



The use and effectiveness of financial and physical reserves in Montana's dryland wheat area  
by Howard W Hjort

A THESIS Submitted, to the Graduate Faculty in partial fulfillment of the requirements for the degree  
of Master of Science in Agricultural Economics  
Montana State University  
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**Abstract:**

The research problem was to test whether financial and physical reserves could be used by the dryland farmer to better adapt his farm organization and operations to the highly variable conditions encountered in dryland grain farming. When and if they could be so used, the problem was to determine the effectiveness of these reserves.

Reserves were defined as that part of the assets and/or earnings of a farm unit purposefully retained and managed in cash or in a less liquid form, as a provision for meeting current and future demands of the firm and household.

To test whether reserves could be used by the farmer, yield series of 14 to 24 years were constructed for 67 tracts of state-owned cropland located in the Judith Basin and Sheridan and Roosevelt counties.

An analysis of these yield series determined the liquid reserves that would be required to cover the non-deferrable expenses of the firm and household in both the short run and over time. These requirements ranged from \$472 to \$35,550 in the northeast area, from \$0 to \$41,061 in the other area. The average requirements in these respective areas were \$6,301 and \$7,060 when the four series with either extremely low average yields or high yield variability were excluded.

To determine the effectiveness of reserves, the amount of income above yearly non-deferrable expenses was isolated for three farm units in each study area. The farm unit in each area representing the low yield group was unable to accumulate the surplus net cash income necessary for long run survival. For the remaining four farm units the surplus income was used to replace depreciable items and invested to accumulate capital. The surplus that was invested demonstrated the effectiveness of reserves of a somewhat less liquid form.

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by  
HOWARD W. HJORT

A THESIS

Submitted to the Graduate Faculty  
in  
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for the degree of  
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at  
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The responsibility for errors is my own.

## ABSTRACT

The research problem was to test whether financial and physical reserves could be used by the dryland farmer to better adapt his farm organization and operations to the highly variable conditions encountered in dryland grain farming. When and if they could be so used, the problem was to determine the effectiveness of these reserves.

Reserves were defined as that part of the assets and/or earnings of a farm unit purposefully retained and managed in cash or in a less liquid form, as a provision for meeting current and future demands of the firm and household.

To test whether reserves could be used by the farmer, yield series of 14 to 24 years were constructed for 67 tracts of state-owned cropland located in the Judith Basin and Sheridan and Roosevelt counties. An analysis of these yield series determined the liquid reserves that would be required to cover the non-deferrable expenses of the firm and household in both the short run and over time. These requirements ranged from \$472 to \$35,550 in the northeast area, from \$0 to \$41,061 in the other area. The average requirements in these respective areas were \$6,301 and \$7,060 when the four series with either extremely low average yields or high yield variability were excluded.

To determine the effectiveness of reserves, the amount of income above yearly non-deferrable expenses was isolated for three farm units in each study area. The farm unit in each area representing the low yield group was unable to accumulate the surplus net cash income necessary for long run survival. For the remaining four farm units the surplus income was used to replace depreciable items and invested to accumulate capital. The surplus that was invested demonstrated the effectiveness of reserves of a somewhat less liquid form.

## CHAPTER I

### INTRODUCTION

#### The Problem Situation

Variations in production caused by the weather, insects, and diseases, together with extreme price fluctuations, introduce elements of risks and uncertainties into the business of agriculture. Heady speaks of risk and uncertainty in the following manner:

Risk refers to variability or outcomes which are measurable in an empirical or quantitative manner. Uncertainty refers to future events where the parameters of the probability distribution cannot be determined empirically. Anticipations of the future can be formed but there is no way that the entrepreneur or administrator can assemble enough homogeneous observations to predict the relevant probability distribution. Risk is insurable in an actuarial sense; uncertainty is not. 1/

Therefore, action may be taken by the individual to shift risk while he must live with uncertainty.

#### The Agricultural Industry

There are two principal variables that cause risk and uncertainty in the agricultural industry. They are price and output.

The individual that depends upon the open market for the sale of his produce is forced to live with the price uncertainties that are characteristic of that industry. When price is free to fluctuate, the uncertainty associated with this variable is common to all producers operating within the industry, regardless of geographic location. When

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1/ Earl O. Heady, Economics of Agricultural Production and Resource Use, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1952, pp. 440, 443.

price is fixed for some specific time period price uncertainty is non-existent during that period of time.

Price as a variable may be considered as being internal to the industry but external to the firm. The individual has no control over price variability but at the industry level action can and has been taken to control prices. Legislative price supports are examples of this form of stabilizing action. When legislative action determines the product price no price risk or uncertainty is present for the individual or the industry, at least in the short run.

A basic assumption in this study is that price is a constant, thereby eliminating one of the two variables from further consideration. Indications are that legislative action will continue to control or support the price of food and feed grains. It is true that the price level may vary over time even with, or as the result of, legislative action. However, regardless of the level, the minimum base price will be determined each year prior to the time that management must determine the short run use of resources and price uncertainty is confined to relatively narrow limits. Even when prices are not fixed or supported, price uncertainty is common to all production areas, so the high risk and uncertainty peculiar to the Great Plains is attributable to uncertainty in output.

Therefore, output remains as the basic problem in this study. The amounts of land and labor available to the firm will be determined prior to analysis -- they will become fixed resources. The other two

resources, management and capital, will be variants -- management will vary with respect to capital and income. The operator will manage his fixed resources to utilize capital in a manner consistent with his goals -- those that are postulated as realistic goals of individual farmers.

Other inputs or factors that determine output can be classified as being internal or external to the firm. No claim to inclusiveness is made and some inputs will be both internal and external.

Internal inputs can be directly controlled by management. Examples of internal inputs are: (1) grain treating materials, (2) weed control materials, (3) fertilizers, (4) crop and building insurance, and (5) credit.

External inputs cannot be directly controlled by management. Examples are: (1) wind, (2) temperature, (3) moisture, (4) hail, (5) freeze, (6) flood, (7) insects, and (8) plant diseases.

External inputs are the major causes of the risks and uncertainties associated with output. Internal inputs can be utilized to reduce the effects of external inputs by management. Management of capital and income becomes a problem of managing the internal inputs, in an attempt to reduce the adverse effects of the external inputs. This is a problem of the individual and the industry that requires additional research.

Private and public institutions have been created to minimize the effects of external inputs. Crop insurance can be used by management to shift risk. Hail insurance can be purchased for any coverage level management desires. All-risk crop insurance provides coverage of the

cash expense associated with crop production. Nevertheless, to shift these risks or to assume them becomes a management decision.

### Dryland Agriculture in the Great Plains Region

The Great Plains Region has been recognized as an area where variations in production are highly erratic. 2/ Variable production produces extreme variation in the individual farmer's income. In the dryland agricultural areas of the Plains the external factors cause problems of greater concern than are found in other major dryland agricultural areas. In fact, variability characterizes dryland agriculture in the Plains Region. Consequent extreme variations in the fortune of the individual farmer is a typical expectation for the Plains agriculturalist.

The reputation of the region arises not from extreme variation from year-to-year alone but because variation occurs in an unpredictable manner. The individual is concerned with year-to-year variation in yield and with yield differences for the same year. 3/ Those concerned with these variations include as a sub-class of year-to-year variation years

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2/ E.g., see works of Carl F. Kraenzel, Rural Sociologist, Montana State College; Rainer Schickele, Agricultural Economist, formerly at North Dakota Agricultural College; E. Lloyd Barber, Agricultural Economist, formerly of the Bureau of Agricultural Economics, USDA; Phil Thair, Agricultural Economist, formerly of the Bureau of Agricultural Economics, USDA, stationed at the North Dakota Agricultural College; and Earl O. Heady, Agricultural Economist at Iowa State College.

3/ Yields will vary from year to year for the farm as a whole, but also yield differs from one part of the farm to the next in the same year.

of low, mean, or high yields that tend to group.<sup>4/</sup> There are indications of this in series of yields specific to individual tracts of land such as that shown in Figure 1. In this yield series, the mean yield is 14.5 bushels per seeded acre; the standard deviation is approximately 6.44 bushels. The coefficient of variation is 44.4 percent. This tract of land is located in Judith Basin county and is owned by the State of Montana.

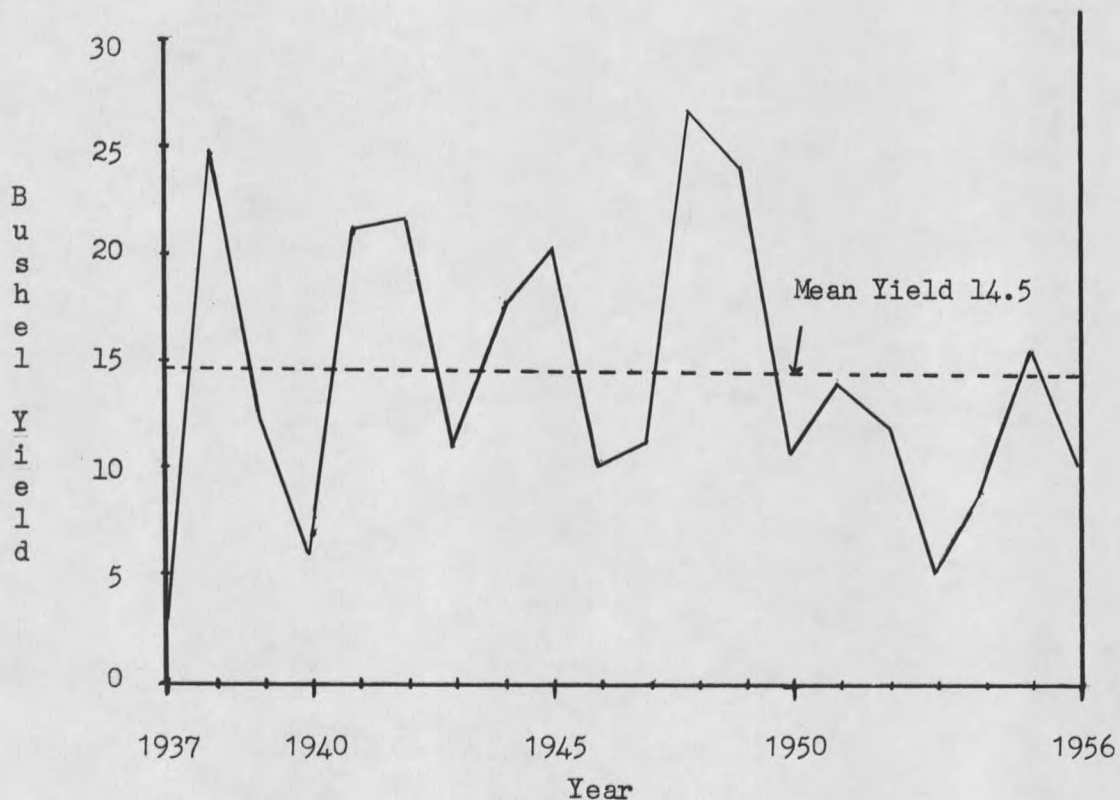


Figure 1. Twenty-year Yield Series on State-owned Cropland Located in Judith Basin County (R-12, T-17, S-34) Montana.

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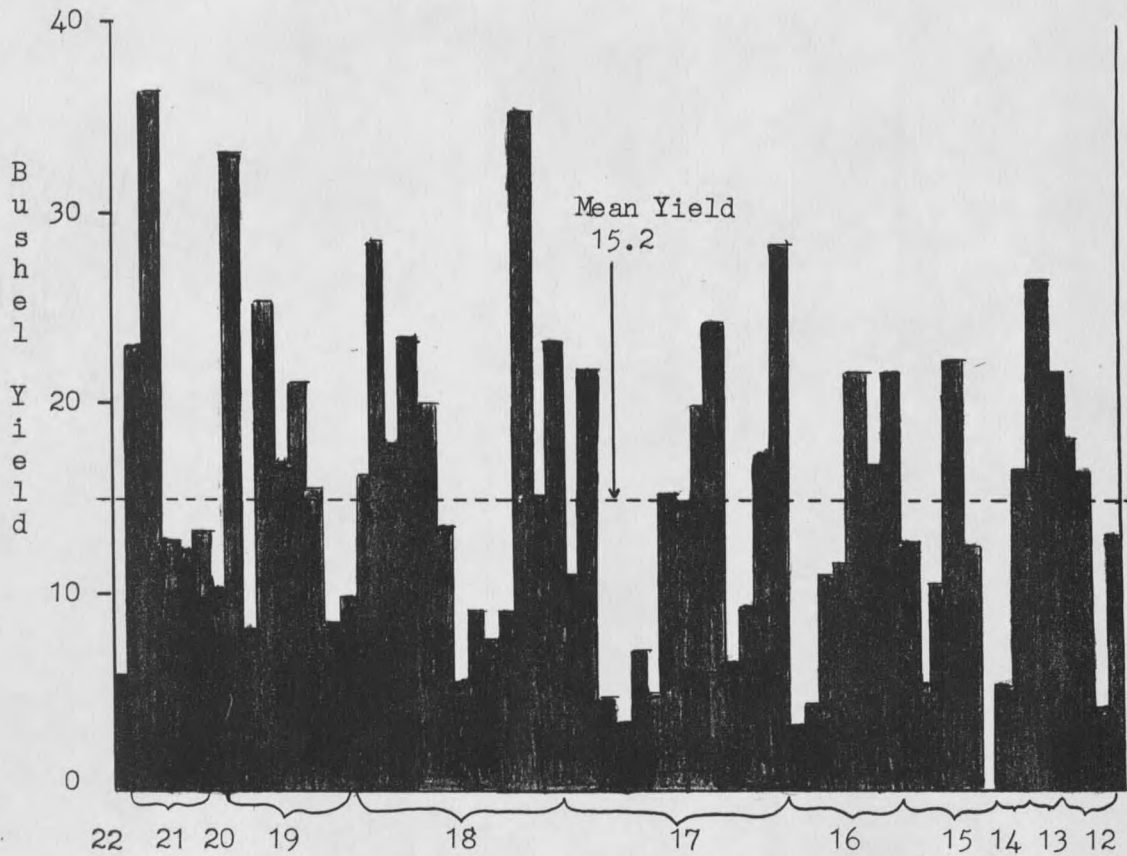
<sup>4/</sup> The statistical tools used to determine bunchiness do not confirm that this is so. This may be because (1) the lack of a suitable statistical device, (2) the lack of adequate time series data, or (3) bunchiness does not exist which is contrary to what we see in visual inspection of existing time series.

Figure 2 presents yields as reported in 1945 by operators of 63 different tracts of state-owned cropland in Judith Basin and Fergus counties. It is evident that within any one year pronounced differences in yields are the rule rather than the exception in this dryland crop area. For the 63 yield observations, the mean yield is 15.2 bushels per seeded acre, the standard deviation 8.28 bushels; therefore, the coefficient of variation is 54.5 percent. The yields on a seeded acre basis range from 0 to 36.6 bushels. Extreme variation in yield of either of these types cause the external factors to be classed as uncertainties rather than risks, as it becomes impossible for the individual farmer to pass them on to someone else.

Numerous economic studies have been made in various parts of the Great Plains to explore these risk and uncertainty aspects of dryland agriculture. 5/ Indications are that intelligent use of reserves will promote income stability for the individual and the industry. It seems that capital and income are recognized as factors that can be managed through the use of reserves. This recognition gives rise to the specific research problem to be studied.

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5/ Especially by Schickele, Barber, Thair, and Baldur Kristjanson, Agricultural Economists formerly of the North Dakota Agricultural College.



Yield Observations and Townships of Observations

Figure 2. Yields Per Seeded Acre as Reported for 63 State-owned Tracts of Cropland Located in Judith Basin and Fergus Counties, Montana, 1945.

The Research Problem

The problem of this research effort is to test whether financial and physical reserves can be used by the dryland farmer in the Great Plains Region, and if so, to measure how effective they, together with other management techniques, are in reducing the adverse effects of the external factors.

Reserves will be defined as that part of the assets and/or earnings of a farm purposefully retained and managed in cash or in a less liquid form, as a provision for meeting the current and future demands of the firm and the household. As such, reserves will be of two major categories: (1) financial and (2) physical.

Reserves will be looked upon as forms of capital. The quantity of reserves will fluctuate in use and will be controlled by annual variations in the income stream and the way it is managed as it enters the business. It is recognized that some farmers may have ample capital beyond that invested in the farm unit that, if retained in sufficiently liquid form, they could operate without other reserves. <sup>6/</sup> However, returns from such capital committed semi-permanently may be great enough to draw it off and justify use of a reserve program appropriate to a situation without surplus capital.

Financial reserves include: (1) cash bank accounts, (2) life insurance annuities, (3) federal, municipal, and corporate bonds, (4) common stocks, and (5) other forms of securities.

Examples of physical reserves are: (1) food or feed grain stored, (2) machinery and equipment, (3) farm land, and (4) off-farm real property.

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<sup>6/</sup> The farm unit consists of the producing and consuming portions of the farm, and is therefore considered a complete economic unit. This term will be used throughout this report and incorporates the firm and the household.

The Individual Farmer and His Goals

The farmer's planning and action are governed by the set of resources at his command, by known techniques, by his knowledge and appraisal of weather and other hazards, and price expectations. His decisions are made within the established set of institutions, both public and private, with which he does business and carries on many of the activities of his daily living.

The institutional framework and individual institutions may or may not be adapted to the environment of the Great Plains. In fact, they may be in conflict with the goals of the farm unit. A comprehensive economic analysis of resource use requires transcending institutional boundaries in an attempt to locate and define the conditions necessary to help the farm unit achieve its goals.

It is assumed that the goals of the farm unit are survival over time and capital accumulation over time. The household must survive; this is a prerequisite to the firm's survival. The management problem is to organize and manage the household and firm, and to conduct the business affairs in a manner that will attain these goals. The extent to which these goals are realized is a measure of economic success.

As the farm unit attempts to establish itself as a business, the first goal is survival. At some further stage of development the major goal becomes capital accumulation. The goals change when the manager decides that survival is assured. The changing of goals is expected to

influence the way reserves are used and almost by definition the quantity and forms of reserves that are available.

The optimum use of reserves by any farm unit may require financial reserves alone, physical reserves alone, or some combination of both. Optimum use of reserves will occur when the farm unit uses the reserves available in the manner most consistent with the limited resources under its command and by this use they will be consistent with the objectives or goals. The form of tenure, the fixed resources of land and labor, and the institutional framework within which the manager makes his decisions will have an effect on the optimum use of resources. This optimum will be guided by the goals as previously postulated.

#### The Present Situation

Present knowledge of the use and effects of reserves, as defined, is not adequate to reject or substantiate existing beliefs of farmers, researchers, and other individuals concerned. An economic analysis of this problem will result in information of value to the individual farmer, the Extension Service, Agriculture Experiment Stations, Department and other Federal Officials and others concerned with Northern Great Plains agriculture and rural welfare.

#### Objectives

The major objective is to develop economic information concerning reserves and their use that will help the farm operator in Montana and in similar areas, to better adapt his farm organization and operations to the highly variable conditions encountered in dryland grain farming.

Specific objectives are to:

1. Measure the effect of reserves on dryland farm organization, management, and overall economic success.
2. Demonstrate the effectiveness of organizational and management adjustments the farm unit can make by using reserves.

#### Hypotheses

Within the uncertain income situations characteristic of farming in the Northern Great Plains Region, the farm unit can use financial and physical reserves to alleviate the problems of management, capital, and income in the efforts to attain the objectives.

Specific hypotheses are:

1. The individual who intelligently manages reserves will attain economic success before the individual who does not utilize reserves.
2. For each organizational and operational farm business there will be a reserve use pattern that is optimum. Of the different organizational and operational plans available to the individual one will show an absolute advantage over the others.

#### Procedure and Assumptions

This research is a phase of a major research project currently being conducted by the Farm Economics Research Division. 7/ The basic data accumulated for the major project will provide much of the basic information needed.

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7/ Study in progress, Effects of Weather on Economy of Dryland Farms, conducted by Don M. Bostwick, Agricultural Economist, Farm Economics Research Division, Agricultural Research Service, United States Department of Agriculture.

### Study Area

The geographic study area is, in general, the dryland winter and spring wheat areas of Montana's portion of the Great Plains. It is hoped that the results of this study will be applicable to similar dryland areas of the Northern Great Plains.

Specifically, portions of Fergus, Judith Basin, Sheridan, and Roosevelt counties were selected for study. The underlying assumption in this selection is that these counties are representative of the two major wheat producing areas in Montana. The first two represent the winter wheat area, the latter two the spring wheat area. These study areas are shown on the following map presented as Figure 3.

### The Specific Farm Unit

It is a necessary requirement that the farm unit be of adequate size to return, at a level of management commonly practiced in the area, income sufficient to meet its goals. There must be sufficient income over time to provide a level of living the family will accept, cover cash expenses, and meet overhead costs -- these are characteristics of a farm unit that will survive. Also over time, there must be some surplus for reinvestment, for capital accumulation as the second goal is expressed above. In the short run, capital must be adequate to meet minimum and non-deferrable living costs and cash operating costs. If these costs are not covered, reserves cannot be utilized effectively, if at all.

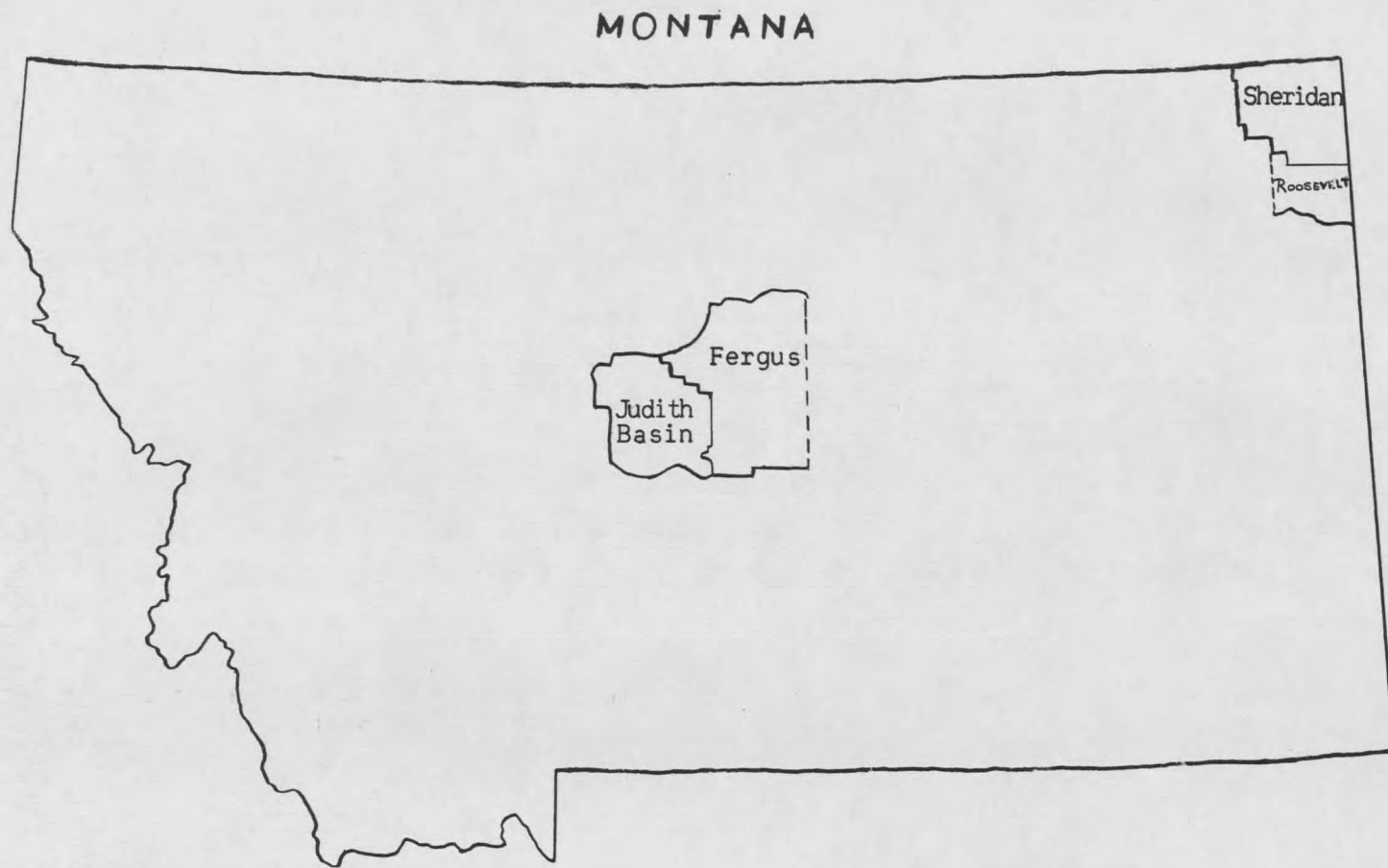


Figure 3. Counties in Montana Selected as Representative of Dryland Winter and Spring Wheat Production.

