,500</td>
<td>11,000</td>
<td>---</td>
</tr>
<tr>
<td><strong>Dairy Cow - 1400# body wt.:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14,000# milk 3.5% BF</td>
<td>70</td>
<td>0</td>
<td>14,000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>14,000# milk 3.5% BF</td>
<td>68</td>
<td>400</td>
<td>9,000</td>
<td>11,000</td>
<td>---</td>
</tr>
<tr>
<td>16,000# milk 3.5% BF</td>
<td>86</td>
<td>500</td>
<td>14,000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>16,000# milk 3.5% BF</td>
<td>84</td>
<td>600</td>
<td>9,000</td>
<td>11,000</td>
<td>---</td>
</tr>
<tr>
<td><strong>Dairy Heifer - Birth to 1 year</strong></td>
<td>7</td>
<td>100</td>
<td>2,000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Dairy Heifer - 1 yr.</strong></td>
<td>9</td>
<td>100</td>
<td>5,000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Dairy Bull (Mature)</strong></td>
<td>9</td>
<td>150</td>
<td>6,000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Ewe</strong></td>
<td>1.7</td>
<td>20</td>
<td>500</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td><strong>Replacement ewe lamb</strong></td>
<td>1.2</td>
<td>20</td>
<td>350</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td><strong>Lambs (27# gain)</strong></td>
<td>2.1</td>
<td></td>
<td></td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

1) Based on 30% digestible protein
2) Better than average alfalfa timothy hay, 6.6% DP and 49.1% TDN
3) Corn silage - dent, well matured, 1.2% DP and 18.1% TDN
Silage substitutes for hay at rate of 3# for 1# of hay
4) Animal Unit days of pasture. For each day on pasture with no supplemental forage reduce forage requirements as follows: 1200# cows all hay, 30# per day; hay and silage, hay 20# and silage 30#. 1400# cows all hay 35# per day; hay and silage, 25# hay and 30# silage.
5) Dairy cow requirements include needs for body maintenance, milk production and equivalent of 10 lbs. grain per day during 60 day dry period.
TABLE II- Feed Required for Selected Systems of Feeding Cattle in Dry Lot - No Silage (a)

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>Weight</th>
<th>Days on Feed</th>
<th>CORN - Bu.</th>
<th>SUPPL. - Lb.</th>
<th>HAY - Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Begin</td>
<td>End</td>
<td>Produced</td>
<td>Per 100#</td>
<td>Per 100#</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total Bu.</td>
<td>Total lb.</td>
</tr>
<tr>
<td>Long fed steer calves</td>
<td>450</td>
<td>1110</td>
<td>660</td>
<td>330</td>
<td>10.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.1167</td>
</tr>
<tr>
<td>Long fed heifer calves</td>
<td>425</td>
<td>850</td>
<td>425</td>
<td>270</td>
<td>10.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.1125</td>
</tr>
<tr>
<td>Long fed yearling steers</td>
<td>575</td>
<td>1160</td>
<td>585</td>
<td>300</td>
<td>10.92</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.1208</td>
</tr>
<tr>
<td>Short fed yearling steers</td>
<td>675</td>
<td>1080</td>
<td>405</td>
<td>180</td>
<td>11.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>45.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.1250</td>
</tr>
<tr>
<td>Short fed common-medium steers</td>
<td>650</td>
<td>992</td>
<td>342</td>
<td>180</td>
<td>11.50</td>
</tr>
<tr>
<td>Light yearling steers on pasture and dry lot</td>
<td>525</td>
<td>1095</td>
<td>570</td>
<td>330</td>
<td>10.00</td>
</tr>
</tbody>
</table>


(b) All are choice unless otherwise designated.
### TABLE III - Feed Required for Selected Systems of Feeding Cattle in Dry Lot - High Corn Silage (a)

<table>
<thead>
<tr>
<th>SYSTEM (b)</th>
<th>Weight (c)</th>
<th>Days on Feed</th>
<th>CORN - Bu.</th>
<th>SUPPL.-lb.</th>
<th>SILAGE-Tons</th>
<th>HAY - Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Begin End</td>
<td>Produced</td>
<td>Per 100#</td>
<td>Total Bu.</td>
<td>Per 100#</td>
<td>Total 100#</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gain</td>
<td></td>
<td>Gain</td>
<td>Gain</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long fed steer calves</td>
<td>450 1110</td>
<td>660</td>
<td>330</td>
<td>9.17</td>
<td>60.5</td>
<td>75.00</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>.20</td>
<td>.36</td>
</tr>
<tr>
<td>Long fed heifer calves</td>
<td>425 850</td>
<td>425</td>
<td>270</td>
<td>8.75</td>
<td>37.2</td>
<td>68.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.25</td>
<td>1.06</td>
</tr>
<tr>
<td>Long fed yearling steers</td>
<td>575 1160</td>
<td>585</td>
<td>300</td>
<td>9.585</td>
<td>56.1</td>
<td>71.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.29</td>
<td>1.68</td>
</tr>
<tr>
<td>Short fed yearling steers</td>
<td>675 1080</td>
<td>405</td>
<td>180</td>
<td>10.0</td>
<td>40.5</td>
<td>68.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.38</td>
<td>1.52</td>
</tr>
<tr>
<td>Short fed common-medium steers</td>
<td>650 992</td>
<td>342</td>
<td>180</td>
<td>10.0</td>
<td>34.2</td>
<td>68.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.38</td>
<td>1.28</td>
</tr>
<tr>
<td>Light yearling steers on pasture and dry lot</td>
<td>525 1095</td>
<td>570</td>
<td>330</td>
<td>9.17</td>
<td>52.3</td>
<td>56.67</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.21</td>
<td>1.18</td>
</tr>
</tbody>
</table>


(b) All are choice unless otherwise designated.

(c) Tables I and II are adjusted to corresponding weights.
### TABLE IV (1) - Feed Requirements - 100 lb. Intervals (2) Without Silage

Incremental wts. (x 100 lbs.)

<table>
<thead>
<tr>
<th></th>
<th>4-5</th>
<th>5-6</th>
<th>6-7</th>
<th>7-8</th>
<th>8-9</th>
<th>9-10</th>
<th>10-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 lb. calves</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn lb.</td>
<td>392.0</td>
<td>425.6</td>
<td>476.0</td>
<td>543.2</td>
<td>638.4</td>
<td>767.2</td>
<td>963.2</td>
</tr>
<tr>
<td>Hay lb.</td>
<td>120</td>
<td>140</td>
<td>160</td>
<td>180</td>
<td>220</td>
<td>260</td>
<td>320</td>
</tr>
<tr>
<td>Protein lb.</td>
<td>39</td>
<td>42</td>
<td>48</td>
<td>54</td>
<td>64</td>
<td>77</td>
<td>96</td>
</tr>
<tr>
<td>Feed Cost-$/cwt. gain</td>
<td>10.70</td>
<td>11.70</td>
<td>13.20</td>
<td>15.00</td>
<td>17.70</td>
<td>21.20</td>
<td>26.60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>6-7</th>
<th>7-8</th>
<th>8-9</th>
<th>9-10</th>
<th>10-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>640 lb. yearlings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn lb.</td>
<td>453.6</td>
<td>526.4</td>
<td>644.0</td>
<td>761.6</td>
<td>980.0</td>
</tr>
<tr>
<td>Hay lb.</td>
<td>160</td>
<td>180</td>
<td>200</td>
<td>260</td>
<td>320</td>
</tr>
<tr>
<td>Protein lb.</td>
<td>45</td>
<td>53</td>
<td>64</td>
<td>76</td>
<td>96</td>
</tr>
<tr>
<td>Feed Cost-$/cwt. gain</td>
<td>12.60</td>
<td>14.70</td>
<td>17.60</td>
<td>21.10</td>
<td>27.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>8-9</th>
<th>9-10</th>
<th>10-11</th>
<th>11-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>835 lb. 2 yr. olds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn lb.</td>
<td>464.8</td>
<td>571.2</td>
<td>728.0</td>
<td>1013.6</td>
</tr>
<tr>
<td>Hay lb.</td>
<td>160</td>
<td>200</td>
<td>240</td>
<td>340</td>
</tr>
<tr>
<td>Protein lb.</td>
<td>46</td>
<td>57</td>
<td>73</td>
<td>101</td>
</tr>
<tr>
<td>Feed Cost-$/cwt. gain</td>
<td>12.80</td>
<td>15.20</td>
<td>20.10</td>
<td>28.00</td>
</tr>
</tbody>
</table>


(2) See explanations following Table VII.
TABLE V  (1) - Feed Requirements - 100 lb. Intervals (2) With Corn Silage  

Incremental wts. (x 100 lbs.)

<table>
<thead>
<tr>
<th>400 lb. calves</th>
<th>4-5</th>
<th>5-6</th>
<th>6-7</th>
<th>7-8</th>
<th>8-9</th>
<th>9-10</th>
<th>10-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn lb.</td>
<td>225.0</td>
<td>275</td>
<td>325</td>
<td>425</td>
<td>638.4</td>
<td>767.2</td>
<td>963.2</td>
</tr>
<tr>
<td>Silage lb.</td>
<td>668</td>
<td>600</td>
<td>605</td>
<td>472</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hay lb.</td>
<td>72</td>
<td>91</td>
<td>112</td>
<td>153</td>
<td>220</td>
<td>260</td>
<td>320</td>
</tr>
<tr>
<td>Protein lb.</td>
<td>39</td>
<td>42</td>
<td>48</td>
<td>54</td>
<td>64</td>
<td>77</td>
<td>96</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>640 lb. yearlings</th>
<th>6-7</th>
<th>7-8</th>
<th>8-9</th>
<th>9-10</th>
<th>10-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn lb.</td>
<td>325</td>
<td>425</td>
<td>644.0</td>
<td>761.6</td>
<td>980.0</td>
</tr>
<tr>
<td>Silage lb.</td>
<td>512</td>
<td>404</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hay lb.</td>
<td>96</td>
<td>140</td>
<td>200</td>
<td>260</td>
<td>320</td>
</tr>
<tr>
<td>Protein lb.</td>
<td>45</td>
<td>53</td>
<td>64</td>
<td>76</td>
<td>98</td>
</tr>
<tr>
<td>Feed Cost-$/cwt. gain</td>
<td>11.45</td>
<td>13.78</td>
<td>17.60</td>
<td>21.10</td>
<td>27.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>835 lb. 2 yr. olds</th>
<th>8-9</th>
<th>9-10</th>
<th>10-11</th>
<th>11-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn lb.</td>
<td>464.8</td>
<td>571.2</td>
<td>728</td>
<td>1013.6</td>
</tr>
<tr>
<td>Silage lb.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hay lb.</td>
<td>160</td>
<td>200</td>
<td>240</td>
<td>340</td>
</tr>
<tr>
<td>Protein lb.</td>
<td>46</td>
<td>57</td>
<td>73</td>
<td>101</td>
</tr>
<tr>
<td>Feed Cost-$/cwt. gain</td>
<td>12.80</td>
<td>15.80</td>
<td>20.10</td>
<td>28.00</td>
</tr>
</tbody>
</table>

(1) From Beef, April 1966, pages 19-20

(2) See explanations on next page.
Explanations for Tables IV and V

1) Table V was derived from Table IV with the following assumptions:
   a) No silage will be fed past 800 pounds.
   b) Grain would be fed with silage at a rate of 1 pound of grain per 100 pounds body weight per day.
   c) Calves assumed to average 2.00 pounds per day gain.
   d) When no-silage period (800 pounds) is approached, the ration is adjusted for a reasonable change over.
   e) Hay in ration will decrease 40% when silage is fed.

2) Costs of ingredients were as follows:
   a) Corn - 1.875¢ per pound = $1.05 per bushel
   b) Silage - 0.4¢ per pound = $8.00 per ton.
   c) Hay - 1.1¢ per pound = $22.00 per ton.
   d) Protein - 5.0¢ per pound = $5.00 per cwt.
TABLE VI
SOWS DURING GESTATION AND NURSING

Pasture Vs Confinement

The following tables and charts apply to only the gestation and nursing portion of the swine enterprise.

Comparison of Feed Consumed Per Litter of 8.5 Pigs By a Sow and Gilt in Confinement and on Pasture, Illinois, 1965

<table>
<thead>
<tr>
<th>Feed</th>
<th>Confinement</th>
<th></th>
<th>Pasture</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sow</td>
<td>Gilt*</td>
<td>Sow</td>
<td>Gilt*</td>
</tr>
<tr>
<td>1. Pounds of 12% ration</td>
<td>468</td>
<td>564</td>
<td>468</td>
<td>594</td>
</tr>
<tr>
<td>2. Pounds of 16% ration</td>
<td>694</td>
<td>994</td>
<td>694</td>
<td>994</td>
</tr>
<tr>
<td>3. Pounds of 20% ration (creep)</td>
<td>153</td>
<td>153</td>
<td>140</td>
<td>140</td>
</tr>
<tr>
<td>4. Corn (or equivalent, in pounds)</td>
<td>951</td>
<td>1266</td>
<td>951</td>
<td>1289</td>
</tr>
<tr>
<td>5. Supplement** (in pounds)</td>
<td>211</td>
<td>292</td>
<td>211</td>
<td>299</td>
</tr>
<tr>
<td>Total (3, 4, &amp; 5)</td>
<td>1315</td>
<td>1711</td>
<td>1302</td>
<td>1728</td>
</tr>
</tbody>
</table>

* 210 pounds at start

** Includes vitamins, minerals, and antibiotics


The data in the above table does not include any feed for finishing the sow before marketing. Sows should gain a pound for every three to five pounds of feed. Thus, at common sow prices the increased value of the sow hardly covers the cost of the feed.

Winter Adjustments

It seems apparent that more energy and hence more feed is needed to maintain the sow’s body temperature during the winter months. According to the above study, a sow requires approximately 1 pound per day more feed from November through May.
TABLE VII

Feed Required per 100 lbs. of Gain
(Comparing Spring & Fall farrowed pigs)

<table>
<thead>
<tr>
<th>Period</th>
<th>No. pigs</th>
<th>St. Wt. (lbs.)</th>
<th>Off. test wt. (lbs.)</th>
<th>Age (days)</th>
<th>Feed required per 100# gain (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Farrowed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54F thru 59S 1/</td>
<td>1036</td>
<td>41.4</td>
<td>209.6</td>
<td>162.1</td>
<td>344.0</td>
</tr>
<tr>
<td>59F thru 65S 2/</td>
<td>1294</td>
<td>43.7</td>
<td>205.4</td>
<td>155.5</td>
<td>311.2</td>
</tr>
<tr>
<td>Spring Farrowed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54F thru 59S 1/</td>
<td>1106</td>
<td>42.7</td>
<td>208.7</td>
<td>163.0</td>
<td>332.5</td>
</tr>
<tr>
<td>59F thru 65S 2/</td>
<td>1354</td>
<td>46.2</td>
<td>206.0</td>
<td>153.4</td>
<td>293.3</td>
</tr>
</tbody>
</table>

1/ Complete mixed meal feed
2/ Pelleted feed

Spring farrowed pigs mostly February and March.
Fall farrowed pigs mostly August and September.

### TABLE VIII

Feed Required Per Pig to Produce a Pound of Pork
Multi Litter Pasture and Confinement Systems
Illinois, 1965

<table>
<thead>
<tr>
<th>Type of Feed</th>
<th>Pasture*</th>
<th>Confinement*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn (in pounds)</td>
<td>466</td>
<td>491</td>
</tr>
<tr>
<td>Supplement (in pounds)</td>
<td>80</td>
<td>84</td>
</tr>
<tr>
<td>Pasture (in acres)</td>
<td>.025</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>546**</td>
<td>575</td>
</tr>
</tbody>
</table>

Pounds of feed/pound gain: 3.21 3.38

* Pigs weighed 40 pounds at start and 210 at the end
** Does not include pasture


---

Feed Required to Produce a Pound of Pork
One Litter Pasture Management System
Illinois, 1965

<table>
<thead>
<tr>
<th>Type of Feed</th>
<th>Pasture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn (in pounds)</td>
<td>509</td>
</tr>
<tr>
<td>Supplement (in pounds)</td>
<td>87</td>
</tr>
<tr>
<td>Pasture (acres)</td>
<td>.025</td>
</tr>
<tr>
<td>Total*</td>
<td>596</td>
</tr>
<tr>
<td>Pounds of feed/pound gain</td>
<td>3.51**</td>
</tr>
</tbody>
</table>

* Pasture not included
** Pigs gained 170 pounds

# Pasture Production Calendar - Estimated Animal Unit Grazing Days Yield

With average weather conditions for different types of pasture (1)

<table>
<thead>
<tr>
<th>Permanent Pasture (Blue Grass etc.)</th>
<th>Anticipated Hay Yield Lbs. (2)</th>
<th>Animal Unit Grazing Days Per Acre Per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U N TREATED, LITTLE GRASS NO LEGUMES, VERY POOR</strong></td>
<td>1000</td>
<td>May</td>
</tr>
<tr>
<td>1. Untreated, Little Grass No Legumes, Very Poor</td>
<td>2000</td>
<td>40</td>
</tr>
<tr>
<td>2. Untreated, Some Grass, No Legumes, Poor</td>
<td>3000</td>
<td>60</td>
</tr>
<tr>
<td>3. Untreated, Few Legumes, Fair</td>
<td>4750</td>
<td>95</td>
</tr>
<tr>
<td>4. Lime, Phosphate, White Clover, Good</td>
<td>6500</td>
<td>130</td>
</tr>
<tr>
<td>5. Lime, Phosphate, Some Manure, Legumes, Very Good</td>
<td>8000</td>
<td>220</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hay Type Rotation Pasture</th>
<th>Anticipated Hay Yield Lbs. (2)</th>
<th>Animal Unit Grazing Days Per Acre Per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alfalfa-Grass Mixture Full Season Yield Level St. Ave.</td>
<td>4000</td>
<td>80</td>
</tr>
<tr>
<td>2. Alfalfa-Grass Mixtures After June, May Yield Level St. Ave.</td>
<td>4000</td>
<td>40</td>
</tr>
<tr>
<td>3. Alfalfa-Grass Mixture Full Season Yield Level Very Good</td>
<td>6500</td>
<td>130</td>
</tr>
<tr>
<td>4. Alfalfa-Grass Mixture After June, May Yield Level Very Good</td>
<td>6500</td>
<td>65</td>
</tr>
<tr>
<td>5. Red Clover Grass Mix Full Season Yield Level St. Ave.</td>
<td>3000</td>
<td>60</td>
</tr>
<tr>
<td>6. Red Clover Grass Mix After June, May Yield Level St. Ave.</td>
<td>3000</td>
<td>20</td>
</tr>
<tr>
<td>7. Red Clover Grass Mix Full Season Yield Level Very Good</td>
<td>4500</td>
<td>60</td>
</tr>
<tr>
<td>8. Red Clover Grass Mix After June, May Yield Level Very Good</td>
<td>4500</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Pasture Crops</th>
<th>Anticipated Hay Yield Lbs. (2)</th>
<th>Animal Unit Grazing Days Per Acre Per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ladino Clover Good</td>
<td>6000</td>
<td>May</td>
</tr>
<tr>
<td>2. Ladino Clover Excellent</td>
<td>8000</td>
<td>160</td>
</tr>
<tr>
<td>3. Timothy Meadow, Full Season, Yield Level St. Ave.</td>
<td>2000</td>
<td>40</td>
</tr>
<tr>
<td>4. Sudan Grass</td>
<td>4000</td>
<td>80</td>
</tr>
<tr>
<td>5. Sweet Clover Fall Grazed First Then Spring</td>
<td>4000</td>
<td>80</td>
</tr>
<tr>
<td>6. New Meadow Seedings Limited Season</td>
<td>1000</td>
<td>20</td>
</tr>
</tbody>
</table>

(1) An Animal Unit Grazing Day represents the amount of pasture required to provide 16 pounds of total digestible nutrients, or the amount that would be needed by a 1000 pound cow in one day and produce 20 pounds of 4% milk.

(2) 2% of the estimated hay yield in pounds equals the approximate number of animal unit grazing days in the year. This takes into account the fact that under ordinary grazing methods approximately one-third less growth is harvested as pasture as is harvested as hay. Through more systematic rotational grazing a greater proportion can be harvested as pasture.

