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## A Consideration of Methods of Securing Historical Price and Production Data and a Survey of Their Relationship for South Dakota

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A CONSIDERATION OF METHODS OF SECURING HISTORICAL PRICE AND PRODUCTION  
DATA AND A SURVEY OF THEIR RELATIONSHIP FOR SOUTH DAKOTA

By

OWEN L. DAWSON, B. S. 1920

A Thesis

Submitted to the Faculty

of

The South Dakota State College

of

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## INTRODUCTION.

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Considerable interest in price relationships has been evidenced since 1920 and no small amount of inquiry into the causes of price changes has been started. Since the beginning of the agricultural depression the question of the adjustment of agricultural production to demand has caused several states to consider the importance of an agricultural program.

A study of agricultural changes and price relationships will furnish basic information of extreme importance needed in the laying down of an agricultural program. Black (2) states that the troubles of our agriculture in the past ten years have been much more largely due to maladjusted production than to anything else.

It is fundamental that changes in price tend to bring about changes in production. Henderson (9) states the law "A rise in price tends sooner or later, to decrease demand and to increase supply. Conversely a fall in price tends sooner or later to increase demand and to decrease supply."

Although the principle of production adjusting itself to price is generally recognized, the amount of change in production and time of occurrence--how quickly production reacts to price changes--is important and must be studied for particular areas so that we may be in a better position to understand farmers' reaction so we can suggest the best type of adjustment needed. A study of how agriculture has changed with prices will give us some indication of how it may change in the future. We must also be quick to recognize new factors affecting the situation.

The farmer changes his production plans in response to certain price changes. Are such changes justified? If not, what sort of program is necessary so that production will be better adjusted to demand? What information is needed?

Warren and Pearson (20) point out the need of farmers understanding price relationships so that they may adjust their farming to meet the changing situation. Warren (19) states that prices are a guide to production and that there is a constant adjustment in progress.

According to Falsoner (8) "alternate over production and scarcity of any farm commodity with their consequent low and high prices can be attributed to the failure to accurately anticipate demand and adjust supply to demand."

Many other writers make similar statements and studies of price and production relationships have attained considerable importance.

It is the purpose of this study to make inquiry into farm price and production relationships for South Dakota.

Different methods of approach to this problem suggest themselves. The following general plan may lay the ground work for getting a method to solve such problems for South Dakota.

- I. How does supply from different sources affect farm price in South Dakota?
- II. To what extent does price received bring about changes in acreage or numbers of livestock?
- III. How do South Dakota farm prices change following these changes in acreages and numbers of livestock?

In such a study we shall have to inquire into the adequacy of our price and production data. In this preliminary study simple correlation methods will be used in order to give a general picture of relationships. The limitations of such methods are recognized but it is hoped that general relationships indicated will suggest further detailed study if a more refined measure of correlation is desired. However, the methods used are considered adequate for showing important or striking relationships.

Working (22) states that much of the work on correlation studies has been laying foundation and few practical applications have been made but he says that every scientist will recognize that the practical usefulness of such knowledge is not judged solely by the applications which may be made of other knowledge for which the first has merely laid the foundation.

Our original purpose was to limit the second phase of the study to the effect of price on acreage but as the yield also plays an important part in the return of the farmer, acre value (price x yield) was added. The time element did not permit of the correlation study on livestock changes but for the sake of future investigation, it was considered important to consider the adequacy of price and production data on livestock.

As the farming area of the state increases there is a natural increase in the production of crops and livestock for which the state is adapted. The relative amounts of different crops and livestock produced may vary widely dependent upon the profit which is in a large

measure related to market price. Unusual changes in acreages of crops or numbers of livestock can be explained to some extent by the producers reaction to the price offered. In certain years seasons may be unfavorable to planting or there may be little feed for livestock as in 1926 and these exceptions must be considered in interpreting price and production relationships.

A general survey of changes in acreages of principal crops and classes of livestock in South Dakota shows some large and erratic changes which are obviously out of line with consistent agricultural development. It is believed that a study of price and production relationships will enable us to show producers a better policy in the adjustments. Price data can also be used to study relation of price to land values, the effect of freight rates on farm prices and are fundamental to a study of income changes.

In our study of prices we will analyze the present prices; discuss the use of price data now available and consider methods of collecting further data. As South Dakota is one of several states or countries producing a surplus of crops and livestock for market, production for the United States and for the world, of certain products, must be considered as affecting the farm prices in South Dakota.

#### More Price Data Needed

The necessity of collecting more data is obvious as the present United States farm prices go back only to 1910, excepting the December price for Crops and the January prices for livestock. It is necessary to have monthly prices further back than we now have them in order to

obtain weighted annual prices which differ materially as is shown by tables in appendix, from the December prices. A longer series of monthly prices than is now available is desirable in order to make the best use of statistical analysis. However, an analysis of the data back to 1910 will give some light on causes of changes and will help us to find the best technic to use for a more exhaustive study of the prices of different commodities when such prices are available back to 1890.

#### Recognition of The Importance of Price Studies.

Until recent years the study of agricultural development has left out of consideration the study of agricultural prices almost entirely. Little research had been done to determine the causes of changes in farm prices. The early years of investigation in agriculture were devoted largely to biological problems of productions. With the more recent emphasis on the economic side of farm problems, the importance of a study of farm prices has been recognized. It has been known for a long time that farm prices were extremely susceptible to changes in production and also that price had a strong influence on production. These price changes were continually making agriculture adjust itself. In order to obtain a more constant state of equilibrium or to make the necessary adjustments with as little disturbance as possible the factors responsible for these price changes should be taken into consideration. If this is done and a continuous study is made of their reaction to price changes and consideration is given to the effect of new factors which are shown to have an influence, there will be built up the best possible

basis for guiding production.

To get a basis for the adjustment of production it is necessary to study prices over as long a period of time as possible in order to make the best statistical analysis. As an evidence of the importance attached to price studies, reference is made to certain studies already made in that field. One of the first attempts of this kind was made by Wallace(16) who made a statistical study of the factors affecting the prices of hogs. Other studies on factors affecting the prices of hogs were made by Wright (24), Ezekial and Haas (5) and Sarle (13). Some important studies have been made on forecasting the price of wheat, one of the most important by Daggett (3) who was then a member of the Division of Statistical and Historical Research, at Washington.

The National Agricultural Conference (6) which was called together by President Harding in 1922 realized the importance of a study of farm and market prices. On page 168 of the Report of the National Agricultural Conference the following recommendations are made: "It is recommended that statistics be collected and published periodically by the U. S. Department of Agriculture, showing the price received by producers for crops, livestock, and livestock products; the price paid for different farm lands and their total value; prices farmers pay for hired labor, seed, fertilizers, machinery, equipment and supplies; and the wholesale and retail price of principle agricultural products by classes and grades at important marketing and consuming centers. It is recommended that statistics concerning factors influencing prices and the values of farm products be collected and published periodically.



It is recommended that statistics of production, market movement, stock and prices be analyzed and correlated with statistics of population, consumption, present and prospective supply and demand and other factors influencing production, consumption and price; that series of index numbers be established and maintained to show relationships and trends and that the results be summarized and illustrated by means of graphs, maps and diagrams so as to set forth certain factors in striking and readily readable form."

#### Interest in Prices in the Division of Crop Estimates.

The committee mentioned above also made many recommendations for enlarging and perfecting the sources of data, and for collecting information on production, both in this country and in foreign countries. Following out these recommendations the Division of Crop and Livestock Estimates has enlarged the scope of collecting data on production and prices. The Division of Statistical and Historical Research has perfected the methods of collecting foreign data, and has begun studies on the effect of supply and demand on prices. A bulletin on Agricultural Prices has been announced which will contain a study of agricultural price fluctuations and of methods of finding and measuring the effect of various price factors. In addition the bulletin will contain a number of historical price series which should form the basis for studies in price forecasting. Sarle (11) who took charge of the work in prices in the Division of Crop Estimates three years ago became interested in extending price series of the Bureau of Agricultural Economics back as far as possible. He brought this matter before the

Statisticians who are in a pretty good position to comb the states for historical records. A study of historical prices is now in progress in Maryland and is beginning in a few other states besides South Dakota. The writer's own particular work in crop and livestock estimates makes it necessary, in order to get a proper back ground, to make a study of acreage changes and the changes in numbers of livestock, and to make a study of the causes of those changes, the principal one of which is price. Such a study by the Agricultural Statistician should put him in a position to be of more help to workers in the field of economics in the state.

#### PRICE MATERIAL AVAILABLE.

The U. S. Department of Agriculture began to collect prices on larger crops in 1866 and also values of livestock on January 1, 1867. These prices were collected annually until 1908. Since that time prices of the more important farm crops have been collected monthly in addition to the yearly prices. Recently Sarle of the Division of Crop and Livestock Estimates compiled a series of bulletins which not only included the yearly prices back as far as 1866 for states in existence at that time but monthly prices as well. The December 1 price of the farm crops and the January 1 livestock price per head have been obtained from the reports of Crop Reporters and those same prices are still asked of Crop Reporters. Beginning with 1908 when monthly prices were collected the County Reporters who were special reporters, one to each county, were asked to make monthly reports on prices. In January 1924 a list of special price reporters was made, which consisted almost entirely

of some town dealers, merchants and a few well informed farmers.

Sarle (11) points out in his discussion of the reliability of the data that a study of these prices by a statistical analysis indicates that they have sufficient reliability to be of value. "In the list of Crop Reporters every effort has been made to get representative samples so that their reports on the yearly prices for all the important crops and classes of livestock are sufficiently representative to give stable figures. It was found by testing the price samples that they would not be materially changed by a great increase in the number of reports, which is a good check on their reliability. For the more important products, weights were used according to the acreages of crops by crop reporting districts and for numbers of livestock according to census numbers by districts. Prices are for no specific grade or quality which accounts for most of the variation in the prices. The reports give the prevailing prices for the class or quality of product generally sold. Of all the crops reported hay shows the greatest variation in price. Apples are another example. For livestock the price may tend to be the grades of animals being sold at that time rather than values of animals of all ages and grades on the farms. The prices reported are really local market prices and are not strictly quotation prices at the farms. The state averages are made up of prices reported from all over the state, weighted as previously mentioned, so they are likely to be high for surplus producing areas and low for deficit areas.

For the lesser important crops the price tends to be self-weighting.

That is, there will be a proportionately larger number of reports where the products are of more importance and a less number where they are of less importance. The weighting of these minor products would probably give averages further from the actual than the straight averages."

In many cases studies have been made using the yearly prices; that is, the December prices for crops and the January 1 prices for livestock. As indicated in Table 1 there is a great variation between prices in December and January and the Annual weighted price. For many years it has been the custom of the U. S. Department of Agriculture to publish valuation figures based on the December 1 unit value of crops. These valuations have been worth while from a comparative standpoint, but from the standpoint of actually getting the valuation, average weighted prices are much to be desired. From the standpoint of actually measuring farm returns, of course, an annual weighted price is essential. Recently annual weighted prices have been worked out for the United States but as yet this has not been done for very many individual states.

For many years the Department has been collecting information from elevator operators on the proportion of farm grain marketed by months. When these figures are studied closely and adjusted for some of the unusual changes which may be due to variation in the sample they can be used by the Department very well for weights with which to weight the monthly prices received as previously explained. These weights are obtainable for crops back to 1909 with the exception of potatoes and hay. As there is some variation in the marketing of potatoes by months a weighted price based upon usual marketings as

obtained from figures of recent years would be better than December 1 prices because in this state a large part of the potatoes have moved to market by that time.

For livestock, the Division of Crop and Livestock Estimates has, since 1920, been collecting data from stock yards and packing plants as to receipts and origin. Prior to that time data for South Dakota are available from some of the main markets. This has enabled us to carry the monthly weights back to 1913 for certain classes of stock. As this gives us over 10 years of monthly marketings we can work out a reasonable set of weights for the other years. It has just recently been possible to secure marketings back to 1902 from Sioux City, one of our main markets, which will be of much assistance in this work. Unfortunately some of the intervening years are missing, but by comparing the earliest year available with proportionate marketings in more recent years we will be aided in setting up representative weights for the earlier years.

#### THE NEED FOR MORE HISTORICAL PRICE DATA.

Since most of the early writings of state history and discussions of agricultural subjects add little or no information on farm prices it is highly important to gather together as many of the facts relating to farm values and prices as soon as possible in order to complete our knowledge of historical development.

In a state like South Dakota which has been settled up comparatively recently and where many of the pioneers are still living there is a unique opportunity to get hold of records and facts relating to farm

prices, history and marketings.

Different public agencies are at work gathering historical data and we can get them interested in locating sources of data relating to prices.

Since the Agricultural depression began in 1920 there has been a great interest in the subject of farm prices so there could be no better time to draw peoples attention to the value of a study of prices and get them to cooperate by furnishing records.

Each year sees many of the old pioneers passing away and often their diaries and accounts are considered of little value by the heirs. Perhaps they have been lying in the attic or in a storehouse, and no one but the original owner knows of their existence. Such records are invaluable and the sooner we get in touch with anyone who has kept such records in order to save them, the more data will be saved for future use. The writer in a number of instances has talked with people who knew of such records but unfortunately when they came into the possession of the heirs they had been thrown away or consigned to the flames. If these priceless records are saved before it is too late, a mass of data will be accumulated which will be of great aid to research workers in the future in their study of the economic development of American Agriculture.

## SOURCES OF HISTORICAL DATA.

The following sources of material have suggested themselves:

Farm diaries

Price slips

Merchants books

Elevator records

Mill records

Creamery records

Newspaper records

Contracts for Reservations and Army Posts

Card prices of grain

Commission Company records

There are a great many more farm diaries in existence than people believe as evidenced by the replies to an inquiry sent out from this office. Of course, most of the diaries, like other records, dealt more with the social aspects of farm development and day-to-day problems than they did with prices, but here and there prices were scattered which are of much help in giving us the framework for other prices which can be supplied from other sources. In many cases these diaries are considered rather personal and the owners do not feel they will be of very much interest to anyone else. They are most apt to be located through a third party who knows the owner of the diary quite well. We have been able to secure records of this kind going back to 1886. A valuable feature of these diaries is that they will often furnish the reason for variation in prices such as poor grades

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or local demand. There are several fragmentary records which have been made by farmers from time to time and these are often valuable while the owner is still living.

