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To the Graduate Council:

I am submitting herewith a thesis written by Bhoopalam N. Sampath Kumar entitled "An Analysis of General Farms in Tennessee with Special Reference to Family Farm Income." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.

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# AN ANALYSIS OF GENERAL FARMS IN TENNESSEE WITH SPECIAL REFERENCE TO FAMILY FARM INCOME

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A Thesis

Presented to

the Graduate Council of

The University of Tennessee

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In Partial Fulfillment

of the Requirements for the Degree

Master of Science

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by

Bhoopalam N. Sampath Kumar

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## ABSTRACT

Agriculture in Tennessee is lagging behind the other southeastern states. In 1954 the net income per farm in Tennessee was $1452, fifth among the southeastern states. In 1964, net income per farm had increased to $1801, but this was the lowest in the southeast. From 1954 to 1969, the percent increase in net income per farm in Tennessee was 24 percent, lowest in southeast. Four other states had increased income by more than 100 percent; so there is a great need to improve the agriculture in Tennessee.

The basic data for the present study was selected from the records of the Tennessee Farms in Unit Test Demonstration program. Forty-two general farms were selected for the four year period from 1964 to 1967, as far as possible using as a criteria that these are classified as general farms for at least three out of the four years.

The selected 42 farms were divided into three groups for each year based on the family farm income. The high, middle and low income groups are the three divisions which have the averages for 11,20 and 11 farms respectively.

It was found that the reason for the higher income of the middle and high income groups is the favorable relationship between the major factors that affects the family farm income and the family farm income. The reason for the low income of the low income group is the preponderance of unfavorable relationship between major factors and family farm income.

In conclusion, measures for improving the family farm income for all income groups of farms were suggested. The practical aspects involved in these improvements were briefly mentioned.

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# CHAPTER I

## INTRODUCTION

Modern farming is becoming increasingly commercial. Efficient farmers are giving way to those who are more efficient. Unless the farm is managed efficiently, it is not possible to thrive as a successful farmer. "Efficiency factors"[1] are generally considered as the management factors that are used as a basis for measuring financial success in farming. Efficiency factors which may be considered include production per unit, capital turnover, income, and labor output per worker.[2]

The farm manager of exceptional ability with intuition can decide the best ways of doing without undergoing the long process of analysis. But, generally farm managers do not have these abilities and need to analyze farm records to know where they stand and what they should do in the future to increase their efficiency.

The concept of farm management is stated by Bradford and Johnson in the following words:

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[1]John A. Hopkins, and Earl O. Heady, Farm Records and Accounting (Ames, Iowa: Iowa State University Press, 1962), p. 181.

[2]Andrew Boss and George A. Pond, Modern Farm Management, Principles and Practice (St. Paul: The Webb Publishing Company, 1947), p. 243.

> Management is an intangible part of production which develops within the lives of men. It is first a mental process, a concentration of desires, a will power. Management functions when a farmer is: (1) observing and conceiving ideas, (2) analyzing with further observations, (3) making decisions on the basis of analysis, (4) taking action, and (5) accepting responsibilities. Management can be seen only through observing the decision-making process and its results.[3]

Variations in farm income of a group of farmers from year to year may be caused by differences in prices, weather and other factors outside their control, but the variation among groups of farmers within a given year is due mainly to differences in the "organization and methods of production."[4] These factors affecting farm income may be grouped into four classes: (1) size of business, (2) organization of business, (3) rate of production or yield, and (4) efficiency in production.

The general objectives of farm management research may be stated as follows in the words of Headley:

> Farm Management research has two general objectives. First, to evaluate the performance of farmers as managers and second, to provide information that can be used to teach farmers and prospective farmers how to achieve a high degree of performance.[5]

Performance may be defined for our purpose, "as the degree to which goals are attained."[6]

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[3]Lawrence A. Bradford and Glenn L. Johnson, Farm Management Analysis (New York: John Wiley and Sons, 1953), p. 1

[4]Boss and Pond, op. cit., p. 243.

[5]J. C. Headley, "Evaluating Farm Management Performance and the Challenge to Farm Management Research," Illinois Agricultural Economics (Urbana: University of Illinois Agricultural Experiment Station, January 1967), p. 11.

# I. THE PROBLEM

The prosperity of Tennessee depends to a large extent on the prosperity of agriculture. To improve agriculture, farm management research has to be conducted to know where and how to improve.

Table 1 shows the changes in median family income in the United States and Tennessee, for 1950 and 1960. Though the median family income has risen for both, the absolute difference between them has increased from $1,090 in 1950 to $1,711 in 1960.

## Changes in the State's Income Position

In terms of productivity and profitability, the relative position of Tennessee's farmers when compared to other southeastern states, has diminished in recent years. Table 2 and Figure 1 show the changes that have taken place in the net income per farm of the southeastern states. In 1954 Tennessee ranked fifth in net income per farm among the eight states and in 1964 it stood lowest with only $1,801. This low income problem in Tennessee can be corrected by scientific approach to the problem.

## The Objectives

The specific objectives of the study are the following:

1. To find the main causes for the difference in family farm income among the groups of farms,

2. To find out the relationship between family farm income and the main factors affecting it, and

3. To recommend the measures to increase the family farm income.

TABLE 1

MEDIAN FAMILY INCOME IN UNITED STATES AND TENNESSEE FOR 1950[a] AND 1960[b]

| | 1950 | | 1960 | |
|---|---|---|---|---|
| | Median | % of U.S. Median | Median | % of U.S. Median |
| United States | 3,073 | 100.0 | 5,660 | 100.0 |
| Tennessee | 1,983 | 64.5 | 3,949 | 69.7 |

[a]United States Bureau of the Census, United States Census of Population: 1950, Vol. 11, Characteristics of the Population, Part 1, United States Summary and Part 42, Tennessee (Washington, D.C: U. S. Government Printing Office, 1953).

[b]United States Bureau of the Census, United States Census of Population: 1960, Vol. 1, Characteristics of the Population, Part 1, United States Summary and Part 44, Tennessee (Washington, D.C.: U. S. Government Printing Office, 1963).

TABLE 2

RELATIVE NET INCOME PER FARM POSITION OF STATES IN 1954 AND 1964 AND THE RANKED PERCENTAGE INCREASE IN NET INCOME PER FARM[a]

| | Per Farm Income 1954 | Rank | Per Farm Income 1964 | Rank | Income Change 54-65 | Percent Change | Rank |
|---|---|---|---|---|---|---|---|
| Alabama | $1,332 | 6 | $2,692 | 6 | $1,360 | 102 | 4 |
| Georgia | 1,475 | 4 | 3,685 | 1 | 2,210 | 149 | 2 |
| Kentucky | 1,820 | 2 | 2,910 | 4 | 1,090 | 60 | 5 |
| Mississippi | 1,307 | 7 | 3,279 | 3 | 1,972 | 150 | 1 |
| North Carolina | 2,225 | 1 | 3,293 | 2 | 1,086 | 48 | 6 |
| South Carolina | 1,211 | 8 | 2,820 | 5 | 1,609 | 132 | 3 |
| Tennessee | 1,452 | 5 | 1,801 | 8 | 349 | 24 | 8 |
| Virginia | 1,707 | 3 | 2,293 | 7 | 586 | 34 | 7 |

[a]Economic Research Service, Farm Income State Estimates, 1949-1965, United States Department of Agriculture, FIS 203 Supplement (Washington, D.C.: Government Printing Office, August 1966), pp. 10-11.

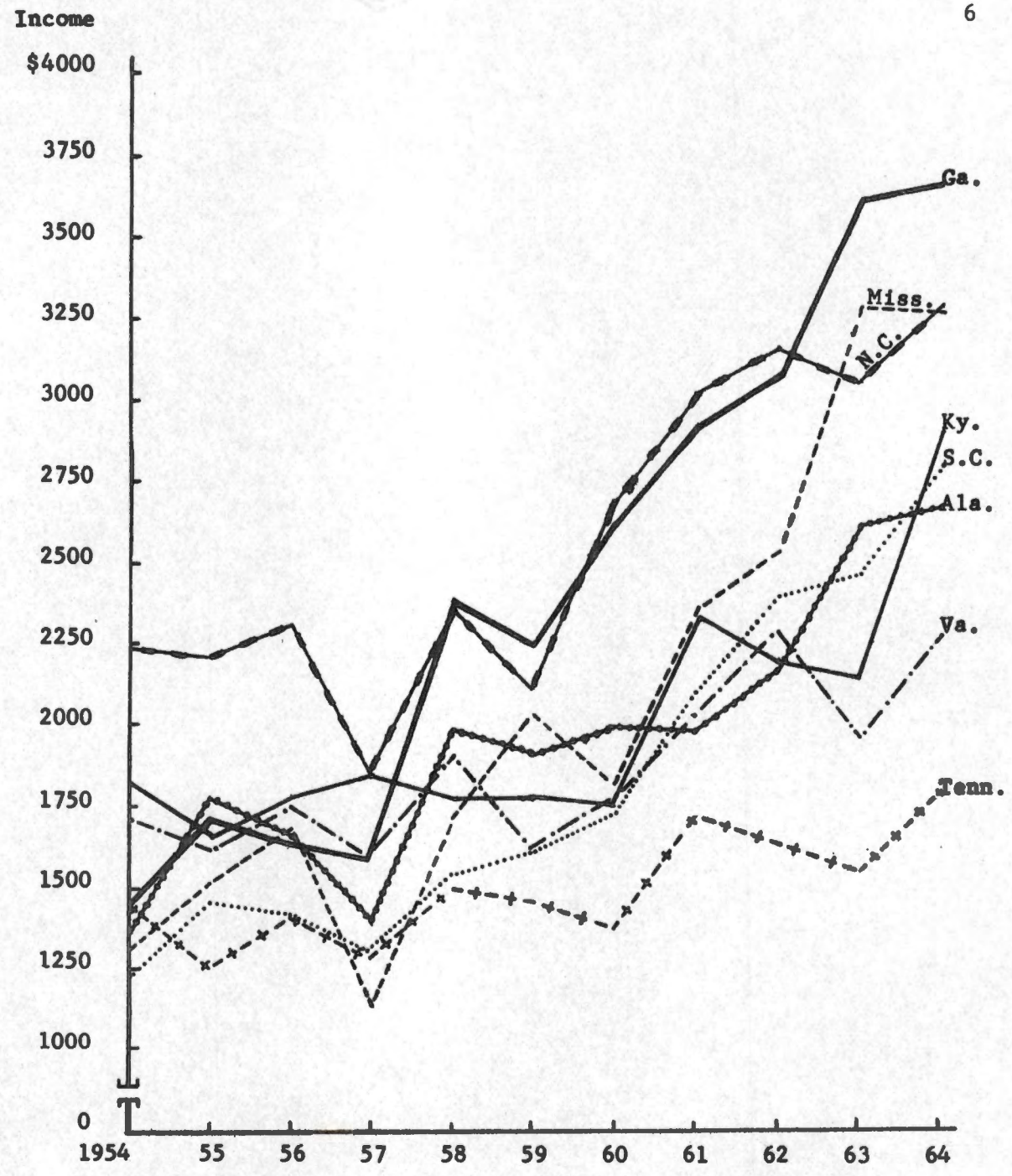



Figure 1. Realized net income per farm from 1954 to 1964 for the southeastern states. (From Economic Research Service, Farm Income State Estimates 1949-1965, United States Department of Agriculture, FIS 203 Supplement, Washington, D.C.: Government Printing Office, August, 1966, pp. 10-11).

## The Nature of the Study

The analysis of the farming enterprise is a complex one, as in decision making, many factors are involved which either cannot be measured or are not easily measured in physical terms. The concept of the function of management in the words of Woodworth and Saunders is as follows:

> The task of evaluation and choice among alternatives is a function of management. It cannot effectively be delegated to others since intricate systems of conflicting and changing goals and objectives are involved. A high income may be an immediate objective, but the sacrifice which a family is willing to undergo to obtain this income depends on many complex, intangible, yet more fundamental goals.[7]

A way to increase efficiency in agriculture is expressed by Strand and Heady as follows:

> Efficiency of agriculture in our country varies in different areas and with different segments of the agricultural economy. In some areas and with some farming systems, efficiency is high; in others, it is low. How can we increase the efficiency of our agriculture? One way is to emphasize, more than has been done in the past, opportunities for production and to encourage shifts in resources in areas where efficiency of production is currently low. The consequent improvement of incomes of people in these areas will make for a healthier economy.[8]

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[7]Roger C. Woodworth and Fred B. Saunders, Evaluating Income Opportunities on North Georgia Farms, Bulletin N.S. 34 (Athens: Georgia Experiment Station, October 1956), p. 8.

[8]Edwin O. Strand and Earl O. Heady, Productivity of Resources Used on Commercial Farms, Technical Bulletin No. 1128 (Ames: Iowa Agricultural Experiment Station, November 1955), pp. 2-3.

Threefold benefits that might be derived from the analysis of the groups of records are as follows in the expression of Case and Johnston:

> (1) The organization of the individual farm may be compared with the organization of other farms in the area or community, (2) the efficiency of each productive enterprise and each major item of input may be compared with returns and inputs on similar farms, (3) the earnings of the farm as a unit may be compared with the earnings of farms similar in size and systems of farming. The earnings from the various systems of farming may also be compared.[9]

When the number of farms under study is too large to make individual comparisons, groups may be formed on the basis of income and comparisons can be made conveniently.

