A STUDY OF THE RELATIONSHIPS BETWEEN SOME SOIL PROPERTIES, ABILITY OF FARMERS, NUMBER OF ANIMAL UNITS CARRIED, AND CROP YIELDS ON ST. CLAIR COUNTY FARMS

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L. W. Buxton

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INTRODUCTION

The purpose of this study is to determine the effect of soil type, ability of farmer, number of animal units, and percent of organic matter in the soil on crop yield, under conditions prevailing on the farms of the low income group of farmers. The data concerning crop yields and numbers of livestock have been compiled from farm records of farmers who have loans with the Farm Security Administration in St. Clair County.

To find the relationship of soil type, ability of farmer, number of animal units and condition of buildings to crop yields, it was necessary to have some definite rating as to the productivity of each farm. Therefore, the crop yields for corn, oats and wheat have been taken. As more than one crop yield was used, it was necessary to place these crop yields on a ratio, or percentage basis. This is called a crop index. The crop indexes may be averaged to obtain a farm index.

To study the value of the crop index in this thesis, it was compared with other available farm ratings. Because the crop index is also used in farm appraisal and farm management studies, it was thought that the comparisons might be of value in these fields.

The crop indexes and farm ratings were used: To determine the effect of soil type and of the skill of the farmer on yields; to find if a certain type of farmer was located on a certain soil type; to study the effect of the number of animal units on the soil productivity; and to determine the effect that soil productivity has on the condition of buildings.

For a further analysis of soil productivity, the percentage of soil organic matter and degree of soil acidity were obtained for the low-yield farms and the high-yield farms on certain soil types. From the data on soil organic matter content a comparison was made of the ignition and carbon-chain methods of determining this constituent. Also the relationship of the yield of oats to the percentage of soil organic matter and degree of soil acidity was considered, together with the effect of the number of animal units on the percentage of organic matter in the soil.

REVIEW OF LITERATURE

Bousman (1) found that the type of buildings gave a fair indication of the quality of soil, providing agriculture had been carried on in that area for a sufficient time to allow trial-and-error adjustments to take place.

The study by Bonsteel, (2) is based on the assumption that farmers over a period of time will grow the crop best suited to the kind of soil being used. In conclusion he states that the assumption generally was found to be true.

An investigation carried on by Brown and Eke (3) in the Minidoka Irrigation Project led to the following conclusions: Soil types influenced the kind of crops grown; tenants tended to grow cash crops more extensively and the return per acre was less than in the case of owner operators; tenants operated larger farms than owners, especially on poorer soil; the average yields obtained by tenants were lower than those of owner operators on heavy soil by 8.4 percent, and on sandy soils by 12.6 percent; tenants had one third less livestock than owner operators; where tenancy was relatively stable the yields were much higher in comparison to those of owner operators than where tenancy was unstable; and owner operators had a higher investment in farm equipment than tenants.

Neither soil type nor soil texture affected the concentration of calcium or magnesium in alfalfa, green beans or peas in any definite manner according to Fonder (6,7,8). There was found to be a relationship between the calcium content of the soil and calcium content of the green bean plants.

Gustafson (9) made a detailed study of the size of farms, crops grown, amount of pasture and woods, number and kind of livestock and farm practices used on each main type of soil in Cayuga County, New York.

The soil in Montgomery County, New York, was divided into four groups according to its present use and its best use in the future. Hill and Blanch (11) concluded that the poor classes I and II were better for forestry and recreation than for agriculture.

The formulas used to calculate the coefficient of correlation and coefficient of contingency were taken from Love (12). Love stated that the coefficient of contingency may be used the same as the coefficient of correlation for practical purposes.

It was shown by McCool and Weldon (13) that the soil type affected the percent of phosphorous in the plant to a certain extent. The application of phosphorous to the soil also affected the percent of this element in the plant.

According to Paden (15) the soil type does affect the number and activity of microorganisms in loessial Clyde clay loam as compared to Muscatine silt loam.

Pasco (16) in studying the relationship between soil type and use of land in southern Michigan concluded that: Forest, brush and pasture were most common on Griffin loam, Carlisle muck and Rifle peat soils; that idle land was found most on sand soil especially Bridgman sand; alfalfa was largely limited to well drained soils regardless of fertility or texture; beans were associated with the more fertile soils as Brookston, Wisner, and Thomas types; beets were grown on the same soils as listed for beans but also included burned muck; truck and special crops were associated with sandy, well drained soils and organic soils; wheat was grown mostly on Hillsdale loam, Miami loam and heavier soils; orchards were most common on the rolling, well-drained soils as the Coloma, Bridgman and Plainfield sands.

In the bulletin "Utilization of lands in West Virginia" (17) it was stated that the four main factors affecting the "operators land-labor income" were type of soil, topography, size of farm and personal characteristics of the operator. Yet if soil and topography were both unfavorable the "operator land-labor incomes" were, with few exceptions low, regardless of the personal characteristics of the farmer.

Veatch and Schneider (18) give certain criteria for the rating of agricultural land as the net income from land, money value of agriculture products, measured yield of crops, selling price of land, values assessed for taxation purposes, value of farm buildings, and

physical character of the land. There are various major objections to each of these ratings when used alone, but the conclusion was, that the best rating could be arrived at by combining as many of the criteria as possible.

PROCEDURE

In order to discover relationships between soil type, skill of farmer, number of animal units, kind and condition of buildings, percent of soil organic matter, degree of soil acidity and crop yields, data relative to these matters were obtained from seventy-five farms in St. Clair County for the years of 1939 and 1940. The data on crop yields and number of animal units were taken either from the account books kept by Farm Security Administration borrowers or obtained directly from the farmer himself. The soil types of each farm were obtained from the soil survey map of St. Clair County (4). The types* of farmer and types of building were classified by the writer on the basis of observation and judgment. To determine the percent of soil organic matter and degree of soil acidity, a sample of soil was taken from the definite soil types in fields where oats had been raised in the summer of 1939.

This study may be divided into three parts: First, to determine the correlation between various farm indexes; second, to compare these various indexes with the soil types, ratings of farmer, number of animal units and types of building; third, to compare the percent of soil organic matter to yield of oats and to number of animal units, and also to compare the soil pH to the yield of oats.

Farm indexes: Six different indexes were secured for each farm as recorded in table 3.

