USE OF SOIL MANAGEMENT GROUPS AND RELATED INFORMATION IN EVALUATION OF FARMLANDS

Thesis for the Degree of M. S.

MICHIGAN STATE UNIVERSITY

Thomas Wesley Priest

1960

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By

Thomas Wesley Priest

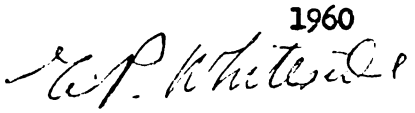
AN ABSTRACT

Submitted to the College of Agriculture
Michigan State University of Agriculture and
Applied Science in partial fulfillment of
the requirement for the degree of

MASTER OF SCIENCE

Department of Soil Science

1960

Approved 

AN ABSTRACT

A study was made in Eaton County, Michigan to test a method of arriving at equitable evaluations of farm lands.

The essential steps of the method are: (1) the soils represented in an area are assigned to soil management groups, (2) the most common land use for the slope groups in each soil management group is determined, (3) the acreage of each combination of soil management group, slope class and land use on each tract are measured and recorded, (4) the average per acre yield of each soil management group and slope class for each use is determined, (5) the total value of the average production per acre on each soil management group and slope class for each use is determined, (6) the cost of production per acre for each land use on each soil management group and slope class is determined, (7) the net income per acre for each soil group, land use and slope class is determined by subtracting the values in step number 6 from those in step number 5, (8) the expected net income for each tract is determined by multiplying the net income per acre by the acreage of each combination of soil management group, slope class and land use and totaling these results, (9) the evaluation of the farmland on the tract is completed by capitalizing the expected net income per tract at a rate consistent with sale prices of farm land in the area, (10) the total value of the property is the sum of the land value, the stumpage value of any timber on the land and the building or improvement values.

This method was used to make evaluations on a number of farms in Eaton County, Michigan. These values were then compared with values determined by the Michigan State Tax Commission and with farmers' estimated land values. The computed land values averaged 112 percent of the Commission's appraised values with a correlation coefficient of .921 for the two values. The computed land values averaged 97 percent of the farmers' estimated land values.

On the basis of the results of this study the following conclusions seem warranted: (1) the computed land values as determined by the soil management group method compares favorably with both the Michigan State Tax Commission's appraised values and with farmers' estimates of the value of their land, (2) the use of soil maps can be of aid to township or county assessors in comparing farms, (3) the use of the values based upon the soils and land use would tend to remove bias and relative overtaxation of low value farms, (4) the soil management group method of land evaluation could provide a sound base for all appraisals of farmland, including those for sale, purchase or condemnation, (5) the soil management group method of land evaluation could be used by management to determine the relative economic benefits from various cropping systems on the soils of a specific tract.

ACKNOWLEDGEMENT

The author expresses his sincere appreciation to Dr. E. P. Whiteside, under whose guidance and interest this investigation was undertaken and whose suggestions were instrumental in bringing this thesis to a conclusion.

He is also indebted to Mr. W. H. Heneberry for his interest and help in the progress of the study.

Grateful acknowledgement is also due Mr. I. F. Schneider and Dr. R. L. Cook for their guidance and help, and to his fellow students for their helpful suggestions and assistance.

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THE PURPOSE

The purpose of this study is to test a method of arriving at equitable evaluations of farm lands. These values, based upon the ability of land to produce income, could provide an equitable base for farmland evaluation. Equitable farmland evaluations are important to both borrower and lender as fair estimates of income potential and collateral as security, respectively. Individual farmers or farm management agencies could use these values in planning the choices of kinds and amounts of crops to grow on different soils in order to maximize farm incomes. These values could also be used as an equitable basis for tax assessments.

REVIEW OF THE LITERATURE

Interest in improving appraisal procedures of farm property taxes is becoming increasingly widespread. The large rise in property values and taxes during recent years is probably the most important reason for this increased attention. Property taxes rose 91 percent from 1950 to 1955 in a sample of agricultural townships in northern Michigan (3). The increase was due to a rise in tax rates as well as assessed valuations. Assessed valuations rose 66 percent during the five-year period while tax rates on the assessed valuations rose 25 percent. In Michigan, property tax collections have been rising for several decades except for the period from 1930 to 1935 (4). From 1946 to 1956 the annual increase averaged ten percent. By 1956 the total property taxes in Michigan had risen to more than 600 million dollars, 70 percent of which was levied on real estate. Taxes on farm real estate averaged $1.32 per acre, which was the highest acreage rate in Michigan's history and almost three times the rate for 1940.

Property taxes were once the main source of revenue for Michigan's state and local governments. Their relative importance has decreased since the early 1930's, but they still constitute close to half of the total state and local taxes, and for many farmers this is the most important of all taxes.

Because of the importance and dimensions of these property taxes, it would appear that every attempt should be made to have an equitable base upon which to apply these taxes to the various

classes of property. Although state laws in general specify that all property is to be assessed at, or at a percentage of, the actual value it is consistently noted that lower valued properties are assessed at a higher proportion of their sale price than the properties of high value. This would indicate that assessors do not have true evaluations upon which to apply their tax rates. This condition was pointed out in Iowa (14), where farms appraised at $2,500 or less, averaging $1,933, were assessed at almost their appraised value or $1,905, while holdings of over $10,000 in value, averaging $15,474, were assessed at but 57 percent of their appraised value or $8,880.

Based upon detailed study of the facts with reference to 1,544 farm properties in South Carolina (1), the ratio of assessed to normal market value tended to decline with each increase in average normal market value. The range in this instance was from 31.3 percent on farms having an appraised normal market value of less than $1,000 and 28.7 percent on those appraised for between $1,000 and $2,000 to 18.8 percent of those appraised for $15,000 and above.

This regressive tendency was also reported in Georgia (16), where properties which sold for less than $1,000 each were assessed for an average of 44.9 percent of sale value whereas those which sold for $10,000 or more were assessed for an average of only 14.6 percent of sale value.

In Montana (13), an analysis was made of more than 5,200

voluntary sales of farm land in 19 selected counties covering the period 1919 to 1935 inclusive. The average ratio of assessed value to sales value for the entire sample was found to be 1.09, showing an average overassessment for the period. However, the ratio varied considerably when applied to various value groupings. The ratio for the group valued at less than $500 was 3.51, with the group valued $500 to $1,000 the ratio was 1.93 while for those sales of over $10,000 the ratio was 0.62.

The tendency found in Nebraska (12) was also for assessment values to concentrate around an average, rather than vary with the sale values of the land. In this study the average assessed value per acre was $60, while the sale price averaged $140, giving an assessment-sale ratio of 43. For the three years studied the assessment-sale ratio for tracts that were sold ranged from 22 to 159. The sale price per acre ranged from about $40 to $330. In contrast to this wide range, the assessed values varied only from $25 to $90 per acre. The result was that land of lower value tended to be overassessed compared to land of higher value.

The Michigan assessor's manual states that all property is to be assessed on the basis of current cash value. In the determination of farmland value this manual gives two general groups of factors for consideration, each of which primarily consists of production and location factors. Ideally, the county equalization committee helps in setting land values and in developing a land value map for the entire county. The method of

assigning value by replacement cost is considered merely a refined comparative method and is included as a part of the comparative method recommended for appraising farms. Sales and capitalization methods are considered to have disadvantages for most uses, and the assessor is left with his own judgment as his most important tool in making assessments.

Investors who purchase land are interested in the potential income from the land, and will bid more for that which offers greater possible return. Difficulties experienced by loan agencies (2) during and following the depression period of the 1930's emphasized the need for the most accurate values.

Just as cropping systems and yields are considered in arriving at farmland values, the reverse of this procedure is also possible. Given farmland values or the soil groupings upon which these values have been prepared, farmers or managers from farm management agencies can determine cropping systems yielding the greatest net returns on specific tracts (7). Yields can also be estimated for uses such as planning the acreage of a certain crop to produce for feeding operations or to provide an income to meet economic obligations. These values also provide a basis for comparing one group of soils with another.

An early attempt to find a true basis upon which to evaluate land is that of Kellogg and Ableiter (8), in which groupings of soils based upon the natural landscape and defined principally by the climate, soil type, topography, and stoniness, were evaluated

as a whole.

In California each soil type and phase was rated according to the Storie Index (15), so as to give their value for general agricultural purposes in relation to all other soils in the state. This rating was based solely on soil characteristics and conditions such as profile development, depth, texture, drainage, alkali, erosion, and fertility. The soils were first grouped into five "natural land types": (1) alluvial fans and terraces; (2) basins; (3) low terraces; (4) high terraces; and (5) uplands. The natural land types were divided into subgroups according to soil characteristics. An index was then assigned to each soil according to its rating for use in tax assessment.

In each of the two cases above, factors which affect the productive capacity of the land are of major importance in the evaluation or rating. This is also true in Nebraska (12), where soil productivity differences are considered the principal reason for differences in land values. In outlining the method proposed there, a soils map is made, then a net income rating is prepared for each soil based on the cropping system, yields, and cost of production. By measuring the acreages of each soil on a tract, a weighted economic rating for the tract can be determined. From this weighted economic rating, an estimate of the value of the land can be made. Location of the tract with respect to distances to schools, market centers, hard surfaced roads and railroads is considered to be one of the minor factors in setting values, and

provision is made for adjustments of the estimated value to allow for unfavorable locations.

These studies indicate that the values of farmland are based upon the ability of the farm to produce income. The most important influences on the values, as judged by the selling price of land for agricultural purposes, are closely related to the nature of the soils and the ways in which they are used.

PROCEDURE

On the basis of a review of literature, and considering conditions as they exist in Michigan, the following method of farm land evaluation essentially as used by Aandahl et al, (12) is proposed. The essential steps of the method are:

(1) the soils represented in an area are assigned to soil management groups,

(2) the most common land use for each soil management group and slope class is determined,

(3) the acreage of each combination of soil management group, slope class and land use on each tract are measured, and recorded,

(4) the average per acre yield of each soil management group and slope class for each use is determined,

(5) the total value of the production per acre on each soil management group and slope class for each use is determined,

(6) the cost of production per acre for each land use on each soil management group and slope class is determined,

(7) the net income per acre for each soil group, land use and slope class is determined by subtracting the values in step number 6 from those in step number 5,

(8) the income for each tract is determined by multiplying the net income per acre by the acreage of each combination of soil management group, slope class and land use and totaling these results,

(9) the evaluation of the farmland on the tract is completed by capitalizing the net income per tract at a rate consistent with sale prices of farm land in the area,

(10) the total value of the property is the sum of the land value, the stumpage value of any timber on the land and the building or improvement values.

Selection and Description of the Area Used to Test the Method

To test the value or accuracy of this method, values of farmland could be computed using the soil management group method and this computed value then compared to results of other methods of evaluation, actual sales values, and with estimations of value by farm owners.

Eaton County, Michigan was selected as an area in which to test the method. The availability of a soil survey of the county (18) and a current review of land values being made by the Michigan State Tax Commission, together with the availability of farm-account records of several farms in the area led to the selection.

Eaton County is located in the central part of the southern half of Michigan's lower peninsula. Dairy and general farming predominate in the area. The minor livestock enterprises are hogs, poultry and sheep. Most of the crops grown are the feed crops of hay, pasture, corn and oats. Wheat is the major cash crop, with white field beans and sugar beets being important on a few farms where soil conditions are favorable.

The major factors influencing the selection of enterprises in this area are the relatively long growing seasons, which range from 140 to 160 days, the predominance of sandy loam, silt loam and loam soils of medium to high fertility, and the good markets for whole milk.

Approximately 500 sales of farmland over 35 acres in size took place in Eaton County during the period July 1, 1952 to June

30, 1957. From this group, farms were selected which were considered to represent valid sales of farm real estate to be used for farming purposes. Sales to relatives, to corporations and companies not engaged in farming operations, properties which were sold soon after purchase or transferred several times during the five-year period, or those having incomplete records and faulty descriptions were among those not considered in this study. Only tracts of 37.5 acres and larger in size were used in an effort to further insure that the sample represented valid sales for agricultural purposes. One-hundred twenty-five of this group of farms were selected to insure study of as many soil management groups as possible, and to give a good area and value distribution in the county. The accompanying farm location map of Eaton County (Figure 1) shows the location and the distribution of farm units used.