(3) Additional grazing days available on pastures that will be plowed the following spring since they can be pastured later in the fall.
Problem: The crop and livestock operations, as you have planned them, define the size of the job that must be accomplished. In order to handle this work load effectively it is desirable to plan the labor, power, equipment and facilities that can best meet the needs of the farm business. In addition to the productive work, some miscellaneous and maintenance work is necessary for conducting an efficient operation.

The seasonal nature of farming is such that we may have severe demands on labor during certain periods of the year. The ability to handle the work load satisfactorily during these peak demands may control the size of the farming operations during the remainder of the year even though the capacity of men and machines may not be fully utilized during most of the year.

Your problem in developing a plan that will make optimum use of available resources is to select the best possible combination of labor, power, equipment and facilities to get the job done, and to program the use of these inputs throughout the year. Remember that costs of maintaining more capacity than needed can be as great as the risks of not maintaining an adequate capacity.

Procedure:

A. Consider the production methods used in your crop and livestock plan. List the items of equipment and power needed for the jobs that need to be done. Indicate those items already on hand. For items which need to be added, indicate the size, the method you plan to use for acquisition, and the cost if purchased.

In deciding on the items and method of acquisition for the equipment and power to be used, consider the hours of use and estimate the cost by each method (owning, custom hire or exchange). A break even analysis may be helpful in selecting the most desirable method of acquisition, type and size for your crop and livestock operation.

B. Budget the costs of selecting equipment for doing at least one job on the class problem farm where alternative methods may be utilized. Determine the fixed and variable costs for each alternative. The following are examples of choices that may be budgeted:

(a) Selecting a two row vs. a four, six or eight row corn planter
(b) Baling vs. chopping hay
(c) Picking vs. combining corn
(d) Chemical weed control vs. cultivation
(e) Bunker vs. upright vs. harvestore silo

C. Estimate the family and operator labor available on the class problem farm, in man-equivalent hours by months.

D. Determine the labor requirements for each major crop and livestock enterprise.
E. Budget the labor requirement for productive work by months. Add an allowance for Maintenance and Miscellaneous Labor. On Ohio farms, this M & M labor usually ranges from 15 to 35% of the total (about 1/6 to 1/2 of "productive" labor). Since some M & M labor must be done when needed, allow at least 5% of each month's labor for M & M, making up the balance in slack months. Compute the total labor required by months. Compare this to the amount available (estimated in C). Adjust labor requirements to labor availability by seasonal redistribution insofar as this is realistic, then modify the labor availability (rework step "C").

F. Make up a component bar chart showing monthly labor distribution. For each month shade in the hours of labor required for crops, then using another key add on the labor required for livestock and finally add on the miscellaneous and maintenance labor needed. Indicate the family and operator labor available, using a line (see p. 8.11).

G. Compute the number of productive man work units (PMWU's) accomplished with your farm organization. A PMWU is the amount of work accomplished in a 10 hour day by an average worker employing typical production practices and equipment. Consideration should be given to using any available resources for expanding crop and livestock activities if the PMWU's per worker is low. On the other hand, if the PMWU's per worker is high but capital is limited and labor is still available, consider using more labor and less capital investment in equipment.

Hand In:

A. Your list of equipment needed and new capital investment required (form on page 8.3)

B. Budget for selection of at least one item of equipment

C. Estimated labor availability (form on page 8.4)

D. Crop and livestock labor required, using the equipment planned and the methods indicated in this or previous sections (forms on pages 8.6 to 8.8)

E. Labor distribution table, including M & M labor (pp. 8.9 & 8.10)

F. Revised schedule of labor availability showing the work-day required for each member of the crew (form on page 8.5).

G. Bar chart showing labor distribution (p. 8.11)

H. PMWU labor efficiency analysis (p. 8.2)

I. A statement of how your farm organization can be adjusted to productively utilize any surplus labor, and/or how labor deficits can be handled. Indicate what problems you encountered and how you have adjusted to overcome the problems.
### Equipment Acquisition and Disposal

<table>
<thead>
<tr>
<th>Equipment to be purchased</th>
<th>Size</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL COST**

<table>
<thead>
<tr>
<th>Equipment acquired by Custom operation</th>
<th>Cost per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Present equipment to be sold</th>
<th>Size</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL VALUE OF EQUIPMENT SOLD**
# Family Labor Inventory

(Man Equivalent Hours by Months)

<table>
<thead>
<tr>
<th>Month</th>
<th>Day 1/</th>
<th>Man Equivalent Hours of Labor</th>
<th>Number of Days</th>
<th>Total Man Equivalent Hours of Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Operator</td>
<td>Wife</td>
<td>Other</td>
</tr>
<tr>
<td>January</td>
<td>Week</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td>February</td>
<td>Week</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td>March</td>
<td>Week</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td>April</td>
<td>Week</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td>May</td>
<td>Week</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td>June</td>
<td>Week</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td>July</td>
<td>Week</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td>August</td>
<td>Week</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td>September</td>
<td>Week</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td>October</td>
<td>Week</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td>November</td>
<td>Week</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>Sunday</td>
<td>+</td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td>December</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>XX</td>
<td>+XX</td>
<td>÷</td>
</tr>
</tbody>
</table>

1/ Holiday included with Sunday.

## Man Equivalent Hours of Labor

<table>
<thead>
<tr>
<th>Worker</th>
<th>Man Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>1.0</td>
</tr>
<tr>
<td>Wife</td>
<td>.8</td>
</tr>
<tr>
<td>Son - 16 yrs. and older</td>
<td>1.0</td>
</tr>
<tr>
<td>12 - 15 yrs.</td>
<td>.8</td>
</tr>
<tr>
<td>under 12</td>
<td>.5</td>
</tr>
<tr>
<td>Hired (16 yrs. or over)</td>
<td>1.0</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
### Man Labor and Tractor Hours Required to Grow and Harvest —

**Crop:** Meadow; **Acres:** _______; **Yield per acre:** _______; **Total Yield:** _______.

<table>
<thead>
<tr>
<th>Operating and size of machinery</th>
<th>Number of: Men in crew</th>
<th>Operating hours required per acre or ton</th>
<th>Total operating hours</th>
<th>Total man hours</th>
<th>Total tractor hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sow Seed - 15 A.</td>
<td>1</td>
<td>.161 A.</td>
<td>2.4</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Chop, haul, store Silage - 10 A. - 6 T.</td>
<td>5</td>
<td>1</td>
<td>.771 T.</td>
<td>9.0</td>
<td>46.2</td>
</tr>
<tr>
<td>Cut Hay - 30 A.</td>
<td>1</td>
<td>.501 A.</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Rake Hay - 60 A.</td>
<td>1</td>
<td>.411 A.</td>
<td>24.6</td>
<td>24.6</td>
<td>24.6</td>
</tr>
<tr>
<td>Bale Hay - 30 A.</td>
<td>1</td>
<td>.501 A.</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Haul and Store - 30 A.</td>
<td>3</td>
<td>.501 A.</td>
<td>15.0</td>
<td>45.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Cut Hay (2nd.) - 15 A.</td>
<td>1</td>
<td>.501 A.</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>Rake Hay - 30 A.</td>
<td>1</td>
<td>.411 A.</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Bale Hay - 15 A.</td>
<td>1</td>
<td>.501 A.</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>Haul and store - 15 A.</td>
<td>3</td>
<td>.501 A.</td>
<td>7.5</td>
<td>22.5</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>XXXX</strong></td>
<td><strong>XXXX</strong></td>
<td><strong>118.5</strong></td>
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**Man Labor and Tractor Hours Required to Grow and Harvest —**

**Crop:** _______; **Acres:** _______; **Yield per acre:** _______; **Total yield:** _______.

<table>
<thead>
<tr>
<th>Operation and size of machinery</th>
<th>Number of: Men in crew</th>
<th>Operating hours required per acre or ton</th>
<th>Total operating hours</th>
<th>Total man hours</th>
<th>Total tractor hours</th>
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### Man Labor and Tractor Hours Required to Grow and Harvest

**Crop:**

**Acres:**

**Yield per acre:**

**Total yield:**

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**Total:**

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**Total:**
Man Labor and Tractor Hours Required to Grow and Harvest --

Crop; Acres; Yield per acre; Total yield

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Total Labor Requirements and Distribution for Form Plan When in Full Operation

(Man Equivalent Hours)

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Surplus or deficit 2/

1/ M & M labor usually is 15-25% of Tot. Est. that at least 5% of a month's labor will be for M & M work.
2/ A surplus in one month will not make up a deficit in another.
Revised Schedule of Family Labor
(To be completed after Page 8.9 is computed)

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<th>No. of Days</th>
<th>Man Equivalent Days</th>
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1/ Holiday included with Sunday

Man Equivalent Hours of Labor

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<tr>
<td>12 - 15 yrs.</td>
<td>.8</td>
</tr>
<tr>
<td>under 12</td>
<td>.5</td>
</tr>
<tr>
<td>Hired (16 yrs. or over)</td>
<td>1.0</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
Accumulative Distribution of Crop, Livestock and Miscellaneous and Maintenance Labor, by Months

Man-hours of labor


Crop

Livestock

Miscellaneous and maintenance

Indicate level family and operator labor available
# LABOR EFFICIENCY

Productive Man-Work Units for Crops and Livestock *

<table>
<thead>
<tr>
<th>Enterprise</th>
<th>Number of Units</th>
<th>PMWU per Unit</th>
<th>Total PMWU</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CROPS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn - grain</td>
<td>X</td>
<td>.8</td>
<td></td>
</tr>
<tr>
<td>Corn - silage</td>
<td>X</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Wheat with straw baled</td>
<td>X</td>
<td>.6</td>
<td></td>
</tr>
<tr>
<td>Oats - grain</td>
<td>X</td>
<td>.5</td>
<td></td>
</tr>
<tr>
<td>Soybeans - grain</td>
<td>X</td>
<td>.6</td>
<td></td>
</tr>
<tr>
<td>Hay - 1st cut</td>
<td>X</td>
<td>.4</td>
<td></td>
</tr>
<tr>
<td>2nd cut</td>
<td>X</td>
<td>.3</td>
<td></td>
</tr>
<tr>
<td>3rd cut</td>
<td>X</td>
<td>.2</td>
<td></td>
</tr>
<tr>
<td>Grass silage</td>
<td>X</td>
<td>.6</td>
<td></td>
</tr>
<tr>
<td>Orchard - Commercial</td>
<td>X</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td>X</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Sugar beets (farm labor only)</td>
<td>X</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Tobacco</td>
<td>X</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>Tomatoes (except picking)</td>
<td>X</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td><strong>LIVESTOCK</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy cow</td>
<td>X</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Dairy replacements</td>
<td>X</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Beef cow-calf to weaning</td>
<td>X</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Bull</td>
<td>X</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Beef replacement heifers</td>
<td>X</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Fat cattle (300 days)</td>
<td>X</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Sow - 2 litters</td>
<td>X</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Boar</td>
<td>X</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Fat hogs (wean to market)</td>
<td>X</td>
<td>.2</td>
<td></td>
</tr>
<tr>
<td>Ewe and lamb to weaning</td>
<td>X</td>
<td>.6</td>
<td></td>
</tr>
<tr>
<td>Fat lamb - 75-100 days</td>
<td>X</td>
<td>.1</td>
<td></td>
</tr>
<tr>
<td>Hens - 1500 + birds</td>
<td>X</td>
<td>.1</td>
<td></td>
</tr>
<tr>
<td><strong>WORKED OFF FARM</strong></td>
<td>X</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total PMWU</strong></td>
<td>XXXXXX</td>
<td>XXX</td>
<td></td>
</tr>
</tbody>
</table>

* A productive man-work unit is the amount of work accomplished in a ten-hour day by an average worker employing typical production practices and equipment.

\[
\frac{\text{man equivalent hours hired}}{3000} \div \text{man equivalent hours available} = \frac{\text{total man equivalent hours}}{\text{man equivalents available}}
\]

For average efficiency a full-time worker (man equivalent) should accomplish at least 250 PMWU per year.
ESTIMATED MAN HOURS OF LABOR REQUIRED FOR SELECTED LIVESTOCK ENTERPRISES ON COMMERCIAL FARMS, OHIO 1963

Livestock Enterprise

**Beef - Cow and calf to weaning**
- **Bull**
- **Replacement (weaning to fresh)**
- **Fat (long fed dry lot total from purchase to sale)**

**Swine - Sow 2 litters to weaning**
- **Fat hogs, wean to market (Gain, 165 pounds)**

**Sheep - Per ewe (ewe and lamb to market)**
- **Feeder lambs**
  - $\frac{1}{2}$ of flock hand fed;
  - $\frac{1}{2}$ self-fed
- **Poultry (laying flock)**
  - Noncommercial, under 100 hens
  - Semi-commercial, 100-500 hens
  - Commercial, 1500 hens

**Dairy - Replacement for milking herd**
- **Milk cows**
  - **Milking System**
  - **Stanchion**
  - **Parlor (side open)**
  - **Herringbone**

**Cows per herd Hours/head**

<table>
<thead>
<tr>
<th>Cows per herd</th>
<th>Hours/head</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>40</td>
<td>15</td>
</tr>
<tr>
<td>60</td>
<td>10</td>
</tr>
</tbody>
</table>

**Number of feeders**

<table>
<thead>
<tr>
<th>Number of feeders</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
</tr>
<tr>
<td>80</td>
</tr>
<tr>
<td>120</td>
</tr>
</tbody>
</table>

**Number of Sows/farrowing group**

<table>
<thead>
<tr>
<th>Number of Sows/farrowing group</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
</tr>
<tr>
<td>15</td>
</tr>
<tr>
<td>25</td>
</tr>
</tbody>
</table>

**Number of mkt. hogs**

<table>
<thead>
<tr>
<th>Number of mkt. hogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
</tr>
<tr>
<td>200</td>
</tr>
<tr>
<td>300</td>
</tr>
</tbody>
</table>

**Ewes per flock**

<table>
<thead>
<tr>
<th>Ewes per flock</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>90</td>
</tr>
</tbody>
</table>

**No. of feeder lambs**

<table>
<thead>
<tr>
<th>No. of feeder lambs</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
</tr>
<tr>
<td>300</td>
</tr>
<tr>
<td>400</td>
</tr>
<tr>
<td>1000</td>
</tr>
</tbody>
</table>

| 1.2 |
| .9  |
| .7  |
| .5  |
| 2.5 |
| 2.2 |
| 1.2 |

20
Man and Machine Time Required to Do Selected Crop Production and Harvest Operations, 1956

R.H. Blosser

(Man hours and tractor hours are the same unless indicated)

