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Problems in Marketing South Dakota Grain

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PROBLEMS IN MARKETING SOUTH DAKOTA GRAIN

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CHAPTER I INTRODUCTION

South Dakota is the transition state of the Nation's grain producing area. Parts of the state lie in each of the three major grain producing belts. The southeastern one-fifth of South Dakota is in the corn belt. The northern one-half of the state lies within the hard spring wheat area; while roughly the southern one-half falls within the winter wheat belt. In addition, the state produces substantial amounts of durum wheat, barley, oats, flaxseed and rye.

ROLE OF GRAIN PRODUCTION IN SOUTH DAKOTA AGRICULTURE

Grain marketing plays an important role in South Dakota agriculture. Approximately 40 percent of the state's total land area is devoted annually to the production of grain crops. 1/ During the three-year period, 1948 through 1950, 59 percent of the total grain produced in South Dakota was marketed as a cash crop and accounted for 33 percent of the total cash farm income. 2/ The remaining 41 percent of the grain was consumed by livestock on farms.

In view of the contribution of grain crops to cash farm income in South Dakota it is important that a high level of efficiency be

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1/ Computed from data presented in South Dakota Crop and Livestock Reporting Service publications, South Dakota Agriculture, (Annual reports).

2/ Ibid.

maintained in both production and marketing of grain. 3/ Periodic statistical reports are available on crop acreages and production, amounts of grains fed to livestock, grain prices received by farmers, and grain storage and transportation facilities, on both state and county levels.

Additional research was needed to provide information on practices followed in marketing grain in South Dakota and to provide direction for future research work on major problems encountered in marketing South Dakota Grain.

OBJECTIVES

This study is primarily an introductory and exploratory analysis of the grain production and marketing structure in South Dakota. There are three major objectives: (1) to obtain data on production and marketing of South Dakota grains, (2) to examine possible measures for improving grain marketing, and (3) to determine what are problem areas in grain marketing.

PROCEDURE

For analytical purposes the state was divided into grain production areas, each possessing a reasonable degree of homogeneity, (Figure 1). Data were secured from 140 farms and 105 elevators. The sample included 20 farms and 15 elevators selected from each production area.

Selection of the farms and elevators to be contacted was accomplished by use of a table of random numbers. All farms in each

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3/ Related studies by the South Dakota Agricultural Experiment Station include, Barley Production in South Dakota, by K. H. Klages, Bulletin 256, December 1930: Farmers Elevators in the Spring Wheat Areas of South Dakota, by R. E. Post, Bulletin 282, December 1933; Feed-Grain Price Relationships in South Dakota, by L. T. Smythe and C. R. Hoglund, Bulletin 367, June 1943.