* "Types of Farmer" is the same as "rating of farmer"

The 1939 and 1940 indexes were made by dividing the yield per acre on each farm by the average yield of the county* (10) for each of three crops; corn, oats, and wheat. These percentages or indexes were then added and divided by three, giving the index for the farm. The year of 1939 was dry, causing low corn yields; the year 1940 was the opposite, being exceptionally wet. Approximately 5 percent of the crops were not harvested in 1940 due to the wet season. It, therefore, seemed necessary that this condition should be considered in making the index, in order to bring out the poorly drained soils and poor managerial ability. Thus, a crop index of 31 was assigned to crop failure and 50 to a crop with an apparently satisfactory yield, but not harvested on account of unfavorable weather conditions at harvest time.

Corn oats, and wheat were used for the index, as almost every farmer raises these crops and the yields may be secured much more accurately than those of many other crops. The yields of corn are the least accurate of the three, as some was fed in the bundle, and some placed in the silo, thus making an estimate of the corn yields necessary. Possibly corn yields should not have been used; yet, this crop may tend to show the quality of the soil and the managerial ability of the farmer better than wheat and oats, as these latter crops receive the early spring moisture.

The 1939-1940 index was made by an average of the 1939 and 1940 crop indexes. This was done to balance the dry year against the wet year, making a more accurate index for the farm.

The Agricultural Adjustment Administration index was taken directly from the (AAA) St. Clair County ratings for each farm.

* The average yield for the county was taken from special bulletin 206, Michigan State College.

Buxton's index was made by rating each farm either poor, fair, medium, good, high, or poor to fair, etc. This rating was made according to the observed productivity of the soil which included the kind of soil (clay, loam, or sand), the locality, and growth of crops. Even though each farm was rated without considering the recorded crop yields, it would be natural that the author would remember a farm having poor or excellent yields at the time visits were made to the farm. All farms of medium rating were given an index of 100, poor 75*, high 125; fair and good were given ratings equally in between the others adjacent to them. Due to this type of classification, many of the farms came out with the same index number.

The all average index consists of an average of the 1939-1940 average, the AAA index, and Buxton's index.

Correlation coefficients: The correlation coefficients of the various indexes were calculated[1] (12) and presented in table 4. When r exceeds the one percent point (this is determined by reference to

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* 75 used as the lowest index listed by the Agricultural Adjustment Administration; thus, 125 was used as the high, since poor was 25 below 100

1

$$r = \frac{\frac{\Sigma P}{N} - (c_x c_y)}{\sigma_x \sigma_y}$$

Fisher's table of values of r for different values of n) (5) the correlation is considered to be significant. Thus, the larger the correlation coefficient is, above the one per cent point, the greater is the correlation between the two values being correlated.

To compare the indexes to soil types, types of farmer, number of animal units, and types of building, each index was divided as nearly as possible into the high one-third, medium one-third, and low one-third groups.

Soil types: The type of soil that each farm was mostly composed of, was determined from the county Soil Survey Map of the year 1929 (4). The land description of each farm was marked out on the survey map. Then a transparent piece of celluloid which had been ruled off in squares of 1/16 inch was sized to cover an area of the farm. From this, the number of acres for each type of soil on the farm was determined. The number of acres for each type of soil was then divided by the total acres in the farm and the result multiplied by one hundred giving the percent of each type of soil. The farm was then placed under the type of soil having the largest percentage. If the farm was composed of several types of soil of about equal percentage, it was placed under the type of soil that the most crops were grown on, or into the type of soil which seemed to fit the farm best.

St. Clair County (4) has 19% of its acreage mapped as Conover silt loam, 11% Brookston,[1] 10% Napanee silt loam, 9% Allendale fine sandy loam, 7% Conover loam, 7% Berrien loamy fine sand, 4.7% St. Clair silt loam, 1.7% Macomb loam, 1.7% Jeddo[2]. This variation in the acreage of types of soils accounts partially for the unequal distribution of number of farms for each type of soil. In general, the number of farms under each type of soil in this study tends to correlate with the percentage of that soil in the county. About 50% of the farms are on Conover silt loam. This large percentage may possibly be accounted for by: First, the large mapped acreage of this soil in the county; second, many of the farms have a fair percentage of Brookston soils, yet the percentage of Conover silt loam is the larger and the farm is classed as Conover silt loam; third, perhaps the soil has become depleted to the extent that fair yields, or incomes can not be secured, thus, resulting in a low income family. In this study, there are few sand farms, due to the fact there are few farms loans in the sand area that lies adjacent to Port Huron. Much of this sand land will not support even a low income family.

The Conover silt loam farms were divided into two classes. The farms under the Conover silt loam (C2s) type have a heavy clay soil, light in color, (showing lack of organic matter) and are on the higher ground; therefore, these are more like a Napanee soil type than Conover silt loam. The farms under the Conover silt loam (Cs) type tend more towards a loam soil that is dark in color.

1 Includes Brookston loam, silt loam, and clay loam
2 Includes Jeddo silt loam and clay loam.

Rating of farmers: Each farmer was rated either good, medium, or poor. The qualifications for a good farmer were as follows; prompt care of farm duties, a suitable knowledge of the proper farm practices and the use of this knowledge, managerial ability and the ability to care for his family. The qualifications for a poor farmer were; not prompt in caring for farm duties, lack of knowledge of proper farm practices, poor managerial ability, and possibly poor care of the family. The medium farmer was one that seemed to be between the high and poor group.

Three separate ratings were made: August, 1939; January, 1941; and April, 1941; at the time each rating was made, no previous rating was reviewed. The farmer was then given a rating from the final average of these three ratings.

The ratings were expressed by numbers: 1 represented high, 2 medium, and 3 low. To secure an average of the three ratings, 1-, 2+, 2-, and 3+ were used. For example, a farmer rated high twice and medium once was given a rating of 1-. In case a farmer rated high once and medium twice his rating was 2+.

The number of farmers in the 1 and 2 ratings are about equal, but the 3 rating has a small number of farmers. The farmers were rated against each other, as low income farmers, not in comparison with other farmers. Possibly this accounts, partly, for the small number of farmers

rated as 3. (This means that all rated at 3 are very poor farmers.)

Rating of farm buildings: Each set of farm buildings was graded as excellent, good, fair, poor, and very poor, according to the author's personal observation. Buildings considered excellent were well painted, in fine condition, large enough for farm needs, and were conveniently arranged. Good buildings were in fair repair, and suitable for the needs of the farm. Buildings classed as fair were suitable for the needs of the farm, but needed some repairs, such as a roof for the barn. Buildings considered poor were in need of repair and were not entirely suitable to the needs of the farm. Very poor buildings are simply shacks.