Seedbed Preparation

<table>
<thead>
<tr>
<th>Operation, type and size of machine</th>
<th>Tractor size (plows)</th>
<th>Number of Farms</th>
<th>Average Tractor Hours/A</th>
<th>Man Hours Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plow sod</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-14&quot;</td>
<td>2</td>
<td>32</td>
<td>1.27</td>
<td>1.09-1.49</td>
</tr>
<tr>
<td>3-14&quot;</td>
<td>3</td>
<td>62</td>
<td>.92</td>
<td>.74-1.00</td>
</tr>
<tr>
<td>4-14&quot;</td>
<td>4</td>
<td>13</td>
<td>.53</td>
<td>.50-.57</td>
</tr>
<tr>
<td><strong>Plow stalk, stubble and bare land</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-14&quot;</td>
<td>2</td>
<td>20</td>
<td>1.23</td>
<td>1.09-1.38</td>
</tr>
<tr>
<td>3-14&quot;</td>
<td>3</td>
<td>47</td>
<td>.91</td>
<td>.77-.1.00</td>
</tr>
<tr>
<td>4-14&quot;</td>
<td>4</td>
<td>11</td>
<td>.51</td>
<td>.47-.56</td>
</tr>
<tr>
<td><strong>Disking (double disk)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7'</td>
<td>2</td>
<td>52</td>
<td>.39</td>
<td>.35-.50</td>
</tr>
<tr>
<td>8'</td>
<td>2</td>
<td>40</td>
<td>.43</td>
<td>.35-.55</td>
</tr>
<tr>
<td>9'</td>
<td>3</td>
<td>46</td>
<td>.38</td>
<td>.32-.44</td>
</tr>
<tr>
<td>10'</td>
<td>3</td>
<td>96</td>
<td>.34</td>
<td>.31-.40</td>
</tr>
<tr>
<td>11'</td>
<td>3</td>
<td>40</td>
<td>.31</td>
<td>.27-.41</td>
</tr>
<tr>
<td>12'</td>
<td>3</td>
<td>49</td>
<td>.30</td>
<td>.25-.34</td>
</tr>
<tr>
<td>13' to 14'</td>
<td>4</td>
<td>21</td>
<td>.25</td>
<td>.20-.29</td>
</tr>
<tr>
<td><strong>Dragging plowed land</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10'</td>
<td>2</td>
<td>12</td>
<td>.39</td>
<td>.33-.50</td>
</tr>
<tr>
<td>12'</td>
<td>2,3</td>
<td>33</td>
<td>.31</td>
<td>.21-.29</td>
</tr>
<tr>
<td>14'</td>
<td>2,3,4</td>
<td>11</td>
<td>.22</td>
<td>.19-.32</td>
</tr>
<tr>
<td><strong>Corn or soybeans</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40' rows</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 row</td>
<td>2,3</td>
<td>55</td>
<td>.54</td>
<td>.43-.66</td>
</tr>
<tr>
<td>4 row</td>
<td>2,3</td>
<td>92</td>
<td>.28</td>
<td>.25-.37</td>
</tr>
<tr>
<td>6 row</td>
<td>3</td>
<td>2</td>
<td>.17</td>
<td></td>
</tr>
<tr>
<td>30' rows</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 row</td>
<td>2,3</td>
<td>6</td>
<td>.47</td>
<td>--</td>
</tr>
<tr>
<td>4 row</td>
<td>2,3</td>
<td>8</td>
<td>.31</td>
<td>--</td>
</tr>
<tr>
<td>42' rows</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 row</td>
<td>2,3</td>
<td>6</td>
<td>.55</td>
<td>--</td>
</tr>
<tr>
<td><strong>Oats or wheat</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-7</td>
<td>2,3</td>
<td>42</td>
<td>.55</td>
<td>.45-.50</td>
</tr>
<tr>
<td>13-7</td>
<td>2,3</td>
<td>73</td>
<td>.51</td>
<td>.41-.55</td>
</tr>
<tr>
<td>15-7</td>
<td>2,3</td>
<td>16</td>
<td>.43</td>
<td>--</td>
</tr>
<tr>
<td>16-7</td>
<td>2,3</td>
<td>23</td>
<td>.47</td>
<td>.30-.50</td>
</tr>
<tr>
<td>17-1</td>
<td>2,3</td>
<td>26</td>
<td>.36</td>
<td>.25-.50</td>
</tr>
<tr>
<td>Broadcast meadow (Tr. seeder)</td>
<td>2,3</td>
<td>46</td>
<td>.16</td>
<td>.12-.20</td>
</tr>
<tr>
<td>Operation, type and size of machine</td>
<td>Tractor size (plows)</td>
<td>Number of Farms</td>
<td>Average Tractor Hours/A</td>
<td>Man Hours Per Acre</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---------------------</td>
<td>----------------</td>
<td>------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td><strong>Cultivating and Spraying</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotary corn or soybeans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 row</td>
<td>2,3</td>
<td>56</td>
<td>.26</td>
<td>.23-.35</td>
</tr>
<tr>
<td>4 row</td>
<td>2,3</td>
<td>49</td>
<td>.15</td>
<td>.13-.16</td>
</tr>
<tr>
<td>Cultivate corn or soybeans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 row</td>
<td>2,3</td>
<td>115</td>
<td>.53</td>
<td>.42-.53</td>
</tr>
<tr>
<td>4 row</td>
<td>2,3</td>
<td>65</td>
<td>.26</td>
<td>.21-.33</td>
</tr>
<tr>
<td>2nd time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 row</td>
<td>2,3</td>
<td>33</td>
<td>.42</td>
<td>.35-.50</td>
</tr>
<tr>
<td>4 row</td>
<td>2,3</td>
<td>21</td>
<td>.25</td>
<td>.22-.31</td>
</tr>
<tr>
<td>Spray corn or meadow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 row</td>
<td>2,3</td>
<td>44</td>
<td>.17</td>
<td>.15-.23</td>
</tr>
<tr>
<td>7 row</td>
<td>2,3</td>
<td>15</td>
<td>.16</td>
<td>.13-.21</td>
</tr>
<tr>
<td>8 row</td>
<td>2,3</td>
<td>10</td>
<td>.15</td>
<td>.13-.17</td>
</tr>
<tr>
<td>Spread fertilizer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 ft.</td>
<td>2,3</td>
<td>12</td>
<td>.23</td>
<td>.18-.27</td>
</tr>
<tr>
<td>12 ft.</td>
<td>2,3</td>
<td>4</td>
<td>.24</td>
<td>--</td>
</tr>
<tr>
<td><strong>Harvesting Operation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pick corn</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 row</td>
<td>2,3</td>
<td>15</td>
<td>1.62</td>
<td>1.36-2.00</td>
</tr>
<tr>
<td>75 bu.</td>
<td>2,3</td>
<td>14</td>
<td>1.61</td>
<td>1.36-2.00</td>
</tr>
<tr>
<td>2 row</td>
<td>2,3</td>
<td>43</td>
<td>.31</td>
<td>.66-1.00</td>
</tr>
<tr>
<td>54 bu.</td>
<td>2,3</td>
<td>29</td>
<td>.39</td>
<td>.72-1.03</td>
</tr>
<tr>
<td>31 bu.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haul and store corn</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54 bu.</td>
<td>2,3</td>
<td>57</td>
<td>.31</td>
<td>1.00</td>
</tr>
<tr>
<td>32 bu.</td>
<td>2,3</td>
<td>46</td>
<td>.91</td>
<td>1.36</td>
</tr>
<tr>
<td>Combine small grain or soybeans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 ft.</td>
<td>2,3</td>
<td>40</td>
<td>1.05</td>
<td>.90-1.35</td>
</tr>
<tr>
<td>7 ft.</td>
<td>2,3</td>
<td>40</td>
<td>.67</td>
<td>.50-1.05</td>
</tr>
<tr>
<td>10 ft.</td>
<td>SP</td>
<td>25</td>
<td>.46</td>
<td>.46-.50</td>
</tr>
<tr>
<td>12 ft.</td>
<td>SP</td>
<td>20</td>
<td>.42</td>
<td>.31-.50</td>
</tr>
<tr>
<td>Haul and store wheat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 bu.</td>
<td>2,3</td>
<td>23</td>
<td>.43</td>
<td>.38</td>
</tr>
<tr>
<td>35 bu.</td>
<td>2,3</td>
<td>27</td>
<td>.52</td>
<td>.57-1.11</td>
</tr>
<tr>
<td>Oats 44 bu.</td>
<td>2,3</td>
<td>23</td>
<td>.60</td>
<td>1.00</td>
</tr>
<tr>
<td>30 bu.</td>
<td>2,3</td>
<td>27</td>
<td>.51</td>
<td>.50-1.00</td>
</tr>
<tr>
<td>Soybeans 23 bu.</td>
<td>2,3</td>
<td>13</td>
<td>.67</td>
<td>.57</td>
</tr>
<tr>
<td>33 bu.</td>
<td>2,3</td>
<td>14</td>
<td>.70</td>
<td>.73</td>
</tr>
<tr>
<td>Haul and store</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation, type and size of machine</td>
<td>Tractor Size (plows)</td>
<td>Number of Farms</td>
<td>Average Tractor Hours/A</td>
<td>Man Hours Per Acre</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>----------------------</td>
<td>------------------</td>
<td>-------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Hay or straw</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 ft. mower</td>
<td>2,3</td>
<td>57</td>
<td>.50</td>
<td>.35 - .57</td>
</tr>
<tr>
<td>Conditioning hay</td>
<td>2,3</td>
<td>18</td>
<td>.36</td>
<td>.27 - .57</td>
</tr>
<tr>
<td>Rake hay or straw</td>
<td>2,3</td>
<td>98</td>
<td>.41</td>
<td>.33 - .50</td>
</tr>
<tr>
<td>Bale hay or straw</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Straw .9 ton</td>
<td>2,3</td>
<td>67</td>
<td>.44</td>
<td>.35 - .50</td>
</tr>
<tr>
<td>Hay 1.3 tons</td>
<td>2,3</td>
<td>48</td>
<td>.50</td>
<td>.33 - .71</td>
</tr>
<tr>
<td>Hay 2.0 tons</td>
<td>2,3</td>
<td>54</td>
<td>.50</td>
<td>.43 - .67</td>
</tr>
<tr>
<td>Haul and store</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Straw .6 ton</td>
<td>2,3</td>
<td>33</td>
<td>.44</td>
<td>1.16</td>
</tr>
<tr>
<td>Hay 1.1 tons</td>
<td>2,3</td>
<td>42</td>
<td>.44</td>
<td>1.42</td>
</tr>
<tr>
<td>Hay 1.2 tons</td>
<td>2,3</td>
<td>53</td>
<td>.50</td>
<td>1.72</td>
</tr>
<tr>
<td>Hay 2.0 tons</td>
<td>2,3</td>
<td>58</td>
<td>.56</td>
<td>2.04</td>
</tr>
<tr>
<td>Corn silage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chop 10 tons/A.</td>
<td>3</td>
<td>14</td>
<td>1.40</td>
<td>1.40</td>
</tr>
<tr>
<td>Haul &amp; store 10 tons/A.</td>
<td>2,3</td>
<td>14</td>
<td>3.55</td>
<td>4.25</td>
</tr>
<tr>
<td>Chop, haul and store</td>
<td>2,3</td>
<td>24</td>
<td>3.85</td>
<td>5.69</td>
</tr>
<tr>
<td>Field chop, store and haul</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry hay with grass silage</td>
<td>3.7 man crew</td>
<td>1.4 hr./ton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manure load and spread</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crew</td>
<td>Number Spreader Cases</td>
<td>Distance to Field</td>
<td>Man hours per Load</td>
<td>Loads Per Hour</td>
</tr>
<tr>
<td>2 men</td>
<td>1,2</td>
<td>2</td>
<td>77 rods</td>
<td>.49</td>
</tr>
<tr>
<td>3 men</td>
<td>2</td>
<td>2</td>
<td>66 rods</td>
<td>.54</td>
</tr>
<tr>
<td>4 men</td>
<td>3</td>
<td>2</td>
<td>33 rods</td>
<td>.51</td>
</tr>
</tbody>
</table>


3/ Missouri Agricultural Experiment Station Bulletin 551, 1951.

Estimating Rates of Accomplishment for Farm Machinery

A close estimation of the rate of accomplishment for tillage, seeding and harvesting equipment can be determined by use of the following efficiency factors and formula.

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>% EFFICIENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tillage and seed bed preparation</td>
<td>75 - 85</td>
</tr>
<tr>
<td>Seeding, drills, planters, etc.</td>
<td>60 - 75</td>
</tr>
<tr>
<td>Harvesting, combines, mowers, pickers, etc.</td>
<td>55 - 65</td>
</tr>
</tbody>
</table>

Formula:

\[
\text{Width of machine in inches \times MPH \times \% efficiency} \quad \div \quad 100 = \text{acres per hour}
\]

Acres per hour can be changed to hours per acre by dividing 1 by acres per hour.

**EXAMPLE**

4-14 plow @ 4 MPH and 75% efficiency

\[
\frac{55'' \times 4 \text{ MPH \times .75}}{100} = 1.68 \text{ acres per hour}
\]

\[
1.68 \text{ acres per hour} = \frac{1}{1.68} = .59 \text{ hours per acre}
\]
### NUMBER OF FAVORABLE DAYS AVAILABLE TO DO SELECTED CROP OPERATIONS ON AVERAGE DRAINED LAND, CENTRAL OHIO, 1938-1957

(Taken from Journal of the American Society of Farm Managers and Rural Appraisers, Vol. 25, No. 2, October, 1961, prepared by J. H. Sitterley and E. T. Shaudys)

<table>
<thead>
<tr>
<th>Operation</th>
<th>Period</th>
<th>Total Days in Period</th>
<th>Days Available</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Average Year</td>
<td>16 Yrs. Out of 20</td>
</tr>
<tr>
<td>Soil Tillage Operations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plow sod</td>
<td>(Mar. 21-Apr. 30)</td>
<td>41</td>
<td>14.5</td>
</tr>
<tr>
<td>Plow bare or stalk land</td>
<td>(Mar. 21-Apr. 30)</td>
<td>41</td>
<td>12.0</td>
</tr>
<tr>
<td>Fit soil &amp; seed oats</td>
<td>(Mar. 21-Apr. 20)</td>
<td>31</td>
<td>8.0</td>
</tr>
<tr>
<td>Fit soil prior to final seedbed</td>
<td>(Apr. 16-May 5)</td>
<td>20</td>
<td>8.0</td>
</tr>
<tr>
<td>Fit soil &amp; plants corn &amp; soybeans</td>
<td>(May 6-June 5)</td>
<td>31</td>
<td>13.5</td>
</tr>
<tr>
<td>Cultivate corn &amp; soybeans</td>
<td>(June 6-July 5)</td>
<td>30</td>
<td>15.0</td>
</tr>
<tr>
<td>Fit soil &amp; fall seed small grain</td>
<td>(Sept. 25-Oct. 15)</td>
<td>21</td>
<td>16.0</td>
</tr>
<tr>
<td>Harvest Grain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combine wheat &amp; oats*</td>
<td>(July 5-July 31)</td>
<td>27</td>
<td>11 whole &amp; 9 whole &amp; &amp; 4 half &amp; 2 half days</td>
</tr>
<tr>
<td>Combine soybeans*</td>
<td>(Sept. 26-Oct. 16)</td>
<td>21</td>
<td>12 whole &amp; 6 whole &amp; &amp; 2 half &amp; 2 half days</td>
</tr>
<tr>
<td>Combine soybeans*</td>
<td>(Oct. 17-Nov. 6)</td>
<td>21</td>
<td>9 whole &amp; 6 whole &amp; &amp; 2 half &amp; 2 half days</td>
</tr>
<tr>
<td>Pick Corn</td>
<td>(Oct. 15-Nov. 15)</td>
<td>32</td>
<td>21.5</td>
</tr>
<tr>
<td>Harvest Hay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Cutting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional--field cure</td>
<td>(June 1-June 30)</td>
<td>30</td>
<td>46%</td>
</tr>
<tr>
<td>Conditioned--field cure</td>
<td></td>
<td></td>
<td>63</td>
</tr>
<tr>
<td>Second Cutting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional--field cure</td>
<td>(July 15-Aug. 15)</td>
<td>31</td>
<td>58</td>
</tr>
<tr>
<td>Conditioned--field cure</td>
<td></td>
<td></td>
<td>78</td>
</tr>
<tr>
<td>Third Cutting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional--field cure</td>
<td>(Sept. 1-Sept. 30)</td>
<td>20</td>
<td>55</td>
</tr>
<tr>
<td>Conditioned--field cure</td>
<td></td>
<td></td>
<td>68</td>
</tr>
</tbody>
</table>

* 16% moisture

Percent of hay cut that could be stored in barn three days after cut

- First Cutting: 46% 43% 29%
- Conditioned: 63 57 38
- Second Cutting: 58 48 31
- Conditioned: 78 73 38
- Third Cutting: 55 40 6
- Conditioned: 68 37 33
NUMBER OF FAVORABLE PERIODS* AVAILABLE FOR MAKING HAY IN CENTRAL CHIO WITH SELECTED HAY MAKING METHODS, June 1-15, 1938-1959

* A favorable hay making period is defined as two good days and one fair day for conventional field curing methods. The length of period was reduced by one day with either a conditioner or dryer available. It was assumed that no more hay would be cut unless it was certain one of the cuttings could be removed and stored the same day.
### Crop Machines Use

C. B. Richey

**Cost per Hour of Using Farm Machines**

*(Per 100 of New Cost)*

<table>
<thead>
<tr>
<th>Machine</th>
<th>Years Until Repair In Obsoleteness</th>
<th>Hours per Year</th>
<th>Total Repair as % of New Cost</th>
<th>Cost per Hour of Use per $100 of New Cost **</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20 HR.</td>
<td>40 HR.</td>
<td>60 HR.</td>
<td>100 HR.</td>
</tr>
<tr>
<td></td>
<td>PER YR.</td>
<td>PER YR.</td>
<td>PER YR.</td>
<td>PER YR.</td>
</tr>
<tr>
<td>Tractor Flow</td>
<td>15 2000 80</td>
<td>$6.500</td>
<td>$3.19</td>
<td>$2.26</td>
</tr>
<tr>
<td>Tractor Disk Harrow</td>
<td>15 2000 30</td>
<td>575</td>
<td>2.95</td>
<td>2.02</td>
</tr>
<tr>
<td>Spring-Tooth Harrow</td>
<td>20 2000 40</td>
<td>495</td>
<td>2.53</td>
<td>1.79</td>
</tr>
<tr>
<td>Spike-Tooth Harrow</td>
<td>20 2500 30</td>
<td>487</td>
<td>2.50</td>
<td>1.71</td>
</tr>
<tr>
<td>Soil Pulverizer</td>
<td>20 2000 15</td>
<td>463</td>
<td>2.45</td>
<td>1.70</td>
</tr>
<tr>
<td>Endgate Seeder</td>
<td>20 800 30</td>
<td>512</td>
<td>2.75</td>
<td>2.38</td>
</tr>
<tr>
<td>Grain Drill</td>
<td>20 1200 25</td>
<td>496</td>
<td>2.56</td>
<td>2.00</td>
</tr>
<tr>
<td>Corn Planter</td>
<td>20 1200 30</td>
<td>500</td>
<td>2.63</td>
<td>1.84</td>
</tr>
<tr>
<td>Field Sprayer</td>
<td>10 1500 30</td>
<td>745</td>
<td>3.83</td>
<td>2.62</td>
</tr>
<tr>
<td>Rotary Hoe</td>
<td>15 1500 20</td>
<td>573</td>
<td>2.93</td>
<td>2.00</td>
</tr>
<tr>
<td>Tractor Cultivator</td>
<td>12 2500 40</td>
<td>662</td>
<td>3.41</td>
<td>2.34</td>
</tr>
<tr>
<td>Rotary Cutter</td>
<td>12 2000 35</td>
<td>559</td>
<td>3.38</td>
<td>2.32</td>
</tr>
<tr>
<td>Tractor Power</td>
<td>12 2000 75</td>
<td>679</td>
<td>3.56</td>
<td>2.52</td>
</tr>
<tr>
<td>Side-Delivery Rake</td>
<td>15 1500 50</td>
<td>551</td>
<td>3.12</td>
<td>2.19</td>
</tr>
<tr>
<td>Forage Harvester***</td>
<td>12 2000 60</td>
<td>671</td>
<td>3.50</td>
<td>2.44</td>
</tr>
<tr>
<td>Forage Blower</td>
<td>12 2500 25</td>
<td>651</td>
<td>3.30</td>
<td>2.24</td>
</tr>
<tr>
<td>Pickup Baler (Auto Tie)***</td>
<td>12 2500 40</td>
<td>657</td>
<td>3.36</td>
<td>2.30</td>
</tr>
<tr>
<td>Swather</td>
<td>12 1200 25</td>
<td>662</td>
<td>3.41</td>
<td>2.35</td>
</tr>
<tr>
<td>Combine***</td>
<td>10 2000 40</td>
<td>745</td>
<td>3.83</td>
<td>2.62</td>
</tr>
<tr>
<td>Corn Binder</td>
<td>10 1000 40</td>
<td>765</td>
<td>4.02</td>
<td>2.82</td>
</tr>
<tr>
<td>Stationary Silage Cutter</td>
<td>10 1200 30</td>
<td>750</td>
<td>3.97</td>
<td>2.67</td>
</tr>
<tr>
<td>Husker-Shredder</td>
<td>10 2500 25</td>
<td>735</td>
<td>3.72</td>
<td>2.52</td>
</tr>
<tr>
<td>Corn Picker</td>
<td>10 1500 30</td>
<td>745</td>
<td>3.83</td>
<td>2.62</td>
</tr>
<tr>
<td>Manure Loader</td>
<td>10 2000 25</td>
<td>738</td>
<td>3.75</td>
<td>2.55</td>
</tr>
<tr>
<td>Manure Spreader</td>
<td>15 2500 25</td>
<td>568</td>
<td>2.89</td>
<td>1.95</td>
</tr>
<tr>
<td>Feed Grinder</td>
<td>15 2000 25</td>
<td>571</td>
<td>2.92</td>
<td>1.98</td>
</tr>
<tr>
<td>Portable Elevator</td>
<td>15 1500 15</td>
<td>563</td>
<td>2.89</td>
<td>1.95</td>
</tr>
</tbody>
</table>

|                           | 60 HR.                             | 150 HR.       | 300 HR.                        | 500 HR.                                    | 750 HR.                                   | 1000 HR.                                  | 1500 HR.                                  |
|                           | PER YR.                            | PER YR.       | PER YR.                         | PER YR.                                    | PER YR.                                   | PER YR.                                   | PER YR.                                   |
| Wagon Gear & Box          | 15 5000 50                         | 0.196         | 0.064                          | 0.047                                      | 0.039                                     | 0.038                                     | 0.035                                     | 0.033                                     |
| Tractor***               | 15 12000 120                       | 0.196         | 0.064                          | 0.047                                      | 0.032                                     | 0.025                                     | 0.023                                     | 0.021                                     |

---

* Agricultural Engineers’ Yearbook, 1959 Edition. Published by American Society of Agricultural Engineers, p. 108.

** Based on 4 1/2 percent of new cost as total annual charge for interest, housing, taxes, and insurance.

*** Operating costs such as fuel, oil, grease, wire, twine, etc. not included.
SPACE REQUIREMENTS

The following amounts of space are generally used in determining the capacity of a building to store crops and furnish livestock or equipment shelter:

<table>
<thead>
<tr>
<th>Crop Type</th>
<th>Space Requirements (cubic feet per bushel/ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ear corn</td>
<td>2 1/2</td>
</tr>
<tr>
<td>Small grain</td>
<td>1 1/4</td>
</tr>
<tr>
<td>Long hay</td>
<td>500</td>
</tr>
<tr>
<td>Chopped hay</td>
<td>250</td>
</tr>
<tr>
<td>Straw</td>
<td>1000</td>
</tr>
<tr>
<td>Shredded fodder</td>
<td>250</td>
</tr>
<tr>
<td>Corn silage</td>
<td>50-65</td>
</tr>
<tr>
<td>Hay silage</td>
<td>38-40</td>
</tr>
<tr>
<td>Bale Hay</td>
<td>200</td>
</tr>
<tr>
<td>Baled Straw</td>
<td>250</td>
</tr>
</tbody>
</table>

Swine:

Farrowing stall - under 400 pounds, 22" x 7' plus an 18'' x 7' creep area on each side; over 400 pounds, 24" x 26" x 7' to 8' plus 18" x 7' creep area on each side.

Farrowing pen - 7' x 8' to 8' x 9'.