Field Survey

Field work consisted of checking the soil survey for accuracy and adequacy, the determination of land use on the sample farms, and recording the amount and kind of wood products occuring as stumpage. It was determined that the soil areas designated contained the soils as described, and were well within the limits set forth in the soil survey report. Many of the areas designated as a single soil series would under the present day system of soil classification (21) be further separated into units containing less variation. However, when these units are combined into the soil management groups as outlined herein, practically all of these separations would be regrouped into the same units as are the soil series as outlined later in this report.

The various uses of the land were grouped into major land use groups, consisting of: (1) cropland, which includes rotational pasture; (2) permanent pasture; (3) woodland; and (4) undifferentiated land use which included land used for farmsteads, roads, and drainage ditches. Each of these were then plotted on the map of each farm, and designated by L, P, F, and X respectively. This was done by using aerial photographs as base maps, and outlining the various uses directly upon the farm outline.

In order to determine the amount of merchantable forest products on the land, the procedure as outlined in the Michigan State Tax Manual (10), pages 229 and 230, was used as follows:

First, the diameter range of the trees: including seedings,

saplings, pole timber, etc. was determined for the majority of the trees present.

Second, the volume range was determined, that is, within the diameter range if the trees ran heavy to the large size the high volume range was used, or if the stand ran mostly in the smaller size, the low volume range was used.

Third, the stocking class of the woodland was determined. The stocking class was rated poor if 10 to 39 percent of the growing space was effectively utilized by trees, medium if 40 to 69 percent, and good when over 69 percent.

From this information and use of Table X, the board feet per acre or the cords of pole timber per acre was determined.

Sale prices and assessed valuations were needed of the farm tracts as a basis for comparison with the values to be computed for the farmland. Sale prices were estimated by examination of the value of internal revenue stamps attached to records of the transfer of property according to the method outlined by Nybroten (11). These sale prices were then adjusted to 1955 levels by multiplying the price by the farm real estate index number for the year of the sale. The index number was determined by comparison of farm real estate values for the years 1952 through 1957 relative to the value for 1955 (17). The index number as determined for the years concerned follows:

Year	Index No.
1952	1.08
1953	1.06
1954	1.03
1955	1.00
1956	.94
1957	.86

Example: (1) a 1953 sale at $25,000 would be

$25,000 X 1.06 = $26,500 at 1955 prices.

(2) a 1957 sale at $25,000 would be

$25,000 X .86 = $21,500.

Assessed valuations were taken from the records of the Eaton County assessor.

Soil Management Groups

Soil management groups are basic interpretive groupings based on similar soil properties and similar adaptations or management requirements. Examples of soil properties most generally considered include the texture of the profile, reaction of the profile, depth of profile, and natural drainage. Some of these groups are subdivided into classes of slope and degree of erosion. Adaptations or management requirements pertain to specific purposes as forestry planting, irrigation design, drainage, crop rotations, and fertilizer or lime recommendations.

In this study the soil management groups are used as a basis for evaluation of farmland. This grouping of soils provides for natural combinations of many soils into a convenient number of units which will still express the main differences in production and so be useful as the basis of land evaluation. In the event that more specific information pertaining to the yields and cost of production for the individual soil series or soil types should become available, then these units probably would become the better basis. However, for convenience and practicability of use, the more detailed units may still be combined into such groups as used here.

In the development of a system of nomenclature or identification of these soil management groups a combination of letters and numbers is used. The numbers indicate the relative coarseness of the mineral materials from which the soils were

formed; from 0 for the finest texture clays, to 5 for coarsest texture sands. The small letter following this number indicates the natural drainage under which the mineral soil developed, "a" for the best drained, "b" for imperfectly drained, and "c" for the most poorly drained conditions.

A combination of two small letters, such as 'bc', indicates a range in natural drainage conditions from imperfectly (b) to poorly drained (c). Where a small letter precedes a number or capital letter, it has a different meaning. Thus, a small 'a' preceding a capital M (for mucks) represents very acid soils and 'b' stands for soils well supplied with bases and less acid in reaction. A small 'h' preceding a number or capital letter indicates that the subsoils of that group are hardened or compacted so as to interfere with root penetration and water movement.

The capital letters indicate other soil characteristics quite important to their use and may be used with or without the numbers. For example, G is for gravelly or stony soils, L is for lowlands subject to seasonal overflow; M is for mucks and peats; and R is for rocky soils, where bedrock is close to the surface.

Thus, the L3a soil management group includes lowland soils developed from sandy loam parent materials, that were formed under well drained conditions. The 2b soil management group includes upland mineral soils formed from loam to silt loam parent materials, under imperfectly drained conditions.

Following is a list of the soil series of Eaton County with the abbreviated soil series designation as reported in the county soil survey report, and the soil management groups into which they have been combined on the basis of the soil characteristics as they occur in the Eaton County Soil Survey Report (18).

Soil Management Group	Map Symbols	Soil
2a	Ml	Miami loam
	Ms	Miami silt loam
	Hl	Hillsdale loam
2b	Cl	Conover loam
	Cr	Crosby loam
2c	Br	Brookston loam
	Bc	Brookston clay loam
3a	Hs	Hillsdale sandy loam
	Bm	Bronson loam
	Bl	Bellefontaine loam
	Bs	Bellefontaine sandy loam
	Fl	Fox loam
	F	Fox sandy loam
	W	Warsaw loam
	Ts	Tuscola silt loam
	Pl	Parma loam
3b	Bo	Brady loam
3c	Gd	Gilford loam
4a	Ol	Oshtemo loamy sand (except areas south and northeast of Eaton Rapids)
	Of	Coloma loamy fine sand
	B	Berrien loamy sand
	Bf	Berrien fine sandy loam
	Os	Ottawa loamy fine sand
4c	Mm	Maumee loam

Soil Management Group	Map Symbols	Soil
5a	Ol	Oshtemo loamy sand (in areas S. and N.E. of Eaton Rapids)
L3a	Gf	Genessee fine sandy loam
L3c	Gl	Griffin loam
L3-4c	Km	Kerston muck
bM	Cm	Carlisle muck
	Hm	Houghton muck
	Rp	Rifle peat
aM	Gp	Greenwood peat

The well drained soil management groups were subdivided on the basis of slope. Those areas having slopes less than 6 percent were placed in slope class A-B, and those areas having slopes between 6 and 18 percent, in slope class C-D. Areas in Eaton County of poorly-drained and imperfectly-drained soils having slope gradients steeper than 6 percent were considered too small to have any important effect upon the outcome of this study, and when they did occur, were placed in the next lower slope class.

Land Use on the Soil Management Groups

The estimation of the percentages of each soil management group used for cropland, permanent pasture, woodland, and other uses are based upon observations on the individual tracts. Specific estimates from several other sources were compared with these measurements on approximately 15,000 acres in Eaton County. Other sources of information included census data; the land use study made in Odessa township in Ionia County, Michigan; the land use study made of Almont township in Lapeer County, Michigan; and estimates prepared for Oakland County, Michigan.

The estimated proportions of slope classes of each soil management group for each of the four groups of land use based on the above data are shown in Table 1.

In the determination of the percentages of cropland occupied by different crops, emphasis was placed upon average harvested acreage figures for the various crops as reported in the Michigan Agricultural Statistics (9) for the period 1952 to 1956 inclusive. In this statistical report, the acreage of each crop is reported annually. By finding the average acreage of each crop and dividing this by the total acreage of cropland, an average percentage of the cropland occupied by each crop is obtained. Adjustments of these average figures for all croplands must then be made for each specific soil management group and slope class. These adjustments were based on studies of land use in Odessa township of Ionia County, in Almont township of Lapeer County, and

also upon specific estimates prepared for Oakland County, Michigan which were based upon data of the United States Census of Agriculture (20), Michigan Agricultural Statistics, and land use studies made in four southern Michigan townships in 1954.

Table II lists the estimated proportions of cropland occupied by the different crops on different soil groups by slope classes in Eaton County. In the preparation of Table II, acreages of crops occupying less than 2 percent of the cropland total were combined with acreages of crops having comparable land and management requirements, production costs, and net returns. For example, acreages of beans were combined with those of corn and acreages of barley with those of oats.

Measurement of Acreages

The individual sales tracts were first drawn to scale on a sheet of paper. The information from the soil survey map was then transferred to this farm outline. Next, the land use information from the aerial photographs was transferred to the farm outline with the soil survey information. From this farm outline, measurements of each land use on each soil mapping unit were made. Several methods of measuring were tried including use of the planimeter, the electric grid counter, and the counting of squares on a small grid overlay. The methods were comparatively equal for accuracy, but the latter method proved to be the more rapid because of small areas which predominated. The accompanying farm outline (Figure 2) shows the soils and land use on a farm together with the chart containing acreages of each land use for each mapping unit and illustrates the application of the method used in measuring each farm.

Estimation of Crop Yield of the Soil Management Groups by Slope Classes

The determination of average yield for each of the soil groups by slope classes consisted essentially of determination of average yields of each crop for the county or area as a whole, from census data, and then estimating the yield for individual soil groups and slope classes based on their relative properties affecting production to arrive at specific estimated yields for the various soils.

The Clinton County, Michigan Soil Survey Report (19) contains a productivity rating table that has withstood the test of use since publication of the report in 1940. This county corners Eaton County on the northeast, contains most of the same soils, and has very similar yields of all crops which are common to each. Thus, with slight adjustment of this table on the basis of differences of soils as they occur in Eaton County and on the basis of the grouping of these soils into soil management groups, a table was developed giving a productivity index for each of the soil management groups.

The yields of crops which were used as standards of 100 in the Clinton County report required upward adjustment in most cases because of the general increase in average yields from the time when the report was prepared to the 1952 to 1956 period. This was done by comparing average yields during each of the periods for the United States, for the State of Michigan, and for the counties

Clinton and Eaton. The averagesthat are used herein as standards of 100 in computing the average yield of crops on each soil management group are shown below for the principal crops of Eaton County and compared to the average yield given in the 1940 Clinton County report. Rye, beans, and alfalfa were not changed as they were considered to have been set too high originally.

CROP	Unit (bu.)	Average per Acre Yield-1940 report	Average per Acre yield 1952-56
Corn	"	50	70
Wheat	"	25	40
Oats	"	50	55
Barley	"	40	45
Rye	"	25	25
Beans	"	25	25
Potatoes	"	200	400
Corn (silage)	(tons)	12	18
Timothy and Clover Hay	"	2	2.5
Red Clover Hay	"	2	3
Alfalfa Hay	"	4	4
Sugar Beets	"	12	16

The productivity rating times the average per acre yield which is used as the standard gives the estimated yield per acre for the respective soil management group. Adjustment of this per acre yield is then necessary for the areas of those soil management groups which occur on steeper slopes. This adjustment was made on the basis that yield is generally reduced in direct relation to the amount of topsoil lost (22), and that the effect of erosion in Eaton County is less on coarser textured soils and as vegetative cover becomes more effective in stopping erosion. Final adjustments were made of those yields on the basis of specific yields as recorded in Michigan State Agricultural Experiment

Station records on experiment fields on similar soils and by estimates of agricultural specialists in southern Michigan. The estimated average per acre yields of the principal crops of Eaton County for each of the soil management groups and slope classes is given in Table III.

Yields of rotational and permanent pasture were estimated on the basis of the number of animal unit days of forage produced per acre on each soil management group and slope class. These are reported in Table IV.

The average annual increment of each group of woodland species on each soil management group on which it occurs was estimated both as board feet of saw timber and cords of pole timber, and is reported in Table XI.

Estimated Net Income Per Acre from Alternative Uses of Land

Net income was determined for the respective soil management groups and slope classes by multiplying the yield times the value of the yield and subtracting the cost of production as adjusted for the various soil units on the basis of variable costs due to such operations as seeding, clipping, and fertilizer applications.