In this study of farm buildings, it must be pointed out that only Farm Security Administration borrower's farms were used; therefore, this study cannot be used to show whether the type of building forecasts the productivity of soil, except for the 75 farms used. It must be noted that no Farm Security Administration borrowers were located on the poor sandy soils of St. Clair County. The opposite tendency is true that very few borrowers are on farms with excellent buildings. Therefore, this study tends to include only certain types of farm buildings and can not be used as a study of the relationship of soil productivity to all types of buildings for St. Clair County.

Determination of the percent of organic matter in the soil samples

taken: The percent of soil organic matter was determined by two methods - the ignition and carbon-chain. From these data, the soils were grouped according to the percent of organic matter to find the relationship of oat yields or number of animal units to soil organic matter content.

To determine the percent of organic matter in the soil samples taken, five types or groups of soils were selected; namely, Conover loam, Conover silt loam, Brookston*, Napanee silt loam and Allendale, Berrien, and Newton sands. Five high yielding farms and five low yielding farms for each soil type or group were selected for this part of the investigation[1].

Samples of soil were collected from the type of soil given, and not from the farm which was classified under a type of soil as in the previous part of this thesis.

The 1939 crop of oats was selected as the indicator of the soil fertility level of each field. The sample of soil was secured in 1940 from the field on which the oats were grown in 1939. In collecting the sample, a spade was used to dig out a small hole, with one straight side, to the depth of the surface soil (6-8 inches). Then a slice of soil about one inch thick, and to the depth of the surface soil was taken. This slice of soil was placed in a pail with five to six other slices from the field. The sample was then placed on a cloth for mixing. After a thorough mixing, a one-quart sample of it was taken and laid out on paper to dry.

* Brookston includes both silt loam and clay loam

1 It was possible to find only 3 Brookston and 4 Conover loam farms

After air drying, the soil was pulverized and screened.

These samples were analyzed for organic matter content by the ignition method and the carbon-chain method as previously mentioned.

Ignition method: The hygroscopic water was obtained by heating in an oven at 110° C for 24 hours. Then a sample of each soil was weighed and burned for 20 minutes in the muffle, electric furnace. The burned soil was again weighed. From these figures the percent of soil organic matter was determined.*

If the duplicate samples did not check within .3 of a percent, the sample was run over until there were duplicates that checked within .3 of a percent.

Carbon-chain method: A sample of approximately one gram of soil was weighed out. This was then mixed with aluminum oxide and manganese dioxide and the mixture placed in a heated tube which burned the organic matter, releasing the carbon or carbon dioxide. The carbon dioxide was absorbed by ascarite in an absorption tube which was weighed before and after the absorption of carbon dioxide. From these weights, the weight of carbon dioxide was obtained and percent of soil organic matter

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* $\frac{\text{Weight of soil}}{1 + (\% \text{ of moisture} \div 100)} = \text{Weight of oven dry soil}$

Weight of moist soil - weight of oven dry soil = Grs. of hygroscopic H_2O (g)

Wt. of soil before burning - Wt. of hygroscopic water (g) = Loss due to organic matter

$\frac{\text{Loss due to organic matter}}{\text{Weight of oven dry soil}} \times 100 = \%$ of organic matter

determined.*

The determinations were repeated until duplicates checked within .4 of a percent. (Five samples checked between .3 to .4 of a percent, all others checked within .3 of a percent or lower.)

Method of testing soils for pH: The soil samples were tested for pH by the Soiltex method. Each sample of soil was tested twice to check against possible error.

Coefficient of contingency: Table 28 presents the coefficients of contingency as calculated[1] (12) and also r at the 1 per cent point (5). According to Love (12) the coefficient of contingency may be used the same as r as far as practical purposes are concerned.

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* $$\frac{\text{Wt. of } CO_2 \times \frac{C \text{ (atomic wt.)}}{CO_2 \text{ (atomic wt.)}} \times 1.72}{\text{Wt. of sample}} = \% \text{ of organic matter}$$

1 $C_1 = \sqrt{\frac{s - n}{s}}$

n = number of individuals

s = sum

DISCUSSION

In this thesis it must be understood that more factors are usually involved than those actually given in a comparison. For instance, in finding the relationship of soil type to crop indexes, these other factors also enter in: The skill of farmer, the weather, and many others. Therefore, it must be expected that the results obtained in many of the relationships studied will show only a tendency in a certain direction.

Correlation of the various farm indexes: From Table 4 it is found that all indexes as compared to another are significant, except the 1939 crop index and 1939-1940 average crop index as compared with the AAA index. Buxton's index as compared with the 1939 crop index, and 1939-1940 average crop index gives a fairly high correlation. Thus, the farms rated by Buxton's index* were more nearly rated like the crop indexes than any of the other indexes. The 1939 crop index as compared to the 1940 crop index shows some correlation, even though the two seasons had opposite weather conditions. The summer of 1939 was hot and dry, but 1940 was cool and exceptionally wet. The Buxton index and AAA index of these farms compared more closely than the AAA index and crop indexes. The AAA index and Buxton index were averaged together and compared to the 1939 crop index and the 1939-1940 average crop index to find if several indexes combined would give a better correlation. It is found that this

* It must be noted that Buxton collected the data on yields, which may have influenced his farm index ratings.

method gives a correlation coefficient that is significant in all instances. Therefore, according to these results, a farm may be given a truer rating by using more than one index, since it lessens the chance of using an index that shows little correlation.

A comparison of soil types with farm indexes: In classifying the farms as to productivity according to soil types in Tables 5 to 10, the Conover loam stands out as the best soil in every index.

The Conover silt loam is divided about equally from high to poor, both for the Cs and C2s types.

The Napanee silt loam shows a definite soil quality of medium to poor.

The Allendale fine sandy loam is about medium in quality according to the tables.

In the other soils, not enough farms are listed to give any weight to their classification.

From Table 28 it may be stated that a definite relationship exists between soil type and farm index.

Comparison of rating of farmer with farm indexes: From this study, Tables 11 to 16, there is a tendency for the grade 1 farmers to be on the best farms and the grade 2 and 2- farmers to be on the medium to poor farms.

The Coefficient of Contingency in Table 28 is quite similar for all indexes, tending to show that a correlation exists between the rating of farmer and farm index value. This may be the result of a farmer residing

on a good farm, a good farmer selecting the best farm, or the good farmer may secure higher yields thus giving a better index rating.

