Land Valuation II
Agricultural Experiment Station

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FOREWORD

The subject of land economics is basic to farm prosperity. An effort to determine the true value of land is fundamental to the development of a permanent and prosperous agriculture.

In determining the true value of land we must pay more and more attention to its intrinsic fertility, to its assessed valuation for taxation purposes, and to its location.

The College of Agriculture has undertaken to develop more basic and accurate methods of evaluating land. In accomplishing its purpose it has invited the cooperation of authorities representing all phases of the subject of land economics.

It is believed that the publication of these careful studies will help to stabilize the agricultural industry and provide a more accurate basis for arriving at an equitable and fair valuation of farm lands in this state.

The papers, which have been somewhat condensed in this publication, were read by their authors during the short course in land valuation held July 24 and 25, 1928. The manuscripts were edited by Sam B. Shirky, superintendent of short courses, to whose enterprise and enthusiasm the success of these annual conferences is largely due.

F. B. MUMFORD.
EVALUATING LAND FOR TAXATION PURPOSES

J. T. WADDILL, Chairman of the Missouri State Tax Commission

Our laws have subjected all property to taxation except that which is specifically exempted such as churches, schools, municipal buildings, etc. It is difficult to discuss the taxation of land without referring to other classes of property subject to taxation, all of which combine to constitute the foundation of our ad valorem tax system.

The State Constitution provides that all property shall be assessed in proportion to its value. Our statutes provide that all property shall be assessed at its cash value. The Supreme Court has so construed it. It is the duty of assessors to so assess all taxable property. In many instances the question, What is cash value? is not easily answered. Where there is a general market for a class of property the answer is, sale or market price, or what an able and willing seller will take, what an able and willing buyer will give.

Farm land represents approximately 32 per cent of the entire assessed value of the State, but since the rates in cities are higher it does not pay 32 per cent of all taxes.

At this time it is difficult to determine the cash value of land as there are but few free sales. Statistical information compiled by the Federal and State governments, farm organizations, and others who have made a study of the matter show a very small or no net return from farm land. It would therefore be dangerous to adopt the method of capitalization of net earnings as a basis of valuation because under our system of taxation it would impair the public school system in farming communities which would tend to further reduce, if not destroy, the value of land.

By comparing sales values with assessed values in a number of counties we found sales values considerably higher. Large properties were also assessed proportionately lower than small properties. During the past few years farm lands have had a wide range of values. The peak was reached following the close of the War. Owing to deflation in rent values at the present time and to only a small reduction in the price of articles purchased by farmers many are having to struggle to meet their obligations.

City real estate has a greater assessed value than farm lands. It represents approximately 38 per cent of the State's value. However,
in most counties city real estate represents only a small portion of the county’s value. Unlike farm lands the price of city real estate did not increase so rapidly during and after the War, but instead it has gradually increased, due to higher rentals, cost of labor, materials, and increased demand. Cities and towns have increased in population, while rural districts have decreased. Selling value; cost of reproduction of building new, less depreciation; cost of land; net earnings; location; etc. should be considered by assessors. Net earnings could be applied to income property only.

Declining population causes depreciation of values. Allowance should be made for speculative values, errors in judgment, forced sales, sales to relatives, and partition sales. In other words, sales prices for assessment purposes should be bonafide cash sales or their equivalent. Sales prices, where extreme credits are extended, should be used with caution.

It is difficult to determine the proper assessable value of live stock, particularly horses and mules which are marketed at so much per head. It is less difficult to make a fair assessment of cattle, sheep, and hogs since there is a fixed market price for these.

Probably no class of property is so irregularly assessed as farm machinery and household property. Second-hand goods can not be sold for much. Replacement cost less depreciation should govern the assessment of these items.

**Duties of Assessor.**—An assessor should thoroly acquaint himself with the general revenue laws, especially that part relating to his duties. He takes an oath “that he will faithfully and impartially discharge the duties of his office and that he will assess all property in the county in which he assesses at what he believes to be its actual cash value.” No assessor should swerve from his sworn duty. The equality of individual assessments in a county depends upon him and the County Board of Equalization. The equality of valuations as between counties depends usually upon the Tax Commission and the State Board of Equalization. Assessors are the only revenue officers who actually inspect property. Therefore, the responsibility of fixing equitable values as between individuals is directly theirs.

**Taxation.**—Many taxpayers have an entirely erroneous understanding of taxation. They believe an increase in valuation means higher taxes. Nothing could be further from the truth. Rates of levy control taxes. It is simply a mathematical calculation. We are interested only in fixing fair values upon which the various levying authorities base their estimate of necessary revenues for the support of their particular governments or schools. If the valuation is equitable, the tax is equitable. Ninety to ninety-six per cent of all advalorem taxes on property is local, collected for the support of county and city
LAND VALUATION

governments and for roads and schools. Approximately fifty per cent is for public schools. Our Constitution and laws provide maximum but no minimum levies. Taxpayers may complain of high taxes, but if a majority want a reduction it is within their power to reduce them. Taxes are higher, due principally to the two following reasons. For example, first, increased cost of material and labor; second, increased demand for good roads and more and better schools. If the demand for reduction of taxes is to be realized it must come from curtailment of activities and economy of administration. If we are to have a system of hard surfaced or other good roads, the best public schools, sufficient support for our institutions of higher learning, paved streets, well managed city and county governments, efficient police and fire protection, public hospitals, proper care of insane and poor, education for the blind and deaf, and other public activities, we must pay for them, and the money under our system of government must come from taxation in some form. The following is a quotation from Assessor’s Manual compiled by the State Tax Commission.

“Farm land should be assessed to include the land itself, all improvements thereon, including farm tiling, fencing, buildings, silos, wells, windmills, etc., and all rights and privileges thereto belonging, and all trees, mines, minerals, quarries or fossils on or under the same.

A study of the soil survey will be helpful to an assessor in arriving at relative basic values of various kinds of land within his jurisdiction and this value should be uniform on the same kinds of soil in the State.

In arriving at a fair value of farm lands, it is suggested that the following should be taken into consideration:

(1) The sale price of the land, i.e., the price that could be obtained ordinarily, assuming that the owner desires to sell and that there is a purchaser with means desiring to buy, thus avoiding speculative sale prices up and forced sale prices down.

(2) The loan value placed upon land by reputable loan companies of long experience.

(3) Character of soil, its productiveness.

(4) Proximity to good markets, the local advantages of markets within the county, together with the transportation advantages.

(5) Any local conditions which affect the value of real estate.

(6) The value of the land separate from the improvements, the value of the improvements as such, and then the value of the land in its improved condition.”
DIFFICULTIES IN OUR PRESENT SYSTEM OF LAND TAXATION

D. C. Wood, Extension Assistant Professor of Agricultural Economics, College of Agriculture, University of Missouri.

In an address delivered before the Tri-State Development Congress, Duluth, Minnesota, in January 1924, Richard T. Ely, Director of the Institute for Research in Land Economics and Public Utilities and Professor of Economics, the University of Wisconsin, made the following statement:

"Taxes on farm lands are steadily and rapidly approximating the annual value of farm lands; and in a period varying from state to state, but in most of the states a relatively short period—a period so short that some of us may live to see it, if the movement continues unchecked—the taxes will absorb farm land values, the farmers' land will be confiscated by the state and our farmers will become virtual tenants of the state."

Recognizing the gravity of the tax situation to the Missouri farmer, the Missouri College of Agriculture in 1926 published Research Bulletin 93, a report of a joint study of taxation of farms in Missouri made by Mr. C. O. Brannen, Bureau of Agricultural Economics, United States Department of Agriculture, and Professor S. D. Gromer, Department of Agricultural Economics, Missouri College of Agriculture. This study, while confined to the State of Missouri for data, discloses the status of farm land taxation, its trends and the problems which obtain generally in most states.

It will be of interest, therefore, to examine the study within this brief period for the purpose of obtaining a mutual understanding of the present farm tax situation, the trends discernible, the causes of the present situation, and the corrective measures which suggest themselves.

Professor Ely has said that there is a law of increasing governmental expenditures and that "the true underlying cause of increase and increasing public expenditures is found in the development of state and nation as cooperative institutions for promoting the general welfare." That, "the service idea of government is gaining ground day by day," that "it is coming to dominate all other ideas." That, "it finds expression in public expenditures." He quotes Montesquieu, a great French philosopher, who in the eighteenth century laid it down as a universal principle that, "Liberty increases governmental expenses" and that, "as our Government becomes more democratic and more socialized, expenses will increase." Ely shows that the total ordinary disbursements of the Federal government exclusive of postal deficits and Panama Canal disbursements, have been as follows:
In 1900, they were 480 million dollars, in 1905, they were 548 million dollars, in 1910 they were 651 million dollars, in 1915, they were 725 million dollars, in 1916, they were 719 million dollars, in 1917, they were 752 million dollars (normal disbursements eliminating war cost and foreign loans), in 1918, they were 1,043 million dollars, in 1919, they were 1,677 million dollars and in 1920, they were 2,003 million dollars.

Brannen and Gromer show that taxes per acre in Missouri from 1881 to 1924 increased 400% and, what is particularly noteworthy, that but 87\% of this increase came about between 1881 and 1913, 100% of it between 1913 and 1919, and 212\% of it came about between the years 1919 and 1924, a period of declining farm income.

These authors also show that in Missouri the general property tax in 1890 supplied 85% of revenues from taxes and similar sources, and 83% in 1920; that real estate in 1890 made up 68% and in 1924 70% of the total assessed valuation of all property; that farm real estate and urban real estate in 1890 each formed about one-third of the total assessed valuation and since 1921 the total assessed valuation of real estate was equally divided between urban and farm real estate.

Thus, the situation in Missouri, as in many other states, is that real estate, about one-half the value of which is farm land, supplies a large proportion of all revenues from taxes obtained by the state and that there is no apparent trend over a period of time towards reducing that proportion. Yet, Ely points out that in 1850 land value made up five-sixths of the total wealth of the United States, and in 1920 but approximately one-third, and that land rent throughout that period remained a relatively small and constant proportion (eight per cent) of the total national income. These facts suggest that our most vital problem is not that of decreasing taxes but rather that of properly redistributing the tax burden; that whereas governmental expense in earlier national and state history was relatively small, the tax burden on land light, and the unequal distribution of the tax burden of relatively small importance, it is rapidly becoming confiscatory with the more recent vast increases in annual governmental disbursements. There is thus disclosed one of our present difficulties in taxation. Too great reliance on general property taxes for governmental revenue is plainly evident.

Brannen and Gromer point out that the general property tax in its operation is impersonal, applies to a specific tract of land, and must be paid out of the earnings of that property specifically taxed; that is to say, out of land rent. It will be of interest, therefore, to look into the relative proportions of land rent absorbed by taxes over a period of years, to determine just how serious the burden is and whether or not the trend is towards a greater absorption of farm land rent. For
this purpose Brannen and Gromer in their investigation collected the data presented in Table 1.