As a great many people have the habit of putting away price slips or sales records a great many of these can be unearthed by diligent inquiry. Sometimes they are rather hard to decipher but have in many cases supplied missing prices.

Merchants books are sometimes available. These give the prices paid for produce, butter and eggs, chickens, etc. It is also important to pick up some of these records before they are lost so that perhaps when enough are accumulated a purchasing power index can be worked out using the farm prices and the local retail prices. Heretofore we have been using the non-agricultural prices as worked out by the U. S. Department of Agriculture. These prices may not be strictly representative of things being bought locally.

One of the most valuable sources of records is the sale records of elevators. Also their general account books. In quite a few cases these are still available although elevators as a rule change hands quite often and the books are lost or disposed of. We obtained a record at Mellette going back to 1888 and one at Clear Lake going back to 1898, and a number of others of more recent date.

In the earlier days there were a great many mills in this state, but many of them have gone out of business. If the records of what they paid for grain could be found they would be one of the most valuable sources of data. Unfortunately we have been unable to locate



any of them as yet. There was one at Yankton which dated back to 1868 but this was disposed of two years ago.

Many of the creameries kept fairly good books giving prices that were paid for butterfat. We have secured a few of these going back to 1900.

No doubt the most systematically kept records are the newspaper records. Most of the important papers have some kind of a file back as far as it has been published. In most of these papers local prices have been quoted but not continuously. The form of publication has changed frequently and local prices have shifted to prices at the terminal markets. One of the oldest records available was from the Yankton Press and Dakotan which began in 1875. The files of the paper preceeding this publication were lost in a fire. The series of local prices quoted in the Press and Dakotan was often broken but nevertheless they will be of some help for anyone who wishes to study prices back to that date. If it were possible to build up a series of prices back to 1877 it would give us a price series for 50 years. There are many other newspaper records scattered over the eastern part of the state which would help to give fairly representative prices for the different localities. While newspaper records are perhaps the most continuous records we have they are subject to the difficulty of giving quotations rather than actual price received. This difficulty would be overcome to a large extent if the prices were corrected the next day or the next week but it appears that prices were often published and not changed in accordance with the market.

Many of these newspaper files are available at the Historical Department at the State Capitol. Others can be obtained by visiting the newspaper offices which often occasions the necessity of climbing into lofts and pulling down files covered with the dust of ages, but the records obtainable are a very valuable check on other records.

A source of data was suggested by reading in some of the old newspapers about Reservation and Army Posts. The writer has not made an attempt to get at these Army records at Washington but has waited the opportunity of visiting there or having some one in Washington go in person to find out. It was quite customary in the early days to buy grain or livestock for use at the different Army Posts, receiving bids from local parties.

Since 1908 the grain bulletin at Minneapolis headed by Mr. Durant has been furnishing what are called Card Prices for the different elevators in the state. These are prices worked out by groups, called relays, based upon prevailing Minneapolis cash prices minus the freight and handling charges. These card prices have been used as a guide by many of the elevators in the state. Of course, the actual price paid varies some, due to local demand and some competition among the buyers. However, these are a good indication of prevailing prices and if they were available back to 1890 would be of much help in furnishing missing prices. However, I am told by men who have worked on these prices that it is possible to work them out by using this plan on the Minneapolis prices prior to 1908.

One other helpful source of data has been the records of the

John Clay Commission Company, showing sales of Dakota livestock at some of the main markets. In order to approximate the local prices there it would be necessary to figure out the freight and a small handling charge. Freight rates will be obtained from the Railway and Warehouse Commission at Pierre.

When the possibility of getting Historical prices occurred to Mr. Sarle, an inquiry was sent from Washington to certain lists, including the banker list, elevator list, and the newspaper list. Replies from these lists were sent to this office for us to follow up. We got a few returns but not as many as expected. The most effective results were obtained by sending out a questionnaire to our Crop Reporters. This resulted in our getting some diaries, account books, and newspaper clippings. At the same time a small item was published in the state papers telling of our work. We got a number of replies from this. Among them were some few interesting reports which were written up by the College Publicity Service and sent out to the State Papers. This story was copied widely and resulted in our getting a few more records. After we had obtained the names of people who might be able to furnish data we devised a form which gave the months and years from 1910 back to 1880. The name of the commodity was stamped on these and they were sent out with the request to send in any prices available or to send in the original account books.

We began summarizing our reports by drawing off prices on to these charts from the account books and when our records were posted in this manner they were brought together by commodities and assembled

by districts, on similar charts, so we could see where the greatest gaps were, and in our succeeding form letters we could place the greatest emphasis on the year where the greatest gaps were.

The final tabulation was made by making up large sheets by commodities and districts after which the prices were posted by giving the name of the party and town, so that when any question arises about unusual price differences the original records can be referred to. At the bottom of these sheets the market prices of some of the principal grades were placed in order to check on the farm prices for their representativeness and which might be of use afterwards in filling in the gaps.

#### THE USES OF REGIONAL PRICES AND STATE PRICES.

In a study of state farm prices considerable variation is shown in different parts of the state, depending upon whether it is a surplus or deficit producing area. These differences in prices will form the basis of an important study in the state. For the present, in making the best kind of a state price some system of weighting is desirable. As the western part of the state was little settled prior to 1910 it was thought best, instead of carrying prices by crop reporting districts, to divide the state into three parts. The area west of the river being district number one, the area between the Missouri River and the James River, down to Douglas County, district number two, and the remainder of the state district three. Weights were obtained by taking the acreages given by the United States Census. It was then thought that these weights could be used back to the time midway between

the two census periods. Monthly weights could be obtained by marketings as previously described.

For a state study of the economics of different commodities, regional prices are desired rather than state prices so the more prices which can be collected with this end in view the better it will be when such a study is made. For our present purposes it is necessary to obtain the state price in order to study the state development, state income, and the effect of production on prices received by farmers in South Dakota.

#### STUDY OF HISTORICAL PRODUCTION.

A thorough study of historical production is necessary to get the data needed for a comparison of production and prices. In order to use these data the research worker will need to know something about the method of arriving at them during the past years, sources of data available, and different revisions which have been made. If he takes the data as he finds them he will often be at a loss to understand unusual changes.

Since 1866 the U. S. Department of Agriculture has been estimating production. This was done by getting an estimate of the acreage early in the season relative to the acreage the preceeding year. At the close of the year, if acreage has been abandoned during the season or any other correction needs to be made in the preliminary figure, a new figure is made and the estimate of yield is applied to the acreage to secure the production. During the more recent years, the figures of the preceeding year are reviewed each year, and, if

further data make it seem advisable, they are revised. This is thought to be necessary because the succeeding year's acreage is used largely as a basis for arriving at the current year's acreage.

Until recent years, reporters were asked only their opinion of how the acreage compared with a year ago. It was only comparatively recently that reporters have been asked actual acreage on their farms compared with a year ago. It was found that the opinion on acreage was subject to wide variation and distinct bias at certain times. Although some attempt was made to adjust for this bias it was difficult to measure with any great degree of exactness. The method of getting an actual sample of the acreage is the best that has been devised in estimating acreage. The main problem in using this method is to get representative samples in order that the acreage reported this year can be compared with the acreage reported the previous year so that changes shown will be indicative of changes in the state acreage.

As errors are apt to creep in and become cumulative it is very desirable to get a check on the whole universe involved in the sample and at frequent intervals such a correction has been made. About 10 years ago, the figures between the census of 1900 and 1910 were adjusted to a census base and published for the United States as a whole. Becker (1) states that the application of a uniform method to all decades somewhat alters this decision. He found that the original work sheets prior to 1895 were destroyed so that the revision prior to that date must be based upon published data rather than upon

original data. In his research work on acreage revision he states two objects, as follows: (1) To put the figures on a uniform basis from the time of the first complete estimate in 1866 to date. (2) To have the absolute figures as nearly correct as possible. For both of these purposes the data collected decennially by the census are the best gauge. The census acreage figures, with certain exceptions, for several reasons are accepted as the most nearly correct basis from which to work. A discussion of the adequacy of the census figures is taken up later. In a preliminary investigation of a technic to use for these revisions Becker and Jackson (1) say: "One part of the corrections to be made in all decades is a mathematical one, so adjusting the trend of acreage that the figures on census years will coincide with the census enumerations. This correction must recognize and allow for the link-relative method of arriving at the estimates. The cumulation of errors is geometrical through a decade; so a correction for the total error in the tenth year, nine-tenths in the ninth year, and so on, is not proper. A formula is used instead, by which the progression of corrections is geometrical. On a 10-year formula the correction for the ninth year is thus the nine-tenths power of the correction for the tenth year. Similarly there may be a progressive improvement in estimates, giving at the end of a decade a figure more nearly correct than that at the beginning. Here also the progression is geometrical and requires a correction the converse of the former. Both are applied in the formula used as shown below.

When

C = Census or corrected figure

E = Estimate by the Department of Agriculture

N = Number of relatives within the period; i.e., number of years (including beginning and ending) less one.

X = Year under consideration (X varies from 0 to N)

Then \*

$$C_x = E_x \left( \frac{C_0}{E_0} \right)^{\frac{n-x}{n}} \left( \frac{C_n}{E_n} \right)^{\frac{x}{n}}$$

Or for this particular purpose, when  $C_0 = E_0$  then  $\left( \frac{C_0}{E_0} \right)^{\frac{n-x}{n}}$  becomes unity and  $C_x = E_x \left( \frac{C_n}{E_n} \right)^{\frac{x}{n}}$

For example, for the year ending with "2" in a period of an exact decade beginning with the year ending in "9" (e.g. for 1882 in a period beginning with 1879 and ending with 1889), the formula becomes

$$C_3 = E_3 \left( \frac{C_0}{E_0} \right)^{\frac{7}{10}} \left( \frac{C_n}{E_n} \right)^{\frac{3}{10}}$$

The formula, of course, may be applied to any one year in question without computing the other years. Periods shorter or longer than a decade may have to be computed by the 10-year formula or a formula may be set up for any other number of years. The method used for more or fewer years must depend upon the particular situation. In correcting more

\*See Wright, Serwall, Department Bul. 300, and other treatises on mathematical progression, cumulative errors, etc.



than 10 years on a 10-year formula, the years outside the terminals of the formula ordinarily are at the latter end of the period and are included because census data did not become immediately available. In the formula, then, in the years following the tenth, X becomes greater than N and for the eleventh year on a 10-year base the formula is

$$C_{11} = E_{11} \frac{(C_0)}{(E_0)} \frac{10^{-1}(C_{10})}{10(E_{10})} \frac{11}{10}$$

"Base years for the formula, of course, must be determined by fixed points which may be accepted as correct, usually census enumerations.

"Often the trend of acreage for a given crop is broken within a decade, and in many such cases a formula for less than a 10-year period must be used. It necessitates, however, finding close to the break and on the side for which the formula is sought, a figure sufficiently good to be considered correct in formulating the correction. There may be no noticeable continued trend for more than three or four years of a decade. Then mathematical corrections, even as described for short periods, are of little avail until the individual years are examined and possibly changed.

"If no unusual physical or economic conditions exist to cause undue irregularities, it often must be assumed that the estimate was arrived at in an irregular way, and therefore does not represent a proper relative. In such cases the preliminary estimates of acreage planted as published in the summer usually give the most satisfactory figure with which to start. These preliminary figures are published

in the reports for June, July, and August of each year. Their use assumes that the method of link relatives, while forming the basis of the estimating system, has not always determined the final figures. Study of the data has justified such an assumption, and there are no sufficient records to refute it. "

By referring to the graphs showing the acreage for South Dakota these changes following the census year are notable in some cases. Whenever the published census figures were available the acreage was adjusted to meet them. This causes an unusual break and may throw off our correlation studies. As the research division in Washington is going to review the acreages, the revised figures will probably be available in about two years. In the meantime our studies of changes, in the light of available data and considering its limitations, is desirable for the reasons stated in the introduction.

It has recently been brought to the author's attention that the census of 1890 may be quite deficient and that the census of 1900 may be high due to the practice of filling out incomplete schedules of enumerations. This will cause us to proceed with care where unusual adjustments seem necessary to bring our data into line with the census figures for those two years.

#### ADDITIONAL DATA FOR CORRECTING PRECEDING YEAR'S ACREAGE.

During the last 10 years an unusual effort has been made to get as many checks on our production data as possible. This can be carried out very well where only a small amount of a crop is fed on the farm. Where a large portion is fed the problem of checking is more complicated.

For checking up on wheat and flax in South Dakota and other northwestern states the following items were used:

Railroad loadings

Mill receipts,

Mill and Elevator stocks end of year,

Farm stocks end of year,

Seed for following spring's planting

Fed to livestock,

Exchanged for flour less M.&E. Stocks beginning of year,

Farm Stocks beginning of year, and

Dockage by Shipments (from U. S. Yearbook).

For checking up on the grain crops the South Dakota Statistician working with the Washington office began gathering data the last year for check-up on the feed crops. In a study of this method it was found that more data on in-shipments was needed. Arrangements may be made with the Railroad Companies to get us this data.

With a crop like potatoes the amount consumed on the farms where grown is very hard to check up and needs much consideration. Last year the writer, in cooperation with Mr. Wertz of the Farm Economics Department obtained data on the consumption of potatoes. With all the different methods of disposal the following basis is tentatively used as a check-up in South Dakota: Used for food on farms where grown; Saved for seed, Lost, Fed, etc.; Requirements for consumption, people not on farms raising potatoes and Shipments out of state. As pointed out, data on in-shipments are necessary and until those are available.

our check up will be deficient.

With these methods of check-up on the crops during the past 10 years and check-ups being worked out for practically all the crops, we now have an additional means of correcting the base used in our estimates each year. This is better than an additional check using the acreage because it may get away from some unknown deficiencies in our acreage samples. As many checks of different kinds as can be worked out are desirable. By using all the known methods of measuring the different items of disposal of a crop we will of necessity satisfy the demands made for accurate estimates because if all the known items in the utilization of the crops are measured and checked against the estimates of crops there must be close agreement.

By perfecting our methods of arriving at production figures and a revision of prior years the changes which have taken place in our agricultural development can be measured to the best advantage. Although we cannot wait until revised figures on acreage are available a study of relationships between acreage figures as we now have them and factors causing these changes will enable us to see the more important changes and make allowance for changes due to methods of securing the data.