Growing and finishing (square feet per pig):

<table>
<thead>
<tr>
<th></th>
<th>Under 100 lb.</th>
<th>Over 100 lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total confinement</td>
<td>4</td>
<td>8 to 9</td>
</tr>
<tr>
<td>(Totally slotted, partially slotted, or solid floor. Limit pen size to 16 to 20 pigs per pen after 100 to 120 lb. to minimize cannibalism and spread of disease.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial confinement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shelter space</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Outside pen, paved</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Beef cattle:

<table>
<thead>
<tr>
<th></th>
<th>Calves to 600 lb.</th>
<th>Feeders 600 lb. to mkt.</th>
<th>Mature Cows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting area, in a shed or on a well-drained bedded mound</td>
<td>15 to 20</td>
<td>25 to 30</td>
<td>30 to 40</td>
</tr>
<tr>
<td>Lot space</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paved, slope 1/4&quot; to 1/2&quot; per ft.</td>
<td>30 to 35</td>
<td>25 to 30</td>
<td>40 to 70</td>
</tr>
<tr>
<td>Unpaved</td>
<td>50 to 100</td>
<td>100 to 200</td>
<td>200 to 300</td>
</tr>
<tr>
<td>Confinement finishing barn (inside feeding)</td>
<td>28</td>
<td>28 to 50</td>
<td>28 to 50</td>
</tr>
<tr>
<td>Feeding space inches/animal</td>
<td>18 to 22</td>
<td>22 to 26</td>
<td>26 to 30</td>
</tr>
<tr>
<td>Limited feeding</td>
<td></td>
<td>4 to 6, hay or silage</td>
<td></td>
</tr>
<tr>
<td>Always available</td>
<td>3 to 4, grain or supplement</td>
<td>6, grain and silage</td>
<td></td>
</tr>
</tbody>
</table>

Shade (if not provided otherwise) 20 to 30 square feet per head, 10 to 12 feet high

Alleys - 12 feet minimum width for vehicles, 16 feet for heavy traffic

Holding pen - 30 square feet per animal, approximately 40 head size minimum

Crowding pen - 150 square feet or one truck load

Working chute - 18 to 30 feet long

Pave heavy traffic areas, around waterers, and along feeders

Dairy cattle:

Resting area - 40 square feet per heifer; 60 to 80 square feet per cow in northern zones.

Free stalls - 4 feet wide and 7 to 8 feet long, depending upon weight of cow. (Allow extra space for alleys).

Holding area - 50 square feet for each milking parlor stall.

Milkroom - Space for all equipment and adequate clearances around the bulk tank. The bulk tank should hold three milkings with everyday pickup and five milkings with every-other-day pickup.

Paved yard - Around waterers, along buildings and feed bunks, in holding pen, and animal routes between these areas. Allow 75 to 100 square feet per cow.

Unpaved yard area - Summer exercise lots for herds not put on pasture. Alternate herd between at least two lots and allow a total of one acre per 24 cows.
Hens:

Fully insulated and mechanically ventilated house

<table>
<thead>
<tr>
<th></th>
<th>Square feet per bird</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional house</td>
<td></td>
</tr>
<tr>
<td>Under 300 birds</td>
<td>1 1/4</td>
</tr>
<tr>
<td>Over 300 birds</td>
<td></td>
</tr>
</tbody>
</table>

Sheep:

<table>
<thead>
<tr>
<th></th>
<th>Square feet per head</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeder lambs</td>
<td></td>
</tr>
<tr>
<td>Shed</td>
<td>6 to 8 a/</td>
</tr>
<tr>
<td>Lot</td>
<td>6 to 8 a/</td>
</tr>
<tr>
<td>Ewes (Lamb in February and March) - shed</td>
<td>12 to 18 b/</td>
</tr>
</tbody>
</table>

a/ Higher figure refers to large lambs.
b/ Higher figure refers to heavy ewes.
Approximate Labor Distribution by Months for Common Field Crops Grown Within 50 Mile Radius of OSU

(Percent of total hours occurring in month indicated)

<table>
<thead>
<tr>
<th>Month</th>
<th>Corn Grain</th>
<th>Corn Silage</th>
<th>Oats</th>
<th>Wheat</th>
<th>Soybeans Seeding</th>
<th>1st Cut</th>
<th>2nd Cut</th>
<th>3rd Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>4%</td>
<td>11%</td>
<td>50%</td>
<td>8%</td>
<td>16%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>April</td>
<td>16%</td>
<td>18%</td>
<td>11%</td>
<td>42%</td>
<td>20%</td>
<td>50%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>May</td>
<td>18%</td>
<td>24%</td>
<td>15%</td>
<td>24%</td>
<td>22%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>June</td>
<td>19%</td>
<td>4%</td>
<td>2%</td>
<td>50%</td>
<td>77%</td>
<td>6%</td>
<td>35%</td>
<td>20%</td>
</tr>
<tr>
<td>July</td>
<td>18%</td>
<td>24%</td>
<td>15%</td>
<td>24%</td>
<td>22%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>August</td>
<td>18%</td>
<td>24%</td>
<td>15%</td>
<td>24%</td>
<td>22%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>September</td>
<td>18%</td>
<td>24%</td>
<td>15%</td>
<td>24%</td>
<td>22%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>October</td>
<td>5%</td>
<td>6%</td>
<td>47%</td>
<td>23%</td>
<td>24%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>November</td>
<td>29%</td>
<td>37%</td>
<td>25%</td>
<td>5%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>December</td>
<td>9%</td>
<td>11%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

A Conventional tillage
B Minimum tillage

Approximate Monthly Distribution of Annual Labor Requirements for Selected Livestock Enterprises

<table>
<thead>
<tr>
<th>Month</th>
<th>Dairy cows and Replacements</th>
<th>Beef Breeding herd &amp; Replacements</th>
<th>Swine Farrowing per year</th>
<th>Sheep Breeding Flock</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>9.5%</td>
<td>13.0%</td>
<td>8.1%</td>
<td>8.3%</td>
</tr>
<tr>
<td>February</td>
<td>9.5</td>
<td>13.0%</td>
<td>14.1%</td>
<td>8.8%</td>
</tr>
<tr>
<td>March</td>
<td>9.5</td>
<td>15.0%</td>
<td>10.6%</td>
<td>8.1%</td>
</tr>
<tr>
<td>April</td>
<td>9.5</td>
<td>18.0%</td>
<td>6.7%</td>
<td>7.7%</td>
</tr>
<tr>
<td>May</td>
<td>8.5</td>
<td>5.0%</td>
<td>6.2%</td>
<td>7.7%</td>
</tr>
<tr>
<td>June</td>
<td>7.5</td>
<td>3.0%</td>
<td>6.0%</td>
<td>8.6%</td>
</tr>
<tr>
<td>July</td>
<td>7.0</td>
<td>3.0%</td>
<td>7.6%</td>
<td>7.8%</td>
</tr>
<tr>
<td>August</td>
<td>6.5</td>
<td>3.0%</td>
<td>10.5%</td>
<td>8.2%</td>
</tr>
<tr>
<td>September</td>
<td>6.5</td>
<td>3.0%</td>
<td>9.5%</td>
<td>8.1%</td>
</tr>
<tr>
<td>October</td>
<td>7.0</td>
<td>3.0%</td>
<td>7.7%</td>
<td>9.4%</td>
</tr>
<tr>
<td>November</td>
<td>9.5</td>
<td>8.0%</td>
<td>6.7%</td>
<td>8.4%</td>
</tr>
<tr>
<td>December</td>
<td>9.5</td>
<td>13.0%</td>
<td>6.4%</td>
<td>8.9%</td>
</tr>
</tbody>
</table>

Total 100.0 100.0 100.0 100.0 100.0
Farm Business Summary  Lab. Problem No. __________  Due Date __________

Problems: To estimate the probable expenses, receipts and net income associated with a plan developed for the class problem farm, and to prepare and analyze a financial summary, in order to determine whether the plan will meet the goals of the family.

Procedure:

1. Quantities of most production inputs have been budgeted in earlier steps. These can be transferred to the summary (p. 9.2). Other quantities needed for production will now need to be computed or, in some cases, estimated.

2. Determine what the production inputs will cost. Use your best estimate of prices during the life of the farm plan.

3. Physical quantities of items available for sale can be transferred from earlier steps of the plan. Your best estimate of prices that can be expected over the period of the plan should be used.

4. Compute building and equipment depreciation; estimate annual livestock purchases and changes in inventory, and compute farm income.

5. Prepare a financial summary of the farm business for a typical year after the plan is established and in full operation. Analyze the efficiency of the farm business and estimate the return to resources which it provides.

Hand In:

A. Prepare a statement of 200 words, explaining whether we are most interested in absolute price accuracy or in price relationships, and why.

B. Write an essay of up to 300 words on depreciation, naming and explaining the methods that can be used and explaining the purpose of handling depreciation as a cost.

C. Using the form on p. 9.2, prepare a financial summary of the farm business

D. Analyze the farm business, computing the following measures:

   a. Labor and management income
   b. Return per hour of labor
   c. Amount and rate of return to equity capital
   d. Rate of capital turnover
   e. Return per $ fed fed.

E. Study the farm income and the factors computed in your analysis. Write a two-part summary and interpretation:

   a) Should the operator go ahead with these plans, or not? If your farm plan were his only alternative in farming, should he farm, or accept the off-farm alternative?

   b) What are the strengths and/or weaknesses of your plan? In what respect would you change it if you were to do it over? Would these changes permit you to achieve your objectives? If not, what other changes (in the farm, in other resources, in objectives, etc.) are needed?
## Financial Summary of Year's Farm Business

### CASH EXPENSES

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hired Labor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed Purchased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Supplies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery Repairs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel, Oil and Grease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity (Farm Share)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone (Farm Share)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misc. Expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeds and Plants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizer and Lime</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine Hire &amp; Trucking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto Expense (Farm Share)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Int. Pd. on Notes &amp; Mortgage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Rent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veterinary and Medicine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breeding Fees, Registration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeder Livestock Purchase</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CASH RECEIPTS

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk and Cream</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poultry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Crops</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Crops</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Rent and Royalties</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Custom Work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wool</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Livestock Products</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patronage Dividend</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Refund</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breeding Fees Rec'd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misc. Receipts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Payments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cattle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veal Calves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lambs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor Off Farm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Net Cash Difference

Total Cash Receipts: ______________________
Total Cash Expenses: ______________________

Net Cash Difference: ______________________

### Depreciation

- Machinery & Equipment: ______________________
- Bldgs. & Improvements: ______________________

Total Depreciation: ______________________

### Breeding Livestock Purchases: ______________________

### Inventory Change: ______________________

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breeding Livestock Purchases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inventory Change</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Farm Income</td>
<td></td>
<td></td>
<td>$</td>
</tr>
</tbody>
</table>

9.2
FINANCIAL ANALYSIS OF THIS YEAR'S FARM BUSINESS

Farm Income represents the return to the bundle of resources provided by the farmer and his family and not otherwise remunerated: the labor of himself and his family, the family's equity capital or share of ownership in the assets of the farm, and the entrepreneurship or management of the family. These three categories represent the family's inputs. While neither the inputs nor the returns can be separated into categories with great finicality and precision, approximation is useful for analytical purposes. An estimate of the returns to these input categories can be computed as follows: For any two of the categories, impute or arbitrarily assign a charge which seems reasonable. Subtract the sum of these imputed charges from farm income; the residue is the return to the third category.

A. Management Income

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Income or Net Farm Profit</td>
<td>$</td>
</tr>
<tr>
<td>Total Farm Assets</td>
<td>$</td>
</tr>
<tr>
<td>Interest (@ mort. rate) X</td>
<td>$</td>
</tr>
<tr>
<td>Total Interest</td>
<td>$</td>
</tr>
<tr>
<td>Interest Paid Out</td>
<td>$</td>
</tr>
<tr>
<td>Interest Not Yet Charge (Imputed charge for use of equity capital)</td>
<td>$</td>
</tr>
<tr>
<td>Family Labor and Management Income</td>
<td>$</td>
</tr>
<tr>
<td>Value of Operator Labor:</td>
<td>$</td>
</tr>
<tr>
<td>Value of Family labor:</td>
<td>$</td>
</tr>
<tr>
<td>Tot. Value of Family &amp; Operator Labor</td>
<td>$</td>
</tr>
<tr>
<td>(Imputed valuation of family's labor)</td>
<td>$</td>
</tr>
<tr>
<td>MANAGEMENT INCOME</td>
<td>$</td>
</tr>
</tbody>
</table>

B. Return to Capital

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Income or Net Farm Profit</td>
<td>$</td>
</tr>
<tr>
<td>Value of Operator &amp; Family Labor</td>
<td>$</td>
</tr>
<tr>
<td>Imputed Mgt. Charge (% of cash receipts adj. for inv. change)</td>
<td>$</td>
</tr>
<tr>
<td>NET RETURNS TO CAPITAL</td>
<td>$</td>
</tr>
</tbody>
</table>

\[
\text{Net Return to Capital} = \frac{\text{Equity Cap or net worth}}{\text{Farm Assets-Farm Liabilities - Net Worth}}
\]

\[
\text{Rate of Return to Capital} = \text{Net Return to Capital}
\]

C. Returns to Labor

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Income or Net Farm Profit</td>
<td>$</td>
</tr>
<tr>
<td>Imputed Charge for Use of Equity Capital</td>
<td>$</td>
</tr>
<tr>
<td>Adjusted gross income</td>
<td>$</td>
</tr>
<tr>
<td>Imputed Mgmt. Charge @ %</td>
<td>$</td>
</tr>
<tr>
<td>RETURNS TO FAMILY &amp; OPERATOR LABOR</td>
<td>$</td>
</tr>
</tbody>
</table>

\[
\text{Returns to Labor} = \text{Returns per hour} = \frac{\text{Man Hr. Equivalents of Family & Operator Labor}}{\text{Man Hr. Equivalents of Family & Operator Labor}}/\text{hr.}
\]
Efficiency of Livestock Enterprises

RECEIPTS from livestock & LS products

Milk and Cream $__________
Eggs, Poultry __________
Cattle, Calves _________
Sheep, lambs, wool _______
Swine __________
Total Receipts $__________
Feeder Livestock Purchases $__________
Net Livestock Increase $__________

FEED FED TO LIVESTOCK

<table>
<thead>
<tr>
<th>Amount Fed</th>
<th>Average Price</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silage</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>Pasture (From table below)</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>Purchased Feed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Value of all Feed Fed. $__________

CHARGE FOR PASTURES

<table>
<thead>
<tr>
<th>Type</th>
<th>Suggested Charge per A.</th>
<th>Charge Used</th>
<th>Acres</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotation (Full Season)</td>
<td>$12</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(After 1st Crop)</td>
<td>$12</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent</td>
<td>3 to 6</td>
<td>3 to 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woods</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$__________ : $__________ = $__________

Net Livestock Increase : Total value of all feed fed = $__________

STANDARDS FOR RETURN PER $1.00 OF FEED FED

Dairy Cattle $1.95  Fattening Cattle $1.25  Sheep $1.50
Beef Breeding Cattle $1.30  Hogs $1.40  Poultry $1.95

Return per dollar of feed fed should pay for the feed, labor, and overhead (taxes, interest, depreciation, and repairs) on buildings and equipment required by the livestock. Some livestock enterprises require more costly buildings and equipment and involve more labor than others.

When arriving at standard for your farm, consider relative portion of total feed consumed by each class of livestock. For example, if half the feed went to dairy cattle and half to hogs, your expected standard return should be about halfway between $1.95 and $1.40 or $1.68.
DISTRIBUTION OF CAPITAL FIVE YEARS AFTER TAKING OVER THE FARM

**ABBREVIATED NET WORTH STATEMENT**

<table>
<thead>
<tr>
<th>Class</th>
<th>Owned</th>
<th>Borrowed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Estate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity</td>
<td></td>
<td>Real Estate Mortgage</td>
<td>Total Value Real Estate</td>
</tr>
<tr>
<td>Chattels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity</td>
<td></td>
<td>Chattel Mortgages</td>
<td>Total Value of Machinery, Livestock &amp; Crops</td>
</tr>
<tr>
<td>Operating</td>
<td></td>
<td>Merchant, Bank, Prod'n Credit</td>
<td>Total Operating Needs</td>
</tr>
<tr>
<td>Cash Reserve</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Reserve</td>
<td></td>
<td>Consumer Credit</td>
<td>Total Living Needs</td>
</tr>
<tr>
<td>Total</td>
<td>Net Worth</td>
<td>Total Liabilities</td>
<td>Total Assets</td>
</tr>
</tbody>
</table>

**ANNUAL INTEREST COSTS**

<table>
<thead>
<tr>
<th>Capital Borrowed</th>
<th>Interest Rate</th>
<th>Cost of Borrowing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Estate</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Chattels</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Total Cost of Borrowed Capital

Total Annual Real Estate Principal Payments

Total Annual Chattel Principal Payments
Use of Capital and Credit

Possible Returns and Losses by Borrowing
Selected Amounts for a Farmer
Owning $5000

<table>
<thead>
<tr>
<th>Item</th>
<th>Percent Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Owned capital</td>
<td>$5000</td>
</tr>
<tr>
<td>Borrowed capital</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$5000</td>
</tr>
</tbody>
</table>

Returns when gain is 10% on investment

<table>
<thead>
<tr>
<th></th>
<th>100</th>
<th>50</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross return</td>
<td>$500</td>
<td>$1000</td>
<td>$2000</td>
</tr>
<tr>
<td>Cost of borrowing (5% int.)</td>
<td>0</td>
<td>250</td>
<td>750</td>
</tr>
<tr>
<td>Return above cost</td>
<td>$500</td>
<td>$750</td>
<td>$1250</td>
</tr>
<tr>
<td>Return on owned capital</td>
<td>10%</td>
<td>15%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Returns when loss is 10% on investment

<table>
<thead>
<tr>
<th></th>
<th>100</th>
<th>50</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss</td>
<td>$500</td>
<td>$1000</td>
<td>$2000</td>
</tr>
<tr>
<td>Cost of borrowing (5% int.)</td>
<td>0</td>
<td>250</td>
<td>750</td>
</tr>
<tr>
<td>Total loss</td>
<td>$500</td>
<td>$1250</td>
<td>$2750</td>
</tr>
<tr>
<td>Loss on own capital</td>
<td>10%</td>
<td>25%</td>
<td>55%</td>
</tr>
</tbody>
</table>
### AMORTIZATION OF LOANS—STANDARD PLAN

**Amount Required Annually for Interest and Principal Payment, per $1000**

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<th>Length of Loan</th>
<th>2%</th>
<th>2½%</th>
<th>3%</th>
<th>3½%</th>
<th>4%</th>
<th>4½%</th>
<th>5%</th>
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<td>$227.79</td>
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$1,000 loan amortized over 20 years with semi-annual payments at 6% simple interest

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Total 728.90 1,000.00 1,728.90
Financial Control

Problem

Farm receipts and expenditures tend to be lumpy. Frequently, a farm operator must make sizeable monetary outlays during one month or season with little or no income for several months. Budgeting his expected money needs and income will help the manager use equity and borrowed funds more effectively.

Procedure

1. Estimate the receipts that can be reasonably expected by months. This can be done by going back to crop and livestock programs and seeing when each item produced will be available for sale. The use of owned or hired storage facilities should be considered.

2. Expenditures can be budgeted in much the same manner. Some items will have to be purchased each month, others only a few times each year.

3. It may be necessary to borrow money during one or more months to meet the obligations incurred or for family living.

4. The next page shows the financial control (or lack of it) on the Rolling Meadows Farm. Current expenses and family living costs were prorated, giving consideration to normal seasonal fluctuation. Note that borrowing was necessary in 4 consecutive months to make ends meet.

5. Attempt to plan the financing of your farm and the expenditures of farm funds to minimize the cost and difficulty of obtaining the money needed. Ideally, repayment of short-term credit and principle payments on longer term borrowing should be scheduled to fall when money will be available from sales.

Hand In

1. A revised financial control budget for the Rolling Meadows Farm. Plan and explain how these finances can best be handled for the borrowing and repayment of capital. Explain why you believe this is the best way to handle the finances for this operation.

2. Work out a financial control budget for your farm plan when in full operation. Include principle payments on the real estate mortgage when it is 40 percent paid off. Explain and defend your handling of finances.
## Monthly Financial Control

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<td>274</td>
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1/ Includes $136 real estate taxes for each half.

2/ Includes $132 income taxes and $63 personal property taxes.

3/ Interest on borrowed operating money.
### Monthly Financial Control

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<th>Beginning Bank Bal. (1)</th>
<th>Expected Receipts (2)</th>
<th>Tot. Avail. Funds (1+2) (3)</th>
<th>Expected Financial Expenditures</th>
<th>Cash Balance (3-8) (9)</th>
<th>Necessary Borrowed Money (10)</th>
<th>Ending Bank Balance (11)</th>
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Tenure and Leasing

Problem

The methods used to obtain the use of our basic resources, particularly land, may, to a large degree, control the profitability of the farm business. It is desirable to know what methods are available and the requirements of each in order to use the one most advantageous for our particular situation.