**Table 1.—Taxes in Relation to Rent of Farm Real Estate, Northwestern Counties* of Missouri, 1913-1922**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of farms</th>
<th>Number of acres</th>
<th>Average tax per acre</th>
<th>Average rent per acre</th>
<th>Relation of taxes to cash rent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913</td>
<td>21</td>
<td>4,328</td>
<td>.35</td>
<td>3.09</td>
<td>11.3</td>
</tr>
<tr>
<td>1914</td>
<td>25</td>
<td>4,955</td>
<td>.33</td>
<td>2.95</td>
<td>11.1</td>
</tr>
<tr>
<td>1915</td>
<td>29</td>
<td>5,987</td>
<td>.32</td>
<td>3.12</td>
<td>10.2</td>
</tr>
<tr>
<td>1916</td>
<td>37</td>
<td>6,933</td>
<td>.32</td>
<td>3.31</td>
<td>9.7</td>
</tr>
<tr>
<td>1917</td>
<td>49</td>
<td>8,867</td>
<td>.35</td>
<td>3.54</td>
<td>9.9</td>
</tr>
<tr>
<td>1918</td>
<td>58</td>
<td>10,299</td>
<td>.36</td>
<td>3.83</td>
<td>9.3</td>
</tr>
<tr>
<td>1919</td>
<td>86</td>
<td>14,279</td>
<td>.48</td>
<td>4.66</td>
<td>10.4</td>
</tr>
<tr>
<td>1920</td>
<td>103</td>
<td>17,724</td>
<td>.53</td>
<td>4.68</td>
<td>11.4</td>
</tr>
<tr>
<td>1921</td>
<td>141</td>
<td>23,231</td>
<td>.71</td>
<td>4.42</td>
<td>16.0</td>
</tr>
<tr>
<td>1922</td>
<td>206</td>
<td>33,403</td>
<td>.73</td>
<td>4.26</td>
<td>17.1</td>
</tr>
</tbody>
</table>

*The counties considered were: Andrew, Atchison, Buchanan, Caldwell, Carroll, Chariton, Clay, Clinton, Daviess, De Kalb, Gentry, Grundy, Harrison, Holt, Lafayette, Linn, Mercer, Nodaway, Putnam, Saline, Sullivan, and Worth.

Table 1 presents no convincing evidence that the trend is towards a lessening absorption of net land rent by taxes. It will be observed that about one-sixth of the net rent was absorbed by taxes in 1921 and 1922. In this connection Ely shows the percentage which property taxes constitute of net rent, before taxes are deducted, tax levies as of 1919, to have 38% in 111 farms in Leewanee County, Michigan, 30% on 106 farms in Dane County, Wisconsin, 24% on 87 farms in McLeod County, Minnesota, 31% on 137 farms in Delaware County, New York, 66% on 177 farms in Chester County, Pennsylvania, and 15% on 77 farms in Tipton County, Indiana.

The conclusion which may be drawn from these instances is that when farm land taxes reach the point where they absorb one-sixth of the net rent and when the tendency is towards a greater absorption of net land rent, some action to redistribute the tax burden is imperatively indicated.

In Missouri Agricultural Experiment Station Research Bulletin 93, it is stated that the State Tax Commission of Missouri estimates that the value of intangible wealth is equal, at least, to the value of real estate, but that the amount returned for taxation amounts to only 6.7 per cent of that returned for real estate. This question of failure
to effectively reach intangible wealth is an old one, nevertheless a most serious one. This problem is clearly another one of the difficulties in our present method of taxation.

Tables 2 and 3 disclose some additional difficulties in so far as farm land is concerned. It will be observed that since 1920, due to the adoption of full value assessments in Missouri, farm land seems to have been assessed at a higher ratio to owners’ estimated value than urban real estate, and that data from six widely separated counties of

Table 2.—Relation of Assessed Valuation to Owners’ Estimates of Sale Value. Rural and Urban Real Estate Compared, 1919-1923

(New Madrid, Gentry, Audrain and Boone Counties)

<table>
<thead>
<tr>
<th>Year</th>
<th>No. Farms</th>
<th>Ratio, assessed to owners’ valuation</th>
<th>No. Properties</th>
<th>Ratio, assessed to owners’ valuation</th>
<th>Per cent, rural assessment ratio of urban assessment ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1919</td>
<td>73</td>
<td>14.6</td>
<td>19</td>
<td>54.6</td>
<td>26.7</td>
</tr>
<tr>
<td>1920</td>
<td>82</td>
<td>18.0</td>
<td>36</td>
<td>56.8</td>
<td>31.7</td>
</tr>
<tr>
<td>1921</td>
<td>103</td>
<td>69.3</td>
<td>41</td>
<td>64.5</td>
<td>107.4</td>
</tr>
<tr>
<td>1922</td>
<td>145</td>
<td>68.7</td>
<td>61</td>
<td>70.5</td>
<td>97.4</td>
</tr>
<tr>
<td>1923</td>
<td>256</td>
<td>105.1</td>
<td>68</td>
<td>64.6</td>
<td>162.7</td>
</tr>
</tbody>
</table>

Table 3.—Relation of Assessed Valuation to Selling Price of Rural and Urban Real Estate Compared, Recorded Sales in Six Missouri Counties, 1924

<table>
<thead>
<tr>
<th>County</th>
<th>Rural Real Estate</th>
<th>Urban Real Estate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Transfers (Number)</td>
<td>Rate of Assessment (per cent)</td>
</tr>
<tr>
<td>Atchison</td>
<td>53</td>
<td>59.1</td>
</tr>
<tr>
<td>Cass</td>
<td>14</td>
<td>46.9</td>
</tr>
<tr>
<td>Linn</td>
<td>71</td>
<td>62.9</td>
</tr>
<tr>
<td>Pettis</td>
<td>61</td>
<td>71.1</td>
</tr>
<tr>
<td>Pike</td>
<td>7</td>
<td>113.8</td>
</tr>
<tr>
<td>Ralls</td>
<td>40</td>
<td>59.9</td>
</tr>
<tr>
<td>6 Counties</td>
<td>246</td>
<td>62.7</td>
</tr>
</tbody>
</table>

*Sales records supplied by the Missouri Farm Bureau Federation.
the State for 1924 indicate that the assessed value of real estate in relation to its actual selling price was rather consistently higher in the case of farm land than for urban real estate. Such inequalities are the more serious when account is taken of the generally recognized fact that farm land normally returns a considerably lower rate of interest on its sale valuation than urban real estate.

There is another problem in taxation shown by Brannen and Gromer to be seriously affecting farm land, which receives less attention than those already mentioned and which is, nevertheless, of great import. This is the relation of state and local methods of finance to the farm tax problem.

**Table 4.—Missouri State and Local Revenues from Taxes and Licenses, by Sources 1890-1922.* (In thousands of dollars)**

<table>
<thead>
<tr>
<th>Source</th>
<th>State Central Government</th>
<th>Local Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1922</td>
<td>1890</td>
</tr>
<tr>
<td></td>
<td>Amt.</td>
<td>Per cent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Property Taxes</td>
<td>4,971</td>
<td>30.20</td>
</tr>
<tr>
<td>Poll Taxes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>2,568</td>
<td>15.60</td>
</tr>
<tr>
<td>Inheritance Taxes</td>
<td>1,375</td>
<td>8.35</td>
</tr>
<tr>
<td>Other Special Taxes</td>
<td>2,007</td>
<td>12.20</td>
</tr>
<tr>
<td>Liquor Licenses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Licenses</td>
<td>5,539</td>
<td>33.65</td>
</tr>
<tr>
<td>Total</td>
<td>16,460</td>
<td>100.00</td>
</tr>
</tbody>
</table>

* *Census of Wealth, Debt and Taxation, 1890 and 1922.
†Poll Taxes not shown separate from property taxes for 1890.
‡Local property taxes estimated by Census.

Although the percentage of total combined state and local revenues from taxes and similar sources derived from the general property tax has remained constant over a long period of years, reference to Table 4, which presents separately the sources of state and local governmental revenues, discloses a decided decrease in proportion of state revenues derived from the general property tax and a considerable increase in proportion of local unit revenues from the general property tax. This is accounted for by the passage of the eighteenth amendment, resulting in a loss to the local unit of revenues derived from liquor taxes and by the new forms of special taxes which the
state central government has been able to put into effect. Such a loss in local unit revenue from special sources has resulted in increasing the local tax burden of farm land through the general property tax.

Since, in effect, the state central government, through its regulatory powers, establishes the minimum costs of county government and of the local unit educational program, it thereby greatly increases the tax burden on local farm land unless its appropriations for local use from state revenues are sufficiently enlarged to equalize the situation. An inspection of such appropriations for common school revenues in 1921 and 1924 (See Table 5) illustrates a case where the local burden is increased through a decrease in state aid. On this point Brannen and Gromer quote a report of the School Survey Committee of another state and a report of a Special Joint Committee on Taxation and Retrenchment of the New York Legislature, 1924, as follows:

"The plain fact seems to be that the cost of the things which the State has delegated to the local political subdivisions has increased more rapidly than the capacity of the local revenue system to expand. As the situation now stands, it is the state and not the local revenue system which contains the most elastic elements and the greatest possibilities of increased productivity. The taxes which should be used to raise additional funds are for the most part taxes whose suc-

Table 5.—Common School Revenues Appropriated from the State Revenue Fund by Sources; 1921 and 1924

<table>
<thead>
<tr>
<th>Source</th>
<th>State appropriation from the revenue fund</th>
<th>1921*</th>
<th>1924†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dollars per cent</td>
<td>dollars per cent</td>
<td></td>
</tr>
<tr>
<td>Income Tax</td>
<td>1,598,165 32.7</td>
<td>1,075,362 30.7</td>
<td></td>
</tr>
<tr>
<td>General property tax</td>
<td>1,109,603 22.7</td>
<td>782,303 22.3</td>
<td></td>
</tr>
<tr>
<td>Corporation franchise tax†</td>
<td>987,625 20.2</td>
<td>573,351 16.3</td>
<td></td>
</tr>
<tr>
<td>Inheritance tax</td>
<td>409,667 8.4</td>
<td>426,391 12.2</td>
<td></td>
</tr>
<tr>
<td>Foreign insurance tax</td>
<td>260,768 5.4</td>
<td>307,235 8.8</td>
<td></td>
</tr>
<tr>
<td>All others</td>
<td>517,154 10.6</td>
<td>339,890 9.7</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4,882,982 100.0</td>
<td>3,504,532 100.0</td>
<td></td>
</tr>
</tbody>
</table>

*From "Facts Concerning Public Education in Missouri," June 30, 1924, Table XIX. †From list submitted by Mr. W. W. Gibbany of the State Department of Education. ‡Including incorporation tax for 1924.
cessful administration demands that they be state rather than local taxes. The solution of the problem would seem to involve either that the state relieve the localities of certain functions which it has asked them to perform, or that the state increase very considerably the amounts which it collects in taxes and then redistributes to the localities.”

Summary.—1. The tax burden of Missouri farm land is becoming serious in that it seems to be absorbing an increasingly large proportion of farm land rent, due to:—

a. Increasing governmental expenditures.

b. Too great reliance on the general property tax.

c. Inequalities in assessment:—

(1) Inability to reach intangible wealth.

(2) Improper application of “sale value” of real estate to farm land and insufficient attention to the earning power of farm land as compared to other real estate.

d. Need of a revision of functions performed by local governments at the demand of the state government or of amount of state revenues redistributed to local units.

Conclusion.—In the foregoing the attempt has been made to disclose some of the difficulties in our present system of land taxation and some of the corrective steps suggested, as determined by the investigation made by Brannen and Gromer. That Missouri, as well as many other states, is employing an antiquated and poorly balanced taxation system and that corrective measures are becoming more and more imperative seem to be self evident facts. A revision of taxes involves great responsibility. Relieving the burden at one point means adding burden at another end as one of the national authorities on taxation, Professor H. G. Brown, of the University of Missouri, so clearly points out in his writings, a tax is often as elusive as quick silver in its shifting and final incidence. Too often a tax directed at one class ultimately falls upon another. Unquestionably a revision is needed. Certainly, our best minds will be required in the revision process.