Prices of products used in computing the value of production and the net income are listed in Table V.

The estimated costs of production of the various crops are shown in Tables VI and VII. The common custom prices as reported for Michigan (9) for the common operations and materials used in the production of each crop are given as adjusted for local conditions. These adjustments were based upon census data, farm account records, economic surveys and the judgment and observations of agricultural economists. Some costs, such as plowing, were assumed to be relatively stable under all conditions. For other operations such as harvesting, though some parts of the operation as the rate for wheat combining is quite stable, the cost was considered to vary almost directly with the yield of the crops due to such factors as additional cost of hauling and storage of a larger yield. Fertilizer costs were based on census data for the total amounts used, and scaled up or down for individual soils according to the proportions of the various crops grown and the yields of those crops.

The combination of the three basic values of crop yields, values of raw plant products and crop production costs, into estimated net incomes expected from each crop on the slope classes on each soil group is illustrated in Table VIII for cropland, which includes rotational pasture.

The estimated net income for the various crops are then combined for each soil group and slope class in proportion to the percentages of cropland occupied by the different crops, to give a weighted average net income for all cropland, which is shown in Table IX. The estimated net incomes per acre from permanent pasture and woodland are also listed in Table IX for the slope classes of the soil management groups.

Net Income for Woodland

The procedure in determining the net income from woodland is similar to that for cropland. In Eaton County there are four principal groups of woodland species represented. These groups, with their map symbols, and the species of trees which predominate in each group are as follows:

Map Symbol	Group Name	Predominant Species
LH	Lowland Hardwoods	Elm, ash, red maple
NH	Northern Hardwoods	Sugar maple, beech, yellow birch, basswood
OH	Oak-Hickory	Oak, hickory
AP	Aspen-Birch	Aspen, white birch

These are comparable to the individual crops on cropland.

The average annual increment of each woodland species on each soil management group on which it occurs was estimated both as board feet of saw timber and cords of pole timber, Table XI. The value of this estimated yield was determined using the stumpage prices as listed in Table V. Net income for the woodland species on each soil management group, Table XII, was determined by weighing the values of the annual increment produced as saw timber and pole timber according to their proportions on each group, Table XIII. The weighted average net income for all woodland on each soil management group was determined by weighing the net income by species, according to the proportion of each species

on each soil management group, Table XIV, and this is shown in Table XV.

Determination of Net Income for Various Tracts

The total computed net income per tract was determined by multiplying the net income per acre for each of the major land uses, soil management groups and slope classes (Table IX) by the acreage of these respective units on the tract. The total of these figures gives the expected net income for the tract.

Capitalization of Net Income

To change the estimated average net income of a tract to farmland value, this net income may be capitalized at a single rate, or as was done in this study the areas of land having widely different uses and net returns, and consequently widely different values may be capitalized at different rates.

As a test to select a rate of capitalization to apply to the computed net income in computing land value, the computed net income was compared with sale prices of farmland sold, and with estimates made of farmland value by farmers. These comparisons are listed in Table XVI and XVII, and are shown graphically in Figures 5 and 4. Farms were selected in Table XVI which had no improvements, or with very low value improvements, and with no woodland or with low acreages of woodland which had low stumpage value of timber on the land. Estimates of farmland value were made by farmers who have been keeping farm account records in cooperation with the Agricultural Economics Department of Michigan State University. The computed net income averaged 14.01 percent of the sale price of the farmland on the tracts in Table XVI. When compared with farmers' estimates of farmland value on farm account farms, the computed values averaged 13.8 percent of the estimated values, Table XVII.

The cropland and permanent pasture were capitalized at approximately 14 percent (14.29%), based on the comparisons previously mentioned. This capitalization rate was also

consistent with similar findings made in a study of net income and land values in Arenac County, Michigan (5). The estimated net return from woodland was capitalized at 5 percent in Arenac County. However, because this rate gave values which were considered too low for the woodland, and as the woodland in Eaton County produces products of higher value per acre than that of Arenac County, the rate of approximately 3 percent (3.03%) was used in Eaton County.

Total Value

The total computed value of the farm property is the sum of the land value, the stumpage value of any timber on the land, and the building or improvement values. The methods of arriving at the land value and timber value have been described. The value of the buildings or improvements cited herein has been that assigned to them in the course of the equalization studies made by the Michigan State Tax Commission in Eaton County.

RESULTS

The purpose of this study was to investigate a method of arriving at equitable evaluations of farm lands. The method has been outlined and used to make evaluations on a number of farms in Eaton County, Michigan. Tests of the accuracy of the method proposed include comparisons of the values obtained with: (1) another method of land evaluation, and (2) farmers' estimates of land values.

The computed land value was compared with the Michigan State Tax Commission's appraised land value. Results of this test are shown in the chart of Table XVIII, and graphically in Figure 7. There was a wide variation in values obtained, with the computed land value ranging from 65 percent to 170 percent and averaging 112 percent of the Commission's appraised value. A correlation coefficient of .921 was determined for this comparison of computed and appraised values.

To compare the computed farmland values with farmers' estimates of the value of the land, values were taken from farm account records kept in cooperation with the Michigan State University Agricultural Economics department. These values were the farmers' estimates of the value of their land (improvements not included), and were used here as an example of comparison of land value with the computed land value. The results of this comparison are shown in Table XIX. These data show a wide variation between many of the computed and the farmer estimated land values, and also

shows the computed land value to average 97 percent of the estimated land value in this test.

Another test made was to compare the sale price of the farms with the county assessed valuations. Results of this test are shown in Figure 8 and in Table XXI, where the wide range which occurred in the assessed value-sale value percentages for the various value groups is shown. The assessed value averaged 49 percent of the sale price for the 99 farms compared. As the assessed value appeared to be quite low, it was further compared with the farm owners' estimates of the value of their farms. The results of the test in which the assessed values averaged 36.5 percent of the estimated farm value, are shown in Table XXII by value groups and graphically in Figure 3.

Using the computed value of farmland obtained by the method as outlined herein, a comparison was made with sale price of the land. Sale price in this test was calculated by subtracting the appraised value of the improvements, which was determined by the Michigan State Tax Commission, from the price for which the farm sold. As an average for the 23 farms tested, the computed land value of the farms averaged 170 percent of the calculated sale price of the land (Table XX). This is obviously a poor method for arriving at the calculated value of the land as indicated by the wide variations when compared to the computed values that agree well with actual sale values of land, appraisers' values of the land and farmers' estimations of farmland values.

To determine the accuracy of the appraised farm values, the farm values as determined by the Michigan State Tax Commission's appraisal were compared with the farm sale values. These comparisons are listed in Table XXIII, and are shown graphically in Figure 6. In this case, the appraised values averaged 124 percent of the sale values. As the Commission's land values, while about 10% lower, agree well with the computed land values, it appears that the Commission's values of buildings are much too high on the average.

Discussion

A method by which 'Soil Management Groups' and related information on their use, their productivities and production costs can be used to arrive at equitable land evaluations has been presented. It was used to make evaluations of a number of farms in Eaton County, Michigan. Tests were made to determine the accuracy of these evaluations.

The computed land values using the above method were quite close to the appraised land values as determined by the Michigan State Tax Commission. The computed land value averaged 112 percent of the appraised values, with a correlation coefficient of .921 between the two values. This means that 85 percent of the variation in the computed land value can be associated with a variation in the appraised land value.

The computed farmland values averaged 97 percent of the land values as estimated by a group of farmers and were about equal to the sale values of bare lands. These three values averaged very close together, though this close relation could have been due to the manner in which the capitalization rate for the net income was determined.

Attempts to compare the computed farmland values and total computed farm values with the sale prices of the land and of the farms respectively, indicated the probable overvaluation of the improvements in relation to the land values. A possible explanation for this overvaluation of improvements may be that with

the general trend toward larger sized farm units, many of these improvements are going out of use and have much less influence in determining the price of the farm unit than they would during a period of time when their use would be continuing or in an area where the size of farm units is not increasing. Changes in the types of farming operations with time, as dairying to cash crops, could also leave many improvements on a farm which would contribute little to the new operation.

Assessed value-sale value ratios of the farm units in this area was typical of conditions as found in other areas as mentioned earlier in the review of literature. The general trend was that farm units of low value were assessed at values near to or higher than their market values, while units of higher value were assessed at a much lower percentage of their sale values. The comparison of the farmers' estimates of value of their farms with assessment values confirmed this trend for farms of higher value groups. Several reasons or explanations of these inequalities in assessments are as follows:

(1) absence of an objective land evaluation procedure for relating reliable sales or other data to assessments of unsold properties,

(2) influence of people who own the more valuable units of land, or

(3) the reluctance of assessors to appraise large properties in proportion to their market values.

These emphasize the need for more objective assessment procedures to arrive at more equitable taxes.

In the determinations of the accuracy of the various determined land values, it was shown that the Michigan State Tax Commission's appraisals avoid the above mentioned bias of undervaluing the more valuable properties and were closer to the actual sales values. A close relationship between the computed land values by the use of soil management groups and related data and the tax commission's appraised land value has been shown. It is also mentioned that adjustments of the computed farmland values may need to be made because of local factors which influence value, as location of the tract, flooding or overflow hazards, or poor soil drainage. To correct for a factor such as reduction of yield due to the effect of poor drainage or flooding, the average annual proportion of each crop that is lost is multiplied by the proportion of the area of that crop on the land, the average yield of that crop on the particular soil management group and slope class and the average price per unit of the crop, after subtracting the harvesting cost per unit, to give the amount to deduct for that crop from the expected net crop income on that particular soil unit. The method of arriving at farmland valuations as previously outlined would be applicable and best suited to an area such as a 'Type of Farming Area' (6). This is an area of relatively uniform agricultural enterprises. Therefore, the price of land is determined by competition for an average use. In the use of this method in such

an area, periodic checks should be made on the land use. The intervals of time at which to make these checks is dependent upon changes in cropping systems because of such factors as changing economic trends, technological trends or advances, soil changes and/or adaptations of cropping system to fit the soil, or acreage controls. When the average cropping system or land pattern for an area is changed, or specialized crops become part of the normal operation of a tract as indicated by census data, then new calculations of values for the area or tract should be made using the net income from the new uses on the soils represented.

The farmland valuations by the 'Soil Management Group' method could provide an objective basis for all appraisals of farmlands. Appraisals based on this method would also be useful to people who wish to sell their property and to others who have purchases of property as their concern. People who sell farmland are usually primarily interested in having facts available which point out the better characteristics of their property. These include not only the value for a definite use, but also the possibilities for, and values of the property under several systems of management, so that the possible market may be broadened to include more buyers to compete for the property. These data are readily available, or can be easily determined after the values have been computed by the method as outlined. A purchaser of farmland usually is primarily concerned about the income that can be expected from the kind of management that he plans to apply to

the tract. By application of the principles of the method as outlined, the net income which could be expected from a particular type of management can be computed.

Credit agencies could use the method as well as individuals to determine the value of a tract as security for loans of all types. The loans could then be made on the basis of the income the tract was actually able to produce.

By application of the principles of the soil management group method, farm managers or farm management agencies could determine the relative economic benefits from different crops on the same soils and on different soils. For example, it is shown in Table VIII (which gives the estimated net income per acre from alternate uses of cropland by soil management groups and slope classes in Eaton County) that for soil management group 2a on slopes of six to twelve percent, the production of alfalfa hay will give the highest net income. From the same table it is seen that the production of corn gives the highest net income on the soils of group 2b, and that on the soils of group 2c the highest net income is obtained by production of corn and the second most profitable crop is wheat. It is also shown that the highest net income from the production of corn is obtained on the soils of groups 2c, 2b, and 3b, in decreasing order. Highest net incomes from the production of wheat is obtained on the soils of groups 2b, 2c, and 3b, in decreasing order. Some crops are actually grown at a loss to the operator on some soils.

