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**ACREAGE RESPONSE OF SOUTH DAKOTA WHEAT PRODUCERS  
TO EXPECTED PRICE CHANGES, 1955**

By

**Richard Hoyt Kruse**

**A thesis submitted  
in partial fulfillment of the requirements for the  
degree Master of Science at South Dakota  
State College of Agriculture  
and Mechanic Arts**

**March 1958**

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**ACREAGE RESPONSE OF SOUTH DAKOTA WHEAT PRODUCERS  
TO EXPECTED PRICE CHANGES, 1955**

This thesis is approved as a creditable, independent investigation by a candidate for the degree, Master of Science, and acceptable as meeting the thesis requirements for this degree; but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

## ACKNOWLEDGEMENTS

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## CHAPTER I

### INTRODUCTION

The large carryover stocks of wheat and other commodities which have accumulated in recent years have served to focus attention on the problem of production adjustment. The need for adjustment is generally recognized but the procedure by which this adjustment can and should be achieved is the subject of considerable controversy. Various methods and combinations of methods have been proposed and some of these have been enacted into law.

One of the proposed methods is to allow prices and the price mechanism to perform the function of allocating resources. The "flexible price support provisions" embodied in the Agricultural Act of 1948, and retained in essence in the Acts of 1949 and 1954, represent legislative recognition of this proposal.

#### The Problem

Prices have long been considered to be an important factor influencing agricultural production. Schultz expresses the view that "Farm prices are by all odds the most powerful and pervasive technique for directing agricultural production" in his analysis of the problems

and alternatives in achieving adjustments in the postwar period.<sup>1</sup>

Other economists have taken a more moderate approach in assuming that price is an important factor but they also emphasize that other factors may tend to modify or even nullify the stimulus of price changes.

Brewster and Parsons maintain that prices and the price mechanism are ineffective in achieving the proper allocation of resources in agriculture on the ground that many farmers lack the necessary orientation toward prices and that the "occupational unity of functions, characteristic of most farms, tends to supplant the truly business frame of mind with a workmanlike-livelihood frame of mind".<sup>2</sup>

This diversity of views as to the effectiveness of prices in allocating resources in agriculture has served to emphasize the need for further research on this problem. Evidence on which to base acceptance or rejection of the above viewpoints is insufficient at the present time.

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<sup>1</sup>Theodore W. Schultz, "Transition Readjustments in Agriculture", Journal of Farm Economics, February 1944, p. 83.

<sup>2</sup>John M. Brewster and Howard L. Parsons, "Can Prices Allocate Resources in American Agriculture", Journal of Farm Economics, November 1946, p. 943.

## Reasons for Undertaking the Study

South Dakota is primarily an agricultural state and is vitally concerned with the problem of adjustment. Geographic and economic conditions in South Dakota are widely different from other parts of the nation. This study was undertaken in order that legislators and other policy makers might have access to more research results in formulating future agricultural policies.

## Objectives of the Study

The purpose of this study was to obtain information on the manner in which South Dakota wheat producers respond to price changes. The specific objectives of the study were:

- (1) To obtain, from a representative sample of wheat producers, information relating to the acreage adjustments, if any, they would make to expected changes in the relative price of wheat.
- (2) To explore possible relationships between certain non-price factors and the producer's propensity to make adjustments.
- (3) To analyze the results in order to obtain an estimate of the effectiveness of price as a tool for inducing adjustments in wheat acreage in South Dakota.

## Procedure

In devising the sampling procedure it was deemed more important to obtain reasonably widespread coverage than to adhere strictly to the requirements of a probability sample (figure 1). The sampled area includes the major wheat producing areas of South Dakota with the following exceptions. The wheat-producing area of Northwestern South Dakota was not sampled due to time and financial considerations; also some counties along the eastern border, which were perhaps of lesser importance as wheat producers, were included for similar reasons.

Seventy producers were interviewed in the fall and winter of 1955. No list of wheat producers was readily available so it was necessary to select the producers to be interviewed in the following manner. The number of interviews to be obtained in each county was determined partly on the basis of the importance of wheat in the county and partly on the volume of wheat produced. The procedure used to select the actual respondents may be described as a compromise between judgment and probability sampling. The interviewer was allowed to select a specific point within a general area as a point of reference. From this point he would proceed a pre-determined distance and then stop at the nearest farm on his right. If no interview could be obtained here, he