MANAGEMENT OF FORECLOSED FARMS

C. A. Helm, Associate Professor of Field Crops, College of Agriculture, University of Missouri.

Foreclosed farms and those chronically delinquent are, with a few exceptions, undesirable farms. They are nearly all marginal in the sense that in their operation farmers with average credit, capital, ability, and industry, are unable to meet their annual fixed overhead obligations and at the same time make a living.
The problem of handling delinquents is comparatively simple. The tendency of loan companies is to do nothing much about them, other than the writing of curt, threatening letters which in reality are not effective and often harmful to both parties. First-hand information, combined with intelligent interpretation, is required in the solution of this problem. Farmers become delinquent for the following reasons: (1) unseasonable dates of interest maturity, (2) high interest rates and high loan values, (3) depreciated land value through abuse of the farm, (4) lack of ability and industry, (5) consecutive seasons of unfavorable crop yields.

In the first case the maturity dates should be changed by prorating to mature at desired dates; in the second case either reduce the sum of the loan or reduce the interest rates, or both; and in the third and fourth cases immediate foreclosure. Since delinquency always precedes foreclosure this phase of the farm mortgage business is without doubt the most important. Probably one-half of all foreclosures in Missouri could have been avoided by making prompt and direct connection with each case immediately following the beginning of delinquency. Adjustments between the loan company and the individual based on a careful and practical knowledge and analysis of both the farm and the man should be made. A decision should be reached as to one of the following procedures (a) extension of time, (b) interest reductions, or (c) immediate foreclosure. In the farm mortgage business fixed rules do not and will not apply. The methods used in other phases of the loan business, such as the buying and selling of bonds, can not be made to apply to dealings with farmers. Every case is an individual case and must be considered as such.

The argument that a loan company can afford to foreclose desirable farms having an equity is not well grounded. During the period of loan company ownership the investment usually increases sufficiently to absorb any equity that existed at foreclosure.

The losses to loan companies in the liquidation of foreclosed land have amounted to large sums. These could be reduced by intelligent action in the case of delinquents.

It is fully as important to promptly foreclose on land being operated by shiftless and careless farmers. It is better to allow land to remain idle and the buildings unoccupied than to continue ownership in this class of tenants.

There are three general classes of tenants in Missouri. (1) Good farmers who through bad investments in past years or for reasons not under their control have been dislodged as land owners and have recently become tenants constitute the first class. They are, as a rule, short on equipment and capital and for this reason can be easily persuaded to go to the more desirable farms of the loan company, by the
offer of liberal rental terms. (2) The second class are those men, usually past middle age, who have always worked either as hired laborers or tenants. They have little or no capital, and very little equipment. They are reasonably honest and can be satisfied with a limited acreage of cultivated land for corn, oats, etc. Such men, where available, should be located on those farms which have been abused to an extent sufficient to warrant the seeding of the most of the farm to grass. (3) The third group are a shiftless, illiterate class who have no desire to realize more than the amount sufficient for existence. They will rent a farm merely as a place to live with no intention of carrying out their lease agreement. This class virtually swarms to loan company farms. These are the only tenants available for those sub-marginal, wornout, badly located farms with depleted improvements. It would be better to run two wires around the property and rent it to a neighbor for pasture for a sum that would partly offset the taxes, rather than rent to the class just described.

The use of lime, intensive rotations, tiling, extensive ditch filling, cutting of sprouts, and clearing of timbered land and elaborate improvements of buildings and fences have no place, when used extensively in the operation of foreclosed farm lands. Depending upon the farm and tenant, the making of conservative improvements, however, is a sound policy and should be undertaken.

Those tenants who will receive, haul and spread lime in connection with wheat or oats without labor charge, in return for the use of the clover crop the first season should be supplied with lime for reasonable acreages. The use of phosphate fertilizers or complete fertilizers should be encouraged on all crops and required where wheat is sown. If necessary, the tenant should be supplied with fertilizer when he is financially unable to purchase his part. This can be done by requiring that it be paid for when the crop is sold.

Intensive and fixed rotations are too complicated and the results too slow to be of any value to the temporary owner or tenant. On the other hand several rules should be followed to the letter. (1) Reduce the corn acreage to a minimum. (2) Increase the soybean, wheat, and oat acreage, including the sowing of grass with the grain to the maximum. (3) Prohibit the plowing of any sod land which is yielding fair pasture or hay. (4) Where a soybean crop is grown require that wheat follow. (5) Require that soybeans be removed for hay.

Land which is in such condition that tiling is necessary for production of cultivated crops or has washed so badly as to necessitate the filling of ditches should be sown to grass either directly or in connection with a grain crop.

Timbered land should never be cleared except where the timber is growing on productive, tillable land. It should be done on a cost
per acre basis, or on a basis of free use of the land for corn the fol-
lowing season. The only man who can afford to remove sprouts by
hand is the one who expects to retain ownership of the land and can
do the work at inexpensive times or during hours which would other-
wise be wasted.

Desirable tenants are entitled to serviceable improvements. Wholesalerepairs and new improvements of fences, buildings, etc. are
never advisable. However, conservative improvements and repairs
are practical and profitable, more especially when they result in the
retention of desirable tenants.

No company need expect incomes from their farms sufficient to
more than partly cover their fixed carrying charges. The cost of
supervision is high. A certain amount of practical supervision, how-
ever, is necessary. The farm should be so handled and organized as
to reduce the need for supervision to a minimum. This can best be
done by (a) obtaining good tenants, working under a lease favorable
to their staying on the farm, and (b) the establishing of grass on the
greater part of the farm. Under the present livestock situation the
rental returns from grass land are small. However, when all facts
are considered less loss accrues at the end of the year from grass land
than from the cultivated part of the farm. The lessened returns from
grass land are offset by reduction of expense in (a) cost of added
supervision (b) cost of seed, fertilizer, freight, threshing charges,
marketing, etc., to say nothing about the added loss in soil depreciation
from already worn land.

Stands of grass can be obtained relatively cheap as compared with
grain farming costs. Timothy, red top, and alsike clover sown as a
mixture will usually give a good stand on poor soils and once establish-
ed will be permanent. The seeding may be done in the spring on oats
or wheat, in the fall, on oats or wheat stubble land, or in late fall in
standing corn.

Foreclosed farms generally require a large amount of labor in the
repair of improvements to make them livable for desirable tenants.
These repairs done with consideration and efficiency are generally
worth while. However, the purchasing of farm labor by the day or
hour is always inefficient, especially on repair work. It should be the
practice therefore of having such work as is necessary done by the ten-
ant on a contract basis. Such work as fencing, cutting of posts, roof-
ing, repairing of house, barn and other out buildings, and painting
should be done by the job instead of by the day or hour.
FARM INDEBTEDNESS

D. C. Wood, Extension Assistant Professor of Agricultural Economics, College of Agriculture, University of Missouri

In considering the subject of farm indebtedness the purpose of this discussion will be to treat the topic from a forward-looking point of view rather than to attempt an extended review of the causes leading up to the present situation. Such treatment is facilitated by the opening address which, in presenting the most significant influences now affecting American agriculture, brought into view the extent of our total farm indebtedness and suggested the difficulties involved in its complete liquidation.

To whatever degree and in whatever manner the present farm indebtedness will be cleared, the financing of agriculture will ever remain an essential and active field. Nevertheless, it is apparent that, for the moment, this function is in process of reconstruction; that the agencies involved in financing agriculture are at this time reconstructing administrative policies and operating methods to fit a changed agricultural situation. In this process the application of research in agricultural economics is finding an important place. It will be our effort, therefore, to discuss farm indebtedness in a manner which will illustrate some applications of general and local research in the field of agricultural economics to such a reconstruction program.

Table 1.—Relation of Amount of Mortgage Indebtedness to Value of Land and Buildings for Three Years

<table>
<thead>
<tr>
<th></th>
<th>1909</th>
<th>1919</th>
<th>1924</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value per acre</td>
<td>Ratio of mortgage to value</td>
<td>Value per acre</td>
</tr>
<tr>
<td><strong>U. S.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All farms</td>
<td>$39.60</td>
<td>$69.38</td>
<td>$53.52</td>
</tr>
<tr>
<td>Farms reporting mortgage</td>
<td>27%</td>
<td>29%</td>
<td>42%</td>
</tr>
<tr>
<td><strong>Mo.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All farms</td>
<td>$49.61</td>
<td>$88.09</td>
<td>$61.37</td>
</tr>
<tr>
<td>Farms reporting mortgage</td>
<td>29%</td>
<td>29%</td>
<td>45%</td>
</tr>
<tr>
<td><strong>Howard County</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Missouri)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All farms</td>
<td>$58.07</td>
<td>$111.18</td>
<td>$67.64</td>
</tr>
<tr>
<td>Farms reporting mortgage</td>
<td>33%</td>
<td>31%</td>
<td>52%</td>
</tr>
</tbody>
</table>
The 1909-1924 Farm Mortgage Situation.—A general view of the changes in farm land values and in the proportions of such values represented by farm land mortgage indebtedness for the prewar, war and postwar periods is presented in Table 1.

It will be observed that both land values and the ratios of mortgage indebtedness to land values were materially increased in 1924 over 1909. It will be noted also that the increases in land values resulting from the inflation period had not been cancelled by deflation by the year 1924.

Nominal vs. Real Value of Land.—A discussion of farm indebtedness inevitably gravitates about the relation of the sale value to the productive value of land. Since the real value of land is determined by the net rent it earns, an acre which returns its owner a net rent of $6.00, when the prevailing rate of interest is six per cent, has a current, real value of \( \frac{6}{6} \times 100 \), $100. But, if the owner believes that this acre will return him a constantly increasing net rent over a period of years, or if he is content to accept less than a six per cent return on his investment, what is his idea of the value of the acre? More than $100, certainly. Thus it comes about that the nominal value and the current, real value of land fail to coincide.

In this illustration the nominal value of land is clearly shown to be the result of individual judgment. On what are such judgments based? Obviously anticipated increases in land rents are normally based on expectations of higher prices for farm products. This being true an inspection of price movements should throw some light on changes in farm land values.

The Application of Price Studies to the Financing of Agriculture.—Within recent years there have become available for general use the results of research in price movements and price relationships. By means of index numbers issued periodically by the agencies engaged in such study current price movements may be followed and interpreted from month to month. Through such means it has become possible to sense the trend of the times and to anticipate future situations through an increasing familiarity with the direction in which and the sequence with which individual classes of commodity prices normally move under a given set of conditions.

