A PROPOSED REVISION OF THE INDEX OF PRICES RECEIVED BY MICHIGAN FARMERS

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This is to certify that the

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A PROPOSED REVISION OF THE INDEX OF PRICES RECEIVED BY MICHIGAN FARMERS

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The author, of course, assumes full responsibility for any errors that may be present in this manuscript.

GEORGE BERNARD MURRAY

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CHAPTER I

INTRODUCTION

Purpose of the study.—Recent government legislation and economic events have stimulated the demand for reliable measurements of farm prices. An index-numbers series of prices received by farmers in the state of Michigan was constructed by Orion Ulrey in 1934 with the statistical data available at that time. The chief purpose of this study is to construct a new index-numbers series of prices received by farmers in Michigan using price data now available.

An index-numbers series of prices received by farmers assists economists in analyzing the factors which influence farm prices. The response of farm prices to the changes in supply and other economic conditions in the past appears to be the most reliable guide to changes that may be expected under similar conditions in the future.

In the long run, it is the consumer and not the farmer who has the greatest influence in determining the pattern of agricultural production. When permanent changes in price relationships occur, changes in production may be desirable. A study of Michigan agricultural prices over a long period of years should be helpful in distinguishing between temporary and permanent price changes.

Similar studies have been made in most of the other states. The Bureau of Agricultural Economics has also prepared price indexes to cover the entire country. The combined information which may be obtained from these price indexes provide a basis for intelligent recommendations on many problems of production and marketing.

CHAPTER II

REVIEW OF LITERATURE

Early Contributions

The latter part of the nineteenth century.—Measurements of price fluctuations were first made by English economists in the latter part of the nineteenth century. Alfred Marshall, C. M. Walsh, W. S. Jevons, and F. Y. Edgeworth were among the first to make notable contributions. It was not until after the price upheaval which resulted from the economic effects of World War I, that Americans took an active interest in the use of index numbers for the measurement of price movements.[1/]

Early American index numbers.—The first authoritative index of wholesale prices used in the United States is that compiled by the Bureau of Labor Statistics. This index was first constructed in 1902 and at that time, it was an unweighted average of price relatives. The base of each relative was the average price of the given commodity for the years 1890-1899 inclusive.

Bradstreet's index of wholesale prices was also developed before World War I; the index covers the period from 1892 to date. Bradstreet's index is constructed by reducing 96 staple articles of commerce to a "per pound" basis and the sum of the prices "per pound" is published; no system of weighting is employed. The index is used as a barometer of business conditions.

Another index which is widely quoted and is of historic signifi-

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1/ J. D. Black and B. D. Mudgett, Research in Agricultural Index Numbers (New York: Social Science Research Council Bulletin 10, 1938), p. 5.

cance is that published by the mercantile agency of R. G. Dun and Company. It was first published in 1901, but the calculations have been carried back to 1860.

Dun's index is a statement, in dollars and cents, of the cost of a year's supply, for a single individual, of an unpublished number of staple commodities (believed to be 300). The index is designed to serve primarily as a measure of general changes in the level of wholesale prices.[2/]

These early indexes caused many differing judgments about wholesale price movements. The different measurements of price fluctuations recorded by these early indexes prompted Professor Wesley Mitchell to investigate the causes of the different interpretations. The results of his study were published in July, 1915, and it encouraged the Bureau of Labor Statistics to discard the old average-of-relatives formula in favor of a weighted aggregative formula.[3/] Mitchell concluded that there was need for a proper formula in the construction of a price index.

The Period from 1915 to 1949: The Problem of the "Best Formula"

Conflicts of opinion.--Mitchell's bulletin and the continued price maladjustments after World War I brought forth an unusual outburst of literature on the use of index numbers and on the index number theory. In December, 1920, the American Statistical Association devoted the an-

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2/ F. C. Mills, Statistical Methods (New York: Henry Holt and Company, 1924), pp. 229-51.

3/ W. C. Mitchell, Index Numbers of Wholesale Prices (Washington, D. C.: U. S. Bureau of Labor Statistics, Bulletin 173, 1915).

nual meeting at Atlantic City to the problem of the "best" formula. Professor Irving Fisher presented a paper in which he proposed that the "ideal" formula, more recently known as Fisher's "Ideal" Formula, be accepted as the "best" formula. He was supported by C. M. Walsh who had reached the same conclusion independently and from a different starting point. The meeting resulted in a sharp conflict of opinion on such questions as whether there is one best formula or whether different purposes require different formulas, and what are the relative merits of variable weighted and fixed weighted indexes. The controversial issues were discussed at least until January, 1936 when Wassily Leontief, in an article in Econometrica, reduced these specific questions to their fundamentals.[4/]

In 1929, this lack of agreement among the authorities prompted the Advisory Committee on Social and Economic Research in Agriculture to include index numbers in its series of 21 subjects to be analyzed from a research standpoint. It was becoming increasingly more evident that the economic problems of agriculture could only be accurately interpreted by a knowledge and understanding of prices, volumes of production, incomes, expenditures, wage rates, farm real estate values, interest rates, tax rates, interest and tax delinquencies. In 1938, the Committee published Bulletin No. 10, Research in Agricultural Index Numbers. The report undertook "to analyze the problems involved in constructing index series, to point out additional series that are needed and the problems involved in constructing them, and finally, to suggest lines which index number research may advantageously follow."[5/]

4/ Black and Mudgett, op. cit., pp. 5-6.
5/ Ibid., pp. 1-3.

The report was compiled by John D. Black of Harvard University and Bruce D. Mudgett of the University of Minnesota.

Formulae used by agricultural statisticians.—The report confirms the findings of O. C. Stine and L. H. Bean who concluded that agricultural index numbers were generally constructed by one of four formulae. These formulae are weighted aggregatives—in other words, agricultural statisticians have followed the lead set by Professor Mitchell in his bulletin published in 1915 and later staunchly supported by Dr. Warren M. Persons, formerly of Harvard University. The formulae were expressed as follows:6/

$$\text{Type A} \quad \frac{P_1 Q_o}{P_o Q_o}$$

$$\text{Type B} \quad \frac{P_1 Q_o}{P_{cm} Q_o}$$

$$\text{Type C} \quad \frac{P_1 Q_{cm}}{P_o Q_{cm}}$$

$$\text{Type D} \quad \frac{P_1 Q_{cm}}{P_{cm} Q_{cm}}$$

The terminology used in these formulae were:

P_1 = Price given month,

P_o = Average annual price for base period,

P_{cm} = Average price for corresponding months in base period,

Q_o = Average quantity per annum for base period,

Q_{cm} = Average quantity for corresponding months in base period.

The limitations of these formulae are:

6/ A. G. Black and D. D. Kittredge, "State Indexes of Prices of Farm Products," (Journal of Farm Economics, July, 1928), p. 312.

Type A. This type of index measures the fluctuations in value of a fixed imaginary cargo consisting of specified quantities. It fails to represent accurately the farmers' national wagonload which varies both in quantity and contents from month to month.

Type B. This formula has the same limitations as type A except that seasonal variations in prices obtained during the base period are eliminated.

Type C. This is similar to type A except that it is weighted by monthly sales rather than by yearly sales. It will give a measure of the value of a "load" for each month. However, the quantities actually marketed in a given month will not agree with the normal monthly weights where marketings vary from year to year. Under such conditions, this type fails to measure accurately the real situation.

Type D. This formula has the same limitations as type C when marketings differ from the so called "normal." Seasonal variations in price are eliminated.7/

It has been contended by King and Stine that a "pure price change" for a group of commodities can only be measured when the effects of a quantity or volume change which accompanies a price change are eliminated. Formulae, type A, B, C, and D meet this condition. Fisher, on the other hand, probably thinks that there can be no true measure of price change for a group of commodities that does not take account of any quantity or volume change that accompanies the change in price. Mudgett accepts Fisher's "Ideal" Formula as the best measure of historical change and agricultural statisticians at the University of

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7/ Ibid., pp. 313-14.

Minnesota use it in a modified form. Comparable farm price indexes are also used at the Colleges of Agriculture in Ohio and Wisconsin.

Weight correlation bias.—Fisher contends that the accuracy of an index number depends on four factors:[8/]

1) the choice of the formula,

2) the assortment of items included,

3) the number of items included,

4) the procuring of original data.

He further contends that the greatest source of error is in the selection of the formula and illustrates that this source of error can be reduced to less than one-tenth of one percent by using the "Ideal" formula, $\sqrt{\frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0} \cdot \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1}}$ providing the three remaining sources of error are eliminated.

The principal source of error in conventional types of fixed-weight aggregative formula, derived from either Laspeyres' formula, $\frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0}$ or derived from Paasche's formula, $\frac{\Sigma P_1 Q_1}{\Sigma P_1 Q_1}$, is what Warren M. Persons calls "weight correlation" bias. By weight correlation is meant correlation between changes in weights and changes in prices.

In periods of rising prices and expanding business, quantities of goods in the market greatly increases. When prices decline, quantities of goods in the market decrease. In either situation, the P's and Q's will be positively correlated. The normal relationship for farm products is for prices to remain constant or to rise when quantities are decreased; or a negative correlation. Persons found that the existence of an inverse correlation between prices and quantities of twelve

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8/ I. Fisher, The Making of Index Numbers, (Boston: Houghton Mifflin Company, 1922), p. 342.

leading crops in the United States had a noticeable effect upon index numbers.[9]

Fisher lists four different methods of weighting an index as follows:

1) base year price x base year quantity,

2) base year price x given year quantity,

3) given year price x base year quantity,

4) given year price x given year quantity.

If we assume a period of rising prices and a high and positive correlation between the P's and Q's, the index numbers will be biased upwards if $P_1 Q_1$ weights are used and will be higher than if $P_0 Q_0$ weights are used, for example:

	Prices		Quantities		Weights	
	P_0	P_1	Q_0	Q_1	$P_0 Q_0$	$P_1 Q_1$
Pig iron	1.00	2.00	100	200	100	400
Corn	1.00	1.00	100	100	100	100
					200	500

	P_0 (P_0 Q_0)	P_1 (P_0 Q_0)
Pig iron	100	200
Corn	100	100
Values	200	300
Indexes, using $P_0 Q_0$ weights	100	150

	P_0 (P_1 Q_1)	P_1 (P_1 Q_1)
Pig iron	400	800
Corn	100	100
Values	500	900
Indexes, using $P_1 Q_1$ weights	100	180

9/ J. D. Black and B. D. Mudgett, Research in Agricultural Index Numbers (New York: Social Science Research Council, 1938), 29.

In the case of declining prices and quantities, the same illustration will also give the $P_1 Q_1$ weights the lower index number.

In the case of the two remaining systems of weighting, $P_0 Q_1$ and $P_1 Q_0$ (Fisher's type 2 and 3) the same illustration will show similar indexes lying about midway between the first two systems of weighting (Fisher's type 1 and 4). With an inverse correlation between the prices and quantities, the $P_0 Q_1$ weight (type 2) will produce the highest index numbers and $P_1 Q_0$ weights the lowest with prices dominantly rising; the reverse is observed when prices are rising and quantities falling.[10/]

Elimination of weight bias.—The method which Fisher proposes to correct weight bias is to combine two formulae which possess opposite biases. He contends that a bias free formula must conform to the reliability of the factor reversal as well as the base reversal test; the "ideal" formula meets both of these requirements.

Albert G. Black and Dorothea D. Kittridge very ably defend the Minnesota formula, $\sqrt{\frac{\Sigma[P_1 Q_{cmo}]}{\Sigma[P_{cmo} Q_{cmo}]} \times \frac{\Sigma[P_1 Q_{cm1}]}{\Sigma[P_{cmo} Q_{cm1}]}}$, which is derived from the "ideal" formula. They contend that it gives a more accurate picture of the real changes in the price level than is possible when constant weights are used. They further contend that in the construction of agricultural price indexes, constant weights should be avoided because of the extreme fluctuation in crop production each year; this is fundamentally the same premise put forth by Dr. Fisher.[11/]

10/ Ibid., pp. 23-29.
11/ Black and Kittridge, op. cit., p. 321.

The distinction between fixed weights and variable weights changing from year to year or month to month is largely one of degree. There seems to be general agreement that weights need to be changed from time to time as the processes of economic change shift the magnitudes of the components of the index numbers. This practice is followed by the Bureau of Labor Statistics, the Bureau of Agricultural Economics, and by statisticians constructing agricultural price indexes for use in regions and states.

Development of the Index-Number Series Published by the Bureau of Agricultural Economics

Early index-number series.—The first comprehensive index-number series of prices of farm products was constructed by George F. Warren and published as United States Department of Agriculture Bulletin 999, Prices of Farm Products in the United States, 1921. In 1924, Dr. O. C. Stine and L. H. Bean developed the fixed-weight aggregative series now published in Crops and Markets. This series was revised by Arthur G. Peterson in 1934 and again in 1943.

The base period selected for the prices received index of the B. A. E. is the period from August 1909 through July 1914. It has been used since 1921. The primary consideration in the original decision to accept this period for a base was the fact that these years constituted a period in which the prices of farm products were relatively stable. The Department of Agriculture did not start to gather price data on farm products until 1908. The economic disturbances caused by World War I brought maladjustments between farm prices and farm costs which can be emphasized when using the prewar base. This period has been retained as a base period partly because it has been

specified in various laws enacted relating to parity prices.

Weights.—The weights now used are annual average sales of farm products for the period 1935-39. Price series for commodities included in the index were weighted by the quantities of the different commodities sold, with adjustment to give some representation to crops not included in the index. Forty-eight items are included in the index which represented about ninety-two percent of the total cash income from marketings in the quantity base period.

Seasonal variation.—Indexes of seasonal variation have been constructed for forty-two out of forty-eight of the products included in the index. These indexes are based largely on averages for the period 1922-41. The adjustment for seasonal variation makes an occasional one percent change in the over-all index of prices received by farmers.[12/]

Tests.—The index as it is now constructed will meet the time reversal test, but it will not meet Fisher's factor reversal test. It is not likely that a formula such as Fisher's "Ideal" will be adopted by the Bureau of Agricultural Economics because: "With respect to moving average weights, personally, we believe that the operational problems involved in the use of a moving average of quantities for weights outweigh theoretical advantages, and that there are more effective means of changing weights."[13/]

Policy of the Bureau of Agricultural Economics.—The retention of

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12/ A. G. Peterson, Index Numbers of Prices Received by Farmers, 1910-43, (Washington, D. C.: United States Department of Agriculture, Bureau of Agricultural Economics, 1944), p. 1-12.

13/ Letter written by B. R. Stauber, Bureau of Agricultural Economics, Washington, D. C. to C. J. Borum, Bureau of Agricultural Economics, Lansing, Michigan, April 8, 1949.

1909-14 as the base of the index of prices received by farmers has been criticized in some quarters. However, various laws enacted during the past fifteen years relating parity prices for agricultural products to the 1910-14 period makes a change undesirable. In 1940 an interdepartmental committee of the Federal Government reviewed the many national index number series and recommended the adoption of a common base period 1935-39 for all series that might be adjusted to this base. In accordance with their recommendation, the Bureau of Agricultural Economics is now publishing the index numbers series of three major series on this base.

A Survey of State Index Number Series

Types of formulae.—In a survey of thirty-two state index-number series of prices received by farmers it was found that only four states have annual price index series running back to the Civil War period—Maryland, Virginia, New York, and Wisconsin. Four use formulae other than the fixed weight aggregative type—Minnesota uses the "Ideal" formula for both its annual and monthly series; Ohio uses the "Ideal" for an annual series only and Wisconsin for one of its historical annual series; Iowa uses a geometric formula. According to Stine's classification, of the fixed-weight price index formulae currently used, fourteen are Type A, ten are Type B, four are Type C, and four are Type D.

The number of commodities included in these series ranges from nine to thirty-five and the percentage of gross income received from the sale of the products included ranges from sixty percent to ninety-seven percent.

The adequacy of these fixed-weight aggregative formulae for state

index-number series is much more questionable than when used by the Bureau of Agricultural Economics to include the entire country. The quantities used for weights in a limited area such as a state may be poorly correlated with prices of products which are nationally if not worldly determined. This means that prices and quantities marketed are likely to have no correlation. Furthermore, in a single state, most of the output may be attributed to a very limited number of products, giving weighting an unusual bias.

Comparison of results obtained from various formulae.—The study, Research in Agricultural Index Numbers, contains a comparison of the results obtained from the "Ideal formula against the results obtained from the fixed-weight aggregative type of formula for the same data in the states of Minnesota, Wisconsin, Ohio, and Alabama.

The two Minnesota series run very close together throughout a period of twenty-five years; the fixed weight series occassionally run a little higher than the "Ideal" series but never more than two points.

Three series were compared in Wisconsin during this same period; the "Ideal," the Paasche and the fixed-weight aggregative formula. The same trends were shown but the divergence between the Paasche and the fixed-weight formula was eight points in 1919 and the divergence between the "Ideal" and the fixed-weight aggregative formula was five. The same general observation applies to Ohio and Alabama.

The general conclusion which can be arrived at from this review of literature on index number construction and theory of index numbers is that there is a wide divergence of opinion as to the type of formula

which is most suited to measure price fluctuations in our economy. The crux of the problem is a matter of definition; what is an index number supposed to measure? There is the school of thought than contends that a "pure price change" is all that should be measured in a price index-numbers series. On the other hand, Drs. Fisher and Mudgett contend that any price change is always associated with quantity change and that any measure of price that does not take account of this changing importance, or quantity is actually wrong.

The "Ideal" formula does have the advantage of meeting the exacting factor reversal test and eliminates undesirable weight biases. However, due to the operational problem of the formula, its popularity is limited and there is little reason to believe that it will be used more widely in the near future.

CHAPTER III

THE INDEX-NUMBER SERIES OF PRICES RECEIVED BY MICHIGAN FARMERS, 1910-49

Description

History.—The index of prices received by Michigan farmers now used was constructed by Ulrey in 1934. It was published the same year by the Michigan Agricultural Experiment Station in Technical Bulletin No. 139, Michigan Farm Prices and Costs, 1910-34. Since that time, the index has been revised and the revisions have been published as supplements to Technical Bulletin No. 139.

Type of index.—According to Stine's classification the index in Type A is the one most commonly used by agricultural statisticians. A weighted aggregative formula is used in the index.

Base.—The five calendar years 1910-14 were chosen for a price base period. A comparable base period has been used by the Bureau of Agricultural Economics and the majority of state agricultural colleges and experiment stations. The use of a common price base by these different agencies makes it possible to readily compare farm prices throughout the country.

Weights.—The index measures price fluctuations of twenty farm products sold by Michigan farmers. These products were the source of eighty-eight and four-tenths percent of the average annual Michigan cash farm income for the years 1924-28 which were selected as the weight period.

The twenty products selected are broken into five small homogeneous groups; namely, feed crops, cash field crops, dairy products, meat animals and wool, and poultry products. Livestock is adequately

represented by 99.7 percent of all livestock and livestock product sales during the period considered. The field crop group is represented by 89.9 percent of all field crop sales for the period. Fruits and vegetables are represented only by apples and they are placed in the cash field crop group. Apple sales during the years 1924-28 represented only 25.1 percent of the cash return to farmers from the sale of fruits and vegetables for this period.

Limitations.—The limited number of commodities included and the grouping of these commodities are definite weaknesses of the index. At the time the index was constructed, price data were available for only twenty products so the selection of the commodities was limited by lack of data. The grouping of the twenty products conformed closely to the pattern followed by the Bureau of Agricultural Economics. However, prices for apples were the only data available for fruit and vegetables and with such limited data it was not possible to construct an index for these groups. Rather than eliminate apples from the index, they were put into the cash field crop group.

The price base period selected is comparable to that used by the Bureau of Agricultural Economics and the majority of state agricultural experiment stations. However, since 1910-14 the economy of the country has been subjected to two world conflicts which have caused changes in the general price level until it is now inadvisable to compare price relationships which existed at that time to those of 1949. Furthermore, by using a 1910-14 price base, present prices are compared with prices which prevailed during a period when agricultural production techniques were not comparable to those which are now used. The Bureau of Agricultural Economics has taken cognizance of this situation and publishes

three of its principal price index-number series using the 1935-39 price base as well as the 1910-14 base.