Much use of the analysis of the farm records is made. "Complete analysis should point out 'strong' and 'weak' points in the organization and operation of the business."[10] By increasing the "strong" points and by eliminating or decreasing the "weak" points, the farm income may be increased. "Farm accounts serve a very useful purpose as a farm-management tool, which the individual producer can use as a basis for adequately finding out what he is doing and why and for providing ideas as to future improvements."[11]

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[9] H. C. M. Case and Paul E. Johnston, Principles of Farm Management (Chicago: J. B. Lippincott Company, 1953), p. 298.

[10] Emery N. Castle and Manning H. Becker, Farm Business Management (New York: The Macmillan Company, 1962), p. 99.

[11] J. Norman Efferson, Principles of Farm Management (New York: McGraw-Hill Book Company, Inc., 1953), p. 48.

Farmers generally have fewer years of formal education than their counterparts in the industrial sector of the economy. Often because of their lack of education, they will not be aware that some of the best methods of production are applicable to their particular situations. In a changing world, the ways of doing things must be constantly adjusted if one is to survive and the agricultural sector is no exception to this. The need for adjustment in a changing world may be put in the words of Castle and Becker as follows:

> The function of management is to anticipate future conditions and to use available resources in light of these anticipations to achieve certain objectives. The greater the deviation of anticipated future conditions from those existing at present, the more important becomes the adjustment problem of the manager. That rapid change has characterized American agriculture in recent years is a matter of historical record. As far as the future is concerned, it appears that the only condition that can be taken as certain is that even more change is likely to occur. The magnitude of the underlying forces that affect both supply and demand conditions for agricultural commodities has not remained and will not remain constant. Examples of such forces that are constantly changing are the technology of production, and the size, income, and tastes of the consuming public.[12]

Because this country is surplus in food production, it does not necessarily follow that no more research is necessary to improve farming methods. To maintain the superior position in agriculture, it is necessary to continue research. Without research, this country may not be able to continue to compete in the world market. Modern farming is not only affected by the supply and demand conditions of the country in question, but also by the supply and demand conditions of the foreign

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[12]Castle and Becker, op. cit., p. 379.

countries. The world is becoming smaller and the impact of agriculture in one country on the other is increasing. According to Black, Clawson, Sayre and Wilcox, this concept is stated as follows:

> The overwhelming facts of the situation are that modern agriculture cannot operate in isolation, but is closely tied in with the rest of the national economy; that it is also tied in inescapably, practically speaking, with the agriculture of the rest of the world, and the economies of other countries; and that the agriculture and the economies of other countries as well as our own, are in constant flux in large measure in unison with ours because of mutual interdependence and subjection to powerful common influences.[13]

## Importance of the Study

Tennessee has shown a pronounced lag in its rate of increase in net farm income over the past number of years when compared to other southeastern states. Low farm income not only affects farmers, but also the other business sectors. Higher income to farmers means increased inputs. Increased inputs means increased demand in the business sector. With the higher income to farmers the whole agricultural community becomes more prosperous. So, to turn the low income farms into high income farms, it is necessary to know its organization and operation.

Identification of problems is the first and most difficult part of farm management research. A preponderance of low income farms is the major problem of farming in Tennessee. The reasons for this problem

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[13] John D. Black, Marion Clawson, Charles R. Sayre, and Walter W. Wilcox, Farm Management (New York: The Macmillan Company, 1947), p. 107.

have to be found to arrive at a workable solution. To find these reasons, the analysis of the farm business is a must.

In the present study an attempt has been made to analyze forty-two general farms in Tennessee for a period of four years from 1964 to 1967. It is hoped this analysis will permit the understanding of the problem and act as a means to bring forth a workable solution for the purpose of increasing farm incomes.

Selection of Data

The basic data was obtained from the records of Tennessee farms which fall under Unit-Test Demonstration Program. "The Unit-Test Demonstration Program is a three way partnership involving selected farm families, The University of Tennessee Agricultural Extension Service and the Tennessee Valley Authority."[14]

The basic data for forty-two general farms was selected for a four year period from 1964 to 1967, as far as possible using as a criteria that these are classified as general farms for at least three out of four years. These forty-two general farms are located in twenty-five counties of the state of Tennessee (Figure 2). These general farms cover all the six Crop Reporting Districts of Tennessee.

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[14]Agricultural Extension Service, Tennessee's Unit-Test Demonstration Program, SP 159 (Knoxville: The University of Tennessee, June 1966), p. 1.




Figure 2. Map of Tennessee showing the counties where the selected farms are situated.

The Procedure

The forty-two selected general farms were divided into three groups for each year based on the family farm income. The highest income group had eleven farms and is referred to as the high income group in the analysis. The middle income group had twenty farms and the low income group had eleven farms.

The percentage change in family farm income and all the main factors affecting it was determined. All the values have been deflated to the 1964 price level using price indexes for the United States.

The correlation coefficient between family farm income and all other main factors affecting it was also calculated. The higher the coefficient the greater the relationship between the income and the factor.

## II. THE SCOPE AND LIMITATIONS OF THE STUDY

While measuring the success of a farm, there are social, aesthetic and other factors apart from the economic factors that have to be taken into account. This idea is described in the following manner:

> A successful farm must provide a profitable farm business, a cheerful place in which to live, and a wholesome environment for children. It must allow the family a share in the better things of present-day civilization. This is the final measure of a successful farm.[15]

The goals of all the farmers may not be the same. One of the problems in analyzing the farm enterprise is to know the extent to which

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[15] Frank App and Allen G. Waller, Farm Economics, Management, and Distribution (Chicago: J. B. Lippincott Company, 1938), p. 1

increased maximum income is the goal of the farmer. So, while comparing the farm records of different farms, to have uniformity for the convenience of analysis, it is necessary to assume that income is the goal. "Goal definition means that farmers must determine what provides satisfaction for them and their families."[16]

Another assumption made was about the consistency of groupings. As the low, middle and high income groups are the statistical groupings for each year, all the farms that are in each group for each year are not the same. Some farms have maintained their grouping positions for all the four years. The remaining farms have either declined on the ladder or climbed up on the ladder of grouping during the course of the given four years. In spite of the change in grouping positions of some farms, it is assumed for the purpose of analysis that the net result is not inconsistent, though it may not be true always.

It may be argued that the present study is more concerned with what is rather than what ought to be, and so it may not be of much use to the farmers who want to adjust their farm operation and organization to improve their incomes. The study does not propose to give exact answers to all the existing problems of the individual farmers. It is an attempt to have the general understanding of the farm business, which would give some ideas to the farmers about the relationship between the different aspects of farm business, which would enable them to make adjustments for increased income.

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[16]Headley, op. cit., p. 11.

It may be argued that what is good for a group of farmers may not be the best alternative for the individual farmer. The farms selected for the Unit-Test Demonstration Program were "representative of the type of agriculture in the county."[17] And so the problems encountered in the study are the typical problems of the area and not the exceptional ones. Therefore, the individual farmers can be benefited by the study. The concept of adjustment on the individual farms in relation to the farming of the region is made clear by the statement of Bradford and Johnson:

> They have thus usually adopted the system of farming prevalent in their communities, adjusted it to their own farms, and followed the practices usual to their areas.[18]

Tennessee is a state of variation. In the words of Ray and Hudson:

> Significant variation in topography, soils, climate, and physiographical conditions are encountered in moving from east to west Tennessee. These variations determine to a great extent the types of agriculture which are feasible and economical within given areas.[19]

Despite this variation, the present analysis can give a general picture of the common problems and the ways to solve them. It will be easier for the farmers then to know how to change situations for improvement.

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[17]Agricultural Economics Extension Department of The University of Tennessee, Criteria for Selection and Procedures for Activation of Test Demonstration Farms (Unpublished article, The University of Tennessee, 1965), p. 1.

[18]Bradford and Johnson, op. cit., p. 69.

[19]R. M. Ray and E. H. Hudson, Tennessee's Rapid Adjustment Program - An Analysis of the First Six Farms, Bulletin 443 (Knoxville: The University of Tennessee Agricultural Experiment Station, 1968), p. 7.

## CHAPTER II

## PHYSICAL AND ECONOMIC FEATURES OF TENNESSEE

### I. PHYSICAL FEATURES

Topography. Tennessee is divided into three broad divisions: East, Middle and West. Since the state is so long from east to west, it crosses six well defined topographic divisions, viz., Unaka mountains, Great Valley of East Tennessee, Cumberland Plateau, Highland Rim, Central Basin and Gulf Coastal Plain. The surface slopes from east to west in general.

Soil. Fertile soil of limestone origin is in the Central Basin, the less elevated parts of the valley of East Tennessee, and parts of the outer portions of the Highland Rim. Along many of the rivers there are narrow strips of rich alluvium. On the mountains, on the ridges of the valley of East Tennessee and on the eastern slope of the East Gulf Plains, the soils vary greatly, according to the routes from which they are derived. The soil for the most part is sandy in the Cumberland Plateau, in the inner portion of the Highland Rim and in the higher parts of the western slope of the East Gulf Plains.

Climate. Tennessee has a temperate climate. The mean annual precipitation exceeds 55 inches in the higher areas and is more than 45 inches everywhere. Over most of the state, the average annual number of

days with snow cover is less than ten, and even in the mountains is less than thirty. At all seasons precipitation occurs. Over most of the state, average winter temperature is between 30 degrees and 40 degrees being somewhat higher in the Southeast. Average summer temperatures are higher than 75 degrees in the west and are lowest in the mountains of the east. Near Memphis, the average number of days without killing frost is 220, and declines to about 180 in the eastern mountains.

## II. ECONOMIC FEATURES

With the rise of industrial activity as a primary base of the state's economy and the decline in the relative importance of agriculture, the economic pattern in Tennessee has vastly changed since the 1930's. Industry is characterized by an even greater division of labor, and agriculture is increasingly mechanized. The influence of organized labor has grown much. It has lead to state laws prohibiting closed and union shops.

About one-fourth of the population is engaged in agriculture. The non-agricultural labor force was distributed in the following manner in 1960, expressed as a percentage of the total: government, 15.6; manufacturing, 35.2; wholesale and retail trade, 21.4; service industries, 11.3; construction, 5.7; transportation, communications, and other public utilities, 6.1; mining and quarrying, 0.8; and finance, insurance and real estate, 3.9.

Income. Per capita personal income in Tennessee rose from $377 in 1929 to $1,565 in 1958. This represents a rise from 54 to 70 percent of the national average. Only 1.15 percent of the national income belonged to Tennessee which amounted to $982 million. By 1946, the state's share of the national income had risen to 1.50 percent. Thereafter, it declined to 1.41 percent in 1955 and 1.39 percent in 1960. In 1960 it amounted to $5,591 million. Relative decline in farm income was the main cause for this.

Agriculture. A long growing season and mild climate are conducive to the diversified farming in Tennessee. For almost all temperate zone crops precipitation is sufficient. Cotton, tobacco, corn, and hay are the chief crops, accounting for almost four-fifths of the cash crop income.

Tennessee is one of the nation's leading producers of cotton which is the state's largest cash crop. In 1963 and 1964, Tennessee ranked second among the southeastern states in cotton yield per acre, with an average of over 600 pounds per acre. Cotton growing is centered in West Tennessee.

In seventy-two of the state's ninety-five counties, tobacco is grown and ranks second in crop value. These seventy-two counties are mainly located in upper East Tennessee, northwest Middle Tennessee, and the northeastern part of West Tennessee. In terms of acreage corn and hay are the leading crops, but as sources of cash income are not as

important since they are principally used as feed crops. Soybeans also provide an important source of income.

Almost half of the cash farm income is derived from the sale of livestock and livestock products. There is an abundance of pasture and water and suitable conditions for the production of a variety of feeds which make Tennessee an excellent place for both beef and dairy cattle.

Land in farms in Tennessee declined from 18,493,000 acres to 16,081,285 acres between 1940 and 1959. The number of farms decreased much more rapidly in the same period. Their number fell from 247,617 to 157,688 resulting in an increase in average acreage from 74.7 to 102 acres.

Manufacturing. In the second half of the 20th Century, Tennessee has experienced a rapid industrial development. The number of manufacturing establishments and their employees approximately tripled from the early 1930's to the 1960's. Chemicals, food and kindred products, textiles, apparel, lumber and wood products, pulp and paper, furniture and fixtures, printing and publishing, primary metals, fabricated metals, leather and leather products were the chief industries. The giant aluminum plants at Alcoa, chemical plants at Kingsport and Old Hickory and newsprint mills at Calhoun are among the largest industrial installations.

Transportation. In Tennessee railway mileage was 4,078 miles in 1920. It had decreased to less than 3,500 miles by the 1960's. There

was a steady growth of the highway system which totaled more than 70,000 miles by the 1960's, of which about 8,000 miles were state roads and the remainder county. Highway trucking firms have taken over much freight formerly handled by railroads. Boats on the Tennessee and Cumberland rivers carry much additional freight.