It is shown in Table IX that while much of the area of some soil groups may be used for cropland, this is done with the production of very low income or even at a cost to the operator, and that higher net incomes could be expected if the soils were used for permanent pasture or woodland. Thus, it is seen that the farm manager can use this type of information to determine the relative economic benefits from various cropping systems on the soils of a specific tract.

Additional Research Needs

The accuracy of the method as outlined for evaluation of farmland is directly dependent upon the accuracy of the data used in the various computations. Therefore, the description of the soil management for each soil, along with yield, cost, and price estimates should be as complete as possible. Accurate information concerning the percentages of the different crops grown and of the land use on each soil are needed, and should be revised as changes occur in an area. Accurate information concerning crop sequences, erosion-control measures, and application of fertilizer should be known as they effect total yield, cost of production, and therefore net income.

Additional data on yields, especially specific yields of the various crops on individual soils, are especially needed.

While average or fixed costs for farms or for operations in general are usually well known, specific information concerning variable costs as they apply to individual soils is needed. These variable costs include such items as additional cost of drainage on some soils, variation in cost of preparation of seedbeds and other tillage operations, and costs of harvesting and storage of increased yields.

Prices of products which apply to the specific areas under consideration are needed. For example, in the area to be considered, not only the prices of products in the market centers within the area, but also the prices at any other location

available to the operator should be considered.

Location of a tract is often reported to be an important factor in determining the value. In Nebraska (12), distances to market centers, schools, hard surfaced roads, and railroads were considered to influence the cost of operation and living because of increased costs of transportation and amounts of time required to reach these locations or services from outlying areas. Such distance can influence and often regulate the type of farming which can be carried out on a tract. The location in respect to the type of land or of farming which surrounds the tract is often important in setting value. For example, the values of individual small tracts of very good land which are widely distributed in an area of much poorer quality land are usually brought down because of the association. The way of life or habits of people in an area often influence land values through the selection of a type of farming which may or may not be most profitable in the area. To illustrate this point, the people of an area may have chosen a dairy type of agriculture, and continue to operate on that basis even though the land is well suited to other types, such as production of cash crops, and would give higher profits under that use. Additional research is needed to more accurately evaluate the influence of location on the value of farmland.

The rate at which to capitalize the net income is one of the most important factors in setting values by the method as outlined. Comparisons of the relationship between the computed net income and

sale price on a large number of farm tracts in each area would be very desirable. While the author believes this comparison provides a true basis for the capitalization rate, further investigation may provide refinements in the method.

Comparisons made to show the accuracy of the method of land evaluation pointed out the need for a reliable method of appraisal of farm improvements. Studies which show the use which is made of these improvements after a sale may help in the determination of more accurate appraised values.

CONCLUSIONS

On the basis of the results of this study the following conclusions seem warranted:

(1) the computed land values as determined by the soil management group method compares favorably with both the Michigan State Tax Commission's appraised land values and with farmers' estimates of the value of their land,

(2) the use of soil maps can be of aid to township or county assessors in comparing farms,

(3) the use of these values based upon the soils and land use would tend to remove bias in relative overtaxation of low value farms,

(4) the soil management group method of land evaluation could provide a base for all appraisals of farmland, including those for sale, purchase or condemnation,

(5) the soil management group method of land evaluation could be used by management to determine the relative economic benefits from various cropping systems on the soils of a specific tract.

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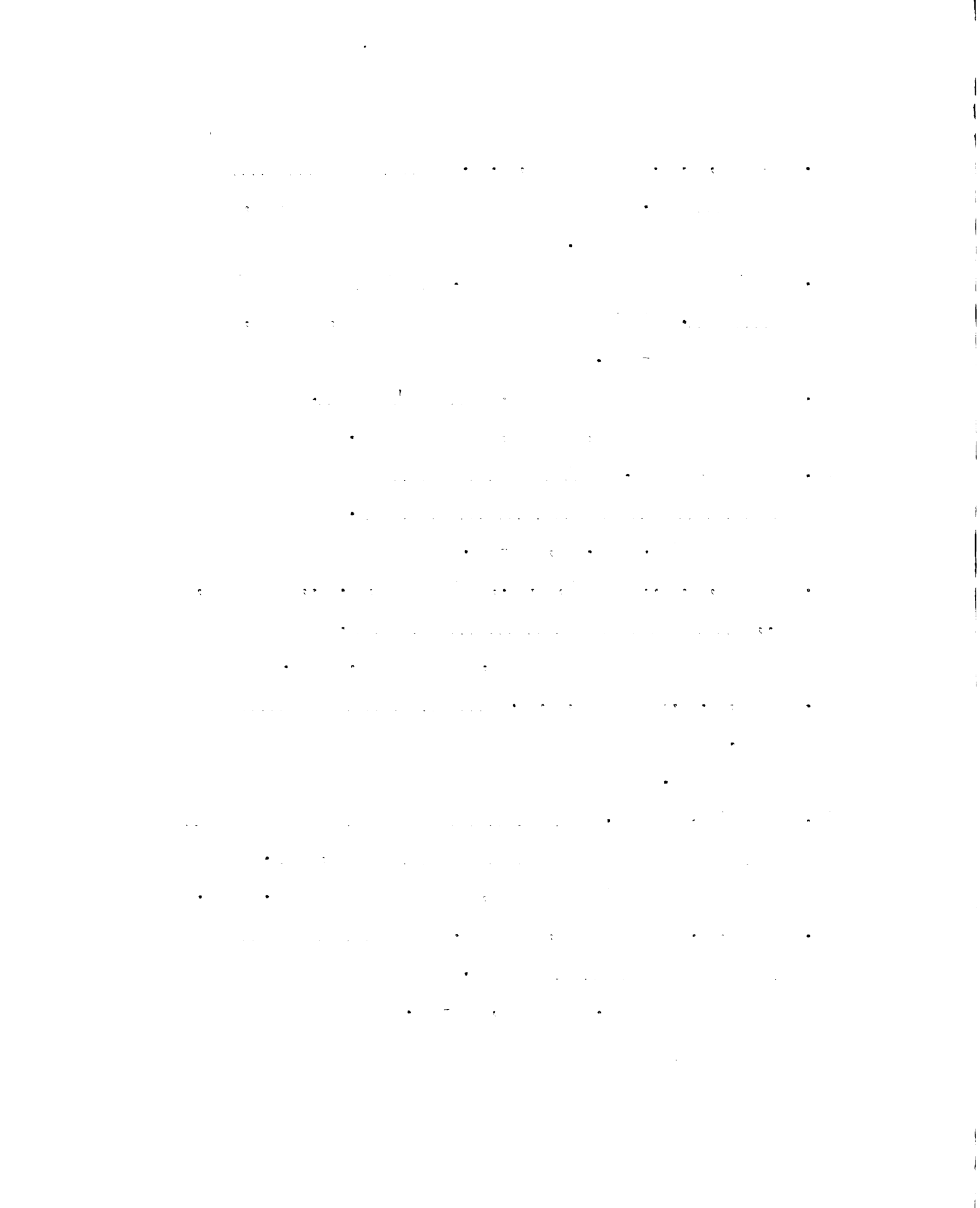

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Table I. Estimated Proportions of Slope Classes of Each Soil Management Group Used for Cropland, Permanent Pasture, Woodland and Other Uses in Eaton County.

Soil Management Groups and Slope Classes		Cropland	Permanent Pasture	Woodland	Other (Farmsteads; etc.)
2a	A-B	.87	.05	.03	.05
2a	C-D	.75	.12	.08	.05
2b	A-B	.80	.09	.06	.05
2c	A-B	.70	.17	.08	.05
3a	A-B	.82	.09	.04	.05
3a	C-D	.65	.20	.10	.05
3b	A-B	.78	.12	.05	.05
3c	A-B	.65	.18	.12	.05
4a	A-B	.75	.14	.06	.05
4a	C-D	.50	.25	.20	.05
4c	A-B	.60	.20	.15	.05
5a	A-B	.65	.22	.08	.05
5a	C-D	.30	.30	.35	.05
L3a	A-B	.39	.39	.17	.05
L3-4c	A-B	.11	.54	.30	.05
bM	A-B	.24	.47	.24	.05

Table II. Estimated Proportions of Cropland Occupied by Different Crops on the Soil Management Groups by Slope Classes in Eaton County.

Soil Management Groups and Slope Classes		Corn	Wheat	Oats	Alfalfa Hay	Other Hay	Rotational Pasture
2a	A-B	.28	.15	.16	.20	.15	.06
2a	C-D	.25	.16	.17	.20	.16	.06
2b	A-B	.36	.15	.13	.16	.14	.06
2c	A-B	.46	.16	.10	.08	.12	.08
3a	A-B	.29	.16	.16	.18	.12	.09
3a	C-D	.20	.16	.18	.20	.14	.12
3b	A-B	.33	.18	.14	.16	.14	.05
3c	A-B	.39	.18	.12	.12	.14	.05
4a	A-B	.28	.16	.18	.18	.12	.08
4a	C-D	.19	.17	.19	.17	.15	.13
4c	A-B	.30	.14	.16	.20	.15	.05
5a	A-B	.24	.16	.19	.18	.14	.09
5a	C-D	.18	.17	.19	.18	.16	.12
L3c	A-B	.36	.16	.14	.14	.15	.05
L3-4c	A-B	.33	.13	.15	.17	.16	.06
bM	A-B	.25	.12	.08	.14	.26	.15

Table III. Estimated Average Per Acre Yields of the Principal Crops of Eaton County by Soil Management Groups and Slope Classes.

Soil Management Groups and Slope Classes		Corn (bu.)	Wheat (bu.)	Oats (bu.)	Alfalfa Hay (tons)	Other Hay (tons)
2a	A-B	49	28	38	2.6	1.8
2a	C-D	38	23	31	2.2	1.6
2b	A-B	58	32	50	2.8	2.3
2c	A-B	63	31	54	2.4	2.1
3a	A-B	41	26	35	2.0	1.7
3a	C-D	34	22	30	1.8	1.5
3b	A-B	53	30	44	2.6	2.2
3c	A-B	56	28	38	2.4	2.1
4a	A-B	28	16	22	1.5	1.2
4a	C-D	23	14	18	1.4	1.1
4c	A-B	42	24	27	2.1	1.8
5a	A-B	21	12	17	1.0	0.75
5a	C-D	18	11	14	1.0	0.75
L3c	A-B	42	20	36	2.4	2.10
L3-4c	A-B	(40)*	(18)	(30)	(2.2)	1.50
bM	A-B	49	(26)	(40)	2.0	1.3

( )* These crops are not extensively grown on these soils, but yields are estimated for use in computing expected net income.

Table IV. Estimated Per Acre Yield of Rotational and Permanent Pasture by Soil Management Groups and Slope Classes.

Soil Management Groups and Slope Classes		Rotational Pasture (Cow-days)	Permanent Pasture (Cow-days)
2a	A-B	165	90
2a	C-D	145	80
2b	A-B	170	100
2c	A-B	170	110
3a	A-B	145	80
3a	C-D	130	70
3b	A-B	160	90
3c	A-B	165	100
4a	A-B	80	60
4a	C-D	70	50
4c	A-B	120	80
5a	A-B	55	35
5a	C-D	55	35
L3c	A-B	142	88
L3-4c	A-B	131	84
bM	A-B	160	90

Table V. Prices of Products Used in Computing Net Income.

Corn	$ 1.25	per bushel
Wheat	1.96	" "
Oats	.64	" "
Alfalfa hay	21.00	" ton
Other hay	17.00	" ton
Pasture	.088	" cow day

Wood Products, stumpage values.

Northern hardwoods, lumber	12.00	per M. bd.ft.
Northern hardwoods, pulpwood	1.00	per cord
Oak-Hickory, lumber	9.00	per M. bd.ft.
Oak-Hickory, pulpwood	1.00	per cord
Lowland Hardwoods, lumber	8.50	per M. bd.ft.
Lowland hardwoods, pulpwood	1.00	per cord
Aspen, pulpwood	1.00	per cord

Table VI. Average Production Costs for Common Crops in Eaton County.