Comparison of rating of farmer with soil type : Tables 17 and 18 were prepared to find the relationship between soil type and rating of farmer. In this manner it might be shown if there were a difference between the relationship of farm index to rating of farmer, Tables 11 to 16, or soil type to rating of farmer. According to the coefficient of contingency, Table 28, there is not nearly as great a correlation between farm index and rating of farmer as between soil type and rating of farmer. From the results in Tables 17 and 18 it may be stated that the best rated farmer tends to be on the better soil type.

Relationship of number of animal units to farm indexes: The number of animal units (14) are about the same, according to the Tables 19-22, on farms in each of the high, medium, and low quality classes of soil as determined by farm indexes. However, there are a few more farms on high quality soil with a large number of animal units than there are on low quality soil. This is probably due to the high quality of soil being able to support more animal units per acre, and may not be the result of more animal units placing the farm in a higher class. Most of these farms are rented, which means a change of tenants every few years; thus, the present amount of livestock might not affect the present quality. Quite often, the livestock units on a farm are determined by the number of units the farmer owns. This may be shown in the 2 low quality farms, in the all

average index, having 21 to 24 units of livestock. Both farms have 120 acres. This means these farms are of only average size which does not warrant the large number of animal units in relation to its productivity.

Yet, according to the values of the Coefficients of Contingency, Table 28, there is a tendency for the number of animal units to correlate with the index value of the farm.

From Table 28, it may be stated that the soil type tends to affect the making of a higher farm index, or farm productivity rating, more than the type of farmer or number of animal units.

Relationship of type of buildings to the all average farm index: The correlation of contingency as calculated for Table 23 shows a small relationship between condition of building and farm index.

Results obtained from the study of percent of organic matter in soils and soil types: According to the data presented in Table 24, the ignition method gave an average of 1.83 percent of organic matter higher than the carbon dioxide method.

The Conover loam and Brookston* soils had a higher percentage of organic matter than the Conover silt loam, Napanee silt loam, and sand soil types.

With the Conover silt loam the percent of soil organic matter for high and low yielding soils was approximately the same according to the

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* Brookston includes both silt loam and clay loam

results of the ignition method. However, with the carbon dioxide method the high yielding soils had the highest percentage of soil organic matter. The converse was true in the case of the Brookston soil.

The difference in the percent of soil organic matter of the high and low yielding Napanee silt loam was too small to be of any significance regardless of the method used. The same situation was found in regard to the sandy soils.

Relationship of percent of soil organic matter to yields: In Table 26 the 46 farms were divided according to the percent of soil organic matter into the high one-third, medium one-third, and low one-third groups. The groups were then classified according to crop yields. From this grouping there is a tendency for the soils with the highest percent of soil organic matter to correlate with the soils having the highest yields.

Relationship between number of animal units and percent of soil organic matter: According to the coefficient of contingency, Table 28, as worked out for Table 26, there is a high correlation between percent of soil organic matter and number of animal units. In other words, the larger the number of animal units, the higher the percentage of organic matter.

Relationship of pH to soil productivity: The Conover loam and Brookston soils have the highest pH according to Table 27.

The Conover silt loam, Napanee silt loam, and sandy soils are somewhat similar in pH values.

The Conover silt loam, Conover loam, and sandy soils tend to have a higher pH on the high yielding soils.

The Napanee and Brookston soils show little difference in pH between the high and low yielding soils.

A relationship between yield and soil acidity is indicated by the coefficient of contingency.

CONCLUSION

1. It was found that a higher correlation existed between Buxton's index and the crop indexes than between crop indexes and the AAA ratings. In general, the combination of several indexes may give a truer correlation than one index. The various farm indexes tend to correlate with each other, but not to an extent that any two indexes will prove that one farm may be measured as so much more productive than another farm.

2. Each index evaluated the Conover loam soil as the best. The Conover silt loams ranged from high to poor. The Allendale soil tended to show medium quality. The Napanee soil was medium to poor. There were not enough samples of the other types of soil to give any evaluation.

3. There was a tendency for the best farmer to be on the better farm, but the medium farmer might be on either a medium or poor farm.

4. The correlation between number of animal units and quality of soil was small.

5. There is a low correlation between quality of soil and type of buildings.

6. The ignition method gave a higher percentage of organic matter in the soils than did the carbon dioxide method.

7. The Conover loam and Brookston soils on the average gave the highest percent of organic matter by both methods.

8. The ignition method gave the high yielding soils of the Conover loam and Brookston types the larger percent of organic matter, the Conover silt loams and sands had about the same amount of organic matter

for both high and low yielding soils. The Napanee low yielding soils had a slightly higher percent of organic matter than the high yield soils.

9. The carbon dioxide method gave the high yielding soils of the Conover silt loam, and Conover loam the greater percent of organic matter. The high and low yielding soils of the Brookston and sand soils are about the same in organic matter content. The Napanee low yielding soil had a little higher percent of organic matter than the high yielding soil, but probably not enough to be of significance.

10. There is some correlation between the soils having the highest percent of organic matter and those having the highest yields.

11. According to this study there is a fair correlation between the number of animal units and the percent of organic matter in the soil.

12. Some relationship was found between soil pH and crop yield.

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Table 1. - The percentage of soil types on each farm.

No. of Farm	Acres per Farm	Soil Types																									
		Af	Be	Bf	Bn	Bm	Bc	Cy	Cm	Cl	Cs	Ff	Gf	Gl	Gn	Jl	Js	Mb	Ns	Nf	Of	Pf	Sl	Wy	B	Gp
1	140		25										18		12							*40	5			
2	70				27	21								19					*33							
3	120					20					*80															
5	40			5							5				27						*57		5			
6	80			*66												30			4							
7	120			*72						4								7				17				
9	150					33					*66															
10	62	6									26							*36				28		2		
11	80		9								*86				4											
12	120									*81				1	1								16			
14	80										*87				12											
16	120			50													*50									

Table 1. - The percentage of soil types on each farm

No. of Farm	Acres per Farm	Soil Types																										
		Af	Be	Bf	Bn	Bm	Bc	Cy	Cm	Cl	Cs	Ff	Gf	Gl	Gn	Jl	Js	Mb	Nf	Ns	Of	Pf	Sl	Wy	B	Gp
18	160					1					*54													42	1	
19	80																*79	6		15						
20	70	*34													34					31						
22	120																45			*55						
23	80										*95							5								
24	120					36					*64															
25	47					4					*96															
26	80																			*100						
27	120																41			*59						
28	80										32												*18		50	
29	66			*77		3												20								
30	120					32					*68															

Table 1. - The percentage of soil types on each farm.