Forests. Tennessee's forest lands totaled 12,408,000 acres in the 1960's and contributed a large portion of the state's agricultural and industrial income.

Minerals. Tennessee ranks about 27th among the states in the value of its mineral products. Coal, cement, stone, phosphate rock, zinc and copper are the principal minerals. Most of the copper mined in the southeastern states is produced by Tennessee. The coal producing area is in the Cumberland Plateau. From the eastern part of the state comes the building marble, for which the state is famous. In Middle Tennessee the phosphate deposits are localized.

Commerce and trade. An inland waterway totaling about 1,000 miles of navigable canal is provided by the Mississippi, Tennessee and Cumberland rivers.

In Tennessee's economy commerce is an important factor. About 140,000 persons were employed in retail trades in 1963 and their sales totaled $4,009,128,000. About 60,000 persons were employed by wholesale establishments.

Population. In 1860, 95.8 percent of population in Tennessee was rural and in 1950 it was 55.9 percent. By 1960, 52.3 percent was the urban population.

## CHAPTER III

## ANALYSIS OF THE GENERAL FARMS

### The Relationship Between Family Farm Income and the Given Factors

The present study is mainly concerned with general farms. "Farms were classified as general farms if 50 percent of the gross farm income did not come from beef, swine, and sheep enterprises as a group or from the dairy enterprises."[20]

In the present analysis, family farm income is taken as the unit for the purpose of comparison instead of net cash farm income, because the former gives a more realistic picture of the farmer's success than the latter because it takes into account the inventory changes. Family farm income is the "gross farm income minus total farm expenses. It is the amount of income the farm family earned with labor, capital and management."[21]

"A study of farm income over a period of years serves as a strong reminder of the many factors causing change."[22] There is a vast array of factors that affect farm income and all of them cannot

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[20]Agricultural Economics Extension Department of The University of Tennessee, Farm Business Analysis for General Farm (unpublished article, The University of Tennessee, 1967), p. 1.

[21]Ibid., p. 2.

[22]National Fertilizer Development Center, Income Estimates and Related Statistics - Elk River Counties, 1959-1967 (unpublished booklet, Tennessee Valley Authority, 1969), p. 1.

be considered in one study. Factors like the age, education, motivational level of farmers are not considered in the present study. Major economic factors like value of farm inventories, farm receipts, expenses, value of crops. Major physical factors like the total acres, open acres, yield per acre of major crops are considered. In other words, those factors that could be altered by the farmers to increase their farm income are considered, which may be called the dynamic factors.

The Grouping of the Farms

Before going to regular analysis, it is necessary to know that many farms remained in the same income group and how many changed their groupings. Only twelve farms out of forty-two remained in the same groups for all of the four years. There were only two farms which remained in the high income group for all four years. For the middle income group, it was eight farms and for the low income group, it was only two. The remaining thirty farms have changed their groupings for one or more years during the same four year period.

But, if the groupings for 1965 and 1966 are ignored and the groupings are considered for a period of four years as a whole, then the following was the outcome:

Both in 1964 and 1967, twenty-one farms out of forty-two remained in the same groupings. Six farms remained in high income group, eleven farms remained in the middle income group, and four farms remained in

the low income group. From 1964 to 1967, twenty-one farms had changed their groupings. Out of these twenty-one farms, ten farms had improved their group positions as follows: five farms had gone to the middle income group from the low income group; three farms had gone to high income group from the middle income group; and two farms had gone to the high income group from the low income group.

For the same period from 1964 to 1967, the remaining eleven farms had gone down in their group positions. Four farms had gone to the middle income group from the high income group; six farms had gone from the middle to the low income group; and only one farm had gone from the high income group to the low income group.

Correlation Coefficient Between the Family Farm Income and the Factors

In the analysis a fourth "group" is also considered. That is, for some purposes all of the forty-two farms are included as a single group. The fourth group consists of the average of each factor for all of the farms for each year. Similarly, the fourth group for family farm income consists of the average of family farm income for all farms for each year. Correlation coefficient has been found for each group in the factor to the corresponding group in the family farm income. So, there are four correlation coefficients for each factor.

Correlation coefficients between family farm income and the different factors were found by using the formula:

$$r = \frac{\Sigma xy}{\sqrt{(\Sigma x^2)\ (\Sigma y^2)}}$$

$r \geq 0.878$[23] is considered to be significant (at 95 percent level).

$r \geq 0.959$[24] is considered to be highly significant (at 99 percent level).

Family Farm Income

Before starting the comparisons between family farm incomes and the factors, a clear idea about the family farm income situation is a necessity. Table 3 shows various family farm income groups for each year. When change in family farm income is considered over the period from 1964 to 1967, it rose for all the groups. The percentage increase was highest for the middle income group with 22.7 and it was lowest for the high income group with 14.8. For low income group and all income group, it was 22.0 and 19.7, respectively. When percentage change is considered from year to year, there was an increase for all groups from 1964 to 1965 and from 1965 to 1966. For the year 1966-1967, the middle and high income groups experienced a decrease in the family farm income. While the low income group had an increase in family farm income from 1966 to 1967, it is only 1.1 percent. The highest percent increase was

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[23] Robert G. D. Steel and James H. Torrie, Principles and Procedures of Statistics (New York: McGraw Hill Book Company, Inc., 1960), p. 453.

[24] Ibid., p. 453.

TABLE 3

DEFLATED[a] AVERAGE OF FAMILY FARM INCOME FOR THE GROUPS OF FARMS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Family Farm Income | Percent Change (Yearly) | Percent Change (1964 to 1967) |
|---|---|---|---|---|
| 1964 | | 450 | | |
| 1965 | Low | 409 | 4.2 | 22.0 |
| 1966 | | 543 | 15.8 | |
| 1967 | | 549 | 1.1 | |
| 1964 | | 1,747 | | |
| 1965 | Middle | 2,058 | 17.8 | 14.8 |
| 1966 | | 2,771 | 34.6 | |
| 1967 | | 2,143 | -22.8 | |
| 1964 | | 4,791 | | |
| 1965 | High | 6,582 | 37.4 | 14.8 |
| 1966 | | 7,683 | 16.7 | |
| 1967 | | 5,626 | -26.8 | |
| 1964 | | 2,205 | | |
| 1965 | All farms | 2,827 | 28.2 | 19.7 |
| 1966 | | 3,474 | 22.8 | |
| 1967 | | 2,638 | -24.1 | |

[a]United States Bureau of the Census, Statistical Abstract of the United States, 1968 (Washington, D.C.: Government Printing Office, 1968), Consumer Price Index, p. 347.

for the high income group for 1964 to 1965 and the lowest percent increase was for the low income group for 1966 to 1967. The highest percent decrease was for the high income group for 1966 to 1967 and the lowest percent decrease was for the middle income group for 1966 to 1967.

Farm Inventories

Farm inventories constitute the major cost in farming. It costs too much for the farmer to have excess inventories due to increasing opportunity cost. In the traditional societies, due to limited opportunities outside agriculture, land is considered to be the greatest of all assets and in such societies the income from such an asset is not as important as in the modern society. Land is the most important of all the farm inventories in terms of cost. When a farmer has surplus inventories, he must either rise to the occasion and make use of them most efficiently or he should dispense with some of them to bring them down to his managerial capacity. When the managerial capacity of a person is fixed, then a large farm which may be running under loss may be made a profitable farm by dispensing with the excess inventories.

Total inventories. Comparison between the family farm income and the value of total inventories gives an idea to what extent it is economical to have the inventories. Table 4 shows that none of the groups is significantly correlated. The low income group is negatively correlated with correlation coefficient -0.3836 and the middle, high, and all income groups are positively correlated with correlation coefficients

TABLE 4

DEFLATED[a] AVERAGE OF THE VALUE OF TOTAL INVENTORIES FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Total Inventories | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 32,415 | | | |
| 1965 | Low | 27,829 | -14.1 | -28.7 | -0.3836 |
| 1966 | | 32,717 | 17.6 | | |
| 1967 | | 23,096 | -29.4 | | |
| 1964 | | 31,112 | | | |
| 1965 | Middle | 32,956 | 5.9 | 17.7 | 0.2650 |
| 1966 | | 33,168 | 0.6 | | |
| 1967 | | 36,643 | 10.5 | | |
| 1964 | | 52,988 | | | |
| 1965 | High | 47,222 | -10.9 | 0.2 | 0.0783 |
| 1966 | | 55,266 | 17.0 | | |
| 1967 | | 53,106 | - 3.9 | | |
| 1964 | | 37,183 | | | |
| 1965 | All farms | 35,350 | - 4.9 | 0.6 | 0.4548 |
| 1966 | | 38,838 | 9.8 | | |
| 1967 | | 37,407 | - 3.7 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Farm Real Estate Value, p. 430.

0.2650, 0.0783, and 0.4548, respectively. The reason for the low income group being negatively correlated is of crucial importance. It may be due to excess of inventories or due to bad management. The actual figures of the weighted average of total inventories show that for the low income group, it is less than that of the other groups. So the possibilities of excess of inventories is ruled out. Then the alternative reason is bad management. Again, there may be two reasons for bad management. One is due to the inefficient farm managers and the other is the concentration on the off-farm income which might not have given enough scope to manage the farm profitably. As it was observed earlier, only two farms remained in the low income group for all the four years. The reason for low income for these two farms may be due to inefficient management. Many of the remaining nine farms, for each year following 1964, are the farms which occupied positions either in the middle or the high income group in 1964. The reason for lowering of income for these groups may possibly be due to the concentration on the off-farm employment.

It is necessary to see the constituents of the total inventories to get an idea as to how they are related to family farm income individually. Land, buildings, feed and supplies, livestock, machinery and equipment are the different constituents of total inventories which are shown in Tables 5, 6, 7, 8, and 9, respectively.

Land. The land value is negatively correlated with family farm income as far as low, middle, and high income groups are concerned. But

TABLE 5

DEFLATED[a] AVERAGE OF LAND VALUE FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Land Value | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 16,027 | | | |
| 1965 | Low | 20,701 | 29.2 | 22.0 | -0.7604 |
| 1966 | | 13,504 | -34.8 | | |
| 1967 | | 12,501 | - 7.4 | | |
| 1964 | | 15,790 | | | |
| 1965 | Middle | 16,576 | 5.0 | 19.1 | -0.0909 |
| 1966 | | 15,860 | - 4.3 | | |
| 1967 | | 18,808 | 19.1 | | |
| 1964 | | 26,655 | | | |
| 1965 | High | 20,495 | -23.1 | - 4.7 | -0.1021 |
| 1966 | | 27,120 | 32.3 | | |
| 1967 | | 25,421 | - 6.3 | | |
| 1964 | | 18,698 | | | |
| 1965 | All farms | 18,683 | 0.1 | -42.1 | 0.1338 |
| 1966 | | 18,193 | - 2.6 | | |
| 1967 | | 10,828 | -40.5 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Farm Real Estate Value, p. 430.

TABLE 6

DEFLATED[a] AVERAGE OF THE VALUE OF BUILDINGS FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Value of Buildings | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 5,504 | | | |
| 1965 | Low | 3,777 | -31.4 | -45.4 | -0.8587 |
| 1966 | | 3,317 | -12.2 | | |
| 1967 | | 3,005 | - 9.4 | | |
| 1964 | | 4,260 | | | |
| 1965 | Middle | 5,022 | 17.9 | -10.3 | 0.6042 |
| 1966 | | 5,275 | 5.0 | | |
| 1967 | | 3,820 | -27.6 | | |
| 1964 | | 8,254 | | | |
| 1965 | High | 7,091 | -14.1 | -17.7 | -0.7993 |
| 1966 | | 6,300 | -11.2 | | |
| 1967 | | 6,632 | 5.3 | | |
| 1964 | | 5,632 | | | |
| 1965 | All farms | 5,238 | - 7.0 | -22.9 | -0.2801 |
| 1966 | | 5,031 | - 4.0 | | |
| 1967 | | 4,343 | -13.7 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Farm Real Estate Value, p. 430.

TABLE 7

DEFLATED[a] AVERAGE OF THE VALUE OF FEED AND SUPPLIES FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Value of Feed and Supplies | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 2,696 | | | |
| 1965 | Low | 1,641 | -39.1 | -76.9 | -0.9329 |
| 1966 | | 1,004 | -38.8 | | |
| 1967 | | 623 | -37.9 | | |
| 1964 | | 1,841 | | | |
| 1965 | Middle | 1,711 | - 5.7 | 39.3 | 0.2606 |
| 1966 | | 2,060 | 20.4 | | |
| 1967 | | 2,526 | 22.6 | | |
| 1964 | | 3,110 | | | |
| 1965 | High | 3,632 | 16.8 | 8.7 | 0.9706 |
| 1966 | | 4,422 | 21.8 | | |
| 1967 | | 3,382 | -23.5 | | |
| 1964 | | 2,397 | | | |
| 1965 | All farms | 2,196 | - 8.4 | - 6.0 | 0.1002 |
| 1966 | | 2,402 | 9.4 | | |
| 1967 | | 2,252 | - 6.2 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.; Government Printing Office, 1968), Prices Received by Farmers for Feed and Supplies, p. 470.