#### REVISION OF ANNUAL LIVESTOCK ESTIMATES.

For six years we have been gathering detailed figures on livestock shipments. For some markets we have figures back as far as 1913. These will be of great help to us in studying the relation of livestock production and prices. A revision of livestock figures has already been

begun and the sheep estimates for South Dakota have been revised in the light of the best available data. The same question of correction when the census figures were available enters into the livestock figures. Hence it is necessary to adjust the link-relatives between the census periods. However in the case of livestock we have another check of great value in the tax data. By taking the census data and using the link-relatives of the tax data compared with original estimates made as of January 1 comparatively satisfactory yearly figures can be obtained.

Several methods of check-up on our yearly livestock figures during recent years have been devised so that the estimates from now on with the more complete marketing data available will give us a very satisfactory picture of the changes actually taking place. However prior to January 1, 1927 our estimates on livestock represented an inventory of livestock on hand. This past year we undertook to estimate the actual production which represented inventory of the previous year with the items of debit and credit to arrive at the inventory of the present year. It is much more satisfactory to have actual production figures than figures of numbers on hand because they would represent better the condition of the livestock industry than would numbers on hand, although numbers on hand do reflect the big changes.

#### ADJUSTMENT OF CENSUS DATA.

In some studies that are made census figures are used as indicative of the trend of production. The great difficulty with this is,

(1) the long periods intervening between census (2) changes in the time of taking the census, such as the change from June 1 to January 1, which would markedly affect the numbers of livestock on hand. (3) the census years cannot be considered representative as they may strike on a poor year or a good year instead of an average year.

In our adjustment of the census as a base to use from year to year we have found certain corrections necessary. With the crops having small acreages, especially as they occur in fractions of an acre, the census is often deficient. Our check-up on potato production has shown this to be true. In a state like South Dakota many errors are apt to occur if the figures published in the census are taken without much study. One of the possible mistakes in this connection results from changes due to changes in County lines. In our study of changes taking place in South Dakota back to 1880 it was necessary to study the numerous changes that have taken place in County lines in order to make the published data comparable. It was often found that enumeration of the Indian Reservations made an appreciable inconsistency. This is especially true if an Indian Reservation covers two states and they are enumerated as a unit. The Standing Rock Reservation is an example of this. The data for the whole Reservation should be pro-rated between the two states.

In a study of agricultural changes in relation to other factors the consideration of production material available as stated is highly necessary. A study of production and price at this time may point out

still further improvements desired in our study of production data. In this way the study will have an added value of extreme importance.

#### PRICE AND PRODUCTION RELATIONSHIPS FROM THE PRESENT PRICE SERIES.

##### Discussion of Method.

In order to determine relationships between price and production as outlined in our introduction the correlations were made as shown in the tables following:

1. World production is used with wheat because it is an exportable product. Data on world production were not available for barley and flax. Corn and oats are largely on a domestic basis so only the United States production was considered.

2. The first difference method was used because the data in most cases did not lend itself to fitting of trends. This method is suggested by Jerome (10) on a similiar problem. Yule (25) and Killough (11). It is probable that certain methods of curve fitting could give a better correlation with a smaller standard deviation and such methods should be tried when more detailed studies are made.

Price is weighted by annual marketings for crop years and the results deflated by the average yearly all commodity index number. Killough (11) suggests that the use of the farm commodity index number might give a higher correlation. Also it might be better to use it as a separate variable instead of deflating each price.

Effect of price on acreage is studied through the effect of price on acreage the next year, and effect of acre value on acreage the next year.

Result of acreage change is studied through the effect shown on price the same year, also farm value same year.

Graphs submitted show production, price, acreage and farm value for the period covered by the price series now available.

#### Wheat Studies.

World production shows a much higher correlation with South Dakota price than does United States production due to our price being affected so largely by the world price. Satisfactory carryover figures were not available for the world crop which would doubtless have raised the correlation. The United States crop and carryover as a second variable might raise the correlation because of its importance during the short crop years when the tariff is effective. Occasionally as in the year 1926 the South Dakota crop would have a noticeable effect on the South Dakota price. Another factor which has a possible effect on the South Dakota price is the size of the world crop of rye (Killough) and also the European crop of potatoes.

Because of the importance of Durum Wheat in South Dakota it would be of value to study durum prices and production. It would be necessary to use market prices as it may be difficult to get a series of local prices. Some have been collected however.

A significant relationship is indicated between acre value of wheat and acreage the next year but no relation between price and acreage the next year.

There is a slight indication of negative correlation in price when acreage is changed. In this connection it would be of value to



know the relationship between U. S. acreage and U. S. price, U. S. acreage and S. D. acreage.

Wheat Correlations

Items Correlated.	Method Used	Correlation
World Production South Dakota Yearly Price	Deviation from Straight Line Trend	-.79
United States Production South Dakota Yearly Weighted Price	"	-.11
United States Production and Carryover South Dakota Yearly Weighted Price	First Differences	-.30
United States Production and Carryover South Dakota Acreage Current Year	"	.52
South Dakota Yearly Weighted Price South Dakota Acreage Next Year	"	-.06
South Dakota Acre Value South Dakota Acreage Next Year	"	.63
South Dakota Acreage South Dakota Yearly Weighted Price Same Year.	"	-.19
South Dakota Acreage South Dakota Acre Value	"	-.10

FIG. 1

WORLD PRODUCTION OF WHEAT AND SOUTH DAKOTA ANNUAL PRICE.

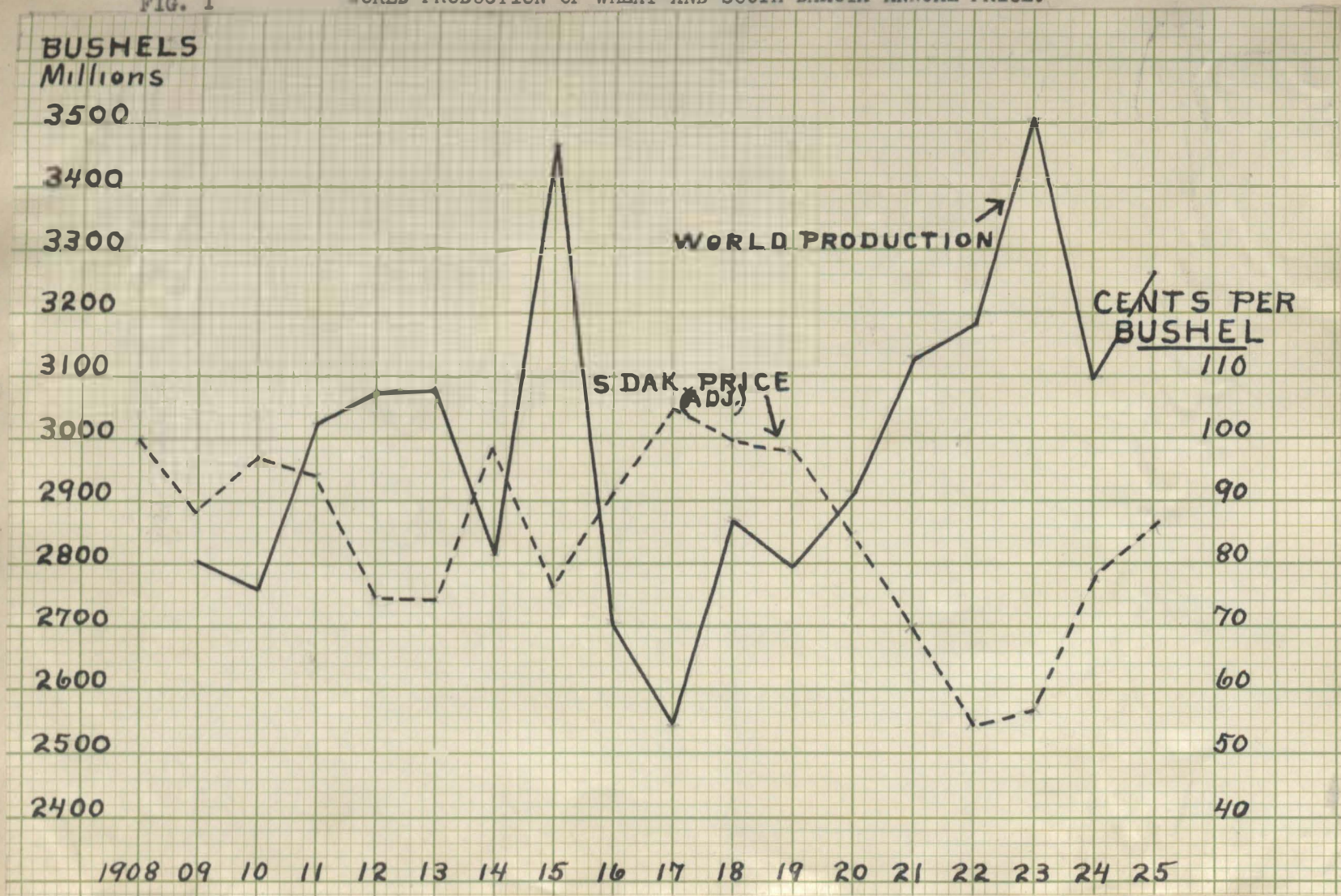


FIG. 2

UNITED WHEAT SUPPLY AND SOUTH DAKOTA ANNUAL PRICE.

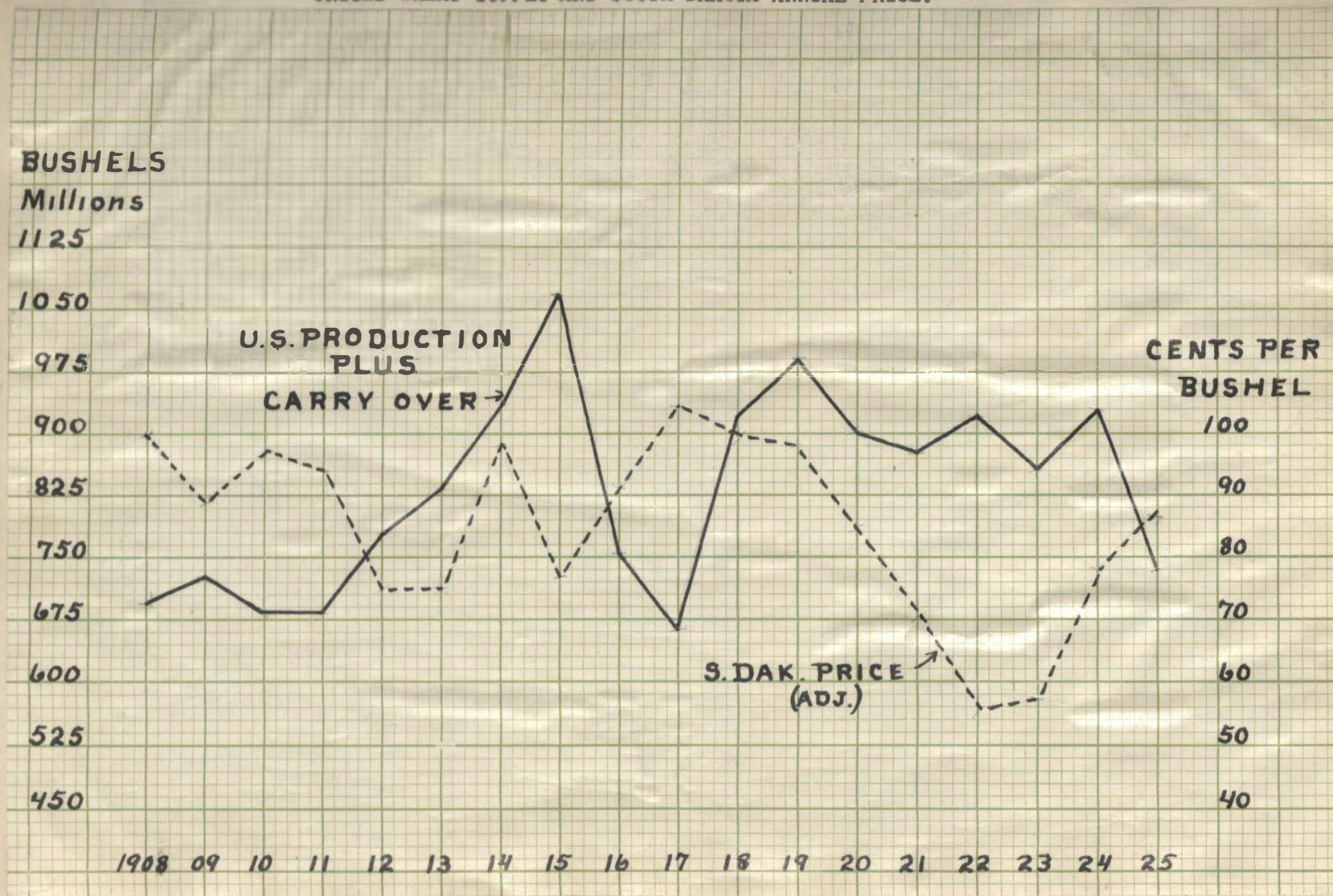


FIG. 3

SOUTH DAKOTA WHEAT ACREAGE AND ANNUAL PRICE.