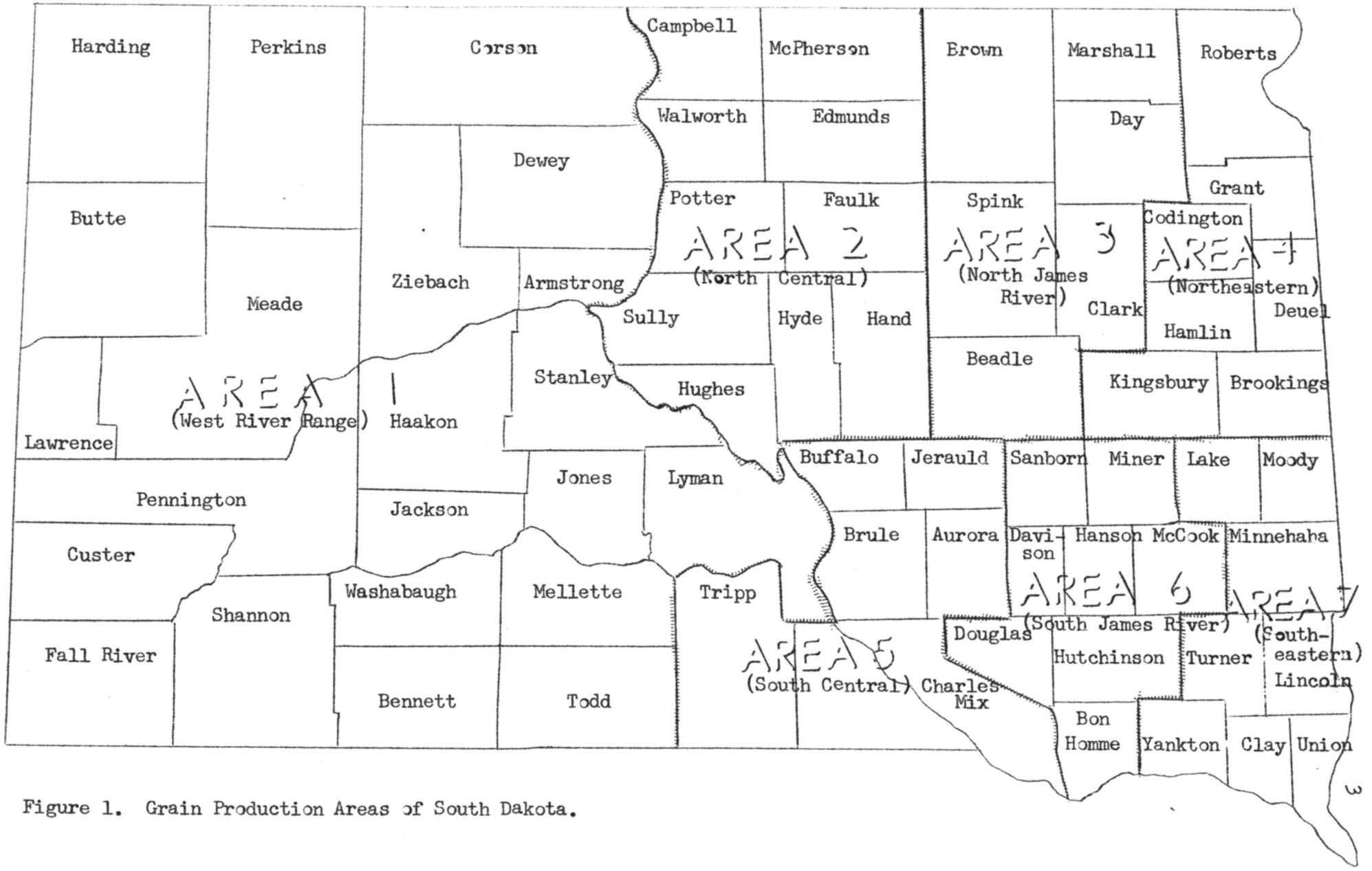

Figure 1. Grain Production Areas of South Dakota.

production area were arrayed and 20 farms were drawn from each area. The same general procedure was used in the selection of elevators. Elevators in the respective areas were grouped according to type of ownership: farmers' cooperative, line elevator and independently owned. 4/ Five elevators of each type were drawn from each area. Alternates were randomly selected for both farms and elevators to replace refusals and non-qualifying sample units.

The data were secured through personal interviews. Interviews with farm operators were made between June and October 1952. The majority of elevator interviews were made in December 1951. The remainder were secured during the summer of 1952. For farmer cooperative and independently owned elevators, information was obtained from the elevator grain manager. In the case of line elevators the data were obtained from the line headquarter grain manager or from the line district grain manager.

RELATIVE IMPORTANCE OF MAJOR PROBLEMS IN MARKETING GRAIN IN SOUTH DAKOTA

The results of interviews with farmers and elevator managers provides insight into the nature and magnitude of various problems in marketing South Dakota grain. In general, information was gathered on the existence and seriousness of various grain marketing problems in the different areas. Additional problems were discussed with individuals interviewed. The ordering of importance and seriousness of different problems differed somewhat between elevator operators and farmers. In general, however, the different problems were ranked as follows.

4/ Elevators were classified as line only if five or more elevators were controlled by an individual or a group of individuals.