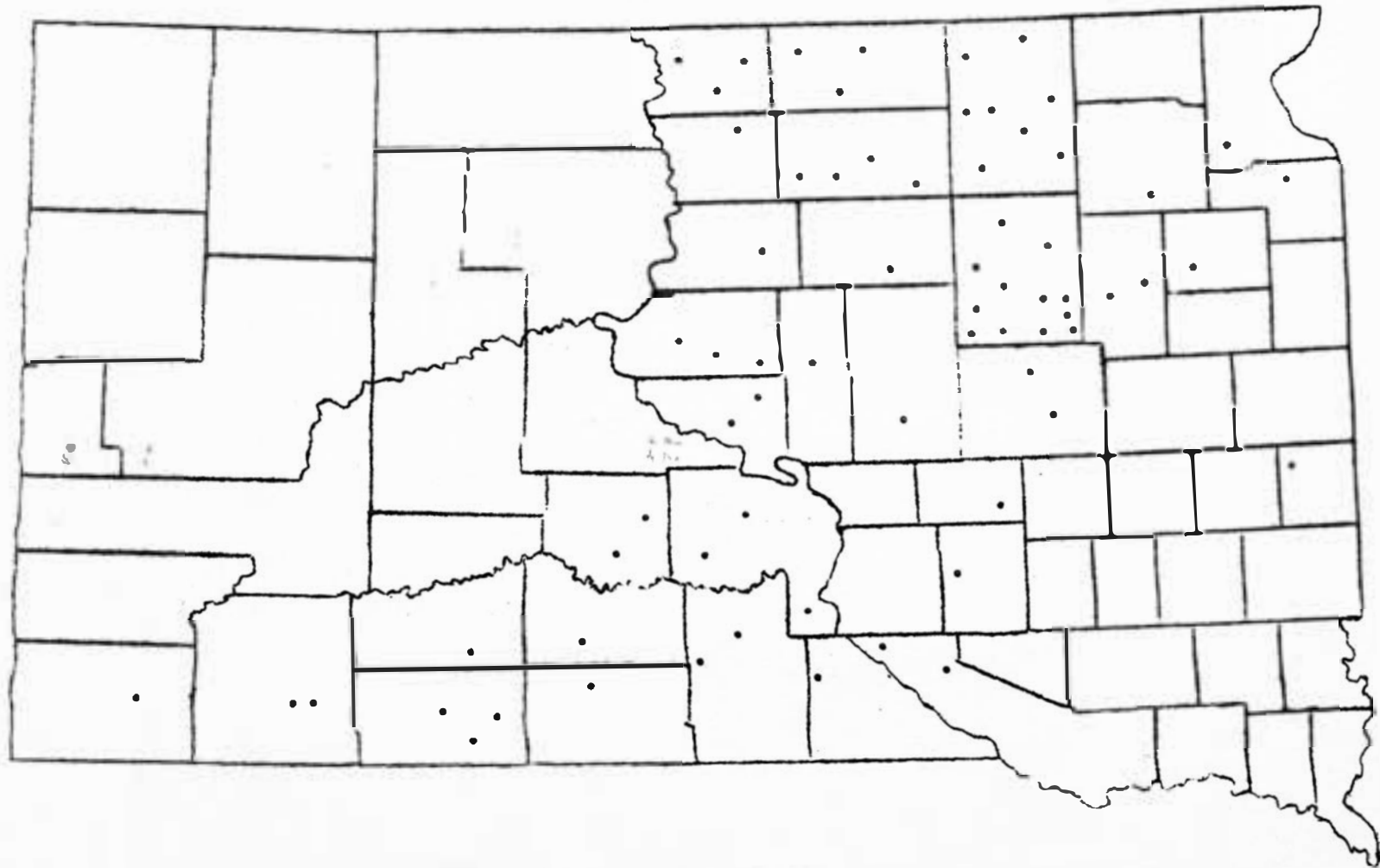


Figure 1. Location of Wheat Producers Interviewed.

was to contact each succeeding farm to the right of his line of travel until an interview was obtained. From there he was to go to another area. In each case, the interviewer had to travel a sufficient distance from the reference point so that the farm selected would not be one of those visible at the time of choosing the reference point. This precaution was taken to preclude introducing a possible bias from selecting only specific types of farms.

The only requirement necessary to qualify as a wheat producer was that the farmer had grown wheat at some time within the period 1953-55.

Unfortunately, the procedure used restricts the degree of confidence which can be placed in general conclusions based on the sample data but the study should provide useful information if the limitations are kept in mind.

#### Scope and Limitations of the Study

It is generally recognised that a study of supply response must be considered in the light of the time dimension. It seems reasonable to assume that, if price is effective at all, the longer the time allowed to effectuate the adjustment the greater will be the response.

Black, in the Marshallian tradition, defines three types of supply curves according to time period as the market curve, the short-run

normal curve, and the long-run normal curve.<sup>3,4</sup> Market curves pertain to: ". . . what the holders of stocks already produced will offer on any given day in the market place."<sup>5</sup> The short-run normal supply is that which producers will produce at a schedule of prices with existing plant and equipment by varying input factors. The long-run normal supply allows, in addition, for changes in plant facilities and equipment.

Heady further distinguishes between short-run and long-run supply functions for the purpose of analyzing agricultural production and resource use. He lists: (1) the intra-year or post-planting supply period where the number of technical units in the form of acres and animal units are fixed but adjustments in output can be made by altering the amount of other resources applied to the fixed units; (2) the inter-year supply period when adjustments can be made in the acreage of specific annual crops or in the numbers of the various types of animals; (3) the multi-year supply period when several years may be allowed for the adjustment and the general level of prices swings

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<sup>3</sup>John D. Black, Introduction to Economics for Agriculture, The Macmillan Company, New York, 1953, p. 236.

<sup>4</sup>The term supply function, supply curve and supply response are used interchangeably in this study as having essentially the same meaning.