Yield series over time will be constructed from state lease data that records yield experience specific to tracts of cropland within the selected four counties. These yield series will describe yield variability and differences. Budgets will be constructed that compare the farm units income as it varies due to variation in yield. Also, different opportunities with respect to the management of this farm income will be budgeted.

These budgets will be based on the following assumptions: the farm unit will consist of a family of four people that rents 1,700 acres of farm land; the family owns the machinery, equipment, and the buildings necessary for an operation of this size; family labor is adequate for all major farm operations except planting and harvesting; hired labor used during planting will be treated as a fixed cost while the amount of hired labor utilized during harvesting operations is considered a function of the acreage harvested.

Cost data are available from a project being conducted by the Farm Economics Research Division. 8/ These data are based on 1958 prices. All costs associated with the production from this farm unit will be treated as constants with the exception of the hired labor mentioned above and direct harvesting and grain storage costs. 9/

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8/ Study in progress, Supply Response of Wheat on Dryland Crop Farms in Montana, conducted by LeRoy C. Rude, Agricultural Economist, Farm Economics Research Division, Agricultural Research Service, United States Department of Agriculture.

9/ Direct harvesting costs include operating costs of the combine, the operating cost of the vehicles used to haul the grain, and the grain handling costs.

Of the 1,700 acres rented, 1,640 are tillable. These 1,640 acres are used for summerfallow and crop, 820 acres of each every year. The farm unit is operated under regulations imposed by the current farm program, and as such, has a wheat base of 820 acres. This is reduced 30 percent for compliance with the acreage allotment program. The only saleable crops produced for income are wheat and barley, and both are considered cash crops. Each year there are 574 acres seeded to wheat and 246 seeded acres of barley. 10/ The landowner's share of the crop is one fourth in the spring wheat area, one third in the winter wheat area.

The product prices are based on projections by the Agricultural Research Service and the Agricultural Marketing Service. 11/ As previously indicated, these prices will be treated as constants.

#### The Plan of the Following Chapters

The completion of this study requires four stages of development. Yield variability will be described in Chapter II by an analysis of state lease records that identify and record yield experience over time. The variation in the yield series constructed from these data will provide means for testing and classifying reserves. The amount of

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10/ The wheat base (820 acres) times 70 percent equals the wheat acreage. The wheat base less the wheat acreage equals the barley acreage.

11/ United States Department of Agriculture, Agricultural Price and Cost Projections, Washington, D. C., September, 1957, pp. 10 and 14.

reserves, in dollar terms, necessary for short-run survival will be calculated for each yield series in the two areas.

In Chapter III all possible yield combinations below short-run survival will be converted to dollar terms and tested for one, two, and three-year time periods. This will provide information that will be useful in determining the dollar amounts of reserves needed for short-run survival.

Chapter IV will be concerned with reserves required for survival over time, the primary goal, and also with reserves available to the farm unit for capital accumulation, the secondary goal. Reserve requirements over time will be determined. Any surplus income will be invested for the purpose of capital accumulation and various investments will be compared.

The final chapter, Chapter V, will be concerned with the summary and conclusions of the study.

## CHAPTER II

### YIELD VARIABILITY.

#### Introduction

It is a necessary condition for research concerning reserves that yield variability be described as close to reality as possible. It is necessary because no two farms are identical in terms of output; therefore, the amounts of capital available over time or on a year-to-year basis will be different for each farm unit. As yearly income varies the amount available for reserve use varies -- they can be considered the same concept from opposing viewpoints. Also, decisions concerning the use of reserves are managerial decisions specific to only one farm unit.

To describe yield variability adequately, yield data must be specific to one tract of land (or farm) over time. This requires data that can be so identified. This is in contrast to data that represent the average of groups of farms, such as an entire county. The average of the group is less variable and hence, does not adequately represent the problem of the individual. Attempts have been made, at various times, to locate individual farm operators that maintain yield records over time. These attempts have been quite unsuccessful. The alternative was to select yield series specific to one tract of land to represent yield experience for the farm unit. This method was used even though it tends to over emphasize yield variability for the farm unit.

Source of Yield Data

The State of Montana holds title to tracts of land located throughout the state. These lands are leased to, and operated by, local farm people. Currently, cropland is leased on a crop-share basis. The leases are for ten-year time periods, and at the expiration date competitive crop-share bids are received. The highest bidder is entitled to the land for the next ten-year period; however, the current lessee has the right to meet the highest bid, and if he does so, continues to lease the land.

The state maintains records that identify these tracts of land by operator, lease number, and legal description. These records list the number of crop acres represented by the lease and the crop-share agreement for the period of time the lease is held. Each year the number of seeded crop acres, by crops, are reported and recorded as is the bushel share of these crops that the state receives. With this information, the bushel yield per seeded acre can be calculated. Example: Assume: (1) state share of wheat received is 210 bushels; (2) the crop-share agreement is  $1/4 - 3/4$ ; (3) 120 acres are seeded to wheat. In this example, the yield per seeded acre for the tract of land is 7.0 bushels  $\left( \frac{(210)(4)}{120} \right)$ .

Prior to 1927 it was mandatory that a cash payment be made for the use of these state lands. From 1927 until the late 1930's the crop-share rental system was permissible. In the 1938 session, the state legislature passed a law that made the crop-share system mandatory.

As the leases expired after this year, the renewals were on a crop-share basis. Lands that were rented under the cash payment agreement did not require recording of any crop data; therefore, it is impossible to determine the yield per acre on lands so operated. As yield data were available only through the 1956 crop year, most of the yield series are for a 17-or-18-year time period. This is unfortunate for this problem, as the 1930's are known as a period of very adverse conditions for farm people in these areas.

#### Construction of Yield Series

The yields per seeded acre, from information reported by the lessee, were calculated for each tract of cropland owned by the state in these four counties. This had been done for the major project, thus the information was readily available. As previously indicated, these tracts of land were identifiable by lease number, operator, and legal description. However, when a lease is renewed, currently every 10 years -- previously every five years, the number changes and in many cases the operator also changes. Thus, the only means of identification over time is by legal description.

The problem was to isolate yield data over time specific to a tract of land and for this study the smallest tract considered was a section, 640 acres. At times, two or even three leases were found for different parts of the same section of land. In such cases, the weighted average was used to determine the yield per seeded acre representative of the section.

The identification of yields specific to one section required sorting the data cards three times, by range, by township within each range, and by section within each range-township combination. After each sort, data cards that did not cover an adequate time period could be eliminated from further consideration.

After sorting, the legal description, the number of acres of cropland, the year of data, the seeded acres of wheat, and the wheat yield per seeded acre were tabulated. It was assumed that yield series with less than 12 years of data would be insufficient to describe yield variability over time. Thus, further elimination of data by visual inspection of the tabulated results was possible.

After eliminating inadequate yield data, there were 44 yield series in the spring wheat area and 68 in the winter wheat area with 12 or more years of data. The numbers of yield series, by areas, by the number of years in the series are given in Table I on the following page.

Several of the yield series were not continuous. When attempting to describe year-to-year yield variation, this presents a problem -- one that does not arise when the problem is within year yield differences. Thus, all 112 yield series were used to describe yield differences within any one year and for year-to-year yield variation for the areas, but only the continuous series or those lacking one year were used for year-to-year calculations.

By eliminating the series with gaps of more than one year, the usable yield series were reduced to sixty seven, 30 in the spring wheat

TABLE I. NUMBER OF YIELD SERIES FOR STATE-OWNED CROPLAND IN SELECTED COUNTIES IN THE WINTER AND SPRING WHEAT AREA, BY NUMBER OF YEARS IN SERIES.

Years in Series	Spring Wheat Area (Roosevelt & Sheridan Counties)		Winter Wheat Area (Fergus & Judith Basin Counties)	
	All Yield Series	Continuous or Minus One Year	All Yield Series	Continuous or Minus One Year
	Number	Number	Number	Number
12	1	0	1	0
13	0	0	2	0
14	0	0	6	1
15	8	2	5	0
16	3	3	9	4
17	15	13	9	5
18	5	3	14	12
19	10	8	11	6
20	1	0	9	7
21	1	1	1	0
22	0	0	1	1
23	0	0	0	0
24	0	0	1	1
Totals	44	30	68	37

area and 37 in the winter wheat area. The number of yield series eliminated and retained by this process are shown in Table I.

The actual wheat yield per seeded acre for each year and the simple average wheat yield <sup>1/</sup> for each of the 67 series is shown in Tables I and II of Appendix A. Table I contains the 30 yield series for the spring wheat area, Table II, the 37 winter wheat area series.

<sup>1/</sup> The simple average is used with the assumption that this is more representative than a weighted average of actual yield variability. In many of the yield series the condition where nearly all cropland acreage would be seeded one year and in the next year very little would be seeded, was quite common. Within the same year the seeded acreage would vary to the same or a greater extent. In either of these cases it seems the weighted average would create a greater bias.

Also included in these tables are the average acres of wheat seeded per year for each series. The use of the simple average wheat yield in these tables requires the assumption that each acre within a section is identical in terms of production.

The following maps, presented as Figures 4 and 5, show the range, township, and section location of each yield series in these four counties. Figure 4 is specific to the spring wheat counties, Sheridan and Roosevelt, while Figure 5 is concerned with the winter wheat counties of Fergus and Judith Basin. The number directly below each tract of land identifies the tract and these correspond with the series numbers found in Tables I and II of Appendix A. All yield series are numbered through each row of townships from west to east progressing from north to south. The only rational basis for this choice was that storm activity tends to follow a west-to-east path in these areas. Although the prevailing movement seems to be west to east, storms do follow a northwest-to-southeast path in the spring wheat area and a southwest-to-northeast path in the winter wheat area.

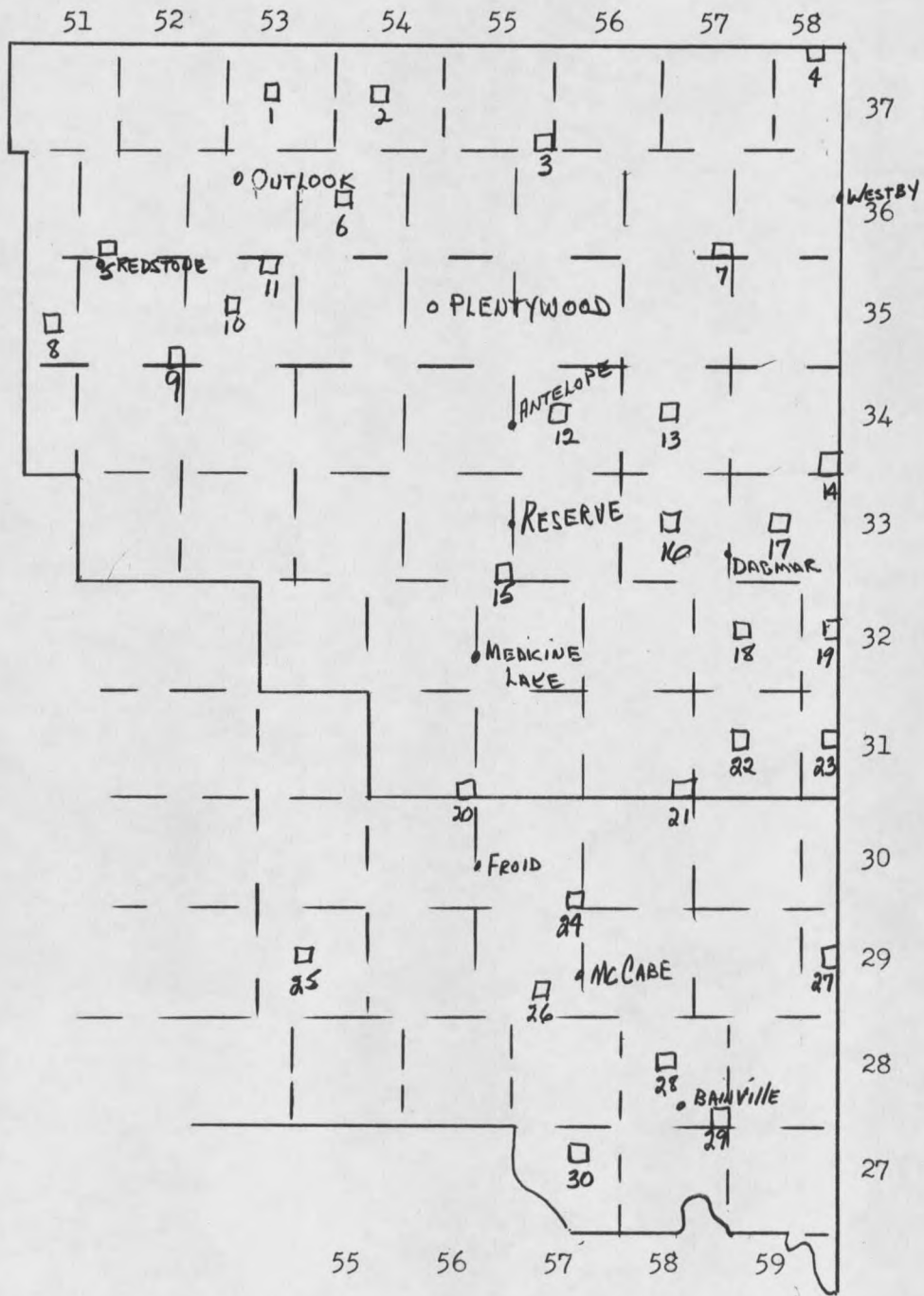


Figure 4. Location of Selected State-owned Tracts of Cropland in Sheridan and Roosevelt Counties, Montana.

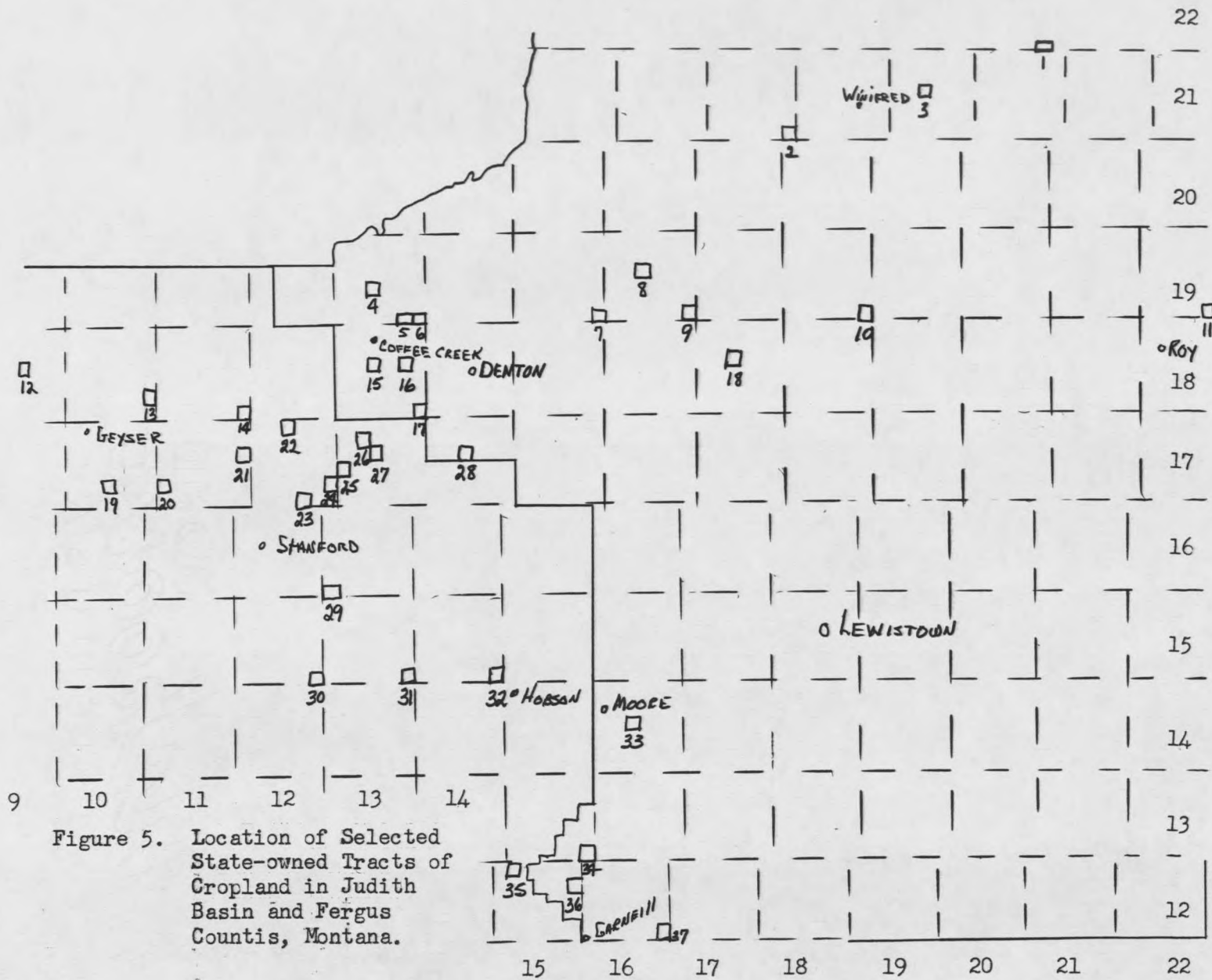


Figure 5. Location of Selected State-owned Tracts of Cropland in Judith Basin and Fergus Counties, Montana.

In Table II the average yield per seeded acre by the number of years in each series, is given for the 30 tracts of state-owned land in the spring wheat area. Table III presents the same information for the 37 tracts located in the winter wheat area. From these tables, there seems to be no indication that yields are significantly lower on the longer yield series.

TABLE II. AVERAGE YIELD PER SEEDED ACRE FOR 30 STATE-OWNED TRACTS OF CROPLAND, BY NUMBER OF YEARS IN EACH SERIES, SHERIDAN AND ROOSEVELT COUNTIES.

Years in Each Series						
	<u>15</u>	<u>16</u>	<u>17</u>	<u>18</u>	<u>19</u>	<u>21</u>
	17.5	14.5	17.1	13.9	17.3	11.4
	13.2	13.8	15.1	13.7	15.7	
		12.8	15.1	12.4	14.6	
			14.9		14.4	
			13.8		14.0	
			13.4		11.5	
			11.9		11.2	
			11.8		11.2	
			11.7			
			11.1			
			9.7			
			8.5			
			6.2			
Average	<u>15.35</u>	<u>13.70</u>	<u>12.33</u>	<u>13.33</u>	<u>13.74</u>	<u>11.40</u>

TABLE III. AVERAGE YIELD PER SEEDED ACRE FOR 37 STATE-OWNED TRACTS OF CROPLAND, BY NUMBER OF YEARS IN EACH SERIES, JUDITH BASIN AND FERGUS COUNTIES.

Years in Each Series a/					
	<u>16</u>	<u>17</u>	<u>18</u>	<u>19</u>	<u>20</u>
	17.2	20.0	29.3	21.8	19.5
	17.0	16.2	21.0	16.3	19.0
	13.2	10.7	20.9	15.5	17.8
	12.8	10.6	20.0	13.4	14.5
		7.0	19.7	11.4	14.4
			17.9	9.7	14.1
			16.8		13.4
			16.8		
			16.4		
			12.5		
			11.7		
			<u>11.6</u>		
Average	<u>15.05</u>	<u>12.90</u>	<u>17.88</u>	<u>14.68</u>	<u>16.10</u>

a/ Three tracts are not included as there is only one observation for each tract. These are: (1) 14 year series - 14.9 bushels, (2) 22 year series - 18.8 bushels, and (3) 24 year series - 15.8 bushels per seeded acre.

#### Measures of Yield Variability

Two statistical measures were used to describe yield variability. These are the standard deviation and the coefficient of variation. The former is a measure of absolute variation while the latter is a measure of relative variation. These measures were calculated for each group of observations by years and for each yield series. In Table III of Appendix A yield variability is described in absolute and relative terms for the yield observations concerning the years 1938-56 for Sheridan and

Roosevelt counties. Table IV, Appendix A, describes yield variation in the same manner for the years 1937-56 for Judith Basin and Fergus counties.

The standard deviation gives the absolute variation in wheat yield for these yield data. The coefficient of variation gives the relative variation in wheat yield for these years of data, thus various coefficients of variation can be compared.

To obtain measures of year-to-year variation in wheat yield, the identical type calculations were completed for the 67 yield series. The results of these calculations are found in Tables V and VI in Appendix A. The former represents the spring wheat area, the latter the winter wheat area.

These tables identify the yield series by number and can therefore, be compared to the legal description as found on Figures 4 and 5 and also to the year-to-year yields that are presented in Tables I and III of Appendix A.

#### Year-to-year Yield Variability of the Group Described

As shown in figure 6, for the spring wheat area the range of the coefficient of variation was 41.6 percent, from a low of 27.9 percent in 1947 to a high of 69.5 percent in 1949. In the winter wheat area the low was 40.4 percent in 1951, the high 60.5 percent in 1954. Thus, the range for this area would be 20.1 percent, much lower than the 41.6 percent range for the spring wheat area.

However, the average variation for the 19-year period for the spring wheat area was 40.84 percent, this compares to the 20-year period in the winter wheat area where the average variation was 48.45 percent.

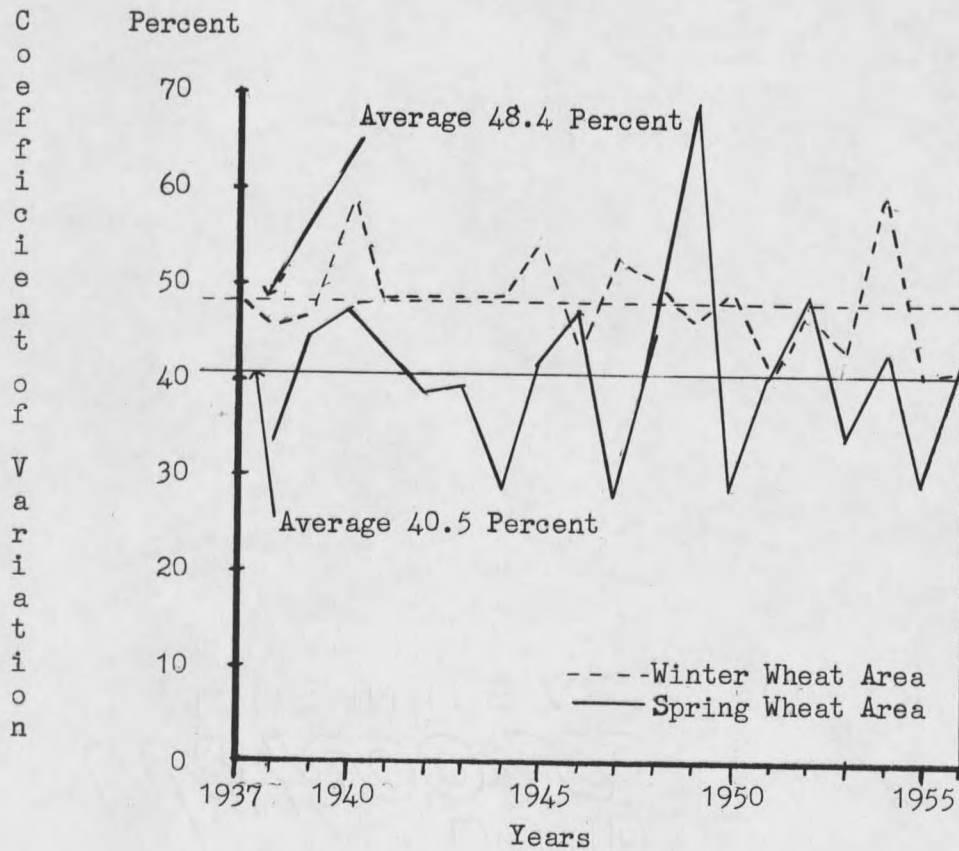


Figure 6. Yield Variation by Years, State-owned Cropland, Spring and Winter Wheat Areas.