TABLE 8

DEFLATED[a] AVERAGE OF THE VALUE OF LIVESTOCK FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Value of Livestock | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 4,156 | | | |
| 1965 | Low | 3,941 | - 5.2 | -43.5 | -0.9841 |
| 1966 | | 2,815 | -28.6 | | |
| 1967 | | 2,349 | -16.6 | | |
| 1964 | | 4,283 | | | |
| 1965 | Middle | 4,039 | - 5.7 | 32.7 | 0.0243 |
| 1966 | | 4,359 | 7.9 | | |
| 1967 | | 5,684 | 30.4 | | |
| 1964 | | 9,125 | | | |
| 1965 | High | 8,570 | - 6.1 | 10.1 | -0.5208 |
| 1966 | | 8,764 | 2.7 | | |
| 1967 | | 10,049 | 14.7 | | |
| 1964 | | 5,518 | | | |
| 1965 | All farms | 5,200 | - 5.8 | 7.9 | -0.5946 |
| 1966 | | 5,108 | - 1.8 | | |
| 1967 | | 5,954 | 16.6 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.; Government Printing Office, 1968), Prices Received by Farmers for Livestock and Products, p. 470.

TABLE 9

DEFLATED[a] AVERAGE OF THE VALUE OF MACHINERY AND EQUIPMENT FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Value of Machinery and Equipment | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 5,031 | | | |
| 1965 | Low | 5,002 | - 0.6 | - 1.9 | -0.8016 |
| 1966 | | 4,782 | - 4.4 | | |
| 1967 | | 4,934 | 3.2 | | |
| 1964 | | 4,856 | | | |
| 1965 | Middle | 5,353 | 10.2 | 0.5 | 0.4819 |
| 1966 | | 5,220 | - 2.5 | | |
| 1967 | | 4,880 | - 6.5 | | |
| 1964 | | 6,557 | | | |
| 1965 | High | 6,985 | 6.5 | 32.6 | 0.3161 |
| 1966 | | 7,964 | 14.0 | | |
| 1967 | | 8,696 | 9.2 | | |
| 1964 | | 5,347 | | | |
| 1965 | All farms | 5,689 | 6.4 | 10.2 | 0.6797 |
| 1966 | | 5,824 | 2.4 | | |
| 1967 | | 5,894 | 1.2 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Price of Industrial Production, p. 430.

none of them is significant. However, for the low income group, correlation coefficient = -0.7604 which is near significance level.

Buildings. In the value of buildings (Table 6), no group is significantly correlated. Low, high, and all income groups are negatively and middle income group is positively correlated. But low and high income groups have correlation coefficients = -0.8527 and -0.7993 which are near the significance level.

Feed and supplies. Table 7 shows how the value of feed and supplies is related to family farm income. Low and high income groups are significantly and highly significantly correlated with family farm income with correlation coefficients = -0.9329 and 0.9706, respectively. This negative sign for low income group shows that the inverse in value of feed and supplies decreases the family farm income. There is a high percent decrease (-76.9 percent) in the value of feed and supplies from 1964 to 1967 and for the same period there is a 22 percent increase in family farm income. The highly significant correlation of the high income group is noteworthy. For this group the farm income may be further increased by increased investment on feed and supplies.

Livestock. The low income group of the value of livestock (Table 8) is highly significantly correlated with family farm income with correlation coefficient = -0.9841. This value corresponds with the value of feed and supplies for the same income group. This means that for the

low income group, the lower value of livestock and feed and supplies are associated with higher income.

Machinery and equipment. The efficiency of modern agriculture has increased due to mechanization. Those farmers who are not efficient are left behind. The way to increase efficiency of labor is mechanization. If machinery is not used properly during a particular year, it does not mean it should be dispensed with. On the contrary, it should be retained and proper use of it be made. This theory holds good for the low income group in Table 9, page 34, which has a correlation coefficient of -0.8016. The all income group has a correlation coefficient = 0.6797 which gives an indication that the efficiency of machines is considerable when all the farms are taken as a whole. So, as a general recommendation to the farmers of the Test Demonstration Program, it could be said that it is relevant to mechanize the farms.

Productive Man Work Units

Productive man work units is one of the measures of performance which shows the general effectiveness with which labor is employed. Table 10 shows that middle, high, and all income groups are positively correlated which means that as labor increases, the farm income increases which conforms to the intuitive feeling.

Total Open Acres

Size of business is a measure of performance and the area of the farm is a measure of size of business and can be used to compare the

TABLE 10

AVERAGE OF THE PRODUCTIVE MAN WORK UNITS FOR THE FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Average of Productive Man Work Units | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 134 | | | |
| 1965 | Low | 158 | 17.9 | -35.8 | -0.9006 |
| 1966 | | 94 | -40.5 | | |
| 1967 | | 86 | - 8.5 | | |
| 1964 | | 150 | | | |
| 1965 | Middle | 142 | 5.3 | 43.3 | 0.4567 |
| 1966 | | 186 | 31.0 | | |
| 1967 | | 215 | 15.6 | | |
| 1964 | | 119 | | | |
| 1965 | High | 215 | 80.7 | 207.6 | 0.5060 |
| 1966 | | 320 | 48.8 | | |
| 1967 | | 366 | 14.4 | | |
| 1964 | | 138 | | | |
| 1965 | All farms | 165 | 19.6 | 60.1 | 0.2424 |
| 1966 | | 173 | 4.8 | | |
| 1967 | | 221 | 27.7 | | |

farms of similar enterprises. Table 11 shows that for the middle, high, and all income groups, as the size of the cropped area increases, the farm income increases. The mere increase in the cultivated area would not have increased the farm income without labor efficiency. For middle, high and all income groups, there is substantial increase in the number of open acres over a period from 1964 to 1967. The percent increase is 33.3, 82.4, and 34.3 for the middle, high, and all income groups, respectively. This trend of increase in open acres increasing the farm income is well manifested in today's American agriculture where the size of the farms is on the increase and the number of farms is on the decrease.

## Farm Receipts

Gross farm income. Generally, gross farm income is closely related to net farm income. The relationship between the gross farm income and family farm income gives the clue to which direction the farm has to move, i.e., whether it has to expand or contract the business or stay where they are. For a low profit farm, it will be useful to increase size as long as the proportion of expenses is the same or decreasing or negligibly increasing. Table 12 reveals that for the middle income group, the gross farm income is significantly correlated with family farm income with correlation coefficient = 0.9306. In such a case it could be said that it will definitely increase the family farm income by increasing the farm business if the proportion of expenses is

TABLE 11

AVERAGE OF TOTAL OPEN ACRES FOR THE FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Average of Total Open Acres | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 100 | | | |
| 1965 | Low | 127 | 27.0 | -12.0 | -0.7363 |
| 1966 | | 70 | 44.9 | | |
| 1967 | | 88 | 25.7 | | |
| 1964 | | 105 | | | |
| 1965 | Middle | 104 | - 1.0 | 33.3 | 0.4786 |
| 1966 | | 125 | 20.2 | | |
| 1967 | | 140 | 12.0 | | |
| 1964 | | 108 | | | |
| 1965 | High | 143 | 32.4 | 82.4 | 0.5872 |
| 1966 | | 192 | 34.3 | | |
| 1967 | | 197 | 2.6 | | |
| 1964 | | 105 | | | |
| 1965 | All farms | 120 | 14.3 | 34.3 | 0.4698 |
| 1966 | | 128 | 6.7 | | |
| 1967 | | 141 | 10.2 | | |

TABLE 12

DEFLATED[a] AVERAGE OF GROSS FARM INCOME FOR THE FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Gross Farm Income | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 8,128 | | | |
| 1965 | Low | 8,460 | 4.1 | -41.3 | -0.9640 |
| 1966 | | 4,155 | -50.9 | | |
| 1967 | | 4,774 | 14.9 | | |
| 1964 | | 6,426 | | | |
| 1965 | Middle | 8,211 | 27.8 | 52.7 | 0.9306 |
| 1966 | | 11,117 | 35.4 | | |
| 1967 | | 9,815 | -11.7 | | |
| 1964 | | 18,066 | | | |
| 1965 | High | 22,571 | 24.9 | 49.5 | 0.7102 |
| 1966 | | 28,116 | 24.6 | | |
| 1967 | | 27,008 | - 3.9 | | |
| 1964 | | 9,920 | | | |
| 1965 | All farms | 12,037 | 21.3 | 31.0 | 0.8628 |
| 1966 | | 13,746 | 14.2 | | |
| 1967 | | 12,998 | - 5.4 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Received by Farmers, p. 470.

maintained in either of the three ways mentioned above. For high and all income groups, the correlation coefficients = 0.7102 and 0.8628, respectively, which are near to the significance level. Because correlation coefficient = 0.8628 for all income group, it could be generalized that for farms in the region of study it is worth while to increase the gross farm income under the prevalent conditions.

Capital assets. Table 13 shows that there is a general trend of increased family farm income with the increased capital assets. For the middle income group, it is highly significant with correlation coefficient = 0.9958 and for the all income group it is significant with correlation coefficient = 0.8908 and for the high income group, it is near the significant level with a correlation coefficient = 0.8183. From this trend it could be said that it pays to increase the capital assets.

Increase in inventory. When a farm has optimum inventories, then increase in inventories may cause to reduce the farm income accordingly. But when the farm has less than optimum inventories, then it pays to increase the inventories as long as the optimum level is not reached. So the relationship between the value of increase in inventory and family farm income shows whether, for the farm groups, the optimum level of inventory exists or not. Table 14 reveals that there is a general trend which is quite significant of increase in family farm income with the increase in the value of increase in inventory. For middle and all income groups, correlation coefficients were 0.8919 and 0.9394,

TABLE 13

DEFLATED[a] AVERAGE OF CAPITAL ASSETS FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Capital Assets | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 240 | | | |
| 1965 | Low | 201 | 16.3 | -100.0 | -0.9984 |
| 1966 | | 0 | -100.0 | | |
| 1967 | | 0 | -- | | |
| 1964 | | 30 | | | |
| 1965 | Middle | 157 | 423.3 | 596.7 | 0.9958 |
| 1966 | | 412 | 162.4 | | |
| 1967 | | 209 | -49.3 | | |
| 1964 | | 319 | | | |
| 1965 | High | 369 | 15.7 | 60.8 | 0.8183 |
| 1966 | | 2,624 | 611.1 | | |
| 1967 | | 125 | -95.2 | | |
| 1964 | | 161 | | | |
| 1965 | All farms | 224 | 39.1 | -18.1 | 0.8908 |
| 1966 | | 883 | 294.2 | | |
| 1967 | | 132 | -85.1 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Received by Farmers, p. 470.

TABLE 14

DEFLATED[a] AVERAGE OF THE VALUE OF INCREASE IN INVENTORY FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Increase in Inventory | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 2,008 | | | |
| 1965 | Low | 613 | -69.5 | -82.9 | -0.7941 |
| 1966 | | 390 | -36.4 | | |
| 1967 | | 343 | -12.1 | | |
| 1964 | | 894 | | | |
| 1965 | Middle | 1,368 | 53.0 | 10.5 | 0.8910 |
| 1966 | | 1,792 | 31.0 | | |
| 1967 | | 988 | -44.9 | | |
| 1964 | | 1,829 | | | |
| 1965 | High | 3,634 | 88.7 | 204.0 | 0.7487 |
| 1966 | | 6,570 | 80.8 | | |
| 1967 | | 5,561 | -15.4 | | |
| 1964 | | 1,431 | | | |
| 1965 | All farms | 1,764 | 23.3 | 41.0 | 0.9394 |
| 1966 | | 2,676 | 51.7 | | |
| 1967 | | 2,017 | -24.6 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Farm Real Estate Value, p. 430.

respectively, which are significant. For the high income group, the correlation coefficient was 0.7487 which is near the significance level. So with this trend, it could be said that it pays to increase the value of inventory.

Government payments. It could be expected from the economic point of view that government payments increase the farm income; such is the case with the farms under study. For all the groups, government payments (Table 15) are positively related to family farm income. For low, middle, high and all income groups, the correlation coefficients were 0.7480, 0.9687, 0.5148, and 0.7759 in the same order, out of which for the middle income group it is highly significant. Though there is positive relationship for all groups, to increase the government payment involves the political aspect and, therefore, this cannot be recommended as a measure to increase the farm income under normal conditions.

Crop receipts. For any general farm crop receipts is one of the major items of receipts. So proper crop management could be expected to lead to a higher income. In Table 16 middle and all income groups are significantly correlated with correlation coefficients which were 0.9032 and 0.8906, respectively. This shows that for the region of the study, as a general measure it could be advocated that it pays to increase crops. For high and low income groups, correlation coefficients were -0.8692 and -0.6842, respectively. This negative relationship may be due to the high cost of production of crops. In such a case, probably

TABLE 15

DEFLATED[a] AVERAGE OF GOVERNMENT PAYMENTS FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Government Payments | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 0 | | | |
| 1965 | Low | 548 | | | 0.7480 |
| 1966 | | 483 | -11.9 | 40.5 | |
| 1967 | | 803 | 66.3 | | |
| 1964 | | 0 | | | |
| 1965 | Middle | 410 | | | 0.9687 |
| 1966 | | 1,085 | 164.6 | 61.2 | |
| 1967 | | 661 | -39.1 | | |
| 1964 | | 0 | | | |
| 1965 | High | 530 | | | 0.5148 |
| 1966 | | 1,191 | 124.7 | 168.4 | |
| 1967 | | 1,424 | 19.6 | | |
| 1964 | | 0 | | | |
| 1965 | All farms | 478 | | | 0.7759 |
| 1966 | | 955 | 99.8 | 87.9 | |
| 1967 | | 898 | - 6.0 | | |

[a]United States Bureau of the Census, Statistical Abstract of the United States, 1968 (Washington, D.C.: Government Printing Office, 1968), Consumer Price Index, p. 347.