<sup>5</sup>Ibid, p. 237.



through the various phases of the business cycle.<sup>6</sup>

It is quite important to bear these distinctions in mind in reading the presentation in the following chapters. The study is primarily concerned with the nature of response in the inter-year supply period for wheat. The choice of the period is consistent with the apparent adjustment period provided for in provisions of the "flexible price supports" Acts. The 1949 Act required the Secretary of Agriculture to announce the level of price support prior to the planting season.<sup>7</sup> From this it may be inferred that adjustments were to be encouraged on the basis of year to year price changes. This would not preclude the same level being maintained from one year to the next but the producer would presumably have no assurance of this at the time of making his production decisions.

Chapter II will present a summary of published research findings, along with a brief description of the research methodology, which bear directly on the nature of the short-run supply response in agriculture. Chapter III will be concerned with analyzing acreage

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<sup>6</sup>Earl O. Heady, Economics of Agricultural Production and Resource Use, Prentice Hall, Inc., New York, 1952, p. 674.

<sup>7</sup>Section 406, 7 U.S.C. 1426, reprinted in U.S.D.A. Agricultural Handbook 79, p. 131.

response data from the survey of South Dakota wheat producers.

Chapter IV will consider certain non-price factors for their possible effect on the producer's response. The summary and conclusions will be presented in Chapter V.

## CHAPTER II

### REVIEW OF LITERATURE

Studies that relate to the nature of the producer's response to price changes are comparatively few in number with no work of this sort having been done in South Dakota.

One of the earliest efforts in this area was reported by Bean in which he used graphic correlation methods to relate changes in harvested acreage of certain commodities to prices received by producers during the first and second season preceding the change.<sup>8</sup> He obtained a high degree of relationship in most cases but cautioned against taking the results as complete explanations of the acreage changes due to the fact that variations in prices are often highly correlated with other factors such as yields, weather conditions, and availability of credit which may also influence the farmer's response. A further qualification is that harvested acreage was used which may not have represented accurately the farmer's intention to produce.

The results of his study indicate that price is a dominant factor, particularly the price of the preceding season, and that there appears to

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<sup>8</sup>L. H. Bean, The Farmer's Response to Price, Journal of Farm Economics, July 1929, pp. 368-85.

be a general type of production response to price but the extent of that response differs by regions and commodities, with some showing a greater response to high prices and others to low prices. He further points out that for each commodity there is, under ordinary conditions, a definite national average price which tends to maintain acreage unchanged from that of the preceding year.

Cox and Quintus in analyzing the changes in acreage devoted to selected crops in Minnesota, found that changes in comparative acre returns tended to induce like changes in crop acreage harvested during the period 1922-31.<sup>9</sup> No attempt was made to determine the degree of relationship.

Kohls and Paarlberg, in a general study of agricultural commodities, analyzed the relationship between wheat acreage planted and changes in prices and other factors by means of correlation analysis.<sup>10</sup> They found that twenty-three percent of the variation in spring seeded acreage could be "explained" in terms of the corrected March price of the planting year. It was necessary to use a measure of changes in the

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<sup>9</sup>R. W. Cox and P. E. Quintus, "Minnesota Farmers' Response to Price Relationships in the Production of Selected Crops," Journal of Farm Economics, October 1932, pp. 697-700.

<sup>10</sup>R. L. Kohls and Don Paarlberg, "The Short-Time Response of Agricultural Production to Price and Other Factors", Station Bulletin 555, Agricultural Experiment Station, Purdue University, 1950.

per acre value for the year of the seeding and for the preceding year before a significant relationship could be obtained for the fall seeded acreage. Twenty-nine percent of the variation in the fall seeded acreage was associated with these factors. They found that a 10 percent increase in the March price of the planting year resulted in a 3.1 percent increase in acreage seeded to spring wheat. Also, in net effect, a 10 percent increase in the average acre value immediately preceding planting resulted in a 1.9 percent increase in fall seeded acreage and a 10 percent increase in acre value of the previous year resulted in a 2.9 percent increase in fall seeded acreage.

In summarizing their results, they state ". . . there was some evidence that farmers as a group do, or intend to, respond to changing relative crop prices from year to year by changing the acreage planted. However, the amount of variation in either intended acreage or harvested acreage was in many instances quite small!"<sup>11</sup>

They conclude that farmers are behaving intelligently and in their own interests by showing only a slight acreage response to year-to-year price changes. A close response of acreage to price from year to year would mean unwise resource allocation because a high

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<sup>11</sup> Ibid., p. 7.

price one year is no indication that the price will be high the next year.<sup>12</sup>

Bowlen also analyzed the relationship between price and wheat acreage planted for the nation as a whole.<sup>13</sup> He used a simple regression model, with lagged adjusted price as the independent variable and acreage planted as the dependent variable, covering the period 1926 to 1952, but excluding 1938 to 1943 inclusive and 1950 because of the production controls in effect. He was unable to discover any significant relationship between prices and acreage planted. He then tried using first differences of planted acreage and first differences of adjusted price ratios for the preceding season, but the results were only slightly better. At this point, he states, "It would be incorrect to conclude that price was not an important consideration in farmers' decision making process, but rather the direction and extent to which farmers respond is influenced by a most diverse set of conditions among areas, among farms within an area and over time."<sup>14</sup> In an attempt to remove some of this diversity, he next restricted the

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<sup>12</sup> Ibid., p. 7.

<sup>13</sup> B. J. Bowlen, "The Wheat Supply Function", Journal of Farm Economics, December 1955, pp. 1177-85.