The least significant limitation of the index is the formula selected. The limitations of the weighted aggregative formula have been outlined by Fisher, but in spite of his criticisms the weighted aggregative formula is widely used by agricultural statisticians.

The limitations of the formula are resolved to the question of just what the index is supposed to measure. Fisher and his followers contend that the quantities marketed must be considered when price movements are measured. The weighted aggregative formula measures price only and does not allow for changes in the quantities of the different products marketed each year or month. Furthermore, it is contended by some authorities that if the index is affected by the quantities marketed during the period for which prices are being measured, the index should be classified as an income index rather than as a price index.

Needs and Resources for a Revision

Needs.—The weights used in the index of prices received by Michigan farmers were obtained from the average annual sales of products sold from Michigan farms during the period 1924-28. These weights should be revised to conform with more recent marketing trends in Michigan in order to eliminate much of the weight bias that may be present in the index.

The revised weights should be taken from ten year averages of marketings rather than from five year averages. Weights derived from ten year periods of marketings of farm products will offset the effects of livestock production cycles and the effects of weather on field crops, fruit crops, and vegetable crops.

Data for more commodities are now available. It is desirable that the products included in the revised index be arranged in more homogeneous groups. This would permit specialized producers to study the price level of their products in relation to all farm prices. In order to accomplish this objective, fruits and vegetables would have to be more adequately represented than they are in the index now used.

Perishable crops, which are marketed in Michigan for very short periods each year, should be included in the index in a manner that does not permit them to influence the index when they are not being sold by Michigan farmers. This could be accomplished by constructing two index-number series—one series to be calculated monthly which would include those products for which monthly price quotations are available, and a second series to be calculated annually from the weighted annual average prices of the majority of products sold by Michigan farmers. The monthly index-number series would conform closely to the grouping in the index now used in Michigan. The annual index would include all of the products included in the monthly series plus additional groups to adequately represent fruits, vegetables, and miscellaneous crops.

Agricultural legislation which defines parity will make it desirable to retain 1910-14 as one of the price bases when the index is revised. However, it is desirable also that a more recent price base be selected for the revised index, preferably 1935-39. The index now used could be spliced to the revised index. It would be possible to publish index numbers using two price base periods, which would conform to the pattern set by the Bureau of Agricultural Economics.

Resources.—The Bureau of Agricultural Economics has collected monthly price data from 1934 to the present for 59 Michigan farm products. This data would permit the annual index of prices received by Michigan farmers to be revised from 1934, to include 59 products rather than the present number of 20 and to increase the groups from five to eight. Monthly price data are available for 26 products and seasonal prices are available for 33 other products.

CHAPTER IV

PROPOSED REVISION 1949

Procedure

Commodities.- - Fifty-nine products were selected to represent sources of farm income in the revised index of prices received by Michigan farmers. Dairy cattle, nursery products and forestry products were omitted from the index due to the lack of adequate data.

Dairy cattle sold for slaughter were accounted for by sales of beef animals. Price data were available for prices received by farmers for the sale of dairy cattle which were to be used as dairy cows. However, data on the number of animals sold for dairy purposes were not available. Under such conditions it was impossible to determine what portion of farm income was derived from this source and consequently dairy cow prices were omitted from the index.

Farm income from the sale of forestry products is estimated annually by the Bureau of Agricultural Economics. The Bureau does not estimate the amounts of the different products sold, nor does it estimate the prices received. Specific data pertaining to quantities marketed and prices received for forestry products by farmers in Michigan were not available. For these reasons and the fact that revenue from the sale of forestry products represented less than one percent of Michigan farm income, forestry products were omitted from the index.

Nursery products were also omitted from the index for reasons similar to those used to justify the omission of forestry products. In addition, nurseries in Michigan are limited to areas close to the large marketing centers and the production of nursery products is a

specialized activity carried on by only a small minority of Michigan farmers.

Grouping.- - The Bureau of Agricultural Economics collects price data on almost all products sold by Michigan farmers, as of the 15th day of each month. Quotations are collected for perishable seasonal crops only on the 15th day of each month while the crops are being marketed.

The fifty-nine products were first divided into two groups; those for which continuous monthly price data were available and those for which only seasonal price data were available. The two groups were then regrouped into eight smaller and more homogenous groups which conformed as closely as possible to the grouping used by the Bureau of Agricultural Economics.

Those products included in the group for which monthly prices could be obtained were regrouped as cash field crops, feed crops, dairy products, meat animals and wool, and poultry products (Table 1). These groups were made up from 26 products. The remaining 33 products were classified into three groups - - fruit crops, truck crops and miscellaneous crops.

The effects of seasonal price variation on the index was partially removed by the arrangement of the groups. Two index number series were constructed - one series contained 26 products for which monthly price quotations could be obtained and the second series contained all 59 products. The series made up of 26 products was calculated monthly, and the series containing the 59 products was calculated annually. The primary reason for constructing the two series was to eliminate the effects of seasonal price variation of the fruits and vegetables.

Table 1 - Groups of Products in Revised and Unrevised Index-Number Series of Prices Received by Michigan Farmers

Unrevised series	Revised series
Cash field crops	
Field beans	Field beans
Potatoes	Potatoes
Wheat	Wheat
Red clover seed	Alfalfa seed
Rye	Red clover seed
Apples	Sweet clover seed
	Alsike seed
	Flax seed
	Soybeans
Feed crops	
Alfalfa hay (loose)	Alfalfa hay (loose)
Corn	Corn
Oats	Oats
Barley	Barley
	Rye
	Buckwheat
Dairy products	
Wholesale milk	Wholesale milk
Butterfat	Butterfat
Meat animals and wool	
Hogs	Hogs
Beef cattle	Beef cattle
Calves	Calves
Sheep	Sheep
Lambs	Lambs
Wool	Wool
Poultry products	
Chickens	Chickens
Eggs	Eggs
	Turkeys
Fruit crops	
(Apples included with field crops)	Apples
	Peaches
	Cherries
	Grapes
	Pears
	Plums
	Strawberries

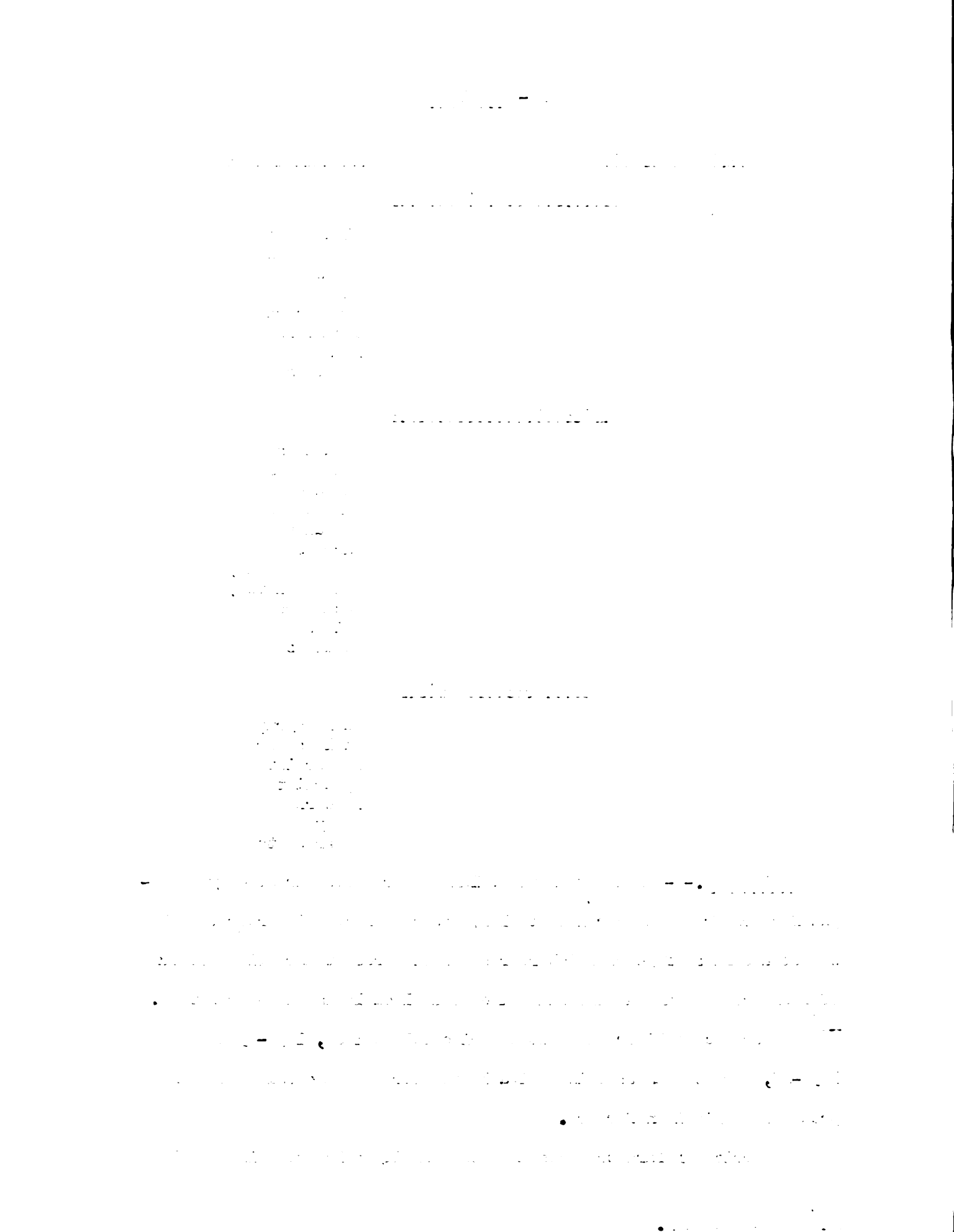
Table 1 - Continued

Unrevised series	Revised series
Truck crops for canning	
	Lima beans
	Snap beans
	Beets
	Cabbage
	Sweet corn
	Cucumbers
	Peas
	Tomatoes
Truck crops for market	
	Asparagus
	Snap beans
	Cabbage
	Danish cabbage
	Cantaloupe
	Carrots
	Celery (early)
	Celery (late)
	Cucumbers
	Onions
	Tomatoes
Miscellaneous crops	
	Maple syrup
	Maple sugar
	Peppermint
	Spearmint
	Popcorn
	Honey
	Sugar beets

Weighting.- - An index of the volume of products marketed by Michigan farmers from the year 1924 to 1947 was constructed in order to help select a series of years which represents the present marketing pattern of farm products and at the same time be applicable in the near future. 14/ After much deliberation two experimental periods, 1934-43 and 1938-47, were chosen as being suitable to represent the sales of farm products by Michigan farmers.

The price of farm products and the quantity sold determine total

14/ See Appendix A.



receipts received by farmers. The importance of the number of products selected for an index of prices received can only be determined by comparing the value of the sales of the selected products against the total receipts received from the sale of all farm products during the same period. This procedure was followed for both "weight" periods and it was found that when the value of forestry and nursery products were included the value of the sales of the selected products represented 96.2 percent of Michigan farmers cash income for the ten year period 1934-43 and 95.5 percent for the 10 year period 1938-47. (Table 2).

Table 2 - Annual Average Value of Sales of Selected Products in the Revised Indexes as Compared with the Total Michigan Cash Farm Income

Weight period	Sales of selected products (000)	Total Michigan cash farm income (000)	Sales as percent of income
1934-43	$264,716	$264,776	96.2%
1938-47	$401,235	$420,070	95.5%

Adjustments.- - The above data clearly indicates that the major sources of Michigan farm income were represented in the revised index. However, it was considered desirable to determine what products or groups of products were not adequately represented. This was done by breaking the value of the total sales of the selected products into five groups and comparing the value of the sales of these selected products with the total receipts received by Michigan farmers for the five comparable groups of products (Table 3).

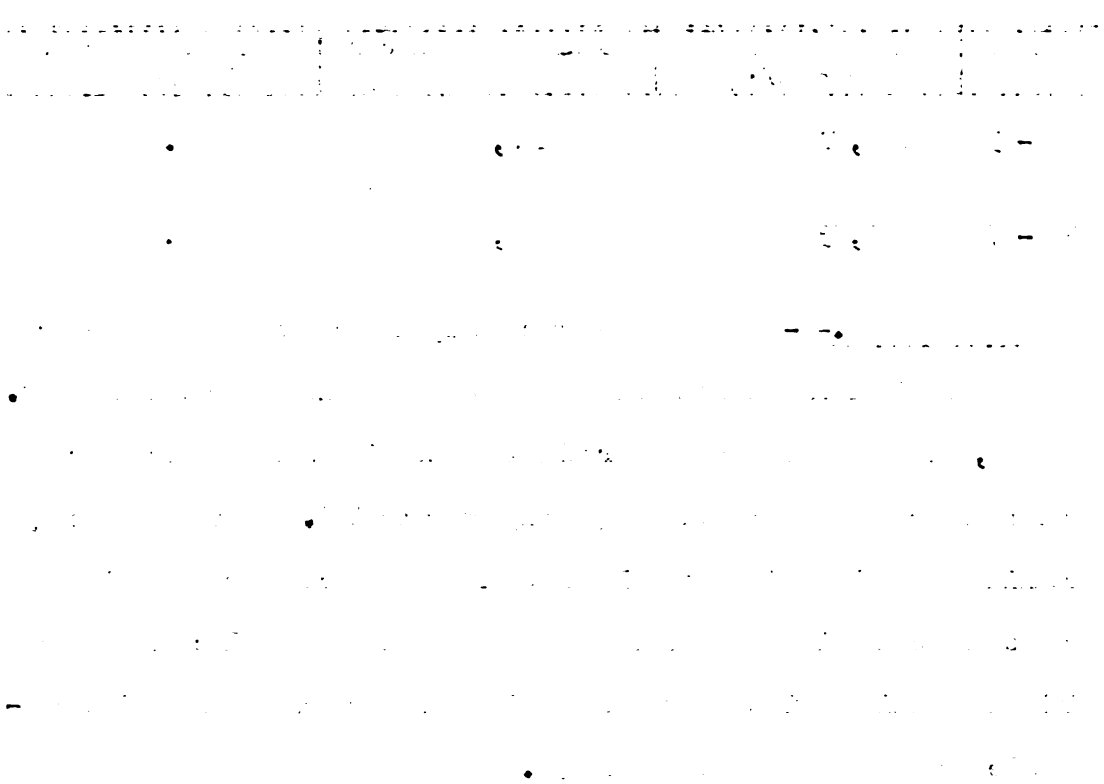
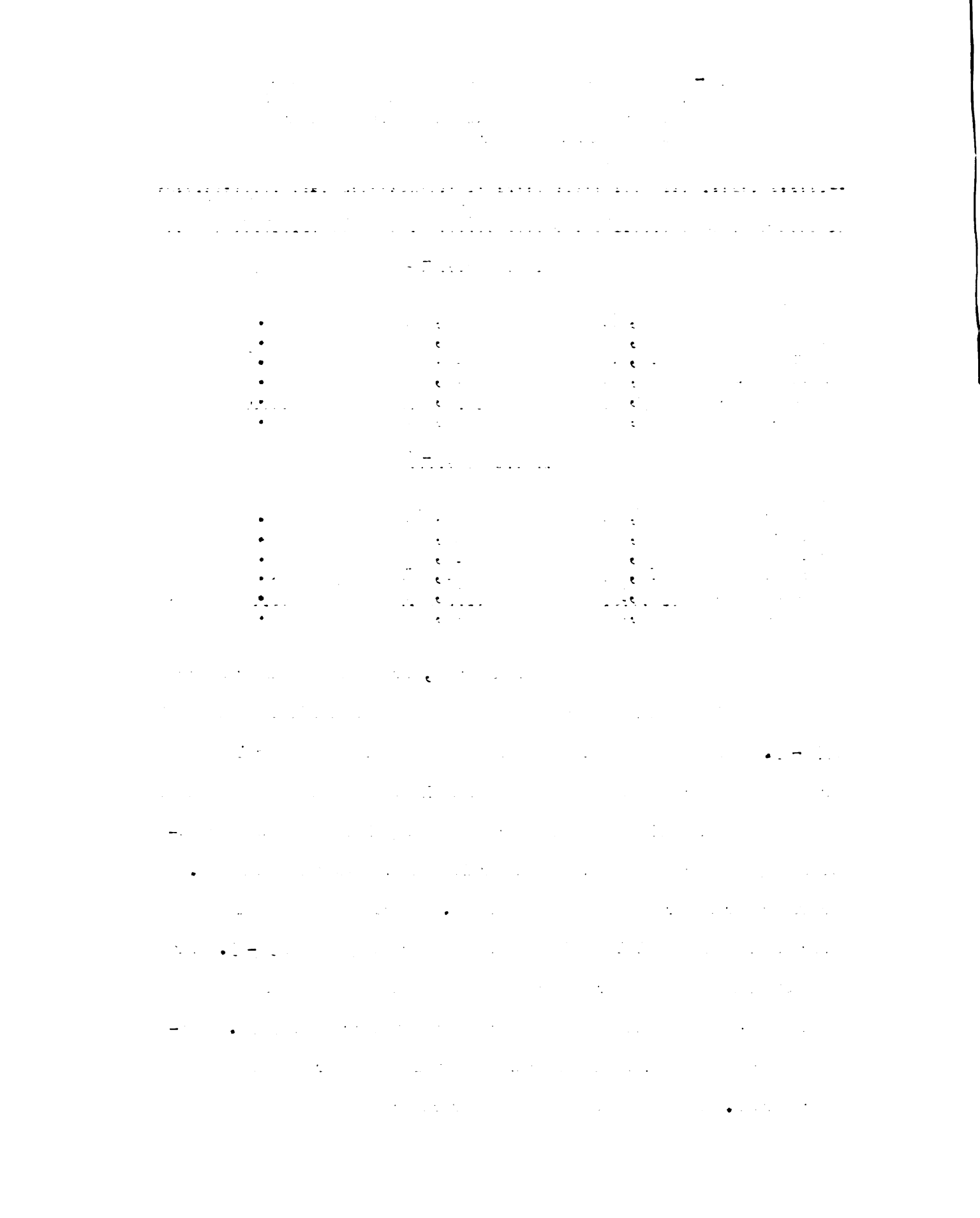


Table 3 - Comparison of Annual Average Value of Sales of Selected Products for the Revised Indexes as Compared with the Total Michigan Cash Farm Income Received by Groups

Groups	Sales of selected products (000)	Cash farm income (000)	Sales as percent of income
		Weights 1934-43	
Livestock & products	$166,639	$167,217	99.6%
Field crops	48,978	50,430	97.1
Fruit crops	17,529	17,969	97.5
Truck crops	11,821	19,524	60.5
Miscellaneous	9,749	9,775	99.7
Total	254,716	264,915	96.2
		Weights 1938-47	
Livestock & products	$265,251	$266,977	99.3%
Field crops	74,990	75,544	99.2
Fruit crops	27,158	31,272	88.0
Truck crops	19,469	31,191	62.0
Miscellaneous	14,316	14,367	99.6
Total	401,184	419,451	95.6

The above data shows that field crops, fruit crops and truck crops were not satisfactorily represented in the data available for the period 1934-43. The quantities of the different products in the fruit and truck groups were adjusted until the annual average value of the sales of the products included in each group were equal to the receipts received by farmers for the sales of fruits and vegetables (Table 4). Fruit products were adjusted by adding 2.5 percent to the estimated average annual quantities sold by farmers for the years 1934-43. The products listed in the truck crop group were adjusted so that the total value of the sales of these products was increased by 39.5 percent which made them equal the receipts by farmers for the sale of truck crops. The total adjustment of truck crops was borne by the



market truck crops. It was assumed that the estimates of quantities sold for manufacture were adequate for the period considered.