Table 2 illustrates the normal sequence of changes which may be expected during inflation and deflation in farm prices wholesale non-agricultural prices and in the general wage level. It is characteristic of inflation that farm prices react upward further and before a similar reaction upward becomes evident in wholesale non-agricultural prices and that the general wage level is the last to react. Inflation may be said to have come about sharply with the entrance of the United
States into the world war. In response thereto farm prices rose from 1917 to 1919 to a greater degree than did wholesale non-agricultural

<table>
<thead>
<tr>
<th>Year</th>
<th>Farm prices</th>
<th>Wholesale non-agr. prices</th>
<th>Purchasing power of farm products*</th>
<th>General wage level</th>
<th>Value of plow land</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910</td>
<td>103%</td>
<td>102%</td>
<td>101%</td>
<td>---%</td>
<td>93%</td>
</tr>
<tr>
<td>1911</td>
<td>95</td>
<td>96</td>
<td>99</td>
<td>---</td>
<td>96</td>
</tr>
<tr>
<td>1912</td>
<td>99</td>
<td>100</td>
<td>99</td>
<td>---</td>
<td>99</td>
</tr>
<tr>
<td>1913</td>
<td>100</td>
<td>105</td>
<td>95</td>
<td>---</td>
<td>103</td>
</tr>
<tr>
<td>1914</td>
<td>102</td>
<td>97</td>
<td>105</td>
<td>100</td>
<td>109</td>
</tr>
<tr>
<td>1915</td>
<td>100</td>
<td>101</td>
<td>99</td>
<td>101</td>
<td>111</td>
</tr>
<tr>
<td>1916</td>
<td>117</td>
<td>138</td>
<td>85</td>
<td>114</td>
<td>123</td>
</tr>
<tr>
<td>1917</td>
<td>176</td>
<td>182</td>
<td>97</td>
<td>129</td>
<td>136</td>
</tr>
<tr>
<td>1918</td>
<td>200</td>
<td>188</td>
<td>107</td>
<td>160</td>
<td>153</td>
</tr>
<tr>
<td>1919</td>
<td>209</td>
<td>199</td>
<td>105</td>
<td>185</td>
<td>167</td>
</tr>
<tr>
<td>1920</td>
<td>205</td>
<td>241</td>
<td>85</td>
<td>222</td>
<td>202</td>
</tr>
<tr>
<td>1921</td>
<td>116</td>
<td>167</td>
<td>69</td>
<td>203</td>
<td>184</td>
</tr>
<tr>
<td>1922</td>
<td>124</td>
<td>168</td>
<td>74</td>
<td>197</td>
<td>156</td>
</tr>
<tr>
<td>1923</td>
<td>135</td>
<td>171</td>
<td>79</td>
<td>214</td>
<td>142</td>
</tr>
<tr>
<td>1924</td>
<td>134</td>
<td>162</td>
<td>83</td>
<td>218</td>
<td>141</td>
</tr>
<tr>
<td>1925</td>
<td>147</td>
<td>165</td>
<td>89</td>
<td>223</td>
<td>---</td>
</tr>
<tr>
<td>1926</td>
<td>136</td>
<td>161</td>
<td>85</td>
<td>229</td>
<td>---</td>
</tr>
<tr>
<td>1927</td>
<td>131</td>
<td>152</td>
<td>86</td>
<td>231</td>
<td>---</td>
</tr>
</tbody>
</table>


*Farm Price Index divided by Wholesale Non-Agr. price index equals purchasing power of farm products.

prices reaching a peak of 209 in 1919 whereas wholesale non-agricultural prices continued to rise to a peak of 241 in 1920 by which time farm prices had receded to 205. Similarly it is characteristic of deflation that farm prices react downward further and before a similar reaction becomes evident in wholesale non-agricultural prices. This sequence of downward reaction is clearly shown in Table 2 for the years 1921 to 1927.

The value of knowing how prices behave in both normal and abnormal periods is obvious as is the benefit to the business man of having before him at all times barometric readings of current price movements. Such information has but recently been available and in general use. Therefore it has not had full opportunity to function during a severe change in price levels. But it is believed that its general application will do much in the future to stabilize price levels.
There is a point illustrated in Table 2 which should have our attention. It will be observed that the value of plow land in the United States rose from 93 in 1910 to 202 in 1920 and that during the same period of time the purchasing power of farm products rose from 101 unevenly to 107 in 1918 and fell back to 85 in 1920. During this entire period there were but four years when the purchasing power of farm products was above 100. Nevertheless the value of plow land rose each year from 1910 to and including 1920 and had fallen to but 141 by 1924 at which time the purchasing power of farm products stood at 83. It seems inconsistent that the value of plow land should increase during a period when the farmer's margin of profit per unit of product is depressed. However if during this period the market absorbed an increased volume of farm products the ability of the average farm to increase its volume of production could have resulted in an enlarged net farm income even though the margin of price over cost of production had been narrowed. Reference to the statistics of volume of farm products marketed by American farmers during the war period and fore part of the postwar period will substantiate this point.

Where some of those who participated in financing agriculture during the period under discussion apparently went astray was in failing to recognize that high farm prices were actually low farm prices when measured with other commodity prices and that the greatly expanded market for American farm products was but a temporary situation which could not be sustained.

This is not our first experience with inflated farm land values and unsound farm financing. But the clarity which research has given to price movements under varying conditions and the ever increasing insight research is bringing about into the world's agricultural situation would seem to justify a belief that the future will not see a repetition of the experience from which we are still suffering.

The Application of Farm Management Studies to Financing the Farm.—From the foregoing discussion it becomes evident that the appraiser has had the difficult task of evaluating farm land at its long-time productive value and, at the same time, meeting unsound competitive appraisals in which speculative value as well as temporary abnormal productive value were given weight. Here we touch upon a weakness which has proved destructive to the borrower as well as the lender and which needs correction by the mutual efforts of the agencies engaged in the farm loan field.

It also seems apparent that the farm mortgage loan is secured less by a mere physical asset than has been hitherto assumed. Since the real value of a farm is determined by the rent it earns, and since
the rent it earns is to a far greater extent dependent on the man who operates the farm than seems to be generally recognized, it follows that the potential productiveness of farm land does not in itself constitute security. The difficulty lies in finding some practical means of measuring the efficiency of the farm business and the rent it is earning. Tables 3 and 4 present the kind of data required to obtain such mea-

Table 3.—Composite Financial Summary of Data from 1926 Farm Business Records of 10 Howard County, Missouri Farms (Average Area per Farm 201 Acres)

<table>
<thead>
<tr>
<th>Description</th>
<th>Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of land and buildings, (farmers' estimates)*</td>
<td>$74.00</td>
</tr>
<tr>
<td>Interest paid</td>
<td>1.48</td>
</tr>
<tr>
<td>Mortgage indebtedness (calculated from interest paid)*</td>
<td>24.67</td>
</tr>
<tr>
<td>Ratio of mortgage debt to value of land and buildings*</td>
<td>33%</td>
</tr>
<tr>
<td>Operating capital, (value of livestock, equipment, feed and supplies)</td>
<td>24.00</td>
</tr>
<tr>
<td>Total investment</td>
<td>98.00</td>
</tr>
<tr>
<td>Total farm credits†</td>
<td>17.30</td>
</tr>
<tr>
<td>Total farm debits‡, (except interest on equity in land)</td>
<td>15.35</td>
</tr>
<tr>
<td>Net land income</td>
<td>1.95</td>
</tr>
<tr>
<td>Capitalized net land income ($1.95 = 6% or Productive value of land*)</td>
<td>32.50</td>
</tr>
<tr>
<td>Net land income</td>
<td>1.95</td>
</tr>
<tr>
<td>Interest paid</td>
<td>1.48</td>
</tr>
<tr>
<td>Gross land income (before interest payments are deducted)</td>
<td>3.43</td>
</tr>
<tr>
<td>Percentage of land income absorbed by interest</td>
<td>43.1%</td>
</tr>
<tr>
<td>Net land income</td>
<td>1.95</td>
</tr>
<tr>
<td>Taxes paid</td>
<td>.56</td>
</tr>
<tr>
<td>Gross land income, (before tax payments are deducted)</td>
<td>2.51</td>
</tr>
<tr>
<td>Percentage of land income absorbed by taxes</td>
<td>22.3%</td>
</tr>
<tr>
<td>Net land income</td>
<td>1.95</td>
</tr>
<tr>
<td>Interest and taxes paid</td>
<td>2.04</td>
</tr>
<tr>
<td>Gross land income (before interest and taxes are deducted)</td>
<td>3.99</td>
</tr>
<tr>
<td>Percentage of land income absorbed by interest and taxes</td>
<td>51.1%</td>
</tr>
</tbody>
</table>

*Compare with data in Table 1.
†Total farm credits include: crop sales, $1.76; livestock sales, $13.05; miscellaneous receipts, $ .37; increase in inventory, $2.12.
‡Total farm debits include: current expenses, (value of family labor, except that of the farm operator, included $9.76; decrease in inventory, $1.15; interest on operating capital, $1.44; value of operator's labor and management service, (arbitrarily fixed at $600 per year) $3.00.
These tables will be briefly reviewed to demonstrate land income and productive land value determinations and to illustrate some of the factors used in measuring the efficiency of farm management.

The data presented in Table 3 includes a calculation by means of which it is possible to approximate the land rent actually earned per acre. The arbitrary value assigned to the labor and management service of the operator is conservative and approximates the annual cost of hiring a farm hand. Nevertheless when the value of house rent, farm produce used by household, family labor and net land income are considered, the family incomes on these farms are far above the average of Missouri farms. The purpose of the calculation is to contrast the computed productive value of the land with the estimated value as well as to illustrate the large proportion of land income absorbed by interest payments and taxes.

**Method of Obtaining Data.**—The data shown in Table 5 were secured by mail questionnaires. These were sent to individual farmers in the month of January 1927 immediately following the close of the calendar year. The data sought covered the farm business of 1926. This attempt was in the nature of an experiment based on past experience of many states in taking so called farm business survey records through personal calls by trained enumerators to test the practicability of using the mails for the same purpose. While the results were satisfactory from a research point of view, it is recognized that for the purpose herein suggested a questionnaire form must be greatly condensed and such a form will be submitted with this paper. Those interested in satisfying themselves as to the average farmer’s ability to give a reliable record of his business through a survey record are referred to pages 40 and 41 of the Missouri Agricultural Experiment Station Bulletin 255 “Land Valuation” as the amount of time assigned to this paper will not permit repetition here.

In addition to making available such a summary as is presented in Table 3 a farm business record supplies supplementary data through which the efficiency of farm organization and administration may be measured. Some farms suffer from improper organization, examples of which are farms in which the total investment or the investment in improvements or in equipment per acre are prohibitive. Other farms attempt extensive methods on land which is not adapted to such production because of its value. Again, some cropping systems result in too great competition for labor at certain seasons of the year, and other cropping systems do not fit in properly with the livestock enterprises. Many farms are fairly well organized as to economical use of land, capital and labor, but suffer from poor methods of production. Both classes of efficiency may be measured in quantitative terms.
It will not be possible to go into farm business analysis here beyond illustrating a few common measures. As all states have been active in farm management studies for a number of years and have established standards which may be applied in making individual farm business analyses, there is available ample supplementary information for those who are interested in studying farm records. Our effort at this time must be confined to suggesting an application to your field, briefly explaining the method, presenting a few illustrative figures, and submitting a suggested blank form.

Table 4.—1926 Composite Farm Business Data of 20 Howard County, Missouri, General Farms

(Composite Data Shown for Two Groups of Farms, viz.—the 10 Most Successful and the 10 Least Successful. These are Records Selected from a Total of 31 Records Obtained by Mail Survey.)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Averages of the 10 most successful farms</th>
<th>Averages of the 10 least successful farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm area</td>
<td>225 acres</td>
<td>190 acres</td>
</tr>
<tr>
<td>Capital investment</td>
<td>$16,372</td>
<td>$14,257</td>
</tr>
<tr>
<td>Receipts (cash and inventory gain)</td>
<td>$3,982</td>
<td>$2,244</td>
</tr>
<tr>
<td>Expenses (cash and inventory loss)</td>
<td>$1,514</td>
<td>$1,899</td>
</tr>
<tr>
<td>Farm income</td>
<td>$2,468</td>
<td>$345</td>
</tr>
<tr>
<td>Interest on equity</td>
<td>$801</td>
<td>$658</td>
</tr>
<tr>
<td>Labor income</td>
<td>$1,667 (minus)</td>
<td>$313</td>
</tr>
<tr>
<td>Number of crop acres per man</td>
<td>74</td>
<td>35</td>
</tr>
<tr>
<td>Number of crop acres per work horse</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Number of crop acres per $100 equipment</td>
<td>15</td>
<td>24</td>
</tr>
<tr>
<td>†Number of units of livestock per man</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>Number of crop acres per unit of livestock</td>
<td>4.2</td>
<td>5.2</td>
</tr>
<tr>
<td>Livestock gross receipts per unit</td>
<td>$119</td>
<td>$97</td>
</tr>
<tr>
<td>Feed fed per unit of livestock</td>
<td>$71</td>
<td>$101</td>
</tr>
<tr>
<td>Gross livestock receipts per dollar of feed fed</td>
<td>$1.68</td>
<td>$0.96</td>
</tr>
</tbody>
</table>

*Labor income represents the returns to the farm operator for his own labor and management service.
†A unit of livestock or animal unit is the equivalent of a work horse on the basis of the value of feed required per year. For example, the feed cost per sow per year is approximately one-fourth of the feed cost per work horse per year. Therefore, 4 sows are equivalent to one unit. Standards for reducing all classes of livestock to animal units may be secured from agricultural experiment stations.