The comparisons of the coefficient of variation in Figure 6 are for year-to-year yield variability for all observations within the two areas. The data for this figure can be found in detail in Appendix A, Tables III and IV.

Year-to-year Yield Variability as Experienced by the Individual

The bar chart presented as Figure 7 below summarizes the results of Tables V and VI of Appendix A. These tables, and the chart, are concerned with year-to-year yield variability on the 67 tracts of state-owned cropland in the two areas. The numbers and the percentages of the total observations that fall within each coefficient of variation category for each area are shown.

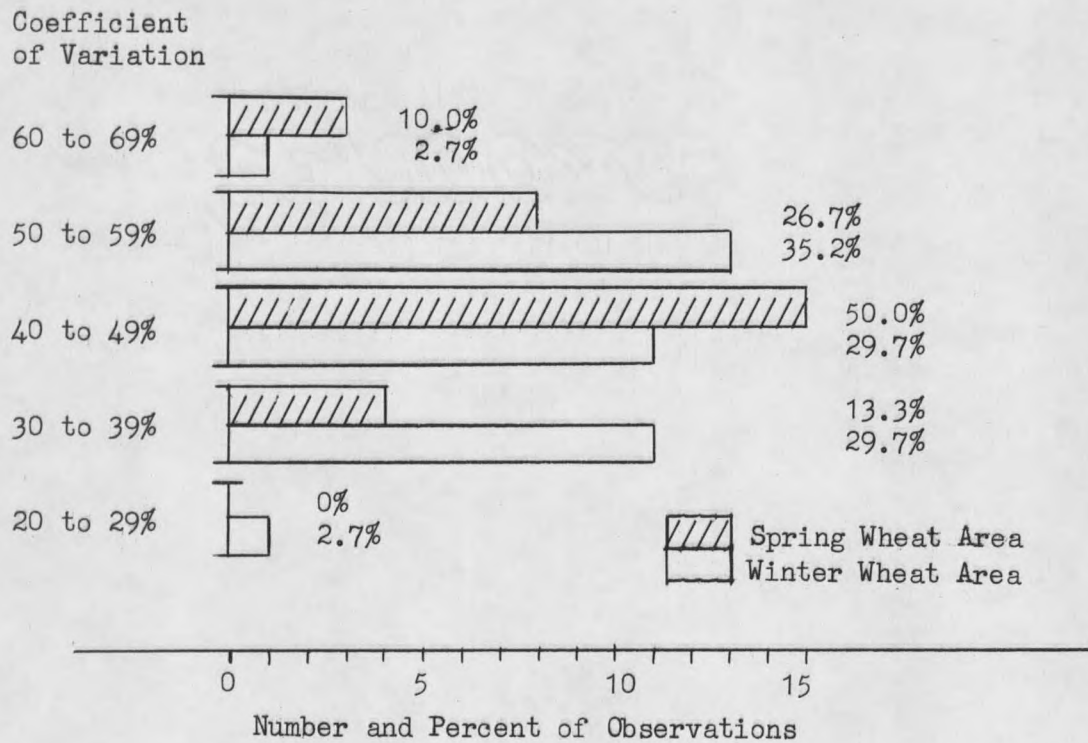


Figure 7. Yield Variability on 67 State-owned Tracts of Cropland, Spring and Winter Wheat Areas, Montana.

As indicated by Figure 7, one-half of the spring wheat area yield observations are within the 40 to 49 percent coefficient of variation category. When the range is from 40 to 59 percent, 77 percent of the spring wheat observations are included.

There were observations found in each coefficient of variation category for the winter wheat area and on this basis the winter wheat area would be a less homogeneous area than the spring wheat area; however, an individual could expect to live with greater yield variability in the spring wheat area (see Figure 7).

There was a range of 30.1 percent in the coefficient of variation for the 30-yield series in the spring wheat area. For the winter wheat area with 37 yield series, the range was 37.1 percent. The lowest coefficient was 36.0 percent and the highest was 66.1 percent in Sheridan and Roosevelt counties (Table V, Appendix A).

In Judith Basin and Fergus counties, the low discovered was 23.3 percent and the high was 60.4 percent (Table VI, Appendix A). The average coefficients of variation were 48.15 percent and 44.66 percent for the spring and winter wheat areas respectively. Indications of this are evident in Figure 7.

Under both the individual and the group measures of year-to-year yield variability the area with the smallest percentage range had the highest average coefficient of variation.

## CHAPTER III

### SHORT-RUN SURVIVAL

In the short-run, the farm unit requires income that is adequate to meet minimum and non-deferrable living costs and cash operating expenses for survival.

#### Farm Unit Expenses

The yearly costs of the assumed farm unit that can be considered fixed for this study are presented in Table I of Appendix B. These are the yearly cash outlays for the listed items that would be required for the farm unit under a zero yield condition. The total dollar requirements and the requirement per seeded acre for the farm unit are summarized in Table IV below. As indicated, in the spring wheat area \$8.20 per

TABLE IV. TOTAL AND PER SEEDED ACRE FIXED CASH EXPENSE OF THE FARM UNIT BY AREAS.<sup>a/</sup>

	<u>Spring Wheat Area</u>	<u>Winter Wheat Area</u>
	<u>Dol.</u>	<u>Dol.</u>
Firm fixed expenses	4,350.00	4,405.00
Household fixed expenses	<u>2,375.00</u>	<u>2,360.00</u>
Farm unit fixed expenses	6,725.00	6,765.00
Firm fixed expense per seeded acre	5.30	5.37
Household fixed expense per seeded acre	<u>2.90</u>	<u>2.88</u>
Farm unit fixed expense per seeded acre	8.20	8.25

<sup>a/</sup> The farm unit's fixed cash expenses are the minimum yearly expenses of the four-member household and the 1,640 crop acre firm under a zero yield condition.

seeded acre would be required for survival of the farm unit for each year that a zero yield is experienced. The dollar per seeded acre requirement for survival when a zero yield is experienced in the winter wheat area would be \$8.25.

Some of the firm's cash expenses can be considered functions of production while others are functions of acres. Those that are functions of production increase at a constant rate with yield. Those that are functions of acreage increase at a constant rate with acres harvested.

Those cost items that are included in Table I of Appendix B are items that are specific to the size of farm in acreage and/or in terms of the size of the household assumed in Chapter I. Thus, they can be considered fixed for this study. In this table there are no costs calculated for grain handling or harvesting. If there is no crop there can be no cash expense chargeable to these items. The hired labor expense, including room and board, the pickup and truck expenses, and the expenses for supplies and miscellaneous items are included in Table I but at a minimum level, a level assumed to be consistent with a zero yield.

Grain handling and pickup and truck costs are considered functions of production. The increase in cost as yield increases is in a one-to-one ratio. This is true regardless of the yield per seeded acre as the cost is calculated on a bushel basis. However, the increases in the other three expense items are functions of the acreage harvested; therefore, at some yield level they will not increase further. This requires an

assumption concerning the yield levels that would encourage the farmer to harvest all the seeded acreage. The following assumptions were made:

In the spring wheat area: (1) if the average yield per seeded acre was above 9.3 bushels the costs would be calculated by assuming all the seeded acreage was harvested; (2) if the crop was between 6.3 and 9.3 bushels per seeded acre, three fourths of the acreage would be harvested; (3) when the crop was between 4.1 and 6.3 bushels, one half of the acreage was harvested; (4) only one fourth of the crop would be harvested if the yield was between 2.2 and 4.1; (5) any yield below 2.2 bushels per seeded acre was considered a zero yield.

In the winter wheat area: (1) a yield above 10.5 bushels requires harvesting all seeded acreage; (2) a yield between 6.7 and 10.5 was equivalent to three fourths of the acreage being harvested; (3) one half of the acreage was harvested for yields between 4.3 and 6.7; (4) one fourth was harvested when the yield was between 2.3 and 4.3; (5) a yield below 2.3 was considered a zero yield.

The increase in costs due to the increased yield at these specified levels was calculated. When the seeded acreage was all harvested, the 9.3 and 10.5 bushel yield conditions, the cash expenses of these farms would increase only due to increased cost of grain handling and pickup and truck expense; thus, any increase in cost would be at a constant rate above these yield levels. Also, once the number of acres assumed to be harvested was determined, harvesting costs can be considered as increasing at a constant rate between each of these yield levels. Using these assumptions, expenses could be calculated for the farm unit for each or any yield level.

In Tables II and III of Appendix B the farm unit expenses are given for different yield levels. These calculations are on a seeded acre basis.

Farm Unit Income

The determination of the profit or loss at each yield level, and also to locate the breakeven yield for survival requires the calculation of the gross income per seeded acre for each yield level. Once income and expense information are available, it is a simple matter to determine the farm yield needed to cover all or any proportion of the farm unit's expenses. Also, one can determine the income position of the farm unit given different yield levels when this information is available.

To determine gross income the following assumptions and notations were used:

1. Assumptions concerning prices. Basis for these assumptions are Agricultural Price and Cost Projections.
  - a. Wheat price for the State of Montana is \$1.55 per bushel.
  - b. Wheat price for the spring wheat area is \$1.60 per bushel.
  - c. Wheat price for the winter wheat area is \$1.50 per bushel.
  - d. Barley price for the State of Montana is \$.97 per bushel.
  - e. Barley price for the spring wheat area is \$.99 per bushel.
  - f. Barley price for the winter wheat area is \$.95 per bushel.
  
2. Assumptions concerning yields. Basis for these assumptions are Montana Agricultural Statistics, wheat and barley yield data for the years 1938-57.
  - a. Barley yield in the spring wheat area is 130 percent of the wheat yield.
  - b. Barley yield in the winter wheat area is 135 percent of the wheat yield.

3. Assumptions concerning crops to be seeded. These assumptions are based on the current agricultural program.
  - a. The seeded acreage base is equal to one-half the cropland acreage.
  - b. The farm unit is operated under compliance with the present program, therefore 30 percent of the seeded acreage base is restricted from wheat production.
  - c. The restricted acreage is seeded to barley; therefore, .3 of each seeded acre is assumed to be seeded to barley, .7 seeded to wheat.

4. Notations used.

- a. Gross income per seeded acre in the spring wheat area =  $I_{sw}$
- b. Gross income per seeded acre in the winter wheat area =  $I_{ww}$
- c. Barley yield =  $B_y$
- d. Barley price =  $B_p$
- e. Wheat yield =  $W_y$
- f. Wheat price =  $W_p$

5. Derivation of the income equations.

- a.  $I_{sw}$  or  $I_{ww} = .3(B_y \cdot B_p) + .7(W_y \cdot W_p)$
- b. In the spring wheat area  $B_y = 1.3 W_y$ ,  $B_p = .61875 W_p$  and  $W_p = \$1.60$ , therefore
  - (1)  $I_{sw} = .3(1.3 W_y \cdot .61875 W_p) + .7(W_y \cdot \$1.60)$
  - (2)  $I_{sw} = .3(1.3 W_y \cdot \$.99) + .7(\$1.60 W_y)$
  - (3)  $I_{sw} = .3(\$1.287 W_y) + .7(\$1.60 W_y)$
  - (4)  $I_{sw} = \$.3861 W_y + \$1.12 W_y$
  - (5)  $I_{sw} = \$1.5061 W_y$
- c. In the winter wheat area  $B_y = 1.35 W_y$ ,  $B_p = .6333 W_p$  and  $W_p = \$1.50$ , therefore
  - (1)  $I_{ww} = .3(1.35 W_y \cdot .6333 W_p) + .7(W_y \cdot \$1.50)$
  - (2)  $I_{ww} = .3(1.35 W_y \cdot \$.95) + .7(\$1.50 W_y)$
  - (3)  $I_{ww} = .3(\$1.2825 W_y) + .7(\$1.50 W_y)$
  - (4)  $I_{ww} = \$.38275 W_y + \$1.05 W_y$
  - (5)  $I_{ww} = \$1.43475 W_y$

With these two income equations,  $I_{sw} = \$1.5061 W_y$  and  $I_{ww} = \$1.43475 W_y$ , the gross income can be determined from any given yield. Also, given some level of gross income per seeded acre the wheat yield equivalent can be determined. It is to be noted that the dollar income per seeded acre received from these calculations incorporates the income received from both barley and wheat. This enables one to apply these formulas directly to the yield series derived in the former chapter and the income per seeded acre amount assumes that the farmer is operating his unit under current acreage restrictions.

#### Farm Unit Income and Expense

In Tables II and III of Appendix B the loss or profit per seeded acre and in dollar terms for the farm unit has been calculated for various yield levels up to the survival yield.<sup>1/</sup> These calculations are based upon the income equations given above and the expense calculations discussed previously.

The farm unit yield remaining after the landlord's share is paid is three fourths of the farm yield in the spring wheat area and two thirds of the farm yield in the winter wheat area. In the spring wheat area, Table II of Appendix B, the farm unit's loss per year due to a

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<sup>1/</sup> This loss or profit is termed farm unit net cash income. Farm unit net cash income is calculated by deducting the cash expenses of the firm, income taxes, and family living expenses. As such, this income can be considered the net income to a farm unit in the short-run.

zero yield is \$6,724. A zero yield in the winter wheat area, Table III, results in a total loss to the farm unit of \$6,765.

The actual yield level and the farm unit share the insures survival in the short-run are shown in these tables for both areas. The spring wheat area farm yield is 8.8 -- farm unit share is 6.6 -- bushels per seeded acre. In the winter wheat area the farm yield is 10.6, the farm unit yield is 7.07 bushels per seeded acre.

#### Reserves Required for Survival in the Short-Run

As previously mentioned, the amount of reserves needed to insure survival of the farm unit that obtains a zero yield is \$6,724 for the spring wheat area and \$6,765 for the winter wheat area.

Therefore, when or if the farmer experiences three such years in succession, the reserves needed to insure survival would be \$20,172 and \$20,295 for the spring and winter wheat areas respectively..

Estimates were required of the dollar amounts of reserves needed to insure survival of the farm unit over a three-year time period when yields were at or below the survival level. At the survival yield income is adequate to cover the cash expenses of the firm and household. Cash expense does not include a charge for depreciation; this is an added expense when survival in the long-run is considered. Four yield levels ranging from the survival yield level down to the zero yield situation were selected for each area. These yield levels are identified as 1, 2, 3, and 4 in Tables IV and V in Appendix B. The one yield level

represents a zero yield; there is no income received from the farm unit. At the two yield level the net income to the farm unit is adequate to cover the household costs. The household expenses and one half the firm's expenses are recovered when the yield level is identified as a three. At the four yield level income is sufficient to cover the firm and household expenses. The four yield is the survival yield level of Tables II and III of Appendix B.

All possible combinations of these four yield levels are tested over three-year time periods with the results being presented in Tables IV and V of Appendix B. These tables show the dollar amounts of reserves needed for survival in the short run for each possible combination of the four yield levels. These results are summarized in Tables V and VI on the following pages.

The order of these combinations is important; the first digit in a series is the year one yield; the second digit the year two yield; and the third the year three yield. The dollar amount of reserves required for survival is identical for several of these combinations. For example a 113, a 131, and a 311 will require the same amount of reserves over the three-year period for survival as indicated in the following two tables. However, although the dollar amounts are identical, each of these series require different management by the farm unit. In the example cited above, the situation where two zero yields are followed by a yield where the operator's loss is only equivalent to one half the cash expense

requires somewhat different management from the situation where the zero yields are split by the three yield.

In the tables on the following pages, the dollar amounts of reserves required are grouped. These listings show the various combinations that require the same amount of reserves and list the dollar amounts in order of magnitude.

By referring to Tables I, II, and III in Appendix B the farm and/or farm unit yield levels that correspond to the income situations represented by the four yield levels can be determined. For the spring wheat area the one yield situation requires \$6,724. This, of course, is the zero yield situation found in row one of Table II. The two yield condition requires \$4,350 (firm expenses in Table I) and by checking Table II it is seen that a farm unit loss of \$4,350 corresponds to a farm yield between 3.1 and 3.2. This is equal to a 2.325 to 2.4 bushel yield per seeded acre for the farm unit. Similar checks for the other yield levels can be made.

When yields are above the survival yield required in the short-run, there is income available for long run survival -- the topic to be considered in the following chapter.

TABLE V. DIFFERENT YIELD COMBINATIONS AND THE DOLLAR RESERVE REQUIREMENT FOR SURVIVAL OVER TWO AND THREE-YEAR TIME PERIODS, SPRING WHEAT AREA.

Three-year Reserve Requirement	Three-year Yield Combinations/a/	Two-year Reserve Requirement	Two-year Yield Combinations/
Dol.			
20,172	111	13,448	111, 112, 113, 114
17,797	112, 121, 211	11,073	121, 122, 123, 124, 211, 212, 213, 214
15,622	113, 131, 311	8,898	131, 132, 133, 134, 311, 312, 313, 314
15,422	122, 212, 221	8,698	221, 222, 223, 224
13,448	114, 141, 411	6,724	141, 142, 143, 144, 411, 412, 413, 414
13,247	123, 132, 213, 231, 312, 321	6,523	231, 232, 233, 234, 321, 322, 323, 324
13,047	222	4,349	241, 242, 243, 244, 421, 422, 423, 424
11,073	124, 142, 214, 241, 412, 421	4,348	331, 332, 333, 334
11,072	133, 313, 331	2,174	341, 342, 343, 344, 431, 432, 433, 434
10,872	223, 232, 322	0	441, 442, 443, 444
8,898	134, 143, 314, 341, 413, 431		
8,698	224, 242, 422		
8,697	233, 323, 332		
6,724	144, 414, 441		
6,523	234, 243, 324, 342, 423, 432		

a/ The first digit in each of those combinations is the year one yield, the second digit is the year two yield, and the third digit is the year three yield. The farm yields associated with these numerals are: 1 = 0 bushels; 2 = 3.1 to 3.2 bushels; 3 = 6.0 to 6.1 bushels; 4 = 8.8 bushels per seeded acre. At the 8.8 bushel yield, income to the farm unit is adequate to cover the cash expenses of the firm and household.

TABLE VI. DIFFERENT YIELD COMBINATIONS AND THE DOLLAR RESERVE REQUIREMENT FOR SURVIVAL OVER TWO AND THREE-YEAR TIME PERIODS, WINTER WHEAT AREA.

Three-year Reserve Requirement	Three-year Yield Combination <sup>a/</sup>	Two-year Reserve Requirement	Two-year Yield Combination <sup>a/</sup>
Dol.			
20,295	111	13,530	111, 112, 113, 114
17,935	112, 121, 211	11,170	121, 122, 123, 124, 211, 212, 213, 214
15,733	113, 131, 311	8,968	131, 132, 133, 134, 311, 312, 313, 314
15,575	122, 212, 221	8,810	221, 222, 223, 224
13,530	114, 141, 411	6,765	141, 142, 143, 144, 411, 412, 413, 414
13,373	123, 132, 213, 231, 312, 321	6,608	231, 232, 233, 234, 321, 322, 323, 324
13,215	222	4,406	331, 332, 333, 334
11,171	133, 313, 331	4,405	241, 242, 243, 244, 421, 422, 423, 424
11,170	124, 142, 214, 241, 412, 421	2,203	341, 342, 343, 344, 431, 432, 433, 434
11,013	223, 232, 322	0	441, 442, 443, 444
8,968	134, 143, 314, 341, 413, 431		
8,811	233, 323, 332		
8,810	224, 242, 422		
6,765	144, 414, 441		
6,609	333		
6,608	234, 243, 324, 342, 423, 432		
4,406	334, 343, 433		
4,405	244, 424, 442		
2,203	344, 434, 443		
0	444		

<sup>a/</sup> The first digit in each of these combinations is the year one yield, the second digit is the year two yield, and the third digit is the year three yield. The farm yields associated with these numerals are: 1 = 0 bushels; 2 = 3.8 to 3.9 bushels; 3 = 7.3 to 7.4 bushels; 4 = 10.5 bushels per seeded acre. At the 10.5 bushel yield, income is adequate to cover the cash expenses of the firm and household.

## CHAPTER IV

### SURVIVAL AND CAPITAL ACCUMULATION

For the farm unit to survive in the long run, net cash income must be adequate to insure survival in the short run and to allow replacement of equipment and maintenance of buildings over time. For capital accumulation there must be surplus farm unit net cash income after long run survival is assured. Before the surplus net cash income of the farm unit can be determined the amount of such income retained in liquid form to insure survival in the short and long run must be known.

#### Short Run Survival

At least in the beginning, the amounts of reserves that seem to be necessary for survival of the farm unit in the short run will be maintained in a near liquid form. Cash in the bank and grain stored on the farm are the two kinds of liquid reserves that will be examined and compared. However, to ease the calculating procedure, the grain that is stored on the farm will be considered not in bushel form but in terms of dollar equivalents. These reserves will be maintained, when possible, in an unencumbered form, the cash will not be invested and the grain will not be subject to loans. The reserves are available at all times to insure survival of the farm unit under short run conditions. These reserves will be utilized to insure all the yearly cash expenses of the firm and household. They will not be used for replacement of equipment or maintenance of buildings.

Reserves have no income-producing ability when they are held in these forms; in fact, the return over time may be negative. Thus, the amount of income retained for the specific purpose of insuring short run survival should be as small as possible.

Two different methods were used in attempting to determine a liquid reserve level that would provide adequate survival protection with the lowest possible cash income commitment.

In Chapter III the dollar amounts of reserves that would be required to insure survival for three-year time periods were considered for different yield combinations. In the present chapter the maximum dollar amounts that would be required at any one time when the time period was extended were calculated. The results of these calculations, discussed below, will provide information that will be of value in determining the liquid reserve requirement for various farm units.

It is unlikely that the farm unit could survive over the long run if the reserve requirement under short run conditions becomes larger than the dollar amount necessary when three zero yield years in a row are experienced. The farm unit would either be unable to accumulate this amount of reserves or if they could do so, it would be uneconomical. As shown in Chapter III, the dollar amount of reserves necessary for the situation involving three zero yields in a row was \$20,172 in the spring wheat area and \$20,295 in the winter wheat area.

These dollar amounts will be defined as the maximum amount of liquid reserves any one farm unit would attempt to maintain.

The problem for the following part of this chapter is to determine a reasonable liquid reserve amount that the farm unit could be expected to attempt to maintain over time. It is expected that this reserve amount will be at some level below the defined maximum and will vary to some extent with the yield level of the budgeted farm unit.

#### Short Run Survivals in Time Series

By applying the income and expense information contained in Tables II and III of Appendix B to the yield series of Tables I and II of Appendix A, the maximum amount of reserves required at any one time for each series can be determined. These amounts specify the maximum reserve requirements at any one time for survival under short run conditions. The knowledge of these accumulative reserve requirements (the applicable dollar amount is added for each yield below the survival yield, subtracted for each yield above the survival yield) will provide a basis for estimating the liquid reserve requirement for each yield series and for each yield group within the areas.