The field crop group was not adjusted, for the 2.9 percent shortage, in order to make the products represented equal the value of the receipts from the sale of field crops by Michigan Farmers. Lack of statistical data made it necessary to estimate the amounts of red clover, alsike, alfalfa and sweet clover marketed from 1934 to 1940 by calculating a regression equation for each product. 15/ This was possible because the production of these products from 1934 to date was available and the amounts marketed from 1940 to date was also available. In view of these circumstances, further adjustments were not made to field crops.

Fruits and truck crops were the only two groups adjusted for the 1938-47 "weight" period. The fruit group was adjusted by increasing the amount of each product represented by 12 percent. The truck crop group was adjusted by increasing the quantities of the market crops represented until the total value of the sales of truck crops for the period was increased by 38 percent. Truck crops sold for manufacture were not adjusted.

A ten year average was selected to represent the quantities of the different products marketed instead of a five year average. This was done in order to offset the effects of livestock production cycles and the effects of weather on crops.

15/ Sweet clover seed: $X_1 = 77.73 - .0004827X_2$.
Alsike clover seed: $X_1 = 86.327 + .00153X_2 - 0569X_3$.
Red clover seed: $X_1 = 58.29 + .078358X_2$.
Alfalfa seed: $X_1 = 64.23 - 00000672X_2$.

Table 4 - A Comparison of the Adjusted Weights of the Revised and Unrevised Index-Number Series of Prices Received by Michigan Farmers

Products	Unrevised weights 1924-28	Revised weights 1934-43	Revised weights 1938-47
Cash field crops			
Field beans, cwt.	3,512,000	4,140,000	3,938,000
Potatoes, bu.	17,450,000	13,610,000	11,184,000
Wheat, bu.	13,229,000	9,213,000	11,884,000
Alfalfa seed, bu.		38,000	65,000
Red clover seed, bu.	86,800	78,000	100,000
Sweet clover seed, bu.		15,000	13,000
Alsike seed, bu.		19,000	19,000
Flax seed, bu.		65,000	55,000
Soybeans, bu.		560,000	1,148,000
Feed crops			
Alfalfa hay (loose) tons	320,000	327,000	347,000
Corn, bu.	940,000	2,782,000	3,322,000
Oats, bu.	8,400,000	3,879,000	5,806,000
Barley, bu.	556,000	1,092,000	1,323,000
Rye, bu.	1,719,000	531,000	353,000
Buckwheat, bu.		155,000	209,000
Dairy products			
Wholesale milk, cwt.	17,696,000	25,683,800	33,258,600
Butterfat, lb.	76,635,400	55,604,000	47,779,000
Meat animals & wool			
Hogs, cwt.	2,038,000	2,039,730	2,550,770
Beef cattle, cwt.	2,192,000	2,637,020	3,176,900
Calves, cwt.	671,000	620,400	627,750
Sheep, cwt.	98,000	156,710	147,490
Lambs, cwt.	699,000	504,900	412,250
Wool, lbs.	7,802,000	7,393,000	5,820,000
Poultry products			
Chickens, lbs.	46,688,000	57,846,100	70,609,000
Eggs, doz.	64,750,000	87,350,000	101,417,000
Turkeys, lbs.		6,583,000	9,645,000
Fruit crops			
Apples, bu.	4,377,000	6,928,200	6,902,000
Peaches, bu.		2,685,100	3,949,000
Cherries, tons		33,349	42,979
Grapes, tons		39,521	34,864
Pears, bu.		1,000,000	856,000
Plums, tons		4,150	4,259
Strawberries, crates		774,300	762,000

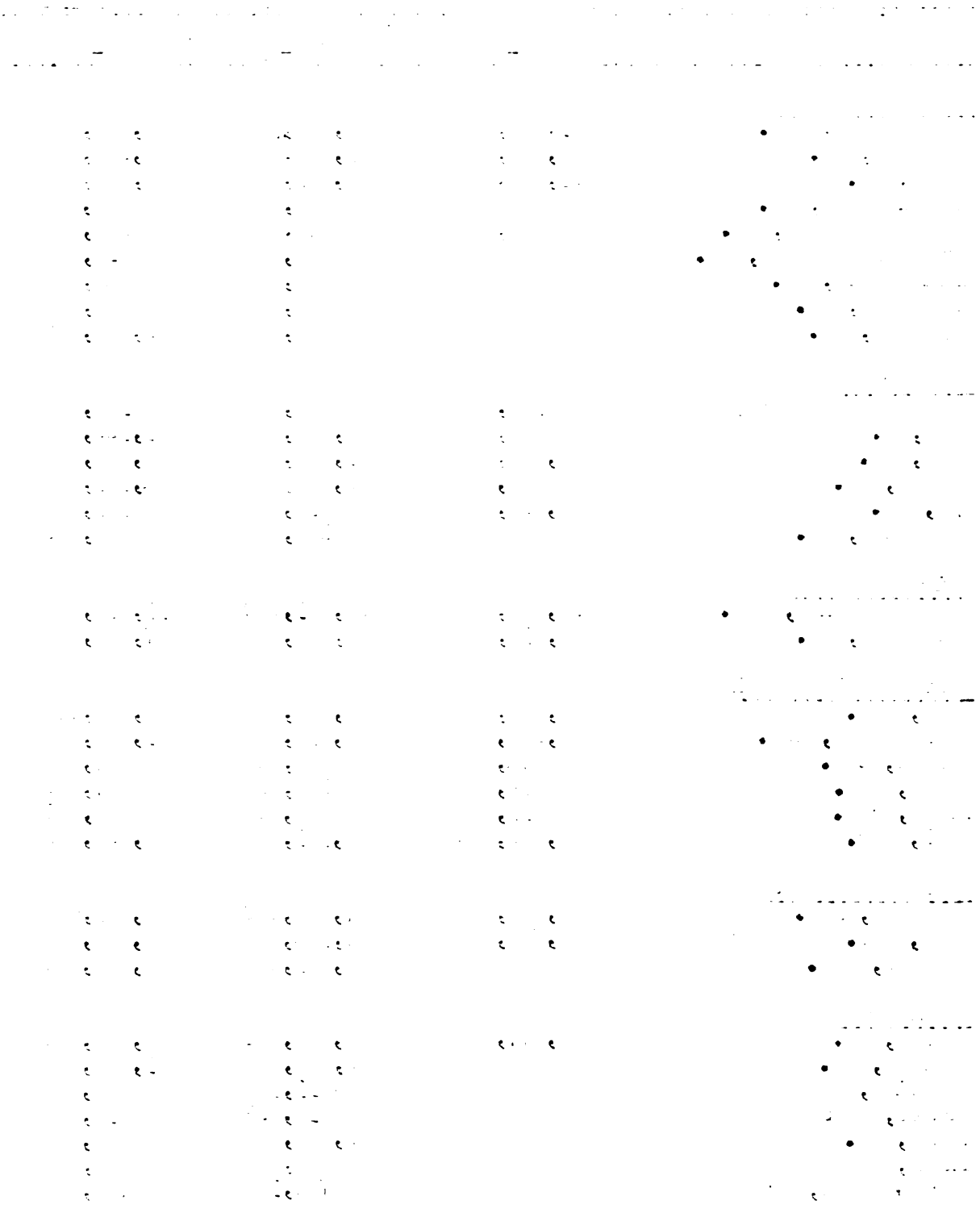
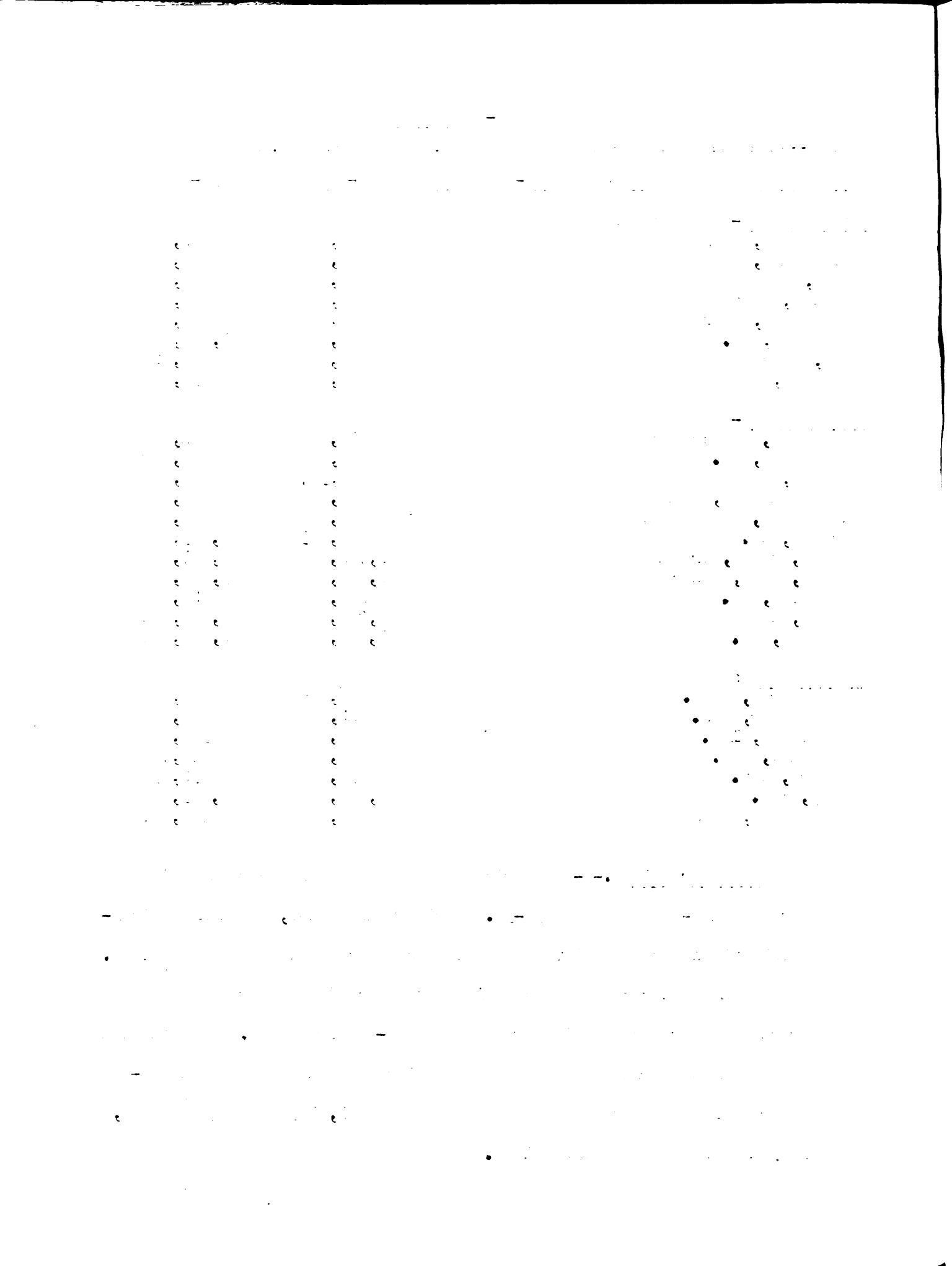


Table 4 - Continued

Products	Unrevised weights 1924-28	Revised weights 1934-43	Revised weights 1938-47
Truck crops - Manufacture			
Lima beans, tons		1,507	1,200
Snap beans, tons		8,290	8,270
Beets, tons		4,900	6,880
Cabbage, tons		6,870	7,180
Sweet corn, tons		5,440	4,550
Cucumbers, bu.		1,547,000	1,748,000
Peas, tons		8,628	8,428
Tomatoes, tons		29,470	37,340
Truck crops - Market			
Asparagus, 24# crates		510,000	851,000
Snap beans, bu.		400,000	464,000
Cabbage, tons		40,367	54,000
Danish cabbage, tons		14,600	22,000
Cantaloupe, 70# crates		814,600	672,000
Carrots, bu.		959,633	1,823,000
Celery, early, crates		1,721,000	2,047,000
Celery, late, crates		2,849,500	3,667,000
Cucumbers, bu.		150,000	220,000
Onions, 50# sacks		6,388,900	6,877,000
Tomatoes, bu.		1,706,400	2,015,000
Miscellaneous			
Maple syrup, gals.		96,000	96,500
Maple sugar, lbs.		12,000	8,200
Peppermint, lbs.		540,000	395,000
Spearmint, lbs.		80,600	79,700
Popcorn, cwt.		36,060	32,634
Honey, lbs.		9,819,400	8,603,000
Sugar beets, tons		857,000	790,000

Base for prices.- - The price base selected for the revised indexes was the five-year period 1935-39. During this period, Michigan Agricultural prices were not disturbed by the economic effects of World War II. The Bureau of Agricultural Economics has selected that period as a price base for three of its principal index-number series. The weighted average annual prices of the 59 commodities were calculated on a calendar year basis for the period between January 1, 1935 and December 31, 1939 and used as the base prices.



The base prices were used to determine the base values of each commodity and of each group. This was done by multiplying the average annual quantities of the 59 commodities sold during the two ten-year periods 1934-43 and 1938-47 by the base price and then determining what percentage the group base values were of the total base values (Table 5-8).

Table 5 - Base Values and Group Weights for Monthly Index of Prices Received by Michigan Farmers, Using 1934-43 Weights

Groups	Base values	Weights
Cash field crops	$31,298,770	17.87%
Feed crops	7,504,660	4.28
Dairy products	61,114,174	34.89
Meat animals and wool	46,447,129	26.53
Poultry products	28,783,816	16.43
Total	$175,148,549	100.00

Table 6 - Base Values and Group Weights for Annual Index of Prices Received by Michigan Farmers, Using 1934-43 Weights

Groups	Base values	Weights
Cash field crops	$ 31,298,770	14.84
Feed crops	7,504,660	3.56
Dairy products	61,114,174	28.99
Meat animals and wool	46,447,129	22.03
Poultry products	28,783,816	13.65
Fruit crops	13,900,846	6.59
Truck crops	14,380,865	6.85
Miscellaneous products	7,363,034	3.49
Total	$210,793,294	100.00

Table 7 - Base Values and Group Weights for Monthly Index of Prices of Michigan Farm Products, Using 1938-47 Weights

Groups	Base values	Weights
Cash field crops	$ 32,517,960	16.22%
Feed crops	8,783,350	4.39
Dairy products	71,871,078	35.83
Meat animals and wool	53,030,062	26.44
Poultry products	34,331,110	17.12
Total	$200,533,560	100.00

Table 8 - Base Values and Group Weights for Annual Index of Prices of Michigan Farm Products, Using 1938-47 Weights

Groups	Base values	Weights
Cash field crops	$ 32,517,960	13.56
Feed crops	8,783,350	3.66
Dairy products	71,871,078	29.98
Meat animals and wool	23,030,062	22.12
Poultry products	34,331,110	14.32
Fruit crops	15,575,149	6.50
Truck crops	17,072,876	7.12
Miscellaneous products	6,574,740	2.74
Total	$239,756,325	100.00

Formula.- - The formula selected for the revised index was type "A" the same as used by Ulrey when he constructed the first index of prices received by Michigan farmers in 1934. It is also used by the Bureau of Agricultural Economics and in the majority of farm price index-number series constructed for the States.

The type "A" formula has two limitations; namely, adjustments are not made for seasonal variations in the quantities of the various commodities marketed, or for seasonal price variations. However, investigations made by the Bureau of Agricultural Economics, Ronk of New York, Ulrey of Michigan and Youngstrom of Idaho have shown that adjustments

for seasonal variations have little affect on the final result of the composite index-number series. Furthermore, if complete adjustments are made for seasonal and annual marketings the final result would be more accurately described as an income index-number series. In view of these considerations, and the fact that the type "A" index is maintained monthly with a minimum of labor, it was considered advisable to continue to use the type "A" form of index with the weighted aggregative formula.

The Revised Index-Number Series

Procedure.- - Two index number series were calculated. The procedure, prices and formula used were identical. However, a different set of weights was used for each series which accounts for the differences which occur in the index numbers when the two series are compared (Tables 9-17).

Table 9 - Annual Index Numbers of Prices Received by Michigan Farmers for 59 Products, 1935-39 = 100

Year	Using 1934-43 weights	Using 1938-47 weights
1934	83	83
1935	94	95
1936	108	107
1937	115	113
1938	94	95
1939	89	90
1940	98	97
1941	121	121
1942	145	147
1943	198	197
1944	189	189
1945	206	205
1946	225	225
1947	263	263
1948	266	267

Table 10 - Annual Index Numbers of Prices Received for Michigan Cash Field Crops (1), 1935-39 = 100

Year	Using 1934-43 weights	Using 1938-47 weights
1934	93	95
1935	84	80
1936	126	123
1937	135	137
1938	73	78
1939	82	82
1940	96	94
1941	117	116
1942	146	144
1943	196	192
1944	196	194
1945	206	203
1946	240	240
1947	310	310
1948	264	264

(1) Field beans, potatoes, wheat, alfalfa seed, red clover seed, sweet clover seed, alsike seed, flax seed, soybeans.

Table 11 - Annual Index Numbers of Prices Received for Michigan Feed Crops (1), 1935-39 = 100

Year	Using 1934-43 weights	Using 1938-47 weights
1934	124	124
1935	119	118
1936	98	98
1937	121	122
1938	84	82
1939	78	80
1940	88	89
1941	98	99
1942	134	135
1943	158	161
1944	193	195
1945	195	194
1946	210	211
1947	261	262
1948	248	251

(1) Alfalfa hay (loose), corn, oats, barley, rye, buckwheat.

Table 10 - Annual Index Numbers of Prices Received for Michigan Cash Field Crops (1), 1935-39 = 100

Year	Using 1934-43 weights	Using 1938-47 weights
1934	93	95
1935	84	80
1936	126	123
1937	135	137
1938	73	78
1939	82	82
1940	96	94
1941	117	116
1942	146	144
1943	196	192
1944	196	194
1945	206	203
1946	240	240
1947	310	310
1948	264	264

(1) Field beans, potatoes, wheat, alfalfa seed, red clover seed, sweet clover seed, alsike seed, flax seed, soybeans.

Table 11 - Annual Index Numbers of Prices Received for Michigan Feed Crops (1), 1935-39 = 100

Year	Using 1934-43 weights	Using 1938-47 weights
1934	124	124
1935	119	118
1936	98	98
1937	121	122
1938	84	82
1939	78	80
1940	88	89
1941	98	99
1942	134	135
1943	158	161
1944	193	195
1945	195	194
1946	210	211
1947	261	262
1948	248	251

(1) Alfalfa hay (loose), corn, oats, barley, rye, buckwheat.