TABLE 16

DEFLATED[a] AVERAGE OF CROP RECEIPTS FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Crop Receipts | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 2,026 | | | |
| 1965 | Low | 3,404 | 68.1 | -23.7 | -0.6842 |
| 1966 | | 1,330 | -60.9 | | |
| 1967 | | 1,545 | 16.2 | | |
| 1964 | | 2,418 | | | |
| 1965 | Middle | 2,716 | 12.3 | - 8.2 | 0.9032 |
| 1966 | | 5,246 | 93.2 | | |
| 1967 | | 2,219 | -57.8 | | |
| 1964 | | 4,583 | | | |
| 1965 | High | 4,188 | - 8.6 | 5.9 | -0.8692 |
| 1966 | | 3,785 | - 9.6 | | |
| 1967 | | 4,855 | 28.3 | | |
| 1964 | | 2,882 | | | |
| 1965 | All farms | 3,282 | 13.9 | - 5.2 | 0.8906 |
| 1966 | | 3,838 | 16.9 | | |
| 1967 | | 2,733 | -28.8 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Received by Farmers for All Crops, p. 470.

it may be more beneficial to reduce the cost of crop production instead of reducing the crop receipts unless the crops are produced at the minimum cost.

Livestock receipts. Livestock is one of the major forms of receipts. For the farms under study, livestock receipts make up more than any other form. The percentage change for different groups is considered over a period of years from 1964 to 1967 (Table 17) and for all groups it has increased. For low, middle, high and all income groups, the percent increase is 9.6, 28.6, 63.3, and 31.4, respectively. Middle, high and all income groups are positively correlated with correlation coefficients of 0.6416, 0.5967 and 0.6937, respectively. But the low income group the correlation of livestock receipts with income was -0.9249 and the reason for this might be the high cost of production of livestock.

Miscellaneous receipts. All groups of miscellaneous receipts (Table 18) have decreased. The percent decrease is -29.1, -43.7, -54.4, and -47.6 for low, middle, high and all income groups, respectively. Only the middle income group is significantly correlated with a correlation coefficient of -0.8861 and the high and all income groups have correlation coefficients of -0.8050 and -0.8127 which are near the significant level. The low income group has a low correlation coefficient of -0.1866.

TABLE 17

DEFLATED[a] AVERAGE OF LIVESTOCK RECEIPTS FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Livestock Receipts | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 3,012 | | | |
| 1965 | Low | 3,595 | 19.4 | 9.6 | -0.9249 |
| 1966 | | 1,666 | -53.7 | | |
| 1967 | | 1,517 | - 8.9 | | |
| 1964 | | 3,889 | | | |
| 1965 | Middle | 3,045 | -21.7 | 28.6 | 0.6416 |
| 1966 | | 5,188 | 70.4 | | |
| 1967 | | 5,003 | - 3.6 | | |
| 1964 | | 8,223 | | | |
| 1965 | High | 12,730 | 54.8 | 63.3 | 0.5967 |
| 1966 | | 12,333 | 3.1 | | |
| 1967 | | 13,429 | 8.9 | | |
| 1964 | | 4,794 | | | |
| 1965 | All farms | 5,726 | 19.4 | 31.4 | 0.6937 |
| 1966 | | 6,137 | 7.2 | | |
| 1967 | | 6,297 | 2.6 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Received by Farmers for Livestock and Products, p. 470.

TABLE 18

DEFLATED[a] AVERAGE OF MISCELLANEOUS RECEIPTS FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Miscellaneous Receipts | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 842 | | | |
| 1965 | Low | 130 | -84.6 | -29.1 | -0.1866 |
| 1966 | | 305 | 134.6 | | |
| 1967 | | 597 | 95.7 | | |
| 1964 | | 833 | | | |
| 1965 | Middle | 382 | -54.1 | -43.7 | -0.8861 |
| 1966 | | 211 | -44.8 | | |
| 1967 | | 469 | 122.3 | | |
| 1964 | | 3,112 | | | |
| 1965 | High | 657 | -78.9 | -54.4 | -0.8050 |
| 1966 | | 1,006 | 53.1 | | |
| 1967 | | 1,418 | 41.0 | | |
| 1964 | | 1,432 | | | |
| 1965 | All farms | 388 | -72.9 | -47.6 | -0.8127 |
| 1966 | | 457 | 17.8 | | |
| 1967 | 751 | 64.3 | | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Received by Farmers, p. 470.

## Farm Expenses

Total farm expenses. Farm economy does not lie in how little one spends but how wisely one spends. Increasing expenditures do not necessarily mean the lowering of income. When the increased expenditure brings increased income, it means money has been spent economically. On the contrary, if the increased expenditures has decreased income, it means that money has not been spent economically. Table 19 shows that expenditures for middle, high and all income groups have increased with the family farm income. The percent increase over the period of years is 16.2, 65.5, and 33.4 for middle, high, and all income groups. But for the low income group, there is -44.4 percent decrease in expenses. Only the middle income group is significantly correlated among the positively correlated groups with correlation coefficient of 0.9167, and the high and all income groups have correlation coefficients of 0.4848 and 0.7453, respectively. This trend gives a clue that, generally speaking, the farms are operating with a good deal of economy. But the low income group has a correlation coefficient of -0.9421 which is significant as it shows that there is no economy in spending for this group. This fact is evidence to the gross farm income being negatively correlated (correlation coefficient = -0.9640) in Table 12, page 40, for the low income group.

Cost of hired labor. In an affluent country like the United States there is no wonder that the cost of labor is high. There are two

TABLE 19

DEFLATED[a] AVERAGE OF TOTAL FARM EXPENSES FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Total Farm Expenses | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 8,047 | | | |
| 1965 | Low | 8,851 | 7.3 | -44.4 | -0.9421 |
| 1966 | | 4,230 | -54.1 | | |
| 1967 | | 4,890 | 12.9 | | |
| 1964 | | 6,751 | | | |
| 1965 | Middle | 6,496 | - 6.1 | 16.2 | 0.9167 |
| 1966 | | 10,699 | 58.2 | | |
| 1967 | | 8,572 | -21.8 | | |
| 1964 | | 13,932 | | | |
| 1965 | High | 16,916 | 18.5 | 65.6 | 0.4848 |
| 1966 | | 23,623 | 34.2 | | |
| 1967 | | 25,220 | 4.2 | | |
| 1964 | | 8,971 | | | |
| 1965 | All farms | 9,842 | 9.7 | 33.4 | 0.7453 |
| 1966 | | 12,390 | 25.9 | | |
| 1967 | | 11,968 | - 3.4 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Paid by Farmers for All Commodities Bought Including Interest, Taxes, and Wage Rates, p. 471.

alternatives to decrease labor costs. One is mechanization and the other is using family labor. All the work on the farm may not be done by machines. There are two reasons for this. Either the machines may not be able to do some particular farm job or, in cases where the work is too small to be done by machines, it may be less costly to hire the labor when the farm family is either engaged in work on the farm or has off-farm employment. In such cases it is unavoidable to hire the labor though it is costly. Table 20 shows that except for the middle income group, all the remaining groups show negative correlation. For the middle income group, the correlation coefficient of 0.7992 which is near the level of significance and so for this group, it is all right to hire the labor. For the low, high and all income groups, correlation coefficients = -0.5109, -0.8674, and -0.5702, respectively, and with the present data, it cannot be said whether this cost is avoidable or unavoidable for the above mentioned groups.

Cost of feed purchased. The cost of feed purchased has some peculiar characteristics associated with it. When the type of feed purchased is cheap but does not have much effect on the final product, it will be worthwhile to add or substitute some feed though it may be apprently costly, but has a desired effect on the final product. In some other cases, the cost of feed may be costly and still it may not have the desired effect because of the wrong proportion of the feed mixture. By having the right proportion in the feed mixture, it may apprently increase the cost but may increase the income much more or it

TABLE 20

DEFLATED[a] AVERAGE OF THE COST OF LABOR HIRED FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Cost of Labor Hired | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 280 | | | |
| 1965 | Low | 898 | 220.7 | -15.7 | -0.5109 |
| 1966 | | 217 | -75.8 | | |
| 1967 | | 236 | 8.8 | | |
| 1964 | | 315 | | | |
| 1965 | Middle | 270 | -14.3 | 1.0 | 0.7992 |
| 1966 | | 401 | 48.5 | | |
| 1967 | | 318 | -20.7 | | |
| 1964 | | 1,738 | | | |
| 1965 | High | 1,246 | -28.3 | -17.7 | -0.8674 |
| 1966 | | 1,280 | 2.7 | | |
| 1967 | | 1,430 | 11.7 | | |
| 1964 | | 679 | | | |
| 1965 | All farms | 690 | 1.6 | -13.4 | -0.5702 |
| 1966 | | 583 | 15.5 | | |
| 1967 | | 588 | 0.9 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Paid by Farmers as Wage Rates for Hired Farm Labor, p. 471.

may decrease the cost and increase the income. Table 21 shows that the middle and high income groups are positively correlated and the low and all income groups are negatively correlated and none among the four groups is significant.

Cost of fertilizer and lime. Cost of fertilizer and lime also has some peculiar characteristics associated with it. Time, the proper mixture, and method of application are important whether cost is more or less. Just because cost has negative relationship with farm income, it does not necessarily mean that there is an excess of the use of fertilizer and lime. It might be due to improper use which might have had an adverse effect on yield. It may be due to applying less than the minimum requirement even with substantial cost but not enough to have sufficient effect to increase the yield. So the effect of cost of fertilizer and lime on farm income without some other considerations may not give a meaningful idea. Table 22 shows the cost of fertilizer and lime and its association with family farm income. Though for the low income group, the correlation coefficient = -0.9752 which is highly significant, at once it cannot be said that there is excess of the use of fertilizer and lime. On the other hand, deflated average of the cost of fertilizer and lime shows that, for the low income group as a whole, it is less than that of any other group as a whole. So to get a meaningful idea, it is necessary to consider some other details which were discussed above. Middle and high income groups have positive and all income group has negative relationship with family farm income.

TABLE 21

DEFLATED[a] AVERAGE OF THE COST OF FEED PURCHASED FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Cost of Feed Purchased | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 548 | | | |
| 1965 | Low | 790 | 44.2 | -16.2 | -0.7165 |
| 1966 | | 282 | -64.3 | | |
| 1967 | | 459 | 62.8 | | |
| 1964 | | 818 | | | |
| 1965 | Middle | 368 | -55.0 | 23.2 | 0.1724 |
| 1966 | | 840 | 128.3 | | |
| 1967 | | 1,008 | 20.0 | | |
| 1964 | | 2,862 | | | |
| 1965 | High | 3,535 | 23.5 | 44.0 | 0.1843 |
| 1966 | | 3,369 | - 4.7 | | |
| 1967 | | 4,122 | 22.4 | | |
| 1964 | | 1,283 | | | |
| 1965 | All farms | 1,308 | 1.9 | 30.9 | -0.0244 |
| 1966 | | 1,356 | 3.7 | | |
| 1967 | | 1,680 | 23.9 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Paid by Farmers for Feed, p. 471.

TABLE 22

DEFLATED[a] AVERAGE OF THE COST OF FERTILIZER AND LIME FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Cost of Fertilizer and Lime | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 784 | | | |
| 1965 | Low | 802 | 2.3 | -56.5 | -0.9752 |
| 1966 | | 441 | 45.0 | | |
| 1967 | | 341 | -22.7 | | |
| 1964 | | 758 | | | |
| 1965 | Middle | 595 | -21.5 | 117.3 | 0.0432 |
| 1966 | | 824 | 38.5 | | |
| 1967 | | 1,647 | 99.9 | | |
| 1964 | | 1,132 | | | |
| 1965 | High | 1,049 | - 7.3 | 18.6 | 0.2220 |
| 1966 | | 1,307 | 24.6 | | |
| 1967 | | 1,342 | 2.7 | | |
| 1964 | | 863 | | | |
| 1965 | All farms | 768 | -11.0 | 41.9 | -0.2056 |
| 1966 | | 850 | 10.7 | | |
| 1967 | | 1,225 | 44.1 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Paid by Farmers for Fertilizers, p. 471.

Cost of capital assets. Modern agriculture is becoming more and more capital intensive. Capitalistic agriculture is not only labor saving but also cost reducing device in most cases in the agriculturally advanced countries. There is not only two major divisions of traditional agriculture which is labor intensive, and modern agriculture which is capital intensive, there are many degrees inbetween these two. So as long as the optimum level of capital is not present, it pays to increase the capital assets. Table 23 shows that for the middle, high and all income groups the cost of capital assets, correlation coefficients of 0.9008, 0.6762 and 0.9357 which means for the middle and all income groups, it is significant and for the high income group, it is near the significance level. This trend shows that there is a lot of scope to increase the capital assets for the farms in these groups.