No. of Farm	Acres per Farm	Soil Types																											
		Af	Be	Bf	Bn	Bm	Bc	Cy	Cm	Cl	Cs	FF	Gf	Gl	Gn	Jl	Js	Lb	Ns	Nf	Of	Pf	Sl	Wy	B	Gp
31	80										* 100															
33	120					36					* 63															
34	80					4					* 96															
35	162	* 37													54				9							
36	80					33					* 66															
37	70	51		49																*						
38	120										* 100															
39	119							33	2	* 65																
41	80			2											6	21			* 70							
42	80			12				1								* 64			8		15					
43	80									* 72													28			
44	80										* 100															
45	80			9							* 91															

Table 1. - The percentage of soil types on each farm.

No. of Farm	Acres per Farm	Soil Types																									
		Af	Be	Bf	Bn	Bm	Bc	Cy	Cm	Cl	Cs	Ff	Gf	Gl	Gn	Jl	Js	Mb	Ns	Nf	Of	Pf	Sl	Wy	B	Gp
46	98					39					*61															
48	140	32									*50											18				
49	72	19	19												6				*54							
50	120			25																			*75			
51	167	*32	3												20				28					17		
54	80	*41	11			14													11					22		
55	80										*48														36	16
56	160			28							*64							8								
57	100									*100																
58	186	5.9				1	9.1												*83.8							
59	80	8																	*92							
60	80								75	*25																
61	120										*100															

Table 1. - The percentage of soil types on each farm.

No. of Farm	Acres per Farm	Soil Types																									
		Af	Be	Bf	Bn	Bm	Bc	Cy	Cm	Cl	Cs	Ff	Gf	Gl	Gn	Jl	Js	Mb	Ms	Nf	Of	Pf	Sl	Wy	B	Gp
62	80										*100															
65	140	4														8	23		*64							
67	120					29					*71															
68	40			25														*75								
70	80									*77		23														
72	117					8					*92															
74	59	*45				50													5							
75	120	*69				28																		3		
76	100				7	15				29	*10				35					4						
77	120					19					*81															
80	60		15				*85																			
81	120					43					*57															
82	120						*100																			

Table 1. - The percentage of soil types on each farm.

No. of Farm	Acres per Farm	Soil Types																										
		Af	Be	Bf	Bn	Bm	Bc	Cy	Cm	Cl	Cs	Ff	Gf	Gl	Gn	Jl	Js	Mb	Ns	Nf	Of	Pf	Sl	Wy	B	Gp
83	80					16					*84															
84	80																		*100							
85	120					12					*88															
86	140					11					*86							3								
88	80					*56					22														22	
91	200									26					13						10		*50			
93	80																46		*54							
95	80			40		26				*8															26	
96	80												9					*91								
97	40										*100															
98	59										*100															
101	120				17					*83																

* For comparitive purposes the farm was placed in this soil type.

Table 2. - Legend: Name of soil types and symbols used in Table 1.

Af	Allendale fine sandy loam
Be	Berrien loamy fine sand
Bf	Berrien fine sandy loam
Bn	Bono clay
Bm	Brookston silt loam
Bc	Brookston clay loam
Cy	Clyde loam
Cm	Carlisle muck
Cl	Conover loam
Cs	Conover silt loam (Light phase)
C2s	Conover silt loam (Heavy phase)
FF	Fox fine sandy loam
Gf	Genesee fine sandy loam
Gl	Gilford loam
Jl	Jeddo silt loam
Js	Jeddo silty clay loam
Lb	Lacomb loam
Ns	Napanee silt loam
Nf	Newton loamy fine sand
Of	Oshtemo loamy fine sand
Pf	Plainfield fine sand
Sl	St. Clair silt loam
Wy	Wauseon fine sandy loam
B	Burned muck
Gp	Green wood peat
Gn	Griffin loam

Table 3. - A comparison of soil types, index ratings, rating of farmer, number of animal units, and type of buildings of the farms studied.

No. of Farm	Soil Type	1939 Index	1940 Index	Av. of 1939-40 Index	Buxton's Index	AAA Index	Av. of 1939-40 Buxton & AAA Index	Rating of Farmer	No. of Animal Units	Type of Bldgs.
1	Pf	31	94	63	75	81	73	1-	20	Good
2	Ns	103	132	118	81	112	104	1	19.6	Good
3	C2s	62	84	73	81	98	84	3+	25.4	Fair
5	Of	62	93	78	88	92	86	1-	8.3	Fair
6	Bf	75	109	92	88	101	94	2	20.3	Fair
7	Bf	107	101	104	88	111	101	1-	18.6	Good
9	C2s	113	118	117	100	106	108	2-	17.7	Poor
10	Mb	111	103	107	88	103	99	1-	17.2	Fair
11	Cs	141	58	100	113	110	108	2+	19	Fair
12	C1	100	121	111	113	110	111	2	13.5	Fair
14	Cs	81	101	91	100	95	95	1-	15	Good
16	Js	65	137	101	100	101	101	2-	18	Fair
18	C2s	48	52	50	75	81	69	3+	11.6	Fair

Table 3. - A comparison of soil types, index ratings, rating of farmer, number of animal units, and type of buildings of the farms studied.

No. of Farm	Soil Type	1939 Index	1940 Index	Av. of 1939-40 Index	Buxton's Index	AAA Index	Av. of 1939-40 Buxton & AAA Index	Rating of Farmer	No. of Animal Units	Type of Bldgs.
19	Js	51	116	84	100	111	98	2+	13.9	Good
20	Af	156	104	130	100	88	106	1	15.8	Good
22	Ns	45	111	78	94	96	89	3+	21.5	Fair
23	Cs	113	94	104	113	109	109	2	18	Fair
24	C2s	107	137	122	107	111	113	2	10.6	Fair
25	Cs	45	106	76	113	98	96	3	15	Fair
26	Ns	109	133	121	100	114	112	1	13	Fair
27	Ns	77	115	115	94	95	101	2+	15.1	Good
28	Sl	115	104	91	88	100	93	2	11.2	Good
29	Bf	122	86	104	100	106	103	1-	15	Good
30	C2s	82	70	76	100	113	96	1	20.7	Excell-ent
31	Cs	114	129	122	113	104	113	1-	11.5	Fair
33	Cs	65	46	56	106	93	85	2	17.8	Good

Table 3. - A comparison of soil types, index ratings, rating of farmer, number of animal units, and type of buildings of the farms studied.