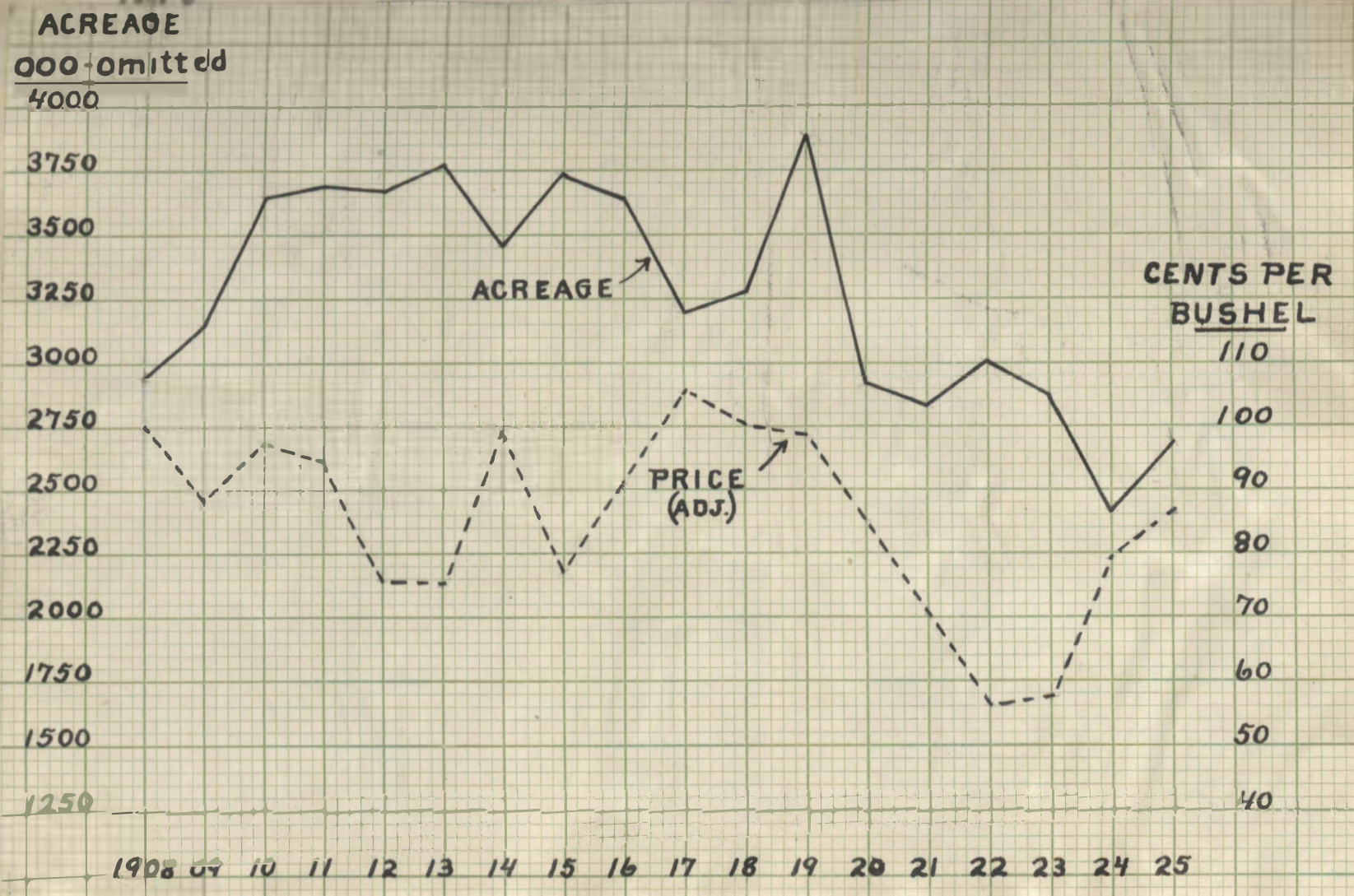
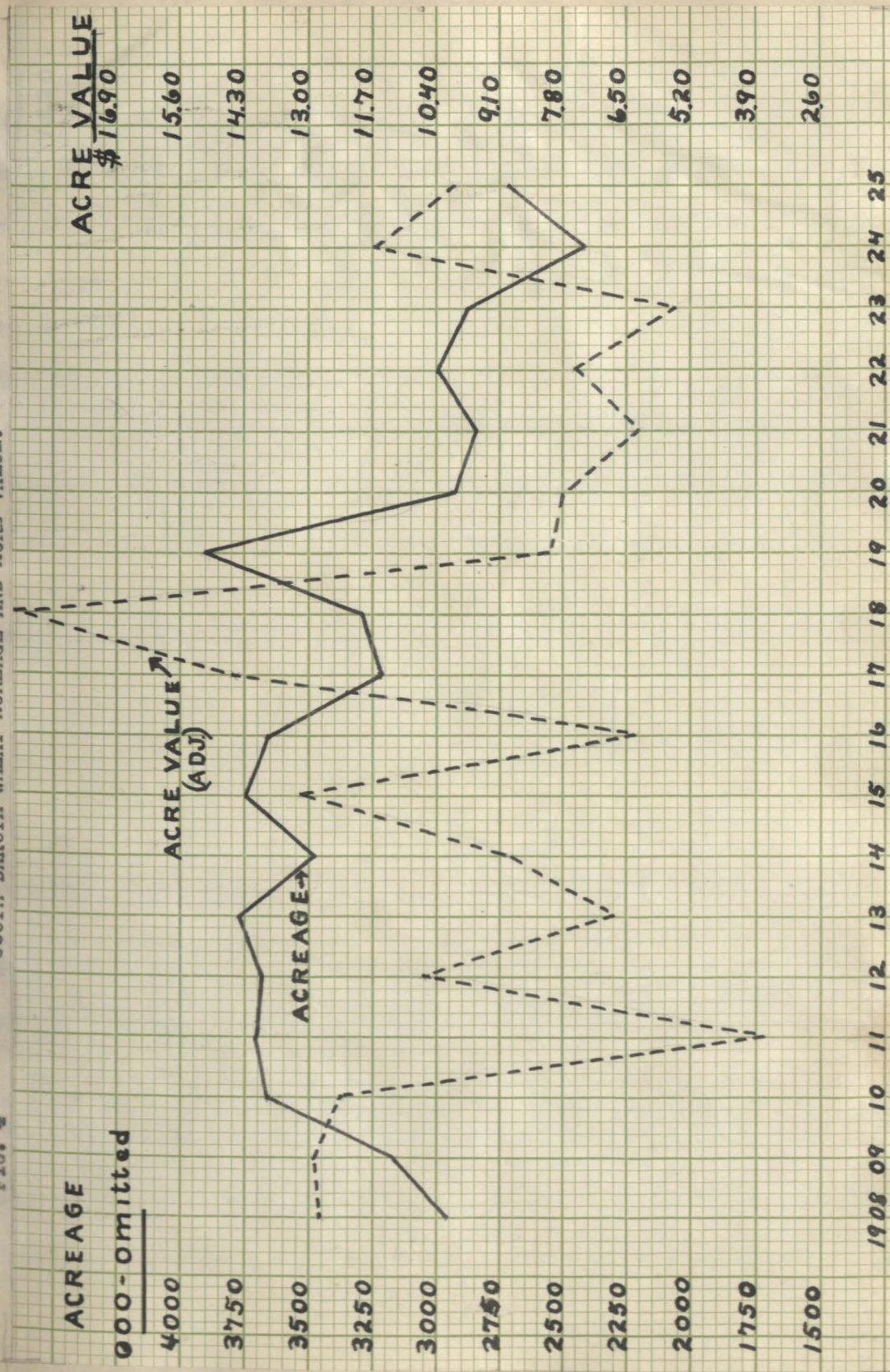


FIG. 4 SOUTH DAKOTA WHEAT ACREAGE AND ACRE VALUE.



### Corn Studies.

A marked correlation is noted between United States supply and South Dakota price in contrast with slight correlation in the case of wheat. South Dakota supply as a separate variable should increase the correlation because of the importance of the local demand during short crop years. Other variables affecting the South Dakota price of corn are numbers of livestock, the amount of grain feeding, and the price of substitute feeds.

There is an indication of the acre value of corn having some effect upon acreage the next year but none to speak of in case of price. The relation shown is not statistically significant as with wheat.

There is some indication of a negative correlation between acreage and price.

### Corn Correlations.

Items Correlated	Method Used	Correlation.
United States Production South Dakota Yearly Weighted Price	Deviation from Straight Line Trends.	-.63
United States Production and Carryover South Dakota Yearly Weighted Price	First Differences	-.72
United States Production and Carryover South Dakota Acreage Current Year	"	.07
South Dakota Yearly Weighted Price South Dakota Acreage Following Year	"	.14
South Dakota Acreage Following Year South Dakota Yearly Weighted Price	Deviation from Straight Line Trends	-.06
South Dakota Acre Value South Dakota Acreage Following Year	First Differences	.28
South Dakota Acreage South Dakota Yearly Weighted Price Current Year.	"	-.03
South Dakota Acreage South Dakota Acre Value	"	-.23

FIG. 5

UNITED STATES CORN SUPPLY AND SOUTH DAKOTA ANNUAL PRICE.

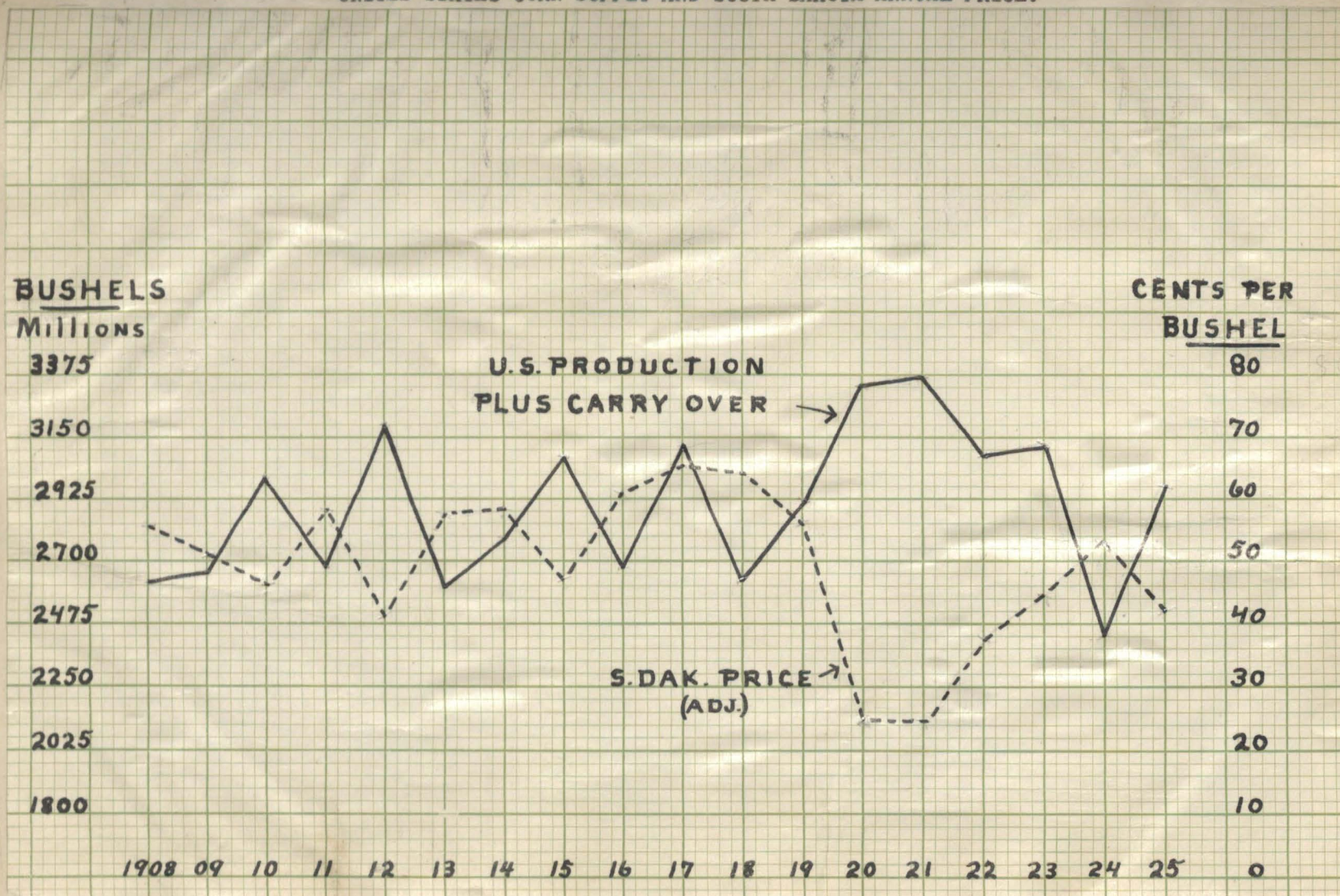


FIG. 6

SOUTH DAKOTA CORN ACREAGE AND ANNUAL PRICE.