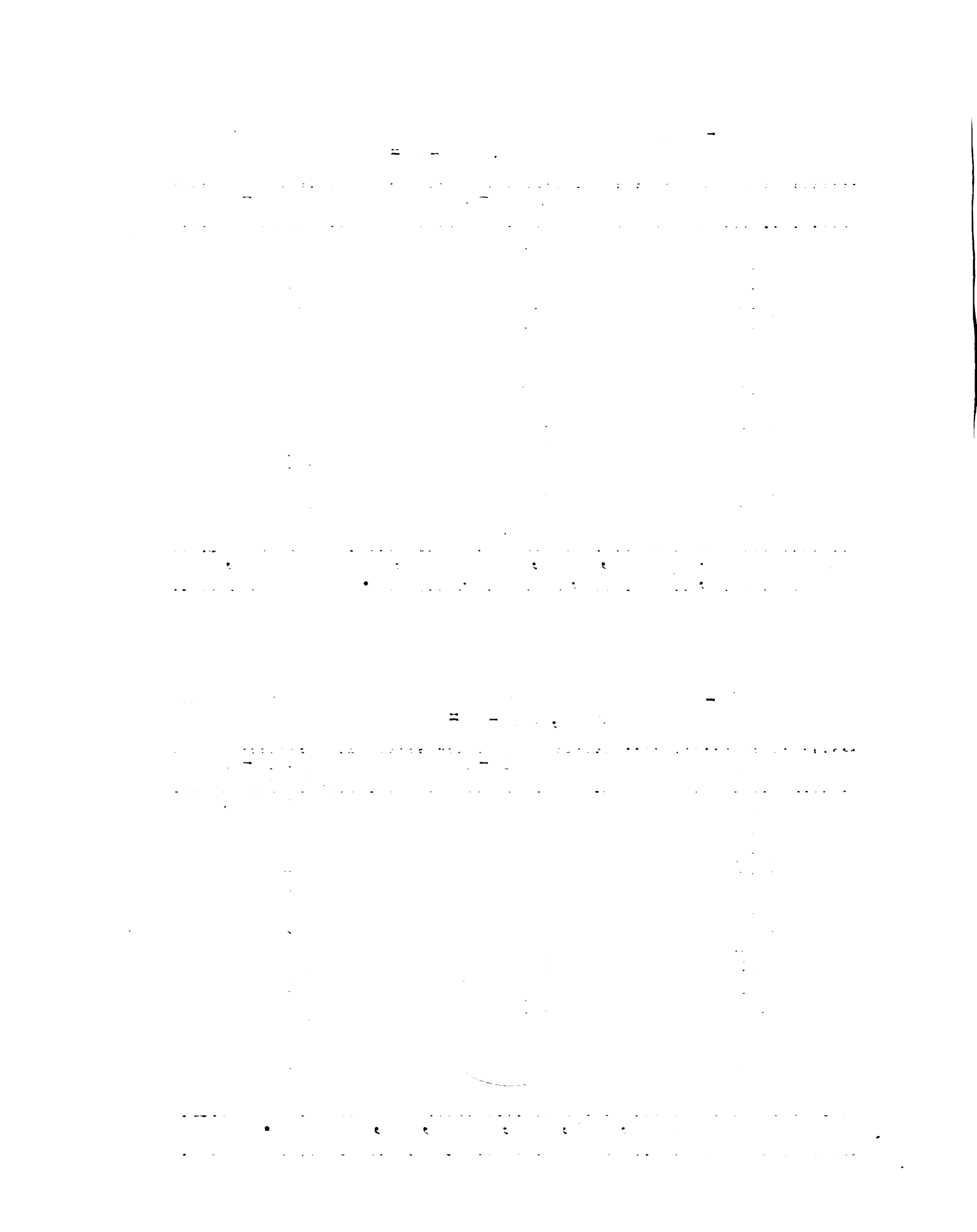


Table 12 - Annual Index Numbers of Prices Received for Michigan Dairy Products (1), 1935-39 = 100

Year	Using 1934-43 weights	Using 1938-47 weights
1934	83	83
1935	93	94
1936	105	106
1937	114	114
1938	95	95
1939	93	91
1940	103	103
1941	123	123
1942	145	145
1943	183	187
1944	188	187
1945	186	185
1946	225	226
1947	248	249
1948	277	277

(1) Wholesale milk, butterfat.

Table 13 - Annual Index Numbers of Prices Received for Michigan Meat Animals and Wool (1), 1935-39 = 100

Year	Using 1934-43 weights	Using 1938-47 weights
1934	59	58
1935	96	96
1936	100	100
1937	113	112
1938	96	97
1939	95	95
1940	94	93
1941	121	120
1942	156	156
1943	169	169
1944	161	161
1945	175	175
1946	216	217
1947	277	280
1948	297	299

(1) Hogs, beef cattle, calves, sheep, lambs, wool.

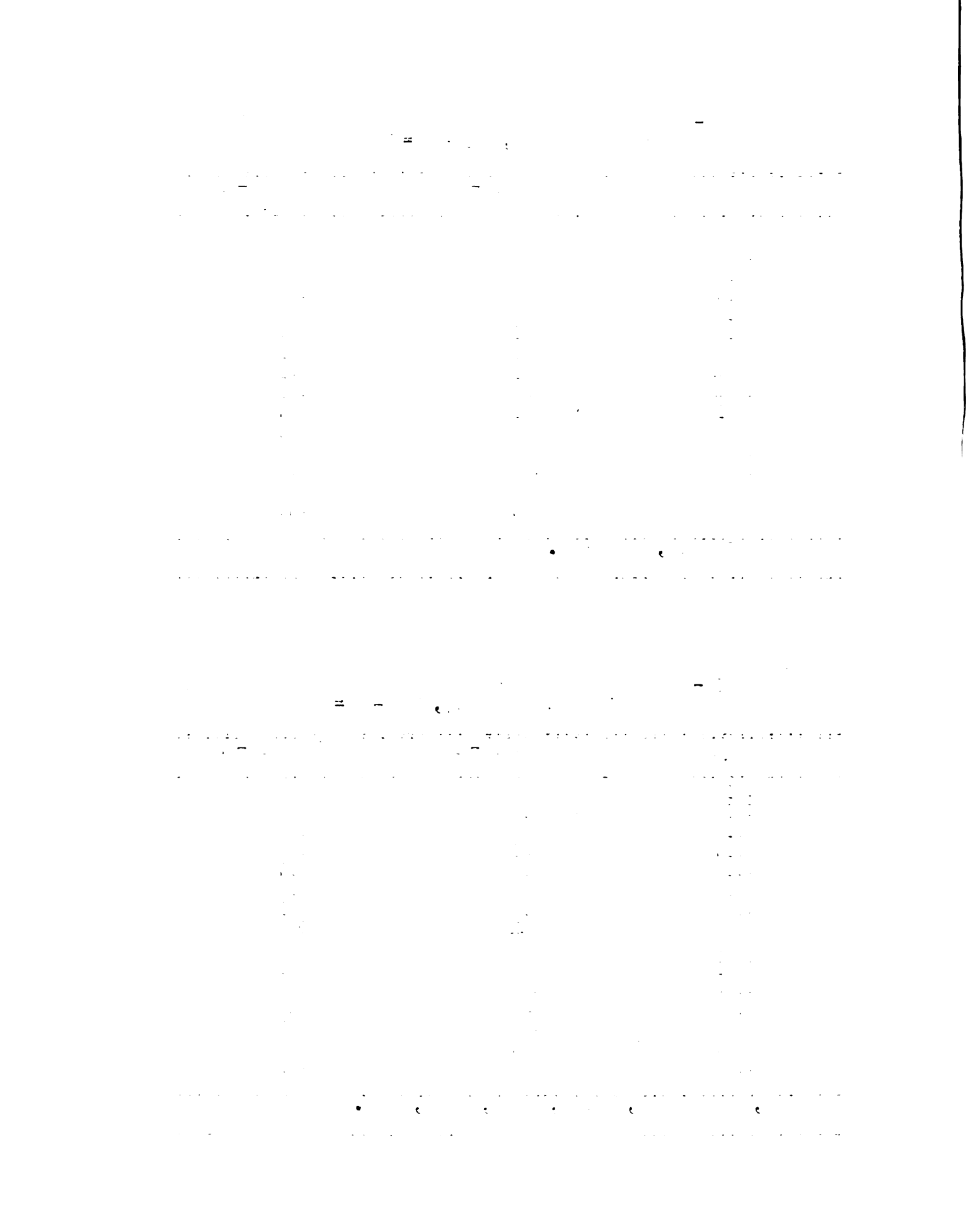


Table 14 - Annual Index Number Series of Prices Received for Michigan Poultry Products (1), 1935-39 = 100

Year	Using 1934-43 weights	Using 1938-47 weights
1934	77	77
1935	109	109
1936	103	103
1937	102	102
1938	100	100
1939	86	86
1940	87	87
1940	109	109
1942	138	138
1943	172	172
1944	153	154
1945	180	180
1946	177	177
1947	207	206
1948	228	228

(1) Chickens, eggs, turkeys

Table 15 - Annual Index Numbers of Prices Received for Michigan Fruit Crops (1), 1935-39 = 100

Year	Using 1934-43 weights	Using 1938-47 weights
1934	109	113
1935	84	84
1936	127	127
1937	93	95
1938	122	122
1939	74	72
1940	102	101
1941	113	111
1942	167	168
1943	324	328
1944	278	272
1945	388	373
1946	331	322
1947	233	230
1948	269	261

(1) Apples, peaches, cherries, grapes, pears, plums, strawberries.

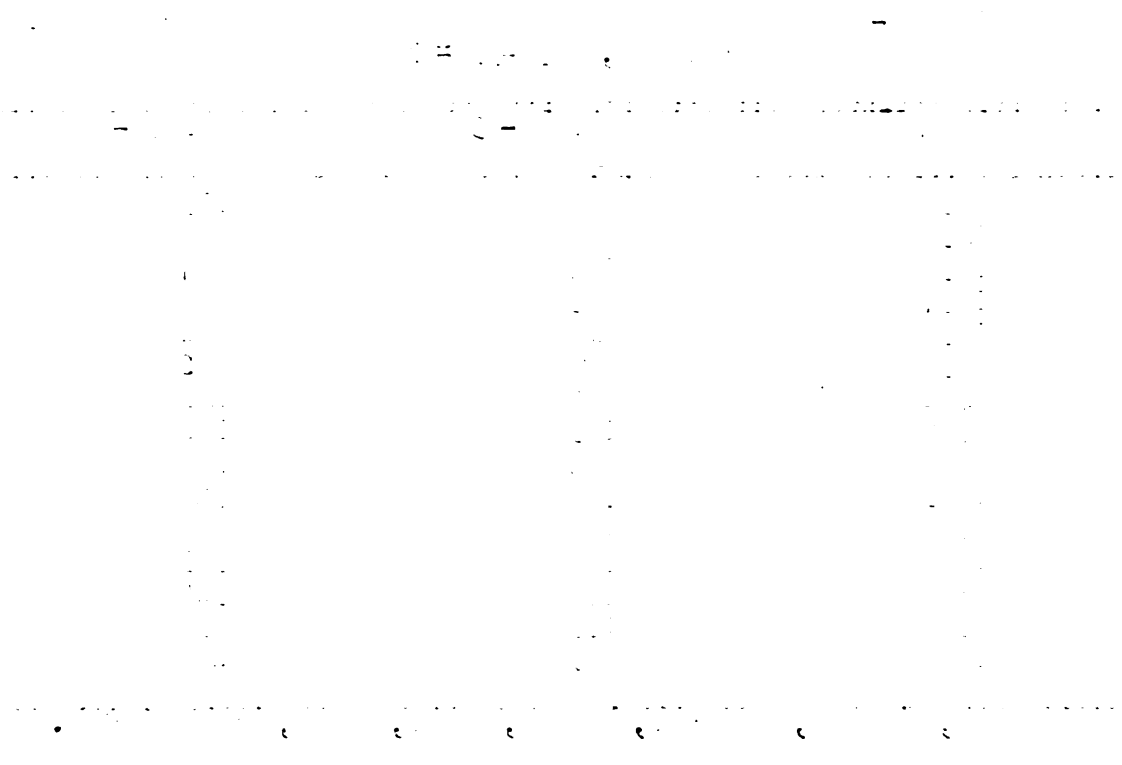


Table 16 - Annual Index Numbers of Prices Received for Michigan Truck Crops (1), 1935-39 = 100

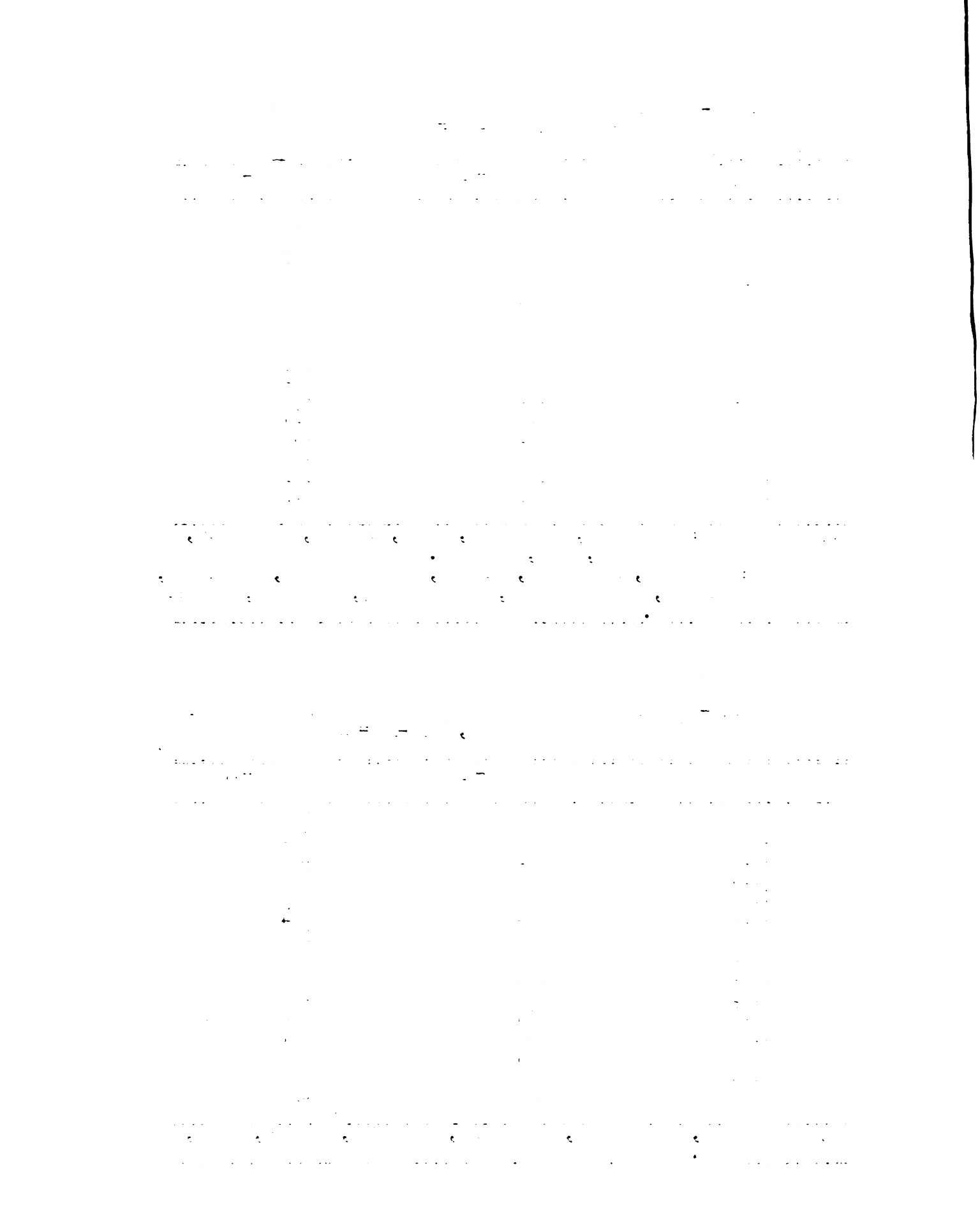
Year	Using 1934-43 weights	Using 1938-47 weights
1934	100	98
1935	90	89
1936	100	101
1937	114	114
1938	97	96
1939	99	100
1940	112	112
1941	164	162
1942	195	193
1943	303	298
1944	238	237
1945	283	279
1946	201	199
1947	329	323
1948	223	219

(1) Manufacture: Lima beans, snap beans, beets, cabbage, sweet corn, cucumbers, peas, tomatoes.
(2) Market: Asparagus, snap beans, cabbage, Danish cabbage, cantaloupe, carrots, celery (early), celery (late), cucumbers, onions, tomatoes.

Table 17 - Annual Index Numbers of Prices Received for Michigan Miscellaneous Crops (1), 1935-39 = 100

Year	Using 1934-43 weights	Using 1938-47 weights
1934	100	100
1935	90	100
1936	113	105
1937	99	101
1938	98	100
1939	92	94
1940	115	104
1941	120	124
1942	151	148
1943	194	190
1944	227	222
1945	210	207
1946	257	254
1947	252	250
1948	242	239

(1) Maple syrup, maple sugar, peppermint, spearmint, popcorn, honey, sugar beets.



Corrections.- - Difficulties were encountered in the calculation of the index because monthly price data were not available for all products included in the index. Annual price data but not monthly price data was available for soy beans and sweet clover during this period. Monthly data became available for soy beans in January 1937 and for sweet clover in August 1938. The base values of these crops were omitted for the period for which monthly price data were not available, from the base value of the groups in which these crops had been placed. The base value of each crop was added to the base value of its respective group as price data became available.

Comparison of the revised series.- - Differences which are present in the two revised series must be attributed to differences in the weights used. The remaining factors which would effect the indexes, such as prices, the products selected and the formula, were identical in each series.

The greatest divergence between the two series was found in the fruit group in the year 1945 (Table 15). The series calculated with the 1934-43 weight showed that the index of prices received for fruit in that year was 388 as compared to 373 in the series calculated using the 1938-47 weights.

The cause of this difference of 15 points or 4 percent was investigated. Each fruit crop was removed from the series for the year 1945, and it was found that cherries was the only crop that had any appreciable effect on either series and it only on the series calculated using the 1934-43 weights. When the effects of cherries was removed from the series calculated from the 1934-43 weights, the index was changed from 388 to 375.

The trends of the revised series were similar to the trends of the unrevised series of prices received by Michigan farmers.

Splicing the Revised Index Number Series To The Unrevised Series

The index number series constructed in 1934 by Ulrey adequately measured the fluctuations of prices received by Michigan farmers up until 1939. The 1924-28 weights represented quite well the sales of farm products until the late thirties. The revision consequently was extended back only until 1934.

Procedure.- - In order to splice the revised and unrevised series, the price base of the original index number series was shifted from 1910-14 to 1935-39. This step permitted the revised index number series to be compared directly with the unrevised series with a minimum amount of effort. This was accomplished by multiplying the unrevised composite index and group indexes by the following constants 16/:

1) Prices of 20 farm products	.90
2) Field crops	.99
3) Feed crops	1.27
4) Meat animals and wool	.82
5) Dairy products	.86
6) Poultry products	.88

Comparisons of Unrevised and Revised Indexes.- - The original index number series were directly compared with the two revised index number series for the eleven year period 1934-44 (Tables 18-23). This was accomplished by shifting the price base of the original index number series

16/ The constants were derived by dividing 100 by the arithmetic mean of the composite index numbers of prices received by farmers and also by the respective group index numbers for the period 1935-39.

from 1910-14 to 1935-39. The comparison showed a marked uniformity between the three series of index numbers from 1934 until 1942. After 1942, the two revised series showed few differences, but the unrevised series showed a marked divergence from the two revised series.

Table 18 - Comparison of Annual Index Number Series of Prices Received by Michigan Farmers (1), 1935-39 = 100

Year	Unrevised series, weights 1924-28	Revised series, weights 1934-43	Ratio of revised to unrevised (2) - (1)	Revised series, weights 1938-47	Ratio of revised to unrevised (4) - (1)
1934	80	83	104	83	104
1935	94	94	100	95	101
1936	108	108	100	107	99
1937	119	115	97	113	95
1938	92	94	102	95	103
1939	87	89	102	90	103
1940	95	98	103	97	102
1941	116	121	104	121	104
1942	145	145	100	147	101
1943	182	198	110	197	108
1944	179	189	106	189	106

(1) Unrevised series contained 20 products; revised series 59.

Table 19 - Comparison of Annual Index Number Series of Prices Received for Michigan Cash Field Crops (1), 1935-39 = 100

Year	(1) Unrevised series, weights 1924-28	(2) Revised series, weights 1934-43	(3) Ratio of revised to unrevised (2) - (1)	(4) Revised series, weights 1938-47	(5) Ratio of revised to unrevised (4) - (1)
1934	98	93	95	95	97
1935	78	84	108	80	103
1936	125	126	100	123	98
1937	137	135	99	137	100
1938	80	73	91	78	98
1939	80	82	102	82	98
1940	101	96	95	94	93
1941	113	117	104	116	103
1942	150	146	97	144	96
1943	213	196	92	192	90
1944	209	196	94	194	93

(1) Unrevised: Field beans, potatoes, wheat, red clover seed, rye, apples.
Revised: Field beans, potatoes, wheat, alfalfa seed, red clover seed, sweet clover seed, alsike seed, flax seed, soybeans.