No. of Farm	Soil Type	1939 Index	1940 Index	Av. of 1939-40 Index	Buxton's Index	AAA Index	Av. of 1939-40 Buxton & AAA Index	Rating of Farmer	No. of Animal Units	Type of Bldgs.
34	C2s	65	94	75	81	103	86	1	14.3	Fair
35	Af	112	116	114	100	101	105	2f	17.3	Good
36	C2s	38	62	50	81	115	82	2+	14.3	Very Poor
37	Nf	69	43	56	81	98	78	3	17.5	Fair
38	C2s	53	134	94	75	88	86	1	16.5	Fair
39	C1	140	154	147	125	109	127	2-	14	Good
41	Ns	117	146	132	88	101	107	2-	13.6	Fair
42	Js	119	141	130	106	111	116	2	15.1	Poor
43	C1	98	115	107	125	90	107	1	11.5	Good
44	C2s	107	177	142	100	94	112	2+	17.4	Poor
45	C2s	125	155	140	100	105	115	1	14.6	Poor
46	C2s	117	144	131	100	98	110	1	10.6	Very Poor
48	Cs	111	174	143	88	76	102	2+	21.5	Fair

Table 3. - A comparison of soil types, index ratings, rating of farmer, number of animal units, and type of buildings of the farms studied.

No. of Farm	Soil Type	1939 Index	1940 Index	Av. of 1939-40 Index	Buxton's Index	AAA Index	Av. of 1939-40 Buxton & AAA Index	Rating of Farmer	No. of Animal Units	Type of Bldgs.
49	Ns	97	134	116	88	93	99	2	12.5	Fair
50	Sl	124	112	118	94	100	104	1	13.6	Good
51	Af	102	147	125	88	98	104	2+	16	Fair
54	Af	68	59	68	81	94	81	2	6	Fair
55	Cs	89	98	94	88	93	92	2-	11.8	Fair
56	Cs	70	107	89	113	107	103	2+	26.3	Fair
57	Cl	150	155	153	125	113	130	1	16.82	Fair
58	Ns	81	77	79	94	96	90	2	15.6	Good
59	Ns	52	93	73	75	117	88	2+	11	Fair
60	Cl	133	141	137	113	109	120	1	15.8	Fair
61	C2s	80	75	78	100	112	97	3	14.3	Fair
62	C2s	96	105	101	100	105	102	1	17	Good
65	Ns	114	119	117	100	101	106	2	15.6	Fair

Table 3. - A comparison of soil types, index ratings, rating of farmer, number of animal units, and type of buildings of the farms studied.

No. of Farm	Soil Type	1939 Index	1940 Index	Av. of 1939-40 Index	Buxton's Index	AAA Index	Av. of 1939-40 Buxton & AAA Index	Rating of Farmer	No. of Animal Units	Type of Bldgs.
67	C2s	69	81	75	100	111	95	2+	14.3	Fair
68	Mb	78	91	85	100	101	95	2+	13.3	Fair
70	C1	139	101	120	125	126	124	2+	24.6	Fair
72	C2s	163	66	115	106	106	109	2+	13.6	Excell-ent
74	Af	75	169	122	88	98	103	1-	10.3	Fair
75	Af	119	191	155	100	106	120	1	24	Good
76	Cs	75	78	77	88	93	86	1	12.8	Good
77	Cs	115	136	126	113	91	110	2	22.3	Poor
80	Bm	135	128	132	100	88	107	1	13.6	Fair
81	Cs	112	52	82	106	100	96	2+	18.8	Good
82	Bm	136	143	139	113	99	117	1	16.8	Fair
83	C2s	64	133	99	94	103	99	2+	14.1	Good
84	Ns	73	114	94	100	96	97	2+	7.6	Fair

Table 3. - A comparison of soil types, index ratings, rating of farmer, number of animal units, and type of buildings of the farms studied.

No. of Farm	Soil Type	1939 Index	1940 Index	Av. of 1939-40 Index	Buxton's Index	AAA Index	Av. of 1939-40 Buxton & AAA Index	Rating of Farmer	No. of Animal Units	Type of Bldgs.
85	C2s	130	142	136	100	98	111	1-	17.3	Good
86	Cs	121	142	133	113	103	116	1	28.3	Good
88	Bm	169	166	168	125	117	137	1	13	Good
91	Sl	72	100	86	113	89	96	2	19	Good
93	Ns	103	128	116	100	116	111	1	16	Good
95	Cl	76	93	85	106	112	101	1	23	Fair
96	Mb	59	91	75	106	101	94	2	15	Poor
97	C2s	94	31	63	75	89	76	3	5	Fair
98	Cs	138	150	144	113	112	123	2	16.05	Good
101	Cl	143	101	122	113	110	115	1	29	Good

Table 4. - Correlation coefficients between indexes

Indexes	r*
1939 Crop Index Compared to the 1940 Crop Index	.3897
1939 Crop Index Compared to the AAA Index	.2862
1939 Crop Index Compared to the Buxton Index	.5527
1939 Crop Index Compared to the Average of AAA-Buxton's Index	.5249
1939-1940 Average Crop Index Compared to AAA Index	.2070
1939-1940 Average Crop Index Compared to Buxton's Index	.5088
1939-1940 Average Crop Index Compared to Average of AAA-Buxton's Index	.4531
AAA Index Compared to Buxton's Index	.3999

* r (1% point) = .3017
  r (5% point) = .2319

Table 5. - Correlation of 1939 crop index to soil types

Index value of farm	Number of farms	Soil Types											
		Cl	Bm	Js	Cs	C2s	Ns	Sl	Mb	Newton Sand	Af	Bf	O.S.L. & Pf
High	25	5	3	1	5	4	2	2			2	1	
Middle	25	2			5	7	6		2		2	1	
Low	25	1		2	4	7	3	1	1	1	2	1	2
Number of farms	75	8	3	3	14	18	11	3	3	1	6	3	2

Table 6. - Correlation of 1940 crop index to soil types.

Index value of farm	Number of farms	Soil types												
		Cl	Bm	Js	Cs	C2s	Ns	Sl	Mb	Newton Sand	Af	Bf	O.S.L. & Pf	
High	25	3	2	2	4	7	4				3			
Middle	25	4	1	1	4	2	5	3	1		2	2		
Low	25	1			6	9	2		2	1	1	1		2
Number of Farms	75	8	3	3	14	18	11	3	3	1	6	3		2

Table 7. - Correlation of the 1939-1940 average crop index to soil types.

Index value of farm	Number of farms	Soil Types												
		Cl	Bm	Js	Cs	C2s	Ns	Sl	Mb	Newton Sand	Af	Bf	O.S.L. & Pf	
High	25	5	3	1	5	5	2				4			
Medium	25	2		1	4	5	6	2	1		1	3		
Low	25	1		1	5	8	3	1	2	1	1		2	
Number of farms	75	8	3	3	14	18	11	3	3	1	6	3	2	

Table 8. - Correlation of AAA index to soil types.