Procedure

1. Study the information handed out in class, in the laboratory manual and review class discussion. Work out the leasing exercises on the following pages.

2. Using your farm plan when in full operation and a ________ system of renting,
   a. Calculate the capital requirements for the landlord and for the tenant.
   b. Calculate the income and expense for the landlord and the tenant with the typical division of costs and returns shown on page
   c. Determine the rate of return on the landlord's capital. Compute the tenant's labor and management income and his return on investment.
   d. Is the typical division of expenses and receipts fair to both parties? If not, make adjustments to improve the equitability of the lease. Show how these changes affect the returns to both parties.
Table for Comparison of Owner and Operator Expenses
For Evaluation of the Equity of a Farm Lease

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<th>Items of Expense</th>
<th>(A) Estimated Total Value Dollars</th>
<th>(B) Estimated Interest Rate Percent</th>
<th>(C) Estimated Annual Cost Whole Farm Dollars</th>
<th>(D) Landlord's Share % Dollars</th>
<th>(E) Tenant's Share % Dollars</th>
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<tr>
<td>2. Tractors</td>
<td>(6)</td>
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<tr>
<td>3. Machinery &amp; equip.</td>
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<td>4. Productive livestock</td>
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<td>5. Feed and supplies</td>
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Farm Operating Expenses
8. Labor:
   (a) Tenant
   (b) Landlord
   (c) Unpaid family
   (d) Hired

9. Repairs:
   (a) Buildings, fences, etc.
   (b) Machinery

10. Depreciation:
    (a) Buildings, fences, etc.
    (b) Tractors
    (c) Machinery

11. Tractor Fuel
12. Machine work hired
13. Seed purchased
14. Fertilizer and lime
15. Other crop expense
16. Feed purchased
17. Other livestock expense
18. Insurance:
    (a) Buildings
    (b) Personal property
19. Taxes:
    (a) Land and buildings
    (b) Personal property
20. Miscellaneous - Telephone & electricity
    - Custom work hired

21. Total of interest charges & farm operating expenses
CLASS EXERCISE IN LEASING METHODS

1. List methods of renting in order the amount of capital required by -
   a. landlord, 1(highest) 2 3 4 5
   b. tenant, 1(highest) 2 3 4 5

2. List methods of renting in order of farm knowledge, experience, and administration ability required for success in case of -
   a. landlord, 1(highest) 2 3 4 5
   b. tenant, 1(highest) 2 3 4 5

3. List methods of renting in order of time and frequency of visits to farm required of landlord.
   1(most) 2 3 4 5

4. List methods of renting in order of the amount of net income that it will provide under typical conditions to -
   a. landlord, 1(most) 2 3 4 5
   b. tenant, 1(most) 2 3 4 5

5. In most instances what type of renting appears likely to best fit the following situations. You should be able to give reasons for your choice of methods.
   a. A beginning tenant, first choice second choice
   b. Farm owned by city born widow, first choice second choice
   c. Farm owned by widow of young farmer with a growing family
      first choice second choice
   d. Farm owned by "well fixed" business or professional man
      (1) within an hours drive of place of business
         1st choice 2nd choice
      (2) within a days drive of place of business
         1st choice 2nd choice
   e. Farm owned by a successful farm operator who thinks he would like to take things a little easier
      1st choice 2nd choice
   f. Farm owned by prominent farmer elected to office of County Treasurer for two years
      1st choice 2nd choice
g. A small farm (80 acres or less)  
1st choice__________  2nd choice__________

h. A hill land farm  
1st choice__________  2nd choice__________

i. A truck garden or small fruit farm  
1st choice__________  2nd choice__________

j. A tenant with considerable experience and capital  
1st choice__________  2nd choice__________

k. A farm with a considerable building investment and well fenced situated a day or more of travel from home of owner  
1st choice__________  2nd choice__________

6. Should one have a written lease? Why?

7. What are the major items that should be covered in it to -  
(a) make it a legally binding contract?  
(b) make it a good lease from the standpoint of sound profitable agriculture?

8. What are the major weaknesses of the present tenant system? Can these be largely eliminated without doing away with tenancy? If so, how?
Although the division indicated in the table on the following page is fairly typical throughout the state, it is not necessary that all leases follow the patterns indicated. In fact, some deviation from the typical is desirable and necessary in many cases if the resulting lease is to be sound and equitable.

The general rule to follow in making up any lease is to keep the share of income received by each in line with the contribution made by each. Or if it is desired not to vary the customary pattern of dividing the income, then the contribution of each should be kept in line with the share of income received.

Some common deviation from the typical pattern -
1. Where the type of farming followed is predominantly made up of an enterprise or enterprises that require large amounts of labor in relation to land such as dairy, poultry, small fruit, etc. it is becoming increasingly common to give the tenant a somewhat larger share of the income or for the landlord to increase his share of the contributions. Many landlords prefer to do the latter. Some do it by supplying all of the cows in the case of the dairy. Others furnish some of the special equipment as milking machines, coolers, feed preparation equipment, etc. Some pay part of the hired labor bill.

2. Most long established tenants, once the farm has been fully limed, pay their share of current or maintenance applications of lime.

3. Where hay or straw are sold, landlord usually pays his share of baling that part of crop which is sold.

Some common bargaining points or contributions which vary considerably from farm to farm -
1. Grass seed: Sometimes landlord pays all, in others, tenant pays part, seldom, except in case of cash lease, will tenant pay all.

2. Fuel and oil: Sometimes the landlord pays $\frac{1}{2}$ or for a fixed amount of gas and the tenant pays the balance.

3. Machine hire: Cost is shared in various ways depending on other contributions of parties.
Typical Division between Landlord and Tenant of Factors of Production, Expense Items and Income in the Different Methods of Renting in Ohio

<table>
<thead>
<tr>
<th>Factors of production and of expense items</th>
<th>Crop share only</th>
<th>Crop share + cash rent for pasture &amp; bldgs.</th>
<th>Livestock share</th>
<th>1/3 share</th>
<th>Cash rent only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ll.  T.</td>
<td>Ll.  T.</td>
<td>Ll.  T.</td>
<td>Ll.  T.</td>
<td>Ll.  T.</td>
</tr>
</tbody>
</table>

| Real estate                               | all            | all                                        | all            | all       | all           |
| Labor                                     | all            | all                                        | all            | all       | all           |
| Management of operations                  | part-          | part-                                      | part-          | part+     | part         |
| Machinery and power                       | all            | all                                        | all            | all       | all           |
| Livestock                                 | all            | 1/2                                        | 1/2            | 1/2       | all           |
| Cash for operation                        | part-          | part-                                      | part-          | part++    | part         |
| Purchased feed                            | all            | all                                        | 1/2            | 1/2       | 2/3           |
| Home grown feed                           | all            | 1/2                                        | 1/2            | 2/3       | 1/3           |
| Seed - corn & grain                       | 1/2            | 1/2                                        | 1/2            | 2/3       | 1/3           |
| - grass seed                              | 1/2            | 1/2                                        | 1/2            | 1/3       | all           |
| Fertilizer                                | 1/2            | 1/2                                        | 1/2            | 1/3       | all           |
| Lime                                      | all            | all                                        | all            | all       | all           |
| Machines hired - combine                  | 1/2            | 1/2                                        | 1/2            | 2/3       | 1/3           |
| - baler                                   | 1/2            | 1/2                                        | 1/2            | 3/3       | all           |
| - picker                                  | all            | all                                        | all            | all       | 2/3           |
| Fuel and oil                              | all            | all                                        | 1/3            | 1/3       | all           |
| Machinery repair                          | all            | all                                        | 1/2            | 1/3       | all           |
| Feeder livestock                          | all            | 1/2                                        | 1/2            | 1/2       | 2/3           |

Real estate repairs & addition
 labor for minor items   | all            | all                                        | all            | all       | all           |
 labor for new or major items | all          | all                                        | all            | all       | all           |
 materials for repairs   | all            | all                                        | all            | all       | all           |
 Real estate tax & insurance | all          | all                                        | all            | all       | all           |
 Chattel taxes & insurance | part-          | part-                                      | part-          | part      | part         |
 Income received
 1/2 of crops | 1/2 of crops | 1/2 of crops | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/3 | 1/3 | cash rent | all | crop & 1/2 |          |
Starting Farming - Ownership Vs. Renting

by T.R. Nodland and D.S. Moore

(Excerpts from Report No. 220, Department Agricultural Economics, 1954)
University of Minnesota

Introduction

The beginning farmer with a moderate amount of savings is often perplexed with the problem of whether it would be best to start farming as an owner or as a tenant. A number of arguments may run through his mind for and against taking either course.

These arguments may run somewhat as follows: "If I buy a farm, I will have to go deeply in debt, and even then I will have only enough savings to make a down payment on a small, low-priced farm. In case of bad weather, disease losses, sickness or falling prices, I could lose all the savings which I put into it. On the other hand, if I purchased, I could work out my own cropping program without landlord interference, I could operate the farm as I wished, and all the income and benefits of improved operations would go to me. If I did not purchase but rented instead, I probably would be able to get hold of a larger and more productive farm unit, but I would have to divide the income with the landlord. Besides, I might not be able to use the cropping program which I would like, and I would never know from one year to the next when I might have to move."

If the beginning farmer definitely decides to rent rather than to buy a farm, he may still have to decide the tenure arrangements under which he should start. Would he do best on a large, well stocked farm under a 50-50 livestock and crop share lease? Or would he be better off with a cash or a cash and crop share lease on a farm not so well stocked and equipped?

Answers to these questions depend partially upon the amount of savings which the beginner has accumulated. Even so, there is a large area of uncertainty, in which the best course of action may not be clearly obvious. One means of shedding light on these problems is to find out how other beginners have been starting and how they have been faring under different types of tenure arrangements. A knowledge of the experiences of other beginning farmers starting as tenants or as owners should be useful to the beginners who are trying to decide upon their own best course of action.

The purpose of this report is (1) to provide some information relative to the minimum amount of capital needed to start farming in southern Minnesota under various tenure arrangements, (2) to show the earnings and financial progress made by beginning farmers and (3) to show the effect of type of tenure arrangements on the various management factors affecting earnings.
Summary and Conclusions

This report is based upon 562 records of beginning farmers in southern Minnesota who took on-the-farm training during the years 1947-51. It gives a comparison of the amount and sources of capital used, the earnings and financial progress, and efficiency of farm operations under the most common types of tenure in southern Minnesota.

What significance does this information have for the beginning farmer? What interpretations can be drawn which may be of value to other young men who are planning to start farming? The following paragraphs give a summary of some of the more significant facts and conclusions developed from a study of these records.

1. Beginners generally tended to be on farms which were smaller than the average for their community. Not only were the farms smaller, but they also tended to have a lower value per acre than the average. Farms operated by livestock and crop share tenants were an exception, these farms being about as large and having almost as high a value per acre as the average of all farms in the area.

2. The farms of beginning owner-operators were both smaller and poorer than the farms operated by beginning tenants. Beginners who started as owner-operators ordinarily did not have the financial resources to obtain as large or as productive farms as the tenants obtained by renting.

3. The most common tenure arrangements used by beginning tenants were livestock and crop share leases in southeastern Minnesota and cash and crop share leases in southwestern Minnesota. Livestock and crop share tenants tended to be on the largest farms of any of the beginners. Under a livestock and crop share lease, a beginner with relatively small savings usually is able to operate a better farm and a larger business since the landlord furnishes part of the working capital. However, he has to divide the larger income of the larger and better farm with the landlord.

4. The amount of savings invested in the farm business ranged from an average of about $3,300 for livestock and crop share tenants to an average of about $9,500 for owner-operators. Owner-operators had roughly three times as much savings invested in the farm business as livestock and crop share tenants, twice as much as cash and crop share tenants, and about one and one-half times as much as cash tenants. Relatively few beginners with savings of less than $5,000 were trying to start as owners, and relatively few of them with savings of over $10,000 were operating under a livestock and crop share lease.

5. Beginners starting as owner-operators were using considerably larger amounts of borrowed capital than were beginners starting as tenants. Moreover, many of the owners were operating on a very small equity, particularly those with small savings. On an average, owners with a net worth of less than $10,000 had liabilities which amounted to well over one-half of total assets, making them especially vulnerable to weather and disease hazards and to falling prices. Tenants generally were not nearly as deeply in debt.

6. The earnings of owners averaged considerably smaller than the earnings of tenants, although the differences were not nearly as marked where both tenants and owners had a net worth of over $10,000. Livestock and crop share tenants had the largest average earnings of any tenure group for the beginners with a net worth of under $10,000, but for beginners who had a net worth of over $10,000, this group had the lowest average earnings.
7. The reason the owner-operators had lower earnings than tenants was due largely to the fact that they were on smaller and poorer farms. Tenants by renting were able to employ the use of a greater amount of capital than owners were using. Livestock and crop share tenants had use of the largest amount of capital of any of the beginners and they were operating larger and better farms. Because of this, they had higher crop yields, their farms had higher livestock intensity, their labor efficiency was greater, and they had lower power, machinery and building expenses per work unit. These advantages became less as the size of the beginner's net worth increased.

8. Over 90 percent of the beginners showed financial progress during the period for which records were kept. There appeared to be little relationship between the size of net worth and whether or not the beginner made financial progress. Despite the fact that owners had considerably smaller earnings than tenants, they showed about the same financial progress, measured in terms of average annual change in net worth. This was evidently made possible by spending less for family living.

9. The experience of these beginners indicate that a young man can make a successful start in farming with only a few thousand dollars of his own, but unless he has substantial savings and has had considerable experience, he would probably be better off to start as a renter. Greater returns can be obtained by investing limited funds in livestock, feed and machinery for a large, productive, rented farm than by investing in a small, unproductive unit as an owner. With savings of less than $5,000, most beginners had higher earnings and showed greater financial progress under a livestock and crop share lease than under any other tenure arrangement.

10. With somewhat larger savings ($8,000 to $12,000) and under favorable circumstances, beginners can show about as much financial progress starting as an owner as they can by starting as a tenant. To do this, however, they must make some temporary sacrifice in the form of accepting a lower standard of living - at least in the earlier years. They are under greater pressures because of heavier debt loads and greater risks, which forces frugality and hard work. Also the pride of ownership may give them greater incentives for hard work than might be the case if they were starting as tenants. It should be kept in mind, however, that usually they are operating under the handicap of smaller and poorer farms than the average beginning farmer.

11. The managerial ability of the operator is the greatest single factor in modern farming. It is more important than the amount of savings a beginning farmer had accumulated for a start in farming. A young man who has farm experience, knows modern farming techniques, who is honest and frugal and has a desire to be a farmer is quite likely to succeed even though his financial resources are limited.
Cash rents, like the terms of leases for other methods of renting, are largely determined by competition. Both renters and landowners have an interest in determining what is fair and equitable. Three methods can be used to determine a fair and equitable cash rent for farm real estate. The three methods might well be thought of as separate parts of the same method, because each can be used as a check on the others. They may also be used in establishing guidelines for competitive determination of rent.

These three methods are presented as applying to a complete farm unit, but they are also adapted to cash rental of individual fields for crops or pasture. It should be noted that in many farming situations, dwellings, barns, lots, and pastures may be surplus, and cash rent or share rent for cropland only may be as high as rentals for similar lands plus the use of some pasture and buildings. In other words rental rates, particularly in some localities, do not appear to be greatly influenced by the inclusion or exclusion of buildings and pasture when these are more or less incidental to the cropland.

1. **Comparative Method**

What rentals are being paid for similar farms in the same locality? The "going rate" for farm land is one way to establish a rental figure. But farms have their differences as well as their similarities. Therefore, in using the comparative method it is necessary to take into account the things which might raise or lower the value of the right to use a particular property. Some of these things are: size; topography; layout of fields; percent of land suitable for crops; condition, adequacy,
and convenience of buildings; water supply; desirability as a place to live; availability and convenience of community services and markets.

Cash rents tend to fluctuate less and to lag behind changes in farm prices and land value trends. Therefore, it may be important to know how long a particular rental has been in effect on a particular farm.

2. **Capital Value Method**

What is a fair value for the farm for agricultural production uses? What rate of interest return can be realized from the farm? These questions must be answered in order to apply the Capital Value Method yardstick to measure cash rent. For purposes of illustration, let us assume that we have a 200-acre farm valued for agricultural purposes, at $70,000. This is $350 per acre, or $275 an acre for the land and $15,000 for the buildings. Let us also assume that five percent net interest return is acceptable. Then, $70,000 X .05 = $3,500, the net return which the owner of the farm would like to realize. But the owner would have certain expenses to pay from the farm income, before obtaining his net return or net rent. Most of these expenses could be closely estimated from current experience. But depreciation on improvements is an item which must be estimated according to some general rules.

The value of the improvements--buildings, fences, tile, etc.--divided by the life expectancy of those improvements yields the annual depreciation. In practice, depreciation is usually figured separately for each item. In the example given here, only the aggregate figures are presented.

The following figures illustrate the classes of items which ordinarily would be taken into account in estimating the gross cash rent which would be necessary to yield the above-mentioned net rent and also cover the landlord's expenses:
Net rent ($70,000 X .05) = $3,500
Depreciation on buildings ($15,000 value ÷ 30 years life expectancy) = 500
Building and fence repair = 300
Taxes = 700
Insurance = 50

Total gross cash rent = $5,050

The total gross rent of $5,050 figures out as $25.25 per acre, and
represents a gross rate of return on investment of 7.21 percent ($5,050 ÷ 70,000 = .0721).

3. Share Rental Value Method

If a farm were to be share rented, what share of the crops should the owner receive? This would vary greatly depending on the expenses stood by the owner and on the productive capacity of the farm. If the owner provided the farm but paid no share of the operating expense, he would have expense for the categories in the previous section: depreciation and repair of improvements, taxes and insurance. The owner would likely receive one-third of the crops (or 1/3 of their value) in this case. The following example indicates how this would work out for a given acreage, cropping program, yield level and prices. Note that a cash rent is paid for the use of the pasture and buildings.

70 a. corn @ 80 bu. = 5600 bu. X $1.10 = $6,160 X 1/3 = $2,053
35 a. soybeans @ 26 bu. = 910 bu. X $2.50 = $2,275 X 1/3 = 758
35 a. wheat @ 30 bu. = 1050 bu. X $1.30 = $1,365 X 1/3 = 455
35 a. hay @ 3½ T. = 122½ T. X $20 = $2,450 X 1/3 = 817
20 a. pasture @ $8 per a. = 160

Buildings--payment for use of dwelling, barns, sheds, lots, etc. = 700

Total = $4,943

$4,943 ÷ 200 acres = $24.76 per acre gross rent.

In this example the gross rent by the various methods does not come out exactly the same. In your case it isn't likely to come out exactly the same either, which points out the importance of using all of these methods as checks on each other.
GLOSSARY OF REAL ESTATE TERMS

Fee Simple Ownership - Complete ownership of all property right; Ownership without limitation. In the United States four ownership rights to all land are retained by government. These rights are:

1. Taxation - Charges levied by a political subdivision to obtain revenue for carrying on the functions of government.

2. Eminent domain - Right of public authority to seize property needed for societal use, after due process of law and payment of just compensation.

3. Police power - Regulation of the use of property for protection of public interest. Includes regulation in commerce, health control and zoning (a type of police power)

4. Escheat - Control of the distribution of property when the owner dies intestate (dies without a will)

Warranty Deed - Legal instrument conveying title to real property which contains an agreement by the grantor (seller) to protect and defend the grantee (buyer) against all lawful claims against the property.

Sheriff or Trustee Deed - Deed granted by the officer or person designated by the court to execute and convey real property that has been placed under the authority of the court.

Quit Claim Deed - A release by the grantor (seller) of whatever right he alone may have in the property.

Real Estate - Land and the attachments which include fixtures and improvements.

Chattel - Personal property such as livestock, harvested crops, machinery, household goods, automobile and other movable property.

Assessment - Charges levied by a political subdivision to collect revenue for some improvement made in a given area; the charges are against the property which is benefited by the improvement.

Easement - Permanent right to use the property belonging to another person, as an easement for access to a land locked parcel by going through a neighbor's field.