Livestock expenses. Table 24 shows how the livestock expenses are related to family farm income. The middle income group is the only group that has significant correlation with a correlation coefficient of 0.8960. The high and all income groups have correlation coefficients of 0.5498 and 0.7542 which are quite considerable. This gives a trend that reveals that increase in the livestock would benefit the farm to increase its income as increased livestock involves the cost.

Value of decrease in inventory. As it could be expected that the decrease in inventory may have a negative relationship with farm income, so also all the groups under study are negatively correlated. But only

TABLE 23

DEFLATED[a] AVERAGE OF THE COST OF CAPITAL ASSETS FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Cost of Capital Items | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 1,928 | | | |
| 1965 | Low | 1,889 | - 2.0 | -61.5 | -0.9870 |
| 1966 | | 664 | -64.8 | | |
| 1967 | | 742 | 11.7 | | |
| 1964 | | 814 | | | |
| 1965 | Middle | 1,892 | 132.4 | 76.3 | 0.9068 |
| 1966 | | 2,429 | 28.4 | | |
| 1967 | | 1,435 | -40.9 | | |
| 1964 | | 1,918 | | | |
| 1965 | High | 2,579 | 34.5 | 235.3 | 0.6762 |
| 1966 | | 8,819 | 242.0 | | |
| 1967 | | 6,432 | -27.1 | | |
| 1964 | | 1,395 | | | |
| 1965 | All farms | 2,071 | 48.5 | 83.7 | 0.9357 |
| 1966 | | 3,640 | 75.8 | | |
| 1967 | | 2,562 | -29.6 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Paid by Farmers for All Commodities Bought Including Interest, Taxes, and Wage Rates, p. 471.

TABLE 24

DEFLATED[a] AVERAGE OF THE LIVESTOCK EXPENSES FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Livestock Expenses | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 793 | | | |
| 1965 | Low | 203 | -74.4 | -82.0 | -0.7432 |
| 1966 | | 174 | -14.3 | | |
| 1967 | | 143 | -17.8 | | |
| 1964 | | 619 | | | |
| 1965 | Middle | 392 | -36.7 | 77.2 | 0.8960 |
| 1966 | | 1,931 | 392.6 | | |
| 1967 | | 1,097 | -43.2 | | |
| 1964 | | 1,268 | | | |
| 1965 | High | 1,976 | 55.8 | 84.2 | 0.5498 |
| 1966 | | 2,081 | 5.3 | | |
| 1967 | | 2,336 | 12.3 | | |
| 1964 | | 835 | | | |
| 1965 | All farms | 757 | - 9.3 | 40.4 | 0.7542 |
| 1966 | | 1,510 | 99.5 | | |
| 1967 | | 1,172 | -22.4 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Paid by Farmers for Livestock, p. 471.

the middle income group is highly significant in its correlation with a correlation coefficient of -0.9921 (see Table 25). The low, high and all income groups have correlation coefficients of -0.5547, -0.5714, and -0.6762 in the same order.

Other expenses. Table 26 shows that, except for the low income group, no other group in other expenses is significantly related to family farm income. The different constituents of other expenses are seeds and plants, machine hire, veterinary and medicine, supplies, repair and maintenance, breeding fees, gasoline, oil and other fuel, storage and warehousing, taxes, insurance, interest, utilities, hauling, auto, cash rent, and miscellaneous.

Operator's Earnings

Operator's earnings indicates the amount of income the operator received for his labor and management plus the value of farm privileges for one year. Table 27 shows that three groups in operator's earnings are almost perfectly correlated with family farm income. Middle, high and all income groups have correlation coefficients of 0.9989, 0.9934 and 0.9891 in the same order which reveals an interesting fact that the farms under study have efficient labor and management, except for farms belonging to low income group for which the correlation coefficient is -0.7099.

TABLE 25

DEFLATED[a] AVERAGE OF THE VALUE OF DECREASE IN INVENTORY FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Decrease in Inventory | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 734 | | | |
| 1965 | Low | 1,123 | 53.0 | - 3.3 | -0.5547 |
| 1966 | | 623 | -44.5 | | |
| 1967 | | 710 | 14.0 | | |
| 1964 | | 535 | | | |
| 1965 | Middle | 474 | -11.4 | -17.4 | -0.9921 |
| 1966 | | 348 | -26.6 | | |
| 1967 | | 442 | 27.0 | | |
| 1964 | | 523 | | | |
| 1965 | High | 85 | -83.7 | 201.1 | -0.5714 |
| 1966 | | -- | -100.0 | | |
| 1967 | | 1,575 | | | |
| 1964 | | 584 | | | |
| 1965 | All farms | 542 | - 7.2 | 38.5 | -0.6762 |
| 1966 | | 329 | -39.3 | | |
| 1967 | | 809 | 145.9 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Farm Real Estate Value, p. 430.

TABLE 26

DEFLATED[a] AVERAGE OF OTHER EXPENSES FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Other Expenses | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 3,325 | | | |
| 1965 | Low | 3,117 | - 6.3 | -43.9 | -0.9764 |
| 1966 | | 1,511 | -51.5 | | |
| 1967 | | 1,865 | 23.4 | | |
| 1964 | | 2,892 | | | |
| 1965 | Middle | 2,326 | -19.6 | - 6.0 | 0.3569 |
| 1966 | | 2,993 | 28.7 | | |
| 1967 | | 2,718 | - 9.2 | | |
| 1964 | | 4,121 | | | |
| 1965 | High | 5,923 | 43.7 | 40.2 | 0.3733 |
| 1966 | | 4,993 | -15.7 | | |
| 1967 | | 5,779 | 15.7 | | |
| 1964 | | 3,327 | | | |
| 1965 | All farms | 3,475 | 4.4 | - 0.9 | -0.5602 |
| 1966 | | 3,129 | 10.0 | | |
| 1967 | | 3,296 | 5.3 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), All Commodities Bought Including Interest, Taxes, and Wage Rates, p. 471.

TABLE 27

DEFLATED[a] AVERAGE OF OPERATOR'S EARNINGS FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Operator's Earnings | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 1,052 | | | |
| 1965 | Low | 1,411 | 34.1 | -12.9 | -0.7099 |
| 1966 | | 799 | -43.4 | | |
| 1967 | | 916 | 14.6 | | |
| 1964 | | 1,298 | | | |
| 1965 | Middle | 1,467 | 13.0 | 19.0 | 0.9989 |
| 1966 | | 1,947 | 32.7 | | |
| 1967 | | 1,544 | -20.7 | | |
| 1964 | | 3.689 | | | |
| 1965 | High | 5,165 | 40.0 | 25.5 | 0.9934 |
| 1966 | | 6,224 | 20.5 | | |
| 1967 | | 4,629 | -25.6 | | |
| 1964 | | 1,857 | | | |
| 1965 | All farms | 2,421 | 30.4 | 17.8 | 0.9891 |
| 1966 | | 2,767 | 14.3 | | |
| 1967 | | 2,188 | -20.9 | | |

[a]United States Bureau of the Census, Statistical Abstract of the United States (Washington, D.C.: Government Printing Office, 1968), Consumer Price Index, p. 347.

## Value of Crops

Though the correlation of crop receipts does tell whether it has contributed to increased income or not, it does not tell which particular crop or crops are responsible. The farmer needs to know whether he has to discontinue growing of any crop or to produce more of some crops in order to increase his income and the relationship of the value of different crops with the family farm income gives him an idea for this purpose. Value of soybeans (see Appendix) is significantly correlated with family farm income with a correlation coefficient of 0.8799 for middle income group and, therefore, it pays for the farmers of this group to grow soybeans. The value of tobacco for the high income group (see Appendix) has a correlation coefficient of 0.7632 which is near the significance level. For some farms, when the crop receipts as a whole are negatively related to family farm income, some particular crops may be positively related. Such a case is seen for the low income group, the crop receipts of which are negatively related to family farm income, but the value of wheat is positively correlated with a correlation coefficient of 0.9691 (see Appendix). So it appears to be advisable for the low income group to grow more wheat.

## Yield Per Acre of Crops

Yield per acre of crops gives further evidence to a farmer who has doubt whether to grow or not to grow a particular crop when this crop has a low correlation coefficient for the value of the crop. When such a crop has a higher figure for the yield per acre, then it gives a

clue to the farmer that increasing the value of that crop by increasing the yield per acre, it is useful for him. Such a case is seen for yield per acre of corn (see Appendix) for the high income group which has a correlation coefficient of 0.8262, and the same group has a much lower correlation with the value of corn. So for the high income group, it is better to increase the value of corn by increasing the yield per acre. Yield per acre of wheat (see Appendix) has a correlation coefficient of 0.9675 for the low income group so it may be better for the low income group to increase the yield per acre of wheat.

# CHAPTER IV

## SUMMARY AND CONCLUSIONS

### Summary

Agriculture is lagging behind in Tennessee compared to other southeastern states. In 1954 the net income per farm in Tennessee was $1452 and its rank was fifth among the southeastern states and in 1964 though the net income per farm had increased to $1801, its relative position occupied the lowest place. From 1954 to 1969, the percent increase in net income per farm was lowest for Tennessee with only twenty-four percent, whereas four other states have increased it by more than 100 percent; so there is a great need to improve the agriculture in Tennessee.

The basic data for the present study was selected from the records of the Tennessee farms in Unit Test Demonstration program. The basic data for 42 general farms was selected for a four year period from 1964 to 1967, as far as possible using as a criteria that these are classified as general farms for at least three out of the four years. These 42 general farms are located in 25 counties of the state of Tennessee, and cover all the six crop reporting districts of Tennessee.

The selected 42 farms were divided into three groups for each year based on the family farm income. The high, middle and low income groups are the three divisions which have the averages for 11, 20 and

11 farms respectively. The fourth group is the average for all the farms for each year.

The correlation coefficient between family farm income and all the main factors affecting was determined using the formula:

$$r = \frac{\sum xy}{\sqrt{(\sum x^2)\ (\sum y^2)}}$$

$/ r / \geq 0.0878$ is significant (at 95 percent level).

$/ r / \geq 0.959$ is highly significant (at 99 percent level) and the analysis is made.

Correlation coefficients show the degree of association between variables, but it does not tell the extent to which one is the cause for the other. An example will make it clear. A farmer who increases seeding rate, fertilizer and water application may find that all these independent variables are significantly correlated with increased income. But correlation coefficients do not tell that to what extent one variable is the cause for the other. It might have even so happened that the new seeding rate may not be any better than the old seeding rate. Income might have increased only because of increased fertilizer and water application. Because there is a chance of being mislead in such a case, one has to exercise caution while considering the recommendation measures based on correlation coefficients alone.

The percent change for family farm income and all the main factors has been found out for year to year and also for 1964 to 1967 as a whole.

Farm inventories constitute the major cost in farming. The relation between the family farm income and the value of inventories gives an idea as to what extent it is economical to have the inventories. Table IV, page 28, shows that none of the groups are significantly correlated. Low income group is negatively correlated with correlation coefficients = 0.2050, 0.0783 and 0.4558, respectively. The reason for the low income group being negatively correlated is of crucial importance. It may be due to excess of inventories or due to bad management. The actual figures of the weighted average of total inventories show that for low income group, it is less than that of other groups. So, the possibility of excess of inventories is ruled out. Then the alternative reason is inefficient management. Again there may be two reasons for inefficient management. One is due to inefficient farm managers and the other is the concentration on the off-farm income, which might not have given enough scope to manage the farm efficiently. Only two farms remained in the low-income group for all four year. The reason for the low income for these farms may be due to the inefficient management. Many of the remaining nine farms for each year following 1964 are the farms which occupied positions either in the middle or high-income group in 1964. The reason for lowering of income for these groups may probably be due to the concentration on the off-farm employment.

For a farm with profit, it is advantageous to increase the gross farm income as long as the proportion of expenses is the same or

decreasing or negligibly increasing. For middle, high and all income groups in gross farm income, correlation coefficients = 0.9306, 0.7102 and 0.8628 which shows that it pays to increase the gross farm income for these groups. For the low-income group, correlation coefficient = 0.9640 which means the proportion of expenses is too high and the best way to increase the farm income would be to have economy in the cost of production.

Farm economy does not lie in how little one spends but how wisely one spends. Increasing expenditure does not necessarily mean the lessening of income. When the increased expenditure brings increased income, it means money has been spent economically. On the contrary, if the increased expenditure has decreased income, it means that money has not been spent economically. Middle, high and all income groups in total farm expenses have correlation coefficient = 0.9167, 0.4848 and 0.7453 which shows that the income could be increased for these farms by more expenditure with at least the same efficiency as it was before. Low-income group correlation coefficient = -0.9421 which means that there is no economy in spending and this serves as evidence for the rationale of the previously considered fact of the relationship between gross farm income and family farm income for the same group.

Operator's earnings indicates the amount of income the operator received for his labor and management plus the value of farm privileges, for one year. For middle, high and all income groups in operator's earnings correlation coefficients = 0.9989, 0.9934 and 0.9891 which

shows that for farms under study in these groups, the labor and management is good. Low-income group correlation coefficient = 0.7099, which though not significant, is considerable. So the solution for the problem of low-income group largely is efficient labor and management.