Index value of farm	Number of farms	Soil types												
		Cl	Bm	Js	Cs	C2s	Ns	Sl	Mb	Newton Sand	Af	Bf	O.S.L.	& Pf
High	24	7	1	2	4	5	4					1		
Medium	26		1	1	3	7	2	2	3	1	4	2		
Low	25	1	1		7	6	5	1			2			2
Number of farms	75	8	3	3	14	18	11	3	3	1	6	3		2

Table 9. – Correlation of Buxton's index to soil types

Index value of farm	Number of farms	Soil types												
		Cl	Bm	Js	Cs	C2s	Ns	Sl	Mb	Newton Sand	Af	Bf	O.S.L. & Pf	
High	25	8	2	1	10	2		1	1					
Medium	22		1	2	1	9	4		1		3	1		
Low	28				3	7	7	2	1	1	3	2	2	
Number of farms	75	8	3	3	14	18	11	3	3	1	6	3	2	

Table 10. - Correlation of all average index to soil types.

Index value of farm	Number of farms	Soil types												
		Cl	Bm	Js	Cs	C2s	Ns	Sl	Mb	Newton Sand	Af	Bf	O.S.L.& Pf	
High	25	6	2	1	6	7	2				1			
Medium	24	2	1	2	2	3	6	1	1		4	2		
Low	26				6	8	3	2	2	1	1	1	2	
Number of farms	75	8	3	3	14	18	11	3	3	1	6	3	2	

Table 11. - Correlation of 1939 crop index to rating of farmer

Index value of farm	Number of farms	Ratings of farmer						
		1	1-	2+	2	2-	3+	3
High	25	12	3	3	5	2		
Middle	25	6	3	7	5	2		2
Low	25	4	3	7	5	1	3	2
Number of farms	75	22	9	17	15	5	3	4

Table 12. - Correlation of 1940 crop index to rating of farmer

Index value of farm	Number of farms	Ratings of farmer						
		1	1-	2+	2	2-	3+	3
High	25	11	2	4	5	3		
Medium	25	7	4	6	5	1	1	1
Low	25	4	3	7	5	1	2	3
Number of farms	75	22	9	17	15	5	3	4

Table 13. - Correlation of the 1939-1940 average crop index to rating of farmer

Index value of farm	Number of farms	Ratings of farmer						
		1	1-	2+	2	2-	3+	3
High	25	12	3	4	4	2		
Medium	25	6	4	6	6	3		
Low	25	4	2	7	5		3	4
Number of farms	75	22	9	17	15	5	3	4

Table 14. - Correlation of AAA index to rating of farmer

Index value of farm	Number of farms	Ratings of farmer						
		1	1-	2+	2	2-	3+	3
High	24	9	1	7	5	1		1
Medium	26	8	4	6	4	3		1
Low	25	5	4	4	6	1	3	2
Number of farms	75	22	9	17	15	5	3	4

Table 15. - Correlation of Buxton index to rating of farmer

Index value of farm	Number of farms	Ratings of farmer						
		1	1-	2+	2	2-	3+	3
High	25	8	1	5	9	1		1
Medium	22	9	3	6	1	2		1
Low	28	5	5	6	5	2	3	2
Number of farms	75	22	9	17	15	5	3	4

Table 16. - Correlation of all average index to rating of farmer

Index value of farm	Number of farms	Ratings of farmer						
		1	1-	2+	2	2-	3+	3
High	25	11	2	4	6	2		
Medium	24	7	4	8	2	2		1
Low	26	4	3	5	7	1	3	3
Number of farms	75	22	9	17	15	5	3	4

Table 17. - The correlation of soil types to rating of farmer in the high one-third group as determined by the all average index

Ratings of farmer	Soil Types												Number of farmers indicated rating
	Cl	Bm	Js	Cs	C2s	Ns	Sl	Mb	Newton Sand	Af	Bf	O.S.L.& Pf	
1	3	2		1	2	2				1			11
1-				1	1								2
2+	1			1	2								4
2	1		1	3	1								6
2-	1				1								2
3+													
3													
Number of farmers	6	2	1	6	7	2				1			25

Table 18. - The correlation of soil types to rating of farmer in the low one-third group as determined by the all average index.

Ratings of farmers	Soil Types													Number of farmers indicated rating
	Cl	Bm	Js	Cs	C2s	Ns	Sl	Mb	Newton Sand	Af	Bf	O.S.L. & Pf		
1				1	3									4
1-				1										1
2+				1	2	1		1						5
2				1		1	2	1		1	1	2		9
2-				1										1
3+					2	1								3
3				1	1				1					3
Number of farmers				6	8	3	2	2	1	1	1	2		26

Table 19. - Correlation of 1939 crop index to number of animal units

Index value of farm	Number of farms	Number of animal units								
		3	6	9	12	15	18	21	24	27
High	25			3	7	9	1	1	2	2
Medium	25	1		3	5	10	5	1		
Low	25		3	3	6	5	4	2	2	
Number of farms	75	1	3	9	18	24	10	4	4	2

Table 20. - Correlation of 1940 crop index to number of animal units

Index value of farm	Number of farms	Number of animal units								
		3	6	9	12	15	18	21	24	27
High	25			3	7	9	2	2	1	1
Medium	25		1	3	4	10	3	1	2	1
Low	25	1	2	3	7	5	5	1	1	
Number of farms	75	1	3	9	18	24	10	4	4	2

Table 21. - Correlation of the 1939-1940 average crop index to the number of animal units

Index value of farm	Number of farms	Number of animal units								
		3	6	9	12	15	18	21	24	27
High	25			4	6	9		2	2	2
Medium	25		1	3	5	10	6			
Low	25	1	2	2	7	5	4	2	2	
Number of farms	75	1	3	9	18	24	10	4	4	2

Table 22. - Correlation of all average index to number of animal units

Index value of farm	Number of farms	Number of animal units								
		3	6	9	12	15	18	21	24	27
High	25			3	6	9	2	1	2	2
Medium	24		1	2	7	8	3	2	1	
Low	26	1	2	4	5	7	5	1	1	
Number of farms	75	1	3	9	18	24	10	4	4	2

Table 23. - Correlation of all average index to types of buildings

Index value of farm	Number of farms	Types of buildings				
		Excellent	Good	Fair	Poor	Very poor
High	25	1	8	10	5	1
Medium	24		9	15		
Low	26	1	8	15	1	1
Number of farms	75	2	25	40	6	2