	Expense Per Acre of Land in		
	Corn	Wheat	Oats
Yield	45 bushels	28 bushels	38 bushels
Labor and Machinery: Plowing, fitting, planting and cultivating	$13.50	$11.00	$ 7.75
Harvesting, loading, hauling and storing	7.50	7.08	6.80
Fertilizer	7.41	6.37	4.30
Seed and crop expense	2.50	5.50	2.00
Overhead	3.09	3.00	2.08
Total	$34.00	$33.05	$22.93

Table VII. Average Production Costs for Hay and Pasture in Eaton County.

	Expense Per Acre of Land in			
	Alfalfa Hay	Other Hay	Rotation Pasture	Permanent Pasture
Yield	2.0 tons	1.6 tons	130 days	100 days
Labor and Machinery, Plowing, fitting planting and cultivating	$ 2.00	$ 2.00	$ 1.80	$ 1.36
Harvesting, loading, hauling and storing	15.35	12.31	___	___
Fertilizer	.75	.50	.50	.30
Seed and crop expense	2.50	2.25	2.00	.40
Overhead	2.06	1.71	1.20	1.04
Total	$22.66	$18.77	$ 5.50	$ 2.10

Table VIII. Estimated Net Income Per Acre from Alternative Uses of Cropland, in Eaton County by Soil Management Groups and Slope Classes.

Soil Management Groups and Slope	Classes	Corn	Wheat	Oats	Alfalfa Hay	Other Hay	Rotation Pasture
2a	A-B	$25.87	$21.64	$1.23	$27.14	$10.33	$ 8.48
2a	C-D	15.68	14.53	- .84	21.94	8.67	6.81
2b	A-B	34.75	27.07	6.69	29.73	14.33	8.90
2c	A-B	39.51	26.68	7.65	24.53	12.55	8.90
3a	A-B	18.55	19.57	0.43	19.34	9.57	6.81
3a	C-D	11.78	13.97	-1.32	17.44	7.74	5.89
3b	A-B	29.80	25.00	3.68	27.14	13.83	8.06
3c	A-B	32.77	21.83	1.39	24.53	12.55	6.81
4a	A-B	7.13	3.89	-4.03	13.55	5.69	2.49
4a	C-D	2.53	0.60	-6.58	12.23	4.99	1.66
4c	A-B	19.54	16.41	-2.26	20.65	10.47	5.06
5a	A-B	- 5.65	- 6.46	-7.06	5.16	0.75	1.14
5a	C-D	- 9.61	- 8.14	-8.50	5.16	0.75	1.14
L3c	A-B	19.54	10.61	0.91	24.53	12.55	5.94
L3-4c	A-B	17.56	7.32	-1.32	21.94	7.74	5.50
bM	A-B	25.87	19.47	2.19	19.34	5.94	8.06

Table IX. Estimated Net Income Per Acre from Alternative Uses of Land, in Eaton County.

Soil Management Groups and Slope Classes		Weighted Average all Cropland	Permanent Pasture	Weighted Average all Woodland
2a	A-B	$18.18	$ 6.10	$ .92
2a	C-D	12.29	5.24	.92
2b	A-B	24.73	6.70	.98
2c	A-B	27.41	7.53	.61
3a	A-B	13.82	5.24	.91
3a	C-D	9.73	4.70	.91
3b	A-B	21.56	6.10	.92
3c	A-B	22.01	6.70	.68
4a	A-B	5.22	3.93	.73
4a	C-D	2.40	3.08	.73
4c	A-B	11.70	5.24	.66
5a	A-B	- 3.62	1.88	.64
5a	C-D	- 3.55	1.88	.64
L3c	A-B	14.57	5.97	.66
L3-4c	A-B	11.88	5.60	.66
bM	A-B	14.44	6.10	.34

Table X. Volume Per Acre of Forest Products by Stand Size and Stocking Class.

Diameter range Inches	Volume range	Stocking Class					
		Good		Medium		Poor	
		bd.ft.	cords	bd.ft.	cords	bd.ft.	cords
0- 1	.....	0	0	0	0	0	0
	Low....	0	0	0	0	0	0
1- 5	Average	0	2.5	0	2.2	0	1.5
	High...	0	2.9	0	2.8	0	2.0
	Low....	700	13.0	500	7.0	200	3.0
5- 9	Average	1,400	20.0	1,000	12.1	990	5.0
	High...	1,500	24.0	1,500	12.9	1,200	7.0
	Low....	6,000	18.0	3,000	13.0	1,500	5.0
9-15	Average	7,700	22.9	4,950	17.6	2,800	10.9
	High...	10,000	26.0	6,000	20.0	3,000	13.0
	Low....	10,000	24.0	5,000	17.0	1,500	6.0
15-	Average	14,850	33.5	8,100	21.2	4,140	12.1
	High...	18,000	40.0	10,000	26.0	5,000	16.0

Table compiled by Paul C. Guilkey, Research Forester, U.S.F.S. Table taken from Michigan State Tax Commission Assessor's Manual (1955).

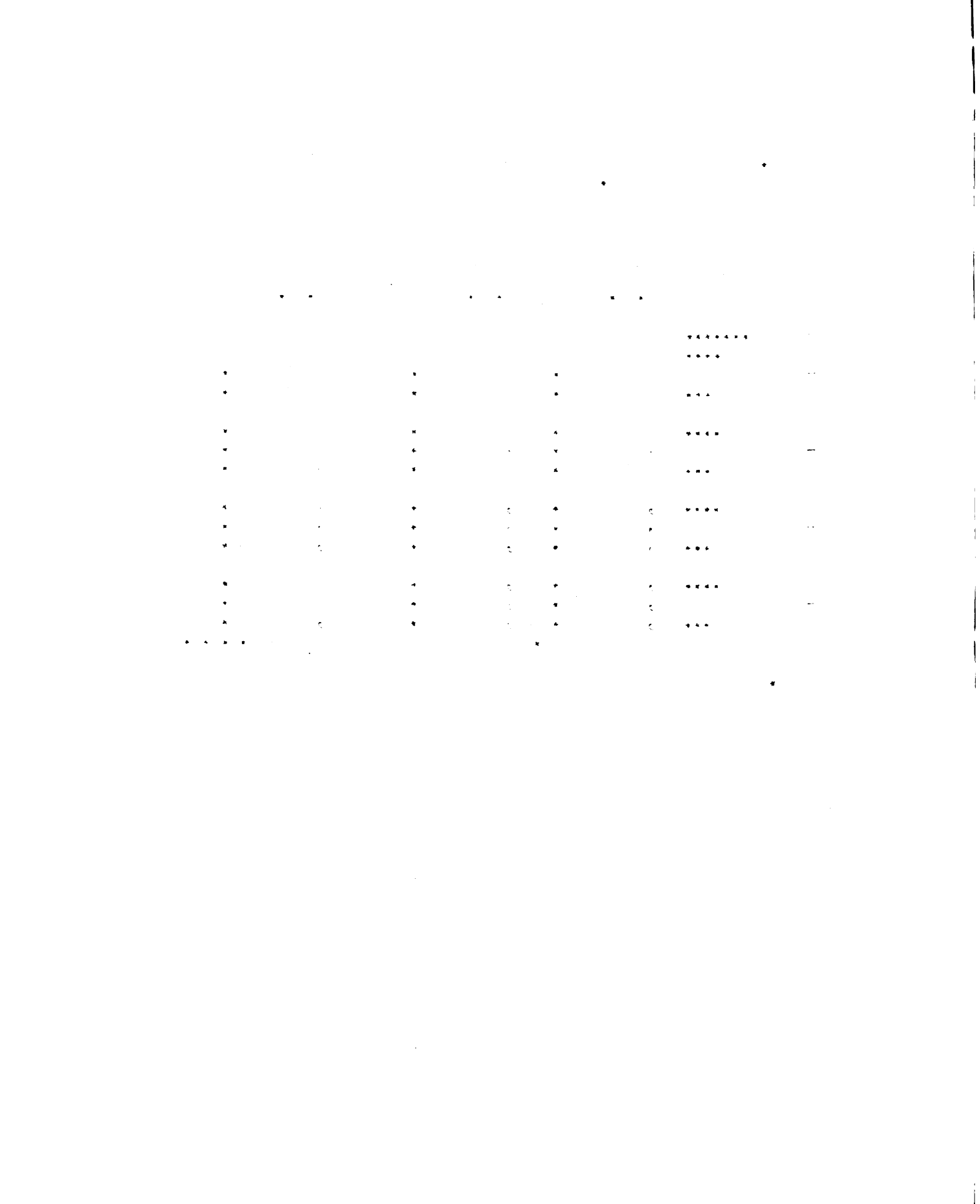


Table XI. Estimated Annual Increment Per Acre of Various Woodland Products for Each Soil Management Group, Eaton County.

Soil Management Group	Woodland Species LH		NH		OH		AP	
	bd.ft.	cords	bd.ft.	cords	bd.ft.	cords	bd.ft.	cords
2a	-	-	120	.48	140	.48	-	-
2b	125	.68	100	.36	224	.72	152	.88
2c	75	.48	90	.30	-	-	112	.80
3a	-	-	120	.48	140	.48	-	-
3b	113	.56	100	.36	224	.72	112	.80
3c	100	.42	90	.30	-	-	72	.68
4a	-	-	111	.42	88	.36	-	-
4c	100	.42	-	-	-	-	48	.56
5a	-	-	100	.36	72	.32	-	-
L3c	100	.42	-	-	-	-	48	.56
L3-4c	100	.42	-	-	-	-	48	.56
bM	50	.21	-	-	-	-	40	.30

Table XII. Estimated Value of Annual Increment Per Acre From Various Woodland Uses for Each Soil Management Group, Eaton County.

Soil Management Group	Woodland Species							
	L H		N H		O H		A P	
	bd.ft.	cords	bd.ft.	cords	bd.ft.	cords	bd.ft.	cords
2a	-	-	$1.44	$ .48	$1.26	$ .48	-	-
2b	$1.00	$ .68	1.20	.36	2.02	.72	$ .83	$ .88
2c	.64	.48	1.08	.30	-	-	.61	.88
3a	-	-	1.44	.48	1.26	.48	-	-
3b	.96	.56	1.20	.36	2.02	.72	.61	.80
3c	.85	.42	1.08	.30	-	-	.39	.68
4a	-	-	1.33	.42	.79	.36	-	-
4c	.85	.42	-	-	-	-	.26	.56
5a	-	-	1.20	.36	.65	.32	-	-
L3c	.85	.42	-	-	-	-	.26	.56
L3-4c	.85	.42	-	-	-	-	.26	.56
bM	.43	.21	-	-	-	-	.22	.30

Table XIII. Estimate of Percentage of Annual Increment Occurring as Saw Timber and Pole Timber by Woodland Species.

Use	Woodland Species			
	L H	N H	O H	A P
Saw Timber	60	55	40	25
Pole Timber	40	45	60	75

Table XIV. Estimated Proportion of Each Soil Management Group Occupied by the Various Groups of Woodland Species.

Soil Management Group	Woodland Species			
	L H	N H	O H	A P
2a	-	.60	.40	-
2b	.20	.40	.35	.05
2c	.80	.13	-	.07
3a	-	.55	.45	-
3b	.10	.60	.25	.05
3c	.85	.05	-	.10
4a	-	.50	.50	-
4c	.90	-	-	.10
5a	-	.50	.50	-
L3c	.90	-	-	.10
L3-4c	.90	-	-	.10
bM	.90	-	-	.10

Table XV. Estimate of Annual Net Income Per Acre From Woodland Species on the Soil Management Groups in Eaton County.

Soil Management Group	Woodland Species			
	L H	N H	O H	A P
2a	$ -	$1.02	$ .79	$ -
2b	.87	.82	1.24	.87
2c	.57	.74	-	.75
3a	-	1.02	.79	-
3b	.80	.82	1.24	.75
3c	.68	.74	-	.61
4a	-	.92	.54	-
4c	.68	-	-	.49
5a	-	.82	.45	-
L3c	.68	-	-	.49
L3-4c	.68	-	-	.49
bM	.34	-	-	.29

Table XVI. Ratio of Computed Net Income to Sale Price on Unimproved Farmlands or Those with Low Timber and Improvement Values in Eaton County.