Lease - A license or temporary right to use the property belonging to another person.

Mortgage - (mortgage deed) - A deed conveying the property to a creditor as security for payment of a debt.

Note - An instrument providing for unconditional promise to repay a claim or debt.

Tenancy in Entirety - Fee simple ownership.

Tenancy in Common - Two or more persons own the same tract of land, each having a fractional interest in the undivided whole. A tenant in common may sell, convey or encumber his share of ownership, but his share cannot be physically separated from the balance.
**Joint Tenancy** - Similar to tenancy in common but has right of survivorship. When one joint tenant dies, his interest is divided among the other joint tenants rather than among his heirs.

**Life Estate** - Entitles the life tenant to possession, use and increase of the property during the person's lifetime. The life tenant cannot affect the legal right of the remainderman.

**Land Contract** - A contract for purchase and sale of real property which provides for transfer of the deed from seller to buyer at some time in the future when a certain amount of money has been paid to the seller. Ordinarily gives buyer most of the rights of ownership immediately, with small down payment.
**Taxes: Real Estate and Personal Property**

**Real Estate**

In Ohio, our farm real estate is appraised for taxation purposes based upon its going market value during a base period three or four years earlier. The tax valuation is usually about 45 per cent of market value.

Reappraisals are made every six years. The valuation of each parcel of property is on the same basis as every other parcel, except for the variations that may occur within the six year period.

Tax rates are different for each taxing district, depending upon the tax base, tax dollars needed and bond issues that have been authorized. Tax rates are expressed in mills or 1/10 of a cent. A tax rate of 30 mills means 3 cents per dollar or $30 per $1,000 of tax valuation.

Taxes are assessed in two equal installments designated as June taxes and December taxes, but usually due 1 to 3 months after these designated dates. The tax on real estate in Ohio is computed as follows:

- fair market value $25,000
- tax valuation factor (45%) .45
- assessed tax value $11,250
- tax district millage rate, 30 mills .030

annual tax $337.50
- semi-annual payment, $168.75

**Personal Property**

Tax on personal property is another Ohio tax required of farm operator. This tax is an inventory tax of an established date on tangibles (machinery, livestock, grain) and intangibles (stock, bonds, notes, mortgages). January 1 is the tax date for equipment and livestock, and February 15 for crops. The state tax commission provides schedules of valuation for livestock crops and other commodities. Depreciable equipment is taxed in accordance with the schedule provided by the State Tax Commission. This schedule permits 10% depreciation to be taken each year for seven years and then 2.5 per cent for the eighth and for the ninth years. The remaining value, 25% of acquisition cost, must be used as long as the asset is held on the farm.

The tax computation is as follows:
An Example:

<table>
<thead>
<tr>
<th>Item</th>
<th>True Valuation</th>
<th>Tax Listed Value--50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock: breeding stock and market animals on hand Jan. 1</td>
<td>$2,900</td>
<td></td>
</tr>
<tr>
<td>Less Individual Ohio Resident Deductions</td>
<td></td>
<td>$1,400</td>
</tr>
<tr>
<td>Agricultural products: grain, hay, products Feb. 15</td>
<td>4,200</td>
<td>2,100</td>
</tr>
<tr>
<td>Machinery: depreciated according to age Jan. 1</td>
<td>5,800</td>
<td>2,900</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$6,400</td>
</tr>
</tbody>
</table>

At a tax rate of 30 mills, the personal property tax would be

\[ $6,400 \times 0.03 = $192.00 \]
Every farm manager makes many decisions that require consideration of future prices. Choosing between alternative plans for the use of available resources is an important managerial function. The primary purpose of planning or budgeting is to select the best course of action to achieve maximum future returns. Although we have little insight into the future, there are several tools and guides available to help us select our best alternative.

The Planning Horizon

Two quite different horizons must be kept in mind when making farm plans. First is an organizational or long run horizon which is far enough in the future that resources such as machinery and buildings, will be worn out and must be replaced to continue in production. Acquisition of long lived productive inputs is usually based on the assumption that they can be used efficiently until fully consumed or depreciated. This horizon may encompass 15 to 30 or more years.

A second shorter horizon is used for making current or operational decisions. This may be one year or one production cycle which in the case of crops consists of a season.

A Look in the Tool Box

Past prices provide one of the very useful tools in predicting future price relationships. Over periods of time prices tend to have a similar relationship one to another. Some of these relationships have been used as norms or standards (corn-hog ratios).

Historical price movements such as trends, cycles, and seasonal changes provide the farm manager with another useful tool. Price trends reflect changes that encompass several production cycles and show the effects of changes in our total economy. Cyclical movements, such as the cattle cycle, are related to the time required to expand or contract an enterprise.
Seasonal price changes are directly related to the production of a commodity during the year. Corn is usually at its lowest price during harvest and increase as the season progresses, dropping at the end of the feeding period or when the next crop is ready for harvest.

Guides

Past prices and price relationship can be very helpful to a manager in testing and evaluating his alternatives. However, it must be remembered that agriculture is not a separate distinct isolated segment of our national economy. Every manager should be aware of seasonal fluctuations, his position in the cycle and expected changes in the general economy.

The planning period under consideration is important when selecting the prices to use. Ideally we need to use the prices that will be realized as each part of the plan becomes operational. Current prices with minor adjustments for the position in the cycle may be our best estimate of next year's prices. For a longer planning period, an average of a period of years including both the high and low of one or several cycles, may provide the best price estimate. In any event the set of prices selected should be sufficiently recent to reflect comparable technology and long enough to average out one cycle.

Generally, commodities produced on farms and commodities such as processed feeds tend to rise and fall with the demand for farm products. However, items used in farm production such as fuel, machinery and utilities tend to be sticky and change slowly.

Summing Up

A farm manager must constantly estimate future prices of items he will need for production and of commodities he will have available for sale. No one set of prices is adequate to meet all of these needs. These tools and guides can be used to help select a desirable plan and accurately estimate anticipated future income. Adjustments must be made when selecting any set of prices for a particular farm program. Advantages of location, personal contacts, and operating conditions make each farm situation an individual consideration.
### Livestock and Livestock Prices Received by Ohio Farmers

<table>
<thead>
<tr>
<th>Item</th>
<th>1948-1967 20 Year Average</th>
<th>1963-1967 5 Year Average</th>
<th>Average 1966</th>
<th>Average 1967</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Hogs (200-220#)</td>
<td>18.74</td>
<td>18.84</td>
<td>23.37</td>
<td>19.31</td>
</tr>
<tr>
<td>Sows</td>
<td>16.45</td>
<td>16.30</td>
<td>19.77</td>
<td>16.43</td>
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<tr>
<td>Slaughter Lambs</td>
<td>20.91</td>
<td>21.59</td>
<td>23.83</td>
<td>22.43</td>
</tr>
<tr>
<td>Feeder lambs (S. St. Paul)</td>
<td>-</td>
<td>20.84</td>
<td>23.58</td>
<td>21.45</td>
</tr>
<tr>
<td>Ewes</td>
<td>6.88</td>
<td>6.38</td>
<td>7.55</td>
<td>6.57</td>
</tr>
<tr>
<td>Veal calves</td>
<td>26.21</td>
<td>29.94</td>
<td>29.18</td>
<td>31.50</td>
</tr>
<tr>
<td>Cull cows: Commercial</td>
<td>17.27</td>
<td>15.71</td>
<td>18.31</td>
<td>16.96</td>
</tr>
<tr>
<td>Canners and cutters</td>
<td>14.02</td>
<td>14.32</td>
<td>16.73</td>
<td>16.27</td>
</tr>
<tr>
<td>Beef steers (900-1100#)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prime</td>
<td>-</td>
<td>25.77</td>
<td>27.00</td>
<td>26.26</td>
</tr>
<tr>
<td>Choice</td>
<td>-</td>
<td>24.97</td>
<td>26.20</td>
<td>25.70</td>
</tr>
<tr>
<td>Good</td>
<td>-</td>
<td>23.44</td>
<td>24.86</td>
<td>24.56</td>
</tr>
<tr>
<td>Fluid milk blend</td>
<td>4.69</td>
<td>4.81</td>
<td>5.22</td>
<td>5.62</td>
</tr>
<tr>
<td>Manufactured milk</td>
<td>3.23</td>
<td>3.59</td>
<td>4.03</td>
<td>4.15</td>
</tr>
<tr>
<td>Wool (per lb. ex government payment)</td>
<td>.501</td>
<td></td>
<td>.479</td>
<td>.51</td>
</tr>
<tr>
<td>(government payment)</td>
<td></td>
<td></td>
<td>.36</td>
<td></td>
</tr>
<tr>
<td>Eggs (dozen)</td>
<td>.375</td>
<td>.324</td>
<td>.369</td>
<td>.288</td>
</tr>
<tr>
<td>Broilers (per lb.)</td>
<td>.227</td>
<td>.156</td>
<td>.166</td>
<td>.149</td>
</tr>
<tr>
<td>Turkeys (per lb.)</td>
<td>.280</td>
<td>.221</td>
<td>.234</td>
<td>.211</td>
</tr>
</tbody>
</table>

Source: Agricultural Prices, USDA, SRS.
AVERAGE MONTHLY PRICES OF 900-1100# SLAUGHTER STEERS
BY GRADE, CHICAGO, JULY 1959-JUNE 1968*

*Note that the seasonal price peak did not occur during the same month each year and is influenced by the position of the long time cycle. The price spread was about $2.00 per hundredweight between the prime choice grades and about $2.50 between the choice and good grade cattle.
AVERAGE MONTHLY PRICE (1963-1967) RECEIVED BY OHIO FARMERS FOR SELECTED CROPS

Source: Ohio Agricultural Prices

* $ per ton
° $ per bushel
Grain and Hay Prices Received by Ohio Farmers for Selected Years

<table>
<thead>
<tr>
<th>Item</th>
<th>20 Year Average (1948-1967)</th>
<th>5 Year Average (1963-1967)</th>
<th>Yearly Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains $/Bu. 1/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn</td>
<td>1.28</td>
<td>1.16</td>
<td>1.10</td>
</tr>
<tr>
<td>Wheat</td>
<td>1.87</td>
<td>1.58</td>
<td>1.88</td>
</tr>
<tr>
<td>Oats</td>
<td>.72</td>
<td>.69</td>
<td>.68</td>
</tr>
<tr>
<td>Soybeans</td>
<td>2.52</td>
<td>2.67</td>
<td>2.56</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hay $/ton 2/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfalfa</td>
<td>26.15</td>
<td>27.77</td>
<td>29.21</td>
</tr>
<tr>
<td>Mixed (C-T)</td>
<td>22.43</td>
<td>24.59</td>
<td>25.79</td>
</tr>
</tbody>
</table>

1/ Grain prices delivered at elevator. Conditioning and hauling charges must be deducted to get net farm price.

2/ Average price for all cuttings, baled.

Grain and Hay Received by Ohio Farmers by Month in 1967

<table>
<thead>
<tr>
<th>Month</th>
<th>$ Per Bushel 1/</th>
<th>$ Per Ton 2/</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corn</td>
<td>Wheat</td>
</tr>
<tr>
<td>Jan.</td>
<td>1.27</td>
<td>1.56</td>
</tr>
<tr>
<td>Feb.</td>
<td>1.25</td>
<td>1.50</td>
</tr>
<tr>
<td>Mar.</td>
<td>1.30</td>
<td>1.64</td>
</tr>
<tr>
<td>Apr.</td>
<td>1.28</td>
<td>1.55</td>
</tr>
<tr>
<td>May</td>
<td>1.27</td>
<td>1.51</td>
</tr>
<tr>
<td>June</td>
<td>1.26</td>
<td>1.41</td>
</tr>
<tr>
<td>July</td>
<td>1.21</td>
<td>1.31</td>
</tr>
<tr>
<td>Aug.</td>
<td>1.12</td>
<td>1.32</td>
</tr>
<tr>
<td>Sept.</td>
<td>1.10</td>
<td>1.30</td>
</tr>
<tr>
<td>Oct.</td>
<td>1.05</td>
<td>1.31</td>
</tr>
<tr>
<td>Nov.</td>
<td>.96</td>
<td>1.29</td>
</tr>
<tr>
<td>Dec.</td>
<td>1.01</td>
<td>1.33</td>
</tr>
<tr>
<td>Ave.</td>
<td>1.17</td>
<td>1.42</td>
</tr>
</tbody>
</table>

1/ Grain prices delivered at elevator. Conditioning and hauling charges must be deducted to get net farm price.

2/ Average price for all cuttings, baled.

Source: Ohio Agricultural Prices.
### Feeder Cattle Prices Paid at Kansas City for Selected Year

#### Feeder Steers (300-550) Choice

<table>
<thead>
<tr>
<th>Month</th>
<th>5 Year Average</th>
<th>1963</th>
<th>1964</th>
<th>1965</th>
<th>1966</th>
<th>1967</th>
<th>1968</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td></td>
<td>27.25</td>
<td>29.50</td>
<td>26.01</td>
<td>22.85</td>
<td>28.19</td>
<td>29.69</td>
</tr>
<tr>
<td>February</td>
<td></td>
<td>27.93</td>
<td>29.68</td>
<td>26.16</td>
<td>23.16</td>
<td>30.96</td>
<td>29.69</td>
</tr>
<tr>
<td>March</td>
<td></td>
<td>28.42</td>
<td>29.10</td>
<td>26.64</td>
<td>23.92</td>
<td>32.45</td>
<td>30.01</td>
</tr>
<tr>
<td>April</td>
<td></td>
<td>28.28</td>
<td>29.48</td>
<td>25.29</td>
<td>25.14</td>
<td>31.27</td>
<td>30.21</td>
</tr>
<tr>
<td>May</td>
<td></td>
<td>28.31</td>
<td>28.96</td>
<td>24.17</td>
<td>25.75</td>
<td>31.80</td>
<td>30.83</td>
</tr>
<tr>
<td>June</td>
<td></td>
<td>28.20</td>
<td>29.21</td>
<td>24.02</td>
<td>26.10</td>
<td>30.90</td>
<td>30.75</td>
</tr>
<tr>
<td>July</td>
<td></td>
<td>27.69</td>
<td>29.42</td>
<td>23.42</td>
<td>25.85</td>
<td>29.02</td>
<td>30.75</td>
</tr>
<tr>
<td>August</td>
<td></td>
<td>27.54</td>
<td>28.66</td>
<td>22.90</td>
<td>25.41</td>
<td>29.81</td>
<td>30.93</td>
</tr>
<tr>
<td>September</td>
<td></td>
<td>27.49</td>
<td>27.91</td>
<td>23.12</td>
<td>26.06</td>
<td>30.21</td>
<td>30.16</td>
</tr>
<tr>
<td>October</td>
<td></td>
<td>27.17</td>
<td>27.04</td>
<td>22.63</td>
<td>26.12</td>
<td>30.09</td>
<td>29.98</td>
</tr>
<tr>
<td>November</td>
<td></td>
<td>26.90</td>
<td>26.78</td>
<td>22.82</td>
<td>26.15</td>
<td>29.71</td>
<td>29.03</td>
</tr>
<tr>
<td>December</td>
<td></td>
<td>26.77</td>
<td>25.74</td>
<td>22.45</td>
<td>27.13</td>
<td>29.31</td>
<td>29.20</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>27.66</td>
<td>28.46</td>
<td>24.14</td>
<td>25.30</td>
<td>30.31</td>
<td>30.10</td>
</tr>
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</table>

#### Feeder Steers (550-750) Good

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td></td>
<td>22.68</td>
<td>25.14</td>
<td>21.32</td>
<td>19.56</td>
<td>24.01</td>
<td>23.36</td>
</tr>
<tr>
<td>February</td>
<td></td>
<td>22.69</td>
<td>24.42</td>
<td>20.76</td>
<td>19.41</td>
<td>25.40</td>
<td>23.44</td>
</tr>
<tr>
<td>March</td>
<td></td>
<td>22.92</td>
<td>24.00</td>
<td>20.92</td>
<td>20.05</td>
<td>26.57</td>
<td>23.08</td>
</tr>
<tr>
<td>May</td>
<td></td>
<td>23.36</td>
<td>23.74</td>
<td>19.41</td>
<td>22.27</td>
<td>26.39</td>
<td>24.97</td>
</tr>
<tr>
<td>June</td>
<td></td>
<td>23.47</td>
<td>24.18</td>
<td>19.87</td>
<td>22.88</td>
<td>25.37</td>
<td>25.04</td>
</tr>
<tr>
<td>July</td>
<td></td>
<td>23.08</td>
<td>24.77</td>
<td>19.38</td>
<td>22.68</td>
<td>23.91</td>
<td>24.95</td>
</tr>
<tr>
<td>August</td>
<td></td>
<td>23.06</td>
<td>24.15</td>
<td>18.66</td>
<td>22.52</td>
<td>24.78</td>
<td>25.20</td>
</tr>
<tr>
<td>September</td>
<td></td>
<td>22.86</td>
<td>23.56</td>
<td>19.38</td>
<td>22.50</td>
<td>24.88</td>
<td>23.96</td>
</tr>
<tr>
<td>October</td>
<td></td>
<td>22.28</td>
<td>22.84</td>
<td>18.83</td>
<td>22.50</td>
<td>23.74</td>
<td>23.50</td>
</tr>
<tr>
<td>November</td>
<td></td>
<td>22.20</td>
<td>22.41</td>
<td>19.42</td>
<td>22.47</td>
<td>23.55</td>
<td>23.13</td>
</tr>
<tr>
<td>December</td>
<td></td>
<td>22.05</td>
<td>21.14</td>
<td>19.06</td>
<td>23.27</td>
<td>23.06</td>
<td>23.70</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>22.80</td>
<td>23.71</td>
<td>19.71</td>
<td>21.78</td>
<td>24.83</td>
<td>23.96</td>
</tr>
</tbody>
</table>

1/ Price differential between choice and good in a given class averaged about $2.50. Heifers average $.250-3.00/cwt. less than steers.

2/1968 prices not included in any averages.

Source: Livestock Situation, Market News Livestock Division, and Agricultural Prices

The cost of getting the animals from Kansas City to Ohio rail stations (commission, yardage and freight) were an additional $2.00/cwt. Trucking charges from the rail station of sales pavilion were 25¢ to 50¢ per hundredweight depending upon the distance hauled.