When yields are below the survival level the amount of reserves required can be determined directly from either Table II or III in Appendix B. When yields are above the survival level the farm unit net cash income can be determined by using the income and expense equations from the preceding chapter. However, the farm unit expense as previously

calculated does not deduct income tax; therefore, the expense amounts are only close estimates.<sup>1/</sup>

An example of the calculation procedure used to determine the maximum reserve requirement at any one time is presented using yield series three in the spring wheat area (Table I, Appendix A). Of the 17 years of yield data in this series, there are five years when the farm yield is below 8.8 bushels per seeded acre. These yields are used in column one, (farm yield) Table II of Appendix B.

The first yield below the survival level is 5.1 bushels, and by visual inspection of Table II it is seen that \$2,903 will be needed to insure survival under short run conditions, given this yield. The next year the farm yield is 6.2 bushels; therefore, an additional \$2,075 would be required. The requirement for the third year is \$308. Therefore, before a yield above the survival level is found, the total reserve requirement for survival under short run conditions would be \$5,286. However, the fourth-year yield of 11.8 bushels per seeded acre is followed by a yield of 6.9 bushels. This requires calculating the farm unit net cash income from the 11.8 bushel yield as this income may be less than

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<sup>1/</sup> An error arises when the farm yield is above the level needed to provide income that will be sufficient to cover the cash expenses of the firm, yearly depreciation, and the standard personal deductions allowed by income tax regulations. The yield level required to provide this amount of income is 13.1 in the spring wheat area and 16.7 bushels per seeded acre in the winter wheat area.

the net cash loss associated with the 6.9 bushel yield that follows.<sup>2/</sup> In this example, however, the net cash income received from an 11.8 bushel yield is \$2,679 which is higher than the \$1,517 loss due to the 6.9 yield. This fourth-year income more than offsets the fifth-year loss and as there are no yields below the survival level for the remainder of the series, the maximum reserve requirement for this yield series at any one time over the 17-year period is \$5,286.

Calculations of this type were completed for each yield series in both areas. The results are shown in detail in Tables I and II of Appendix C and summarized in Tables VII and VIII on page 47.

When the yield per seeded acre was above 9.3 in the spring wheat area, the increase in net income before income taxes for the farm unit was \$86.60 for each one-tenth bushel increase in farm yield, as gross income is increasing at a constant rate as are the firm's expenses. In the winter wheat area, the increase in the farm unit's net income before taxes associated with a one-tenth bushel yield increase above 10.5 bushels is \$74.40.

In Tables VII and VIII on page 47 the yield series for each area are grouped into high, mean, and low yield groups. The average yields and dollar requirements for each group are given. The final column for

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<sup>2/</sup> Farm unit net cash income is calculated by the following steps:  
(1) deduct cash expense and yearly depreciation from gross income;  
(2) determine the amount of income tax payable on the remainder;  
(3) deduct the income tax; (4) add back the depreciation charge to this result; (5) subtract the fixed yearly requirement for the household.

TABLE VII. . MAXIMUM RESERVES IN DOLLARS REQUIRED AT ANY ONE TIME FOR SURVIVAL UNDER SHORT RUN CONDITIONS FOR EACH YIELD SERIES IN THE SPRING WHEAT AREA. (FROM TABLE I, APPENDIX C).

<u>High Yield Group</u>			<u>Mean Yield Group</u>			<u>Low Yield Group</u>		
<u>Yield Series</u>	<u>Average Yield</u>	<u>Dollar Reserves</u>	<u>Yield Series</u>	<u>Average Yield</u>	<u>Dollar Reserves</u>	<u>Yield Series</u>	<u>Average Yield</u>	<u>Dollar Reserves</u>
<u>No.</u>	<u>Bu.</u>	<u>Dol.</u>	<u>No.</u>	<u>Bu.</u>	<u>Dol.</u>	<u>No.</u>	<u>Bu.</u>	<u>Dol.</u>
1	17.5	472	16	14.0	6,346	7	11.8	5,837
20	17.3	3,436	15	13.9	6,724	25	11.7	9,909
9	17.1	6,724	10	13.8	2,148	14	11.5	4,590
27	15.7	3,296	3	13.8	5,286	13	11.4	15,970
19	15.1	5,384	2	13.7	4,334	12	11.2	9,577
26	15.1	2,304	8	13.4	4,838	17	11.2	4,588
21	14.9	6,724	30	13.2	6,724	11	11.1	8,241
22	14.6	3,830	4	12.8	5,234	5	9.7	13,171
29	14.5	3,375	18	12.4	6,724	28	8.5	11,201
24	14.4	8,117	6	11.9	6,724	23	6.2	35,550
Average	15.6	4,366		13.3	5,508		10.4	11,953

TABLE VIII. MAXIMUM RESERVES IN DOLLARS REQUIRED AT ANY ONE TIME FOR SURVIVAL UNDER SHORT RUN CONDITIONS FOR EACH YIELD SERIES IN THE WINTER WHEAT AREA. (FROM TABLE II, APPENDIX C).

<u>High Yield Group</u>			<u>Mean Yield Group</u>			<u>Low Yield Group</u>		
<u>Yield Series</u>	<u>Average Yield</u>	<u>Dollar Reserves</u>	<u>Yield Series</u>	<u>Average Yield</u>	<u>Dollar Reserves</u>	<u>Yield Series</u>	<u>Average Yield</u>	<u>Dollar Reserves</u>
<u>No.</u>	<u>Bu.</u>	<u>Dol.</u>	<u>No.</u>	<u>Bu.</u>	<u>Dol.</u>	<u>No.</u>	<u>Bu.</u>	<u>Dol.</u>
4	29.3	935	18	17.2	11,310	1	13.4	6,621
33	21.8	246	27	17.0	11,136	32	13.4	9,578
9	21.0	0	21	16.8	5,076	36	13.2	4,723
17	20.9	2,165	34	16.8	1,812	25	12.8	9,832
8	20.0	11,423	37	16.4	6,765	12	12.5	11,455
29	20.0	0	22	16.3	2,944	26	11.7	10,012
28	19.7	1,402	5	16.2	2,944	10	11.6	20,350
6	19.5	4,781	15	15.8	26,552	30	11.4	14,687
31	19.0	8,351	16	15.5	7,929	13	10.7	12,039
2	18.8	9,709	35	14.9	4,534	19	10.6	12,706
24	17.9	7,872	23	14.5	4,551	20	9.7	13,270
7	17.8	11,357	3	14.4	11,144	11	7.0	41,061
			14	14.1	6,765			
Average	20.5	4,850		15.8	7,959		11.5	8,865

each group records the maximum amount of liquid reserves required at any one time to insure survival of the farm unit under short run conditions.

In the spring wheat area there is only one yield series that requires more reserves than the defined maximum amount (\$20,172) any one farm unit would attempt to maintain; in the winter wheat area there are three that are above the defined maximum amount (\$20,295).<sup>3/</sup>

The maximum liquid reserve requirement at any one time for survival for the spring wheat series is \$35,550; the maximum in the winter wheat area is \$41,061. (see Tables VII and VIII). The average amount of this requirement for the remaining 29 yield series in the spring wheat area is \$6,301; the range is from \$472 to \$15,970. This compares to an average amount of \$7,060 for the 34 yield series remaining in the winter wheat area, the range being from \$0 to \$14,687. The average requirement is higher and subject to more variation for all three yield groups in the winter wheat area than in the spring wheat area.

As shown in Table VII, if a liquid reserve in dollar terms equivalent to \$6,724 (one zero yield requirement) had been available at the beginning of the time period considered in these spring wheat yield series, 22 of the 30 would have had adequate reserves for survival under the short run conditions. For the two higher yielding groups, 19 of the 20 within this area would have had ample reserve protection. However, in the lowest yield group only three of the 10 would have adequate protection beginning with a \$6,724 reserve.

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<sup>3/</sup> Defined maximum amounts developed in Chapter III.

When the one-year reserve equivalent assumption is applied to the winter wheat area yield series (Table VIII), only 17 of the 37 would have had adequate protection for survival under short run conditions. Fifteen of the 25 in the two highest yield groups would have ample reserve protection as would have only two of the 12 in the low yield group.

It appears that there are two different conditions that influence the amount of reserves required for survival in these areas. The requirement increases as yield per seeded acre decreases and also increases as the coefficient of variation increases. However, isolated cases are noted where this does not hold true.

It is assumed that the amount of liquid reserves considered adequate will be available to the farm unit at the beginning of the time period being considered. When the net cash income of the farm unit is inadequate to cover the cash expense of the firm and the household expenses, the liquid reserve will be reduced by the amount necessary to cover the difference. In subsequent years, the amount taken from the liquid reserve will be replaced from net cash income by one of two methods. In the one case, any time that net cash income is positive the surplus will be transferred to the liquid reserve fund unless the liquid reserve fund is at the specified maximum. In the alternative situation, the liquid reserve fund will be repaid when net cash income is of adequate size to require an income tax payment. The net effect of either of these methods will be identical when the liquid reserve is cash in

the bank but will be different when the reserve is held as grain stored. The amount of the difference will be equal to the savings due to lower income taxes.

### Survival in the Long Run

With the amounts of liquid reserves required for survival under short run conditions in mind, the analysis can now turn to the goals that were presented in Chapter I as realistic farm unit goals.

Six yield series, one from each yield group for each area, were selected to develop estimates of the amounts of yearly surplus available to farm units. The amount of yearly surplus is the net cash income of the farm unit that is available for replacement of depreciable farm unit items and for investment. When this surplus is adequate over time to replace the depreciable items the farm unit can survive in the long run. Any surplus after long run survival is assured will be available for the goal of capital accumulation.

In the spring wheat area, yield series 19, 3, and 12 were used as the representatives of the high, mean, and low yield groups respectively (see Table VII). The liquid reserve requirement considered adequate for short run survival for the first two series was \$6,724; for the latter series, \$10,086.

Representatives of the high, mean, and low yield groups in the winter wheat area were yield series 6, 16, and 19 respectively (see Table VIII). The liquid reserve requirement considered adequate for short run survival for the two highest yield series in this area was \$10,147. The low yield group series needs liquid reserves equal to \$13,530. These dollar amounts of reserves are assumed to be available at the beginning of the time period being considered.

Tables III through VIII in Appendix C show the yearly surplus for each of these yield series. The farm unit net cash income and yearly surplus are calculated by three different methods: (1) the reserve is held as cash in the bank; (2) the reserve is held as grain in storage with rapid replacement (any deficit is replaced when net cash income is a positive amount); and (3) the reserve is held as grain in storage with replacement only from high yield years.

Two additional years (1957 and 1958) of yield data were made available at this stage of development for each of these series and has been included for the calculation of yearly surplus. With this exception, these yield series are those presented in Tables I and II of Appendix A. The cumulative value of the yearly surplus determined by the calculations completed in Tables III through VIII in Appendix C are presented as Table IX on page 52.

The value of the assets owned by the farm unit at the beginning of the period was \$15,750 for machinery and equipment and \$9,250 for buildings and household equipment in the spring wheat area. The yearly depreciation charge for these items was \$3,305 in this area, \$2,475 for machinery and equipment, and \$830 for buildings and household equipment.

In the winter wheat area the beginning value of the machinery and equipment was \$20,500; the household equipment and buildings were valued at \$10,000. The yearly depreciation charge totaled \$4,067, \$3,207 for machinery and equipment, \$860 for buildings and household equipment.

The total charge for depreciation for the period of time considered for each series was calculated by two different methods: (1) it was assumed that the value of the owned items would have, if possible, the

TABLE IX. CUMULATIVE YEARLY SURPLUS AVAILABLE FOR LONG RUN SURVIVAL AND CAPITAL ACCUMULATION WHEN RESERVES ARE MANAGED AS CASH IN THE BANK, GRAIN STORED AND REPLACED RAPIDLY, AND GRAIN STORED AND REPLACED ONLY IN HIGH YIELD YEARS, FOR THE THREE SELECTED YIELD SERIES IN EACH OF THE TWO STUDY AREAS.

<u>Area</u>	<u>Yield Series</u>	<u>Cash in Bank</u>	<u>Grain Replaced Rapidly</u>	<u>Grain Replaced from High Yields</u>
	<u>No.</u>	<u>Dol.</u>	<u>Dol.</u>	<u>Dol.</u>
Spring Wheat:	Series 19	83,830	84,451	85,710
	Series 3	67,679	68,620	70,868
	Series 12	49,973	53,017	55,720
Winter Wheat:	Series 6	150,412	150,772	151,776
	Series 16	72,939	74,952	76,780
	Series 19	15,794	18,462	26,984

same value at the end of the time period as at the beginning; and (2) the ending inventory would allow for complete depreciation of the machinery and equipment; only the buildings and household equipment would have the beginning inventory value. This latter assumption is considered a reality for the farm unit that plans retirement at the end of the time period. The total depreciation charge for each yield series is presented in Table X on page 53. The dollar differences within the same area are due to the number of years of data the series contain.

When the aggregate amounts of net surplus from Table IX are compared to the total depreciation charge in Table X it appears that long run survival is assured for yield series 19 and three in the spring wheat area and series six in the winter wheat area. Series 16 in the winter wheat area would appear to be at the margin, while it seems yield

series 12 in the spring wheat area and 19 in the winter wheat area would be unable to survive in the long run.

TABLE X. CUMULATIVE DEPRECIATION CHARGE TO MAINTAIN COMPLETE INVENTORY AND TO DEPRECIATE OUT EQUIPMENT AT END OF PERIOD FOR THREE SELECTED YIELD SERIES IN EACH STUDY AREA.

<u>Area</u>	<u>Yield Series No.</u>	<u>Depreciation Objective</u>	
		<u>Maintenance<sup>a/</sup></u> <u>Dol.</u>	<u>Depreciated Out<sup>b/</sup></u> <u>Dol.</u>
Spring Wheat:	Series 19	62,795	47,045
	Series 3	62,795	47,045
	Series 12	69,405	53,655
Winter Wheat:	Series 6	89,474	68,974
	Series 16	85,407	64,907
	Series 19	77,273	56,773

<sup>a/</sup> A full depreciation charge is made each year.

<sup>b/</sup> Only the depreciation charge for buildings and household equipment is made in the later years.

To obtain a closer estimate of the ability of these farm units to survive in the long run the yearly surplus amounts were subjected to additional calculation. By subtracting the dollar amount of depreciation from the yearly surplus for each year the capital available for capital accumulation is isolated. The amount of this residual gives an indication of the farm unit's ability to survive as well as accumulate capital. Another method of estimating the ability of the farm unit to survive in the long run is by visual inspection of the yearly surplus columns in Tables III through VIII of Appendix C. When for a period of consecutive years there is no yearly surplus, the farm unit will not survive. The number of such years that the unit can stand will vary

with management, at least to some degree. Although depreciation is written off as a yearly expense for income tax computations, it seems that the replacement of depreciable items is normally a function of the farm unit net cash income. If this would not be true very few farm units would survive in the long run, as indicated by the variation in yearly surplus for these six yield series.

Tables IX through XIV summarize the year-to-year income positions of these six farm units. The yearly surplus amounts in these tables were taken from the last columns of Tables III through VIII of Appendix C. This then, is the yearly surplus when the liquid reserve is held as stored grain and any replacements are made only when the yields are adequate to require an income tax payment if the grain were sold. The net worth of these farm units, the value of the liquid reserve plus the value of the depreciable items owned by the farm unit plus the cumulative surplus for investment, are given in these tables for the beginning of the time period, each year of the time period, and at the end of the time period. This net worth is graphically presented in Figures 8 and 9 on the following pages. This would be the net worth of the farm unit if the surplus for investment were held at a zero rate of interest.

The net worth of a farm unit represented by yield series 12 in the spring wheat area is at its highest value at the beginning of the time period. (see Figure 8). At the end of the twelfth year the net worth of this unit was \$2,054, a decrease of \$33,032 from the beginning inventory. When a full depreciation charge is deducted from the yearly surplus for this unit there is at no time a surplus for investment,

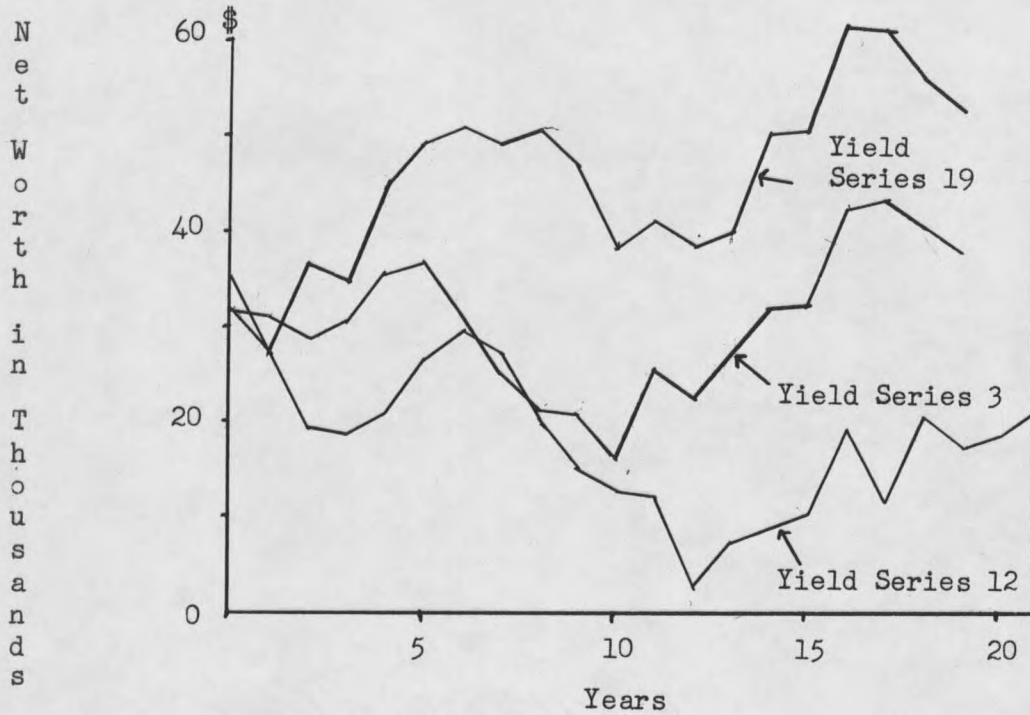


Figure 8. Year-to-year Net Worth for the Three Selected Yield Series in the Spring Wheat Area.

therefore, no chance for capital accumulation. This firm would be unable to provide adequate reserves necessary for long run survival and even with reserves provided by institutions, such as insurance and fertilizers, survival is extremely doubtful. It would appear that a farm unit with yield experience of this type has only the alternative of increasing size for survival, assuming economies of scale do exist.

Although the net worth of a farm unit represented by yield series three in the spring wheat area is only \$11,034 at the end of 10 years it is assumed that this unit could survive with some reliance upon reserves provided by institutions. It seems a farm unit that experiences yields as those of yield series 19 in this area could

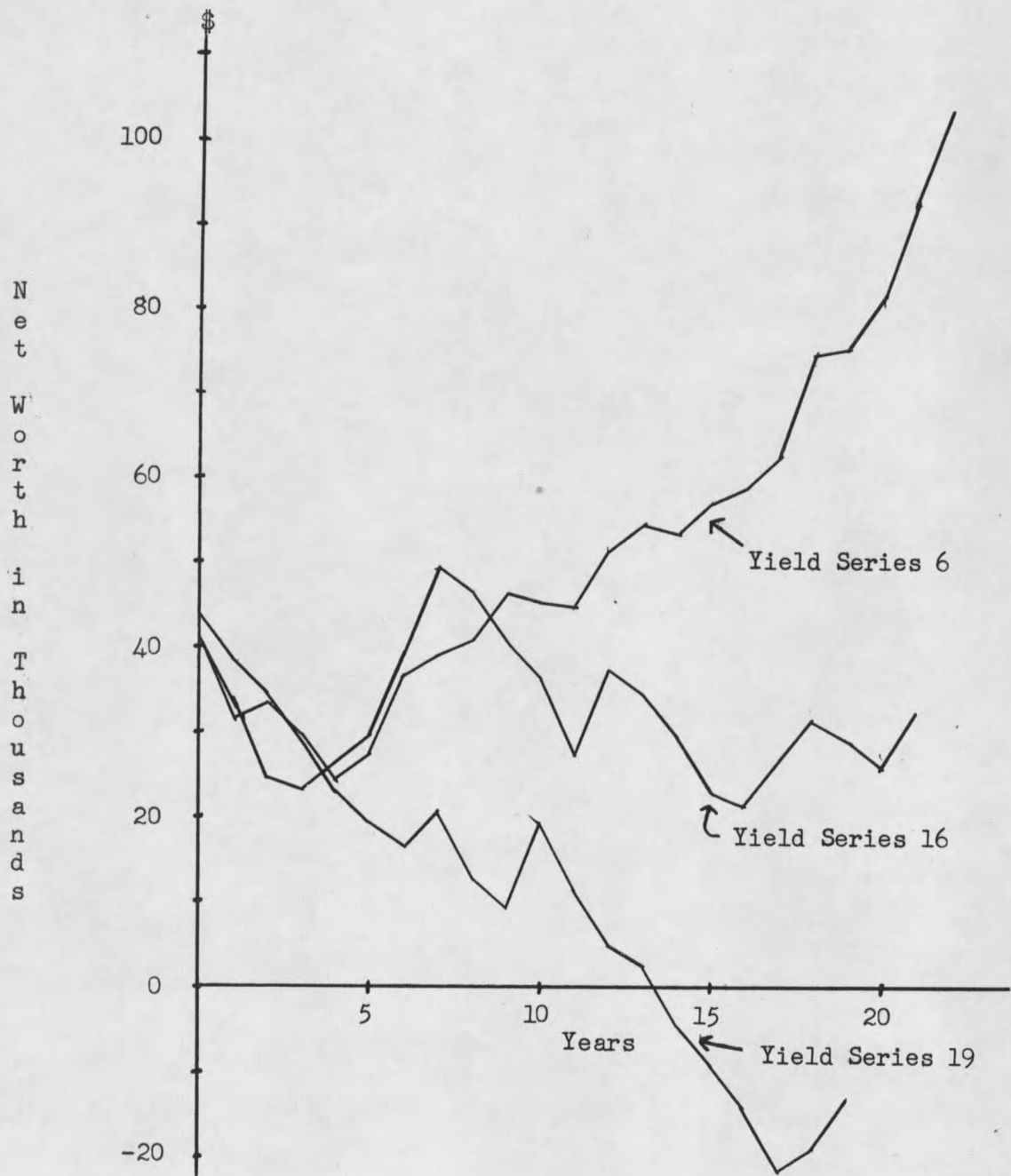


Figure 9. Year-to-year Net Worth for the Three Selected Yield Series in the Winter Wheat Area.

provide adequate protection for survival in the long run without relying upon reserves from non-unit sources. The surplus for investment for this farm unit is \$29,872.

Decisions concerning the ability of the farm units in the winter wheat area to survive in the long run under the given assumptions can be made quite easily (see Figure 9). There would be no chance for survival of the farm unit represented by yield series 19; the farm unit represented by yield series 16 could survive with rather heavy reliance upon reserves provided by institutions if the surplus for investment were wisely invested. The farm unit represented by yield series six could quite easily survive as well as accumulate capital.

#### Capital Accumulation

The dollar amounts of net cash income that are available for capital accumulation by years are isolated for each yield series in Tables IX through XIV of Appendix C and are identified by the columns entitled surplus for investment. As stated in the preceding section, the amounts of yearly surplus accumulated under the grain storage liquid reserve with replacement on high yielding years was used. The income tax advantage accruing over time from this method ranged from a high of \$5,747 (yield series 12, spring wheat area) to a low of \$1,361 (yield series six, winter wheat area). The advantage is the greatest when the variation in income is high, which is a function of yields.