<sup>14</sup> Ibid., p. 1177.

analysis to wheat production in Kansas, but again the results were not significant. He further subdivided Kansas into three areas but in only one, the 44 eastern counties, was he able to discover a significant relationship and that only after excluding 1937 data from the analysis. The results obtained from the analysis serve to emphasize that the effectiveness of prices in allocating resources may be conditioned by other considerations.

All of the studies reviewed can be considered attempts to determine the short-run supply response of various agricultural commodities. An implicit assumption, in each case, is that the formulation of the price variable is assumed to be the same as that which the producers used in determining acreage plans. This assumption is, of course, necessary in any analysis of time series data to derive statistical relationships.

The present study attempted to avoid this difficulty by reversing the procedure and determining response to a predetermined price. This was done by asking each respondent a series of questions in which specific price relationships were postulated and the acreage response recorded. Analysis of the survey data is the subject of the chapters which follow.

## CHAPTER III

### ANALYSIS OF ACREAGE RESPONSE DATA

This study is concerned with the acreage response of South Dakota wheat producers, in the inter-year supply period, to expected changes in the price of wheat relative to other farm prices. This chapter reports the responses obtained when a segment of the population was interviewed in accordance with the procedure previously outlined.

The data on acreage response were obtained by posing a series of questions, concerning specific price expectations, to each respondent. The series consisted of three questions in which the producer was asked what his wheat acreage would be the following year, if there were no acreage controls, but the price of wheat was expected to be \$1.50 a bushel, \$1.00 a bushel, and \$2.50 a bushel, respectively, with all other farm prices expected to remain about the same as they were then. The responses obtained are presented in the tables which follow.

At the time the survey was conducted, the prevailing price of wheat was approximately \$2.00 a bushel, so the assumed prices represent decreases of about 25 and 50 percent, and an increase of



about 25 percent.<sup>15</sup>

Acreage allotments were in effect, so it was necessary to establish a standard or norm with which other responses could be compared. This norm was taken as the number of acres which the respondent indicated he would have planted for 1955 harvest if he had been free to do so. Out of seventy producers interviewed, only forty-six producers indicated that they would have planted more wheat for harvest in 1955 even if there had been no controls of acreage.

Once the norm for each producer was established, any deviation from this value in response to the succeeding questions could reasonably be considered as the price effect. The value obtained in each case provided the basis for deciding how the producer's answer should be classified. It should be pointed out that, while the answers were obtained as specific acreages, they are reported only in relation to the established norm. It was thought that, in view of the limited time allowed the producer to consider his decision, the answers were reliable as indicators of direction but not necessarily of magnitude of response.

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<sup>15</sup> South Dakota Crop and Livestock Reporting Service, "South Dakota Agriculture, 1956", p. 78.

The responses are also classified as to whether the norm was based on an indicated acreage greater than or equal to the 1955 acreage. These classes are designated as over-allotment or allotment norm, respectively.

The current concern in view of the "economic surplus" is whether a decline in the relative price of wheat can induce a reduction in the acreage planted to wheat. Two of the questions were designed to obtain information that would indicate the way South Dakota wheat producers would respond to specific price declines. Each respondent was asked, "How would your wheat acreage compare with the acreage this year, if there were no controls on production, but you expected wheat prices to drop to about \$1.50 a bushel and all other farm prices were expected to remain about the same as they are now?"

Thirty-five producers, exactly half, reported they would plant the same as their acreage norm. Twenty-seven indicated they would decrease their acreage but one stated he would increase his wheat acreage. One producer would not plant any wheat while five indicated they weren't sure what they would do (table 1). It appears that the tendency to adjust is more pronounced in the over-allotment group.

The respondent was then asked what his acreage would be if the price of wheat was expected to drop to about \$1.00 a bushel, with no controls on production, and other farm prices were expected to

remain about the same. It was thought that a decline of this magnitude would be sufficient to nullify any economic advantage wheat might possess relative to alternative crops.

**Table I. Acreage Response of Producers to an Assumed 25 Percent Decrease in the Price of Wheat With Other Farm Prices Constant.**

Response:	Allotment Norm		Over-Allotment Norm		Combined	
	No.	%	No.	%	No.	%
Would Plant:						
More Acres	1	4.2	-	-	1	1.4
Same Acreage	14	58.2	21	45.7	35	50.0
Fewer Acres	4	16.7	23	50.0	27	38.6
No Wheat	1	4.2	-	-	1	1.4
Don't Know	4	16.7	2	4.3	6	8.6
Total	24	100.0	46	100.0	70	100.0

Nineteen producers said they would still plant the same acreage and twenty-six indicated they would reduce their acreage but still plant some wheat. Twelve producers stated they would not plant any wheat and another twelve were uncertain as to what they would do. One producer, the same one who indicated an increase in response to the previous

question, asserted he would increase his wheat acreage even more (table II).

As before, a greater proportion of those in the over-allotment group indicated a willingness to reduce their acreage in response to the expected price decline. More than one-sixth of the producers were uncertain as to their response and a greater proportion of these was also found in the over-allotment group.