Southeastern Ohio cattle delivered in the feedlot cost about the same price as comparable grade animals in Kansas City. The delivered farm cost of cattle purchases from Kansas City was $1.50 to $2.00 per hundredweight higher than southeastern Ohio cattle.
Average Monthly Prices Paid for Graded Feeder Pigs and Market Hogs, Ohio, 1965-1967
## Retail Prices of Commercial Feeds

<table>
<thead>
<tr>
<th>Feed</th>
<th>Price Per Cwt.</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef Supplement</td>
<td>5.80</td>
<td>5.97</td>
<td>6.36</td>
<td>6.11</td>
<td>6.34</td>
</tr>
<tr>
<td>Pig Supplement</td>
<td>5.97</td>
<td>6.10</td>
<td>6.69</td>
<td>6.31</td>
<td>6.69</td>
</tr>
<tr>
<td>Sow and Pig Supplement</td>
<td>5.94</td>
<td>5.96</td>
<td>6.35</td>
<td>6.00</td>
<td>6.29</td>
</tr>
<tr>
<td>40% Pork Maker</td>
<td>5.92</td>
<td>6.17</td>
<td>6.76</td>
<td>6.33</td>
<td>6.90</td>
</tr>
<tr>
<td>32% Dairy Supplement</td>
<td>4.33</td>
<td>4.53</td>
<td>4.98</td>
<td>4.88</td>
<td>4.66</td>
</tr>
<tr>
<td>Calf Pellets</td>
<td>6.18</td>
<td>6.30</td>
<td>6.70</td>
<td>6.31</td>
<td>6.07</td>
</tr>
<tr>
<td>Calf Maker</td>
<td>18.08</td>
<td>20.04</td>
<td>21.16</td>
<td>21.86</td>
<td>22.18</td>
</tr>
<tr>
<td>Lamb Pellets</td>
<td>3.37</td>
<td>3.46</td>
<td>3.62</td>
<td>3.63</td>
<td>3.37</td>
</tr>
<tr>
<td>Sheep Pellets</td>
<td>5.69</td>
<td>5.90</td>
<td>6.38</td>
<td>6.14</td>
<td>6.17</td>
</tr>
<tr>
<td>Free Choice Minerals</td>
<td>4.27</td>
<td>4.32</td>
<td>4.00</td>
<td>4.04</td>
<td>4.15</td>
</tr>
</tbody>
</table>

### Price Per Ton

<table>
<thead>
<tr>
<th>Feed</th>
<th>Price Per Ton</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa Meal 17%</td>
<td>3.74</td>
<td>3.94</td>
<td>4.12</td>
<td>3.32</td>
<td></td>
</tr>
<tr>
<td>Cottonseed Meal 41%</td>
<td>5.27</td>
<td>5.82</td>
<td>5.77</td>
<td>6.02</td>
<td></td>
</tr>
<tr>
<td>Linseed Meal</td>
<td>5.62</td>
<td>5.96</td>
<td>5.68</td>
<td>6.22</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feed</th>
<th>Price Per Ton</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa Meal Dehy 17%</td>
<td>63.75</td>
<td>69.62</td>
<td>72.28</td>
<td>56.64</td>
<td></td>
</tr>
<tr>
<td>Cottonseed Meal 45%</td>
<td>99.00</td>
<td>113.26</td>
<td>111.02</td>
<td>115.35</td>
<td></td>
</tr>
<tr>
<td>Linseed Meal 34%</td>
<td>99.00</td>
<td>109.52</td>
<td>108.27</td>
<td>113.28</td>
<td></td>
</tr>
<tr>
<td>Soybean Oil Meal 44% (Bulk)</td>
<td>83.75</td>
<td>99.19</td>
<td>90.12</td>
<td>100.89</td>
<td></td>
</tr>
<tr>
<td>Soybean Oil Meal 44% (Bagged)</td>
<td>95.60</td>
<td>114.66</td>
<td>104.09</td>
<td>116.67</td>
<td></td>
</tr>
</tbody>
</table>

1/ Ohio Farm Bureau monthly retail prices.
Retail Prices of Fertilizers Per Ton, Ohio, Fall and Spring 1964, 1965, 1966 and 1967

<table>
<thead>
<tr>
<th>Analysis</th>
<th>1964</th>
<th>1965</th>
<th>1966</th>
<th>1967</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spring</td>
<td>Fall</td>
<td>Spring</td>
<td>Fall</td>
</tr>
<tr>
<td>Mixed Fertilizers¹/</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-12-12</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>54</td>
</tr>
<tr>
<td>4-16-16</td>
<td>62</td>
<td>62</td>
<td>64</td>
<td>65</td>
</tr>
<tr>
<td>5-20-20</td>
<td>73</td>
<td>74</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>6-24-12</td>
<td>74</td>
<td>75</td>
<td>76</td>
<td>77</td>
</tr>
<tr>
<td>6-24-24</td>
<td>86</td>
<td>87</td>
<td>89</td>
<td>87</td>
</tr>
<tr>
<td>12-12-12</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>71</td>
</tr>
<tr>
<td>0-20-20</td>
<td>63.3</td>
<td>63</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>8-32-16</td>
<td>95</td>
<td>94</td>
<td>95</td>
<td>95</td>
</tr>
</tbody>
</table>

Nitrogen

Anhydrous Ammonia

<table>
<thead>
<tr>
<th>Analysis</th>
<th>1964</th>
<th>1965</th>
<th>1966</th>
<th>1967</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spring</td>
<td>Fall</td>
<td>Spring</td>
<td>Fall</td>
</tr>
<tr>
<td>Anhydrous Ammonia</td>
<td>135</td>
<td>130</td>
<td>125</td>
<td>115</td>
</tr>
<tr>
<td>Ammonium Nitrate</td>
<td>81</td>
<td>78</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Sulphate of Ammonia</td>
<td>50</td>
<td>48</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>Urea (45%)</td>
<td>105</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Elemental

Superphosphate (20%) | 42     | 43     | 46    | 46    | 45     | 45  |
| Treble Superphosphate (46%) | 75     | 77     | -     | -     | 83     | 80  |
| Muriate of Potash (55%) | 56    | 54     | 56    | 51    | 56     | 55  |
| Rock Phosphate | 23     | 26     | -     | -     | -      | -   |

Agricultural Limestone

(at lime plant)

<table>
<thead>
<tr>
<th>Analysis</th>
<th>1965</th>
<th>1966</th>
<th>1967</th>
<th>1968</th>
</tr>
</thead>
<tbody>
<tr>
<td>45% through 100 mesh screen (bulk)</td>
<td>2.15²/</td>
<td>2.40²/</td>
<td>2.40²/</td>
<td>2.40²/</td>
</tr>
<tr>
<td>60% through 100 mesh screen (bulk)</td>
<td>2.80²/</td>
<td>3.10²/</td>
<td>3.10²/</td>
<td>3.10²/</td>
</tr>
<tr>
<td>98% through 100 mesh screen (bag)</td>
<td>6.70²/</td>
<td>7.00²/</td>
<td>7.00²/</td>
<td>7.00²/</td>
</tr>
</tbody>
</table>

Source: Lime prices from Marble Cliff Quarries. All others from Agricultural Prices.

¹/ Bulk fertilizer $5.00 less per ton.

²/ Price at plant. The percent which passes through a 100 mesh screen is roughly the percent that will become available during the first 3 years.

(Hauling charges of 7c/ton-mile and spreading charges of $.50 per acre should be added to the price per ton.)
Retail Prices of Purchased Farm Seeds  
Ohio, Selected Years

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed Wheat</td>
<td>bu.</td>
<td>60</td>
<td>2.80</td>
<td>2.60</td>
<td>3.15</td>
<td>2.65</td>
</tr>
<tr>
<td>Seed Oats</td>
<td>bu.</td>
<td>32</td>
<td>1.65</td>
<td>1.58</td>
<td>1.74</td>
<td>1.79</td>
</tr>
<tr>
<td>Seed Corn</td>
<td>bu.</td>
<td>56</td>
<td>11.32</td>
<td>11.00</td>
<td>11.70</td>
<td>12.30</td>
</tr>
<tr>
<td>Soybean Seed</td>
<td>bu.</td>
<td>60</td>
<td>4.20</td>
<td>4.25</td>
<td>4.27</td>
<td>4.44</td>
</tr>
<tr>
<td>Red Clover</td>
<td>bu.</td>
<td>60</td>
<td>24.05</td>
<td>21.30</td>
<td>21.60</td>
<td>21.72</td>
</tr>
<tr>
<td>Alfalfa (Certified)</td>
<td>bu.</td>
<td>60</td>
<td>35.39</td>
<td>32.88</td>
<td>34.08</td>
<td>35.46</td>
</tr>
<tr>
<td>Alfalfa (Uncertified)</td>
<td>bu.</td>
<td>60</td>
<td>27.35</td>
<td>24.78</td>
<td>26.46</td>
<td>28.56</td>
</tr>
<tr>
<td>Sweet Clover</td>
<td>bu.</td>
<td>60</td>
<td>11.24</td>
<td>9.53</td>
<td>9.30</td>
<td>9.30</td>
</tr>
<tr>
<td>Alsike Clover</td>
<td>bu.</td>
<td>60</td>
<td>18.44</td>
<td>19.80</td>
<td>18.48</td>
<td>17.28</td>
</tr>
<tr>
<td>Timothy</td>
<td>bu.</td>
<td>45</td>
<td>11.73</td>
<td>12.82</td>
<td>11.70</td>
<td>8.91</td>
</tr>
<tr>
<td>Brome</td>
<td>lb.</td>
<td>14</td>
<td>.31</td>
<td>.28</td>
<td>.27</td>
<td>.36</td>
</tr>
<tr>
<td>Orchard Grass</td>
<td>lb.</td>
<td>14</td>
<td>.41</td>
<td>.38</td>
<td>.38</td>
<td>.37</td>
</tr>
<tr>
<td>Fescue</td>
<td>lb.</td>
<td>25</td>
<td>.30</td>
<td>.24</td>
<td>.23</td>
<td>.24</td>
</tr>
<tr>
<td>Rye Grass</td>
<td>lb.</td>
<td>60</td>
<td>.15</td>
<td>.14</td>
<td>.16</td>
<td>.16</td>
</tr>
<tr>
<td>Ladino Clover</td>
<td>lb.</td>
<td>60</td>
<td>.89</td>
<td>.86</td>
<td>.85</td>
<td>.86</td>
</tr>
</tbody>
</table>

Source: Agricultural Prices. USDA, SRS.

Note: Certified seeds are slightly higher. Sale prices of farm produced seeds are about 80% of the retail price. Cleaning and treating of small grains cost $.25 per bushel. Cleaning legume seeds cost 1¢ per pound.

Electricity, Telephone and Milk Hauling Expenses  
Ohio, 1968

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electricity (per month)</strong></td>
<td></td>
</tr>
<tr>
<td>Dairy Farms</td>
<td>$33.45</td>
</tr>
<tr>
<td>Corn-Hog Farms</td>
<td>23.06</td>
</tr>
<tr>
<td>Cash Crop-Grain Farms</td>
<td>13.65</td>
</tr>
<tr>
<td>Beef Farms</td>
<td>20.37</td>
</tr>
<tr>
<td><strong>Telephone (per month)</strong></td>
<td>7.07</td>
</tr>
<tr>
<td><strong>Hauling Charge for Milk (per cwt.)</strong></td>
<td>Central Ohio</td>
</tr>
<tr>
<td>Bulk</td>
<td>0.27</td>
</tr>
<tr>
<td>Cans</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Source: 1967 Ohio Farm Account Summaries.
Labor, Fuel Consumption, Insurance, Taxes and Interest Rates, Ohio, 1968

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labor</strong></td>
<td></td>
</tr>
<tr>
<td>Per hour without board</td>
<td>$ 1.50</td>
</tr>
<tr>
<td>Per month--house, etc. furnished</td>
<td>260.00</td>
</tr>
<tr>
<td>Dairy workers per month--house, etc.</td>
<td>275.00 to 350.00</td>
</tr>
<tr>
<td><strong>Fuel and Oil (1968 Ohio Farm Record Analysis Reports)</strong></td>
<td></td>
</tr>
<tr>
<td>Beef Farms</td>
<td>$ 4.25</td>
</tr>
<tr>
<td>Dairy Farms</td>
<td>5.92</td>
</tr>
<tr>
<td>Corn-Hog Farms</td>
<td>5.45</td>
</tr>
<tr>
<td>Cash Crop-Grain Farms</td>
<td>4.49</td>
</tr>
<tr>
<td><strong>Average Fuel Consumption Under Rated Loads (Nebraska Tractor Tests)</strong></td>
<td></td>
</tr>
<tr>
<td>2-3 plow tractor (gasoline)</td>
<td>3.5</td>
</tr>
<tr>
<td>2-3 plow tractor (diesel)</td>
<td>3.0</td>
</tr>
<tr>
<td>3-4 plow tractor (gasoline)</td>
<td>4.1</td>
</tr>
<tr>
<td>3-4 plow tractor (diesel)</td>
<td>3.3</td>
</tr>
<tr>
<td>4-5 plow tractor (gasoline)</td>
<td>6.0</td>
</tr>
<tr>
<td>4-5 plow tractor (diesel)</td>
<td>5.2</td>
</tr>
<tr>
<td>5-6 plow tractor (gasoline)</td>
<td>7.7</td>
</tr>
<tr>
<td>5-6 plow tractor (diesel)</td>
<td>6.4</td>
</tr>
<tr>
<td>6-7 plow tractor (diesel)</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>Gasoline and Oil</strong></td>
<td></td>
</tr>
<tr>
<td>Gasoline (includes 7¢/gal. Ohio tax)</td>
<td>0.28</td>
</tr>
<tr>
<td>Lubricating Oil</td>
<td>1.25</td>
</tr>
<tr>
<td>No. 2 Diesel Fuel (no tax)</td>
<td>0.16</td>
</tr>
<tr>
<td><strong>Insurance, Mutual Companies</strong></td>
<td>Per $1,000 of Coverage</td>
</tr>
<tr>
<td>(Fire, lightning, hail and windstorm)</td>
<td>$ 4.00</td>
</tr>
<tr>
<td>80% minimum coverage required for buildings and livestock</td>
<td></td>
</tr>
<tr>
<td><strong>Taxes</strong></td>
<td>Per $1,000 Assessed Valuation</td>
</tr>
<tr>
<td>Rural hill land counties</td>
<td>$ 25.00 to 33.00</td>
</tr>
<tr>
<td>Rural flat land counties</td>
<td>27.00 to 35.00</td>
</tr>
<tr>
<td>Urbanized counties</td>
<td>30.00 to 40.00</td>
</tr>
<tr>
<td>* Real estate is assessed at about 45% Market Valuation. Personal Property is assessed at 50% of Depreciated Valuation--and may not be depreciated below 25% of original value.</td>
<td></td>
</tr>
<tr>
<td><strong>Interest Rates</strong></td>
<td>Per Cent</td>
</tr>
<tr>
<td>Long-term real estate loans</td>
<td>$ 6.50 to 8.00</td>
</tr>
<tr>
<td>Intermediate and short-term credit</td>
<td>7.00 to 8.50</td>
</tr>
<tr>
<td>Spray Materials</td>
<td>Price</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Atrazine 80% WP</td>
<td>$2.30/lb.</td>
</tr>
<tr>
<td>Lorox</td>
<td>2.85/lb.</td>
</tr>
<tr>
<td>2, 4-D ester 4# formulation</td>
<td>3.98/gal.</td>
</tr>
<tr>
<td>2, 4-D ester 3.3# formulation</td>
<td>3.19/gal.</td>
</tr>
<tr>
<td>CIPC (in 5 gal. can)</td>
<td>7.50/gal.</td>
</tr>
<tr>
<td>alanap 3</td>
<td>4.50/gal.</td>
</tr>
<tr>
<td>alanap 3 (granular)</td>
<td>.35/lb.</td>
</tr>
<tr>
<td>Knox-weed 42% WP</td>
<td>13.00/gal.</td>
</tr>
<tr>
<td>Knox-weed 52% granular</td>
<td>.28½/lb.</td>
</tr>
</tbody>
</table>
Machinery and Equipment Prices

The price paid by farmers for machinery and equipment varies considerably. Many things enter into the determination of the price such as the aggressiveness of the dealer, the machines traded in, the total value of the machine being bargained for, the size of the deal (how many machines and how many dollars are involved), public relations, the possibility of future purchases by the farmer, the amount of servicing required, and your bargaining ability. Dealers may accept a general pricing policy such as their cost plus a set mark-up of 5 to 18 percent, others discount the manufacturers suggested retail price.

Quality of workmanship and materials, and the options selected influence the price of machinery and equipment. An item considered standard equipment by one company may be considered optional by another. Thus the basic machine price may vary considerably from one company to another.

Factors other than price should be carefully considered before purchasing machinery. Among these factors are: 1. The reliability of the company and how well do they stand behind their products. 2. The service policy and practice of the individual dealer. 3. How readily available are parts and services. 4. Will it really do the job you want it to do.

Prices quoted on the following pages were computed from the prices quoted for the machines equipped as the farmers most often purchased them. The prices quoted by six machinery companies as their "most usual" selling price were averaged to obtain the prices quoted on the following pages. The general range of prices would be approximately the average price plus or minus 5 percent.
New Machinery and Equipment Prices, 1966

**TRACTORS 1/**

<table>
<thead>
<tr>
<th>PTO-HP Range</th>
<th>Plow Size</th>
<th>Average PTO-HP</th>
<th>Average Price 2/**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Gasoline</td>
<td>Diesel</td>
</tr>
<tr>
<td>35-45</td>
<td>2-3</td>
<td>39</td>
<td>40</td>
</tr>
<tr>
<td>45-60</td>
<td>3-4</td>
<td>54</td>
<td>56</td>
</tr>
<tr>
<td>60-75</td>
<td>4-5</td>
<td>67</td>
<td>68</td>
</tr>
<tr>
<td>75-95</td>
<td>5-6</td>
<td>89</td>
<td>91</td>
</tr>
<tr>
<td>95+</td>
<td>6-7</td>
<td>--</td>
<td>116</td>
</tr>
</tbody>
</table>

1/** All tractors with 3 point hitch, live PTO, power steering, fenders, lights, and speed-hour meter. 2-3 plow utility tractor with rear hydraulic outlet, all others both front and rear outlets. 4-5 plow tractors and larger equipped with power brakes.

**CORN PLANTERS**

<table>
<thead>
<tr>
<th>Machine</th>
<th>2 Row</th>
<th>4 Row</th>
<th>6 Row (Narrow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Unit</td>
<td>$425</td>
<td>$825</td>
<td>$1125</td>
</tr>
<tr>
<td>Dry Fertilizer Attachment</td>
<td>125</td>
<td>275</td>
<td>450</td>
</tr>
<tr>
<td>Liquid Fertilizer Attachment</td>
<td>125</td>
<td>350</td>
<td>500</td>
</tr>
<tr>
<td>Dry Herbicide Attachment</td>
<td>75</td>
<td>150</td>
<td>225</td>
</tr>
<tr>
<td>Liquid Herbicide Attachment</td>
<td>---</td>
<td>225</td>
<td>300</td>
</tr>
</tbody>
</table>

**Machine**

<table>
<thead>
<tr>
<th>Average Price 2/**</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-14</td>
</tr>
<tr>
<td>3-14</td>
</tr>
<tr>
<td>4-14</td>
</tr>
<tr>
<td>5-14</td>
</tr>
<tr>
<td>2-16</td>
</tr>
<tr>
<td>3-16</td>
</tr>
<tr>
<td>4-16</td>
</tr>
<tr>
<td>5-16</td>
</tr>
<tr>
<td>6-16</td>
</tr>
<tr>
<td>7-16</td>
</tr>
<tr>
<td>Chisel plow 9'</td>
</tr>
</tbody>
</table>

2/** Average of suggested Columbus retail prices as quoted by leading manufacturers.
<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disks-Harrows</strong></td>
<td>(w/tires and cylinders, 18' blades and regular bearings)</td>
<td></td>
</tr>
<tr>
<td>9' light</td>
<td></td>
<td>750</td>
</tr>
<tr>
<td>12' light</td>
<td></td>
<td>910</td>
</tr>
<tr>
<td>15' light</td>
<td></td>
<td>1050</td>
</tr>
<tr>
<td>12' heavy</td>
<td></td>
<td>1020</td>
</tr>
<tr>
<td>15' heavy</td>
<td></td>
<td>1280</td>
</tr>
<tr>
<td>18' heavy</td>
<td></td>
<td>1680</td>
</tr>
<tr>
<td>21' heavy</td>
<td></td>
<td>1880</td>
</tr>
<tr>
<td><strong>Spring Tooth Harrows</strong></td>
<td>(with hitch)</td>
<td></td>
</tr>
<tr>
<td>12'</td>
<td></td>
<td>240</td>
</tr>
<tr>
<td>15'</td>
<td></td>
<td>350</td>
</tr>
<tr>
<td>18'</td>
<td></td>
<td>480</td>
</tr>
<tr>
<td><strong>Spike Tooth Harrow</strong></td>
<td>(with evener)</td>
<td></td>
</tr>
<tr>
<td>12'</td>
<td></td>
<td>140</td>
</tr>
<tr>
<td>24'</td>
<td></td>
<td>280</td>
</tr>
<tr>
<td><strong>Field Cultivators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8' mounted</td>
<td></td>
<td>250</td>
</tr>
<tr>
<td>10' mounted</td>
<td></td>
<td>320</td>
</tr>
<tr>
<td>14' mounted</td>
<td></td>
<td>550</td>
</tr>
<tr>
<td>14' pull (with tires and cylinders)</td>
<td></td>
<td>770</td>
</tr>
<tr>
<td><strong>Subsoilers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 knife</td>
<td></td>
<td>130</td>
</tr>
<tr>
<td>2 knives</td>
<td></td>
<td>250</td>
</tr>
<tr>
<td><strong>Fertilizer Spreaders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10'</td>
<td></td>
<td>420</td>
</tr>
<tr>
<td>12'</td>
<td></td>
<td>475</td>
</tr>
<tr>
<td><strong>Rotary Hoe (heavy sections)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 row pull</td>
<td></td>
<td>550</td>
</tr>
<tr>
<td>4 row mounted</td>
<td></td>
<td>660</td>
</tr>
<tr>
<td><strong>Cultivators (with sweeps, shields, and cylinders, if needed)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 row front mount</td>
<td></td>
<td>490</td>
</tr>
<tr>
<td>4 row front mount</td>
<td></td>
<td>950</td>
</tr>
<tr>
<td>4 row rear mount</td>
<td></td>
<td>830</td>
</tr>
<tr>
<td>6 row rear mount (narrow row)</td>
<td></td>
<td>1100</td>
</tr>
<tr>
<td>4 row rolling cultivator</td>
<td></td>
<td>1125</td>
</tr>
<tr>
<td><strong>Corn pickers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 row pull</td>
<td></td>
<td>1800</td>
</tr>
<tr>
<td>2 row pull</td>
<td></td>
<td>2900</td>
</tr>
<tr>
<td>2 row mounted</td>
<td></td>
<td>3725</td>
</tr>
<tr>
<td>sheller for 2 row mounted</td>
<td></td>
<td>1100</td>
</tr>
<tr>
<td><strong>Corn Heads for S.P. Combines</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 row</td>
<td></td>
<td>2100</td>
</tr>
<tr>
<td>3 row (narrow)</td>
<td></td>
<td>3625</td>
</tr>
<tr>
<td>4 row</td>
<td></td>
<td>4525</td>
</tr>
</tbody>
</table>
Grain Drills (Fert. and grass hoppers, w/band seeding attach. w/tires, w/o cylinder)