Middle income group for value of soybeans has correlation coefficient = 0.8799 with family farm income, and it is highly recommended to grow more of this crop.

For high income group, in the yield per acre of corn correlation coefficient = 0.8262, with family farm income, which is near significance level and it will be quite profitable to increase the yield per acre of this crop for this group.

Causes for the change in the grouping positions of the individual farms from low to high income group and vice versa were looked into. Out of seven farms which have moved from low to high income group or vice versa, during any of the four years, only two have moved to low income group from high income group and again have gone up to high income group. Out of the remaining five farms, four farms have gone up to high income group from low income group and only one farm has gone down to low income group from high income group.

One farm which went down to the low income group in 1965 from the high income group in 1964, had a decrease in family farm income of 92 percent. This decrease was mainly accompanied by 67 percent increase in open acres, 33 percent increase in gross farm income, 1690 percent increase in cost of capital assets, 104 percent increase in farm expenses, 456 percent increase in value of soybeans and 70 percent increase in

productive man work units and a decrease in operator's labor earnings of 30 percent. Cost of capital assets include purchase cost of items like land, machinery and equipment. The same farm went up to high income group in 1967 with an increase in family farm income by 1010 percent. This increase was mainly accompanied by decrease in the cost of capital assets and total farm expenses by 93 percent and 34 percent respectively and increase in government payments from $36 to $5670.

The second farm which went down to low income group in 1965 from high income group in 1964 had a decrease in family farm income by 60 percent. This was accompanied by the following major changes: The cost of capital assets increased by $1795 in 1965 which was 0 in 1964. Operator's labor earnings decreased by 57 percent. Productive man work units went to 345 in 1965 from 289 in 1964. The same farm increased its family farm income by about 11 times in 1966 from 1965 and went to high income group in 1966. This was mainly accompanied by decrease in the cost of labor hired and the cost of capital assets by 58 percent and 72 percent respectively and increase in productive man work units from 345 to 382.

The third farm went to high income group in 1967 from low income group in 1964 with 520 percent increase in family farm income. This was mainly accompanied by increase in livestock receipts, gross farm income and value of tobacco by 88 percent, 60 percent, and 253 percent, respectively.

The fourth farm went up to the high income group in 1966 from low income group in 1964 with an increase in family farm income by about 22 times. This was mainly accompanied by 77 percent increase in gross farm income, 6300 percent increase in cost of capital assets, 90 percent increase in operator's labor earnings and 33 percent increase in per acre yield of tobacco, and the government payment increased by $1084 from 0. Receipts from miscellaneous items increased by $3706 from 0.

The fifth farm went to high income group in 1967 from low income group in 1965 with an increase in family farm income by 580 percent. This was mainly associated with 350 percent increase in livestock receipts, 383 percent increase in gross farm income, 2399 percent increase in operator's labor earnings and 491 percent increase in productive man work units and decrease in other expenses and total farm expenses by 56 percent and 63 percent respectively.

Ths sixth farm increased its family farm farm income by about 13 times from 1964 to 1965 and went up to the high income group from low income group. This was mainly associated with 63 percent increase in open acres, 126 percent increase in gross farm income, 215 percent in cost of capital assets, 53 percent increase in total farm expenses, 690 percent increase in operator's labor earnings and 3420 percent increase in the value of soybeans. Increase in inventory and government payments increased by $5754 and $738 in 1965 from nothing in both the cases in 1964. The value of corn went down by 62 percent.

The seventh farm went down to the low income group in 1967 from high income group in 1964 with a decrease in family farm income by 79

percent. This was mainly accompanied by increases of 825 percent in cost of livestock, 41 percent in total farm expenses and 83 percent in productive man work units and a decrease in operator's labor earnings of 82 percent. This farm poses a strange case. In spite of very high increase in livestock expenses and high increase in total farm expenses and productive man work units, why was there decrease in family farm income? Probably, the farmer might have added too much livestock during that year and was beyond his managerial capacity. This might have resulted in very high increase in livestock expenses. It is possible that this livestock involved too much of work which increased his productive man work units. Because of too much work he might not have been able to do the work at the proper time which might have adversely affected his family farm income. The livestock he bought might be of poor quality which migh have increased his expenses. Probably he might not have had sufficient feed supplies for the increased livestock and this might have brought his income down. Since livestock expenses are part of the total farm expenses, it seems reasonable that total farm expenses increased by 41 percent after livestock expenses have increased by 825 percent.

The above discussion reveals that many of the factors like cost of capital assets, total farm expenses, productive man work units, open acres, value of soybeans have moved in the same direction as family farm income in some farms. Government payments and livestock receipts have contributed to the high income group. The only factor that could be said to be distinctively influencing family farm income is operator's labor

earnings. Wherever it has increased it is associated with high income group and wherever it has decreased it is associated with low income group.

## Conclusions

The reason for the higher income of the middle and high income groups is the favorable relationship between the major factors and the family farm income. The reason for the low income of the low income group is the preponderance of unfavorable relationship between major factors and family income.

Though no group shows significant correlation between family farm income and total inventory, middle and high income groups are positively related and low income group is negatively correlated which shows that the farm inventories could have been more efficiently used especially for low income group.

The expenditure for middle and high income groups is quite economically incurred; whereas, for the low income group it has not been so. So, economic spending is very necessary for the low income group.

For the middle and high income groups, returns to labor and management are good, The low income needs to increase its labor and managerial efficiency to a very great deal to increase family farm income.

For middle income group, it is highly recommended to increase the value of soybeans by growing more of that.

For high income group it will be worthwhile to increase the yield per acre of corn.

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# APPENDIX

TABLE 28

DEFLATED[a] AVERAGE OF NET MACHINERY COST FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Net Machinery Cost | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 1,847 | | | |
| 1965 | Low | 2,208 | 19.5 | - 3.6 | -0.6626 |
| 1966 | | 1,495 | -33.9 | | |
| 1967 | | 1,780 | 22.0 | | |
| 1964 | | 1,817 | | | |
| 1965 | Middle | 2,110 | 16.1 | - 2.6 | 0.6422 |
| 1966 | | 2,148 | 1.8 | | |
| 1967 | | 1,769 | -17.6 | | |
| 1964 | | 2,718 | | | |
| 1965 | High | 2,712 | - 0.2 | 28.3 | -0.3438 |
| 1966 | | 2,660 | - 1.9 | | |
| 1967 | | 3,488 | 31.1 | | |
| 1964 | | 2,061 | | | |
| 1965 | All farms | 2,289 | 11.1 | 7.8 | 0.0811 |
| 1966 | | 2,102 | - 8.2 | | |
| 1967 | | 2,222 | 5.7 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Price of Industrial Production, p. 430.

TABLE 29

DEFLATED[a] AVERAGE OF INTEREST ON CAPITAL FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Interest or Capital | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 1,285 | | | |
| 1965 | Low | 1,573 | 22.4 | -16.7 | -0.7149 |
| 1966 | | 1,198 | -23.8 | | |
| 1967 | | 1,070 | -10.7 | | |
| 1964 | | 1,227 | | | |
| 1965 | Middle | 1,362 | 11.0 | 32.4 | 0.3318 |
| 1966 | | 1,399 | 2.7 | | |
| 1967 | | 1,625 | 16.2 | | |
| 1964 | | 2,262 | | | |
| 1965 | High | 1,810 | -20.0 | - 9.2 | -0.8845 |
| 1966 | | 1,860 | 2.8 | | |
| 1967 | | 2,054 | 10.4 | | |
| 1964 | | 1,513 | | | |
| 1965 | All Farms | 1,535 | 1.4 | 5.2 | -0.5190 |
| 1966 | | 1,467 | - 4.2 | | |
| 1967 | | 1,592 | 8.5 | | |

[a]United States Bureau of the Census, Statistical Abstract of the United States, 1968 (Washington, D.C.: Government Printing Office, 1968), Consumer Price Index, p. 347.

TABLE 30

AVERAGE OF MAN EQUIVALENT FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Average of Man Equivalent | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 1.21 | | | |
| 1965 | Low | 1.35 | 11.6 | -15.7 | -0.8347 |
| 1966 | | 1.09 | -19.3 | | |
| 1967 | | 1.02 | - 6.4 | | |
| 1964 | | 1.26 | | | |
| 1965 | Middle | 1.36 | 7.9 | -13.5 | 0.1188 |
| 1966 | | 1.30 | - 4.4 | | |
| 1967 | | 1.09 | -16.2 | | |
| 1964 | | 1.66 | | | |
| 1965 | High | 1.96 | 18.0 | 5.4 | -0.1206 |
| 1966 | | 1.56 | -20.4 | | |
| 1967 | | 1.75 | 12.2 | | |
| 1964 | | 1.35 | | | |
| 1965 | All farms | 1.51 | 11.9 | - 8.4 | -0.0259 |
| 1966 | | 1.31 | -13.2 | | |
| 1967 | | 1.24 | - 5.3 | | |

TABLE 31

DEFLATED[a] AVERAGE OF GROSS FARM INCOME PER MAN EQUIVALENT FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Gross Farm Income/Man Equivalent | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 6,995 | | | |
| 1965 | Low | 7,372 | 5.4 | - 0.8 | -0.6017 |
| 1966 | | 5,401 | -26.7 | | |
| 1967 | | 6,936 | 28.4 | | |
| 1964 | | 10,398 | | | |
| 1965 | Middle | 7,610 | -26.8 | - 6.2 | -0.1971 |
| 1966 | | 9,272 | 21.8 | | |
| 1967 | | 9,758 | 5.2 | | |
| 1964 | | 13,965 | | | |
| 1965 | High | 14,526 | 4.0 | 15.1 | 0.8001 |
| 1966 | | 19,381 | 33.4 | | |
| 1967 | | 16,074 | -17.0 | | |
| 1964 | | 10,441 | | | |
| 1965 | All farms | 9,359 | -10.4 | 2.2 | 0.2228 |
| 1966 | | 10,906 | 16.5 | | |
| 1967 | | 10,673 | - 2.1 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Received by Farmers, p. 470.

TABLE 32

DEFLATED[a] AVERAGE OF INVESTMENT PER MAN EQUIVALENT FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Investment Per Man Equivalent | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 29,632 | | | |
| 1965 | Low | 43,775 | 47.7 | 20.5 | -0.0388 |
| 1966 | | 33,633 | -23.2 | | |
| 1967 | | 35,712 | 6.2 | | |
| 1964 | | 39,388 | | | |
| 1965 | Middle | 29,116 | -26.1 | -11.1 | -0.8162 |
| 1966 | | 26,930 | - 7.5 | | |
| 1967 | | 35,029 | 30.1 | | |
| 1964 | | 45,135 | | | |
| 1965 | High | 30,460 | -32.5 | -22.7 | -0.5705 |
| 1966 | | 36,775 | 20.7 | | |
| 1967 | | 34,890 | - 5.1 | | |
| 1964 | | 38,338 | | | |
| 1965 | All farms | 33,307 | -13.1 | - 8.3 | -0.9687 |
| 1966 | | 31,264 | - 6.1 | | |
| 1967 | | 35,172 | 12.5 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Farm Real Estate Value, p. 430.

TABLE 33

AVERAGE OF THE WORK UNITS PER MAN EQUIVALENT FOR THE FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Average of Work Units Per Man Equivalent | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 112 | | | |
| 1965 | Low | 167 | 49.1 | 32.1 | -0.0460 |
| 1966 | | 112 | 33.0 | | |
| 1967 | | 148 | 32.1 | | |
| 1964 | | 142 | | | |
| 1965 | Middle | 120 | -15.5 | 43.7 | 0.1506 |
| 1966 | | 153 | 27.5 | | |
| 1967 | | 204 | 33.3 | | |
| 1964 | | 145 | | | |
| 1965 | High | 184 | 26.9 | 66.9 | 0.4267 |
| 1966 | | 213 | 15.8 | | |
| 1967 | | 242 | 13.6 | | |
| 1964 | | 135 | | | |
| 1965 | All farms | 149 | 10.4 | 47.4 | 0.1586 |
| 1966 | | 158 | 6.0 | | |
| 1967 | | 199 | 25.9 | | |

TABLE 34

AVERAGE OF TOTAL ACRES FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Average of Total Inventories | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 152 | | | |
| 1965 | Low | 165 | 8.6 | - 2.6 | -0.6626 |
| 1966 | | 119 | -27.9 | | |
| 1967 | | 148 | 24.4 | | |
| 1964 | | 160 | | | |
| 1965 | Middle | 164 | 2.5 | 30.0 | 0.0389 |
| 1966 | | 164 | 0 | | |
| 1967 | | 208 | 26.8 | | |
| 1964 | | 185 | | | |
| 1965 | High | 160 | -13.5 | 48.1 | 0.1411 |
| 1966 | | 242 | 51.3 | | |
| 1967 | | 274 | 13.2 | | |
| 1964 | | 165 | | | |
| 1965 | All farms | 163 | - 1.2 | 27.3 | -0.0355 |
| 1966 | | 173 | 6.1 | | |
| 1967 | | 210 | 21.4 | | |

TABLE 35

DEFLATED[a] AVERAGE OF GROSS FARM INCOME PER OPEN ACRE FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Gross Farm Income Per Open Acre | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 83 | | | |
| 1965 | Low | 59 | -28.9 | -38.6 | -0.7778 |
| 1966 | | 59 | 0 | | |
| 1967 | | 51 | -13.6 | | |
| 1964 | | 88 | - 3.4 | - 8.0 | 0.7984 |
| 1965 | Middle | 85 | 25.9 | | |
| 1966 | | 107 | -24.3 | | |
| 1967 | | 81 | | | |
| 1964 | | 183 | | | |
| 1965 | High | 173 | - 5.5 | -14.8 | -0.4997 |
| 1966 | | 161 | - 6.9 | | |
| 1967 | | 156 | - 3.1 | | |
| 1964 | | 112 | | | |
| 1965 | All farms | 101 | - 9.8 | | |
| 1966 | | 109 | 7.9 | -17.0 | 0.0253 |
| 1967 | | 93 | -14.7 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Farm Real Estate Value, p. 470.