Farm Number	Sale Price	Computed Net Income	Capitalization Percentage
8	$13,600	$ 867	6.6
19.5	3,750	893	26.4
27	7,250	1,025	14.2
45	11,000	1,492	13.6
54	17,750	3,013	16.1
84	4,250	750	17.6
Averages	$ 9,600	$ 1,345	14.01

Table XVII. Ratio of Computed Net Income to Farmer's Estimate of Farmland Value on Farm Account Farms in Eaton County.

Farm Number	Estimated Farmland Value	Computed Net Income	Capitalization Percentage
2A	$ 13,599	$ 1,871	13.8
6A	22,828	4,503	19.8
7A	16,315	1,183	7.2
13A	11,591	3,151	27.3
14A	24,342	3,247	13.3
20A	34,251	2,923	8.5
21A	16,517	2,357	14.3
Averages	$ 19,920	$ 2,748	13.8

Table XVIII. Ratio of Computed Land Value Per Farm to Appraised Land Value Per Farm on 26 Farms, Eaton County.

Farm Number	Computed Land Value	Appraised Land Value	Computed/Appraised %
1	$ 8,888	$ 5,320	170
2	2,464	3,720	65
5	6,342	5,775	110
15	9,812	9,350	105
33	17,612	15,145	116
34	18,188	12,300	162
40	10,542	9,500	110
41	4,535	4,500	100
42	8,469	8,000	106
46	14,931	14,241	105
47	10,465	7,700	135
51	18,177	20,860	83
53	22,235	14,830	150
54	21,402	18,188	118
55	15,159	12,280	123
65	3,718	5,200	72
66	3,872	3,400	114
67	11,882	9,600	124
70	16,682	15,450	108
71	6,592	7,000	94
72	8,476	6,350	133

Table XVIII (Continued)

Farm Number	Computed Land Value	Appraised Land Value	Computed/Appraised %
73	$ 11,406	$ 12,000	95
74	5,153	4,610	112
75	5,123	4,800	107
93	14,141	16,910	84
99	17,827	16,730	106
Averages	$ 11,311	$ 10,145	112

Table XIX. Ratio of Computed Land Value to Farmer's Estimated Land Value, Eaton County.

Farm Number	Computed Land Value	Estimated Land Value	Computed/Estimated %
2A	$ 13,305	$ 13,599	98
6A	31,418	22,828	138
7A	8,433	16,315	52
13A	22,334	11,591	192
14A	23,001	24,342	95
20A	20,461	34,251	60
21A	16,641	16,517	100
Average	$ 19,370	$ 19,920	97

Table XX. Ratio of Computed Land Value to Calculated Sale Price of Land on 23 Farms, Eaton County.

Farm Number	Calculated Sale Price of Land	Computed Land Value	Computed/Calculated %
1	$ 3,240	$ 8,888	274
2	2,804	2,464	88
5	4,346	6,342	146
34	14,160	18,188	129
40	7,263	10,542	145
42	3,788	8,469	224
46	7,852	14,931	191
47	7,310	10,465	142
51	3,992	18,177	455
53	4,495	22,235	500
54	4,260	21,402	500
55	7,621	15,159	199
65	5,405	3,718	69
66	1,555	3,872	249
67	6,894	11,883	172
70	9,515	16,682	176
71	4,025	6,592	163
72	2,536	8,476	334
73	8,788	11,406	131
74	6,795	5,153	76
75	5,624	5,123	91

Table XX (Continued)

Farm Number	Calculated Sale Price of Land	Computed Land Value	Computed/Calculated %
93	$ 21,277	$ 14,141	67
99	10,746	17,827	166
Average	$ 6,708	$ 11,397	170

Table XXI. Ratio of Assessed Value to Sale Price of Farm Real Estate on 99 Farms in Eaton County by Value Groups.

Sale Price	Number of Farms	Sale Price		Assessed Value		Assessed / Sale %
		Total	Per Farm	Total	Per Farm	
Under $5,000	12	$39,491	$ 3,291	$43,100	$ 3,592	109
$ 5,000- 7,499	8	48,437	6,055	37,650	4,706	78
7,500- 9,999	19	165,094	8,689	94,500	4,973	57
10,000-14,999	31	394,129	12,713	183,900	5,932	47
15,000-19,999	13	230,490	17,730	105,150	8,086	46
20,000 & above	16	417,066	26,066	169,500	10,594	41
All Groups	99	1,294,707	13,078	633,800	6,402	49

Table XXII. Ratio of Assessed Value to Owners Estimate of Farm Market Value on 15 Farms in Eaton County by Value Groups.

Market Value	Number of Farms	Market Value		Assessed Value		Assessed / Market
		Total	Per Farm	Total	Per Farm	%
$15,000-$24,999	5	$101,500	$20,300	$ 39,600	$ 7,920	39
25,000- 34,999	5	150,000	30,000	55,200	11,040	37
35,000 & above	5	225,200	45,040	80,000	16,000	35
All Groups	15	476,700	36,780	174,800	11,620	36.5

Table XXIII. Ratio of Total Appraised Farm Value Per Farm to Sale Price on 23 Farms in Eaton County.

Farm Number	Sale Price	Appraised Value	Appraised/Sale %
1	$ 3,240	$ 5,320	165
2	5,130	6,046	117
5	11,070	12,499	113
34	21,000	19,140	91
40	14,850	17,087	115
42	10,105	14,317	141
46	20,790	27,179	131
47	14,805	15,195	102
51	17,750	34,618	196
53	13,865	24,200	175
54	18,815	32,743	174
55	10,575	15,134	144
65	5,405	5,200	96
66	8,500	10,345	121
67	15,750	18,456	118
70	18,815	24,750	131
71	13,750	16,725	121
72	8,750	12,564	143
73	22,795	26,007	114
74	14,750	12,565	85
75	13,750	13,566	99

Table XXIII (Continued)

Farm Number	Sale Price	Appraised Value	Appraised/Sale %
93	$32,702	$28,335	87
99	21,385	27,369	128
Average	$14,732	$18,242	124

FIGURE I. EATON COUNTY, MICHIGAN

LOCATION OF FARMS USED IN LAND EVALUATION STUDY

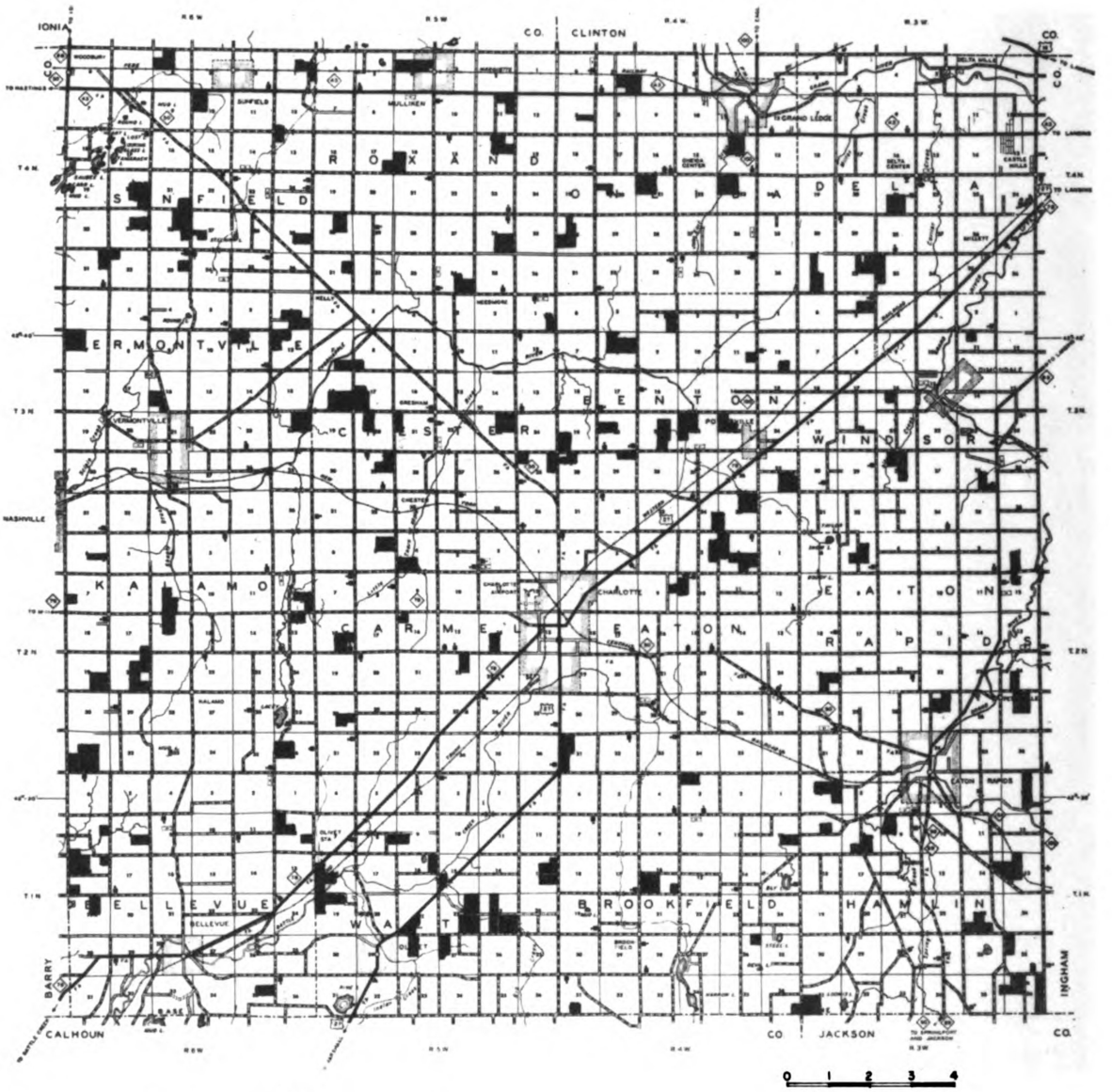
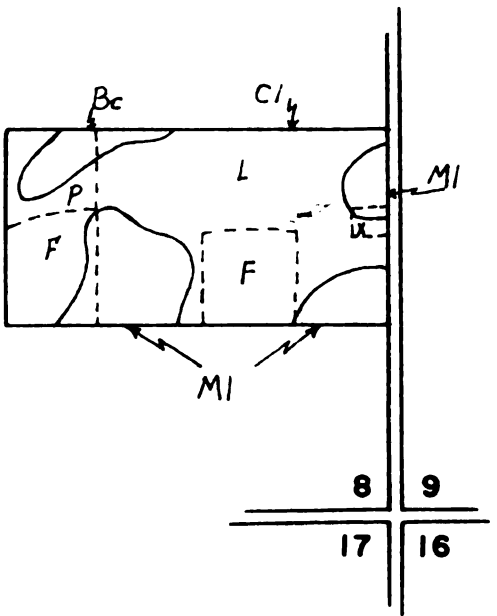


FIGURE 2. ILLUSTRATION OF THE METHOD USED IN MEASUREMENT AND RECORDING OF ACREAGES.