- 13 x 7: $1050
- 15 x 7: $1200
- 17 x 7: $1325

Combines:
- 7' PTO: $3050
- 10' S.P. 40-50 hp engine: $7125
- 12' S.P. 40-50 hp engine: $7550
- 12' S.P. 50-70 hp engine: $8375
- 14' S.P. 90 hp engine: $9950
- 16' S.P. 90 hp engine: $11450
  Cab for above: $625
  Hydro Static drive: $825

Mowers:
- 7' mounted: $550
- 7' pull (w/tires & cylinders): $625

Mower-Conditioner:
- 7' pull: $1750
- 9' pull: $2250

Windrowers:
- 12' pull: $1250
- 10' S.P.: $4150
- 12' S.P.: $4250
- 14' S.P.: $4825

Hay Conditioner: $850

Side Delivery Rakes:
- 7' mounted: $575
- 7' pull (w/tires): $600
- 9' mounted: $625
- 9' pull (w/tires): $650

Balers: (twine tie w/tires)
- 12-14 T/hr. PTO: $1850
- 16-18 T/hr PTO: $2100
- 16-18 T/hr Aux. Engine: $2650

Bale Thrower: $525

Forage Harvesters:

One Row
- Basic Unit: $1925
- Windrow Pickup: $500
- Cutter Bar Pickup: $775
- Row Crop Unit: $625

Two Row
- Basic Unit: $2450
- Windrow Pickup: $575
- Cutter Bar Pickup: $875
- Row Crop Unit: $900
Forage Wagons: (w/o gears, w/front, side & rear delivery, multispeed)

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>14'</td>
<td>1525</td>
</tr>
<tr>
<td>16'</td>
<td>1675</td>
</tr>
</tbody>
</table>

Forage Blower (w/pipe for 60' silo)  
860

Wagons: (Gear 6 ton capacity w/tires)

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 T Gear</td>
<td>300</td>
</tr>
<tr>
<td>7' x 14' Box</td>
<td>325</td>
</tr>
<tr>
<td>6 T Hoist</td>
<td>110</td>
</tr>
<tr>
<td>125 bu. grain box</td>
<td>220</td>
</tr>
<tr>
<td>255 bu. grain box</td>
<td>375</td>
</tr>
</tbody>
</table>

Elevators: (PTO)

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>24'</td>
<td>525</td>
</tr>
<tr>
<td>32'</td>
<td>600</td>
</tr>
<tr>
<td>40'</td>
<td>800</td>
</tr>
<tr>
<td>50'</td>
<td>1025</td>
</tr>
</tbody>
</table>

Grain Augers:

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>4' Max. Capacity 600 bu./hr. (without motor, hoppers, or transport)</td>
<td></td>
</tr>
<tr>
<td>11' requires 2 hp gas or 1/2 hp electric</td>
<td>23</td>
</tr>
<tr>
<td>15' requires 2 hp gas or 1/2 hp electric</td>
<td>27</td>
</tr>
<tr>
<td>20' requires 2 hp gas or 1/2 hp electric</td>
<td>35</td>
</tr>
</tbody>
</table>

(Portable with hoppers & transports)

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; D 31' long (PTO)</td>
<td>475</td>
</tr>
<tr>
<td>6&quot; D 41' long (PTO) with downspout</td>
<td>625</td>
</tr>
<tr>
<td>8&quot; D 52' long (PTO)</td>
<td>950</td>
</tr>
</tbody>
</table>

Portable Grinder-Mixer:

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 bu.</td>
<td>1700</td>
</tr>
<tr>
<td>90 bu.</td>
<td>1800</td>
</tr>
</tbody>
</table>

Auger Feed Wagons

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 bu.</td>
<td>610</td>
</tr>
<tr>
<td>125 bu.</td>
<td>700</td>
</tr>
</tbody>
</table>

Manure Spreaders: (w/o tires)

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 bu. Ground drive</td>
<td>660</td>
</tr>
<tr>
<td>100 bu. PTO</td>
<td>720</td>
</tr>
<tr>
<td>150 bu. PTO</td>
<td>940</td>
</tr>
<tr>
<td>180 bu. PTO</td>
<td>1075</td>
</tr>
<tr>
<td>240 bu. PTO</td>
<td>1640</td>
</tr>
</tbody>
</table>

Front End Tractor Loader  
600

Rear End Tractor Blade  
210

Elevators: (Gas eng. or Electric Motor, Not included)

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>24'</td>
<td>500</td>
</tr>
<tr>
<td>32'</td>
<td>675</td>
</tr>
<tr>
<td>40'</td>
<td>875</td>
</tr>
<tr>
<td>50'</td>
<td>1025</td>
</tr>
</tbody>
</table>
Following is an example comparing new and used machine prices.

**Comparison of New and Used Machinery Prices**

**EXAMPLE ONLY**

<table>
<thead>
<tr>
<th>Machine</th>
<th>New</th>
<th>2 yr. old</th>
<th>5 yr. old</th>
</tr>
</thead>
<tbody>
<tr>
<td>35-45 PTO HP Tractor (gasoline)</td>
<td>3725</td>
<td>2500</td>
<td>1975</td>
</tr>
<tr>
<td>45-60 PTO HP Tractor (gasoline)</td>
<td>5125</td>
<td>3350</td>
<td>2425</td>
</tr>
<tr>
<td>60-75 PTO HP Tractor (gasoline)</td>
<td>6000</td>
<td>4100</td>
<td>3150</td>
</tr>
<tr>
<td>75-95 PTO HP Tractor (gasoline)</td>
<td>6900</td>
<td>5050</td>
<td>3775</td>
</tr>
<tr>
<td>10' combine</td>
<td>7125</td>
<td>4600</td>
<td>3100</td>
</tr>
<tr>
<td>16-18 T/hr. string tie baler (motor)</td>
<td>2650</td>
<td>1500</td>
<td>1050</td>
</tr>
</tbody>
</table>

**FARM TRUCKS**

**1967 Prices**

3/4 Ton Pickup - Wide Box
700 x 16 6 ply tires
heavy duty front & rear springs & helpers
4 spd trans
rear bumper
radio

**Total Price including freight & dealer handling**
$2,750.00

1 Ton Chassis & Cab
750 x 16 8 ply tires dual rear
HD springs Fr & Rear & helpers
4 spd - std
spare wheel & carrier
west coast mirrors

**Price -- $2,800.00**

9' factory stake body $260.00 extra
9' combination fold-down $500.00 extra

2 Ton Chassis & Cab
825 x 20 dual rear 10 ply tires
2 spd rear axle
HD springs Fr & Rear & helpers
west coast mirrors clearance lights
spare wheel & carrier 6½" rims

**Price -- $4,150.00**

14' combination fold down $800.00 extra
## Miscellaneous Livestock Equipment Prices Paid by Ohio Farmers, 1966

<table>
<thead>
<tr>
<th>Item</th>
<th>Price 1966</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bulk milk tanks</strong> (includes $150 installation charge)</td>
<td></td>
</tr>
<tr>
<td>400 gallon</td>
<td>$2,315.00</td>
</tr>
<tr>
<td>545 gallon</td>
<td>2,635.00</td>
</tr>
<tr>
<td>625 gallon</td>
<td>2,850.00</td>
</tr>
<tr>
<td>850 gallon</td>
<td>3,510.00</td>
</tr>
<tr>
<td>1000 gallon</td>
<td>3,810.00</td>
</tr>
<tr>
<td><strong>Stock tanks</strong></td>
<td></td>
</tr>
<tr>
<td>180 gallon</td>
<td>29.00</td>
</tr>
<tr>
<td>300 gallon</td>
<td>39.00</td>
</tr>
<tr>
<td><strong>Electric heated automatic hog water fountain (2 hole)</strong></td>
<td>29.00</td>
</tr>
<tr>
<td><strong>Electric heated automatic cattle water fountain (50-70 head)</strong></td>
<td>115.00</td>
</tr>
<tr>
<td><strong>70 gallon hog drinking fountain</strong></td>
<td>56.00</td>
</tr>
<tr>
<td><strong>Electric fountain heater for above</strong></td>
<td>9.00</td>
</tr>
<tr>
<td><strong>Kerosene fountain heater for above</strong></td>
<td>9.00</td>
</tr>
<tr>
<td><strong>Metal self-hog feeders</strong></td>
<td></td>
</tr>
<tr>
<td>18 bu. (8 door)</td>
<td>50.00-65.00</td>
</tr>
<tr>
<td>35 bu. (12 door)</td>
<td>70.00-85.00</td>
</tr>
<tr>
<td>50 bu. (12 door)</td>
<td>85.00-110.00</td>
</tr>
<tr>
<td><strong>14 bu. feed cart (silage or grain)</strong></td>
<td>68.50</td>
</tr>
<tr>
<td><strong>Water hydrants</strong></td>
<td>12.00-15.00</td>
</tr>
<tr>
<td><strong>1&quot; plastic pipe</strong></td>
<td>.20/ft.</td>
</tr>
<tr>
<td><strong>Pig brooder lamps</strong></td>
<td>5.00</td>
</tr>
<tr>
<td><strong>Farrowing Crate</strong></td>
<td>45.00</td>
</tr>
<tr>
<td><strong>Electric litter pad for Pigs</strong></td>
<td>22.50</td>
</tr>
<tr>
<td><strong>Single unit</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Double unit</strong></td>
<td>33.00</td>
</tr>
</tbody>
</table>

## Buildings, Building and Fence Material Prices
Ohio, 1966

<table>
<thead>
<tr>
<th>Item</th>
<th>Price 1966</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fencing Materials</strong></td>
<td></td>
</tr>
<tr>
<td>Locust or Cedar line posts</td>
<td>.60 ea.</td>
</tr>
<tr>
<td>Locust or Cedar end posts</td>
<td>3.00 ea.</td>
</tr>
<tr>
<td>7' steel posts</td>
<td>1.15 ea.</td>
</tr>
<tr>
<td>32&quot; hog fence 10# top-$12½ barbed bottom</td>
<td>1.35 rd.</td>
</tr>
<tr>
<td>47&quot; #10-12&quot; stay woven wire</td>
<td>1.35 rd.</td>
</tr>
<tr>
<td>4-pt. barbed wire #12½</td>
<td>14.00/80 rd.</td>
</tr>
<tr>
<td>Electric fence charger (battery type)</td>
<td>20.00 ea.</td>
</tr>
<tr>
<td>Battery for fence charger</td>
<td>3.50 ea.</td>
</tr>
<tr>
<td>Hi-Line fence charger</td>
<td>$20.00-38.00 ea.</td>
</tr>
<tr>
<td>Electric fence insulators</td>
<td>6.85/100</td>
</tr>
<tr>
<td>Copper-covered electric fence wire</td>
<td>10.00/160 rd.</td>
</tr>
<tr>
<td>38&quot; steel posts with insulators</td>
<td>.40 ea.</td>
</tr>
<tr>
<td>16' steel gate</td>
<td>34.00 ea.</td>
</tr>
</tbody>
</table>
Building Materials

Ready-mix concrete (12-mile radius) $17.50/cu.yd.
Additional charge outside 12-mile radius .20/mile
Concrete blocks (8 x 8 x 16) .22 ea.
Charge for laying blocks .25 ea.

48" snow fence 10.75/50 ft.

Rough cut hardwood lumber (dry) .13/bd.ft.
Rough cut hardwood lumber (green) .06-.10/bd.ft.
Hemlock or Fir dimension lumber 140.00/M
1" #2 yellow pine 130.00/M
1" #4 fir 120.00/M
#2 yellow pine shiplap 145.00/M
2" Creosote treated lumber .22/bd.ft.

Saw timber (standing)
#2 Hard maple $30.00-$75.00 range 51.00/M
White Oak $15.00-$70.00 range 47.00/M
Ash $30.00-$60.00 range 44.00/M

Creosote Poles (delivered in county)

<table>
<thead>
<tr>
<th>Top Diameter</th>
<th>Length</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>5&quot;</td>
<td>12'</td>
<td>5.50</td>
</tr>
<tr>
<td>5&quot;</td>
<td>16'</td>
<td>7.12</td>
</tr>
<tr>
<td>5&quot;</td>
<td>18'</td>
<td>8.42</td>
</tr>
<tr>
<td>5&quot;</td>
<td>20'</td>
<td>9.67</td>
</tr>
<tr>
<td>5&quot;</td>
<td>25'</td>
<td>14.19</td>
</tr>
<tr>
<td>5&quot;</td>
<td>30'</td>
<td>18.48</td>
</tr>
<tr>
<td>6&quot;</td>
<td>12'</td>
<td>7.06</td>
</tr>
<tr>
<td>6&quot;</td>
<td>16'</td>
<td>9.33</td>
</tr>
<tr>
<td>6&quot;</td>
<td>18'</td>
<td>10.96</td>
</tr>
<tr>
<td>6&quot;</td>
<td>20'</td>
<td>12.60</td>
</tr>
<tr>
<td>6&quot;</td>
<td>25'</td>
<td>17.29</td>
</tr>
<tr>
<td>6&quot;</td>
<td>30'</td>
<td>24.24</td>
</tr>
<tr>
<td>7&quot;</td>
<td>12'</td>
<td>8.88</td>
</tr>
<tr>
<td>7&quot;</td>
<td>16'</td>
<td>12.69</td>
</tr>
<tr>
<td>7&quot;</td>
<td>20'</td>
<td>15.88</td>
</tr>
<tr>
<td>7&quot;</td>
<td>25'</td>
<td>20.94</td>
</tr>
</tbody>
</table>

Galvanized roofing 15.50/square
Aluminum roofing 20.50/square

Buildings (erected price)
Poultry buildings 1.40/sq.ft.
Hog finishing units 1.50-2.00/sq.ft.
Farrowing barns (20 sow unit complete with stalls, electric heat pads, and insulation) 5.00/sq.ft.
Pole-type loafing barns (metal siding, open front and creosote kick panels - earth floor)

3,000 sq. ft 1.25/sq.ft.
4,000 sq. ft. 1.22/sq.ft.
4,600 sq. ft. 1.19/sq.ft.
5,500 sq.ft. 1.16/sq.ft.

For larger sizes use base price for the 5,500 sq. ft. building and add $1.00 for each additional square foot.
Pole-type machinery sheds (Metal siding, open front)

<table>
<thead>
<tr>
<th>Size (sq. ft.)</th>
<th>Cost per sq. ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,300</td>
<td>1.52</td>
</tr>
<tr>
<td>1,600</td>
<td>1.46</td>
</tr>
<tr>
<td>1,900</td>
<td>1.38</td>
</tr>
<tr>
<td>2,230</td>
<td>1.33</td>
</tr>
<tr>
<td>2,550</td>
<td>1.29</td>
</tr>
</tbody>
</table>

Larger sizes cost an additional $1.00 per sq. ft. added.

For wood siding instead of metal siding add 7% to the total cost.
Materials cost approximately 70% of the total erected cost.

Pole-Type Wood-Slat Corn Cribs with Concrete Floor Erected

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000 bu.</td>
<td>900.00</td>
</tr>
<tr>
<td>4,000 bu.</td>
<td>2400.00</td>
</tr>
<tr>
<td>2,700 bu. double crib</td>
<td>2700.00</td>
</tr>
</tbody>
</table>

Metal Bar-Mesh Corn Cribs with Concrete Floor Erected

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>800 bu.</td>
<td>495.00</td>
</tr>
<tr>
<td>1,100 bu.</td>
<td>620.00</td>
</tr>
<tr>
<td>1,500 bu.</td>
<td>647.00</td>
</tr>
</tbody>
</table>

Steel Grain Bins Erected

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,100 bu.</td>
<td>355.00</td>
</tr>
<tr>
<td>1,500 bu.</td>
<td>435.00</td>
</tr>
<tr>
<td>2,100 bu.</td>
<td>625.00</td>
</tr>
<tr>
<td>3,100 bu.</td>
<td>800.00</td>
</tr>
</tbody>
</table>

Continuous Flow Dryers

<table>
<thead>
<tr>
<th>Capacity (bu/hr)</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>230</td>
<td>6611.00</td>
</tr>
<tr>
<td>350</td>
<td>13605.00</td>
</tr>
</tbody>
</table>

In-storage Drying Bins (with Dryer)

<table>
<thead>
<tr>
<th>Capacity (bu.)</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,300</td>
<td>3225.00</td>
</tr>
<tr>
<td>4,500</td>
<td>3850.00</td>
</tr>
<tr>
<td>6,000</td>
<td>4350.00</td>
</tr>
<tr>
<td>9,100</td>
<td>5850.00</td>
</tr>
<tr>
<td>13,500</td>
<td>8750.00</td>
</tr>
</tbody>
</table>

In-Storage Drying Bins Erected (without dryer)

<table>
<thead>
<tr>
<th>Capacity (bu.)</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000</td>
<td>495.00</td>
</tr>
<tr>
<td>1,250</td>
<td>535.00</td>
</tr>
<tr>
<td>1,500</td>
<td>740.00</td>
</tr>
<tr>
<td>2,000</td>
<td>830.00</td>
</tr>
<tr>
<td>3,000</td>
<td>1000.00</td>
</tr>
</tbody>
</table>

Bins equipped with perforated floors and airducts to dry grains while in storage. This does not include cost of fans and heater. Cost of bins are approximately the same whether steel foundation ring or concrete floor is used. Materials for cribs and grainaries are 75% of erected cost.
### Silos

**Bunker** (concrete floor with creosote wood sides)
- 100 ton (6' x 15' x 69') \( \text{774.00} \)
- 200 ton (6' x 20' x 101') \( \text{1264.00} \)
- 300 ton (6' x 30' x 101') \( \text{1527.00} \)

**Tower Concrete stave**
- 100 ton (12' x 40') \( \text{2100.00} \)
- 140 ton (14' x 40') \( \text{2300.00} \)
- 250 ton (16' x 50') \( \text{2600.00} \)
- 315 ton (18' x 50') \( \text{3200.00} \)
- 540 ton (20' x 60') \( \text{4100.00} \)
- 16' silo unloader \( \text{1300.00} \)

**Individual Farrowing Houses**
- 6' x 7' \( \text{74.00} \)
- 11' x 8' \( \text{125.00} \)

Concrete feeding floor or paved yards (material cost/sq.yd) 2.50-3.00

**Source:** Agricultural Prices, USDA, SRS; Tractor and Farm Equipment Guide compiled by National Farm & Power Equipment Dealers Association and the district offices of the following manufacturers; International Harvester, John Deere, Massey Ferguson, J. J. Case, Oliver, and Minneapolis Moline.