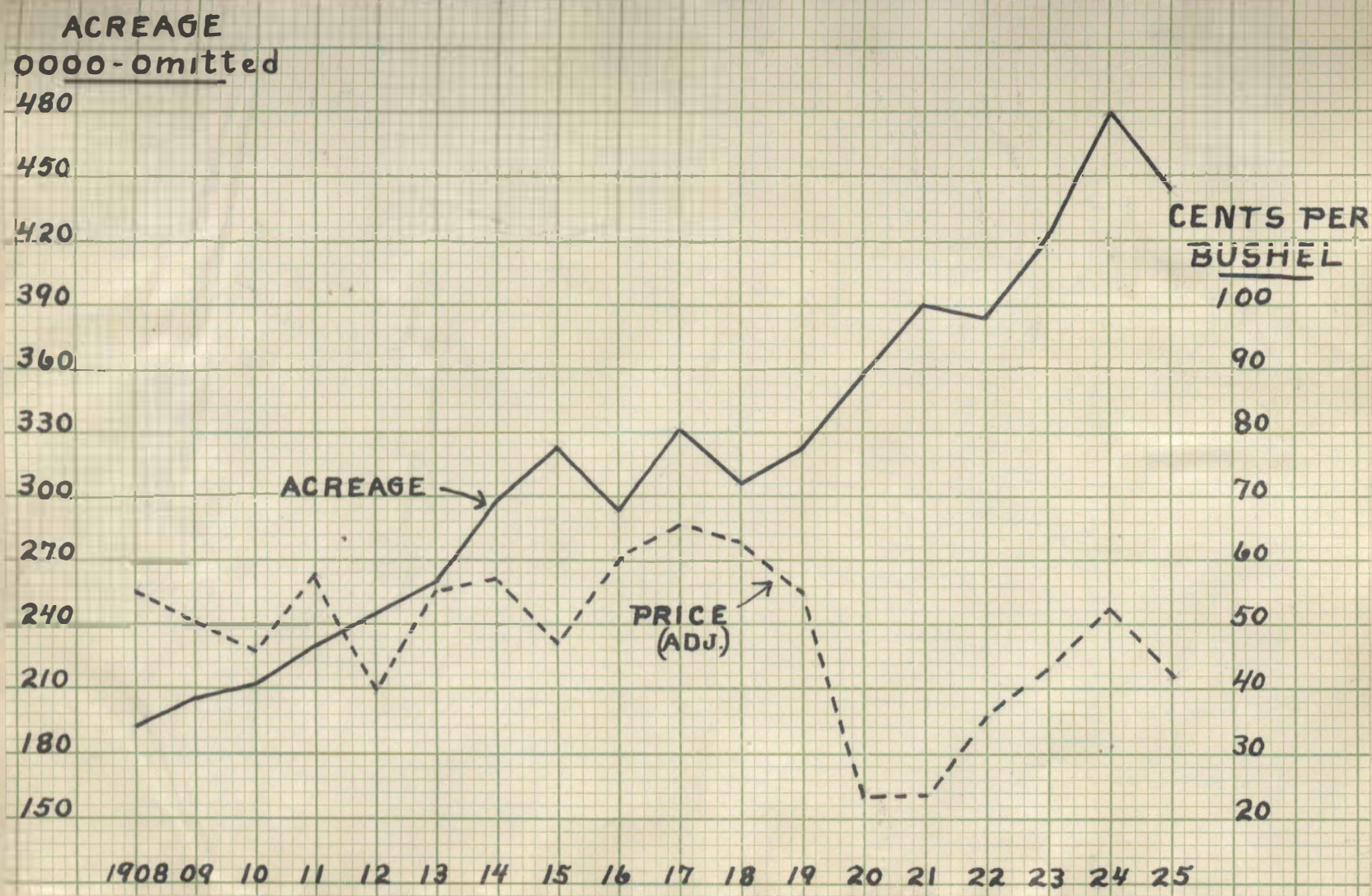
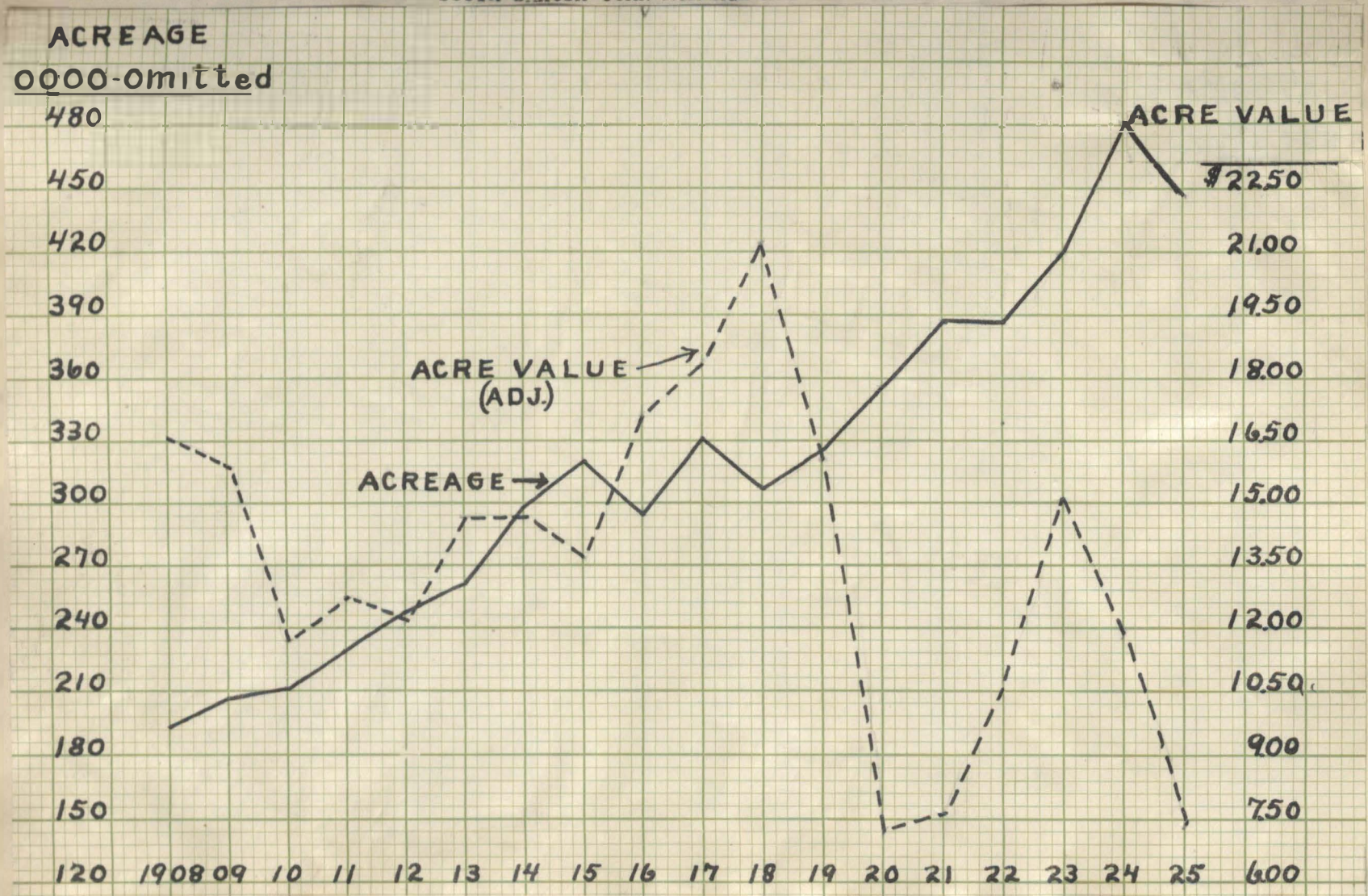




FIG. 7

SOUTH DAKOTA CORN ACREAGE AND ACRE VALUE.



### Oats Studies

There is less correlation between the United States supply of oats and the South Dakota price than in the case of corn. This may be due to the falling off in the demand for oats because of markedly decreased horse numbers. In a multiple correlation study horse numbers is an important variable for consideration.

Slight indications of positive correlation are shown between the price of oats and the acreage the next year, and between the acre value of oats and the acreage the next year.

No relation at all is indicated between acreage change and price or acre value the same year.

#### Oats Correlation.

Items Correlated	Method Used	Correlation
United States Production South Dakota Yearly Price	Deviation from Straight Line Trends	-.12
United States Production and Carryover South Dakota Yearly Price	First Differences	-.54
United States Production and Carryover South Dakota Acreage Current Year	"	.17
South Dakota Yearly Weighted Price South Dakota Acreage Following Year	"	.19
South Dakota Price South Dakota Acreage Following Year	Deviation from Straight Line Trends	.11
South Dakota Acre Value South Dakota Acreage Following Year	First Differences	.23
South Dakota Acreage South Dakota Yearly Price	"	-.09
South Dakota Acreage South Dakota Acre Value	"	-.04

FIG. 8

UNITED STATES OATS SUPPLY AND SOUTH DAKOTA PRICE.

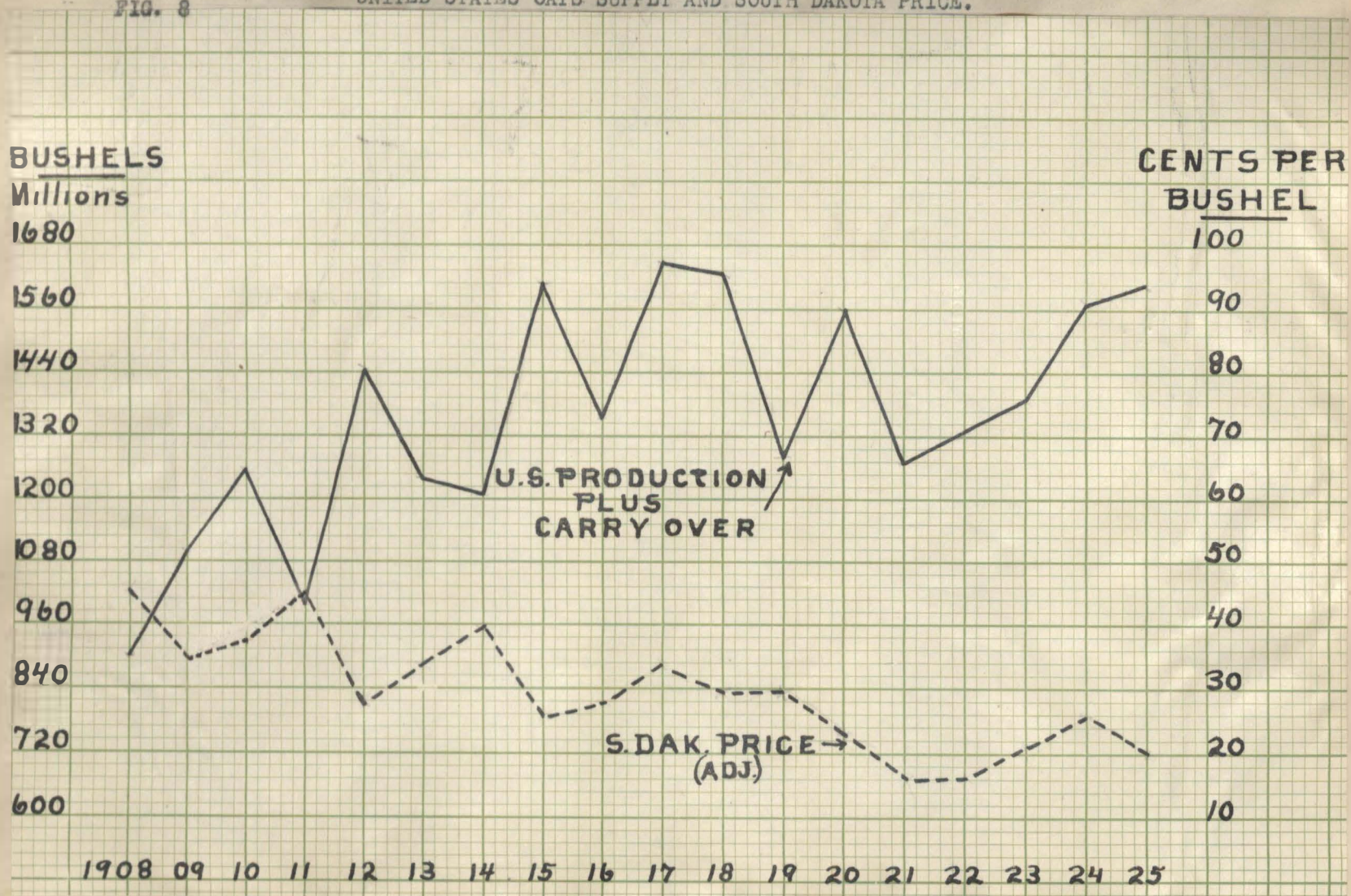


FIG. 9

SOUTH DAKOTA OATS ACREAGE AND ANNUAL PRICE.