Farm Outline



Township - (in Eaton County)
Acres = 80
Scale = 4" = 1 mile
Soil boundary = ~~~
Land use boundary = ------

Acreage Chart

Soil Management Group	Slope Class	Map Symbol	Land Use			
			L	P	F	X
2a	A-B	M1	17.2	~	1.7	0.4
2b	A-B	Cl	31.3	4.3	19.7	0.9
2c	A-B	Bc	1.1	3.4	~	~
Totals			49.6	7.7	21.4	1.3

Total 80.0

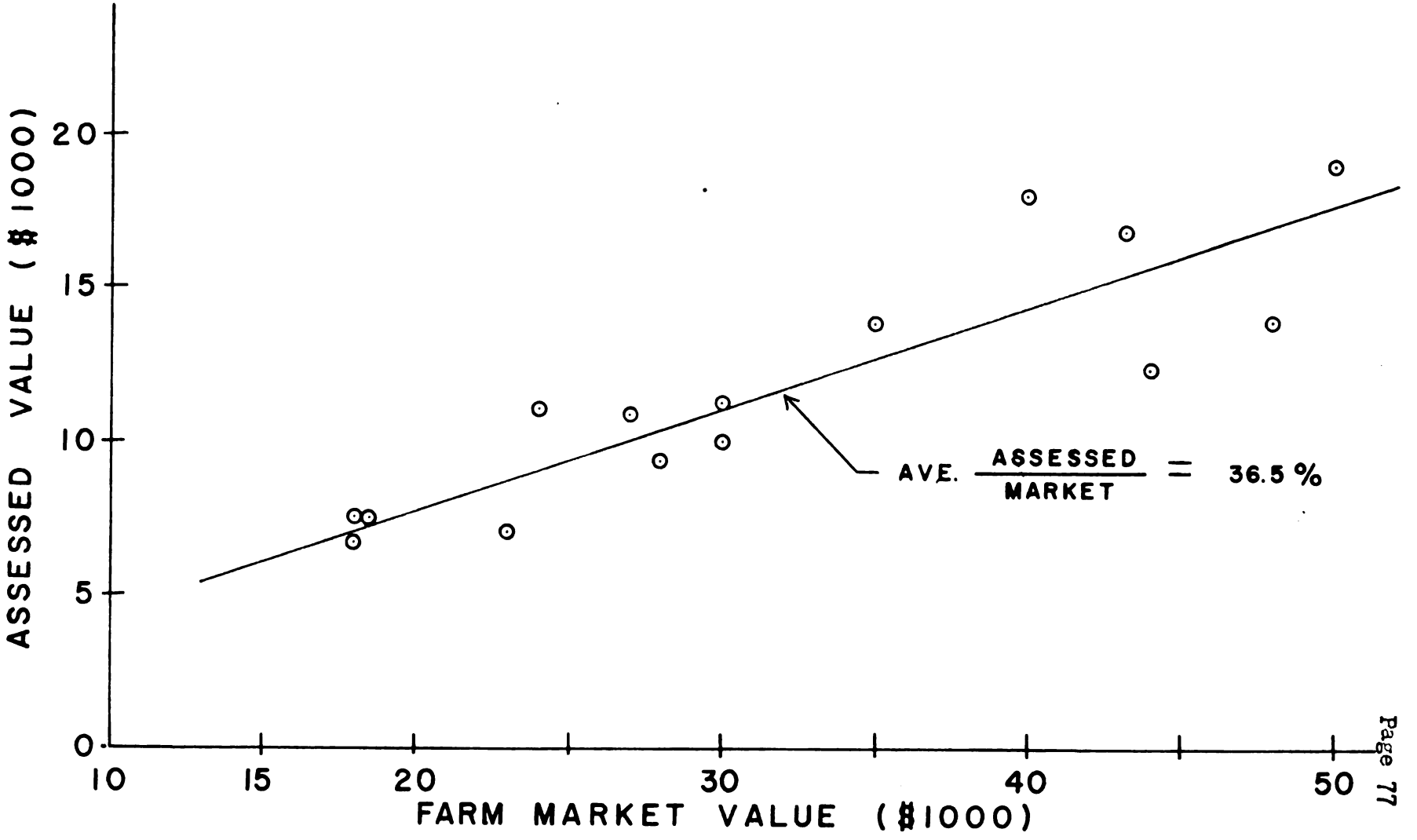


FIGURE 3. RELATION OF ASSESSED VALUE TO OWNERS ESTIMATE OF FARM MARKET VALUE ON 15 FARMS IN EATON COUNTY.

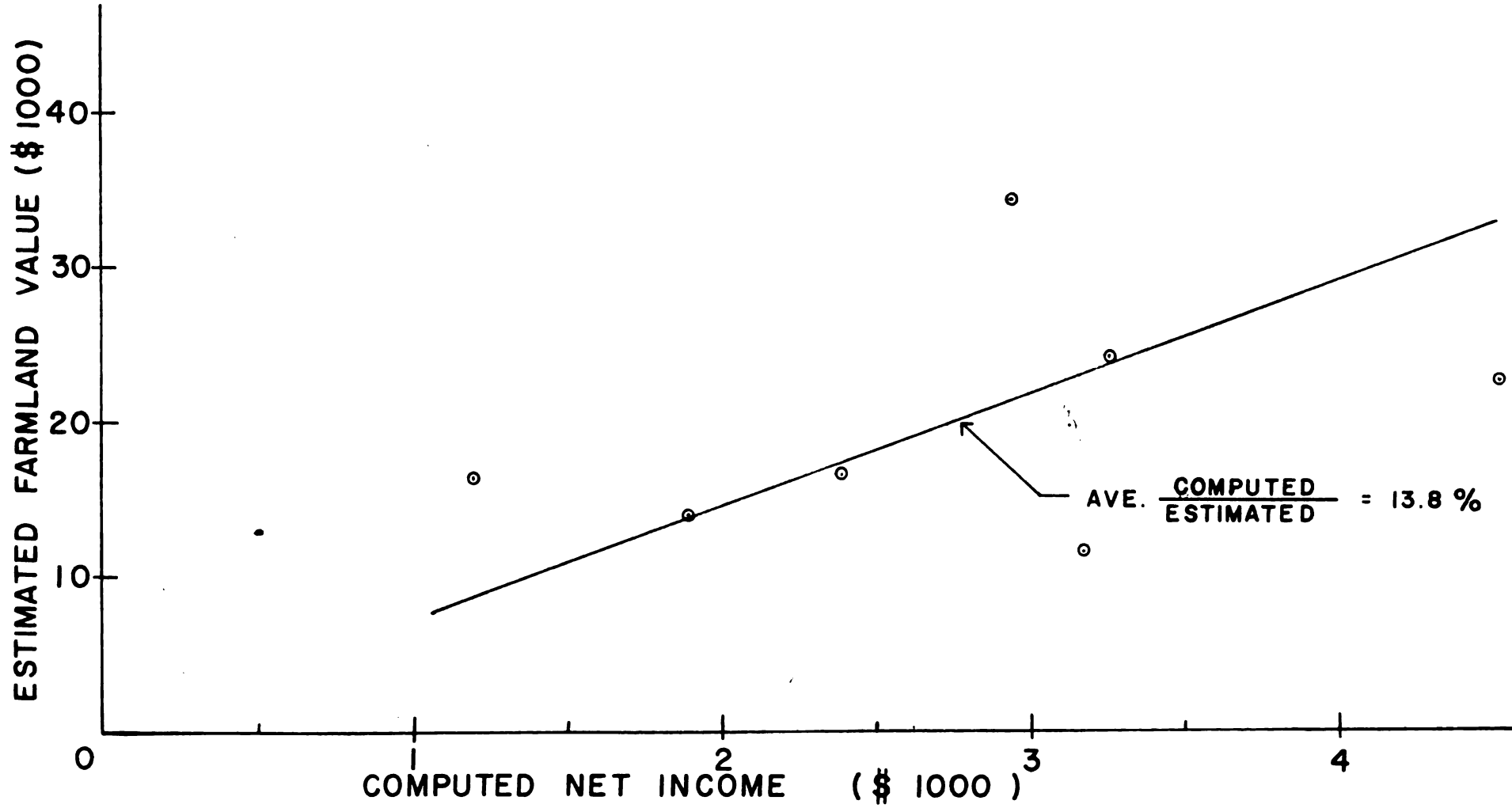


FIGURE 4. A GRAPH SHOWING RELATIONSHIP BETWEEN FARMERS ESTIMATED FARMLAND VALUE AND THE COMPUTED NET INCOME.

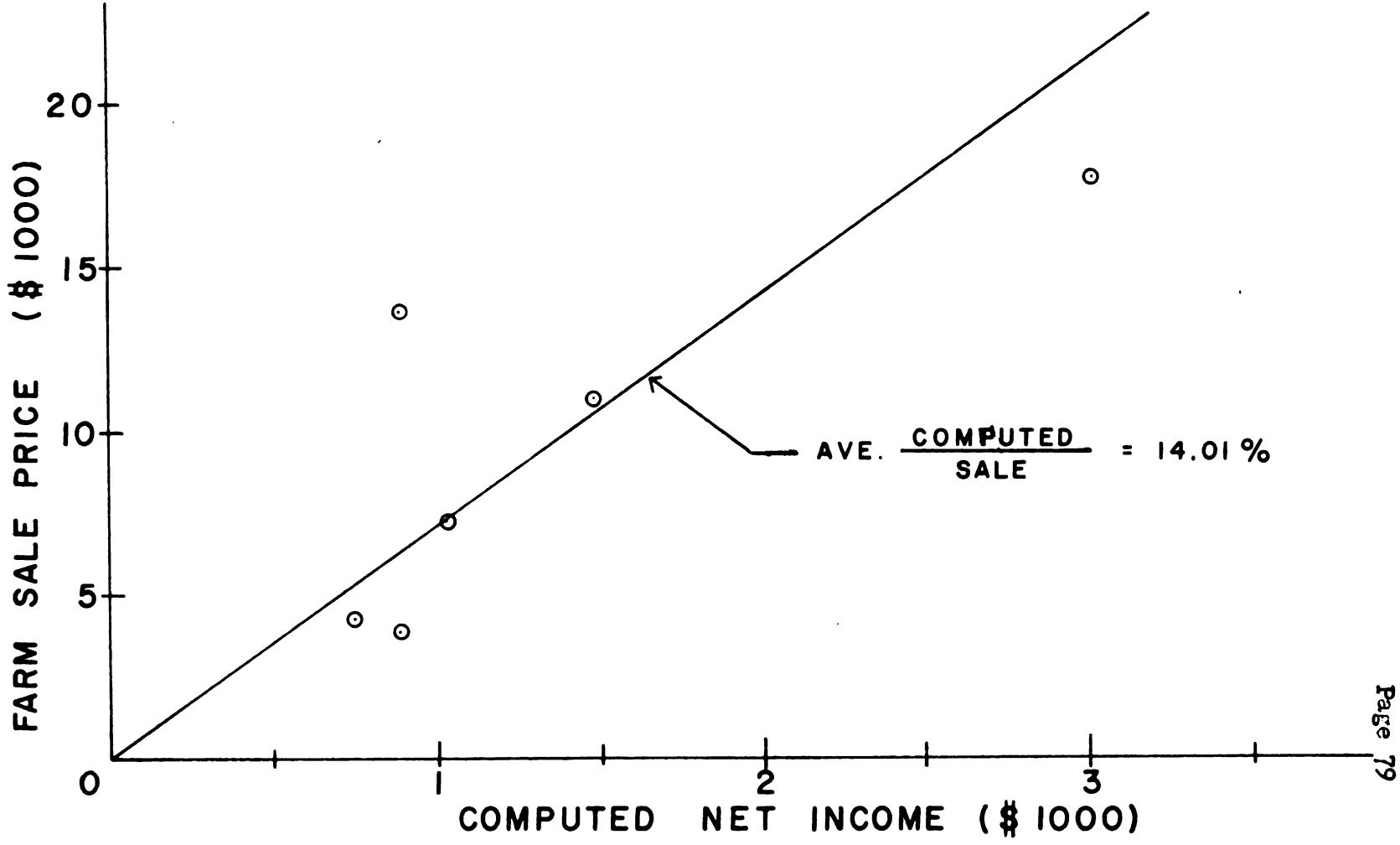


FIGURE 5. A GRAPH SHOWING RELATIONSHIP BETWEEN COMPUTED NET INCOME AND SALE PRICE OF THE LAND ON SIX UNIMPROVED PROPERTIES IN EATON COUNTY.