From data in Table 4 it will be observed that the most successful group of farms averaged greater farm area and larger capital investment; had greater gross receipts, smaller expense and larger farm income; that the successful group of farmers averaged a labor income
of $1667 and the unsuccessful group of labor income of minus $313. In other words, the least successful group averaged a farm income insufficient to return a current rate of interest on capital invested.

The successful group utilized labor to better advantage in that they handled more than twice the number of acres of crops per man and more than twice the number of animal units per man. The least successful group had insufficient investment in farm equipment, probably old, single row implements, resulting in an uneconomical use of man and horse labor.

The successful group of farms were more fully stocked, having one animal unit to each 4.2 acres of crops.

The more successful group handled livestock more efficiently, getting better production per unit, feeding at a considerably lower cost per unit and getting a return of $1.68 per dollar's worth of feed fed as against 96c in the case of the least successful group.

Such an analysis may be carried to a considerable degree. The purpose here, however, is merely to illustrate a few comparisons which may be worked out from farm business survey records.

The collection of records in a community and the gradual accumulation of records in various regions and of various types of farming by an organization results, finally, in establishing standards for each. It is impossible to lay down standards which have general application. Care must always be taken to classify or identify a set of standards with a specific type of farming and with a specific region. However, in the Corn Belt the general farm does not differ in broad organization to such an extent as to preclude some rough standards.

Utilization of Capital.—Normally on successful general farms in Missouri not much more than 75 per cent of the total capital investment is in land and improvements; not much less than 25 per cent is represented by operating capital (equipment, livestock, feed and supplies); not much more than 5 per cent in equipment and a like proportion in feed and supplies; and not much less than 15 per cent in livestock.

Utilization of Land.—Normally on successful general farms in Missouri the proportion of farm area in crops is not much less than from 60 to 75 per cent. However, this proportion will vary both with the region, because of differences in values, soils, topography and the like, and from one period to another because of changes in the price situation. The percentage of farm area in waste is an important item. It normally varies from 2 to 5 per cent on general farms in the better regions of Missouri. While great variations will be found in the distribution of crops, the general statement may be made, (with reservations), that, normally, within typical corn regions of the state, the successful general farm will not have greatly in excess of one-third
of its area in corn, one-fourth, or less, in small grains, and from one-fifth to one-third in hay. Incidentally the presence of legumes suited to the soil in large proportion may be taken as evidence of constructive farming.

Utilization of Labor and Equipment.—On the successful general farm in Missouri there will normally be 60 or more crop acres handled per man, 20 or more crop acres per work horse and from 15 to 18 crop acres per $100 of equipment.

In the foregoing specific figures have been laid down solely for illustrative purposes. They should not be accepted without necessary reservations, already mentioned. Our purpose in presenting them is to suggest the value of farm business data for obtaining such measures and the practicability of applying such methods to your field when the proper research force is made available.

The Farm Business Operating Statement.—The series of mail survey questionnaires may be condensed to the form shown in Tables 5 and 6. Such a form properly filled in by the farmer, will supply sufficient data for the purposes we have been discussing. It may be printed on both sides of a sheet measuring less than the standard letterhead. It is submitted at the request of those attending the Land Valuation Short Course of 1927 as a practical means of applying farm management studies to financing the farm.
LAND VALUATION

FARM OPERATING STATEMENT

Region Number ____________  Page 1  Farm Number ____________

County ____________________  Bank ____________________  P. O. ____________________

Land I Farmed Last Year

- acres of land I owned.
- acres of land I cash rented from another.
- acres of land I share rented from another.

Total Acres I Farmed

- acres in building lots and waste.
- acres in pasture.
- acres in woods not pastured.
- total land not in crops.

NOTE: "Total acres I farmed" should equal the sum of "total land not in crops," "total acres of crops on land I owned or cash rented from another" and total acres of crops on land I share-rented from another. Inaccuracies usually occur in pasture area estimates.

Blank spaces are provided in the crop statement form for writing in crops not shown therein. All crops raised should be reported, with their estimated yields, sales and share rent divisions.

Where two crops are harvested from the same land in the same year each crop should be reported separately in crop statement, but, in this case, in one report the number of crop acres should be encircled with lead pencil ( ) to indicate that this area has been once previously accounted for.

Where two crops are grown on the same land in the same year, as in the case of soybeans with corn, as a companion crop, or clover with small grain, as a nurse crop, a lead pencil notation of the companion or nurse crop should follow the name of the main crop.

CROP STATEMENT

TABLE 5

<table>
<thead>
<tr>
<th>Acres</th>
<th>Crops</th>
<th>Total Yield</th>
<th>Acres</th>
<th>Total Yield</th>
<th>My Share</th>
<th>Acres</th>
<th>Total Yield</th>
<th>My Share</th>
<th>Amount of My Crops Sold</th>
<th>Receipts from My Crop Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wheat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oats</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clovers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Timothy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Potatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X</td>
<td>X X</td>
<td>X X X</td>
<td>X X X</td>
<td>$</td>
<td></td>
</tr>
</tbody>
</table>

CROP STATEMENT

TABLE 5
### TABLE 6

<table>
<thead>
<tr>
<th>Taken as at Jan. 1</th>
<th>Inventory value of this farm</th>
<th>Farm Cash Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A beginning of the year</td>
<td>At the end of the year</td>
</tr>
<tr>
<td></td>
<td>Amount</td>
<td>Value</td>
</tr>
<tr>
<td>(No. acres --------)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land &amp; Bldgs. (except dwelling)</td>
<td>X X X</td>
<td>$</td>
</tr>
<tr>
<td>Buildings alone (except dwelling)</td>
<td>X X X</td>
<td>$</td>
</tr>
<tr>
<td>Farm Equipment</td>
<td>Work Stock</td>
<td>Head</td>
</tr>
<tr>
<td>Other Horses or Mules</td>
<td>Milk Cows</td>
<td></td>
</tr>
<tr>
<td>Other dairy cattle</td>
<td>Beef Cows</td>
<td></td>
</tr>
<tr>
<td>Feeding Steers</td>
<td>Other Beef Cattle</td>
<td></td>
</tr>
<tr>
<td>Other Sheep</td>
<td>Ewes</td>
<td></td>
</tr>
<tr>
<td>(Held for farrowing) Sows &amp; Bred Gilts</td>
<td></td>
<td>Other Sheep</td>
</tr>
<tr>
<td>Other Hogs</td>
<td>Poultry</td>
<td></td>
</tr>
<tr>
<td>Hives of Bees</td>
<td>TOTAL LIVESTOCK</td>
<td></td>
</tr>
<tr>
<td>Feed &amp; Bedding</td>
<td>Crops held for sale</td>
<td>X X X</td>
</tr>
<tr>
<td>(Labor and seed) Crops in Ground</td>
<td>(Seed, fertilizer, etc.) Farm Supplies</td>
<td>X X X</td>
</tr>
<tr>
<td>TOTAL FARM INVESTMENT</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Farm Cash on hand</td>
<td>(Farm business) Amounts Owed Me</td>
<td></td>
</tr>
<tr>
<td>(Farm business) Assets</td>
<td>(Farm Business) Amounts I owe</td>
<td></td>
</tr>
<tr>
<td>FARM NET WORTH</td>
<td>MISCELLANEOUS FARM RECEIPTS</td>
<td></td>
</tr>
<tr>
<td>Cash rent $</td>
<td>Outside farm man and horse labor $</td>
<td></td>
</tr>
<tr>
<td>Machine work $</td>
<td>Timber $</td>
<td>Other miscellaneous receipts $</td>
</tr>
</tbody>
</table>

**Note:** The table provides a detailed breakdown of the inventory value of a farm and the associated cash expenses. Each entry in the table indicates the amount and value of various farm assets and the expenses incurred for their upkeep. The table also includes miscellaneous farm receipts and calculations for total livestock and net worth.
SOIL FERTILITY AS A FACTOR IN LAND APPRAISAL

M. F. MILLER, Professor of Soils, Chairman of Department of Soils, College of Agriculture, University of Missouri.

Probably no factor is as important in determining land values as the natural fertility of the soil. Location value at times is more important. Natural soil adaptation to particular high-priced crops may be more important in a few cases where fertilizers may be used as a substitute for natural fertility. These are exceptions to the general rule. The highest priced lands used for general farming are the black corn belt lands of Iowa, northern Illinois and Missouri, eastern Kansas and Nebraska, and northern Minnesota. These are fertile lands by nature, and in spite of much deterioration, are still highly productive. The fertile lands are the valuable lands.

The causes of the great differences which exists in lands of high and low fertility are pretty well understood. Highly fertile land is that which is not only well supplied with the important fertility elements but there must also be a good supply of these in readily available form for crop use. These conditions are more commonly found in soil well stocked with organic matter to a depth of twelve to eighteen inches. Timber lands rarely have as large a supply of organic matter as prairie lands, and when they do it is usually confined to the surface eight or ten inches. Timber soils are usually light in color and when they do happen to be dark this layer is rather shallow. However, not all prairies are black and rich. Some are grey and of medium to low fertility, particularly when they are very level. Some of the most difficult lands to handle are the grey prairies.

The most fertile and most desirable lands should contain an abundant supply of lime. This makes it possible to grow clover and alfalfa, and has a very favorable influence on most chemical and bacteriological processes which determine fertility. One can even sacrifice something in natural fertility in order to secure a soil of high lime content.

Soils of low fertility are as a rule deficient in both the total supply and the available supply of the fertility elements. They may have a very tight subsoil. They are commonly low in lime, and are, therefore, acid. They may be badly eroded so that the surface soil is largely removed. They are almost always shallow, and light in color; that is, grey, yellow, light brown or light red. In such cases the subsoil is usually light grey, yellowish, or reddish yellow.

Exhaustive cropping and poor management may transform good soils into poor soils. Such soils are usually badly eroded. This is one of the most common causes of soil depletion. Depleted soils are low
in organic matter as indicated by a light color and often by a poor tilth. They usually produce an excessive variety of poor land weeds, such as crab grass, buckhorn, narrow leaved plantain, cockel burs and many others. The weeds on such soils as a rule are small. In the case of rolling lands, clay points are common on the slopes and these spots tend to be seepy and wet in the spring, and hard and cloddy in the summer or fall.

It is not always easy to distinguish between good and poor lands by superficial examination. One should either dig into them and observe their color, their depth, and the character of the subsoil, or better still, learn to use an auger for this purpose. An inch and a half auger with the jaws ground off, and a three foot extension handle is most convenient for this purpose.