Table 24. - Oat yield, percent of organic matter and pH value of soils on farms classified as to definite soil types

High yield farms					Low yield farms				
Number	Oat yield 1939 (bu/acre)	Percent organic matter ignition method	Percent organic matter carbon-chain method	pH[1]	Number	Oat yield 1939 (bu/acre)	Percent organic matter ignition method	Percent organic matter carbon-chain method	pH[1]
					Conover Silt Loam				
31	40	4.740	4.195	6.0	3	21	6.010	3.350	4.5
86	50	5.625	2.999	5.5	18	13	5.030	3.520	5.25
98	42	4.615	3.790	5.5	34	18.6	5.100	1.905	4.5
45	40	4.790	3.155	4.5	38	20	5.230	2.720	5
62	35	5.920	3.758	5	44	23	5.100	3.100	5.5
Average		5.138	3.579		Conover Loam		5.290	2.919	
39	49	5.675	3.935	6.0	43	24	5.625	3.440	5.5
57	38.5	6.245	4.334	6.0	12	33	6.035	4.285	6.0
70	50	8.110	5.400	7.5	95	23	5.125	3.842	5.5
101	50	3.990	2.660	5.5	102	35	6.250	3.960	6.5
Average		6.005	4.082				5.758	3.882	
					Brookston[2]				
77	35	5.495	3.710	6	25	16	6.825	5.310	5.5
88	60	6.320	5.365	6	46	30	5.200	3.660	5.5
82	40	7.410	4.745	5	81	30	5.455	4.860	5.5
Average		6.408	4.606				5.826	4.610	

Table 24. - Oat yield, percent of organic matter and pH value of soils on farms classified as to definite soil types (continued)

High yield farms					Low yield farms				
Number	Oat yield 1939 (bu/acre)	Percent organic matter ignition method	Percent organic matter carbon-chain method	pH[1]	Number	Oat yield 1939 (bu/acre)	Percent organic matter ignition method	Percent organic matter carbon-chain method	pH[1]
				Jeddo					
93B	50	7.725	3.319	5	42	28	5.075	3.30	4.5
				Napanee Silt Loam					
65	39	4.775	3.330	5.0	4	25	4.810	3.040	5.0
93A	35	4.435	2.150	4.5	27	21	4.525	2.915	4.5
41	30	4.245	2.575	4.5	49	25	4.675	4.220	5.0
58	30	6.385	4.743	5.5	59	not harvested	8.195	3.625	4.5
84	31.5	5.320	3.190	5.5	19	20	4.835	3.030	5.5
26	30	4.670	3.120	5.5					
Average		4.961	3.185				5.408	3.366	
				Allendales, Berrien Sand, and Newton Sand					
48	33	3.905	3.090	5	74	20	4.155	3.350	6.0
29	45	4.435	2.680	7	6	12	4.735	3.260	4.75
35	35	5.145	3.795	5.5	100	16	3.670	2.595	4.5
51	28	4.240	3.745	5.5					
7	30	2.990	2.215	5					
37	29	18.285	15.600	6					
*Average		4.143	3.105				4.186	3.068	
						Average of total	5.690	3.758	

* 37 was left out in the average as it would place the average results out of line.

1 Soiltex method 2. Includes Brookston loam, silt loam, and clay loam

Table 25. - Correlation of oat yields to percent of soil organic matter

Soil rating on basis of organic matter content	Number of farms	Yield of oats 1939 in bushels										
		10 15	15 20	20 25	25 30	30 35	35 40	40 45	45 50	50 55	55 60	60+
High	15		1	1	2	3	3	2	1	1		1
Medium	15	3		3	2	2	3	1		1		
Low	16		2	4	1	4	1	1	1	2		
Number of farms	46	3	3	8	5	9	7	4	2	4		1

Table 26. - Correlation of animal units to percent of soil organic matter

Rating based on number of animal units	Number of farms	Percent of organic matter								
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
3										
6	1				1					
9	6					2	3	1		
12	9		1		1	3	1	2		1
15	17			1	3	4	4	1	2	2
18	4			1		2			1	
21	3					1	2			
24	2					1				1
27	2				2					
Number of farms	44		1	2	7	13	10	4	3	4

Table 27. - Correlation of oat yield to soil acidity

Rating based on pH of soils	Number of farms	Yield of oats 1939 in bushels										
		10 15	15 20	20 25	25 30	30 35	35 40	40 45	45 50	50 55	55 60	60+
High	11			1	1	1	3	1	2	1		1
Medium	16	1	1	4	1	5	1	1		2		
Low	19	2	2	3	3	3	3	2		1		
Number of farms	46	3	3	8	5	9	7	4	2	4		1

Table 28. - The coefficients of contingency as calculated from the correlation of farm indexes to soil type, rating of farmer, number of animal units, type of buildings; of soil types to rating of farmer; percent of soil organic matter to oat yield, to number of animal units; soil acidity to oat yield.

Number of table	Correlation of farm indexes to soil type	Coefficient of contingency	r (1% point
5	1939 crop index to soil types	.4982	.3017
6	1940 crop index to soil types	.5140	.3017
7	1939-1940 average crop index to soil type	.5454	.3017
8	A A A index to soil types	.5674	.3017
9	Buxton index to soil types	.6902	.3017
10	All average index to soil types	.5522	.3017
	Correlation of farm indexes to rating of farmer		
11	1939 crop index to rating of farmer	.4089	.3017
12	1940 crop index to rating of farmer	.3715	.3017
13	1939-1940 average crop index to rating of farmer	.4880	.3017
14	A A A index to rating of farmer	.3777	.3017
15	Buxton index to rating of farmer	.4248	.3017
16	All average index to rating of farmer	.4405	.3017
	Correlation of soil types to rating of farmer		
17	The correlation of soil types to ratings of farmer in the high 1/3 of the all average index	.6309	.4869
18	The correlation of soil types to ratings of farmer in the low 1/3 of the all average index	.7715	.4869
	Correlation of farm indexes to number of animal units		
19	1939 crop index to number of animal units	.4514	.3017
20	1940 crop index to number of animal units	.3465	.3017
21	1939-1940 crop index to number of animal units	.4630	.3017
22	All average index to number of animal units	.3681	.3017

23	All average index to type of buildings	.3681	.3017
25	Correlation of oat yield to percent of soil organic matter	.4816	.3721
26	Correlation of number of animal units to percent of soil organic matter	.7163	.3721
27	Correlation of oat yield to soil acidity	.5316	.3721