**Table II. Acreage Response of Producers to an Assumed 50 Percent Decrease in the Price of Wheat With Other Farm Prices Constant.**

Response	Allotment Norm		Over-Allotment Norm		Combined	
	No.	%	No.	%	No.	%
Would Plant:						
More Acres	1	4.2	-	-	1	1.4
Same Acreage	10	41.6	9	19.6	19	27.2
Fewer Acres	7	29.2	19	41.3	26	37.2
No Wheat	4	16.7	8	17.4	12	17.1
Don't Know	2	8.3	10	21.7	12	17.1
Total	24	100.0	46	100.0	70	100.0

Since prices are assumed to exert a positive as well as a negative

influence on acreage, answers to a question pertaining to an expected price increase were obtained. Each producer was asked, "How would your wheat acreage compare next year with the acreage this year, if there were no controls on production, but you expected wheat prices to be about \$2.50 a bushel and all other farm prices were expected to remain about the same as they are now?" The replies indicate that producers, though not all answered the same, were more certain of their response. Forty-five producers reported that they would plant the same as their acreage norm, sixteen would increase acreage but nine stated they would decrease acreage in response to the expected price increase (table III). The apparent tendency for the over-allotment group to adjust acreage is still evident. However, the proportion of perverse responses also found in this group, is considerably larger for the positive than for either of the negative price changes.

In general, the responses obtained indicate that South Dakota wheat producers do not respond too readily to expected price changes. Nearly two-thirds of the producers reported they would maintain their norm acreage despite the expected price increase, and half of the respondents gave this answer in response to the expected twenty-five percent decrease. Only in the case of the expected fifty percent decrease was there a marked tendency to reduce acreage.

**Table III. Acreage Response of Producers to an Assumed 25 Percent Increase in the Price of Wheat With Other Farm Prices Constant.**

Response	Allotment Norm		Over-Allotment Norm		Combined	
	No.	%	No.	%	No.	%
Would Plant:						
More Acres	6	25.0	10	21.7	16	22.9
Same Acreage	18	75.0	27	58.7	45	64.3
Fewer Acres	-	-	9	19.6	9	12.8
Total	24	100.0	46	100.0	70	100.0

However, the proportion of those in the allotment group who indicated they would maintain acreage irrespective of price was consistently higher than the corresponding proportion in the over-allotment group.

In view of the more pronounced tendency on the part of the allotment group to maintain acreage, a chi-square test of independence was applied to each set of responses to determine if sampling variation could account for the response variation between norm groups. The results of this analysis do not yield conclusive evidence either for or against the hypothesis of independence.

A significant difference, using the 5 percent probability level,

was indicated in the case of the 25 percent decline but in each of the other cases the analysis did not indicate such a difference. However, in the latter cases, the computed value was close to the significance level and the difference would have been considered significant had the 10 percent level of probability been used. <sup>16</sup>

As a result, it was deemed worthwhile to pursue the analysis of possible group differences with respect to certain characteristics which might influence response, which is the purpose of the next chapter.

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<sup>16</sup> See Appendix A.

## CHAPTER IV

### ANALYSIS OF THE TWO NORM GROUPS FOR POSSIBLE GROUP DIFFERENCES

The purpose of this chapter is to examine the influence of certain factors which may account for the difference in response between the two groups.

A first hypothesis in a survey of this kind is that the response might be influenced by the personality of the interviewer. The two groups were classified by interviewer to test this possibility, but no interviewer bias was indicated (appendix B, table I).

Information was obtained from each producer at the time of interview on such factors as size of operation, tenure status or degree of ownership, proportion of gross farm income from grain production, age of respondent, net income the previous year, and others which might have some bearing on the respondent's attitude. Each of these was studied to discover a possible relationship with the norm response given.

Elliot, in an early article on supply response, points out that the conditions of tenure may influence production response.<sup>17</sup>

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<sup>17</sup> F. F. Elliot, "The Nature and Measurement of the Elasticity of Supply of Farm Products", Journal of Farm Economics, July 1927 p. 294.



Tenants may lack freedom of choice in planning their operation or encumbered owners may lack "working capital". No information on the equity position of the full and part owners or on the tenants' lease arrangements was obtained so the full implications of this hypothesis cannot be tested.

However, it was felt that degree of ownership might be a possible group difference so the two norm groups were classified as to whether they were full owners, part owners but owning 50 percent or more, part owners but owning less than 50 percent, or rented all their land (table IV). When the classifications were tested, the chi-square value obtained was not sufficient to reject the hypothesis of independence. The cross-classification did reveal, however, that a considerably greater proportion of the tenants were in the over-allotment group which indicates that tenant arrangements are such that they are free to adjust acreage in response to expected price changes if they so desire.

The next factor studied was chosen on the basis of Clarke's findings concerning farmers' response to price changes in Central Saskatchewan, Canada. He reported "Sixty-three percent of the farmers made conscious adjustments to price changes in both crop and livestock production. However, 37 percent did not make such adjustment and a bigger proportion of the farmers on small farms were

in this category."<sup>18</sup>

Table IV. Norm Response Groups Classified by Degree of Ownership

Degree of Ownership	Allotment Norm	Over-Allotment Norm
Full Owners	9	15
Part Owners		
Owning 50 Percent or more	10	15
Less than 50 Percent	4	6
Full Renters	1	10
Total	24	46

Computed chi-square 3.778. Chi-square at .05 probability level with 3 degrees of freedom 7.82. Hypothesis of independence not rejected.