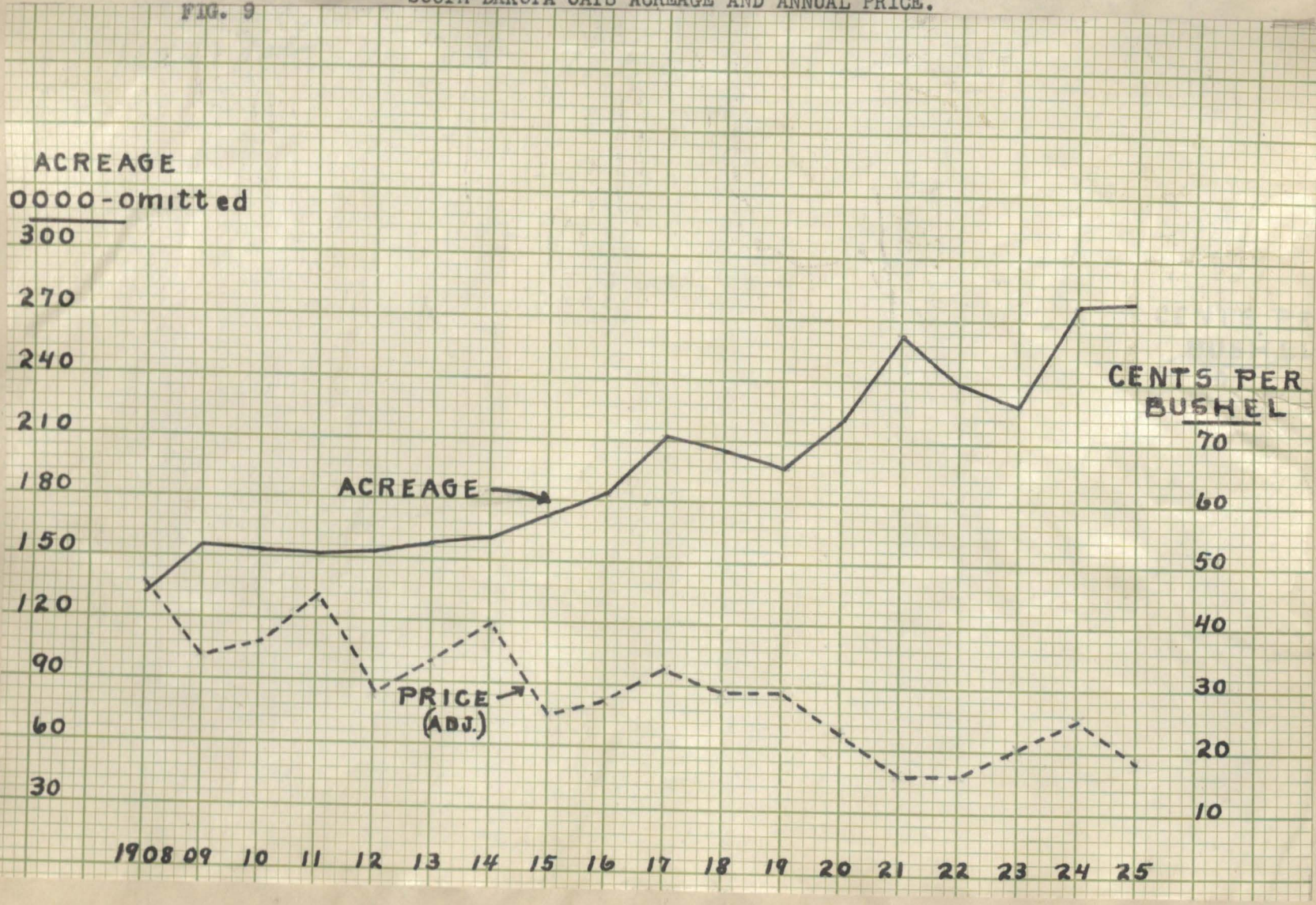
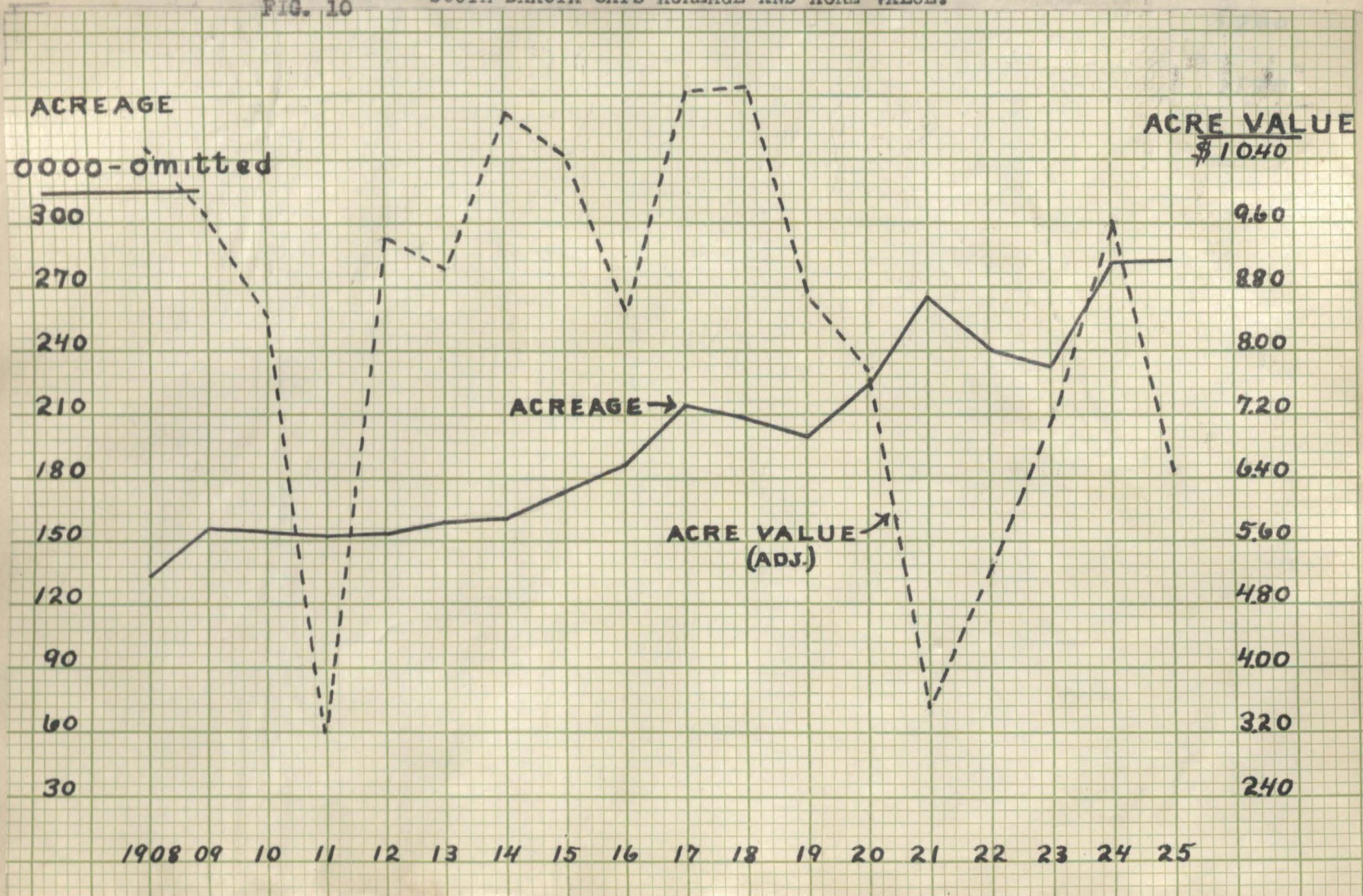


FIG. 10

SOUTH DAKOTA OATS ACREAGE AND ACRE VALUE.



### Barley Studies

A negative correlation of significance is shown between United States supply and South Dakota price.

An indication of an important relationship between acre value and acreage the next year is shown but the relation between price and acreage the next year is of relatively small importance.

No relation is shown between acreage and price or acre value the same year.

### Barley Correlations

Items Correlated	Method Used	Correlation
United States Production South Dakota Yearly Weighted Price	Deviation from Straight Line Trend.	-.25
United States Production and Carryover South Dakota Yearly Weighted Price	First Differences	-.64
United States Production and Carryover South Dakota Acreage Current Year	"	.45
South Dakota Acre Value South Dakota Acreage Following Year	"	.48
South Dakota Acreage South Dakota Yearly Weighted Price Same Year	"	-.12
South Dakota Acreage South Dakota Acre Value	"	.22
South Dakota Yearly Weighted Price South Dakota Acreage Following Year	"	.27

UNITED STATES BARLEY SUPPLY AND SOUTH DAKOTA PRICE.

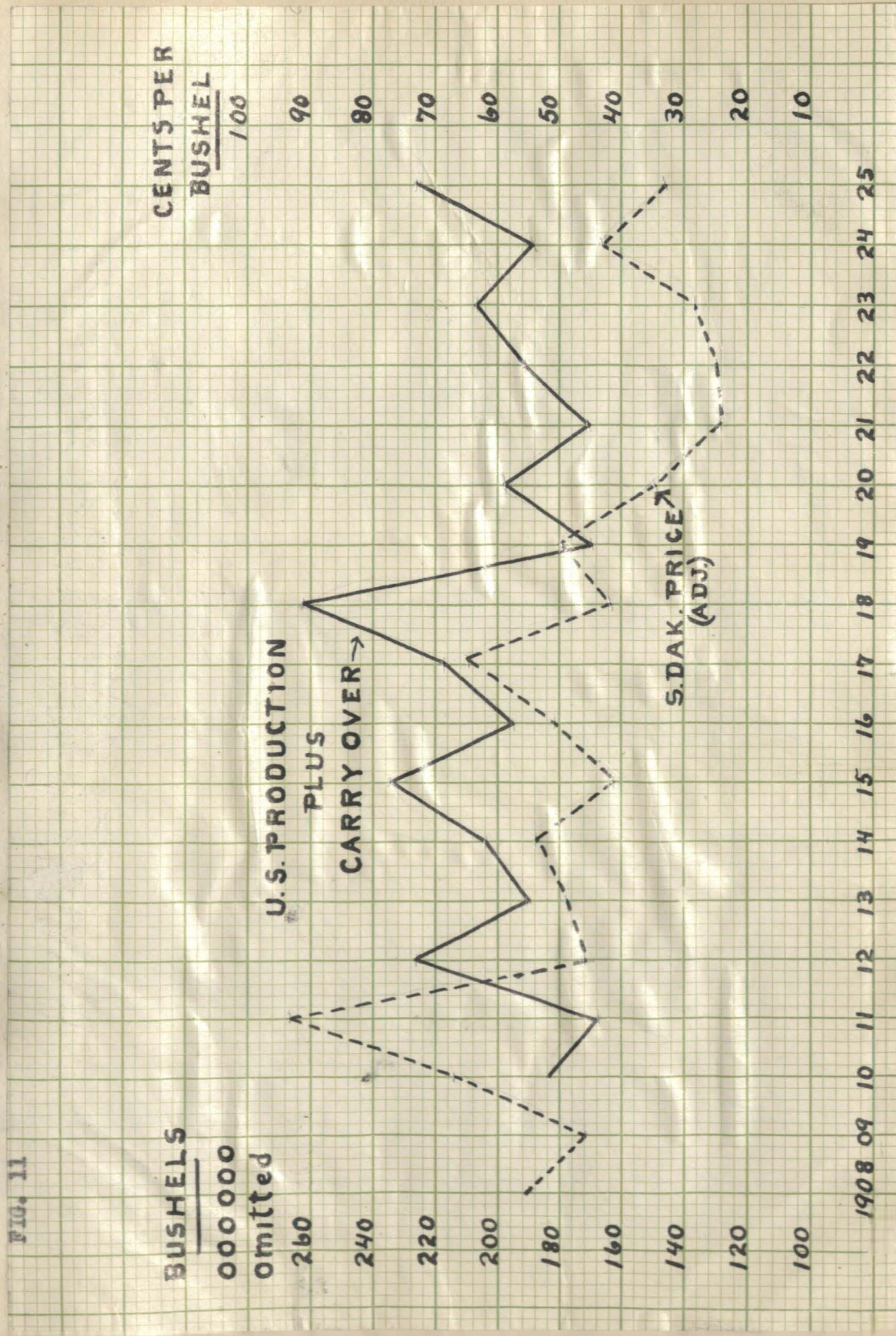


FIG. 12

SOUTH DAKOTA BARLEY ACREAGE AND ANNUAL PRICE.

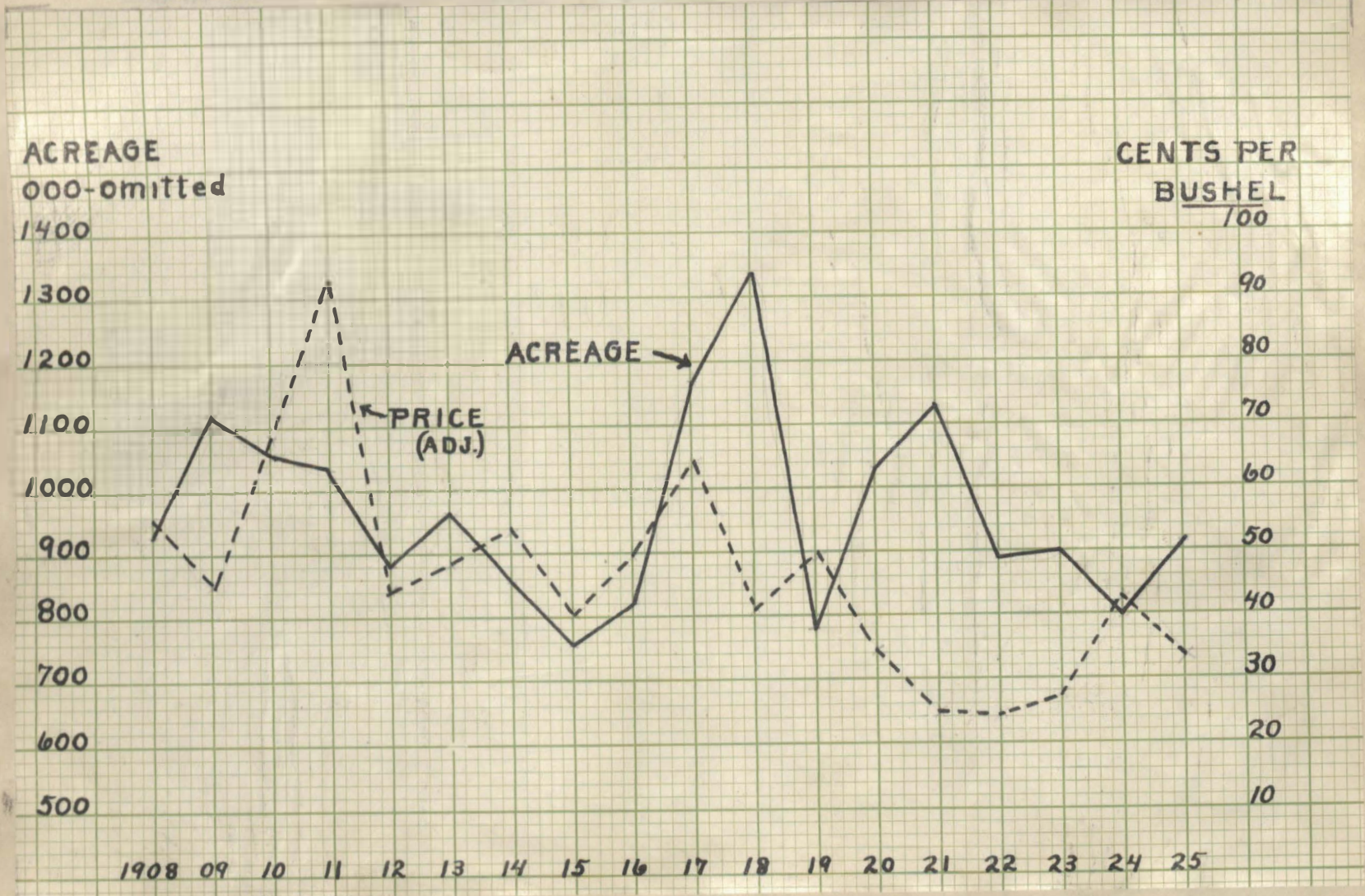
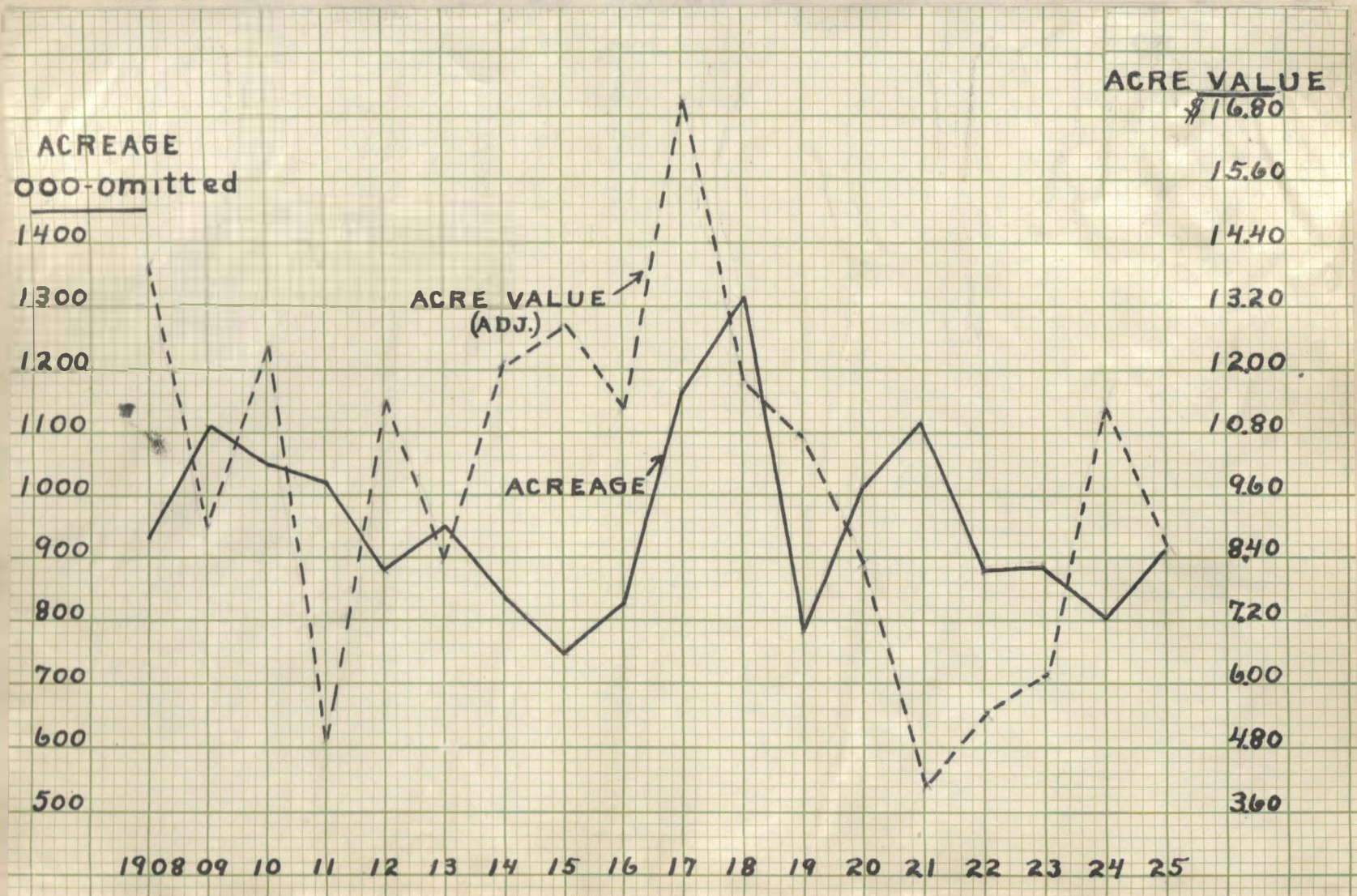