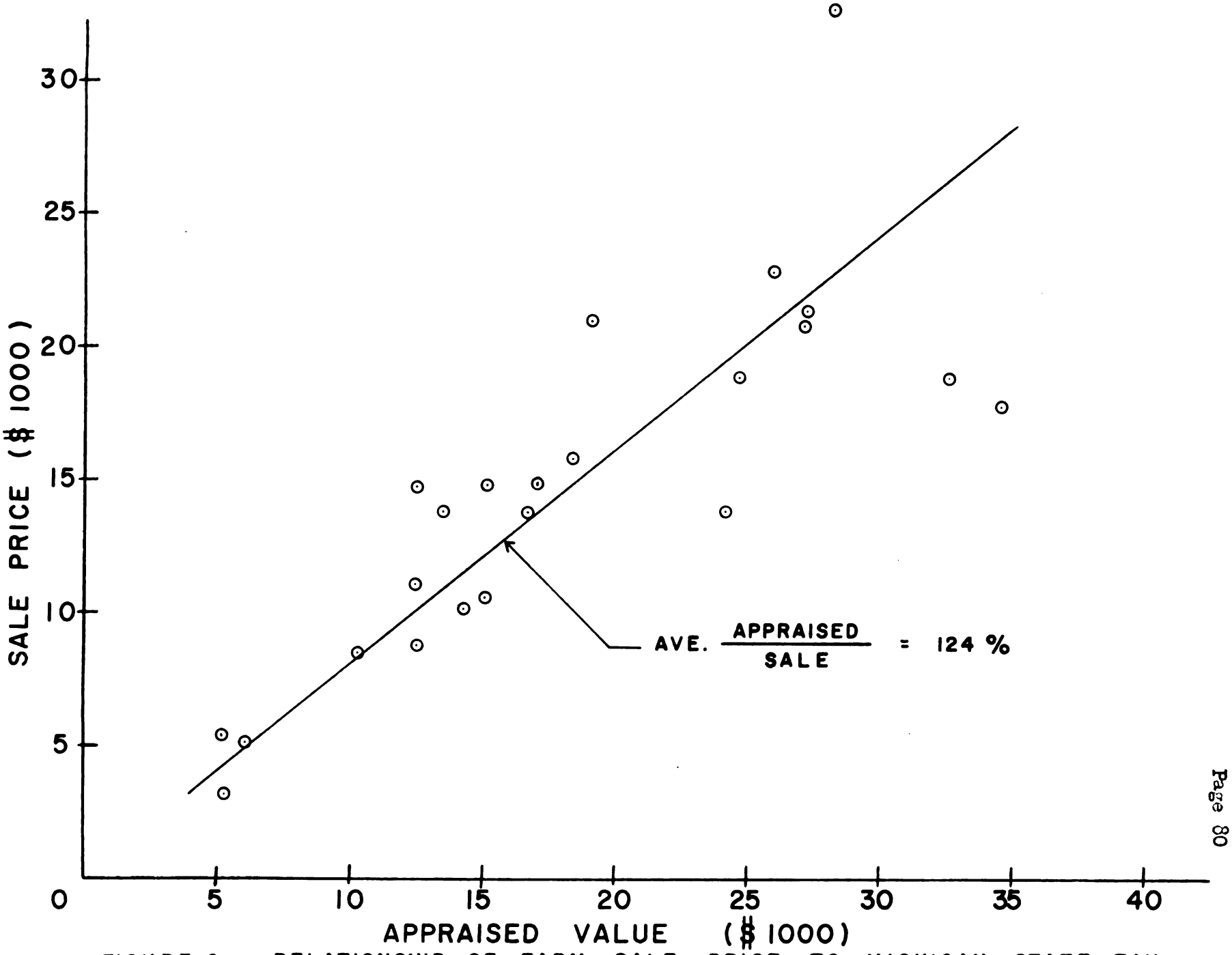


FIGURE 6. RELATIONSHIP OF FARM SALE PRICE TO MICHIGAN STATE TAX COMMISSIONS' APPRAISED FARM VALUE ON 23 FARMS IN EATON CO.

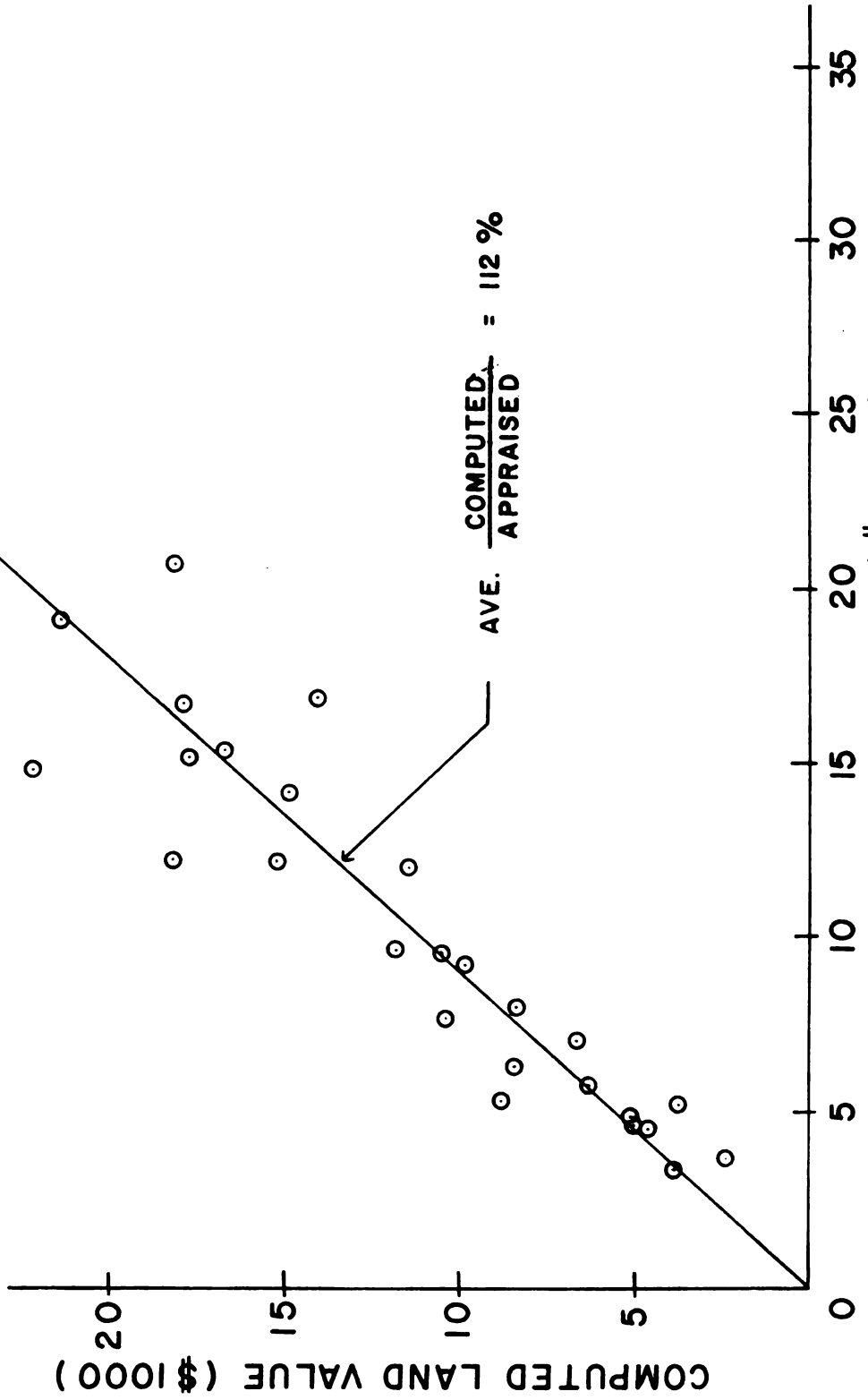


FIGURE 7. A GRAPH SHOWING RELATIONSHIP BETWEEN COMPUTED LAND VALUE AND MICHIGAN STATE TAX COMMISSION'S APPRAISED LAND VALUE ON 26 FARMS IN EATON COUNTY.

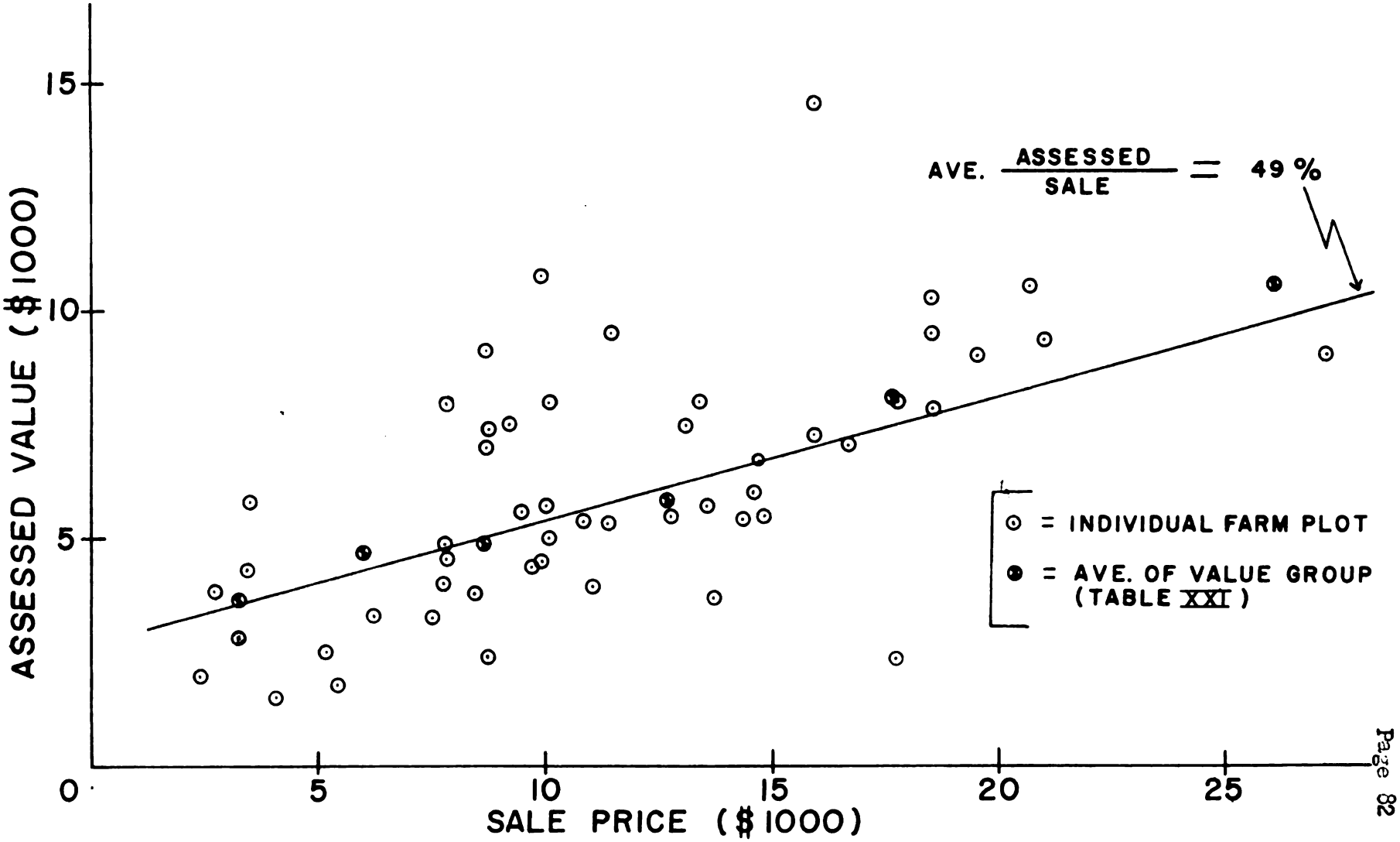


FIGURE 8. RELATIONSHIP OF ASSESSED VALUES TO SALE PRICE ON 99 FARMS IN EATON COUNTY, MICHIGAN. (52 FARMS PLOTTED)