1. Excessively high moisture content.
2. Sprouting
3. Inadequate storage capacity both in elevators and on farms.
4. Lack of sufficient transportation, leading to clogged elevators and inability of elevators to accept additional grain at harvest time.
5. Rodent damage and insect infestation.
6. Faulty grading, taking of test weights and inadequate differentials between grades of grain. Elevator operators cited lack of sufficient testing equipment and time to test during harvest.
7. Presence of damaged and undersized kernels, weed seed and other dockage and foreign materials.

CHAPTER II FACTORS AFFECTING MARKET VALUE OF GRAIN

A large number of factors affect market value of different grains. Most important of these is quality. Under quality are included such things as moisture content, porportion of spoiled, damaged, or undersized kernels. Amount foreign material--weed seed, dirt, other grain--affects the market value. Some types of grain variety mixtures, protein content, and germination rate are also very important considerations.

EXCESSIVE MOISTURE

High moisture content in grain gives rise to more difficulties in storage and marketing than any other single factor. It is a serious problem for both farmers and elevator operators. It affects farmers from the standpoint of spoilage in stored grains, and through price penalties for marketed grains. Grain elevators are inconvenienced by the extra handling operations and storage facilities required to keep high moisture grain from going out of condition, i.e., keeping it from heating and spoiling in the bin.

Of the 140 farmers interviewed, 56 indicated they were concerned with a moisture problem in one or more grains. Ninety-two of the 105 elevator operators listed one or more grains in which high moisture content was a problem.

Grain Spoilage. High moisture content, sprout damage, mustiness, presence of foreign materials, and inadequate protection from weather

all contribute to deterioration and spoilage in farm stored grains. When grains subjected to any of these adverse conditions are marketed the problem becomes the concern of elevator operators.

Over one-half of the elevator operators indicated spoilage was a major problem in grains received. Forty-three percent said it applied to all grains, an additional 20 percent listed wheat, while from 5 to 10 percent mentioned each of various other grains. These percentage figures are significant in view of the fact that only about 10 percent of the farmers regarded spoilage as an important grain quality problem. One would expect greater concern with the problem among farmers. However, the lack of greater concern among farmers may result in part from a belief that little can be done about it.

Excessive moisture is responsible for several types of deterioration in stored grains including heat damage, mustiness, mold, objectionable odors, and sour grain. In unharvested grains it contributes to sprout damage, blight and discoloration of kernels. 5/

Heat damage in wheat is the most serious single factor affecting the quality of flour. As little as 1 percent heat-damaged kernels will darken the flour and cause a bitter taste. Since there is no way to separate these damaged kernels, the value of such grain is severely reduced. Musty, moldy, or sour wheat as well as that with objectionable odors is similarly reduced in value. Sprout damage also makes wheat undesirable for milling purposes since it reduces the gluten content of the kernel and causes poor quality flour.

5/ Grading stipulations for grain exhibiting these undesirable characteristics are outlined in detail for the various grains by the Official Grain Standards. "Handbook of Official Grain Standards of the United States, 1947", United States Department of Agriculture, Production and Marketing Administration, Grain Branch, Washington, D. C.

Even a small amount of heat damage in barley makes it unsuitable for malting. Any trace of musty or moldy kernels or the presence of odors disqualifies it. Barley for malting cannot contain over 4 percent blighted and discolored kernels. A very small percent of sprout damage makes barley unsuitable for malting purposes since the germination process essential in the conversion of starches to soluble sugars has already taken place.

The policy followed by elevators in the purchasing of high moisture grains depends to a large extent upon the facilities and equipment for handling the grains. The maximum moisture content for safe storage of most small grains is normally about 14 percent (11 percent for flax). Moisture contents above these amounts generally subject grains to grade penalty on that count.

In some years elevators wishing to handle a normal volume of grains are compelled to purchase grains containing moisture in excess of the safe storage percentage. Elevators not possessing drying equipment must handle such grains in one of three ways: (1) dispose of the grains immediately, accepting prevailing price discounts; (2) mix with grains of lower moisture content so as to achieve an average moisture percentage which will permit safe storage, or (3) exercise the handling precautions necessary to keep the grain in condition. The alternative an elevator follows depends upon the type of grain and the seriousness of its condition, handling and storage facilities available, and present market price relative to anticipated future price.