FIG. 13

SOUTH DAKOTA BARLEY ACREAGE AND ACRE VALUE.



### Flax Studies

The correlation between United States Production of flax and the South Dakota price is not high enough to be significant. Studies are now being made of the relation between production in important countries and the South Dakota price.

No relations of importance are noted between price or acre value and acreage the next year or acreage changes and price or acre value the same year.

### Flax Correlations

Items Correlated	Method used	Correlation
United States Production South Dakota Yearly Weighted Price	Deviation from Straight Line Trends	+.21
South Dakota Yearly Weighted Price South Dakota Acreage Following Year	First Differences	.52
South Dakota Acre Value South Dakota Acreage Following Year	"	.18
South Dakota Acreage of Flax South Dakota Yearly Weighted Price	"	-.02
South Dakota Acreage of Flax South Dakota Acre Value	"	-.04

FIG. 14

SOUTH DAKOTA FLAX ACREAGE AND ANNUAL PRICE.

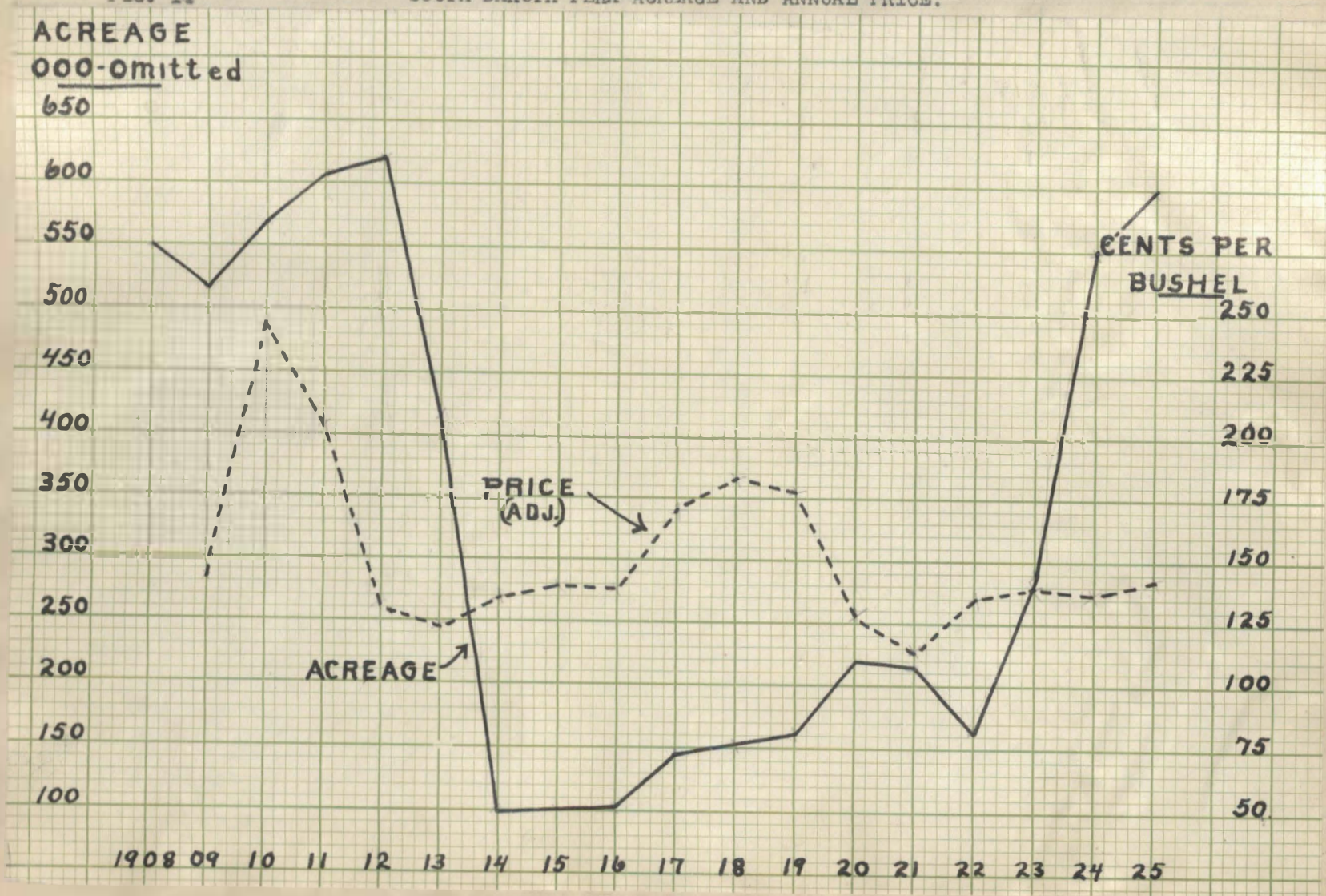
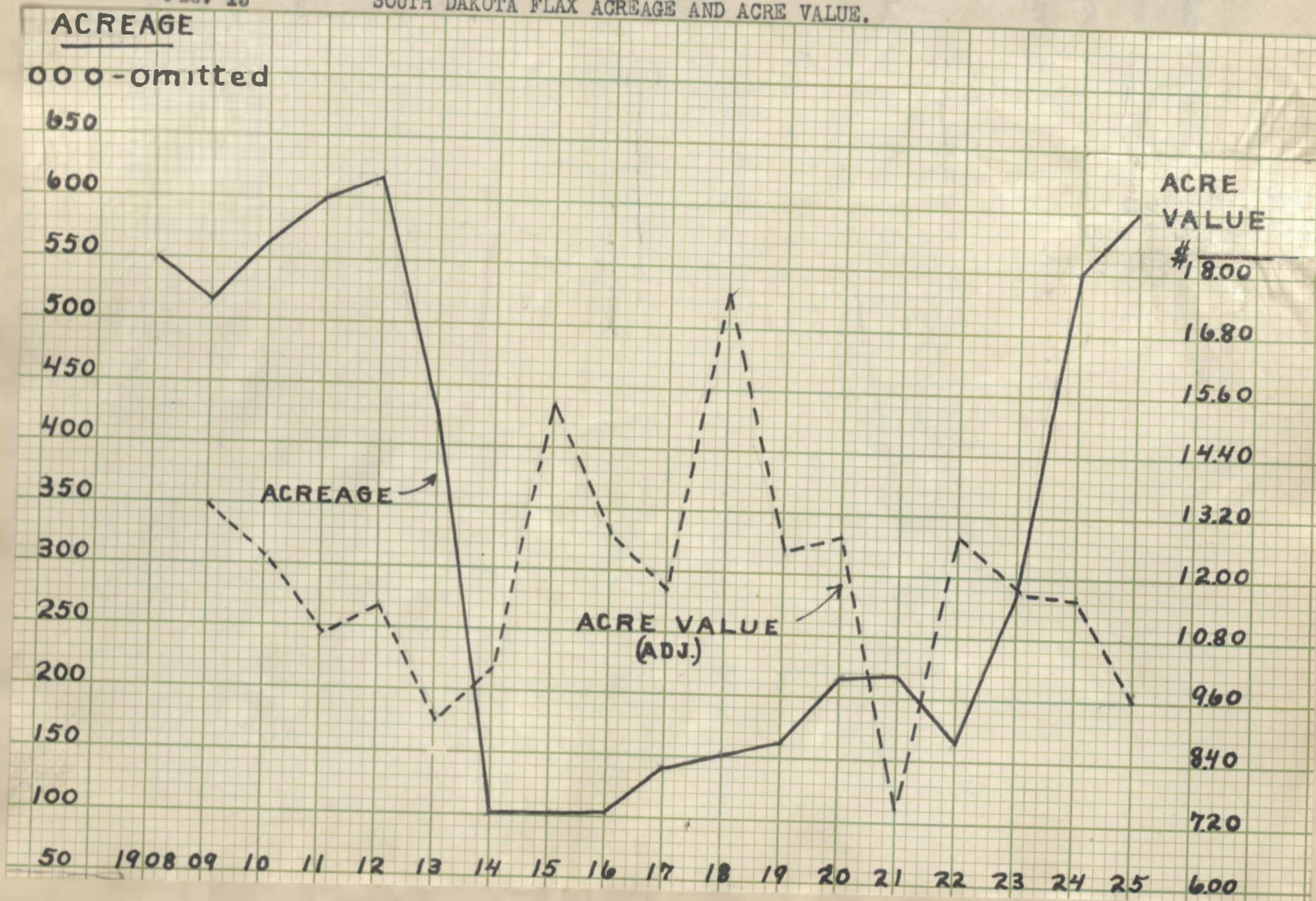


FIG. 15

SOUTH DAKOTA FLAX ACREAGE AND ACRE VALUE.



## GENERAL CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDIES.

Important relationships are indicated between supply and South Dakota price but correlations are not high enough for forecasting purposes. Multiple correlation studies could perhaps be made which would raise the correlation coefficients measurably. Other variables have been suggested in the previous discussion chiefly as:

1. State supply
2. Competing crop supply, domestic or foreign, depending on whether we export the crop or are largely on a domestic basis.
3. Numbers of livestock where the crop is fed.
4. Relative amount of grain feeding being done.

Slight correlations are shown between price or acre value and acreage the next year.

The relationship between acreage changes and price or acre value is negligible. As this relationship is one measure of the justification for acreage change it might be of value to study the correlation between United States acreage and price or acre value. In the latter case, for crops on a domestic basis, we would expect a significant negative correlation. If so it would appear that South Dakota acreage is not highly correlated with United States acreage or that there is some offsetting factor in the state demand.

It is recommended that when a price series to 1900 or 1890 is obtained, similar correlation studies be made and a more careful consideration of trend as a factor be considered which is difficult with the short series at present available and the abnormal factors enter-

ing into the war period. It will be necessary to give some consideration to acreage revisions especially for the period prior to 1909 as the adjustment around the census period might be sufficient to affect correlation studies seriously.

ACKNOWLEDGEMENT.

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SOUTH DAKOTA.

COMPARISON OF LIVESTOCK JANUARY 1 PRICE AND ANNUAL PRICE

Year	Beef Cattle		Hogs		Sheep	
	Jan. 15; Price. : Cwt.	Annual : Per : Price. : Cent.	Jan. 15; Price. : Cwt.	Annual : Per : Price. : Cent.	Jan. 15; Price. : Cwt.	Annual : Per : Price. : Cent.
1909						
1910						
1911						
1912						
1913						
1914						
1915	\$ 6.10	100.7	\$ 6.20	6.14	\$ 4.80	5.17
1916	5.90	116.2	5.90	8.13	5.60	6.54
1917	7.80	102.0	9.30	13.43	7.50	9.64
1918	8.60	114.9	15.10	15.67	10.70	9.96
1919	10.50	92.2	15.80	16.56	10.00	8.47
1920	8.60	92.9	12.80	12.44	10.10	7.15
1921	6.00	86.8	7.80	7.20	4.60	4.17
1922	4.80	119.8	6.40	8.01	4.30	6.14
1923	5.60	106.3	7.40	6.54	6.10	6.38
1924	5.80	106.6	6.10	6.76	6.80	7.13
1925	5.80	117.9	8.90	10.59	8.10	8.25
						107.7
						116.8
						128.5
						93.1
						84.7
						70.5
						90.7
						142.8
						104.6
						104.9
						101.9

WHEAT ACREAGE, PRODUCTION AND PRICE DATA.

TABLE 5

Year	: World Wheat : Production. :(Million Bus.)	: Trend of World : Wheat Production: (Million Bus.)	: U. S. Wheat : Production. :(Thousand Bus.)	: Trend of U. S. : Wheat Production (Thousand Bus.)
1908	:	:	:	:
1909	2,804	2,830	700,434	721,426
1910	2,762	2,852	635,121	729,656
1911	3,028	2,874	621,338	737,896
1912	3,077	2,896	730,267	746,116
1913	3,080	2,918	763,380	754,346
1914	2,815	2,940	891,017	762,576
1915	3,477	2,962	1,025,801	770,806
1916	2,713	2,984	636,318	779,036
1917	2,553	3,006	636,655	787,266
1918	2,869	3,028	921,438	795,496
1919	2,797	3,050	967,979	803,726
1920	2,922	3,072	833,027	811,956
1921	3,133	3,094	814,905	820,186
1922	3,184	3,116	867,598	828,416
1923	3,509	3,138	797,394	836,646
1924	3,099	3,160	864,428	844,876
1925	3,274	3,182	676,429	853,106
1926	:	:	:	:

WHEAT ACREAGE, PRODUCTION AND PRICE DATA.