The using of the yearly surplus accumulated under this form of grain reserves requires the assumption that the income tax savings are great enough to offset storage costs associated with the grain.

The surplus for investment, calculated under the assumptions discussed under survival in the long run, was assumed to be invested at various rates of interest. Other assumptions associated with these calculations were that the investments would be made at approximately the same date each investing year and that the interest (or dividend) would be reinvested on this same date. The interest was compounded annually. The value of these investments at the end of the time period considered are summarized in Table XI on page 59. The number and amounts of investments by years are from the surplus for investment column of Tables IX, X, XII, and XIII of Appendix C.

An indication of the importance of the time when investments can be made is included in Table XI. Compare, in the 6 percent rate of interest column, the dollar growth due to interest accumulations in yield series six and 19. The value of the investment at the zero rate of interest (summation of the surplus for investment) for yield series 19 in the partial value row is \$39,994 and this grows to a \$71,238 value when invested at 6 percent. This increase is \$31,224. The value of the surplus for investment for yield series six under the partial value row is \$82,802 and this grows to a \$106,966 value when invested at 6 percent. The dollar difference in this case is \$24,164. This is significantly different than the \$31,224 growth for the yield

series 19 case, and is due to the time the investments were made as can be seen in the applicable table in Appendix C.

TABLE XI. DOLLAR VALUE OF THE SURPLUS FOR INVESTMENT AT THE END OF THE TIME PERIOD WHEN INVESTED AT VARIOUS RATES OF INTEREST FOR TWO SELECTED YIELD SERIES IN EACH STUDY AREA.

Area	Yield Series	Depreciation Objective	Rate of Interest				
			0%	3%	4%	5%	6%
			Dol.	Dol.	Dol.	Dol.	Dol.
Spring Wheat:	Series 19:	Maintenance <sup>a/</sup>	29,872	41,506	46,498	52,182	58,645
		Depr. Out <sup>b/</sup>	39,994	52,810	58,218	64,332	71,238
	Series 3:	Maintenance <sup>a/</sup>	11,965	15,324	16,727	18,306	20,075
		Depr. Out <sup>b/</sup>	23,823	28,148	29,884	31,804	33,922
Winter Wheat:	Series 6:	Maintenance <sup>a/</sup>	62,302	71,414	74,929	78,723	82,811
		Depr. Out <sup>b/</sup>	82,802	93,661	97,794	102,221	106,966
	Series 16:	Maintenance <sup>a/</sup>	9,143	13,831	15,834	18,102	20,671
		Depr. Out <sup>b/</sup>	11,873	16,561	18,564	20,832	23,401

a/ A full depreciation charge is made each year.

b/ Only the depreciation charge for buildings and household equipment is made in the latter years.

To illustrate the ability of capital to accumulate in another manner yield series six was reversed in order. The yield experience recorded for the last year of data was assumed to be the first year of experience.

The yearly surplus, the yearly surplus for investment, and the accumulative value of this surplus when invested at a 6 percent rate of interest when this series is reversed is presented on page 60 as Table XII.

TABLE XII. YEARLY SURPLUS, YEARLY SURPLUS FOR INVESTMENT, AND THE CUMULATIVE VALUE OF THIS SURPLUS WHEN INVESTED AT A 6 PERCENT RATE OF INTEREST, YIELD SERIES SIX REVERSED, WINTER WHEAT AREA.

<u>Year</u>	<u>Yearly Surplus</u>	<u>Surplus for Investment</u>	<u>Value of Investment</u>
	<u>Dol.</u>	<u>Dol.</u>	<u>Dol.</u>
1	14,601	10,534	10,534
2	15,909	11,842	23,008
3	9,497	5,430	29,818
4	4,974	907	32,514
5	16,116	12,049	46,514
6	7,824	3,757	53,062
7	5,583	1,516	57,762
8	7,757	3,690	64,918
9	2,929	0	68,813
10	6,970	1,765	74,707
11	10,743	6,676	85,865
12	3,675	0	91,017
13	2,601	0	96,478
14	10,090	4,165	106,432
15	5,691	1,624	114,442
16	6,480	2,413	123,722
17	10,506	6,439	137,584
18	4,607	540	146,379
19	0	0	155,162
20	616	0	164,472
21	4,607	0	174,340
22	0	0	184,800

The value of the investment under the identical assumptions, when the yield series was as experienced, at the end of the 22-year period was \$82,811 (Table IV, yield series six, full value). The order of the yield experience, or the time when the investments were made, resulted in an increased value of \$101,989 over the 22-year period when this yield series was reversed. This should amply illustrate the advantage of reserves used to accumulate capital.

## CHAPTER V

### SUMMARY AND CONCLUSIONS

#### Summary

Risks and uncertainties arising from variable output are basic to this study. Erratic production, as experienced in dryland areas of the Great Plains brings forth extreme variation in the farmer's income. It is assumed that the goals of the farm unit (firm and household) are survival of the unit over time and then capital accumulation. The hypotheses of the study are that the farm unit operating within these conditions can use financial and physical reserves in the efforts to attain these goals. Specifically, reserves will hasten the attainment of the goals and for each farm unit there will be an optimum reserve use pattern for goal realization.

Yield data specific to identifiable tracts of land were located. All usable series for the Judith Basin and Roosevelt and Sheridan counties were selected providing 37 series for the former and 30 for the northeast counties. From these series, yield variability as experienced by the individual was described. Differences in yield, and the variability associated with these differences were described for the two wheat-producing areas. In the northeast area the coefficient of variation for individual yield series ranged from 36.0 to 66.1 percent, in the Judith Basin from 23.3 to 60.4 percent.

The net cash income requirements for short run survival when yields were below the breakeven point were calculated. The liquid reserve requirements for short run survival of the farm unit at four selected

yield levels at and below the breakeven point in each area were determined. Every possible three-year combination of these four yield levels were tested to demonstrate total short run survival requirements. In both areas the maximum was a little over \$20,000. For each yield series, the liquid reserve requirements at any one time for short run survival were calculated. These requirements ranged from \$472 to \$35,550 in the northeast area; from \$0 to \$41,061 in the other area.

In each area three yield series representing high, medium, and low mean yield levels were selected. The yearly surplus net cash income available for long run survival and capital accumulation for each series was determined. While in all cases there would be surplus above short run survival requirements, in the long run the series with the lowest mean yield level in each area could not survive.

For the remaining four yield series, the surplus net cash income for capital accumulation was isolated. This surplus was assumed to be held as a liquid reserve (zero rate of interest) and invested at rates of interest ranging from 3 to 6 percent. Whenever a surplus can be invested early in a time series, a reserve builds up that can protect the farm unit against any normal demands on income that arise in these series. When low yields are experienced at the beginning of a management time period it is difficult to provide protection through the use of reserves but two high, or even one extremely high, yield years at the beginning of the period can assure short run survival under almost any circumstances and provide adequate capital accumulation.

### Conclusions

As information concerning reserves and their uses was developed, it became apparent that reserves, as defined, would be used for two distinct purposes. Liquid reserves can have as their only reasonable purpose the insuring of survival in the short run. Reserves of a somewhat less liquid form have as their major purpose the accumulation of capital. They are also capable of insuring or partially insuring long run survival of the farm unit, and finally, can serve as a basis for credit needed in the short run in place of liquid reserves.

A farm unit of adequate size can use reserves to alleviate the problems of management, capital, and income in the efforts of farmers to attain their goals. Information developed throughout the study supports this hypothesis, within the scope of the study. It became apparent when investment alternatives were calculated that the individual, or farm unit, who intelligently manages reserves could expect to attain economic success before one who does not use reserves. When various yield series were analyzed to determine short run survival, it was found that there is an optimum reserve use pattern specific to each series. These results tend to verify the specific hypotheses.

### Implications

The yield series that were available began in the late 1930's and yields were low in the first few years. This only emphasized the hazards of a farm business attempting to become established. During the early years the firm is normally in a vulnerable position, mainly

because of capital limitations. It appears then that measures to insure stable income are of greatest importance at this time -- hail, all-risk, or other insurance could be critical. Whenever the capital position is improved to the point where there is a significant surplus that can be invested then the investment can provide the necessary financial support. Of course, any surplus that is already committed in the form of indebtedness will delay the accumulation of a reserve.

The importance of the first few years in a management series is also apparent. If they bring low yields the management problem is difficult and the financial condition hazardous. If they happen to be favorable the opportunity to establish a reserve is at hand, and once established at a level appropriate to the farm unit, the probability of survival and capital accumulation is high. In either case, the use of income to establish reserves at an early date should have high priority in competition with desires to increase level of living and other alternatives.

Management of reserves cannot be separated from credit, except in the case of liquid reserves held in limited amounts for short run survival. The mechanics of investments, including selection, purchase, and sale of instruments or titles, payment of dividends and earnings, and so on, suggest that control of income to the farm unit can be managed most effectively through credit based on the reserve rather than by continually converting when needed and reinvesting when the surplus again becomes available.

Implications are difficult to develop with respect to the varieties of farm sizes and tenure systems and yield levels that were not explored. The size used as the example in this study was selected because it was expected to have inherent survival capabilities, at least with mean average yields. A priori smaller farms would be expected to have difficulty except with very high yields, and larger farms should be able to provide for the farmers' goals with somewhat lower mean yields.

The possibility of survival and capital accumulation in relation to the yield variability and mean yield level of a given farm has important implications with respect to the value of the farm and the form of tenure under which the farm is operated. It may be possible to demonstrate a given capitalized value which, under some adverse values of size, variability, or productivity would even be negative. The same land used as an increment (owned or rented) to another farm may have a high value.

#### Future Research

Farmers realize that it is more difficult to break new ground than to spend time working with smoother, previously-broken ground; however, the work associated with break new ground tends to be a more satisfying as well as a more productive labor.

This analogy applies to this research effort. In the ground-breaking process the tools available were inadequate in many respects, and assumptions were required that limited the study in scope. However, the findings and methodology open the door to future research in this

and related areas. There is a definite need for extended empirical research to test more completely hypotheses of this study and extend the applicability of the results to the great variety of farming situations where production is uncertain.

The limitations were many. The selected areas represent a minor portion of the wheat-producing areas in the State of Montana. The yield data from within these areas were from only one source, and there is some possibility of bias arising from reporting procedure and land selection and lieu lands. A farm unit of only one size was considered and somewhat restricting assumptions were introduced concerning the firm and the household that the unit comprises.

The findings and methodology of this study could effectively be applied to research in (1) the economics of insurance as a means of shifting risk for dryland grain farmers, (2) rural appraisal; (3) forms of tenure; (4) economic size of farm units operating under dryland conditions, and (5) detailed study of financial management for farms of different sizes, yield levels, financial requirements over time, and alternative uses of income.

APPENDICES

TABLE I, APPENDIX A. WHEAT YIELDS PER SEEDED ACRE BY YEARS AND AVERAGE WHEAT YIELDS, STATE-OWNED CROPLAND, SHERIDAN AND ROOSEVELT COUNTIES, MONTANA.

Year	Yield Series									
	1	2	3	4	5	6	7	8	9	10
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
1935										
1936										
1937										
1938										
1939		7.8			4.5		2.7		9.4	
1940		18.2	11.8		8.4	16.5	15.7	6.9	19.7	
1941		7.6	10.1	14.9	6.5	11.2	--	7.1	22.3	16.3
1942	18.3	19.4	14.3	25.3	10.3	19.7	23.3	19.0	22.4	18.4
1943	12.8	20.0	20.0	20.8	17.9	0	21.8	14.8	--	26.5
1944	20.8	15.7	14.0	14.5	15.1	20.0	22.7	25.8	23.1	18.4
1945	8.2	12.3	5.1	13.8	1.2	6.2	14.4	6.2	13.1	7.0
1946	13.9	6.9	6.2	8.0	4.6	8.4	9.3	7.8	18.1	11.5
1947	11.0	5.3	8.4	6.7	12.8	10.4	14.4	16.8	15.5	16.0
1948	13.3	8.7	11.8	10.4	6.9	9.3	11.9	10.2	17.8	9.6
1949	13.3	9.9	6.9	3.8	3.3	4.9	3.2	4.3	13.0	7.7
1950	31.2	19.1	24.1	19.6	11.4	20.1	13.6	21.6	27.5	24.3
1951	16.5	9.6	8.7	9.0	4.6	7.1	8.0	2.5	0	10.0
1952	19.0	17.2	19.4	14.3	14.1	11.3	2.4	15.6	10.5	6.1
1953	27.9	21.4	18.9	13.9	10.4	15.1	11.9	29.4	25.1	19.6
1954	15.1	13.9	12.8	5.5	7.9	10.7	5.0	13.0	18.1	9.8
1955	26.2	22.3	27.4	16.7	24.6	23.1	14.9	18.2	25.0	12.6
1956	<u>15.7</u>	<u>11.3</u>	<u>14.0</u>	<u>8.4</u>	<u>--</u>	<u>7.8</u>	<u>5.2</u>	<u>8.3</u>	<u>10.4</u>	<u>6.3</u>
Avg. Yield	17.5	13.7	13.8	12.8	9.7	11.9	11.8	13.4	17.1	13.8
Avg. Seeded Wheat Acreage	113	39	111	71	47	127	39	42	112	177

TABLE I, APPENDIX A. (Continued). WHEAT YIELDS PER SEED ACRE BY YEARS AND AVERAGE WHEAT YIELDS, STATE-OWNED CROPLAND, SHERIDAN AND ROOSEVELT COUNTIES, MONTANA.

Year	Yield Series									
	11	12	13	14	15	16	17	18	19	20
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
1935			3.5							
1936			0							
1937			--							
1938		3.0	5.5	3.0	3.4	4.0	5.3	3.3		4.4
1939	8.0	3.1	5.6	7.8	--	6.2	6.5	--		15.4
1940	17.1	7.9	10.7	8.5	19.6	10.4	10.5	8.7	7.8	8.3
1941	11.7	14.7	18.7	19.5	13.8	19.5	14.8	16.3	24.6	15.1
1942	11.8	18.7	22.2	17.8	24.6	23.8	19.1	1.4	10.7	20.9
1943	19.8	16.2	2.5	10.7	18.1	20.1	11.7	19.8	25.9	25.7
1944	14.4	9.8	24.2	21.7	11.3	19.8	21.7	22.3	19.6	17.3
1945	9.1	4.2	15.0	11.1	11.3	12.9	14.7	15.2	14.2	28.1
1946	8.7	6.5	10.3	11.6	14.0	9.6	16.1	14.3	11.3	17.6
1947	--	10.1	10.1	10.6	11.2	12.7	11.0	14.6	13.9	17.3
1948	8.5	11.8	12.9	6.8	16.5	5.4	7.0	8.4	8.2	15.6
1949	5.0	1.3	0	4.1	0	4.1	6.0	4.3	2.4	5.4
1950	22.3	19.0	13.7	19.3	18.8	19.4	11.5	18.9	15.5	29.0
1951	12.9	13.9	11.5	7.1	12.3	13.5	7.7	12.0	9.5	25.7
1952	6.0	14.0	7.0	7.0	9.7	8.6	8.1	6.3	14.4	7.9
1953	17.2	24.0	18.7	15.9	25.7	27.1	11.6	20.6	26.4	26.1
1954	0	0	16.0	7.9	10.4	8.1	9.9	12.8	13.1	13.2
1955	6.9	26.1	22.0	21.3	18.2	25.6	11.6	17.6	28.0	17.5
1956	<u>9.5</u>	<u>9.2</u>	<u>9.4</u>	<u>7.3</u>	<u>10.9</u>	<u>15.1</u>	<u>7.2</u>	<u>6.5</u>	<u>11.8</u>	<u>17.5</u>
Avg. Yield	11.1	11.2	11.4	11.5	13.9	14.0	11.2	12.4	15.1	17.3
Avg. Seeded Wheat Acreage	61	123	59	46	100	146	125	124	104	112

TABLE I, APPENDIX A. (Continued). WHEAT YIELDS PER SEEDED ACRE BY YEARS AND AVERAGE WHEAT YIELDS, STATE-OWNED CROPLAND, SHERIDAN AND ROOSEVELT COUNTIES, MONTANA.

Year	Yield Series									
	21	22	23	24	25	26	27	28	29	30
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
1935										
1936										
1937										
1938	8.0	6.8		4.7			4.8			
1939	14.1	13.6		10.8		9.5	9.8	6.5		
1940	--	16.2	6.3	0	16.2	15.3	7.4	--	8.2	
1941	16.6	16.4	10.4	24.2	5.8	--	19.9	13.3	5.1	11.3
1942	17.8	18.5	5.0	20.2	30.3	18.8	21.3	10.7	9.6	18.7
1943	22.8	18.9	11.5	23.9	19.1	23.1	25.9	11.3	12.3	23.7
1944	26.1	18.0	10.3	17.9	13.7	28.1	17.4	6.9	7.2	8.6
1945	21.8	15.9	5.1	16.1	12.8	14.7	16.3	9.2	13.4	15.0
1946	15.2	16.8	5.7	13.7	0	5.9	15.0	2.1	11.0	.8
1947	18.8	15.1	4.0	14.2	10.8	17.2	16.0	7.2	16.0	13.2
1948	14.2	6.3	3.7	16.4	10.7	22.5	18.4	7.1	28.0	17.7
1949	15.1	6.5	1.3	7.9	0	7.5	9.1	11.2	19.8	8.6
1950	20.6	26.5	7.0	25.3	13.6	23.6	25.1	13.6	25.5	21.4
1951	9.8	10.2	4.0	14.6	8.2	10.7	12.2	5.9	13.0	8.6
1952	4.8	9.1	1.5	5.3	4.0	8.9	7.3	4.1	9.1	2.4
1953	12.9	19.3	10.3	13.1	20.1	16.0	20.6	12.1	25.9	22.2
1954	0	7.3	8.3	10.6	9.1	7.5	12.0	11.1	9.3	7.1
1955	15.2	22.8	7.2	21.7	20.0	21.1	27.2	11.5	19.3	18.3
1956	--	13.4	4.2	13.7	4.1	7.0	12.0	.7	--	--
Avg. Yield	14.9	14.6	6.2	14.4	11.7	15.1	15.7	8.5	14.5	13.2
Avg. Seeded Wheat Acreage	169	169	64	146	118	87	157	96	293	37

TABLE II, APPENDIX A. WHEAT YIELDS PER SEEDED ACRE AND AVERAGE WHEAT YIELDS, STATE-OWNED CROP-  
LAND, JUDITH BASIN AND FERGUS COUNTIES, MONTANA.

Year	Yield Series								
	1 Bu.	2 Bu.	3 Bu.	4 Bu.	5 Bu.	6 Bu.	7 Bu.	8 Bu.	9 Bu.
1932									
1933									
1934		8.0							
1935		5.2							
1936		--							
1937	2.4	4.6	5.9			3.2	4.0		
1938	14.3	9.9	10.1			17.9	6.8		11.3
1939	11.1	14.8	9.1	22.5	10.8	11.4	3.7	11.9	--
1940	14.6	9.3	4.9	20.7	6.2	9.1	20.0	--	11.6
1941	5.0	29.2	6.2	31.0	15.3	19.5	22.2	21.5	20.7
1942	24.6	32.4	26.0	37.3	22.6	30.5	32.6	33.5	51.5
1943	10.0	21.6	19.2	39.9	17.9	19.9	19.6	21.5	23.7
1944	8.0	30.3	15.3	9.2	17.6	18.6	16.0	22.5	17.2
1945	6.1	23.4	13.1	33.3	8.6	25.9	16.6	21.6	15.5
1946	11.2	22.5	20.7	29.4	16.6	14.1	14.4	14.4	16.8
1947	7.7	0	11.5	12.1	14.0	15.5	13.6	0	16.3
1948	31.7	27.2	11.3	51.9	24.8	27.0	20.4	3.4	21.3
1949	10.9	23.5	17.0	30.1	16.6	20.7	28.0	23.5	10.7
1950	17.0	27.1	18.8	21.5	16.7	14.5	2.6	22.7	21.1
1951	13.3	26.7	16.2	31.8	15.1	22.0	19.5	21.5	31.3
1952	--	7.4	12.8	33.7	14.0	18.4	15.8	17.2	21.3
1953	20.0	23.0	18.6	27.0	14.5	22.1	16.8	23.0	18.6
1954	18.7	16.9	18.1	38.6	27.2	36.9	29.1	32.5	25.0
1955	18.6	27.7	16.9	37.6	17.6	17.3	41.8	34.5	31.5
1956	<u>8.7</u>	<u>22.5</u>	<u>17.1</u>	<u>20.4</u>	<u>--</u>	<u>24.9</u>	<u>12.5</u>	<u>14.3</u>	<u>12.7</u>
Avg. Yield	13.4	18.8	14.4	29.3	16.2	19.5	17.8	20.0	21.0
Avg. Seeded Wheat Acreage	36	54	200	69	67	224	151	63	47

TABLE II, APPENDIX A. (Continued). WHEAT YIELDS PER SEEDED ACRE AND AVERAGE WHEAT YIELDS, STATE-OWNED CROPLAND, JUDITH BASIN AND FERGUS COUNTIES, MONTANA.

Year	Yield Series								
	10	11	12	13	14	15	16	17	18
	<u>Bu.</u>	<u>Bu.</u>	<u>Bu.</u>	<u>Bu.</u>	<u>Bu.</u>	<u>Bu.</u>	<u>Bu.</u>	<u>Bu.</u>	<u>Bu.</u>
1932						0			
1933						--			
1934						4.1			
1935						4.9			
1936						1.7			
1937					2.8	2.8	5.4		
1938	8.0		21.6		19.6	22.1	3.7	34.0	
1939	0		4.4	3.8	13.1	10.7	14.2	--	
1940	0	1.7	4.3	--	2.0	13.3	20.1	11.8	14.1
1941	11.0	3.2	5.7	6.9	13.8	24.2	20.4	19.8	29.0
1942	--	13.6	12.1	10.7	23.3	25.7	31.4	28.2	8.5
1943	11.1	4.3	17.1	16.0	11.1	29.2	33.9	19.1	--
1944	14.0	16.6	16.4	20.3	8.8	10.9	11.5	12.1	36.5
1945	8.7	10.1	16.7	17.9	23.9	9.7	7.8	35.6	23.6
1946	2.5	9.6	9.1	6.7	12.7	16.9	10.8	30.1	1.8
1947	7.8	4.2	--	4.1	9.1	6.1	2.6	9.7	11.6
1948	20.8	8.2	8.4	11.6	22.6	30.0	30.0	32.3	2.3
1949	11.2	6.4	4.8	5.7	15.2	18.6	12.2	27.0	23.1
1950	15.6	6.2	7.7	7.2	27.4	27.6	--	15.2	19.0
1951	15.3	6.3	12.1	10.0	16.9	14.0	9.0	15.2	18.0
1952	7.8	2.0	5.0	13.4	14.7	17.1	7.1	14.6	12.5
1953	12.9	7.1	12.6	14.0	12.9	16.8	14.6	7.4	18.7
1954	25.1	7.4	20.4	10.9	20.8	25.1	22.6	27.4	21.1
1955	16.2	9.1	29.6	14.7	4.0	32.9	24.5	22.3	17.4
1956	<u>20.4</u>	<u>3.7</u>	<u>16.4</u>	<u>8.0</u>	<u>7.3</u>	<u>14.3</u>	<u>12.8</u>	<u>14.9</u>	<u>18.3</u>
Avg. Yield	11.6	7.0	12.5	10.7	14.1	15.8	15.5	20.9	17.2
Avg. Seeded Wheat Acreage	21	71	65	33	43	178	78	75	84

TABLE II, APPENDIX A. (Continued). WHEAT YIELDS PER SEEDED ACRE AND AVERAGE WHEAT YIELDS, STATE-OWNED CROPLAND, JUDITH BASIN AND FERGUS COUNTIES, MONTANA.