Few states have a wider variety of soils than the State of Missouri. From the black prairies and bottom lands on the one hand to the thin, gravelly Ozark uplands on the other, it has some of the best and some of the poorest soil in the world. Four of the thirteen great soil divisions of the United States are found in Missouri; the great Glacial and Loessial Province in the northern half of the State, the Limestone Valley and Upland Province in the Ozarks, the Great Plains Region in the southwest, and the River Flood Plains Province of the southeastern lowlands and of the river bottoms. In color the soils range from black through brown, red, and grey to white, in texture from drifting sand to gumbo clay, in depth from two inches to two feet, in drainage from wet to dry, in fertility from eighty-bushel corn land to that which does well to produce a twenty-bushel crop.

To date there have been mapped in Missouri about 160 soil types. By a soil type is meant a soil which is so distinct from others as to be easily recognized. Thus the grey prairie of northeast Missouri is the type known as the Putnam silt loam. It is a level to undulating prairie soil, of silt loam texture, eight to nine inches deep, underlain by a distinct greyish layer a few inches thick, and this by a dense, sticky and compact clay pan extending from about eighteen to thirty inches below the surface. This soil type is very distinct from the Lindley loam, for instance, which represents the white oak timber type of the same region.

It is not necessary for the judge of land to know all of the soil types, yet if he could learn two or three dozen of the most important ones it would be of great value to him. The general soil map of Missouri shows the general location of about thirty of these whose total area comprises about three-fourths of the State. The land appraiser should become familiar with these principal types, and learn to identify them in the field.

The location within the State of the prominent soils of varying
degrees of fertility is a matter of much interest. An attempt has been made to divide the principal soil types of the State into five general classes, representing five degrees of fertility. These have been so classified in the following paragraphs.

**CLASS I.—SOIL TYPES OF HIGH FERTILITY.**—Soils which under ordinary conditions will produce from 50 to 60 bushels of corn or more.

- Wabash silt loam
- Marshall silt loam
- Summit silt loam
- Sarpy fine sandy loam (below New Madrid)

**CLASS II.—SOIL TYPES OF MEDIUM HIGH FERTILITY.**—Soils which will produce, under ordinary conditions, from 40 to 50 bushels of corn.

- Sarpy fine sandy loam (above New Madrid)
- Lintonia loam and fine sandy loam
- Sharkey clay loam
- Knox silt loam (west of Howard county)
- Osage silt loam
- Grundy silt loam
- Shelby loam
- Huntington loam

**CLASS III.—SOIL TYPES OF MEDIUM FERTILITY.**—Soils which, under ordinary conditions, will produce from 30 to 40 bushels of corn.

- Knox silt loam (Howard county to Cape Girardeau)
- Crawford gravelly and silt loams
- Putnam silt loam
- Oswego silt loam
- Hagerstown silt loam
- Waverly fine sandy loam

**CLASS IV.—SOIL TYPES OF MEDIUM LOW FERTILITY.**—Soils which under ordinary conditions, will produce from 20 to 30 bushels of corn.

- Knox silt loam (south of Cape Girardeau)
- Union silt loam
- Bates fine sandy loam
- Cherokee silt loam
- Lindley loam
- Waverly silt loam
- Clarksville gravelly loam

**CLASS V.—SOIL TYPES OF LOW FERTILITY.**—Soils which, under ordinary conditions, will not produce over 20 bushels of corn.

- Hanceville loam
- Tilsit silt loam
Lebanon silt loam
Ashe stony loam
Clarksville stony loam

Such a classification of the principal soils of Missouri is of general value only, and represents the productivity of these soil types under normal conditions and under rather good systems of management. Individual tracts may naturally fall below their class, while tracts which have been and are being exceptionally well managed may rise above their class.

Corn yields have been used as a measure of the relative productivity of these soils. It must be understood that the yield range adopted is purely empirical. However, the ranges selected represent with a fair degree of accuracy, the yields which could be expected from these soils in normal seasons.

THE CURRENT FARM REAL ESTATE SITUATION

E. H. WIECKING, Division of Land Economics, United States Department of Agriculture.

This discussion has been published by the Department of Agriculture as a Circular entitled, "The Farm Real Estate Situation, 1927-28." Illustrations were also drawn from "The Farm Real Estate Situation, 1926-27," published as Circular No. 15. Copies of both may be obtained by writing the Division of Land Economics, Washington, D. C.

THE EFFECT OF FARM AND COMMUNITY IMPROVEMENTS ON LAND VALUES

E. H. WIECKING, Division of Land Economics, United States Department of Agriculture.

The types of improvements discussed in this paper will be confined to farm buildings and roads. By "value" in this discussion is meant the probable market price at voluntary sale. By "land" is meant the farm as a whole, inclusive of permanent improvements and other fixtures.

One of the best places to study the problem of building valuation is in the older sections of the country, particularly in the Northeastern States. In the nine Northeastern States, the ratio of building values to total real estate values in 1925 ran from 50 to 57 per cent according to the Census. In Missouri the ratio was 22 per cent; in Arkansas 22 per cent; in Illinois 18 per cent; in Iowa 20 per cent, in Nebraska 16 per cent, in Kansas 17 per cent, and 16 per cent in Oklahoma.¹

¹A complete comparison for all States will be found in the Department of Agriculture Circular, "The Farm Real Estate Situation," 1927-28, Figure 5 and Table 14.
Fire insurance companies are as much concerned with the value of farm buildings as are loan agencies. A recent Ohio comment, for example, stated that "Oftentimes it is possible for the farmer to take the money received following a fire and buy an entire adjoining farm with the buildings on it. It is certain that the farmers are not building today the big barns which were commonly constructed a few years ago. When a big barn burns today, it is replaced by a smaller one." The same thing is reported to be true of large old farm houses there. It was reported recently that fire insurance companies writing Midwestern farm business were seeking a basis for modifying their schedules downward toward what the buildings were worth to the farm.

The problem has been brought into increasing prominence by opposite trends of farm building values and farm real estate values during the last seven years. For example, from 1920 to 1925 the average value per acre of American farm real estate, as reported by the Census, fell 23 per cent, but building values per acre averaged a 2.3 per cent increase. The same percentage changes for Missouri were a decrease of 30 per cent and an increase of 0.1 per cent; Arkansas, a decrease of 20 per cent and an increase of 8; Illinois, a decrease of 27 per cent and an increase of 8; Iowa, a decrease of 34 per cent, and an increase of 7; Nebraska, a decrease of 32 per cent and an increase of 5; Kansas, a decrease of 19 per cent and an increase of 7. Oklahoma showed a decrease of both of 20 per cent and 9 per cent respectively.

Why this contrast in movement? Probably because buildings usually are valued on a replacement basis and building costs have been as high as during the war years. In 1918 farm building costs were 67 per cent above prewar. In 1923 and 1924 they averaged 68 per cent above; in 1927, 74 per cent above.

Table 1.—Farm Real Estate: Percentage of Total Value Represented by Buildings in Selected States as Reported by the Census, 1910, 1920, and 1925.

<table>
<thead>
<tr>
<th>State</th>
<th>1910</th>
<th>1920</th>
<th>1925</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri</td>
<td>16</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>Arkansas</td>
<td>20</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Illinois</td>
<td>12</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Iowa</td>
<td>14</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Nebraska</td>
<td>11</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Kansas</td>
<td>12</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>12</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>New England States</td>
<td>47</td>
<td>47</td>
<td>54</td>
</tr>
<tr>
<td>West North Central States</td>
<td>13</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>United States</td>
<td>18</td>
<td>18</td>
<td>24</td>
</tr>
</tbody>
</table>


The result of this opposite movement of building values and real estate values has been that a greater proportion of the total value of the farm is represented in buildings, when the latter are valued on a reproduction new basis. Table 1 cites examples of this.

Since 1925 farm building costs have not decreased while farm real estate has.

In some sections of the Northeastern States sets of buildings have been abandoned because the original farms were consolidated into larger units made possible of operation by one family through the use of new devices and practices. Since tractors came into use barns need not be so large. There is generally less grain and hay raised. Barns built to handle 100 acres of tillage land no longer serve that much.

The situation in the older Northeast illustrates several general factors involved in the valuation of farm buildings. Among them are:

1. Structural or physical depreciation: normal wear and tear assuming normal repair and upkeep; and in some cases excessive depreciation on account of subnormal maintenance.

2. Obsolescence: This factor has two aspects: (a) built for a purpose, to meet a need or use which has been considerably changed or has disappeared; (b) the need or use has not changed but materials or method of construction are no longer desirable.

3. Cost of replacement: Depreciation, obsolescence, and cost of replacement are not wholly unrelated. Higher replacement and maintenance costs may bring into certain sizes, designs, and types of construction, the factor of obsolescence.

4. Farmers' incomes: The ability to pay for buildings and maintain them. In times of prosperity good buildings might add more to the value of the farm than in times of depression.

5. A building may be unsuitable to the farm itself. Such buildings, in a sense, may be obsolete almost the day they are built. "Special purpose" buildings are especially subject to this sort of obsolescence.

Appraisers must know how much more or less buildings add to the value of farm property. Several methods of finding this out suggest themselves. One might be the capitalization of net income, but the determination of the net income attributable to the buildings alone seems an impossible task. A second method might be the sales basis commonly used in evaluating the real estate as a whole. However, buildings are almost never sold separately. Even were they sold separately there would remain a question as to whether the building was worth its full value on the farm on which it was located.

The third method is more familiar. It is based on observation as to how farms about alike in all respects except the buildings have sold
in the past. This method frequently may serve well enough for prac­
tical purposes. The procedure necessarily is largely a matter of human
judgment and observation. Considerable differences in individual
opinions may occur. Conclusions also are frequently based on a com­
paratively few cases, often rather unusual cases. In any case check­
ing the results of general experience by other methods usually does no
harm.

A suggested check involves what is essentially only an extension
of the process of general experiment. Collect all the sales in a given
area. If there are too few actual sales, use good appraisals; the more
for each farm, the better. Calculate the cost of reproduction of the
buildings, less depreciation. Average together all farms with the
same value of buildings per acre and see what happens to the cor­
responding sales price or estimates of sale price. For example see
Table 2.

<table>
<thead>
<tr>
<th>Average building values per acre</th>
<th>Average sales price of entire farm per acre</th>
<th>Increase in value due to buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>105</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>115</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>124</td>
<td>9</td>
</tr>
<tr>
<td>20</td>
<td>132</td>
<td>8</td>
</tr>
</tbody>
</table>

However, this method also has its difficulties. The farms with the
better soils may have the better buildings. The increase in value due
to buildings therefore may include some addition to value that really
belongs to better soil. Also the farms with the better buildings may
be situated on the better roads. The "increase in value due to build­
ing" may claim too much—some of it may really belong to soils and
some to roads.

A better method would be re-divide the farms in each building
class so that in each class we have farms which are alike in all im­
portant respects except in buildings. This would require a great many
farms and usually becomes very laborious and complex.

The Department of Agriculture, at present for purely experiment­
al purposes, has undertaken studies to determine just what and how
much influence on farm values buildings, roads, soil, and other factors
have. A method is being tried which seems to answer the requirements
of workability and accuracy better than any other yet advanced. That method is known as multiple curvilinear correlation. Its details will not be given here.