Absolute acreage was not considered to be an adequate measure of farm size in South Dakota, so the acreage in each case was first converted to relative terms by dividing by the average size for the

<sup>18</sup> J. W. Clarke, "Farm Practices in Central Saskatchewan", Mimeographed Publication, Regina, no date, p. 31. This study was sponsored by the Dominion Economics Division, Marketing Service, Canada Department of Agriculture, in cooperation with Department of Farm Management, University of Saskatchewan.

county as reported in the 1954 Census of Agriculture. The two norm groups were then classified by relative size of farm and tested for independence but no relationship was found (table V).

**Table V. Norm Response Groups Classified by Relative Size of Farm**

<b>Relative Size</b>	<b>Allotment Norm</b>	<b>Over-Allotment Norm</b>
Less than 75 Percent of Average	11	19
75 to 124 Percent of Average	7	14
125 Percent of Average or Over	6	13
Total	24	46

Computed chi-square 0.113. Chi-square at .05 probability level with 3 degrees of freedom 5.99. Hypothesis of independence not rejected.

The two norm groups were then classified according to the respondent's net farm income the previous year on the assumption that the level of income might be related to the producer's response. The test of independence was applied to the distribution but no significant relationship was indicated at the 5 percent level of probability. However, if the 10 percent level had been the criterion, the results would

have been considered significant. It should be noted that a considerably larger proportion of the respondents in the \$4000 - \$5999 classification were in the over-allotment group (table VI).

**Table VI. Norm Response Groups Classified by Net Farm Income the Preceding Year<sup>a</sup>**

<b>Income Class (dollars)</b>	<b>Allotment Norm</b>	<b>Over-Allotment Norm</b>
0 - 1999	7	9
2000 - 3999	12	15
4000 - 5999	1	13
6000 and over	3	5
<b>Total</b>	<b>23</b>	<b>42</b>

<sup>a</sup>Five producers did not reply to this question.

Computed chi-square 6.524. Chi-square at .05 probability level with 3 degrees of freedom 7.82. Results would be significant at the .10 probability level.

The relatively large chi-square value obtained, even though less than the pre-determined criterion, was sufficient to justify further consideration of the effect of farm income on response. The responses were retabulated, excluding the \$4000 - \$5999 group, but the difference between groups does not appear to be due to this factor. In some cases

exclusion tends to magnify the difference between groups (appendix B, table II).

The possibility that the response to the acreage norm question may have reflected more what the producer wished he had done that year rather than what he would have done was the next consideration. A means to test this possibility was devised by expressing the producer's yield in relation to the 1955 average for his county on the assumption that if his yield was especially high that year he might wish he had planted more acres. Again the distribution was tested for independence but no relationship was indicated (table VII).

Table VII. Norm Response Groups Classified by Percentage Producer's 1955 Wheat Yield Was of Average Yield For the County<sup>a</sup>

Percentage	Allotment Norm	Over-Allotment Norm
Less than 75 Percent	1	6
75 to 124 Percent	16	21
125 Percent and Over	7	17
Total	24	44

<sup>a</sup> Two producers did not reply to this question.

Computed chi-square 2.804. Chi-square at .05 probability level with 2 degrees of freedom 5.99. Hypothesis of independence not rejected.

It was felt that the difference in response of the two groups might be related to the relative importance of the grain enterprise to the producer as indicated by the proportion of gross farm income derived from grain production. The sixty-eight producers were divided into three classes on the basis of whether more than half, approximately half, or less than half of their gross farm income in 1954 was obtained from grain. These, in turn, were cross-classified by norm response group and tested for independence (table VIII). The chi-square test indicated no relationship, or stated another way, that the classifications appeared independent of each other.

Table VIII. Norm Response Groups Classified by the Proportion of the Producer's 1954 Gross Farm Income From Grain Production<sup>a</sup>

Proportion of Gross Farm Income	Allotment Norm	Over-Allotment Norm
More than half	5	14
Approximately half	5	11
Less than half	13	20
Total	23	45

<sup>a</sup> Two producers did not reply to this question.

Computed chi-square 0.944. Chi-square at .05 probability level with 2 degrees of freedom 5.99. Hypothesis of independence not rejected.

Information relating to the crop the producer considered the most profitable and the one he considered least profitable was obtained at the time of interview. It was thought that the ranking of wheat in the producer's mind might affect his response so the norm response groups were classified on the basis of whether the producer considered wheat the most profitable, least profitable, or was not mentioned in response to the question. Chi-square analysis was applied but the results indicate that this consideration did not affect the producer's response (table IX).

Table IX. Norm Response Groups Classified by Relative Profitability of Wheat.

Ranking of Wheat	Allotment Norm	Over-Allotment Norm
Wheat Most Profitable	13	31
Wheat Least Profitable	3	2
Wheat Not Mentioned	8	13
Total	24	46

Computed chi-square 2.086. Chi-square at .05 probability level with 2 degrees of freedom 5.99. Hypothesis of independence not rejected.

The age of the respondent was taken into consideration as possibly

affecting response on the assumption that the younger producers might be more inclined to change than those whose pattern of production was more established. However, this assumption was not borne out by the results of the tabulation. The agreement between actual and theoretical frequencies was as close as could be expected, resulting in a negligible chi-square value far short of the significance level (table X).