Year	Yield Series								
	19	20	21	22	23	24	25	26	27
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
1932									
1933									
1934									
1935									
1936									
1937					3.6			3.6	
1938	8.2	13.5	20.6	23.5	24.9			6.0	
1939	11.0	11.5	12.0	10.8	12.2	6.1		8.4	
1940	7.4	5.8	7.9	12.9	6.2	8.5		12.8	
1941	8.8	11.5	14.2	24.7	21.3	32.2	21.6	21.3	22.3
1942	10.7	11.5	--	30.5	21.7	32.1	17.1	18.9	11.7
1943	12.1	9.8	9.7	20.0	11.5	17.0	15.3	20.7	15.0
1944	21.6	14.0	16.6	17.9	17.3	19.3	6.3	7.2	12.0
1945	5.2	5.1	15.2	14.9	20.2	24.3	6.8	9.6	17.2
1946	11.6	10.6	13.8	16.0	10.7	20.1	12.2	--	14.6
1947	29.8	8.9	6.0	6.9	11.8	16.6	10.9	9.2	10.3
1948	3.8	16.2	23.2	18.3	26.2	29.6	14.4	17.0	43.8
1949	7.1	10.1	19.1	18.5	23.8	25.4	22.2	16.6	27.3
1950	--	10.8	41.7	19.7	11.2	18.7	17.8	8.7	24.2
1951	12.6	8.5	19.9	14.4	14.4	23.6	18.6	10.1	18.6
1952	6.4	7.8	16.7	8.6	12.0	10.2	11.7	10.6	15.0
1953	10.0	5.4	27.7	21.9	5.8	9.3	6.0	8.1	3.9
1954	9.4	6.4	2.7	6.2	9.5	0	0	0	0
1955	5.4	10.9	23.9	13.5	15.5	16.5	13.2	22.7	23.1
1956	--	5.6	11.2	10.8	10.4	13.3	10.8	--	13.4
Avg. Yield	10.6	9.7	16.8	16.3	14.5	17.9	12.8	11.7	17.0
Avg. Seeded Wheat Acreage	83	212	195	257	146	78	275	123	117

TABLE II, APPENDIX A. (Continued). WHEAT YIELDS PER SEEDED ACRE AND AVERAGE WHEAT YIELDS, STATE-OWNED CROPLAND, JUDITH BASIN AND FERGUS COUNTIES, MONTANA.

Year	Yield Series									
	28	29	30	31	32	33	34	35	36	37
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
1932										
1933										
1934										
1935										
1936										
1937				.7	3.6					
1938		22.9	7.0	8.3	14.2	25.6	13.0			13.7
1939	8.5	19.3	8.1	13.7	12.3	21.0	--			--
1940	15.9	18.8	3.4	7.2	8.7	10.2	11.7			0
1941	24.4	20.6	7.2	17.5	23.4	28.0	18.2		5.3	18.6
1942	36.6	28.1	5.1	22.2	19.9	35.8	10.3		13.6	27.6
1943	21.3	25.9	14.5	22.5	19.6	17.8	9.5	14.1	20.4	20.9
1944	19.6	25.1	17.9	22.3	14.9	23.8	28.5	21.2	21.9	23.4
1945	29.0	22.1	10.8	22.3	0	17.1	22.1	16.8	4.3	13.2
1946	15.5	19.1	13.3	16.4	6.4	10.3	13.2	4.4	9.9	18.1
1947	14.0	15.6	11.8	13.3	10.6	16.8	12.5	13.7	15.8	7.6
1948	19.5	--	16.1	25.7	17.1	26.2	21.2	20.7	13.7	23.9
1949	26.7	24.3	10.2	25.3	14.0	24.7	17.0	17.7	13.1	9.3
1950	18.0	15.6	15.5	29.5	12.4	16.1	7.9	5.9	18.3	19.8
1951	19.2	10.9	13.0	12.8	12.7	19.6	14.2	8.5	3.3	10.3
1952	20.2	14.8	13.9	18.0	10.3	14.8	23.0	16.0	17.2	21.5
1953	24.0	17.7	15.3	28.5	18.3	24.7	23.1	21.7	17.5	15.1
1954	10.2	19.0	13.8	29.1	18.4	33.0	28.6	19.2	8.3	18.0
1955	22.8	26.5	11.3	26.0	17.7	25.1	19.6	15.4	13.2	20.5
1956	8.5	14.1	8.2	19.6	13.3	23.5	8.2	13.1	15.9	13.6
Avg. Yield	19.7	20.0	11.4	19.0	13.4	21.8	16.8	14.9	13.2	16.4
Avg. Seeded Wheat Acreage	166	160	144	165	114	68	86	68	90	58

TABLE III, APPENDIX A. YIELD VARIATION BY YEARS, STATE-OWNED TRACTS OF GROPLAND, SHERIDAN AND ROOSEVELT COUNTIES, MONTANA.

Year	Observations	Mean Yield	Standard Deviation	Coefficient of Variation
	<u>Number</u>	<u>Bu.</u>	<u>Bu.</u>	<u>Pct.</u>
1938	15	5.1	1.70	33.3
1939	27	8.0	3.62	45.2
1940	35	11.0	5.21	47.4
1941	36	14.1	5.95	42.2
1942	41	17.6	6.81	38.7
1943	38	17.5	6.93	39.6
1944	43	17.4	4.98	28.6
1945	43	12.4	5.25	42.3
1946	41	9.8	4.67	47.6
1947	40	12.4	3.46	27.9
1948	42	11.6	5.23	45.1
1949	44	6.2	4.31	69.5
1950	44	19.6	5.60	28.6
1951	44	10.4	4.26	41.0
1952	42	9.4	4.58	48.7
1953	44	17.8	6.14	34.5
1954	44	10.0	4.34	43.4
1955	44	19.7	5.79	29.4
1956	38	9.6	4.12	42.9

TABLE IV, APPENDIX A. YIELD VARIATION BY YEARS, STATE-OWNED TRACTS OF CROPLAND, JUDITH BASIN AND FERGUS COUNTIES, MONTANA.

Year	Observations <u>Number</u>	Mean Yield <u>Bu.</u>	Standard Deviation <u>Bu.</u>	Coefficient of Variation <u>Pct.</u>
1937	15	3.3	1.73	49.1
1938	48	15.0	6.88	45.9
1939	45	10.9	5.13	47.1
1940	49	9.4	5.58	59.4
1941	57	16.1	7.85	48.8
1942	56	21.2	10.25	48.3
1943	59	16.8	8.06	48.0
1944	67	15.7	7.73	49.2
1945	63	15.2	8.28	54.5
1946	65	13.2	5.68	43.0
1947	63	10.3	5.50	53.4
1948	65	19.0	9.60	50.5
1949	63	15.6	7.22	46.3
1950	64	16.3	8.14	50.0
1951	68	13.9	5.62	40.4
1952	66	13.3	6.37	47.9
1953	63	15.8	6.94	43.9
1954	67	16.5	9.99	60.5
1955	66	19.7	8.09	41.1
1956	62	11.9	4.96	41.7

TABLE V, APPENDIX A. YIELD VARIATION ON 30 STATE-OWNED TRACTS OF CROP-  
LAND, SHERIDAN AND ROOSEVELT COUNTIES, MONTANA.

Yield Series No.	Range	Twsp.	Section	Years of Data	Mean Yield Bu.	Standard Deviation Bu.	Coefficient of Variation Pct.
1	53	37	16	15	17.5	6.30	36.0
2	54	37	16	18	13.7	5.39	39.3
3	55	37	36	17	13.8	6.16	44.6
4	58	37	4	16	12.8	5.74	44.8
5	52	36	32	17	9.7	5.77	59.5
6	54	36	16	17	11.9	6.12	51.4
7	57	36	36	17	11.8	6.63	56.2
8	51	35	23	17	13.4	7.49	55.9
9	52	35	36	17	17.1	6.90	40.3
10	53	35	16	16	13.8	6.19	44.8
11	53	35	3	17	11.1	5.43	48.9
12	56	34	16	19	11.2	7.26	64.8
13	57	34	16	21	11.4	7.03	61.7
14	58	34	36	19	11.5	5.75	50.0
15	55	33	36	18	13.9	6.32	45.5
16	57	33	16	19	14.0	7.13	50.9
17	58	33	16	19	11.2	4.38	39.1
18	58	32	16	18	12.4	6.20	50.0
19	59	32	16	17	15.1	7.14	47.3
20	55	31	36	19	17.3	7.22	41.7
21	57	31	36	17	14.9	6.40	42.9
22	58	31	16	19	14.6	5.57	38.1
23	59	31	16	17	6.2	3.01	48.5
24	56	30	36	19	14.4	6.76	46.9
25	54	29	16	17	11.7	7.73	66.1
26	56	29	27	17	15.1	6.73	44.6
27	59	29	16	19	15.7	6.43	40.9
28	58	28	16	17	8.5	3.73	43.9
29	58	28	36	16	14.5	6.93	47.8
30	57	27	10	15	13.2	6.89	52.2

TABLE VI, APPENDIX A. YIELD VARIATION ON 37 STATE-OWNED TRACTS OF CROPLAND, JUDITH BASIN AND FERGUS COUNTIES, MONTANA.

Yield Series No.	Range	Twsp.	Section	Years of Data	Mean Yield Bu.	Standard Deviation Bu.	Coefficient of Variation Pct.
1	20	22	35	19	13.4	7.00	52.2
2	21	17	36	22	18.8	9.48	50.4
3	21	19	16	20	14.4	5.34	37.1
4	13	19	21	18	29.3	10.15	34.6
5	13	19	35	17	16.2	5.11	31.5
6	13	19	36	20	19.5	7.36	37.7
7	15	19	36	20	17.8	9.67	54.3
8	16	19	16	17	20.0	9.10	45.5
9	16	19	36	18	21.0	9.48	45.1
10	18	19	36	18	11.6	6.69	57.7
11	22	19	36	17	7.0	3.86	55.1
12	9	18	16	18	12.5	6.88	55.0
13	10	18	35	17	10.7	4.69	42.8
14	11	18	36	20	14.1	7.08	50.2
15	13	18	16	24	15.8	9.54	60.4
16	13	18	14	19	15.5	9.22	59.5
17	13	18	36	18	20.9	8.66	41.4
18	17	18	16	16	17.2	8.69	50.5
19	10	17	28	17	10.6	6.18	58.3
20	11	17	30	19	9.7	3.05	31.4
21	11	17	13	18	16.8	8.75	52.1
22	12	17	4	19	16.3	6.19	38.0
23	12	17	34	20	14.5	6.44	44.4
24	12	17	25	18	17.9	8.78	49.0
25	13	17	19	16	12.8	5.86	45.8
26	13	17	8	18	11.7	6.24	53.3
27	13	17	16	16	17.0	9.78	57.5
28	14	17	16	18	19.7	7.00	35.5
29	13	16	31	18	20.0	4.67	23.3
30	12	15	36	19	11.4	3.89	34.1
31	13	15	36	20	19.0	7.68	40.4
32	15	15	36	20	13.4	5.62	41.9
33	16	14	16	19	21.8	6.67	30.6
34	15	13	36	18	16.8	6.41	38.1
35	15	12	5	14	14.9	5.27	35.4
36	15	12	12	16	13.2	5.46	41.4
37	16	12	36	18	16.4	6.57	40.1

TABLE I, APPENDIX B. YEARLY EXPENSES FOR A FARM UNIT CONSISTING OF A FOUR-MEMBER HOUSEHOLD AND A 1,640 CROP ACRE FIRM, BY AREAS, MONTANA.<sup>a/</sup>

Cost Item	Spring Wheat	Winter Wheat
	Area	Area
	<u>Dol.</u>	<u>Dol.</u>
Fuel, oil, grease, and repairs	1,037.00	1,082.00
Seed treatment	70.50	75.00
Weed spraying	1,025.00	1,025.00
Firm car expense	215.00	200.00
Pickup and truck expense	502.50	480.00
Insurance	200.00	206.00
Taxes	340.00	377.00
Hired labor	200.00	200.00
Board and room for hired labor	60.00	60.00
Telephone, heat and electricity	300.00	300.00
Supplies and miscellaneous	<u>400.00</u>	<u>400.00</u>
Firm fixed costs	4,350.00	4,405.00
Food	900.00	900.00
Insurance and medical costs	360.00	360.00
Telephone, heat and electricity	300.00	300.00
Household car expense	215.00	200.00
Clothes and miscellaneous expense	<u>600.00</u>	<u>600.00</u>
Household fixed costs	2,375.00	2,360.00
Farm unit fixed costs	<u>6,725.00</u>	<u>6,765.00</u>
Firm fixed costs per seeded acre	5.30	5.37
Household fixed costs per seeded acre	<u>2.90</u>	<u>2.88</u>
Farm unit fixed costs per seeded acre	8.20	8.25

<sup>a/</sup> These expenses are considered fixed for the assumed farm unit; they are the dollar requirements associated with a zero yield.

TABLE II, APPENDIX B. FARM UNIT NET CASH LOSS OR PROFIT AT VARIOUS YIELD LEVELS IN THE SPRING WHEAT AREA.

Farm Yield	Farm Unit Yield	Farm Unit Gross Income	Farm Unit Expense	Farm Unit Loss or Profit	Farm Unit Loss or Profit
Bu.	Bu. <sup>a/</sup>	Dol. <sup>b/</sup>	Dol. <sup>b/</sup>	Dol. <sup>b/</sup>	Dol. <sup>c/</sup>
0 - 2.1	0	0	8.200	-8.200	-6,724
2.2	1.650	2.485	8.650	-6.165	-5,055
2.3	1.725	2.600	8.670	-6.070	-4,977
2.4	1.800	2.710	8.700	-5.990	-4,912
2.5	1.875	2.820	8.720	-5.900	-4,838
2.6	1.950	2.940	8.740	-5.800	-4,756
2.7	2.025	3.050	8.770	-5.720	-4,690
2.8	2.100	3.160	8.790	-5.630	-4,617
2.9	2.175	3.280	8.820	-5.540	-4,543
3.0	2.250	3.390	8.840	-5.450	-4,469
3.1	2.325	3.500	8.860	-5.360	-4,395
3.2	2.400	3.615	8.890	-5.275	-4,325
3.3	2.475	3.730	8.910	-5.180	-4,248
3.4	2.550	3.840	8.930	-5.090	-4,172
3.5	2.625	3.950	8.960	-5.010	-4,108
3.6	2.700	4.070	8.980	-4.910	-4,026
3.7	2.775	4.180	9.010	-4.830	-3,961
3.8	2.850	4.290	9.030	-4.740	-3,887
3.9	2.925	4.405	9.050	-4.645	-3,809
4.0	3.000	4.520	9.080	-4.560	-3,739
4.1	3.075	4.630	9.100	-4.470	-3,665
4.2	3.150	4.740	9.120	-4.380	-3,592
4.3	3.225	4.860	9.140	-4.280	-3,510
4.4	3.300	4.970	9.160	-4.190	-3,436
4.5	3.375	5.080	9.180	-4.100	-3,362
4.6	3.450	5.200	9.200	-4.000	-3,280
4.7	3.525	5.310	9.220	-3.910	-3,206
4.8	3.600	5.420	9.240	-3.820	-3,132
4.9	3.675	5.535	9.260	-3.725	-3,055
5.0	3.750	5.650	9.280	-3.630	-2,977
5.1	3.825	5.760	9.300	-3.540	-2,903
5.2	3.900	5.870	9.320	-3.450	-2,829
5.3	3.975	5.990	9.345	-3.355	-2,751
5.4	4.050	6.100	9.370	-3.270	-2,681
5.5	4.125	6.210	9.390	-3.180	-2,608

<sup>a/</sup> See footnote at the end of Table.

<sup>b/</sup> See footnote at the end of Table.

<sup>c/</sup> See footnote at the end of Table.

TABLE II, APPENDIX B. (Continued). FARM UNIT NET CASH LOSS OR PROFIT AT VARIOUS YIELD LEVELS IN THE SPRING WHEAT AREA.

Farm Yield	Farm Unit Yield	Farm Unit Gross Income	Farm Unit Expense	Farm Unit Loss or Profit	Farm Unit Loss or Profit
Bu.	Bu. <sup>a/</sup>	Dol. <sup>b/</sup>	Dol. <sup>b/</sup>	Dol. <sup>b/</sup>	Dol. <sup>c/</sup>
5.6	4.200	6.325	9.410	-3.085	-2,530
5.7	4.275	6.440	9.430	-2.990	-2,452
5.8	4.350	6.550	9.450	-2.900	-2,378
5.9	4.425	6.660	9.470	-2.810	-2,304
6.0	4.500	6.780	9.490	-2.710	-2,222
6.1	4.575	6.890	9.510	-2.620	-2,148
6.2	4.650	7.000	9.530	-2.530	-2,075
6.3	4.725	7.120	9.550	-2.430	-1,993
6.4	4.800	7.230	9.565	-2.335	-1,915
6.5	4.875	7.340	9.580	-2.240	-1,837
6.6	4.950	7.455	9.595	-2.140	-1,755
6.7	5.025	7.570	9.610	-2.040	-1,673
6.8	5.100	7.680	9.625	-1.945	-1,595
6.9	5.175	7.790	9.640	-1.850	-1,517
7.0	5.250	7.910	9.655	-1.745	-1,431
7.1	5.325	8.020	9.670	-1.650	-1,353
7.2	5.400	8.130	9.685	-1.555	-1,275
7.3	5.475	8.250	9.700	-1.450	-1,189
7.4	5.550	8.360	9.715	-1.355	-1,111
7.5	5.625	8.470	9.730	-1.260	-1,033
7.6	5.700	8.585	9.745	-1.160	- 951
7.7	5.775	8.700	9.760	-1.060	- 869
7.8	5.850	8.810	9.775	-9.965	- 791
7.9	5.925	8.920	9.790	- .870	- 713
8.0	6.000	9.040	9.805	- .765	- 627
8.1	6.075	9.150	9.820	- .670	- 549
8.2	6.150	9.260	9.835	- .575	- 472
8.3	6.225	9.375	9.850	- .475	- 390
8.4	6.300	9.490	9.865	- .375	- 308
8.5	6.375	9.600	9.880	- .280	- 230
8.6	6.450	9.710	9.895	- .185	- 152
8.7	6.525	9.830	9.910	- .080	- 66
8.8	6.600	9.940	9.925	+ .015	+ 12
8.9	6.675	10.050	9.940	+ .110	+ 90

<sup>a/</sup> The farm unit yield is three fourths of the farm yield.

<sup>b/</sup> Operators income, expense, and loss or profit are in terms of dollars per seeded acre.

<sup>c/</sup> Operator loss or profit in this column is calculated by multiplying the operator loss or profit per seeded acre by the number of seeded acres (820).

TABLE III, APPENDIX B. FARM UNIT NET CASH LOSS OR PROFIT AT VARIOUS YIELD LEVELS IN THE WINTER WHEAT AREA.

Farm Yield Bu.	Farm Unit Yield	Farm Unit Gross Income	Farm Unit Expense	Farm Unit Loss or Profit	Farm Unit Loss or Profit
	Bu. <sup>a/</sup>	Dol. <sup>b/</sup>	Dol. <sup>b/</sup>	Dol. <sup>b/</sup>	Dol. <sup>c/</sup>
0 - 2.2	0	0	8.25	-8.25	-6,765
2.3	1.53	2.20	8.68	-6.48	-5,314
2.4	1.60	2.30	8.70	-6.40	-5,248
2.5	1.67	2.40	8.73	-6.33	-5,191
2.6	1.73	2.48	8.75	-6.27	-5,141
2.7	1.80	2.58	8.77	-6.19	-5,076
2.8	1.87	2.68	8.80	-6.12	-5,018
2.9	1.93	2.77	8.82	-6.05	-4,961
3.0	2.00	2.87	8.84	-5.97	-4,895
3.1	2.07	2.97	8.87	-5.90	-4,838
3.2	2.13	3.06	8.89	-5.83	-4,781
3.3	2.20	3.16	8.92	-5.76	-4,723
3.4	2.27	3.26	8.94	-5.68	-4,658
3.5	2.33	3.34	8.96	-5.62	-4,608
3.6	2.40	3.44	8.99	-5.55	-4,551
3.7	2.47	3.54	9.01	-5.47	-4,485
3.8	2.53	3.63	9.03	-5.40	-4,428
3.9	2.60	3.73	9.06	-5.33	-4,371
4.0	2.67	3.83	9.08	-5.25	-4,305
4.1	2.73	3.92	9.10	-5.18	-4,248
4.2	2.80	4.02	9.13	-5.11	-4,190
4.3	2.87	4.12	9.15	-5.03	-4,125
4.4	2.93	4.20	9.17	-4.97	-4,075
4.5	3.00	4.30	9.19	-4.89	-4,010
4.6	3.07	4.40	9.21	-4.81	-3,944
4.7	3.13	4.49	9.23	-4.74	-3,887
4.8	3.20	4.59	9.25	-4.66	-3,821
4.9	3.27	4.69	9.27	-4.58	-3,756
5.0	3.33	4.78	9.29	-4.51	-3,698
5.1	3.40	4.88	9.31	-4.43	-3,633
5.2	3.47	4.98	9.33	-4.35	-3,567
5.3	3.53	5.06	9.35	-4.29	-3,518
5.4	3.60	5.17	9.37	-4.20	-3,444

<sup>a/</sup> See footnote at the end of Table.

<sup>b/</sup> See footnote at the end of Table.

<sup>c/</sup> See footnote at the end of Table.

TABLE III, APPENDIX B. FARM UNIT NET CASH LOSS OR PROFIT AT VARIOUS YIELD LEVELS IN THE WINTER WHEAT AREA.

Farm Yield	Farm Unit Yield	Farm Unit Gross Income	Farm Unit Expense	Farm Unit Loss or Profit	Farm Unit Loss or Profit
Bu.	Bu. a/	Dol. b/	Dol. b/	Dol. b/	Dol. c/
5.5	3.67	5.27	9.39	-4.12	-3,378
5.6	3.73	5.35	9.40	-4.05	-3,321
5.7	3.80	5.45	9.42	-3.97	-3,255
5.8	3.87	5.55	9.44	-3.89	-3,190
5.9	3.93	5.64	9.46	-3.82	-3,132
6.0	4.00	5.74	9.48	-3.74	-3,067
6.1	4.07	5.84	9.50	-3.66	-3,001
6.2	4.13	5.93	9.52	-3.59	-2,944
6.3	4.20	6.03	9.54	-3.51	-2,878
6.4	4.27	6.13	9.56	-3.43	-2,813
6.5	4.33	6.21	9.58	-3.37	-2,763
6.6	4.40	6.31	9.60	-3.29	-2,698
6.7	4.47	6.41	9.62	-3.21	-2,632
6.8	4.53	6.50	9.63	-3.13	-2,567
6.9	4.60	6.60	9.65	-3.05	-2,501
7.0	4.67	6.70	9.66	-2.96	-2,427
7.1	4.73	6.79	9.67	-2.88	-2,362
7.2	4.80	6.89	9.68	-2.79	-2,288
7.3	4.87	6.99	9.70	-2.71	-2,222
7.4	4.93	7.07	9.71	-2.64	-2,165
7.5	5.00	7.17	9.72	-2.55	-2,091
7.6	5.07	7.27	9.73	-2.46	-2,017
7.7	5.13	7.36	9.75	-2.39	-1,960
7.8	5.20	7.46	9.76	-2.30	-1,886
7.9	5.27	7.56	9.77	-2.21	-1,812
8.0	5.33	7.65	9.78	-2.13	-1,747
8.1	5.40	7.75	9.80	-2.05	-1,681
8.2	5.47	7.85	9.81	-1.96	-1,607
8.3	5.53	7.93	9.82	-1.89	-1,550
8.4	5.60	8.03	9.83	-1.80	-1,476
8.5	5.67	8.14	9.85	-1.71	-1,402
8.6	5.73	8.22	9.86	-1.64	-1,345
8.7	5.80	8.32	9.87	-1.55	-1,271
8.8	5.87	8.42	9.89	-1.47	-1,205
8.9	5.93	8.51	9.90	-1.39	-1,140
9.0	6.00	8.61	9.91	-1.30	-1,066

a/ See footnote at the end of Table.

b/ See footnote at the end of Table.

c/ See footnote at the end of Table.