An illustration of the approximate net effect of buildings alone upon farm values, based upon the results obtained from a field survey analyzed by this method are given in the following table:

<table>
<thead>
<tr>
<th>Successive increments of building value added* per acre</th>
<th>Increase in the value of the real estate per acre</th>
<th>Total buildings added per acre*</th>
<th>Average value of the real estate per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dollars</td>
<td>Dollars</td>
<td>Dollars</td>
<td>Dollars</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>170</td>
</tr>
<tr>
<td>12.50</td>
<td>20</td>
<td>12.50</td>
<td>190</td>
</tr>
<tr>
<td>12.50</td>
<td>15</td>
<td>25.00</td>
<td>205</td>
</tr>
<tr>
<td>12.50</td>
<td>8</td>
<td>37.50</td>
<td>213</td>
</tr>
<tr>
<td>12.50</td>
<td>6</td>
<td>50.00</td>
<td>219</td>
</tr>
<tr>
<td>12.50</td>
<td>5</td>
<td>62.50</td>
<td>224</td>
</tr>
<tr>
<td>12.50</td>
<td>4</td>
<td>75.00</td>
<td>228</td>
</tr>
<tr>
<td>12.50</td>
<td>3</td>
<td>87.50</td>
<td>231</td>
</tr>
<tr>
<td>12.50</td>
<td>2</td>
<td>100.00</td>
<td>233</td>
</tr>
<tr>
<td>12.50</td>
<td>1</td>
<td>112.50</td>
<td>234</td>
</tr>
<tr>
<td>12.50</td>
<td>0</td>
<td>125.00</td>
<td>234</td>
</tr>
<tr>
<td>12.50</td>
<td>0</td>
<td>137.50</td>
<td>234</td>
</tr>
<tr>
<td>12.50</td>
<td>0</td>
<td>150.00</td>
<td>234</td>
</tr>
</tbody>
</table>

*All building values on depreciated basis.

The investigation on which this example is based comprised a visit to some 600 to 800 Middlewestern farms. The buildings were measured, their age obtained, and condition and type of construction noted. The farm operator was asked to estimate the cost of replacement new for each building. Similar buildings were classified by type and an average cubic foot replacement cost obtained. This procedure was necessary because suitable cost tables for farm buildings were not available. These average cubic costs were applied to cubic contents and results depreciated according to a depreciation table considered applicable to rural conditions.5

4Most of the charts shown when this address was given will appear in future publications of the Department of Agriculture. Others shown appear as Figs. 9, 10, and 11, in U. S. Department of Agriculture Bulletin 1440, "Factors Affecting Farmers' Earnings in Southeastern Pennsylvania," by Mordecai Ezekiel.

5See Haas, G. C., "Sales Prices as a Basis for Farm Land Appraisal," Technical Bulletin No. 8, University of Minnesota Agricultural Experiment Station, Appendix B.
Table 3 gives us the net effect due to the buildings only, since the correlation method used compensates for, "eliminates" or "holds constant" the other factors used in the analysis. The effect is clearly one in which a dollar's worth of buildings does not always add a dollar's worth of value to the farm. After about $25.00 worth of buildings per acre have been placed on the farm, successive additions of buildings add to the farm in terms sale value, less than their replacement cost. Finally a point is reached at about $100.00 worth of buildings per acre where more buildings do not add a cent to sales value.

Below $25.00 worth of buildings the table indicates that buildings add more than their depreciated cost to the value of the farm. The first $12.50 worth is associated with a $20.00 increase in farm values. The second $12.50 added is associated with a $15.00 increase. This result appears somewhat unreasonable, but several explanations may be made. For example, the depreciation table may not be wholly accurate. Even though it is accurate, a building well along the end of its estimated structural life may still be a very useful building. A psychological or sentimental consideration may enter. Good buildings, substantial, but not fancy, adequate, but not too many and in good condition are often an important element in a person's judgment of a farm. There may be defects in the method as we have applied it but serious ones at this time do not suggest themselves.

These studies are in the nature of experiments and should be regarded so. Much work remains to be done but we believe this method holds forth considerable promise. The results of such investigations may provide experience tables which will enable one to say, "On the average, on the basis of 1000 farms in this county, the buildings on this farm are not worth to the farm more than _______ dollars." Such tables may form a guide for appraisals. They would also be a good control check for a central office. It must be said in caution that results obtained for one area may differ widely from those holding true of other areas.

Roads.—Many of the same problems which apply to determining the influence of buildings on value apply to roads.

Road improvement may not add what it costs to (1) the value of the farms fronting on it, were the total cost distributed among the abutting properties; (2) nor to the value of the zone of farms along its right of way were costs so distributed; (3) nor again to the value of the real estate of the entire taxing unit which has built them.

There is considerable difference of opinion as to how much a concrete road adds to the value of the farm. Methods mentioned in connection with buildings are fully as open to question for measuring accurately the effect of roads on value. Other methods not previously suggested may be mentioned. One of these is the traffic count used in
city valuation work. This method will not help much except possibly, in limited areas where roadside markets, country resorts, filling stations, etc., are possibilities. Too heavy traffic may sometimes be an objectionable factor.

A second method which has been used is that "the benefit is in proportion to the cost." Actually, of course, cost may have little to do with value. For example, traffic count made in 1926 in New York showed that on twenty-nine roads only 4 per cent of the total traffic came from the farms of the county the road was located in; 14 per cent was out-of-State travel entirely; 5 per cent was from villages and cities of the county and 77 per cent from other parts of the State. Obviously the assumption that the farms along these roads benefited in value in any relation to cost of road would be difficult to uphold.

A third possible method might be through the estimated savings in transportation costs. The Iowa Engineering Experiment Station at Ames has made a study giving the cost per vehicle mile by automobile at a speed of twenty-five to thirty-five miles per hour on various types of roads as follows:

Ordinary earth 12.6 cents; Best earth 12.0 cents; Ordinary gravel 11.8 cents; Best gravel 10.9 cents; Average concrete 10.0 cents; Best concrete 9.3 cents.

As a possible fourth method, the use of sales price or good appraisals on identical farms before and after the roads were improved offers many difficulties from the point of view of insuring accurate results.

The method of multiple curvilinear correlation again seems to be the best available. The results of three such studies made with this method are as follows: (1) In Blue Earth County, Minnesota, farms on State gravelled roads, all other things equal, were worth $22.00 per acre more than farms on dirt roads;7 (2) In Chester County, Pennsylvania, farms on gravel, or broken stone roads were worth $15.00 per acre more than the same kind of farms on dirt roads, and farms on concrete or other hard surfaced roads were worth $16.00 more than on gravel;8 (3) Preliminary results of one of our studies now in progress in southern Wisconsin9 indicates similar differentials as in Chester county, but they are appreciably smaller.

In concluding this brief and inadequate consideration of the relation of improved roads to farm real estate values, it may be well to repeat that for the present, at least, the results found in such widely scattered areas can not be applied to other areas. Until more investi-

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*See Haas, G. C. "Sales Prices as a Basis for Farm Land Appraisal."
*Ezekiel, M.J.B., "Factors Affecting Farmers' Earnings in Southeastern Pennsylvania."
*To be published at a later date.
LAND VALUATION

...gation has been made these results should be applied only to the areas in which made under their particular conditions of soil, topography, type of farming, the method of distributing the cost of the road, income levels of the farming population, length of time the higher type roads have been in use, and the other factors.

THE PROBLEM OF MARGINAL LANDS

O. R. Johnson, Professor of Agricultural Economics and Chairman of Department of Agricultural Economics, College of Agriculture, University of Missouri.

This discussion is confined to remarks about land that is at the extensive margin.

The term "marginal land" is a much abused term. The fact that land is for the time being idle or being used is not proof that it is or is not marginal. Land is submarginal when over a series of years it fails to pay operating costs. Land may be marginal in one use and not in another. It may be marginal with one operator and not with another. It may be marginal in one season and not in another. It may be marginal with one set of price relationships and not with another.

There must be a clear distinction between the marginality problem of a field and the marginality problem for the farm as a whole. A field of a given quality may be marginal on one farm and an equally good field be far above or far below margin on another. For example, rough, hilly pasture land may be far above the margin if it is associated with good crop land in a farming system, and it may be distinctly submarginal when not associated with good crop land.

Turning to the entire farm business it is often true that one enterprise may be conducted at a loss and other profitable enterprises make up the balance of the business so that the farm as a whole is considerably above the margin. Good management may make up for poor soil or too high capital costs. When land is abandoned it must have been found marginal or below margin by various men through many seasons and prices changes and for all tried uses.

Causes for marginality may be grouped under internal and external causes. The internal causes would include the ability of the operator and the quality and utilization of the land. External causes might be price relationships over which the operator has no control. It might be scientific discovery or invention, or the invasion of the community by disease or pests.

In analyzing marginality we must consider some common concepts of cost. Land may be paying some rent and still the entrepreneur may be forced to leave the farm or change the use of the land. With any particular product the factors of production must receive sufficient reward to cause that volume of production to be maintained—
and the poorest corn land demands some rent. Then the land factor is involved in the question as to whether this enterprise or another shall receive the land's service. The poorest ground devoted to corn must pay enough rent to keep that ground from being used by some other crop. It is therefore a question of cost of production, because that outlay is necessary to maintain present production. We might even go further and say that the corn crop must pay more for the use of the land than the next best crop.

We are, therefore, compelled to place rent in the list of costs of production. The apparent existence today of many farms that can be secured on a no-rent basis is not a real exception to this principle. If one could move onto these farms and operate them as he wished without regulation or requirement by the owner, they would truly be no-rent farms. As the situation actually is the no-rent feature is more apparent than real, as the occupier is bound by requirements and prohibition which actually amount in effect to a rent charge.

The limitations of the operator himself may cause the field or the farm to be marginal. He may not have sufficient managerial ability. He may not have foresight in interpreting changing conditions. He may not grasp the significance of many internal economies. His fields may be badly washed, foul with weeds, odd shape, exhausted of fertility, devoted to crops for which they are no longer adapted. He may be using poor judgment in the disposal of his crop. It may be the wrong kinds of feed or the wrong quantities of feed, or the wrong kind or quality of live stock.

External circumstances may make some of the best farms and best farmers close to or below the margin. The influence of the invention of a combine to be used in regions competing with him but which he can not himself use may result in a less satisfactory ratio between his costs and the resulting price. Legislative activity or lack of activity, wars and their accompanying difficulties may cause price disturbances; wet or dry seasons, hail storms or floods, contagious abortion, corn borer, boll weevil, and many other factors may for the time being render impotent the efforts of the most resourceful manager. Temporary forces could not be used in truly judging marginality.

Failure to take advantage of the best information available can often be attributed to the immediate necessity for making a return on a one time fair valuation of the property. Perhaps the most serious cause of the increasing number of acres passing into the marginal class is the false idea we hold that land values once placed should never be altered downward. Attempts to make the land yield a living and a return on this supposed value causes us to follow methods and practices which are not consistent with using the land in the best possible man-
We are more likely to follow the older practices and place the farm more definitely in the permanently submarginal class. If we could only take the position that the farm is worth what it will earn, lands would be maintained in a higher state of usefulness.

In addition, we have the variation in the item of necessary profit. That is the reward to the operator necessary to keep him producing. In other words, his cash outlay must be met and he must get enough from his production to keep him in this field. If he makes more than this, this additional margin of profit is the spur which leads him to increased production. The more intelligent and widely informed men place a higher figure on this necessary profit. The lower the grade of intelligence and the less information the entrepreneur has the greater his reluctance to change his occupation and the smaller will be this cost item of necessary profit. For this reason one would expect agriculture in highly developed regions to have a greater turnover of proprietorships than that in poverty stricken areas with relatively low living standards. Because of the nature of agricultural production submarginal producers can continue in production long after they have dropped below the margin. So long as taxes and cash living expenses are met they may continue as producers. Farmers with mostly good land may continue to operate some poor land at a loss.