Table 22 - Comparison of Annual Index Number Series of Prices Received for Michigan Meat Animals and Wool (1), 1935-39 = 100

Year	(1) Unrevised series, weights 1924-28	(2) Revised series, weights 1934-43	(3) Ratio of revised to unrevised (2) ÷ (1)	(4) Revised series, weights 1938-47	(5) Ratio of revised to unrevised (4) ÷ (1)
1934	59	59	100	58	98
1935	97	96	99	96	99
1936	103	100	97	100	97
1937	111	113	102	112	101
1938	95	96	101	97	102
1939	94	95	101	95	101
1940	93	94	101	93	100
1941	119	121	102	120	101
1942	153	156	102	156	102
1943	169	169	100	169	100
1944	160	161	101	161	101

(1) Unrevised and revised: Hogs, beef cattle, calves, sheep, lambs, wool.

Table 23 - Comparison of Annual Index Number Series of Prices Received for Michigan Poultry Products (1), 1935-39 = 100

Year	(1) Unrevised series, weights 1924-28	(2) Revised series, weights 1934-43	(3) Ratio of revised to unrevised (2) ÷ (1)	(4) Revised series, weights 1938-47	(5) Ratio of revised to unrevised (4) ÷ (1)
1934	77	77	100	77	100
1935	109	109	100	109	100
1936	103	103	100	103	100
1937	104	102	98	102	98
1938	100	100	100	100	100
1939	86	86	100	86	100
1940	86	87	101	87	101
1941	108	109	101	109	101
1942	136	138	101	138	101
1943	172	172	100	172	100
1944	157	153	97	154	98

(1) Unrevised: Chickens, eggs.
Revised: Chickens, eggs, turkeys.

Conclusions.—The weights and the products selected for the original index were adequate up until 1939 and possibly up until 1942. However, after 1942 a definite weight bias is observed in the new indexes which is made more noticeable when the 39 new products were added to the revised annual index.

There were only slight differences between the three series of index numbers during the period 1935-39. The revised annual series of prices received for the 59 products and the unrevised series representing 20 products showed no difference between original series and the revised series calculated from the 1934-43 weights. The series calculated from the 1938-47 weights showed a mean difference of only two-tenths of one percent for the same period. The group index-number series show but limited discrepancies between the revised and unrevised series for comparable groups. (Table 24.) The dairy products group and the meat

Table 24 - Arithmetic Mean of the Ratio of Revised to Unrevised Index-Number Series for the Period 1935-39

	Weights 1934-43	Weights 1938-47
Composite prices received index	100.0%	100.2%
Field crops index	100.2	100.4
Feed crops index	100.2	99.4
Dairy products index	100.4	100.6
Meat animals and wool index	100.2	100.0
Poultry products index	99.4	99.4

animals and wool group contained the same products in the revised and the unrevised series; all of the remaining groups in the two revised

series contained products which were not represented in comparable unrevised groups. It was concluded that any differences which existed between the revised and the original series during the period 1935-39 could be attributed to the efforts of weights and the effects of new commodities added to the index.

World War II had little or no effect upon Michigan agriculture up to the end of 1939 and Government price controls were not introduced until after the United States entered the war. Under these conditions and due to the market uniformity that prevailed between the three series during 1935-39, it was considered desirable to select this period rather than a later period to splice the two revised series to the original index.

The Revised Index-Number Series Shifted to the 1910-14 Price Base

Reasons.--It was necessary to shift the price base of the revised index-number series to the 1910-14 price base in order that it be comparable to the present price series issued by the Bureau of Agricultural Economics and to conform to some of the present methods of calculating "parity". The two revised series of index-number series were shifted to the 1910-14 base and compared with the original series from the year 1934 to date.

Method.--The revised index-number series of prices received by Michigan farmers were shifted from the 1935-39 price base by multiplying the index numbers of the two revised series by constants. These constants were derived by finding the average of the original index-numbers for the period 1935-39, after the series had been shifted back to the 1910-14 price base, and dividing these averages by one-hundred;

the resulting constants were multiplied by the corresponding revised indexes and group indexes in order that the price base of the two revised series could be shifted from the 1935-39 price base to the 1910-14 price base. The same constants were used for the new groups — fruit, truck crops, and miscellaneous products — as for the composite index of 59 products. The following constants were derived:

1) Index of prices received for 59 farm products 1.11
2) Field crop index 1.01
3) Feed crop index .79
4) Meat animal and wool index 1.22
5) Dairy products index 1.16
6) Poultry products index 1.13
7) Fruit index 1.11
8) Truck crop index 1.11
9) Miscellaneous products index 1.11.

The composite indexes and group indexes are shown in tables 25 to 33 and figures 1 to 8 on a 1910-14 price base.

Table 25 - Annual Index of Prices Received by Michigan Farmers, 1910-14 = 100

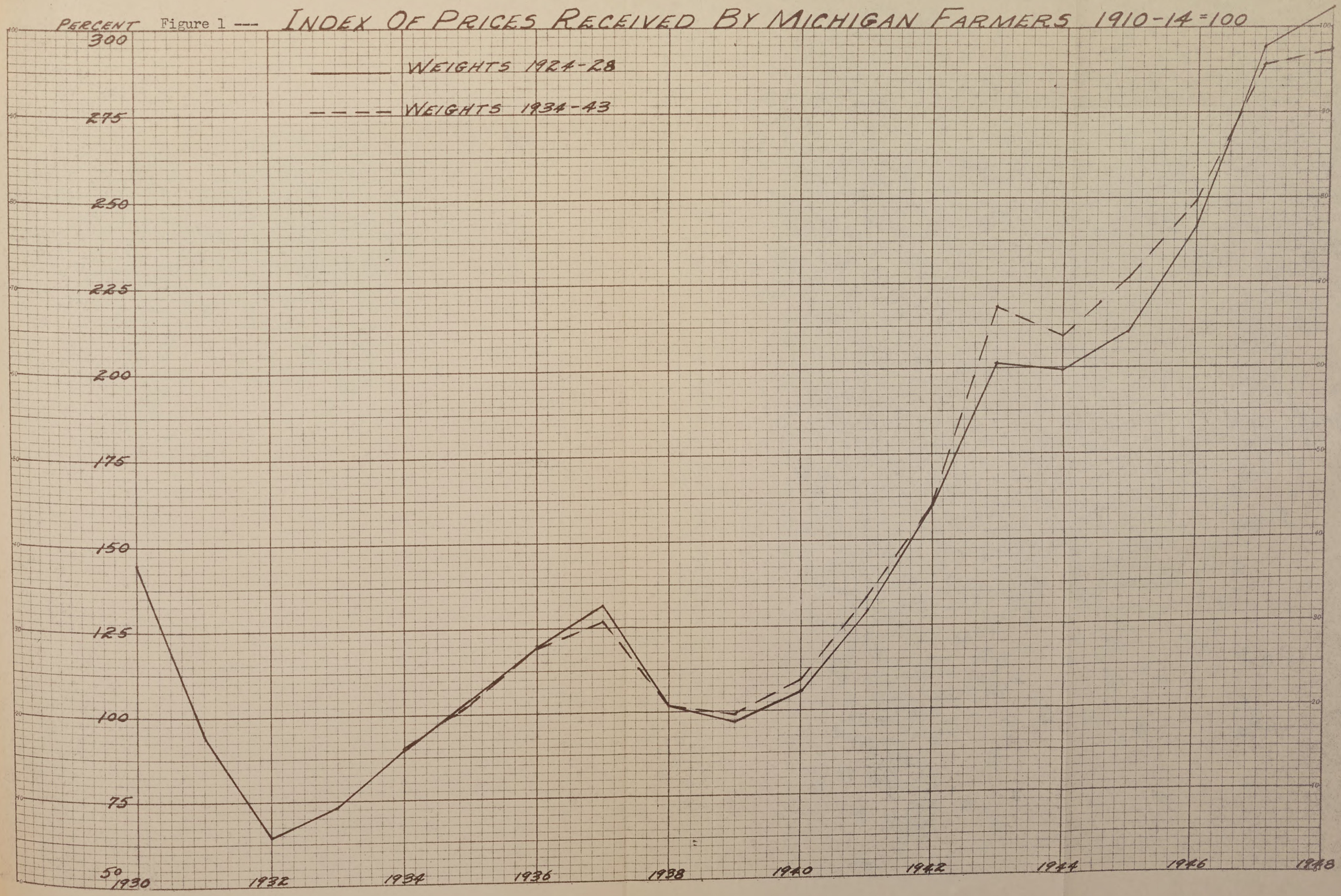
Year	20 products, weights 1924-28	59 products, weights 1934-43	59 products, weights 1938-47
1934	89	91	92
1935	104	103	105
1936	120	119	119
1937	132	127	125
1938	102	103	105
1939	97	98	100
1940	106	108	108
1941	129	133	135
1942	161	160	163
1943	202	218	217
1944	199	208	208
1945	211	227	228
1946	242	248	249
1947	294	289	292
1948	306	293	296

Table 26 - Annual Index of Prices Received for Michigan Cash Field Crops (1), 1910-14 = 100

Year	Unrevised series, weights 1924-28	Revised series, weights 1934-43	Revised series, weights 1938-47
1934	99	94	96
1935	79	85	81
1936	126	127	124
1937	138	136	138
1938	81	74	79
1939	81	83	83
1940	102	97	95
1941	114	118	117
1942	151	147	145
1943	215	198	194
1944	211	198	196
1945	237	208	205
1946	230	242	242
1947	314	313	313
1948	286	267	267

(1) Unrevised: Field beans, potatoes, wheat, red clover seed, rye, apples.
Revised: Field beans, potatoes, wheat, alfalfa seed, red clover seed, sweet clover seed, alsike seed, flax seed, soybeans.

Figure 1 --- INDEX OF PRICES RECEIVED BY MICHIGAN FARMERS 1910-14=100



PERCENT Figure 2 — INDEX OF PRICES RECEIVED BY MICHIGAN FARMERS 1910-14=100

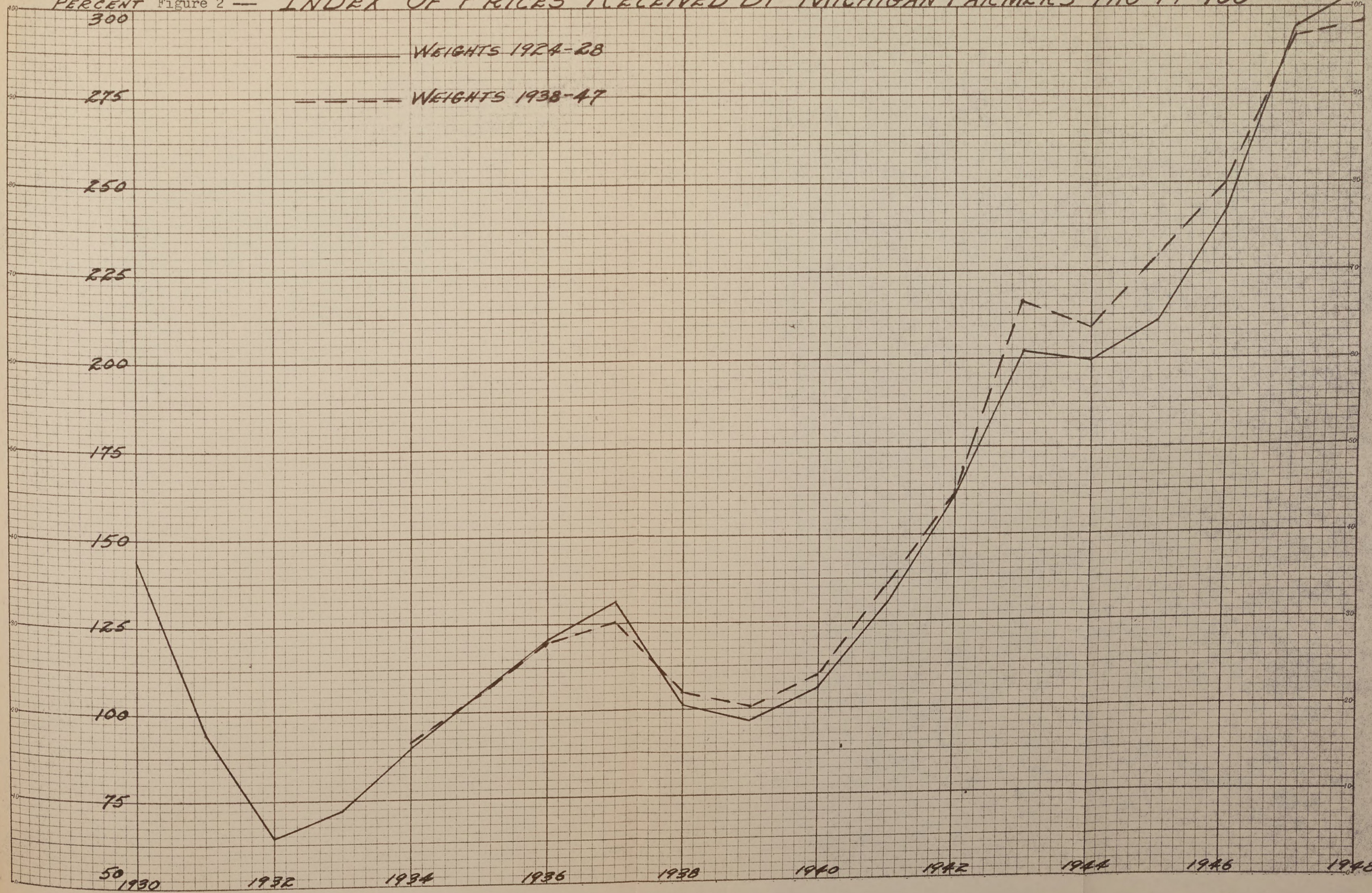
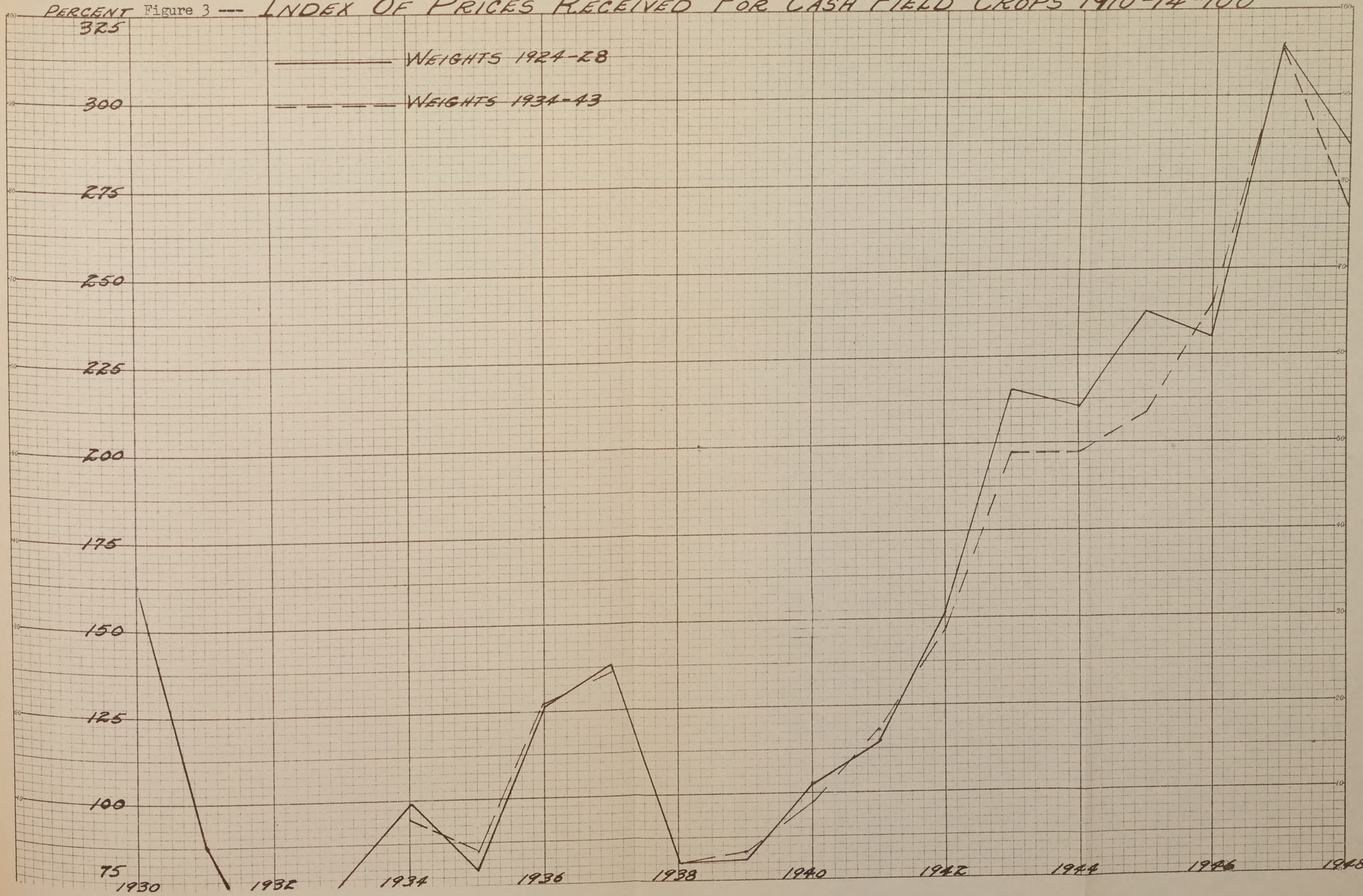


Figure 3 --- INDEX OF PRICES RECEIVED FOR CASH FIELD CROPS 1910-14=100



PERCENT Figure 4 — INDEX OF PRICES RECEIVED FOR CASH FIELD CROPS 1910-14=100

Table 27 - Annual Index of Prices Received for Michigan Feed Crops (1), 1910-14 = 100

Year	Unrevised series, weights 1924-28	Revised series, weights 1934-43	Revised series, weights 1938-47
1934	101	98	98
1935	95	94	93
1936	75	77	77
1937	93	96	96
1938	67	66	65
1939	65	62	63
1940	71	70	70
1941	77	77	78
1942	107	106	107
1943	132	125	127
1944	159	152	154
1945	153	154	153
1946	160	166	167
1947	190	206	207
1948	198	196	198

(1) Unrevised: Alfalfa hay (loose), corn, oats, barley.
Revised: Alfalfa hay (loose), corn, oats, barley, rye, buckwheat.

Table 28 - Annual Index of Prices Received for Michigan Dairy Products (1), 1910-14 = 100

Year	Unrevised series, weights 1924-28	Revised series, weights 1934-43	Revised series, weights 1938-47
1934	94	96	96
1935	107	109	108
1936	122	123	122
1937	137	132	132
1938	111	110	110
1939	102	106	108
1940	115	119	119
1941	140	143	143
1942	162	168	168
1943	204	217	212
1944	211	217	218
1945	209	215	216
1946	257	266	261
1947	283	289	287
1948	315	321	321

(1) Unrevised and revised: Wholesale milk, butterfat.