TABLE III, APPENDIX B. (Continued). FARM UNIT NET CASH LOSS OR PROFIT AT VARIOUS YIELD LEVELS IN THE WINTER WHEAT AREA.

Farm Yield Bu.	Farm Unit Yield	Farm Unit Gross Income	Farm Unit Expense	Farm Unit Loss or Profit	Farm Unit Loss or Profit
	Bu. <sup>a/</sup>	Dol. <sup>b/</sup>	Dol. <sup>b/</sup>	Dol. <sup>b/</sup>	Dol. <sup>c/</sup>
9.1	6.07	8.71	9.92	-1.21	- 992
9.2	6.13	8.80	9.94	-1.14	- 935
9.3	6.20	8.90	9.95	-1.05	- 861
9.4	6.27	9.00	9.96	- .96	- 787
9.5	6.33	9.08	9.97	- .89	- 730
9.6	6.40	9.18	9.99	- .81	- 664
9.7	6.47	9.28	10.00	- .72	- 590
9.8	6.53	9.37	10.01	- .64	- 525
9.9	6.60	9.47	10.02	- .55	- 451
10.0	6.67	9.57	10.04	- .47	- 385
10.1	6.73	9.66	10.05	- .39	- 320
10.2	6.80	9.76	10.06	- .30	- 246
10.3	6.87	9.86	10.07	- .21	- 172
10.4	6.93	9.94	10.08	- .14	- 115
10.5	7.00	10.04	10.10	- .06	- 49
10.6	7.07	10.14	10.11	+ .03	+ 25

<sup>a/</sup> The farm unit yield is two thirds of the farm yield.

<sup>b/</sup> Operators income, expense, and loss or profit are in terms of dollars per seeded acre.

<sup>c/</sup> Operator loss or profit in this column was calculated by multiplying the operator loss or profit per seeded acre by the number of seeded acres (820).

TABLE IV, APPENDIX B. DOLLAR RESERVE REQUIREMENTS FOR SURVIVAL IN THE SHORT RUN FOR VARIOUS YIELD COMBINATIONS, SPRING WHEAT AREA.

Three-year Yield Combination a/	Reserves Required Year One	Reserves Required Year Two	Reserves Required Year Three	Reserves Required Years One and Two	Reserves Required Years One, Two and Three
	<u>Dol.</u>	<u>Dol.</u>	<u>Dol.</u>	<u>Dol.</u>	<u>Dol.</u>
111	6,724	6,724	6,724	13,448	20,172
112	6,724	6,724	4,349	13,448	17,797
113	6,724	6,724	2,174	13,448	15,622
114	6,724	6,724	0	13,448	13,448
121	6,724	4,349	6,724	11,073	17,797
122	6,724	4,349	4,349	11,073	15,422
123	6,724	4,349	2,174	11,073	13,247
124	6,724	4,349	0	11,073	11,073
131	6,724	2,174	6,724	8,898	15,622
132	6,724	2,174	4,349	8,898	13,247
133	6,724	2,174	2,174	8,898	11,072
134	6,724	2,174	0	8,898	8,898
141	6,724	0	6,724	6,724	13,448
142	6,724	0	4,349	6,724	11,073
143	6,724	0	2,174	6,724	8,898
144	6,724	0	0	6,724	6,724
211	4,349	6,724	6,724	11,073	17,797
212	4,349	6,724	4,349	11,073	15,422
213	4,349	6,724	2,174	11,073	13,247
214	4,349	6,724	0	11,073	11,073
221	4,349	4,349	6,724	8,698	15,422
222	4,349	4,349	4,349	8,698	13,047
223	4,349	4,349	2,174	8,698	10,872
224	4,349	4,349	0	8,698	8,698
231	4,349	2,174	6,724	6,523	13,247
232	4,349	2,174	4,349	6,523	10,872
233	4,349	2,174	2,174	6,523	8,697
234	4,349	2,174	0	6,523	6,523
241	4,349	0	6,724	4,349	11,073
242	4,349	0	4,349	4,349	8,698
243	4,349	0	2,174	4,349	6,523
244	4,349	0	0	4,349	4,349

a/ See footnote at the end of Table.

TABLE IV, APPENDIX B. (Continued). DOLLAR RESERVE REQUIREMENTS FOR SURVIVAL IN THE SHORT RUN FOR VARIOUS YIELD COMBINATIONS, SPRING WHEAT AREA.

Three-year Yield Combination a/	Reserves Required Year One <u>Dol.</u>	Reserves Required Year Two <u>Dol.</u>	Reserves Required Year Three <u>Dol.</u>	Reserves Required Years One and Two <u>Dol.</u>	Reserves Required Years One, Two and Three <u>Dol.</u>
311	2,174	6,724	6,724	8,898	15,622
312	2,174	6,724	4,349	8,898	13,247
313	2,174	6,724	2,174	8,898	11,072
314	2,174	6,724	0	8,898	8,898
321	2,174	4,349	6,724	6,523	13,247
322	2,174	4,349	4,349	6,523	10,872
323	2,174	4,349	2,174	6,523	8,697
324	2,174	4,349	0	6,523	6,523
331	2,174	2,174	6,724	4,348	11,072
332	2,174	2,174	4,349	4,348	8,697
333	2,174	2,174	2,174	4,348	6,522
334	2,174	2,174	0	4,348	4,348
341	2,174	0	6,724	2,174	8,898
342	2,174	0	4,349	2,174	6,523
343	2,174	0	2,174	2,174	4,348
344	2,174	0	0	2,174	2,174
411	0	6,724	6,724	6,724	13,448
412	0	6,724	4,349	6,724	11,073
413	0	6,724	2,174	6,724	8,898
414	0	6,724	0	6,724	6,724
421	0	4,349	6,724	4,349	11,073
422	0	4,349	4,349	4,349	8,698
423	0	4,349	2,174	4,349	6,523
424	0	4,349	0	4,349	4,349
431	0	2,174	6,724	2,174	8,898
432	0	2,174	4,349	2,174	6,523
433	0	2,174	2,174	2,174	4,348
434	0	2,174	0	2,174	2,174
441	0	0	6,724	0	6,724
442	0	0	4,349	0	4,349
443	0	0	2,174	0	2,174
444	0	0	0	0	0

a/ The farm yields associated with the numerals in this column are: 1 = 0 bushels; 2 = 3.1 to 3.2 bushels; 3 = 6.0 to 6.1 bushels; 4 = 8.8 bushels per seeded acre. At the 8.8 bushel yield income to the farm unit covers the cash expenses of the firm and household. The first digit in this column is the year one yield, the second digit is the year two yield, and the third digit is the year three yield.

TABLE V, APPENDIX B. DOLLAR RESERVE REQUIREMENTS FOR SURVIVAL IN THE SHORT RUN FOR VARIOUS YIELD COMBINATIONS, WINTER WHEAT AREA.

Three-year Yield Combination a/	Reserves Required Year One Dol.	Reserves Required Year Two Dol.	Reserves Required Year Three Dol.	Reserves Required Years One and Two Dol.	Reserves Required Years One, Two and Three Dol.
111	6,765	6,765	6,765	13,530	20,295
112	6,765	6,765	4,405	13,530	17,935
113	6,765	6,765	2,203	13,530	15,733
114	6,765	6,765	0	13,530	13,530
121	6,765	4,405	6,765	11,170	17,935
122	6,765	4,405	4,405	11,170	15,575
123	6,765	4,405	2,203	11,170	13,373
124	6,765	4,405	0	11,170	11,170
131	6,765	2,203	6,765	8,968	15,733
132	6,765	2,203	4,405	8,968	13,373
133	6,765	2,203	2,203	8,968	11,171
134	6,765	2,203	0	8,968	8,968
141	6,765	0	6,765	6,765	13,530
142	6,765	0	4,405	6,765	11,170
143	6,765	0	2,203	6,765	8,968
144	6,765	0	0	6,765	6,765
211	4,405	6,765	6,765	11,170	17,935
212	4,405	6,765	4,405	11,170	15,575
213	4,405	6,765	2,203	11,170	13,373
214	4,405	6,765	0	11,170	11,170
221	4,405	4,405	6,765	8,810	15,575
222	4,405	4,405	4,405	8,810	13,215
223	4,405	4,405	2,203	8,810	11,013
224	4,405	4,405	0	8,810	8,810
231	4,405	2,203	6,765	6,608	13,373
232	4,405	2,203	4,405	6,608	11,013
233	4,405	2,203	2,203	6,608	8,811
234	4,405	2,203	0	6,608	6,608
241	4,405	0	6,765	4,405	11,170
242	4,405	0	4,405	4,405	8,810
243	4,405	0	2,203	4,405	6,608
244	4,405	0	0	4,405	4,405
311	2,203	6,765	6,765	8,968	15,733
312	2,203	6,765	6,765	8,968	13,373
313	2,203	6,765	2,203	8,968	11,171

a/ See footnote at the end of Table.

TABLE V, APPENDIX B. (Continued). DOLLAR RESERVE REQUIREMENTS FOR SURVIVAL IN THE SHORT RUN FOR VARIOUS YIELD COMBINATIONS, WINTER WHEAT AREA.

Three-year Yield Combination a/	Reserves Required Year One Dol.	Reserves Required Year Two Dol.	Reserves Required Year Three Dol.	Reserves Required Years One and Two Dol.	Reserves Required Years One, Two and Three Dol.
314	2,203	6,765	0	8,968	8,968
321	2,203	4,405	6,765	6,608	13,373
322	2,203	4,405	4,405	6,608	11,013
323	2,203	4,405	2,203	6,608	8,811
324	2,203	4,405	0	6,608	6,608
331	2,203	2,203	6,765	4,406	11,171
332	2,203	2,203	4,405	4,406	8,811
333	2,203	2,203	2,203	4,406	6,609
334	2,203	2,203	0	4,406	4,406
341	2,203	0	6,765	2,203	8,968
342	2,203	0	4,405	2,203	6,608
343	2,203	0	2,203	2,203	4,406
344	2,203	0	0	2,203	2,203
411	0	6,765	6,765	6,765	13,530
412	0	6,765	4,405	6,765	11,170
413	0	6,765	2,203	6,765	8,968
414	0	6,765	0	6,765	6,765
421	0	4,405	6,765	4,405	11,170
422	0	4,405	4,405	4,405	8,810
423	0	4,405	2,203	4,405	6,608
424	0	4,405	0	4,405	4,405
431	0	2,203	6,765	2,203	8,968
432	0	2,203	4,405	2,203	6,608
433	0	2,203	2,203	2,203	4,406
434	0	2,203	0	2,203	2,203
441	0	0	6,765	0	6,765
442	0	0	4,405	0	4,405
443	0	0	2,203	0	2,203
444	0	0	0	0	0

a/ The farm yields associated with the numerals are: 1 = 0 bushels; 2 = 3.8 to 3.9 bushels; 3 = 7.3 to 7.4 bushels; 4 = 10.5 bushels per seeded acre. At the 10.5 bushel yield income to the farm unit covers the cash expenses of the farm and household. The first digit in this column is the year one yield; the second digit is the year two yield, and the third digit is the year three yield.

TABLE I, APPENDIX C. MAXIMUM RESERVES, IN DOLLARS, REQUIRED AT ANY ONE TIME FOR SURVIVAL UNDER SHORT RUN CONDITIONS FOR EACH YIELD SERIES, SPRING WHEAT AREA.

Yield Series	Years of Data	Average Yield	Standard Deviation	Coefficient of Variation	Max. Reserves Required for Survival
No.	Yrs.	Bu.	Bu.	Pct.	Dol.
1	15	17.5	6.30	36.0	472
20	19	17.3	7.22	41.7	3,436
9	17	17.1	6.90	40.3	6,724
27	19	15.7	6.43	40.9	3,296
19	17	15.1	7.14	47.3	5,384
26	17	15.1	6.73	44.6	2,304
21	17	14.9	6.40	42.9	6,724
22	19	14.6	5.57	38.1	3,830
29	16	14.5	6.93	47.8	3,375
24	19	14.4	6.76	46.9	8,117
Average	17.5	15.6	6.64	42.65 (42.56)	4,366
16	19	14.0	7.13	50.9	6,346
15	18	13.9	6.32	45.5	6,724
10	16	13.8	6.19	44.8	2,148
3	17	13.8	6.16	44.6	5,286
2	18	13.7	5.39	39.3	4,334
8	17	13.4	7.49	55.9	4,838
30	15	13.2	6.89	52.2	6,724
4	16	12.8	5.74	44.8	5,234
18	18	12.4	6.20	50.0	6,724
6	17	11.9	6.12	51.4	6,724
Average	17.1	13.3	6.36	47.94 (47.82)	5,508
7	17	11.8	6.63	56.2	5,837
25	17	11.7	7.73	66.1	9,909
14	19	11.5	5.75	50.0	4,590
13	21	11.4	7.03	61.7	15,970
12	19	11.2	7.26	64.8	9,577
17	19	11.2	4.38	39.1	4,588
11	17	11.1	5.43	48.9	8,241
5	17	9.7	5.77	59.5	13,171
28	17	8.5	3.73	43.9	11,201
23	17	6.2	3.01	48.5	35,550
Average	18.9	10.4	5.67	53.87 (54.52)	11,953
All Series Average	17.5	13.1	6.22	48.15 (47.48)	7,276

TABLE II, APPENDIX C. MAXIMUM RESERVES, IN DOLLARS, REQUIRED AT ANY ONE TIME FOR SURVIVAL UNDER SHORT RUN CONDITIONS FOR EACH YIELD SERIES, WINTER WHEAT AREA.

Yield Series	Years of Data	Average Yield	Standard Deviation	Coefficient of Variation	Max. Reserves Required for Survival
<u>No.</u>	<u>Yrs.</u>	<u>Bu.</u>	<u>Bu.</u>	<u>Pct.</u>	<u>Dol.</u>
4	18	29.3	10.15	34.6	935
33	19	21.8	6.67	30.6	246
9	18	21.0	9.48	45.1	0
17	18	20.9	8.66	41.4	2,165
8	17	20.0	9.10	45.5	11,423
29	18	20.0	4.67	23.3	0
28	18	19.7	7.00	35.5	1,402
6	20	19.5	7.36	37.7	4,781
31	20	19.0	7.68	40.4	8,315
2	22	18.8	9.48	50.4	9,709
24	18	17.9	8.78	49.0	7,872
7	20	17.8	9.67	54.3	11,357
Average	18.83	20.5	8.225	40.65 (40.12)	4,850
18	16	17.2	8.69	50.5	11,310
27	16	17.0	9.78	57.5	11,136
21	18	16.8	8.75	52.1	5,076
34	18	16.8	6.41	38.1	1,812
37	18	16.4	6.57	40.1	6,765
22	19	16.3	6.19	38.0	2,944
5	17	16.2	5.11	31.5	2,944
15	24	15.8	9.54	60.4	26,552
16	19	15.5	9.22	59.5	7,929
35	14	14.9	5.27	35.4	4,534
23	20	14.5	6.44	44.4	4,551
3	20	14.4	5.34	37.1	11,144
14	20	14.1	7.08	50.2	6,765
Average	18.38	15.8	7.26	45.75 (45.95)	7,959

TABLE II, APPENDIX C. (Continued). MAXIMUM RESERVES, IN DOLLARS, REQUIRED AT ANY ONE TIME FOR SURVIVAL UNDER SHORT RUN CONDITIONS FOR EACH YIELD SERIES, WINTER WHEAT AREA.

Yield Series	Years of Data	Average Yield	Standard Deviation	Coefficient of Variation	Max. Reserves Required for Survival
<u>No.</u>	<u>Yrs.</u>	<u>Bu.</u>	<u>Bu.</u>	<u>Pct.</u>	<u>Dol.</u>
1	19	13.4	7.00	52.2	6,621
32	20	13.4	5.62	41.9	9,578
36	16	13.2	5.46	41.4	4,723
25	16	12.8	5.86	45.8	9,832
12	18	12.5	6.88	55.0	11,455
26	18	11.7	6.24	53.3	10,012
10	18	11.6	6.69	57.7	20,350
30	19	11.4	3.89	34.1	14,687
13	17	10.7	4.69	43.8	12,039
19	17	10.6	6.18	58.3	12,706
20	19	9.7	3.05	31.4	13,270
11	17	7.0	3.86	55.1	41,061
Average	17.83	11.5	5.45	47.50 (47.39)	13,861
Over-all Average	18.35	15.9	6.99	44.66 (43.96)	8,865

TABLE III. APPENDIX C. YIELD SERIES 19, SPRING WHEAT AREA HIGH YIELD GROUP, CASH AND GRAIN RESERVES EQUIVALENT TO \$6,724 AT THE BEGINNING OF THE PERIOD.

Farm Yield	Farm Unit Yield	Farm Unit		Firm Net Inc. Before Inc. Taxes	Cash Reserve a/		Grain Reserve b/		Grain Reserve c/	
		Gross Income Per Acre	Firm Expense Per Acre		Farm Unit Net Cash Income	Yearly Surplus	Farm Unit Net Cash Income	Yearly Surplus	Farm Unit Net Cash Income	Yearly Surplus
		Dol.	Dol.		Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
7.8	5.850	8.81	10.91	- 1,722	- 792	0	- 792	0	- 792	0
24.6	18.450	27.79	11.90	13,030	11,857	11,065	11,271	11,271	11,271	11,271
10.7	8.025	12.09	11.20	730	1,660	1,660	1,660	1,660	1,660	1,660
25.9	19.425	29.26	11.96	14,186	12,713	12,713	12,713	12,713	12,713	12,713
19.6	14.700	22.14	11.65	8,602	8,439	8,439	8,439	8,439	8,439	8,439
14.2	10.650	16.04	11.38	3,821	4,574	4,574	4,574	4,574	4,574	4,574
11.3	8.475	12.76	11.23	1,255	2,185	2,185	2,185	2,185	2,185	2,185
13.9	10.425	15.70	11.36	3,559	4,369	4,369	4,369	4,369	4,369	4,369
8.2	6.150	9.26	10.97	- 1,402	- 472	0	- 472	0	- 472	0
2.4	1.800	2.71	9.83	- 5,838	- 4,908	0	- 4,908	0	- 4,908	0
15.5	11.625	17.51	11.44	4,977	5,492	112	527	527	3,830	3,830
9.5	7.125	10.73	11.14	- 336	594	594	594	594	594	594
14.4	10.800	16.27	11.39	4,002	4,711	4,711	4,711	4,711	3,830	3,830
26.4	19.800	29.82	11.99	14,621	12,939	12,939	12,939	12,939	11,445	11,445
13.1	9.825	14.80	11.32	2,854	3,784	3,784	3,784	3,784	3,784	3,784
28.0	21.000	31.63	12.07	16,039	14,058	14,058	14,058	14,058	14,058	14,058
11.8	8.850	13.33	11.26	1,697	2,627	2,627	2,627	2,627	2,627	2,627
7.1	5.325	8.02	10.80	- 2,280	- 1,350	0	- 1,350	0	- 1,350	0
9.2	6.900	10.39	11.12	- 599	331	0	331	0	331	331
Cumulative Total						83,830	84,451	84,451	85,710	

a/ Reserve held as cash in the bank. At the end of the period this reserve has a value of \$5,705.

b/ Reserve held as grain in storage, rapid replacement. At the end of the period this reserve has a value of \$5,705.

c/ Reserve held as grain in storage, replacement on high yield years. At the end of the period this reserve has a value of \$5,374.

TABLE IV, APPENDIX C. YIELD SERIES THREE, SPRING WHEAT AREA MEAN YIELD GROUP, CASH AND GRAIN RESERVES EQUIVALENT TO \$6,724 AT THE BEGINNING OF THE PERIOD

Farm Yield	Farm Unit Yield	Farm Unit			Cash Reserve a/		Grain Reserve b/		Grain Reserve c/		
		Gross Income	Firm Expense	Firm Net Inc.	Farm Unit Net Cash	Yearly Surplus	Farm Unit Net Cash	Yearly Surplus	Farm Unit Net Cash	Yearly Surplus	
		Per Acre	Per Acre	Before Inc. Taxes	Income	Dol.	Income	Dol.	Income	Dol.	
Bu.	Bu.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.		
11.8	8.850	13.33	11.26	1,697	2,627	2,627	2,627	2,627	2,627	2,627	
10.1	7.575	11.41	11.17	197	1,127	1,127	1,127	1,127	1,127	1,127	
14.3	10.725	16.15	11.38	3,911	4,639	4,639	4,639	4,639	4,639	4,639	
20.0	15.000	22.59	11.67	8,954	8,720	8,720	8,720	8,720	8,720	8,720	
14.0	10.500	15.81	11.37	3,641	4,434	4,434	4,434	4,434	4,434	4,434	
5.1	3.825	5.76	10.43	- 3,829	- 2,899	0	- 2,899	0	- 2,899	0	
6.2	4.650	7.00	10.66	- 3,001	- 2,071	0	- 2,071	0	- 2,071	0	
8.4	6.300	9.49	11.00	- 1,238	- 308	0	- 308	0	- 308	0	
11.8	8.850	13.33	11.26	1,697	2,627	0	0	0	2,627	2,627	
6.9	5.175	7.79	10.77	- 2,444	- 1,514	0	- 1,514	0	- 1,514	0	
24.1	18.075	27.22	11.87	12,587	11,531	7,366	8,295	8,295	6,165	6,165	
8.7	6.525	9.83	11.04	- 992	- 62	0	- 62	0	- 62	0	
19.4	14.550	21.91	11.64	8,421	8,294	8,232	8,244	8,244	8,244	8,244	
18.9	14.175	21.35	11.61	7,987	7,943	7,943	7,943	7,943	7,943	7,943	
12.8	9.600	14.46	11.31	2,583	3,513	3,513	3,513	3,513	3,513	3,513	
27.4	20.550	30.95	12.04	15,506	13,677	13,677	13,677	13,677	13,677	13,677	
14.0	10.500	15.81	11.37	3,641	4,434	4,434	4,434	4,434	4,434	4,434	
6.6	4.950	7.46	10.73	- 2,681	- 1,751	0	- 1,751	0	- 1,751	0	
11.9	8.925	13.44	11.26	788	2,718	967	967	967	2,718	2,718	
Cumulative Total						67,679		68,620		70,868	

a/ Reserve held as cash in the bank, At the end of the period this reserve has a value of \$6,724.

b/ Reserve held as grain in storage, rapid replacement, At the end of the period this reserve has a value of \$6,724.

c/ Reserve held as grain in storage, replacement on high yield years. At the end of the period this reserve has a value of \$4,973.