Elevators with sufficient bin and storage facilities and labor supply to permit necessary handling and conditioning of grain are in

a position to follow the last method. If elevators do not have sufficient facilities and labor available some alternative must be employed. Most elevators follow the practice of mixing or blending quantities of high moisture grain with the proper amount of low moisture grain in order to achieve an over all moisture level which is safe for storage or which just qualifies the grain for a certain market grade.

Of the 105 elevators, only 12 reported special grain drying equipment. Ten of these were located in areas 6 and 7. Several of the elevators with dryers reported that the dryers were installed in 1951 to aid in handling the soft-corn crop of that year. Most of the elevators reporting drying equipment, indicated that it was used primarily in the handling of purchased grains, and only during slack periods would they consider drying grains for farmers.

The 92 elevator operators who indicated they were concerned with the moisture problem also were asked the cause of excess moisture in grain marketed in their area. Eighty-one attributed it to harvesting grains too early. The other 10 percent felt that it was due primarily to unfavorable weather conditions at harvest. Many of the elevator men also mentioned the hurry of roving combine crews as an important factor contributing to the problem.

Causes of High Moisture in Grain. The farmers who reported that excess moisture in grains was an important problem were asked what they considered to be the major factor contributing to the situation. Of these 32 placed the blame on too much rainy weather during harvest; 13 felt that it was due to too great a rush to get the harvest done, which often results in cutting grain too green. Two farmers thought that the

use of late maturing seed varieties was the primary cause. This latter reason applied to corn.

In the past, harvesting with threshing machines generally extended over a two or three month period. Grain was cut and allowed to dry-out and cure in the shock before it was threshed and stored, or marketed. Under present methods the harvest period has been shortened to two or three weeks. Many farmers get harvest fever the instant grain looks ripe. In comparatively dry years this is not too serious since the grain has been subject to considerable drying throughout the maturing process, but in less favorable ripening and drying seasons a considerable amount of grain is harvested green.

The policy followed by custom combine crews of covering as many acres as possible in as short a period of time as possible has contributed to the problem. Farmers who are dependent upon custom combining are sometimes forced to choose between the alternative of getting the job done immediately, even though the grain may not be quite ready, or having to wait until much later. Farmers are often forced to wait for the custom machine beyond the best time for harvesting. The uncertainty as to future weather is responsible for much farmer haste in getting the harvesting job done. Timing of harvest operations so as to avoid weather, or insect loss is extremely important, but the level of moisture content is equally as important from the standpoint of storage problems and net returns to farmers.

Three major reasons for farm grain spoilage were suggested by the elevator operators: Sixty-one percent blamed it on storing grains with too high moisture content, 27 percent attributed it to inadequate farm

storage facilities, and 12 percent felt that it resulted from farmers' negligence in not periodically checking the condition of stored grains. Farmers attributed grain spoilage in farm stored grains to lack of structurally adequate facilities and too high moisture levels when it was put into storage. Stored grain should be checked periodically for heating regardless of how certain the farmer may be that it is sufficiently dry for storing.

Moisture is often a serious problem in corn. There are several measures which farmers can take to reduce this risk: (1) plant earlier maturing varieties even though they may be slightly lower yielding; planting of seed corn which is too late maturing for the area is responsible for recurrent soft corn crops; (2) plan field operations so as to plant corn as early as weather and soil conditions permit; and, (3) use commercial fertilizers wherever practicable to promote earlier maturity as well as increase yields. Use of mechanical drying, either with farm installed equipment or through custom drying by grain elevators will usually save a large part of a soft corn crop.