PERCENT Figure 5 --- INDEX OF PRICES RECEIVED FOR DAIRY PRODUCTS 1910-14=100

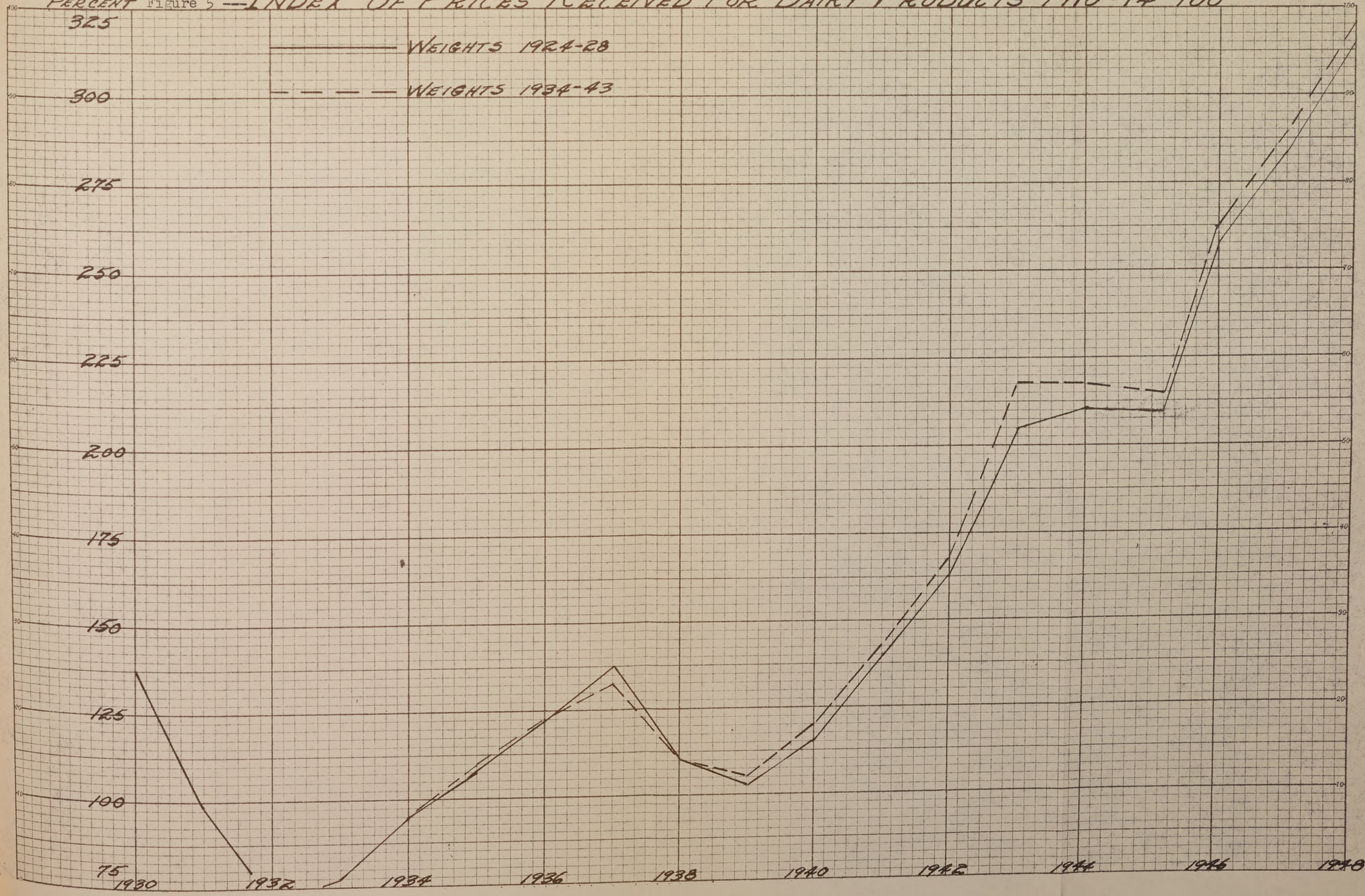


Figure 6 -- INDEX OF PRICES RECEIVED FOR DAIRY PRODUCTS 1910-1914=100

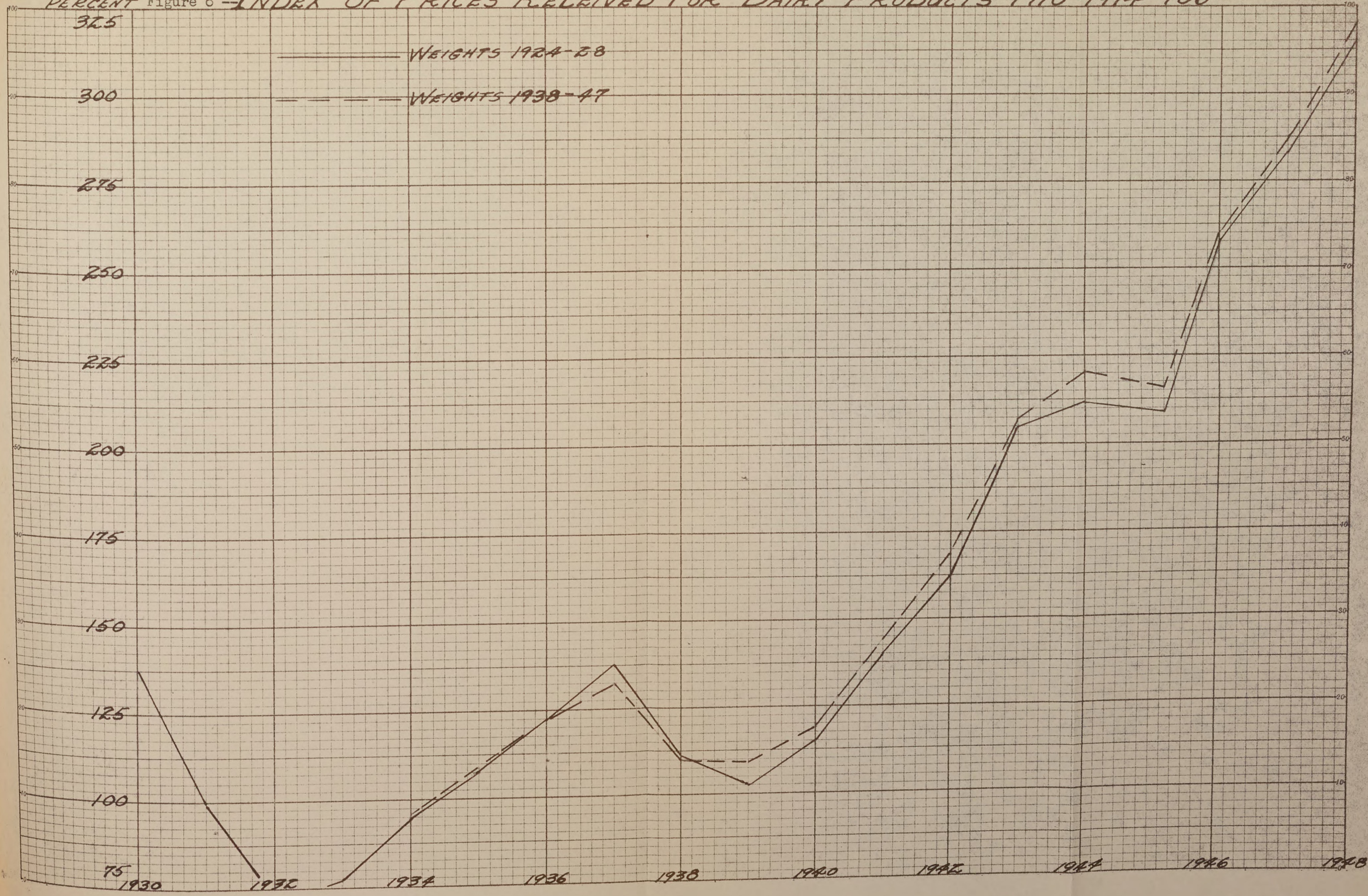


Table 29 - Annual Index of Prices Received for Michigan Meat Animals and Wool (1), 1910-14 = 100

Year	Unrevised series, weights 1924-28	Revised series, weights 1934-43	Revised series, weights 1938-47
1934	72	72	71
1935	118	117	117
1936	126	122	122
1937	137	138	137
1938	116	117	118
1939	115	116	116
1940	113	115	113
1941	145	148	146
1942	187	190	190
1943	206	206	206
1944	195	196	196
1945	209	214	214
1946	257	264	265
1947	327	338	342
1948	364	362	365

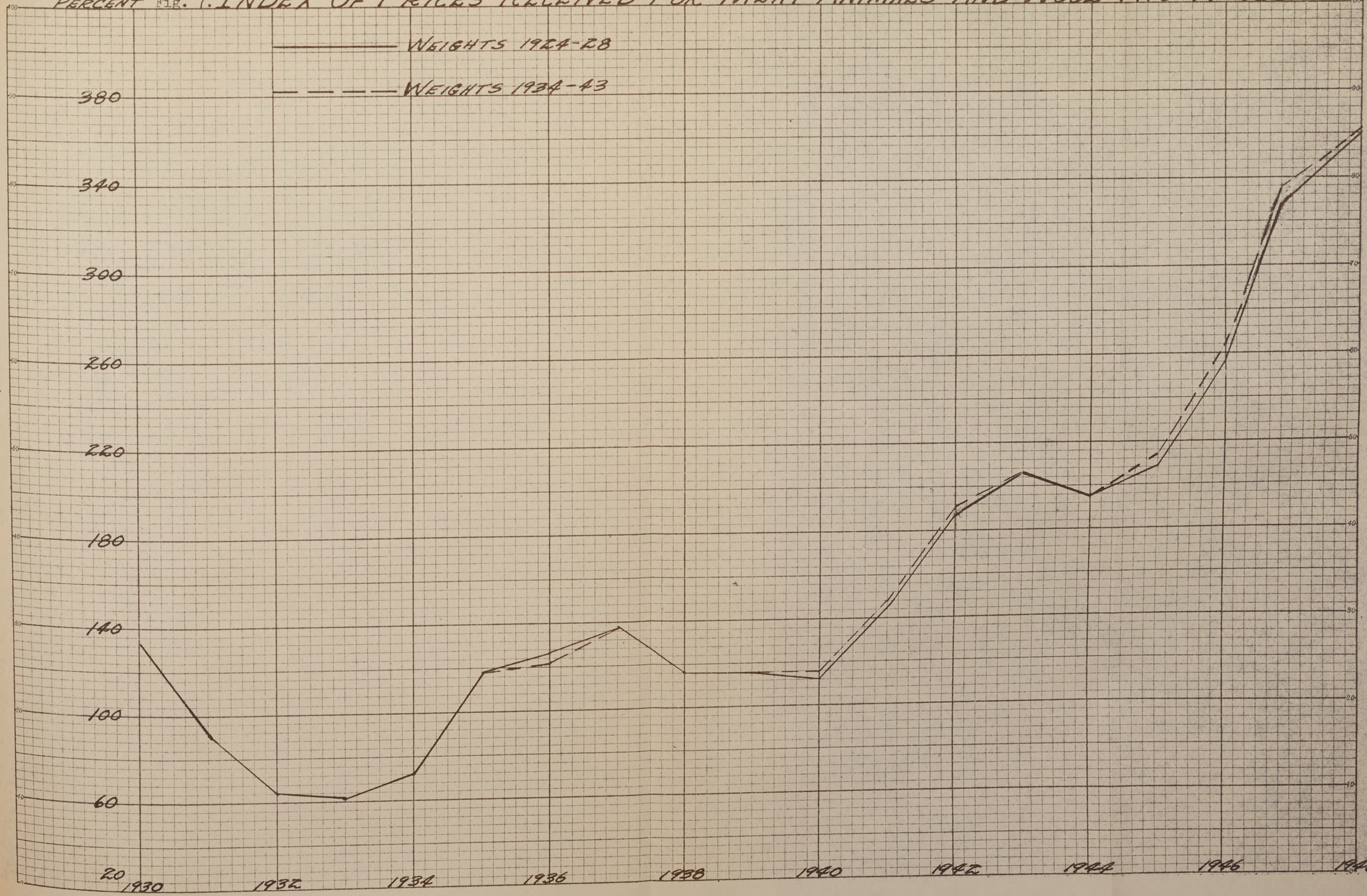
(1) Unrevised and revised: Hogs, beef cattle, calves, sheep, lambs, wool.

Table 30 - Annual Index of Prices Received for Michigan Poultry Products (1), 1910-14 = 100

Year	Unrevised series, weights 1924-28	Revised series, weights 1934-43	Revised series, weights 1938-47
1934	87	87	87
1935	123	123	123
1936	116	117	116
1937	118	115	115
1938	113	113	113
1939	97	97	97
1940	97	98	98
1941	122	123	123
1942	154	156	156
1943	194	194	194
1944	177	173	174
1945	207	203	203
1946	202	200	200
1947	232	234	233
1948	262	258	258

(1) Unrevised: Chickens, eggs.
Revised: Chickens, eggs, turkeys.

PERCENT Fig. 7. INDEX OF PRICES RECEIVED FOR MEAT ANIMALS AND WOOL 1910-14=100



PERCENT Fig. 8 - INDEX OF PRICES RECEIVED FOR MEAT ANIMALS AND WOOL 1910-14=100

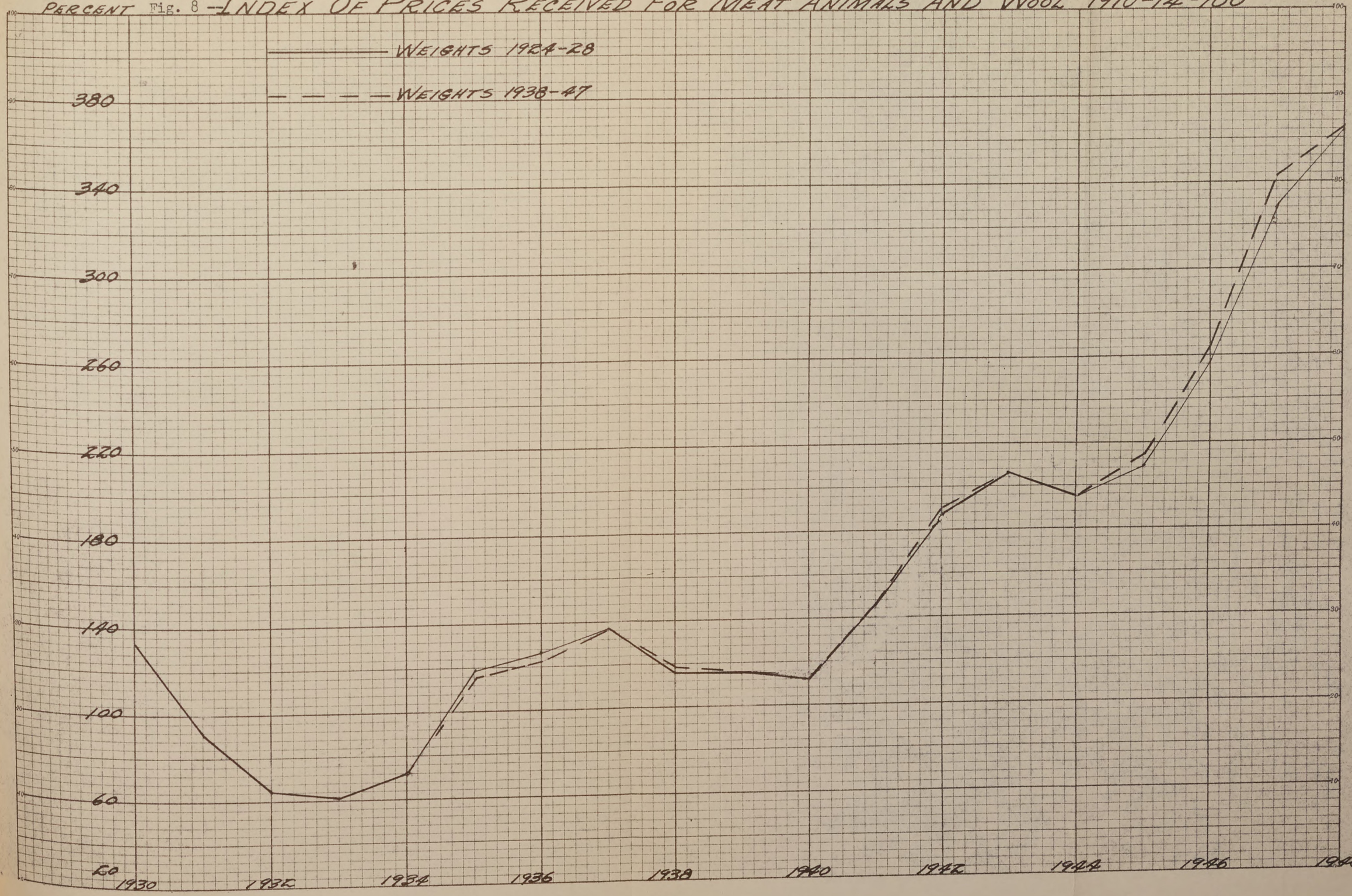


Table 31 - Annual Index of Prices Received for Michigan Fruit Crops (1), 1910-14 = 100

Year	New index, weights 1934-43	New index, weights 1938-47
1934	120	125
1935	92	93
1936	140	141
1937	102	105
1938	134	135
1939	81	80
1940	112	112
1941	124	123
1942	184	182
1943	356	364
1944	306	302
1945	427	414
1946	364	357
1947	256	255
1948	296	290

(1) Products: Apples, peaches, cherries, grapes, pears, plums, strawberries.

Table 32 - Annual Index of Prices Received for Michigan Truck Crops (1), 1910-14 = 100

Year	New index, weights 1934-43	New index, weights 1938-47
1934	110	108
1935	99	99
1936	110	112
1937	125	127
1938	107	107
1939	109	111
1940	123	124
1941	180	180
1942	215	214
1943	333	331
1944	262	263
1945	311	310
1946	221	221
1947	362	359
1948	245	243

(1) Manufactured: Lima beans, snap beans, beets, cabbage, sweet corn, cucumbers, peas, tomatoes.
Market: Asparagus, snap beans, cabbage, danish cabbage, [illegible], celery (early), celery (late),

Table 33 - Annual Index of Prices Received for Michigan Miscellaneous Crops (1), 1910-14 = 100

Year	New index, weights 1934-43	New index, weights 1939-47
1934	110	111
1935	108	111
1936	124	117
1937	109	112
1938	108	111
1939	101	104
1940	127	115
1941	132	138
1942	166	164
1943	213	211
1944	250	246
1945	231	230
1946	283	282
1947	277	278
1948	266	265

(1) Products: Maple syrup, maple sugar, peppermint, spearmint, popcorn, honey, sugar beets.

Comparisons.--The two revised annual index-number series and the unrevised group index-number series were very similar through 1942, when they were shifted from the 1935-39 price base to the 1910-14 price base -- except the fruit groups for the year 1945. This discrepancy was attributed to cherries.

There are some divergences between the original series and the two revised series after 1942. The most marked difference in the composite revised index-number series and the original index of prices received by Michigan farmers occurs in 1943. (Tables 18 to 23 and Figures 1 and 8.) The most marked differences which occur in the groups between the original index-number series and the revised series occurs in the cash field crop group.

Causes of differences.—The cause of the divergence between the original index and the two revised index-number series of prices received by Michigan farmers in 1943 was investigated. The two revised index-number series are relatively higher due to the effects of the fruit and truck crop groups which were represented only by apples in the original series.

During the year 1943 the prices received by Michigan farmers averaged 24 percent higher than in 1942. For the same period, the average increase in prices of fruit crops included in the revised index-number series (1938-47 weights) was 178 points or 96 percent. Truck crops increased 55 percent during this period.

Further evidence which confirms this conclusion was obtained when the annually weighted monthly index-number of the revised series, in which fruits and truck crops are not represented, was compared with the original index of prices received by Michigan farmers. (Table 34.) During the period under consideration, the comparison showed that the two revised series ran consistently below the original series — but never more than 3 percent.

Table 34 - Annually Weighted Index Numbers of the Three Series, Which Are Quoted Monthly, 1910-14 = 100

Year	Unrevised 20 products weights 1924-28	Revised 26 products weights 1934-43	Revised 26 products weights 1938-47
1941	129	130	130
1942	161	162	162
1943	202	199	197
1944	199	195	195
1945	211	206	205
1946	242	240	239
1947	294	288	287
1948	306	299	299

Within the major group index-number series, the most marked differences between the original series and the revised series occurs in the cash field crop group. This difference between the original series and the revised series can be attributed to the fact that the two groups are not comparable. The revised cash field crop group differs from the original group in that alfalfa seed, sweet clover seed, alsike clover seed, flax seed and soybeans are represented and that apples and rye were removed from this group.

The minor differences between the revised and original indexes for the remaining groups can be attributed to changes in weights and products included. The differences in the dairy groups and the meat animals and wool groups can only be attributed to the effects of the use of different weights in the 3 series because the same products are represented in each series.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

Controversy.—The controversial issues of index-number theory are not settled, but there is agreement that the fundamental question is one of definition. One school of thought contends that an index-number series of prices should measure only "pure" price change while a second school contends that an index of prices should be a measure of historical price change which takes cognizance of the effects of quantities bought and sold.