TABLE 36

DEFLATED[a] AVERAGE COST OF LIME AND FERTILIZER PER ACRE FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Cost of Lime and Fertilizer | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 8.7 | | | |
| 1965 | Low | 6.5 | -25.3 | -43.6 | -0.7863 |
| 1966 | | 6.6 | 1.5 | | |
| 1967 | | 4.9 | -25.6 | | |
| 1964 | | 6.6 | | | |
| 1965 | Middle | 6.7 | 1.1 | 26.1 | 0.3374 |
| 1966 | | 7.3 | 9.4 | | |
| 1967 | | 8.3 | 14.0 | | |
| 1964 | | 10.4 | | | |
| 1965 | High | 7.6 | -27.2 | - 3.3 | -0.9194 |
| 1966 | | 7.5 | - 1.8 | | |
| 1967 | | 10.1 | 35.4 | | |
| 1964 | | 8.1 | | | |
| 1965 | All farms | 6.9 | -14.8 | - 2.5 | -0.7109 |
| 1966 | | 7.2 | 4.3 | | |
| 1967 | | 7.9 | 9.7 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Paid by Farmers for Fertilizer, p. 471.

TABLE 37

DEFLATED[a] AVERAGE VALUE OF CORN FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average Value of Corn | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 1,532 | | | |
| 1965 | Low | 1,802 | 17.6 | -25.3 | -0.8732 |
| 1966 | | 1,000 | -44.5 | | |
| 1967 | | 1,145 | 14.5 | | |
| 1964 | | 1,790 | | | |
| 1965 | Middle | 2,684 | 50.0 | 100.3 | 0.1217 |
| 1966 | | 2,287 | -14.8 | | |
| 1967 | | 3,585 | 56.8 | | |
| 1964 | | 2,455 | | | |
| 1965 | High | 3,568 | 45.3 | 79.7 | 0.3640 |
| 1966 | | 3,579 | 0.3 | | |
| 1967 | | 4,412 | 23.3 | | |
| 1964 | | 1,897 | | | |
| 1965 | All farms | 2,085 | -41.5 | 66.7 | 0.1334 |
| 1966 | | 2,288 | -14.8 | | |
| 1967 | | 3,163 | -38.2 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Received by Farmers for Food Grains, p. 470.

TABLE 38

DEFLATED[a] AVERAGE VALUE OF COTTON FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average Value of Cotton | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 1,730 | | | |
| 1965 | Low | 8,205 | 374.3 | -76.8 | -0.5425 |
| 1966 | | 1,407 | -82.9 | | |
| 1967 | | 401 | -71.5 | | |
| 1964 | | 3,085 | | | |
| 1965 | Middle | 2,550 | -17.3 | -88.2 | 0.2116 |
| 1966 | | 3,442 | 35.0 | | |
| 1967 | | 364 | 89.4 | | |
| 1964 | | 7,202 | | | |
| 1965 | High | 6,205 | -13.8 | -61.1 | -0.5293 |
| 1966 | | 2,944 | -52.6 | | |
| 1967 | | 2,798 | - 5.0 | | |
| 1964 | | 3,808 | | | |
| 1965 | All farms | 4,988 | 31.0 | -73.5 | -0.0923 |
| 1966 | | 2,779 | -44.3 | | |
| 1967 | | 1,011 | -63.6 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Received by Farmers for Cotton, p. 470.

TABLE 39

DEFLATED[a] AVERAGE OF VALUE OF SOYBEANS FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average of Value of Soybeans | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 90 | | | |
| 1965 | Low | 3,078 | 3320.0 | 337.8 | 0.1347 |
| 1966 | | -- | -100.0 | | |
| 1967 | | 3,130 | | | |
| 1964 | | 1,167 | | | |
| 1965 | Middle | 950 | - 18.6 | 6.2 | 0.8799 |
| 1966 | | 2,049 | 115.7 | | |
| 1967 | | 1,239 | - 39.5 | | |
| 1964 | | 604 | | | |
| 1965 | High | 1,778 | 194.4 | 181.6 | -0.0394 |
| 1966 | | 616 | - 65.4 | | |
| 1967 | | 1,701 | 176.1 | | |
| 1964 | | 738 | | | |
| 1965 | All farms | 1,724 | 133.6 | 151.4 | 0.1817 |
| 1966 | | 1,137 | - 34.0 | | |
| 1967 | | 1,855 | 63.1 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Received by Farmers for Oil Bearing Crops, p. 470.

TABLE 40

DEFLATED[a] AVERAGE VALUE OF TOBACCO FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average Value of Tobacco | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 1,578 | | | |
| 1965 | Low | 1,840 | 16.6 | -47.1 | -0.7836 |
| 1966 | | 1,393 | -24.3 | | |
| 1967 | | 835 | -40.1 | | |
| 1964 | | 1,202 | | | |
| 1965 | Middle | 1,535 | 27.7 | 11.2 | 0.4903 |
| 1966 | | 1,430 | - 6.8 | | |
| 1967 | | 1,337 | - 6.5 | | |
| 1964 | | 1,806 | | | |
| 1965 | High | 1,822 | 0.9 | 8.3 | 0.7632 |
| 1966 | | 2,194 | 20.4 | | |
| 1967 | | 1,956 | -10.8 | | |
| 1964 | | 1,463 | | | |
| 1965 | All farms | 1,690 | 15.5 | - 6.5 | 0.5678 |
| 1966 | | 1,620 | - 4.1 | | |
| 1967 | | 1,368 | -15.6 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Received by Farmers for Tobacco, p. 470.

TABLE 41

DEFLATED[a] AVERAGE VALUE OF WHEAT FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Deflated Average Value of Wheat | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | -- | | | |
| 1965 | Low | -- | | | 0.9691 |
| 1966 | | 257 | | | |
| 1967 | | 208 | -19.1 | | |
| 1964 | | 239 | | | |
| 1965 | Middle | 408 | 70.7 | 116.7 | 0.4884 |
| 1966 | | 414 | 1.5 | | |
| 1967 | | 518 | 25.1 | | |
| 1964 | | 1,091 | | | |
| 1965 | High | 497 | -54.4 | -42.3 | -0.5503 |
| 1966 | | 740 | 48.9 | | |
| 1967 | | 629 | -15.0 | | |
| 1964 | | 400 | | | |
| 1965 | All farms | 325 | -18.7 | 16.5 | 0.2660 |
| 1966 | | 458 | 40.9 | | |
| 1967 | | 466 | 1.7 | | |

[a]United States Department of Agriculture, Agricultural Statistics, 1968 (Washington, D.C.: Government Printing Office, 1968), Prices Received by Farmers for Food Grains, p. 470.

TABLE 42

AVERAGE YIELDS (IN BUSHELS) PER ACRE OF CORN FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Average Yield Per Acre of Corn | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 72.6 | | | |
| 1965 | Low | 77.0 | 6.1 | -14.2 | -0.4254 |
| 1966 | | 77.0 | 0 | | |
| 1967 | | 62.3 | -19.1 | | |
| 1964 | | 67.9 | | | |
| 1965 | Middle | 79.7 | 17.4 | 14.6 | -0.1554 |
| 1966 | | 68.9 | -13.6 | | |
| 1967 | | 77.8 | 12.9 | | |
| 1964 | | 66.7 | | | |
| 1965 | High | 89.6 | 34.3 | 7.5 | 0.8262 |
| 1966 | | 83.9 | - 6.4 | | |
| 1967 | | 71.7 | -14.5 | | |
| 1964 | | 67.4 | | | |
| 1965 | All farms | 82.6 | 22.6 | 7.0 | 0.5440 |
| 1966 | | 75.0 | - 8.5 | | |
| 1967 | | 72.1 | - 4.0 | | |

TABLE 43

AVERAGE YIELD (IN POUNDS) PER ACRE OF COTTON FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Average Yield Per Acre of Cotton | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 377.5 | | | |
| 1965 | Low | 772.0 | 104.5 | -47.7 | -0.2382 |
| 1966 | | 676.6 | -12.4 | | |
| 1967 | | 197.5 | -70.8 | | |
| 1964 | | 1,014.8 | | | |
| 1965 | Middle | 718.3 | -29.2 | -77.7 | -0.5227 |
| 1966 | | 527.4 | -26.6 | | |
| 1967 | | 226.0 | -57.1 | | |
| 1964 | | 774.2 | | | |
| 1965 | High | 752.7 | - 2.8 | -58.3 | -0.0387 |
| 1966 | | 597.7 | -20.6 | | |
| 1967 | | 323.0 | -46.0 | | |
| 1964 | | 784.9 | | | |
| 1965 | All farms | 741.4 | - 5.5 | -68.9 | -0.1528 |
| 1966 | | 584.9 | -21.1 | | |
| 1967 | | 243.9 | -58.3 | | |

TABLE 44

AVERAGE YIELD (IN BUSHELS) PER ACRE OF SOYBEANS FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Average Yield Per Acre of Soybeans | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 12.0 | | | |
| 1965 | Low | 32.0 | 166.7 | 83.3 | -0.3345 |
| 1966 | | -- | -100.0 | | |
| 1967 | | 22.0 | | | |
| 1964 | | 23.0 | | | |
| 1965 | Middle | 27.0 | 17.4 | 18.7 | -0.1006 |
| 1966 | | 23.6 | -12.6 | | |
| 1967 | | 27.3 | 15.7 | | |
| 1964 | | 24.5 | | | |
| 1965 | High | 18.0 | -26.5 | 19.2 | -0.2590 |
| 1966 | | 25.0 | 38.9 | | |
| 1967 | | 29.2 | 16.8 | | |
| 1964 | | 20.5 | | | |
| 1965 | All farms | 26.0 | 26.8 | 28.8 | -0.3752 |
| 1966 | | 17.8 | -31.5 | | |
| 1967 | | 26.4 | 48.3 | | |

TABLE 45

AVERAGE YIELD (IN POUNDS) PER ACRE OF TOBACCO FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Average Yield Per Acre of Tobacco | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | 2,405 | | | |
| 1965 | Low | 2,437 | 1.3 | -13.2 | -0.6625 |
| 1966 | | 2,390 | - 1.9 | | |
| 1967 | | 2,088 | -12.6 | | |
| 1964 | | 2,143 | | | |
| 1965 | Middle | 2,039 | - 4.9 | -10.0 | 0.5026 |
| 1966 | | 2,266 | 11.1 | | |
| 1967 | | 1,929 | -14.9 | | |
| 1964 | | 2,344 | | | |
| 1965 | High | 2,227 | - 5.0 | 36.1 | -0.3675 |
| 1966 | | 2,264 | 1.6 | | |
| 1967 | | 3,191 | 41.0 | | |
| 1964 | | 2,264 | | | |
| 1965 | All farms | 2,193 | - 3.2 | 1.6 | 0.1857 |
| 1966 | | 2,298 | 4.8 | | |
| 1967 | | 2,301 | 0.1 | | |

TABLE 46

AVERAGE YIELD (IN BUSHELS) PER ACRE OF WHEAT FOR FARM GROUPS FROM 1964 TO 1967 AND THE PERCENT CHANGE

| Year | Income Group | Average Yield Per Acre of Wheat | Percent Change Yearly | Percent Change 1964-67 | Correlation Coefficient |
|---|---|---|---|---|---|
| 1964 | | -- | | | |
| 1965 | Low | -- | | | 0,9675 |
| 1966 | | 40.0 | | | |
| 1967 | | 32.0 | -20.0 | | |
| 1964 | | 130.0 | | | |
| 1965 | Middle | 41.0 | -68.5 | -79.7 | -0.6446 |
| 1966 | | 38.0 | - 7.3 | | |
| 1967 | | 26.3 | -30,8 | | |
| 1964 | | 28.0 | | | |
| 1965 | High | 32.7 | 16.8 | 17.9 | -0.2484 |
| 1966 | | 26.5 | -19.0 | | |
| 1967 | | 33.0 | 24.5 | | |
| 1964 | | 69.2 | | | |
| 1965 | All farms | 28,1 | -59.4 | -57.4 | -0.6204 |
| 1966 | | 35.5 | 26,3 | | |
| 1967 | | 29.5 | -16.9 | | |

# VITA

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