Sprouting Damage. Sprouting in grains is influenced by both the time and method of harvesting. The degree of severity varies considerably between years, but a substantial number of operators indicated that it is important even in an average season. Thirty-six percent of the elevator operators said the problem applied to all grains. An additional 30 percent named wheat, and 10 percent listed barley. Of the 140 farmers interviewed, 39 said it was a serious problem in one or more of the grains raised. Wheat was the grain most commonly mentioned with 25 farmers reporting a sprouting problem with their wheat. Strangely the

only areas reporting considerable sprouting damage, areas 2 and 3, are in a relatively dry section of the state where normally one would expect sprouting to be the least common. However, the abnormally wet 1951 harvest season in those areas may have predominated in the farmers' thinking when the interviews were made.

Sprouting in grains generally results from prolonged exposure to wet weather during the harvest period. It is more prevelant in the swathed grains since the heads are lying very close to the ground, but it may also occur in shocked or standing grain. There is very little that farmers can do when prolonged wet weather occurs during harvest. Turning of grain is usually helpful but there is no remedy in extremely damp periods. The best protective measure is to plan the harvest operations so that large quantities of windrowed grain are not left exposed to the weather at one time. Where possible the farmer should windrow only far enough ahead of the combine to allow for the necessary amount of curing.

OTHER FACTORS AFFECTING QUALITY

Insect Infestation. The presence of insects in grain when it reaches the elevators usually means that its quality already has been impaired. Fumigation will reduce further damage, but the grain still may be penalized when purchased and when sold by the elevator. Maintaining grains at proper moisture levels is very important in controlling insect infestation.

Insect damage reduces the commercial value of any grain, and is particularly detrimental in grains to be used for human consumption. Grading standards classify grains as weevily if a 1,000 gram sample of grain contains insects equal to or in excess of the following:

wheat and rye--two live weevils, one live weevil and two other insects, or five other insects alone; oats, barley and corn--two live weevils, one live weevil and 10 other insects, or 25 other insects. The importance of insect infestation in farm stored grains varies considerably from year to year, as well as between farms within any given year due to differences in farm storage facilities, and condition of the grain going into storage.

Forty-nine elevator managers considered it normally to be of some significance in all grains, although 38 of these indicated that it was generally a relatively minor problem. An additional 23 operators specifically mentioned wheat but again the majority indicated that the problem was only of minor importance. In nearly all cases weevils were blamed for most of the damage.

Rodent Damage. Large amounts of South Dakota grain is consumed or damaged by rodents each year. In addition the presence of rodent droppings, or feces is objectionable in grains, particularly in food grains. Price penalties and even condemnation may result where food grain shows indications of excess rodent contamination.

Of the 105 elevator operators interviewed, 56 (53 percent), reported rodent damage to be a problem in purchased grains. However, 54 of these 56 operators indicated rodent damage was only of minor importance. This compares quite closely with the 43 percent of the farmers who indicated that rodent damage was a problem. Insect infestation and rodent contamination usually occur while grain is in storage but also may occur prior to threshing while grain is lying in the swath. Some

insect infestation even may occur prior to cutting the grain.

Effect of Manner of Harvesting on Quality. Timing and manner of harvesting are among the most important determinates of quality of grain when it reaches the market. The moisture content, prevalence of weed seed and other foreign matter, number of broken or cracked kernels, insect infestation and coloration are all a reflection of the manner of harvesting.

Of course, moisture is one of the most severe problems, but lack of care in machine operating may result in lower quality of grain, loss of grain over the sieves, and excess weed seed and other dockage in the grain. It also may result in overly many cracked or skinned kernels which are weak spots in the natural defense against the insects and bacteria which cause spoilage.

Elevator operators regarded faulty harvesting to be important primarily in barley and wheat. Over 55 percent listed it as a problem in barley and 39 percent for wheat. In contrast only 13 percent of the farmers regarded faulty harvesting as important in all grains.

The principal factor in faulty harvesting according to 88 percent of the elevator men was improper combine adjustment, 6 percent placed the blame on farmers being in too much of a hurry and harvesting when conditions are not right. The remaining 6 percent attributed it to unfavorable weather conditions during harvest. Farmers were asked what they considered the most important factor contributing the improperly harvested grains. Thirty-three responded giving four causes: Poor combine adjustment (16 farmers); custom combine operators careless or in too big a hurry (7 farmers); unfavorable weather conditions during

harvest (5 farmers); and, grain harvested before it is ready (5 farmers). All of these except for weather conditions, can be remedied by the farmer to a large extent if he is willing to spend more time and effort in supervising the harvesting.