The divergence of opinion between these two schools is one of degree. There is general agreement that the fixed-weight aggregative formula is adequate only so long as the weights used are representative of the quantities of the commodities which are included. The practice of changing weights with shifts in farm sales is by all creators of dependable price index-number series who use the fixed weighted aggregative type of formula.

Formula.—The "ideal" formula has the desirable feature of being free from weight bias and it will also meet the requirements of both the factor reversal test and the time reversal test. The weighted aggregative formulae will only meet the time reversal test. However, the degree of accuracy obtained from the fixed-weighted aggregative type of formulae is of a sufficiently high standard that it is used by the majority of state colleges and agricultural experiment stations.

The fixed-weighted aggregative type of index series has been adopted in Michigan because it conforms to that type of formulae which is used by the Bureau of Agricultural Economics and the calculating

problems in its maintenance are relatively simple. Furthermore, Ronk of Cornell, Youngstrom of Idaho, and the Bureau of Agricultural Economics of the United States Department of Agriculture, have found this type of formula to be comparable in accuracy to those formulae which make allowance for seasonal variation in prices and quantities marketed.

The revision.--Four major changes introduced into the Michigan farm price index by the two proposed revised series are:

1) Two index-number series were constructed - one calculated monthly and one calculated annually.

2) Thirty-nine new products were added to the indexes - six to the monthly indexes and thirty-three additional to the annual indexes.

3) The products were regrouped.

4) The number of group indexes in the annual series was increased from five to eight; the new group index series created are fruit crops, truck crops, and miscellaneous crops.

5) The base periods for weighting the revised indexes were 1934-43 and 1938-47, instead of 1924-28 as in the original index.

6) Two periods were used for the price base: 1910-14 and 1935-39.

The structure and grouping of the monthly index series has five groups as did the unrevised series, and products have been added bringing the total up to twenty-six as compared with twenty products in the unrevised series. The method of calculating the series is the same for revised and unrevised series.

The construction of the annual index is the same as the monthly series. However, this index represents fifty-nine products divided among eight group index-number series. The principal reason for this regrouping of the annual index is to eliminate the effect of seasonal

variation of fruit and vegetable prices. Seasonal prices only are available for most of these products and during the remainder of the year they would unduly disturb the monthly price indexes if they were represented in it.

The price base period selected for the revised index was the calendar years 1935-39. This period was selected because price data for the majority of the thirty-nine commodities added to the index was not available before 1934. A second reason for this selection of a price base is that the Bureau of Agricultural Economics uses this base to publish three major index-number series of prices received. The revised index was also shifted to the 1910-14 price base in order to conform to some of the present methods of calculating "parity."

The average annual sales of fifty-nine products for two periods, 1934-43 and 1938-47, were selected for the weights of the two revised index-number series. The period, 1934-43, conforms closely to the present weights used by the Bureau of Agricultural Economics, 1935-39, and conforms closely to the pattern of marketing Michigan agricultural products just prior to the recent war.

The second period, 1938-47, contained five and a half years which were affected by war. This period was selected because it seems extremely doubtful that the pattern of agricultural production will return to that of pre-war. The principal reason for experimenting with two base periods was to study the effects of different weights on the price index.

The two revised price index-number series of prices received by Michigan farmers show no appreciable difference in spite of the difference in the periods taken for weighting the commodities. This same

observation also applies to the group indexes. The general trends of these series are in line with the trends of the unrevised series, which in turn behave similarly to the index series of prices received by farmers for the entire United States. There are marked divergences between the two revised index series and the unrevised series after 1942. This divergence of the revised annual index from the original index is accounted for primarily by the addition of fruits and truck crops. The effect of these groups is most noticeable in the year 1943 when O. P. A. price controls were being enforced on other farm products more than on fruits and vegetables.

CONCLUSIONS

Advantages gained by revising the original index.—The elimination or the reduction of the effects of weight bias from the index of individual and groups of prices received by Michigan farmers was the principal advantage gained by revising the original index. The physical volume of agricultural products marketed in Michigan increased by thirty-nine percent during the period 1934 to 1946, Appendix Table It is obvious that weights obtained from the average annual sales of the period 1924-28 no longer represents the Michigan agricultural marketing pattern. Only by using relatively recent weights can the effects of weight bias be reduced in a type "A" index and a periodic revision of these weights is necessary if a degree of accuracy comparable to that which may be obtained by using the "Ideal" formula is to be expected.

The second advantage gained by revising the original index is that the number of products represented in the annual index was increased

from twenty to fifty-nine products. The fifty-nine products represents the source of about ninety-five percent of present Michigan farm income as compared with eighty-eight percent of cash farm income represented by twenty products in the original index. It is desirable that as large a part of the farm income as possible be represented. The increased number of products permitted eight homogeneous groups to be formed as compared with five in the original index. This greater number of eight homogeneous groups makes it possible for specialized producers to study the prices they receive in relation to the prices received by other specialized producers and prices received by all Michigan farmers. The additional groups are particularly advantageous to fruit and vegetable producers because a group has been added for each of these types of crops. In the original index fruits and vegetables were only represented by apples which had been placed in the cash field crop group.

The effects of seasonal price variation on the index was reduced considerably by the revision. The perishable fruit and vegetable crops which have a high seasonal price variation were placed only in the annual index. Crops which are seasonally produced and inexpensively stored such as corn, wheat, oats, barley, rye, field beans and hay which have a smaller seasonal price variation than the perishable crops constituted the monthly index-number series. In the original index, apples which have a high seasonal price variation, distorted the field crop group index particularly during the spring and early summer.

Recommendations.--Two revised series were calculated. One series was calculated from weights taken from the average annual sales of Michigan farm products sold during the period 1934-43 and the second

from 1938-47 sales. There is but little significant difference between the two series.

The weights obtained from the average annual sales 1934-43 conform closely to the weighting period selected by the Bureau of Agricultural Economics. However, the Bureau probably will revise the 1935-39 weights after the decennial census is taken.

Michigan agricultural production undoubtedly will change, but not to its prewar pattern. Readjustments in agriculture even though prices decline in the future, will be relatively slow. Furthermore, if the present volume of agricultural production were to change in Michigan as much as it did after World War I, it would not readjust to the 1934-43 pattern.

Another factor that should be considered before selecting one of the revised series is the population trend in the state. For the state as a whole, there was an increase of fifteen and five-tenths percent in population between 1940-47. The population in the rural areas increased from 1,801,239 in 1940 to 2,056,008 in 1947, or fourteen and one-tenth percent. During the same period, the urban population rose from 3,454,867 to 4,012,992, or sixteen and two-tenths percent.[17/] As long as a high level of employment prevails throughout the country, the non-farm and urban population will increase more rapidly than the farm population and agriculture will be faced with a continued high effective demand. The pattern of agriculture in Michigan consequently, would continue its recent pattern.

17/ J. R. Thaden, "Population Change in the Rural and Urban Areas of Michigan Since 1940," The Quarterly Bulletin, Michigan State College, Vol. 31, No. 2, (November, 1948) 233-247.

It is recommended consequently, that the revised series calculated from the 1938-47 weights be adopted as the price index-number series to measure fluctuations of prices received by Michigan farmers. The weights used in this series would be representative not only of the present agricultural marketing pattern in Michigan, but they also should be applicable for a considerable period in the future.

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APPENDIX A

Calculations:

Prices received for Michigan farm products

Monthly basis for Jan. 1948

Annual basis for 1948

Weights used to compute annually weighted prices

The Calculation of the Index of Price Received by Michigan Farmers

Data. -- All statistical data were obtained from the Bureau of Agricultural Economics. All price quotations are those collected as for the 15th of each month.

Formula. -- The formula used is Laspeyres' -- Type A from Bean and Stine.

Calculations. -- The products represented in the index were arranged into homogeneous groups. Within each group, the average annual quantity of each product marketed by Michigan farmers during the weight period (1934-43 or 1938-47) was multiplied by the average price of the product received by Michigan farmers during the calendar years 1935-39. The values of the different products which were obtained were sumated and the sum was called a group base value. The group base value was considered to be equal to 100.

In order to find the index number of the group for a particular year, the weights of the various products included in the group were multiplied by the prices of those products which prevailed in the year being considered. The resulting values were sumated and the sum was called the group value for the given year. The index number of the group was then obtained by dividing the group value for the given year by the group base value.

In order to find an index number of all farm prices for a given year, it was necessary to find what the percentage of each group base value was of the base value of all products. These percentages were called group weights. The group index numbers for given years were multiplied by these group weights (percentages) and the result-

ing products were sumated and the index of prices received by farmers for the products was obtained. A detailed illustration is shown in Table 1, Appendix A for the monthly index which includes 26 products, and in Table 2, Appendix A for the annual index which includes 59 products.

Table 1 Calculation of Monthly Price Indexes for Five Groups and for Composite Index of 26 Michigan Farm Products for Jan. 1948.

Weight base, 1938-47= 100 Price base, 1935-39= 100

Commodities	Weights 1938-47 = 100	Jan. 1948 prices	Jan. 1948 values
Cash field crops			
Field beans 100# bags	3,933,000	$13.10	$ 51,587,800
Potatoes, bu.	11,184,000	1.75	19,572,000
Wheat, bu.	11,884,000	2.93	34,820,120
Alfalfa seed, bu.	65,000	23.00	1,495,000
Red clover seed, bu.	100,000	29.00	2,900,000
Sweet clover seed, bu.	13,000	7.00	91,000
Alsike seed, bu.	19,000	20.50	389,500
Flaxseed, bu.	55,000	6.70	368,500
Soybeans, bu.	1,148,000	4.05	4,649,400
Total value for Jan. 1948			$115,873,320
Base value at 1935-39 prices			32,517,960
Jan. 1948 index			356.3
Feed crops			
Alfalfa hay (loose) tons	347,000	$23.00	$ 7,981,000
Corn, bu.	3,322,000	2.56	8,504,320
Oats, bu.	5,806,000	1.29	7,489,740
Barley, bu.	1,323,000	2.15	2,844,450
Rye, bu.	353,000	2.40	847,200
Buckwheat, bu.	209,000	2.15	449,350
Total value for Jan. 1948			$23,507,200
Base value at 1935-39 prices			8,783,350
Jan. 1948 index			320.1
Dairy products			
Milk sold at wholesale, cwt.	33,258,600	$4.85	$161,304,210
Butterfat, lbs.	47,779,000	.93	44,434,470
Total value for Jan. 1948			$205,738,680
Base value at 1935-39 prices			71,871,078
Jan. 1948 index			286.3

Livestock and wool			
Hogs, cwt.	2,550,770	$26.20	$ 66,830,174
Beef cattle, cwt.	3,176,900	20.80	66,079,520
Calves, cwt.	627,750	27.30	17,765,325
Sheep, cwt.	147,490	9.70	1,430,653
Lambs, cwt.	412,250	22.70	9,359,075
Wool, lbs.	5,820,000	.43	2,502,600
Total value for Jan. 1948			$163,966,347
Base value at 1935-39 price			53,030,062
Jan. 1948 index			309.2

Poultry Products			
Chickens, lbs.	70,609,000	$ .294	$20,759,046
Eggs, doz.	101,417,000	.488	49,491,496
Turkeys, lbs.	9,645,000	.39	3,761,550
Total value for Jan. 1948			$74,012,092
Base value at 1935-39 prices			34,331,110
Jan. 1948 index			215.6

Groups of Commodities	Group weights at 1935-39 prices	Group indexes	Group weights x group indexes
Cash field crops	16.22	356.3	57.79
Feed crops	4.39	320.1	14.05
Dairy products	35.83	286.3	102.58
Livestock & wool	26.44	309.2	81.75
Poultry products	17.12	215.6	36.91
	100.00		
Composite index, Jan. 1948			293.08

Table 2 Calculation of Annual Price Index for Groups and for Composite Index of 59 Michigan Farm Products for 1948

Weight base, 1938-47= 100 Price base, 1935-39= 100

Commodities included in Annual index	Weights	1948 prices	1948 values
Fruit crops			
Apples, bu.	6,902,000	$ 1.85	$12,768,700
Peaches, bu.	3,949,000	1.90	7,503,100
Cherries, tons	42,979	184.00	7,908,136
Grapes, tons	34,864	105.00	3,660,720
Pears, bu.	956,000	2.20	1,883,200
Plums, tons	4,259	95.00	404,605
Strawberries, crates	762,000	8.55	6,515,100
Total value for 1948			40,643,561
Base value at 1935-39 prices			15,575,140
1948 index			261.0
Truck crops for manufacture			
Lima beans, tons	1,200	$ 124.70	$ 149,640
Snap beans, tons	8,270	110.30	912,181
Beets, tons	6,880	21.00	144,480
Cabbage, tons	7,180	14.90	106,982
Sweet corn, tons	4,550	22.00	100,100
Cucumbers, bu.	1,748,000	1.65	2,884,200
Peas, tons	8,428	76.80	647,270
Tomatoes, tons	37,340	25.10	937,234
Truck crops for market			
Asparagus, crates	851,000	2.02	1,719,020
Snap beans, bu.	464,000	2.65	1,229,600
Cabbage, tons	54,000	32.00	1,728,000
Danish cabbage, tons	22,000	31.00	682,000
Cantaloupe, 70# crates	672,000	3.40	2,284,800
Carrots, bu.	1,823,000	.70	1,276,100
Celery, early, crates	2,043,000	1.30	2,661,100
Celery, late, crates	3,667,000	1.50	5,500,500
Cucumbers, bu.	220,000	2.20	484,000
Onions, 50# sacks	6,877,000	1.30	8,940,100
Tomatoes, bu.	2,015,000	2.50	5,037,500
Total value for 1948			37,424,807
Base value at 1935-39 prices			17,072,876
1948 index			219.2

Miscellaneous products			
Maple syrup, gals.	96,500	5.40	521,100
Maple sugar	8,200	.74	6,068
Peppermint, lbs.	395,000	6.85	2,705,750
Spearmint, lbs.	79,700	4.60	366,620
Popcorn, cwt.	32,634	4.75	155,012
Honey	8,603,000	.15	1,290,450
Sugar beets, tons	700,000	13.50	10,665,000
Total value for 1948			15,710,000
Base value at 1935-39 prices			6,574,740
1948 index			238.9

The annual indexes for 1948 for the other five groups of products are calculated in the same manner as for the monthly indexes in Table 1. The eight groups are combined into the composite index for 59 commodities as follows:

Groups of commodities	Group weight at 1935-39 price	Group indexes for 1948	Group weights x group index
Cash field crops	13.56	264.3	35.84
Feed crops	3.66	251.1	9.19
Dairy products	29.93	276.8	82.98
Meat animals	22.12	299.3	66.21
Poultry products	14.32	228.0	32.65
Fruit crops	6.50	261.0	16.97
Truck crops	7.12	219.2	15.61
Miscellaneous products	2.74	238.9	
	100.00		
Composite index for 1948			266.0

Weights Used to Compute Annually Weighted Prices

Source of data. -- Data was obtained from the published and unpublished monthly marketing estimates of the Bureau of Agricultural Economics.

Weights for annual prices. -- The weighted annual prices as calculated by the Bureau were used in calculating the annual indexes for livestock and products. The seasonal prices prepared by the Bureau were also used for fruit, crops, truck crops and miscellaneous crops. The assumption is that these crops were entirely marketed by farmers by the end of the calendar year, which is not entirely correct.

The Bureau crop year annual averages for the field and feed crops were not used. Instead, annual averages for the calendar years were calculated from monthly marketings. The monthly marketings used were averages for the period 1934-47, where data were available.

Table 3 lists the weights used to calculate the weighted annual prices of the feed and field crops. Much of the data were derived from unpublished material now in possession of the Bureau.

Table 3 Weights used to compute annually weighted prices for Feed and Field Crops

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
Alfalfa Hay	11	12	11	12	9	8	3	3	4	7	8	12	100
Corn	9.5	9.1	9.0	8.0	7.7	7.5	6.7	6.0	6.3	8.4	11.0	10.8	100
Oats	6.4	6.4	8.6	9.1	8.1	7.3	7.7	19.9	8.6	6.1	5.8	6.0	100
Barley	6.0	6.6	7.6	6.1	4.2	3.3	11.0	29.8	10.8	5.6	4.6	4.4	100
Rye	3.5	3.2	4.1	2.6	2.2	1.5	16.1	34.5	14.6	7.6	6.3	3.8	100
Buckwheat	6	4	4	4	4	6	3	3	6	26	20	14	100
Field Beans	8.1	5.5	4.3	4.7	4.9	5.6	3.7	2.5	9.7	24.4	16.3	10.3	100
Potatoes	12	11	12	14	8	2	0	2	5	13	12	9	100
Wheat	6.1	5.8	5.7	4.6	4.8	4.5	22.1	13.6	9.4	7.3	5.5	5.6	100
Alfalfa Seed	8	5	6	6	4	3	2	2	11	20	21	12	100
Sweet Clover Seed	5.6	7.5	10.5	7.7	3.3	1.3	.09	4.4	18.4	17.0	13.9	10.5	100
Alsike Seed	3	5	7	5	3	1	0	23	20	16	13	4	100
Soy Beans	7	4	6	11	13	6	2	1	0	22	21	7	100
Flaxseed	2.5	1.9	2.6	2.3	21	21	8.7	33.7	24.5	12.9	4.1	2.6	100
Red Clover	6	7	8	6	4	2	2	2	21	19	15	8	100

APPENDIX B

Index Numbers of Prices of Michigan Farm Products 1934-49,
1935-39 = 100

Weights 1938-47 = 100

Table 4. Index Numbers of Prices of 26 Michigan Farm Products 1935-39 = 100 Weights - 1938-47=100

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	70	76	76	73	72	72	75	83	89	87	89	89	79
1935	94	100	97	99	95	91	90	94	98	101	102	104	96
1936	102	106	97	97	96	99	109	118	109	117	123	122	106
1937	124	123	124	124	120	117	118	118	116	115	113	112	115
1938	107	100	100	95	94	93	97	91	94	95	98	95	93
1939	91	90	89	86	85	83	86	87	99	99	101	97	90
1940	98	99	96	95	94	95	94	94	97	101	106	105	98
1941	103	102	102	109	110	114	124	121	132	133	137	140	118
1942	142	141	140	140	141	139	143	148	152	159	162	164	147
1943	168	174	177	180	180	179	179	184	185	188	186	186	179
1944	179	179	180	176	175	172	171	178	179	182	185	186	177
1945	186	186	187	186	187	190	191	191	188	186	189	191	186
1946	186	183	186	188	189	194	220	230	233	257	262	266	217
1947	252	250	259	253	246	246	255	269	279	283	285	293	261
1948	293	272	274	274	273	280	268	285	280	271	268	264	272
1949	254	240	240	237									

Table 5. Annual Index of Michigan Fruit Crops, Truck Crops, Miscellaneous Crops, and Composite Index of 59 Products, 1934-48. 1935-39 =100. Weights 1938-47 = 100.