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TABLE V, APPENDIX C. YEILD SERIES 12, SPRING WHEAT AREA LOW YIELD GROUP, CASH AND GRAIN RESERVES EQUIVALENT TO \$10,086 AT THE BEGINNING OF THE PERIOD

Farm Yield	Farm Unit Yield	Farm Unit Gross Income Per Acre	Firm Expense Per Acre	Firm Net Inc. Before Inc. Taxes	Cash Reserve a/		Grain Reserve b/		Grain Reserve c/	
					Farm Unit Net Cash Income	Yearly Surplus	Farm Unit Net Cash Income	Yearly Surplus	Farm Unit Net Cash Income	Yearly Surplus
Bu.	Bu.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
3.0	2.250	3.39	9.97	- 5,396	- 4,466	0	- 4,466	0	- 4,466	0
3.1	2.325	3.50	9.99	- 5,322	- 4,392	0	- 4,392	0	- 4,392	0
7.9	5.925	8.92	10.92	1,640	2,570	0	0	0	2,570	2,570
14.7	11.025	16.60	11.40	4,264	4,914	0	0	0	3,830	3,830
18.7	14.025	21.12	11.60	7,806	7,800	6,426	6,916	6,916	3,830	3,830
16.2	12.150	18.30	11.48	5,592	5,999	5,999	5,999	5,999	3,913	3,913
9.8	7.350	11.07	11.16	- 74	856	856	856	856	856	856
4.2	3.150	4.74	10.25	- 4,518	- 3,588	0	- 3,588	0	- 3,588	0
6.5	4.875	7.34	10.71	- 2,763	- 1,833	0	- 1,833	0	- 1,833	0
10.1	7.575	11.41	11.17	197	1,127	0	0	0	1,127	1,127
11.8	8.850	13.33	11.26	1,697	2,627	0	0	0	2,647	2,647
1.3	0	0	9.33	- 7,651	- 6,724	0	- 6,724	0	- 6,724	0
19.0	14.250	21.46	11.62	8,069	8,010	0	608	608	3,830	3,830
13.9	10.425	15.70	11.36	3,559	4,369	3,988	4,369	4,369	3,830	3,830
14.0	10.500	15.81	11.37	3,641	4,434	4,434	4,434	4,434	3,830	3,830
24.0	18.000	27.11	11.87	12,497	11,497	11,464	11,464	11,464	7,086	7,086
0	0	0	9.33	- 7,651	- 6,724	0	- 6,724	0	- 6,724	0
26.1	19.575	29.48	11.97	14,358	12,821	6,097	7,662	7,662	7,662	7,662
9.2	6.900	10.39	11.12	- 599	331	331	331	331	331	331
13.7	10.275	15.48	11.35	3,387	4,232	4,232	4,232	4,232	4,232	4,232
16.4	12.300	18.53	11.49	5,773	6,146	6,146	6,146	6,146	6,146	6,146
Cumulative Total						49,973	53,017	53,017	55,720	

a/ Reserve held as cash in the bank. At the end of the period this reserve has a value of \$10,086.

b/ Reserve held as grain in storage, rapid replacement. At the end of the period this reserve has a value of \$10,086.

c/ Reserve held as grain in storage, replacement on high yield years. At the end of the period this reserve has a value of \$10,086.

TABLE VI, APPENDIX C. YIELD SERIES SIX, SPRING WHEAT AREA HIGH YIELD GROUP, CASH AND GRAIN RESERVES EQUIVALENT TO \$10,147 AT THE BEGINNING OF THE PERIOD.

Farm Yield	Farm Unit Yield	Farm Unit Gross Income Per Acre	Firm Expense Per Acre	Firm Net Inc. Before Inc. Taxes	Cash Reserve a/		Grain Reserve b/		Grain Reserve c/		
					Farm Unit Net Cash Income	Yearly Surplus	Farm Unit Net Cash Income	Yearly Surplus	Farm Unit Net Cash Income	Yearly Surplus	
Bu.	Bu.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	
3.2	2.133	3.06	10.97	- 6,486	- 4,779	0	- 4,779	0	- 4,779	0	
17.9	11.933	17.12	12.55	3,747	5,294	515	675	675	4,607	4,607	
11.4	7.600	10.90	12.23	- 1,091	616	616	616	616	6,215	616	
9.1	6.067	8.70	12.00	- 2,706	- 999	0	- 999	0	5,216	0	
19.5	13.000	18.65	12.63	4,936	6,238	5,239	5,439	5,439	4,607	4,607	
30.5	20.333	29.17	13.18	13,112	12,602	12,602	12,602	12,602	10,506	10,506	
19.9	13.267	19.03	12.65	5,232	6,480	6,480	6,480	6,480	6,480	6,480	
18.6	12.400	17.79	12.59	4,264	5,691	5,691	5,691	5,691	5,691	5,691	
25.9	17.267	24.77	12.95	9,692	10,090	10,090	10,090	10,090	10,090	10,090	
14.1	9.400	13.49	12.40	894	2,601	2,601	2,601	2,601	2,601	2,601	
15.5	10.333	14.83	12.43	1,968	3,675	3,675	3,675	3,675	3,675	3,675	
27.0	18.000	25.83	13.01	10,521	10,743	10,743	10,743	10,743	10,743	10,743	
20.7	13.800	19.80	12.69	5,830	6,970	6,970	6,970	6,970	6,970	6,970	
14.5	9.667	13.87	12.38	1,222	2,929	2,929	2,929	2,929	2,929	2,929	
22.0	14.667	21.04	12.76	6,790	7,757	7,757	7,757	7,757	7,757	7,757	
18.4	12.267	17.60	12.58	4,116	5,583	5,583	5,583	5,583	5,583	5,583	
22.1	14.733	21.14	12.76	6,872	7,824	7,824	7,824	7,824	7,824	7,824	
36.9	24.600	35.29	13.50	17,868	16,116	16,116	16,116	16,116	16,116	16,116	
17.3	11.533	16.55	12.52	3,305	4,974	4,974	4,974	4,974	4,974	4,974	
24.9	16.000	23.82	12.90	8,954	9,497	9,497	9,497	9,497	9,497	9,497	
36.5	24.333	34.91	13.48	17,573	15,909	15,909	15,909	15,909	15,909	15,909	
34.0	22.667	32.52	13.36	15,711	14,601	14,601	14,601	14,601	14,601	14,601	
Cumulative Total						150,412		150,772		151,776	

a/ Reserve held as cash in the bank. At the end of the period this reserve has a value of \$10,147.

b/ Reserve held as grain in storage, rapid replacement. At the end of the period this reserve has a value of \$10,147.

c/ Reserve held as grain in storage, replacement on high yield years. At the end of the period this reserve has a value of \$10,147.

TABLE VII, APPENDIX C. YIELD SERIES 16, SPRING WHEAT AREA MEAN YIELD GROUP, CASH AND GRAIN RESERVES EQUIVALENT TO \$13,530 AT THE BEGINNING OF THE PERIOD.

Farm Yield	Farm Unit Yield	Farm Unit Gross Income Per Acre	Firm Expense Per Acre	Firm Net Inc. Before Inc. Taxes	Cash Reserve a/		Grain Reserve b/		Grain Reserve b/		
					Farm Unit Net Cash Income	Yearly Surplus	Farm Unit Net Cash Income	Yearly Surplus	Farm Unit Net Cash Income	Yearly Surplus	
Bu.	Bu.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	
5.4	3.600	5.17	11.45	- 5,150	- 3,443	0	- 3,443	0	- 3,443	0	
3.7	2.467	3.54	11.09	- 6,191	- 4,484	0	- 4,484	0	- 4,484	0	
14.2	9.467	13.58	12.37	992	2,699	0	0	0	2,699	2,699	
20.1	13.400	19.23	12.66	5,387	6,608	1,380	1,866	1,866	4,607	4,607	
20.4	13.600	19.51	12.68	5,601	6,784	6,784	6,784	6,784	4,607	4,607	
31.4	20.933	30.03	13.23	13,776	13,186	13,186	13,186	13,186	11,144	11,144	
33.9	22.600	32.43	13.35	15,646	14,555	14,555	14,555	14,555	14,555	14,555	
11.5	7.667	11.00	12.23	- 1,009	698	698	698	698	698	698	
7.8	5.200	7.46	11.84	- 3,592	- 1,885	0	- 1,885	0	- 1,885	0	
10.8	7.200	10.33	12.20	- 1,533	174	0	0	0	174	174	
2.6	1.733	2.49	10.83	- 6,839	- 5,132	0	- 5,132	0	- 5,132	0	
30.0	20.000	28.70	13.16	12,743	12,423	5,580	7,026	7,026	6,891	6,891	
12.2	8.133	11.67	12.27	- 492	1,215	1,215	1,215	1,215	1,215	1,215	
9.0	6.000	8.61	11.99	- 2,772	- 1,065	0	- 1,065	0	- 1,065	0	
7.1	4.733	6.79	11.75	- 4,067	- 2,360	0	- 2,360	0	- 2,360	0	
14.6	9.733	13.96	12.39	1,287	2,994	0	0	0	2,994	2,994	
22.6	15.067	21.62	12.79	7,241	8,123	7,692	7,773	7,773	5,347	5,347	
24.5	16.333	23.43	12.88	8,651	9,255	9,255	9,255	9,255	9,255	9,255	
12.8	8.533	12.29	12.30	- 49	1,658	1,658	1,658	1,658	1,658	1,658	
11.7	7.800	11.19	12.24	- 861	846	846	846	846	846	846	
25.9	17.267	24.77	12.95	9,692	10,090	10,090	10,090	10,090	10,090	10,090	
Cumulative Total						72,939		74,952		76,780	

a/ Reserve held as cash in the bank. At the end of the period this reserve has a value of \$10,147.

b/ Reserve held as grain in storage, rapid replacement. At the end of the period this reserve has a value of \$10,147.

c/ Reserve held as grain in storage, replacement on high yield years. At the end of the period this reserve has a value of \$10,147.

TABLE VIII, APPENDIX C. YEILD SERIES 19, SPRING WHEAT AREA LOW YIELD GROUP, CASH AND GRAIN RESERVES EQUIVALENT TO \$13,530 AT THE BEGINNING OF THE PERIOD.

Farm Yield	Farm Unit Yield	Farm Unit	Firm	Firm	Cash Reserve a/		Grain Reserve b/		Grain Reserve c/	
		Gross Income Per Acre	Expense Per Acre	Net Inc. Before Inc. Taxes	Farm Unit Net Cash Income	Yearly Surplus	Farm Unit Net Cash Income	Yearly Surplus	Farm Unit Net Cash Income	Yearly Surplus
Bu.	Bu.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
8.2	5.467	7.84	11.89	- 3,321	- 1,614	0	- 1,614	0	- 1,614	0
11.0	7.333	10.52	12.21	- 1,386	321	0	0	0	321	321
7.4	4.933	7.08	11.79	- 3,862	- 2,155	0	- 2,155	0	- 2,155	0
8.8	5.867	8.42	11.97	- 2,911	- 1,204	0	- 1,204	0	- 1,204	0
10.7	7.133	10.23	12.19	- 1,607	100	0	0	0	100	100
12.1	8.067	11.57	12.26	- 566	1,141	0	0	0	1,141	1,141
21.6	14.400	20.66	12.74	6,494	7,515	4,104	4,758	4,758	4,607	4,607
5.2	3.467	4.97	11.41	- 5,281	- 3,574	0	- 3,574	0	- 3,574	0
11.6	7.733	11.09	12.24	- 943	764	0	0	0	764	764
29.8	19.867	28.50	13.15	12,587	12,308	9,498	10,157	10,157	9,327	9,327
3.8	2.533	3.63	11.11	- 6,134	- 4,427	0	- 4,427	0	- 4,427	0
7.1	4.733	6.79	11.75	- 4,067	- 2,360	0	- 2,360	0	- 2,360	0
12.6	8.400	12.05	12.29	- 197	1,510	0	0	0	1,510	1,510
6.4	4.267	6.12	11.64	- 4,526	- 2,819	0	- 2,819	0	- 2,819	0
10.0	6.667	9.57	12.12	- 2,091	- 384	0	- 384	0	- 384	0
9.4	6.267	8.99	12.04	- 2,501	- 794	0	- 794	0	- 794	0
5.4	3.600	5.17	11.45	- 5,150	- 3,443	0	- 3,443	0	- 3,443	0
18.9	12.600	18.08	12.60	4,494	5,890	0	0	0	4,607	4,607
24.1	16.067	23.05	12.86	8,356	9,019	2,192	3,547	3,547	4,607	4,607
Cumulative Total						15,794		18,462		26,143

a/ Reserve held as cash in the bank. At the end of the period this reserve has a value of \$13,530.

b/ Reserve held as grain in storage, rapid replacement, At the end of the period this reserve has a value of \$13,530.

c/ Reserve held as grain in storage, replacement on high yield years. At the end of the period this reserve has a value of \$13,530.

TABLE IX, APPENDIX C. YEAR-TO-YEAR NET WORTH OF A FARM UNIT REPRESENTED BY YIELD SERIES 19, SPRING WHEAT AREA.

Year	Liquid Reserve <sup>a/</sup>	Yearly Surplus	Value of Assets <sup>b/</sup>	Surplus for Investment	Value of Assets <sup>c/</sup>	Surplus for Investment
No.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
0	6,724	---	25,000	---	25,000	---
1	5,932	0	21,695	0	21,695	0
2	6,724	11,271	25,000	4,661	25,000	4,661
3	6,724	1,660	23,355	0	23,355	0
4	6,724	12,713	25,000	7,763	25,000	7,763
5	6,724	8,439	25,000	5,134	25,000	5,134
6	6,724	4,574	25,000	1,269	25,000	1,269
7	6,724	2,185	23,880	0	23,880	0
8	6,724	4,369	24,944	0	24,944	0
9	6,252	0	21,639	0	21,639	0
10	1,344	0	18,334	0	18,334	0
11	3,421	3,830	18,859	0	18,859	0
12	3,421	594	16,148	0	16,148	0
13	4,523	3,830	16,673	0	17,483	0
14	6,724	11,445	24,813	0	21,625	3,188
15	6,724	3,784	25,000	292	19,150	2,954
16	6,724	14,058	25,000	10,753	16,675	13,228
17	6,724	2,627	24,322	0	14,200	1,797
18	5,374	0	21,017	0	10,895	0
19	<u>5,374</u>	<u>331</u>	<u>18,043</u>	<u>0</u>	<u>7,921</u>	<u>0</u>
Ending Inventory	5,374	---	18,043	29,872	7,921	39,994

a/ The liquid reserve is held as grain in storage with replacement only from high yield years.

b/ Value of the machinery, equipment, and buildings of the firm and household. A full depreciation charge is subtracted each year.

c/ Value of the machinery, equipment, and buildings of the firm and household. Only the depreciation charge for buildings and household equipment is made in the later years.

TABLE X, APPENDIX C. YEAR-TO-YEAR NET WORTH OF A FARM UNIT REPRESENTED BY YIELD SERIES THREE, SPRING WHEAT AREA.

Year	Liquid Reserves <sup>a/</sup>	Yearly Surplus	Value of Assets <sup>b/</sup>	Surplus for Investment	Value of Assets <sup>c/</sup>	Surplus for Investment
No.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
0	6,724	---	25,000	---	25,000	---
1	6,724	2,627	24,322	0	24,322	0
2	6,724	1,127	22,144	0	22,144	0
3	6,724	4,639	23,478	0	23,478	0
4	6,724	8,720	25,000	3,893	25,000	3,893
5	6,724	4,434	25,000	1,129	25,000	1,129
6	3,825	0	21,695	0	21,695	0
7	1,754	0	18,390	0	18,390	0
8	1,446	0	15,085	0	15,085	0
9	1,446	2,627	14,407	0	14,407	0
10	68	0	11,102	0	11,102	0
11	6,724	6,165	13,962	0	13,962	0
12	6,662	0	10,657	0	10,657	0
13	6,724	8,244	15,596	0	16,496	0
14	6,724	7,943	20,234	0	21,625	0
15	6,724	3,513	20,442	0	19,150	1,292
16	6,724	13,677	25,000	5,814	16,675	12,847
17	6,724	4,434	25,000	1,129	14,200	3,604
18	6,724	0	21,695	0	10,895	0
19	4,973	2,718	21,108	0	9,250	1,058
Ending Inventory	4,973	---	21,108	11,965	9,250	23,823

<sup>a/</sup> The liquid reserve is held as grain in storage with replacement only from high yield years.

<sup>b/</sup> Value of the machinery, equipment, and buildings of the firm and household. A full depreciation charge is subtracted each year.

<sup>c/</sup> Value of the machinery, equipment and buildings of the firm and household. Only the depreciation charge for buildings and household equipment is made in the later years.

TABLE XI, APPENDIX C. YEAR-TO-YEAR NET WORTH OF A FARM UNIT REPRESENTED BY YIELD SERIES 12, SPRING WHEAT AREA.

Year	Liquid Reserve <sup>a/</sup>	Yearly Surplus	Value of Assets <sup>b/</sup>	Surplus for Investment	Value of Assets <sup>c/</sup>	Surplus for Investment
No.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
0	10,086	---	25,000	---	25,000	---
1	5,620	0	21,695	0	21,695	0
2	1,228	0	18,390	0	18,390	0
3	1,228	2,570	17,655	0	17,655	0
4	2,592	3,830	18,180	0	18,180	0
5	7,498	3,830	18,705	0	18,705	0
6	10,086	3,913	19,313	0	19,313	0
7	10,086	856	16,864	0	16,864	0
8	6,498	0	13,559	0	13,559	0
9	4,665	0	10,254	0	10,254	0
10	4,665	1,127	8,076	0	8,076	0
11	4,665	2,647	7,418	0	7,418	0
12	- 2,059	0	4,113	0	4,113	0
13	3,110	3,830	4,638	0	4,638	0
14	3,769	3,830	5,163	0	5,163	0
15	4,510	3,830	5,688	0	5,688	0
16	10,086	7,086	9,469	0	9,469	0
17	3,362	0	6,164	0	6,164	0
18	10,086	7,662	10,521	0	10,521	0
19	10,086	331	7,547	0	7,547	0
20	10,086	4,232	8,474	0	8,474	0
21	<u>10,086</u>	<u>6,146</u>	<u>11,315</u>	<u>0</u>	<u>9,250</u>	<u>2,065</u>
Ending Inventory	10,086	---	11,315	0	9,250	2,065

<sup>a/</sup> The liquid reserve is held as grain in storage with replacement only from high yield years.

<sup>b/</sup> Value of the machinery, equipment, and buildings of the firm and household. A full depreciation charge is subtracted each year.

<sup>c/</sup> Value of the machinery, equipment, and buildings of the firm and household. Only the depreciation charge for buildings and household equipment is made in the later years.

TABLE XII, APPENDIX C. YEAR-TO-YEAR NET WORTH OF A FARM UNIT REPRESENTED BY YIELD SERIES SIX, WINTER WHEAT AREA.

Year	Liquid Reserves <sup>a/</sup>	Yearly Surplus	Value of Assets <sup>b/</sup>	Surplus for Investment	Value of Assets <sup>c/</sup>	Surplus for Investment
No.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
0	10,147	---	30,500	---	30,500	---
1	5,368	0	26,433	0	26,433	0
2	6,215	4,607	26,973	0	26,973	0
3	6,215	616	23,522	0	23,522	0
4	5,216	0	19,455	0	19,455	0
5	7,252	4,607	19,955	0	19,995	0
6	10,147	10,506	26,434	0	26,434	0
7	10,147	6,480	28,847	0	28,847	0
8	10,147	5,691	30,471	0	30,471	0
9	10,147	10,090	30,500	5,994	30,500	5,994
10	10,147	2,601	29,034	0	29,034	0
11	10,147	3,675	28,642	0	28,642	0
12	10,147	10,743	30,500	4,818	30,500	4,818
13	10,147	6,970	30,500	2,903	30,500	2,903
14	10,147	2,929	29,362	0	29,362	0
15	10,147	7,757	30,500	2,552	30,500	2,552
16	10,147	5,583	30,500	1,516	29,242	2,774
17	10,147	7,824	30,500	3,757	26,035	6,964
18	10,147	16,116	30,500	12,049	22,828	15,256
19	10,147	4,974	30,500	907	19,621	4,114
20	10,147	9,497	30,500	5,430	16,414	8,637
21	10,147	15,909	30,500	11,842	13,207	15,049
22	<u>10,147</u>	<u>14,601</u>	<u>30,500</u>	<u>10,534</u>	<u>10,000</u>	<u>13,741</u>
Ending Inventory	10,147	---	30,500	62,302	10,000	82,802

<sup>a/</sup> The liquid reserve is held as grain in storage with replacement only from high yield years.

<sup>b/</sup> Value of the machinery, equipment, and buildings of the firm and household. A full depreciation charge is subtracted each year.

<sup>c/</sup> Value of the machinery, equipment, and buildings of the firm and household. Only the depreciation charge for buildings and household equipment is made in the later years.

TABLE XIII, APPENDIX C. YEAR-TO-YEAR NET WORTH OF A FARM UNIT REPRESENTED BY YIELD SERIES 16, WINTER WHEAT AREA.

Year	Liquid Reserve <sup>a/</sup>	Yearly Surplus	Value of Assets <sup>b/</sup>	Surplus for Investment	Value of Assets <sup>c/</sup>	Surplus for Investment
No.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
0	10,147	---	30,500	---	30,500	---
1	6,704	0	26,433	0	26,433	0
2	2,220	0	22,366	0	22,366	0
3	2,220	2,699	20,998	0	20,998	0
4	4,707	4,607	21,538	0	21,538	0
5	7,408	4,607	22,078	0	22,078	0
6	10,147	11,144	29,155	0	29,155	0
7	10,147	14,555	30,500	9,143	30,500	9,143
8	10,147	698	27,131	0	27,131	0
9	8,262	0	23,064	0	23,064	0
10	8,262	174	19,171	0	19,171	0
11	3,130	0	15,104	0	15,104	0
12	10,147	6,891	17,928	0	17,928	0
13	10,147	1,215	15,076	0	15,076	0
14	9,082	0	11,009	0	11,009	0
15	6,722	0	6,942	0	6,942	0
16	6,722	2,994	5,869	0	5,869	0
17	10,147	5,347	7,149	0	7,149	0
18	10,147	9,255	12,337	0	12,337	0
19	10,147	1,658	9,928	0	9,928	0
20	10,147	846	6,707	0	6,707	0
21	<u>10,147</u>	<u>10,090</u>	<u>12,730</u>	<u>0</u>	<u>10,000</u>	<u>2,730</u>
Ending Inventory	10,147	---	12,730	9,143	10,000	11,873

a/ The liquid reserve is held as grain in storage with replacement only from high yield years.

b/ Value of the machinery, equipment, and buildings of the firm and household. A full depreciation charge is subtracted each year.

c/ Value of the machinery, equipment, and buildings of the firm and household. Only the depreciation charge for buildings and household equipment is made in the later years.

TABLE XIV, APPENDIX C. YEAR-TO-YEAR NET WORTH OF A FARM UNIT REPRESENTED BY YIELD SERIES 19, WINTER WHEAT AREA.

Year	Liquid Reserve <sup>a/</sup>	Yearly Surplus	Value of Assets <sup>b/</sup>	Surplus for Investment	Value of Assets <sup>c/</sup>	Surplus for Investment
No.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
0	13,530	---	30,500	0	30,500	0
1	11,916	0	26,433	0	26,433	0
2	11,916	321	22,687	0	22,687	0
3	9,761	0	18,620	0	18,620	0
4	8,557	0	14,553	0	14,553	0
5	8,557	100	10,586	0	10,586	0
6	8,557	1,141	7,660	0	7,660	0
7	12,151	4,607	8,200	0	8,200	0
8	8,577	0	4,133	0	4,133	0
9	8,577	764	830	0	830	0
10	13,530	9,327	6,090	0	6,090	0
11	9,103	0	2,023	0	2,023	0
12	6,743	0	- 2,044	0	- 2,044	0
13	6,743	1,510	- 4,601	0	- 3,343	0
14	3,924	0	- 8,668	0	- 4,203	0
15	3,540	0	-12,735	0	- 5,063	0
16	2,746	0	-16,802	0	- 5,923	0
17	- 697	0	-20,869	0	- 6,783	0
18	897	4,607	-20,329	0	- 3,036	0
19	<u>6,353</u>	<u>4,607</u>	<u>-19,789</u>	<u>0</u>	<u>711</u>	<u>0</u>
Ending Inventory	6,353	---	-19,789	0	711	0

a/ The liquid reserve is held as grain in storage with replacement only from high yield years.

b/ Value of the machinery, equipment, and buildings of the firm and household. A full depreciation charge is subtracted each year.

c/ Value of the machinery, equipment, and buildings of the firm and household. Only the depreciation charge for buildings and household equipment is made in the later years.

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