Much of our difficulty in judging land is due to our tendency to base our judgment on the recent past. A good crop or two makes us optimistic and a crop failure makes us think the land poorer than it actually is. The better the improvements the longer we will cling to the old method. As soon as the land reaches the point where it must be reimproved the real test of its position is met. Marginal or submarginal land is abandoned when the improvements go. New improvements on old farms mean either the improvements are being made by outside funds or the farm is above the margin.

Taxes on land near the margin are more important than other equal cost items in throwing land out of use, because taxes can neither be avoided nor influenced by management methods.

Land often becomes useless for crops, and taxes prevent its being used for more appropriate purposes. Much Missouri land would be above the margin if it could be used in large enough areas for forests or grass land, but for the most part our tax rate is based on livestock farming units and it is impossible to profitably collect such land in units large enough for timber and pasture. Instead of our tax system forcing poorly utilized land into better uses, it is forcing poorly adapted land into grain farming or into idleness.

It is plain that the margin shifts from time to time. There are two ways to secure cheap agricultural production. One is by improved
production methods with intelligent workers; the other is to emphasize cheap labor.

We must forget many of our previously formed ideas concerning land values. It may be necessary to follow New York's lead and make careful studies through a State Commission concerning the wisest use of the various kinds of land, and recast our values according to these uses. Growing scarcity of good timber will tend to alter the adjustment between land used for timber purposes and other land. Many of these changing forces can be computed and allowed for in any system of land utilization.

THE USE OF SOIL MAPS FOR LAND APPRAISING

H. H. Krusekopf, Professor of Soils, College of Agriculture, University of Missouri.

The variableness of soils is the most difficult single factor in the art of land appraising. There are many kinds of soils. This fact is not always recognized and even more tragic is the fact that soils are not always understood. For this reason no scientific method of land appraisal has yet been evolved. It is for this reason also that many of the present day agricultural ills have developed.

In relation to human welfare the soil is the most important of all natural objects, but the last to be made the subject of systematic study. Star gazing was a highly developed science long before soil was given much consideration. Plants and animals have been the object of a vast amount of research. The scientific study of soils is a recent development. Soil knowledge is not yet common knowledge. Few there are that do not know the characteristics of a good race horse, of a good dairy cow, or of a good ear of corn, but how many can define the characteristics of a good corn soil. Only as necessity compelled has mankind begun to investigate and study the greatest of all resources.

The Soil Survey is the only organization designed to accumulate information on soils as they occur in the field, in their natural position and environment, and to classify them according to their various characteristics. The soil map is the means of presenting in a graphic way the classified information that has been obtained on the soils of the county or survey area. The map is intended to show the location and boundaries of all the soil types. It shows also streams, roads, railroads, land lines, etc. Accompanying each map is a report which gives a description of each soil type as to its characteristics, uses and agricultural value. At the present time soil maps have been made of more than fifty counties in Missouri.

The rapid increase in the number of soil surveys has been accompanied by an even greater increase in the practical utilization of the
soil maps, not only by farmers and teachers, but also by land owners, investors, appraisers, road builders and others. The result has been that the real purpose and value of soil maps is not always fully appreciated or understood. There are as yet many individuals that have only a limited experience in the use of maps in general. Maps that emphasize (usually exaggerate) only one or a few known features, such as the location of a town, road, or a (proposed) oil well, are easily understood. A soil map is complex, and presents many features, some of which may be unknown or not generally recognized. For the land appraiser it is essential that he know how to interpret all the features of a soil map.

It is important to note that soil maps are all too frequently thought of as being land classification maps, although they are unlike in their intent and purpose. A soil map gives the inherent and permanent soil differences, that may or may not have an agricultural significance. A land classification map groups land according to its agricultural value or desirableness without any or only slight regard to soil differences. It is concerned only with the practical land utilities. Soil maps do indicate the agricultural value of soils, altho this is not their primary object, and is incidental to the classification as based on soil character. Much of the confusion in the understanding of soil maps is no doubt due to the agronomic (practical) point of view rather than the soil point of view when using the maps.

The method of examining a soil or the conception of a soil as held by the layman differs from that of the soil surveyor. The former considers primarily the surface soil—its color and depth—factors that are obvious with only a superficial examination. The surveyor considers the surface as only one of many factors. His conception is that of the soil in profile—that is, the whole range of soil characters to a depth of three or more feet. In fact, subsoil differences are frequently given more importance than surface soil differences. This divergence in viewpoints in itself explains in part why soil maps—constructed according to one idea and used by others of a different conception—are not always intelligible to the latter.

The soil type is the unit in all soil mapping. Each type is a soil of a definite character no matter where it is found. It has the same color, texture, structure, character of subsoil, general topography and about the same agricultural value. Thus the Marshall silt loam, one of the most important Corn Belt soils, is characterized by a black color, silty texture and a dark brown, friable silty clay subsoil. The surface varies from almost level to rolling. As long as the soil at any place does not vary from these characteristics, it is classed as Marshall silt loam. Each of the 175 soil types in Missouri has characteristics that distinguish it from every other type.
The primary basis for appraising land must be the productive capacity of the soil. Each soil type has a productive capacity ranging within comparatively narrow limits. The duty of the appraiser is to interpret and to classify this capacity in terms of dollars and cents. He must correlate money values and soil conditions. A land appraisal therefore that is based on soil conditions, i.e., soil types, must be considered as little more than guesswork. It is here that the value of the soil map comes in. It presents the soil conditions in classified form from which the land values can be determined.

It is evident that the appraiser will find his job easier if he has a fair soil knowledge. He should at least know the more important factors that are used in soil classification, and know how to evaluate those soil characteristics that affect crop growth. Thus the presence of an “ashy” subsurface layer, concretions (buckshot), and blue-gray mottling in the subsoil, can always be associated with poor drainage. Such knowledge is rather easily gained if he will examine a few soil types and study these with the aid of the soil report. A book in Chinese script would be of little value to anyone of us. A lumber dealer may be a successful salesman, but this does not indicate that he would be a good timber cruiser. Without some soil knowledge the soil map loses much of its value.

To most appraisers, one of the primary values of the soil map is that it indicates soil variations and differences that would not be otherwise recognized. Soils may be alike in their surface appearance, but unlike in their subsoil characteristics, with a corresponding difference in agricultural value. Such conditions are common in every part of Missouri. Failure to recognize them may result in faulty land valuation. It can be assumed that the average appraiser is not equipped to detect as many soil differences as are determined in a soil survey. On the soil map, each kind of soil five or more acres in extent, is indicated.

It is as yet a common practice to assign an average value to the land in a given community or county. Such a value may not even approximate the true value of any given farm or soil type in the area. No stockman would think of bunching cows, calves, and steers, in order to estimate their value. He would group them according to age, finish or sex, and evaluate each class separately. Land appraising must be on the basis of some unit. That unit is the soil type of the soil map.

To determine the area of any soil by field inspection requires much time. Soil maps supply this information, and are extensively used for this purpose. If a value has been assigned to a soil, and its area is known, then a reliable and accurate appraisal can be made of the land.

Loan organizations that operate over a large territory frequently
want to know the relationship of soils in different counties or different parts of a state. Such information aids in comparing land values and uses. Thus if the black prairie in Andrew county and Lafayette county is classified on the soil maps as Marshall silt loam, it is an indication that the prairie soil is similar in these two counties. The valuation from the soil standpoint would therefore be the same.

The average county soil map shows from 20 to 30 different soil types. It is not to be expected that an appraiser will know the agricultural value of each of these. He will, however, know the value of two or three of the more important ones. With this information, appraisal can be made of all the soils in terms of the known types.

Appraisals based on the relationship of soils should be more reliable and easier made.

In attempting to use soil maps as a basis for land valuation, appraisers find it difficult to distinguish differences in agricultural value of some of the soils as mapped. As a matter of fact, some types, while distinctly different in soil character, are, from a practical standpoint, of equal, or nearly equal, agricultural value. By grouping the types that are of equal quality or value, the number of units that the appraiser must consider can be reduced. As far as possible, the soil classification should always be simplified by grouping the types in the form of a land classification. For the average county, probably five or six soil groups will meet the requirements. In Boone county there are extensive soils types classified as Lindley loam, Boone, Clinton, and Marion silt loams. Although these vary widely in soil characteristics, they are very much alike in agricultural value, and can be placed in one group for appraisal purposes. A land classification map, based on and supplementing the soil map, should be a part of every land appraiser’s equipment.

It is generally conceded that one of the primary causes of present agricultural ills is over-expansion, a surplus of farm land. The evidence of this is the vast area of idle land. To a large extent our agricultural expansion was financed and even instigated by banks and loan companies. The question now is, can these idle lands be reclaimed, are they worth additional investment or should they be allowed to revert to the state? The answer to all these is the soil. The majority of idle land is made up of soils of low productive capacity. In Missouri, most idle land is represented by five or six well known types. The location of these in surveyed counties is known. To the thoughtful appraiser such information is of fundamental value. Soils maps form the basis for a plan for the future disposal or use to be made of idle land—which tracts are to be kept for farming, which for pasture and which for forestry. Without a soil map it is difficult to make a sound inter-
pretation of agricultural conditions. It might be of interest to note that as a rule, the poorer agricultural areas have the most soil variations.

In recent years many banks and loan companies have become the unwilling owners of farm lands. Perplexing problems of soil management and cropping systems have accompanied each farm. From the soil reports much information can be obtained that will aid in solving these problems.

It has been found necessary in some localities to secure a lower valuation for assessment purposes. County courts and equalization boards are notoriously conservative and dislike to make revisions downward. Soil maps may be used as evidence before such boards in petitions for the equalization of assessments and taxes. Investigations have shown that soil maps can be correlated with assessed valuation.

Many land appraisers make extensive use of soil maps for the geographical information they contain. Maps, and especially large scale maps, are not available for many counties. The location of a farm to be appraised with respect to land lines, roads, towns, streams, and other features, can easily be determined from the soil map. To gain such information by personal investigation would require time and expense, and even then would probably not be as complete.

It has already been stated that soil maps are complex because of the many features that they combine. Their value will be in proportion as the various markings and symbols are understood and interpreted. It is advisable always when using a map to have it oriented, that is to have it in the relative position of the directions, and to view the map from the south or lower end. There are many that are confused in reading a map unless it is properly oriented.

On each soil map is a legend which defines all colors and markings used. The scale of the map is always indicated. All Missouri soil maps are on a scale of one inch to the mile. Thus one square inch on the map represents one square mile of land surface. Near the margin of the map are placed the number of the townships and ranges. The section number is in the center of the section. By means of these numbers it is possible to determine the exact location on the map of any land area.

The most important feature of a soil map is the representation of the various soil types by means of different colors. Each type is indicated by a separate color, and the extent and distribution of each color corresponds to the distribution of that particular type. The number of colors therefore correspond to the number of different soils mapped in the county. It should be remembered that the color on the map has no relation to the color of the soil, nor is the contrast in colors in accordance with marked soil differences.

The task of the land appraiser is not an easy one. He is dealing
with a natural object that is not always well understood. Loan companies are demanding that his estimate of present land values and probable future values must be made more reliable than ever before. When prices were ascending, a faulty appraisal was not apt to result in losses. The decline in prices has made evident that speculative values have no place in land appraisal. The tendency therefore, is for all farm financing to be on the basis of the earning power of the land. There is a tendency also for a greater spread in values between good land and poor land. This implies that the appraiser must practice more discrimination. He must know how to select the better soils and how to subordinate the poorer soils in his estimate of values. As our agriculture expands it will extend more and more to regions less favorable to crop production. Here too, discrimination must be used in selecting those soil areas potentially productive. It can be concluded that the land appraiser will have constant need of all available soil information. We believe that the soil map and soil report present this information in the most complete and reliable form.