Year	: U. S. Wheat : Production. :(Million Bus.)	: Old Stocks On : Farm. July 1 (Million Bus.)	: U. S. Visible : Supply of Wheat: (Million Bus.)	: Total (Million Bus.)
1908	645	33	15	693
1909	700	14	10	724
1910	635	37	12	684
1911	621	34	24	679
1912	730	24	23	777
1913	763	36	30	829
1914	891	32	13	936
1915	1,026	29	8	1,063
1916	636	75	43	754
1917	637	16	14	667
1918	921	8	1	930
1919	968	19	9	996
1920	833	50	19	902
1921	815	57	8	880
1922	868	32	18	918
1923	797	36	26	859
1924	864	31	35	930
1925	876	29	29	734
1926	:	:	:	:

TABLE 4

WHEAT ACREAGE, PRODUCTION AND PRICE DATA.

Year:	S. D. Wheat Acreage (Thousand A.):	S. D. Values of Wheat (Dollars):	S. D. Annual Price of Wheat August-July (Cents):	S. D. Weighted Annual Price of Wheat August-July (Cents):	Trend of S. D. Price of Wheat Adjusted (Cents):
1908:	2,958	12.80	93.36	100	
1909:	3,152	12.99	91.17	89	93.75
1910:	3,650	12.42	91.32	97	92.59
1911:	3,700	3.76	91.38	94	91.43
1912:	3,675	10.65	75.27	75	90.27
1913:	3,775	6.75	73.95	75	89.11
1914:	3,469	9.01	96.21	99	87.95
1915:	3,725	13.17	93.29	77	86.79
1916:	3,650	6.32	145.88	93	85.63
1917:	3,200	14.70	195.62	105	84.47
1918:	3,280	19.00	201.71	100	83.31
1919:	3,896	8.04	225.12	98	82.15
1920:	2,930	7.82	148.58	85	80.99
1921:	2,845	6.37	100.20	70	79.83
1922:	2,989	7.50	86.82	66	78.67
1923:	2,870	5.47	85.06	57	77.51
1924:	2,408	11.68	124.92	80	76.35
1925:	2,701	10.06	133.72	86	75.19
1926:	1,917				

TABLE 5 CORN ACREAGE, PRODUCTION AND PRICE DATA

Year	U. S. : : Corn Production : : (Million Bus.)	Old Stocks on : farms. Nov. 1. : : (Million Bus.)	Visible Supply : : of Corn. Nov. 1. : : (Million Bus.)	Total : (Million Bus.)
1908	2,545	69	1	2,615
1909	2,572	77	3	2,652
1910	2,886	114	4	3,004
1911	2,531	124	2	2,657
1912	3,125	65	3	3,193
1913	2,447	138	6	2,591
1914	2,673	80	3	2,756
1915	2,995	96	3	3,094
1916	2,567	88	2	2,657
1917	3,065	34	1	3,100
1918	2,503	115	5	2,623
1919	2,811	70	1	2,882
1920	3,209	139	10	3,358
1921	3,069	286	19	3,374
1922	2,906	177	9	3,092
1923	3,054	84	1	3,139
1924	2,309	102	8	2,419
1925	2,917	58	2	2,977
1926				

CORN ACREAGE, PRODUCTION AND PRICE DATA

Year	U. S. : : Corn Production : : (Thousand Bus.)	Trend of U. S. : : Corn Production. : : (Thousand Bus.)	S. D. Corn : : Acreage. : : (Thousand A.)	Trend of : S. D. Corn : Acreage. : : (Thousand A.)
1908			1,942	
1909	2,572,336	2,715,601	2,038	2,006
1910	2,886,260	2,726,435	2,100	2,163
1911	2,531,488	2,737,269	2,310	2,320
1912	3,124,746	2,748,103	2,495	2,477
1913	2,446,988	2,758,937	2,640	2,634
1914	2,672,804	2,769,771	3,000	2,791
1915	2,994,793	2,780,605	3,250	2,948
1916	2,566,927	2,791,439	2,950	3,105
1917	3,065,233	2,802,273	3,350	3,262
1918	2,502,665	2,813,107	3,100	3,419
1919	2,811,302	2,823,941	3,288	3,576
1920	3,208,584	2,834,775	3,650	3,732
1921	3,069,569	2,845,609	3,926	3,890
1922	2,906,020	2,856,443	3,861	4,047
1923	3,053,557	2,867,277	4,208	4,204
1924	2,309,414	2,878,111	4,814	4,361
1925	2,916,961	2,888,945	4,478	4,518
1926				

CORN ACREAGE, PRODUCTION AND PRICE DATA

TABLE 6

Year	S. D. Acre Values of Corn. (Dollars)	S. D. Weighted Annual Price of Corn. Nov.- Oct. (Cents)	S. D. Weighted Annual Price of Corn. Nov.- Oct. Adjusted. (Cents)	Trend of S. D. Price of Corn. Adjusted. (Cents)
1908	16.63	53.85	56	
1909	16.17	51.60	51	55.31
1910	11.75	43.48	47	54.47
1911	12.76	56.89	58	53.63
1912	12.24	39.60	40	52.79
1913	14.54	56.75	57	51.95
1914	14.82	57.24	57	51.11
1915	13.63	56.72	47	50.27
1916	17.39	103.57	61	49.43
1917	18.48	125.53	66	48.59
1918	21.42	127.78	63	47.75
1919	15.68	128.33	55	46.91
1920	7.20	36.86	24	46.07
1921	7.68	35.74	24	45.23
1922	10.55	57.07	37	44.39
1923	15.18	66.48	44	43.55
1924	11.50	86.01	54	42.71
1925	7.18	63.22	41	41.87
1926				



OATS ACREAGE, PRODUCTION AND PRICE DATA.

TABLE 7

Year	U. S. Oats Production: (Million Bus.)	Old Stocks on Farms. Aug. 1. (Million Bus.)	U. S. Visible Supply of Oats. Aug. 1. (Million Bus.)	Total (Million Bus.)
1908	847	41	2	890
1909	1,068	27	4	1,099
1910	1,186	67	3	1,256
1911	922	68	11	1,001
1912	1,418	35	1	1,454
1913	1,122	104	17	1,243
1914	1,141	62	6	1,209
1915	1,549	56	1	1,606
1916	1,252	114	9	1,375
1917	1,593	48	7	1,648
1918	1,538	61	8	1,627
1919	1,184	93	20	1,297
1920	1,496	55	4	1,555
1921	1,078	161	38	1,277
1922	1,216	75	37	1,328
1923	1,306	71	5	1,382
1924	1,503	66	3	1,572
1925	1,488	92	26	1,606
1926				

OATS ACREAGE, PRODUCTION AND PRICE DATA.

Year	U. S. Oats Production: (Thousand Bus.)	Trend of U. S. Oats Production: (Thousand Bus.)	S. D. Oats Acreage. (Thousand A.)	Trend of S. D. Oats Acreage. (Thousand A.)
1908	847,109	956,603	1,365	
1909	1,068,289	1,008,839	1,859	1,341
1910	1,186,341	1,061,673	1,550	1,426
1911	922,298	1,114,507	1,540	1,511
1912	1,418,337	1,167,341	1,550	1,595
1913	1,121,768	1,220,175	1,590	1,680
1914	1,141,060	1,273,009	1,606	1,766
1915	1,549,030	1,325,943	1,725	1,851
1916	1,251,837	1,378,677	1,850	1,936
1917	1,592,740	1,415,540*	2,138	2,021
1918	1,538,124	1,406,135	2,050	2,106
1919	1,184,030	1,396,730	1,963	2,191
1920	1,496,281	1,387,325	2,219	2,276
1921	1,078,341	1,377,920	2,650	2,362
1922	1,216,803	1,368,515	2,400	2,447
1923	1,305,883	1,359,110	2,304	2,532
1924	1,502,529	1,347,705	2,334	2,617
1925	1,487,550	1,340,300	2,334	2,703
1926			1,984	

\*Beginning of New Trend.

OATS ACREAGE, PRODUCTION AND PRICE DATA.

Year	S. D. Acre Values of Oats. (Dollars.)	S. D. Weighted Annual Price of Oats. Aug.-July. (Cents)	S. D. Weighted Annual Price of Oats. Aug.-July. (Cents)	Trend of S. D. Price of Oats. Adjusted. (Cents)
1908	10.58	43.12	46	
1909	9.80	35.27	35	38.53
1910	8.51	31.44	37	37.28
1911	3.26	42.63	44	36.03
1912	9.46	27.61	28	34.78
1913	9.01	33.53	34	33.53
1914	11.00	39.15	40	32.28
1915	10.50	30.70	25	31.03
1916	8.54	43.68	28	29.78
1917	11.22	62.82	33	28.53
1918	11.31	58.45	29	27.28
1919	8.70	69.03	30	26.03
1920	7.82	39.60	23	24.78
1921	3.52	22.27	16	23.53
1922	5.27	26.84	17	22.28
1923	7.14	31.55	21	21.03
1924	9.62	40.82	26	19.78
1925	6.46	29.83	19	18.53
1926				

**BARLEY ACREAGE, PRODUCTION AND PRICE DATA.**

**TABLE 9**

Year	U. S. Barley Production: (Million Bus.)	Old Stocks on farms. Nov. 1.: (Million Bus.)	U. S. Visible Supply: of Barley. Aug. 1.: (Thousand Bus.)	Total (Million Bus)
1908	185		540	
1909	189		273	
1910	174	8	995	183
1911	160	6	683	167
1912	224	3	338	227
1913	178	11	1,319	190
1914	195	8	902	204
1915	229	6	253	235
1916	182	11	1,641	195
1917	212	4	1,475	217
1918	256	5	1,302	262
1919	148	12	8,741	169
1920	189	4	3,034	196
1921	155	13	1,845	170
1922	182	7	832	190
1923	198	7	847	206
1924	182	6	283	188
1925	217	6	1,091	224
1926				

**BARLEY ACREAGE, PRODUCTION AND PRICE DATA.**

Year	U. S. Barley Production: (Thousand Bus.)	Trend of U. S. Barley Production: (Thousand Bus.)	S. D. Barley Acreage: (Thousand A.)
1908			928
1909	187,973	190,263	1,115
1910	173,832	190,509	1,050
1911	160,240	190,755	1,020
1912	223,824	191,001	887
1913	178,189	191,247	958
1914	194,953	191,493	850
1915	228,851	191,739	750
1916	182,309	191,985	825
1917	211,759	192,231	1,166
1918	256,225	192,477	1,325
1919	147,608	192,723	771
1920	189,332	192,969	1,028
1921	154,946	193,215	1,120
1922	182,068	193,461	881
1923	197,691	193,707	890
1924	181,575	193,953	790
1925	216,554	194,199	915
1926			

BARLEY ACREAGE, PRODUCTION AND PRICE DATA.

Year	S. D. Acre Values of Barley. (Dollars.)	S. D. Weighted Annual Price of Barley. Aug.-July. (Cents)	S. D. Weighted Annual Price of Barley. Aug.-July. Adjusted. (Cents)	Trend of S. D. Weighted Annual Price of Barley. Adjusted. (Cents)
1908	14.05	49.69	53	
1909	9.05	46.04	45	61.99
1910	12.56	59.33	69	59.96
1911	4.97	89.92	92	57.93
1912	11.44	44.21	44	55.90
1913	8.40	47.77	48	53.87
1914	12.19	52.40	53	51.84
1915	12.80	47.93	40	49.81
1916	11.35	79.26	50	47.78
1917	17.28	119.08	64	45.75
1918	11.80	81.26	40	43.72
1919	10.78	112.22	49	41.69
1920	8.50	58.73	34	39.66
1921	4.08	34.65	24	37.63
1922	5.52	36.49	24	35.60
1923	6.08	41.05	27	33.57
1924	11.34	64.95	42	31.54
1925	8.32	50.20	32	29.51
1926				

FLAX ACREAGE, PRODUCTION AND PRICE DATA.

TABLE 11

Year	U. S. Flax Production: (Thousand Bus.)	Trend of U. S. Flax Production: (Thousand Bus.)	S. D. Flax Acreage: (Thousand A.)	S. D. Acre Values of Flax: (Dollars.)
1908				
1909	19,699	16,096	519	13.16
1910	12,718	16,067	570	12.15
1911	19,370	16,038	607	10.71
1912	28,073	16,009	619	11.27
1913	17,853	15,980	425	8.93
1914	13,749	15,951	100	9.98
1915	14,030	15,922	100	15.29
1916	14,296	15,893	100	12.83
1917	9,164	15,864	140	11.83
1918	13,369	15,835	150	17.48
1919	7,178	15,806	160	12.46
1920	10,752	15,777	220	12.80
1921	8,029	15,748	216	7.41
1922	10,375	15,719	162	12.83
1923	17,060	15,690	284	11.90
1924	31,547	15,661	548	11.78
1925	22,424	15,632	559	9.72
1926			475	

FLAX ACREAGE, PRODUCTION AND PRICE DATA.

Year	S. D. Weighted Annual Price of Flax. Sept.-Aug. (Cents)	S. D. Weighted Annual Price of Flax. Sept.-Aug. Adjusted. (Cents.)	Trend of S. D. Weighted Annual Price of Flax. Adjusted. (Cents.)
1908			
1909	142.59	140	171.35
1910	228.04	243	168.80
1911	195.57	202	166.35
1912	130.52	131	163.90
1913	122.29	124	161.45
1914	131.67	133	159.00
1915	159.64	139	156.55
1916	225.61	138	154.10
1917	317.88	169	151.65
1918	373.05	184	149.20
1919	410.55	178	146.75
1920	214.69	128	144.30
1921	165.62	114	141.85
1922	209.24	135	139.40
1923	209.26	140	136.95
1924	214.50	137	134.50
1925	220.47	143	132.05
1926			

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