Table X. Norm Response Groups Classified by Age of Respondent

Age (in years)	Allotment Norm	Over-Allotment Norm
20 - 39	6	11
40 - 49	14	26
60 and over	4	4
Total	24	46

Computed chi-square 0.106. Chi-square at .05 probability level with 2 degrees of freedom 5.99. Hypothesis of independence not rejected.

A final classification was made on the basis of crop reporting districts (though in some cases districts were combined because of the relatively small number of respondents in a district.) The results of the chi-square analysis indicate that the norm response is independent of the location or crop reporting district of the producer (table XI).



**Table XI. Norm Response Groups Classified by Crop Reporting District.**

<b>Crop Reporting Districts</b>	<b>Allotment Norm</b>	<b>Over-Allotment Norm</b>
District 2	13	20
Districts 3 and 6	3	4
District 5	2	10
Districts 7, 8 and 9	6	12
<b>Total</b>	<b>24</b>	<b>46</b>

Computed chi-square 2.267. Chi-square at .05 probability level with 3 degrees of freedom 7.82. Hypothesis of independence not rejected.

The results of the preceding analysis seem to indicate that the reason for the difference in the acreage norms given is not related to any identified characteristic of the group. It may be that the response is an indication that the producer has already made adjustments in his farm plans to allow for acreage allotments and is unwilling, if not unable, to shift again.

## CHAPTER V

### SUMMARY AND CONCLUSIONS

Prices have long been considered to be an important factor influencing agricultural production. This study is concerned with the acreage response of South Dakota wheat producers, in the inter-year supply period, to expected changes in the price of wheat relative to other farm prices.

The data were obtained from seventy South Dakota wheat producers interviewed in the fall and winter of 1955. Each respondent was asked a series of three questions concerning what his wheat acreage would be the following year, if there were no acreage controls, but the price of wheat was expected to be \$1.50 a bushel, \$1.00 a bushel, and \$2.50 a bushel, respectively, with all other farm prices expected to remain about the same as they were then. These prices represented approximately 25 and 50 percent decreases and a 25 percent increase.

Acreage controls were in effect at the time so it was necessary to establish a norm or standard for each producer in order to isolate the response to the expected price from the effect of removing acreage controls. This norm was established on the basis of the producer's estimate of his 1955 acreage had he been free of acreage controls.

Forty-six producers, nearly two-thirds, would have planted more wheat in 1955 had they been free to do so but the other twenty-four indicated they would not have increased their acreage.

In general, the responses obtained indicate that South Dakota wheat producers do not adjust too readily to expected price changes. Nearly two-thirds of the producers reported they would plant the same as their estimated 1955 acreage the following year despite the expected price increase, and half the respondents gave this answer in response to the expected twenty-five percent decrease. Only in the case of the expected fifty percent decrease was there a larger percentage of producers who would make acreage adjustments than would maintain acreage.

Though not all producers would adjust acreage, the response to the price changes indicates that changes in expected price can induce acreage adjustments. Twenty-three percent of the producers would have increased acreage in response to the expected twenty-five percent increase. The response seemed to be more certain in this case than for the expected price decreases.

Twenty-eight producers would have decreased acreage in response to the expected twenty-five percent price decline and one of these stated he would grow no wheat. However, thirty-eight producers would have decreased acreage in response to the expected fifty percent

decline with twelve of these indicating they would not plant any wheat.

The view is sometimes expressed that producers will increase acreage in response to a decrease in price. Apparently this perverse response is not typical of South Dakota wheat producers as only one respondent stated he would increase his acreage if the price of wheat declined. The converse, that producers will decrease acreage if the price of wheat increases, appears to have more support as nine producers, about 13 percent, reported they would plant fewer acres in response to the expected price increase. However, a vast majority of the producers would either maintain acreage or adjust acreage in the direction of the price change.

There was some evidence that those producers who would not have increased their 1955 acreage had they been free to do so, were less "price responsive" than the other group. Such factors as tenure status or degree of ownership, size of operation, net farm income the preceding year, proportion of gross farm income from grain production, age of respondent, and others, which were obtained at the time of interview, were analyzed to discover possible relationships with the producer's response to the norm acreage question.

However, the analysis failed to indicate any significant relationships which might help to explain the difference in response.

The principal conclusion of this study is that changes in the

relative price of wheat can induce acreage adjustments in South Dakota. The response is limited when the price expectations are on a year-to-year basis but it seems reasonable to expect that if the price change is expected or certain to extend for more than one year the degree of response will increase. It is not to be expected that every producer will respond to the same degree due to differences between farms both in physical and organizational characteristics.

Research is needed to determine the reasons why some producers appear more willing to adjust than others and a more complete set of price expectations must be considered if the information is to be adapted for predictive purposes.

This study would not be complete without at least a brief consideration of the research technique used. The principal advantage of this technique is that there is no uncertainty surrounding the "responsible price" which is a limitation of the statistical approach. This method seems to be one which can be used to approximate controlled experimentation in the area of supply response. In view of the diversity of government programs involving agriculture, it is thought that a refinement of this technique will provide the most suitable means of obtaining current price response information.