Year	7 Fruit Crops	19 Truck Crops	7 Misc. Crops	59 Products
1934	113	98	100	83
1935	84	89	100	95
1936	127	101	105	107
1937	95	114	101	113
1938	122	96	100	95
1939	72	100	94	90
1940	101	112	104	97
1941	111	162	124	121
1942	168	193	148	147
1943	328	298	190	197
1944	272	237	222	189
1945	373	279	207	205
1946	322	199	254	224
1947	230	323	250	263
1948	261	219	239	266

Table 6. Index Numbers of Prices Paid to Producers for 9 Cash Field Crops in Michigan 1935-39=100 Weights 1938-47=100

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	89	99	95	88	87	87	90	101	109	91	83	84	95
1935	86	85	86	89	84	78	81	84	79	80	77	78	80
1936	81	84	83	88	92	108	140	159	149	146	152	161	123
1937	176	191	194	188	175	164	161	129	106	100	88	93	137
1938	96	97	93	89	89	90	96	72	68	66	64	66	78
1939	69	71	69	71	79	72	77	77	98	87	87	96	82
1940	101	103	103	107	103	100	100	89	88	89	93	91	94
1941	91	87	89	105	111	114	129	123	126	123	132	140	116
1942	151	143	140	138	139	134	148	144	146	147	150	157	144
1943	165	170	180	198	212	212	206	208	198	197	194	195	192
1944	197	194	195	191	191	185	185	207	203	201	199	199	194
1945	203	205	208	212	213	221	225	223	205	192	197	199	203
1946	199	200	205	210	212	212	224	218	240	237	287	291	240
1947	291	292	309	312	307	304	305	318	316	341	349	356	310
1948	356	319	311	321	307	308	300	262	232	225	231	231	264
1949	237	235	234	244									

Table 7. Index Numbers of prices paid to Producers for 6 Feed Crops in Michigan 1935-39=100 Weights 1938-47=100

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	90	93	98	103	107	118	126	154	167	164	161	162	124
1935	159	159	153	150	144	135	99	86	85	86	75	74	118
1936	75	77	74	75	75	80	99	127	131	131	131	136	98
1937	143	145	144	150	154	147	133	110	111	100	92	95	122
1938	96	96	95	93	88	85	88	74	73	77	78	75	82
1939	76	77	78	77	81	80	76	71	84	84	86	90	80
1940	92	94	97	97	98	90	84	78	78	82	85	85	89
1941	90	89	88	92	91	89	93	94	107	108	114	126	99
1942	136	149	151	150	145	132	117	115	119	118	121	125	135
1943	132	140	144	149	151	158	157	162	170	178	185	191	161
1944	199	201	206	209	211	198	177	178	184	193	196	198	195
1945	201	210	210	202	197	198	189	175	174	181	187	189	194
1946	197	191	191	195	202	203	224	219	224	238	227	224	211
1947	224	230	245	246	242	262	268	274	286	289	286	306	262
1948	320	268	289	286	282	272	244	226	227	215	204	221	251
1949	205	184	183	190									

Table 8. Index Numbers of Prices Paid to Producers for 2 Dairy Products in Michigan 1935-39=100 Weights 1938-47=100

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	71	77	81	79	78	78	82	89	88	88	95	96	83
1935	97	103	98	100	88	81	85	88	91	97	101	108	93
1936	111	112	102	100	95	93	105	112	91	114	115	116	105
1937	117	114	115	114	110	105	105	110	116	121	127	128	114
1938	116	109	107	100	94	88	89	91	91	96	98	100	95
1939	97	96	90	85	82	85	85	88	98	104	107	108	93
1940	109	106	103	100	97	94	97	100	102	106	114	117	103
1941	112	112	112	113	114	120	122	117	134	141	146	145	123
1942	145	143	140	139	138	134	135	141	150	159	165	167	145
1943	170	183	183	181	178	177	177	180	185	192	192	192	183
1944	192	192	193	188	183	180	180	186	188	193	195	195	188
1945	195	193	190	183	180	178	178	181	183	188	193	195	186
1946	195	193	193	189	186	193	228	243	261	276	280	290	225
1947	272	252	249	238	224	222	229	246	260	261	272	284	248
1948	286	281	272	269	268	268	280	286	286	278	278	281	277
1949	261	244	235	223									

Table 9. Index Numbers of Prices Paid to Producers for 6 Meat Animals and Wool Products in Michigan 1935-39=100
Weights 1938-47=100

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	52	59	59	56	55	55	58	59	67	64	59	61	58
1935	77	85	97	98	100	101	100	108	111	108	102	103	96
1936	105	107	104	106	102	105	104	108	109	104	100	104	100
1937	111	109	110	112	114	119	121	131	125	112	100	96	112
1938	97	94	101	97	95	100	109	98	104	95	98	93	97
1939	97	99	100	96	95	91	95	91	105	98	94	88	95
1940	91	90	89	89	93	90	95	97	98	97	96	96	93
1941	107	109	108	114	114	119	129	129	136	129	123	134	120
1942	137	143	149	152	156	158	159	167	163	168	163	162	156
1943	171	176	179	178	176	172	172	173	173	166	157	159	169
1944	161	166	168	169	168	167	160	159	161	157	153	156	161
1945	166	171	176	181	186	191	188	181	174	169	170	172	175
1946	176	177	184	194	195	199	231	250	208	257	250	256	217
1947	249	268	285	275	269	276	287	295	300	298	284	291	280
1948	309	276	285	287	295	320	334	330	325	302	287	279	299
1949	278	269	280	274									

Table 10. Index Numbers of Prices Paid to Producers for 3 Poultry Products in Michigan 1935-39=100
Weights 1938-47=100

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	75	76	72	68	65	61	62	73	88	98	115	108	77
1935	105	114	92	99	100	97	95	100	116	126	134	132	109
1936	108	119	102	95	98	98	100	105	108	118	146	127	103
1937	103	93	97	101	91	87	97	107	115	125	134	122	102
1938	113	92	92	90	95	95	97	102	113	124	130	120	100
1939	93	86	87	84	81	76	83	90	97	104	115	87	86
1940	85	91	79	80	76	72	80	86	97	107	118	111	87
1941	90	84	85	97	98	102	120	121	131	138	149	139	109
1942	133	126	123	123	123	123	131	140	150	165	172	171	138
1943	169	158	161	166	165	166	170	186	190	201	210	202	172
1944	151	149	148	137	139	138	151	157	161	172	194	191	154
1945	174	166	163	166	167	179	188	195	199	199	201	198	180
1946	163	147	151	149	157	162	178	180	204	238	222	209	177
1947	181	179	189	191	194	187	202	221	244	245	243	245	206
1948	216	201	212	212	206	211	226	241	252	255	261	243	228
1949	225	201	202	208									

APPENDIX C

Index Numbers of Prices of Michigan Farm Products, 1934-49
1910-14 = 100

Weights 1938-47 = 100

Table II Index Numbers of Prices of Michigan 26 Farm Products
1910-14 = 100 Weights 1938-47 = 100

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	77	84	84	80	79	79	93	91	93	96	98	98	87
19351	103	110	107	109	105	100	99	103	108	111	112	114	106
1936	112	117	107	107	106	109	120	130	120	129	135	134	117
1937	136	135	136	136	132	129	130	130	128	127	124	123	127
1938	118	110	110	105	103	102	107	100	103	105	108	105	102
1939	100	99	98	95	94	91	95	96	109	109	111	107	99
1940	108	109	106	105	103	105	103	103	107	111	117	116	108
1941	113	112	112	120	121	125	136	133	145	146	151	154	130
1942	156	155	154	154	155	153	157	163	167	175	179	180	162
1943	185	191	195	198	198	197	197	202	204	207	205	205	197
1944	197	197	193	194	193	189	188	196	197	200	204	205	195
1945	205	205	206	205	206	209	210	210	207	205	208	210	205
1946	205	201	205	207	208	213	242	253	256	283	288	293	239
1947	277	275	285	278	271	271	281	296	307	311	314	322	287
1948	325	302	301	301	300	308	317	314	308	298	295	290	299
1949	279	264	264	261									

Table 12 Annual Index of Michigan Fruit Crops, Truck Crops, Miscellaneous Crops and Composite Index of 59 Products, 1934-48 1935-39 = 100
Weight 1938-47 = 100

Year	7 Fruit Crops	19 Truck Crops	7 Miscellaneous Crops	59 Products
1934	125	109	111	92
1935	93	99	111	105
1936	141	112	117	119
1937	105	127	112	125
1938	135	107	111	105
1939	80	111	104	100
1940	112	124	115	103
1941	123	180	138	134
1942	186	214	164	163
1943	364	331	211	219
1944	302	263	246	210
1945	414	310	230	228
1946	357	221	202	240
1947	255	359	278	292
1948	290	243	265	296

Table 13 Index Numbers of Prices Paid to Producers for 9 Cash Field Crops in Michigan
1910-14 = 100 Weights 1938-47 = 100

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	90	100	96	89	88	88	91	102	110	92	84	85	96
1935	87	86	87	90	85	79	82	85	80	82	78	79	81
1936	82	85	84	89	93	109	141	160	150	147	153	163	124
1937	178	193	196	190	177	166	163	130	107	101	89	95	138
1938	97	98	94	90	90	91	97	73	69	67	65	67	79
1939	70	72	70	72	80	73	78	78	99	88	88	97	83
1940	102	104	104	108	104	101	101	90	89	90	94	92	95
1941	92	88	90	106	112	115	130	124	127	124	133	141	117
1942	153	144	141	139	140	135	150	145	147	148	151	158	145
1943	167	172	182	200	214	214	209	210	200	199	196	197	194
1944	199	196	197	193	193	187	187	209	205	203	201	201	196
1945	205	207	210	214	215	223	227	225	207	194	199	201	205
1946	201	202	207	212	214	214	226	220	242	237	290	294	242
1947	294	295	312	315	209	307	308	321	319	314	352	360	313
1948	360	322	314	324	310	311	303	265	234	227	237	273	267
1949	239	237	236	246									

Table 14 Index Numbers of Prices Paid to Producers for 6 Feed Crops in Michigan
1910-14 = 100 Weights 1938-47 = 100

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	71	73	77	81	85	93	100	122	132	130	127	128	98
1935	126	126	121	119	114	107	78	68	67	63	59	58	93
1936	67	61	58	59	59	63	78	100	103	103	103	107	77
1937	113	115	114	119	122	116	105	87	88	79	73	75	96
1938	76	76	75	73	70	67	70	58	58	61	61	59	65
1939	60	61	62	61	64	63	60	56	66	64	68	71	63
1940	73	74	77	77	77	71	66	62	62	65	67	67	70
1941	71	70	70	73	72	70	73	74	85	85	90	100	78
1942	107	118	119	119	115	104	92	91	94	93	96	99	107
1943	104	111	114	118	119	125	124	128	134	141	146	151	127
1944	157	159	163	165	167	156	140	141	145	152	155	156	154
1945	159	166	166	160	156	156	149	138	137	143	148	149	153
1946	156	151	151	154	160	160	177	173	177	178	179	177	167
1947	177	182	194	194	191	207	212	216	226	223	224	242	207
1948	273	212	223	226	223	215	193	179	179	170	161	175	198
1949	162	145	145	150									

Table 15 Index Numbers of Prices Paid to Producers for 2 Dairy Products in Michigan
1910-14 = 100 Weights 1938-47 = 100

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	82	89	94	92	90	90	95	103	102	102	110	111	96
1935	113	119	114	116	102	94	99	102	106	113	117	125	108
1936	129	130	117	116	110	102	122	130	106	132	133	135	122
1937	136	132	133	132	128	122	122	128	135	140	147	148	132
1938	135	126	124	116	109	102	103	106	106	111	114	116	110
1939	113	111	104	99	95	99	99	102	114	121	124	125	108
1940	126	123	119	116	113	109	113	116	118	123	132	136	119
1941	130	130	130	131	132	130	142	136	155	164	169	168	143
1942	168	166	162	161	160	155	157	164	174	184	191	194	168
1943	197	212	212	210	206	205	205	209	215	223	223	223	212
1944	223	223	224	218	212	209	209	216	218	224	226	226	218
1945	206	224	220	212	209	206	206	210	212	218	224	226	216
1946	226	234	224	219	216	224	264	282	303	320	325	336	261
1947	316	282	289	276	260	258	266	285	302	303	314	329	288
1948	332	326	316	312	311	311	325	332	332	322	322	326	321
1949	303	283	273	259									

Table 16 Index Numbers of Prices Paid to Producers for 6 Meat Animals and Wool Products in Michigan. 1910-14 = 100 Weights 1938-47 = 100

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	63	72	72	68	67	67	71	72	82	78	72	74	71
1935	94	104	118	120	122	123	122	132	135	132	124	126	117
1936	128	131	127	129	124	120	127	132	133	127	122	127	122
1937	135	133	134	137	139	145	148	160	153	137	122	117	137
1938	118	115	123	118	116	122	133	120	127	116	120	113	119
1939	119	121	102	117	116	111	116	111	120	120	115	107	116
1940	111	110	109	109	113	110	116	118	120	118	117	117	113
1941	131	138	142	139	139	145	157	157	166	157	150	163	146
1942	167	174	182	185	190	193	194	204	199	205	199	198	190
1943	209	215	218	217	215	210	210	211	211	203	192	194	206
1944	196	203	205	206	205	204	195	194	196	198	197	190	196
1945	203	209	215	221	227	233	229	221	212	206	207	210	214
1946	215	216	224	237	238	243	282	305	254	314	305	312	265
1947	324	327	348	336	328	357	350	360	366	364	346	355	342
1948	377	377	348	350	360	340	407	403	397	368	350	340	365
1949	339	328	342	334									

Table 17 Index Numbers of Prices Paid to Producers for 3 Poultry Products in Michigan
1910-14 = 100 Weights 1938-47= 100

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted Average
1934	85	86	81	77	73	69	70	82	99	111	130	122	87
1935	119	129	104	112	113	110	107	113	131	142	151	149	123
1936	122	134	115	107	111	111	113	119	122	133	165	144	116
1937	116	105	110	114	103	93	110	121	130	141	151	138	113
1938	123	104	104	102	107	107	110	115	128	140	147	136	113
1939	105	97	93	95	92	86	94	102	110	118	130	98	97
1940	96	103	89	90	86	81	90	97	110	121	133	125	98
1941	102	95	96	110	111	115	136	137	148	156	168	157	123
1942	150	142	130	130	130	130	148	158	170	186	194	193	156
1943	191	179	182	188	186	188	192	210	215	227	237	223	194
1944	171	162	167	155	157	156	171	177	192	194	210	216	174
1945	197	188	194	198	199	202	212	220	225	225	227	224	203
1946	174	166	171	169	177	183	201	203	231	269	271	236	200
1947	205	202	214	216	219	211	228	250	276	277	275	277	233
1948	244	227	240	240	233	232	255	272	285	288	285	275	258
1949	254	237	228	235									

APPENDIX D

Calculations:

Index of Physical Volume of Farm Products Marketed in Michigan.

Index of Physical Volume of Farm Products Marketed in Michigan.

An index of the physical volume of farm products marketed in Michigan for the period 1934 to 1947 was constructed in order to study the sales of individual and groups of farm products.

Data -- The data were obtained from sources published by the Bureau of Agricultural Economics.

Formula -- The formula used was Laspeyres'. The variable was in terms of quantities marketed each year and the variable was the average annual price of the individual products included in the index for the years 1924-26. In cases where price data for some products was not available during this period, the annual average price for the greatest number of years between 1924 and 1948 was used.

Calculation -- The same procedure was followed in the calculation of the marketing index as that of the price index. However, the average farm prices received by producers, 1924-46 were held constant and quantities marketed each year were varied. The base values or $P_o Q_o$ was obtained by multiplying the average annual marketings of the years 1934-43 by annual average farm prices for the years 1924-46. In order to find the total index the group indexes were not weighted; the total index is constructed in the same manner as the group index numbers. A detailed illustration is shown in Table, Appendix A.

Table 1[illegible]

[illegible] INDEX

Index of sales of farm products from Michigan farms on a calendar year basis. Price was held constant (average price was taken from 192[illegible] to 19[illegible]6 on all products where data was available) and multiplied by each year's marketings, 193[illegible]-[illegible]3 = 100.

	Average Prices 192[illegible]-[illegible]6	193[illegible]
Cash field crops		
Field beans, 100[illegible] bags	[illegible].[illegible]7(x quantity	[illegible],[illegible]00
Potatoes, bu.	.96 marketed	[illegible],11[illegible]
Wheat, bu.	1.09 in 193[illegible])	6,[illegible]97
Alfalfa seed, bu.	15.53	373
Red clover seed, bu.	12.95	259
Sweet clover seed, bu.	[illegible].26	51
Alsike seed, bu.	12.07	169
Flaxseed, bu.	2.07	168
Soybeans, bu.	1.60	82
Value (193[illegible]-[illegible]3 = [illegible]3,122,000)		38,212
Index		89
Feed Crops		
Alfalfa hay (loose) tons	11.17	3,250
Corn, bu.	.[illegible]4	1,237
Oats, bu.	.45	852
Barley, bu.	.7[illegible]	340
Rye, bu.	.77	389
Buckwheat, bu.	.76	49
Value (193[illegible]-[illegible]3 = 9,075,000)		6,117
Index		67
Dairy products		
Milk sold at wholesale cwt.	2.17	[illegible]1,350
Butterfat, lbs.	.[illegible]0	2[illegible],095
Value (193[illegible]-[illegible]3 = 80,060,000)		65,[illegible]15
Index		82
Meat animals		
Hogs, cwt.	9.[illegible]0	[illegible]4,235
Beef cattle, calves	9.31	26,016
Sheep, lambs	7.[illegible]2	5,57[illegible]
Wool, lbs.	.33	2,7[illegible]6
Value (193[illegible]-[illegible]3 = 56,577,000)		[illegible]8,571
Index		86
Poultry products		
Chickens	.196	9,865
Eggs	.26	21,772
Turkeys	.25	1,555
Value (193[illegible]-[illegible]3 = 36,035,000)		33,187
Index		92

Table 18. (cont'd.)

	Price	1934 (000)
Fruit crops		
Apples, bu.	1.33	7,516
Peaches, bu.	1.63	4,051
Cherries, tons	125.54	4,105
Grapes, tons	61.57	3,626
Pears, bu.	1.35	1,461
Plums, tons	70.64	332
Strawberries, crates	4.14	1,367
Value (1934-43 = 24,166,000)		22,458
Index		93
Truck crops for manufacturing		
Lima Beans, tons	69.92	136
Snap beans, tons	56.80	329
Beets, tons	12.71	41
Cabbage, tons	7.99	88
Sweet corn, tons	12.72	57
Cucumbers, bu.	.82	853
Peas, tons	53.47	342
Tomatoes, tons	13.76	238
Truck crops for market		
Asparagus, crates 24#	1.60	186
Snap beans, bu.	1.58	337
Cabbage, tons	22.17	924
Danish cabbage, tons	27.00	321
Cantaloupe, 70# c.	2.19	812
Carrots, bu.	.56	227
Celery, early, crates	1.42	1,147
Celery, late, crates	.98	1,610
Cucumbers, bu.	1.42	63
Onions, 50# sacks	.99	4,488
Tomatoes, bu.	1.46	1,382
Value (1934-43 = 13,566,000)		13,581
Index		100
Miscellaneous products		
Maple syrup, gals.	2.40	168
Maple sugar	.35	4
Peppermint, lbs.	3.71	2,270
Spearmint, lbs.	2.54	
Popcorn, cwt.	2.98	122
Honey	.13	7,932
Value (1934-43= 9,930,000)		10,496
Index		106

Table 18. (cont'd.)

MARKETING INDEX OF ALL FARM PRODUCTS

Marketing Index - 1935-39 = 100

Average annual value - 1934-43	272,531,000
Index, 1934-43	100.00
Annual value in 1934	238,567,000
Marketing index, 1934	87.5

Table 19. Annual Index of Physical Volume of Farm Products Marketed by Michigan Farmers, 1934-47. 1934-43 = 100

Year	Cash field crops	Feed crops	Dairy products	Meat animals & wool	Poultry products	Fruit crops	Truck crops	Miscellaneous products	Total Prod.
1934	89	67	82	86	92	93	100	106	88
1935	107	84	84	77	88	104	89	89	89
1936	97	88	90	84	92	98	101	97	92
1937	88	83	92	94	100	73	90	71	90
1938	102	94	94	93	92	101	107	110	97
1939	108	107	99	102	92	117	91	123	102
1940	92	125	106	110	96	120	94	119	105
1941	101	108	112	117	102	98	113	112	109
1942	116	128	120	116	112	108	125	124	117
1943	101	116	121	121	134	88	90	49	112
1944	118	99	123	132	144	117	114	68	123
1945	102	126	134	124	149	56	112	79	119
1946	109	143	134	125	143	118	133	86	127
1947	99	143	132	123	130	91	103	64	115

INDEX OF FARM PRODUCTS MARKETED 1934-43=100