The technique is subject to some limitations which must be considered in any further application and means should be devised to improve

upon the methodology. The principal limitation is the requirement for the producer to make a decision in a relatively short period of time. It seems unrealistic to assume that producers make production decisions on the spur of the moment. For this reason, only the direction, not magnitude, of response was considered. A second difficulty is in getting the respondent to consider the price in relative terms when past experience with prices has shown a tendency for prices to move together.

There are at least two sources of bias in a survey of attitudes or opinions which, though not measurable, must be considered. First, the way the respondent feels the results are to be used may influence the way in which he responds. Second, a producer's response to a hypothetical situation may be different than the response to an actual situation.

In spite of these limitations, it is considered that with suitable refinement the technique has merit as a means of obtaining information on price-supply relationships.

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**APPENDIX A**

**Table I. Acreage Response of Producers to an Assumed 25 Percent Decrease in the Price of Wheat With Other Farm Prices Constant**

<b>Response<sup>a</sup></b>	<b>Allotment Norm</b>		<b>Over-Allotment Norm</b>	
	<b>Observed Frequency</b>	<b>Expected Frequency</b>	<b>Observed Frequency</b>	<b>Expected Frequency</b>
<b>Would Plant:</b>				
<b>Same Acreage</b>	14	(11.7)	21	(23.3)
<b>Fewer Acres</b>	5	( 9.3)	23	(18.7)
<b>Don't Know</b>	4	( 2.0)	2	( 4.0)
<b>Total</b>	23	(23.0)	46	(46.0)

<sup>a</sup> The More Acres category was excluded because only one producer gave this response and it was thought that the extremely small theoretical frequencies would excessively inflate the computed chi-square and decrease the validity of the test. Fewer Acres and No Wheat classes were combined for the same reason.

Computed chi-square 6.66 and chi-square at .05 probability level with 2 degrees of freedom is 5.99. Therefore, the hypothesis of independence is rejected.

**Table II. Acreage Response of Producers to an Assumed 50 Percent Decrease in the Price of Wheat With Other Farm Prices Constant**

Response <sup>a</sup>	Allotment Norm		Over-Allotment Norm	
	Observed Frequency	Expected Frequency	Observed Frequency	Expected Frequency
<b>Would Plant:</b>				
Same Acreage	10	( 6.3)	9	(12.7)
Fewer Acres	11	(12.7)	27	(25.3)
Don't Know	2	( 4.0)	10	( 8.0)
Total	23	(23.0)	46	(46.0)

<sup>a</sup> The More Acres category was excluded because only one producer gave this response and it was thought that the extremely small theoretical frequencies would excessively inflate the computed chi-square and decrease the validity of the test. Fewer Acres and No Wheat classes were also combined.

Computed chi-square 5.09 and chi-square .05 probability level with 2 degrees of freedom 5.99. Therefore, hypothesis of independence accepted.

**Table III. Acreage Response of Producers to an Assumed 25 Percent Increase in the Price of Wheat With Other Farm Prices Constant**

Response	Allotment Norm		Over-Allotment Norm	
	Observed Frequency	Expected Frequency	Observed Frequency	Expected Frequency
<b>Would Plant:</b>				
More Acres	6	( 5.5)	10	(10.5)
Same Acreage	18	(15.4)	27	(29.6)
Fewer Acres	-	( 3.1)	9	( 5.9)
Total	24	(24.0)	46	(46.0)

Computed chi-square 5.46 and chi-square at .05 probability level with 2 degrees of freedom 5.99. Therefore, hypothesis of independence is not rejected.

**APPENDIX B**

**Table I. Norm Response Groups Classified by Interviewer**

<b>Interviewer</b>	<b>Allotment Norm</b>	<b>Over-Allotment Norm</b>
1	6	13
2	13	23
3	1	5
4	4	5
<b>Total</b>	<b>24</b>	<b>46</b>

Computed chi-square value 1.408. Chi-square value at .05 probability level with 3 degrees of freedom 7.82. Hypothesis of independence not rejected.

**Table II. Acreage Response of Producers to Specified Percentage Changes in the Price of Wheat When the \$4000 - \$5999 Net Income Group is Excluded**

Response	Allotment Norm		Over-Allotment Norm		Total
	No.	%	No.	%	
<b>Response to Assumed 25 Percent Increase</b>					
<b>Would Plant:</b>					
More Acres	6	26.1	8	24.2	14
Same Acreage	17	73.9	17	51.5	34
Fewer Acres	-	-	8	24.2	8
Total	23	100.0	33	99.9	56
<b>Response to Assumed 25 Percent Decrease</b>					
<b>Would Plant:</b>					
More Acres	1	4.3	-	-	1
Same Acreage	13	56.5	15	45.5	28
Fewer Acres	4	17.4	17	51.5	21
No Wheat	1	4.3	-	-	1
Don't Know	4	17.4	1	3.0	5
Total	23	99.9	33	100.0	56
<b>Response to Assumed 50 Percent Decrease</b>					
<b>Would Plant:</b>					
More Acres	1	4.3	-	-	1
Same Acreage	9	39.1	5	15.2	14
Fewer Acres	7	30.4	14	42.4	21
No Wheat	4	17.4	6	18.2	10
Don't Know	2	8.7	8	24.2	10
Total	23	99.9	33	100.0	56