GRAIN VARIETY PROBLEMS

In some grains, and even for some commercial uses variety is relatively unimportant, but for the majority of uses, particularly with the cash grains, variety greatly influences acceptability, and market value.

Elevator operators, terminal buyers and processors are much concerned about separation of grain varieties. This is also of importance to farmers. It affects grain storage problems and prices received for marketed grains. Three aspects of the variety problem which affect grain handling, storing and marketing are: (1) the number of varieties produced in a given area, (2) the mixing of different varieties, and (3) adaptability of different varieties. These problems are more serious for certain grains and areas than for others.

Mixed Varieties. The combined effect of the introduction of new crop varieties and the reluctance of some farmers to give up old varieties has resulted in somewhat of a hodgepodge of varieties for some grain crops. This is particularly true for oats and true to a slightly lesser extent for barley and hard spring wheat.

Variety problems in grain marketing are most serious in the cases of wheat and barley. Flaxseed and rye each have only a single market

variety classification. Variety differences are relatively unimportant in corn and oats since these grains are used principally for livestock feed. Normally, specific variety requirements in corn and oats to meet the limited commercial uses can be secured quite readily.

In both wheat and barley some varieties are sufficiently similar that mixtures are of little or no consequence. The major problems arise when inferior varieties or varieties with different properties are involved. Very little can be done by local elevators to remedy such situations. Unlike the dockage problem there is no possibility of separating varieties through cleaning operations. Nor is any advantage likely to be realized by further mixing or blending with either better or poorer quality grain since the entire lot stands to be graded down on the basis of the least desirable grain in the mixture.

Wheat is graded on the basis of class, subclass and variety characteristics. There are seven classes: Hard Red Spring, Hard Red Winter, Durum, Red Durum, Soft Red Winter, White, and Mixed Wheat. Each class is best suited for a specific type of flour, and a mixture of classes reduces the milling value of the grain. Grain standards stipulate that any class, except Mixed Wheat, cannot contain over 10 percent of all other classes combined. South Dakota wheats are primarily Hard Red Spring and Hard Red Winter both of which are best suited for bread flour, and Durum which is used in the milling of semolina flour.

Subclass, or texture characteristics include color, hardness, and vitreousness of the kernels. These factors have an important effect in quality of bread flour produced from the hard wheat classes. Soft or starchy kernels generally have a low protein content which makes them

less desirable for milling of bread flours.

Variety differences in wheat are generally less significant than class or subclass differences as far as milling qualities are concerned. Grading on the basis of varieties must be done by eye, which means that local elevator men must be able to recognize class and variety characteristics. Fortunately relatively few wheat varieties are normally produced within any area so variety grading and handling problems for the local elevator operator are somewhat reduced as compared to those confronting terminal buyers.

Variety considerations are probably even more exacting in malting barley than in wheat. Different varieties have different malting characteristics, and when mixed they create unfavorable results in the malting process. Mellowness, or starchiness, and germination properties are the two major varietal characteristics in malting barley. Variety type is not an absolute guarantee that these characteristics will always be favorable for malting purposes, however, under normal growing conditions certain varieties are more desirable than others. In order to be acceptable for malting a barley variety must contain a minimum of 75 percent mellow kernels.

Maltsters prefer white barleys over blue varieties. Some blue barleys are sufficiently mellow for malting purposes but in general they are harder or more steely than the white varieties. For this reason it has become somewhat of a custom for elevator operators to grade white barleys over blue varieties which otherwise have comparable qualities. Pearling tests are used by a few local elevators to test for mellowness, however, the results of the tests do not always provide a

reliable basis for price determination.

Both two-row and six-row barley varieties are acceptable for malting purposes, but the latter type is preferred. The major concern in malting is that the two are not mixed since they generally absorb water at different rates in the initial stages of the malting process. As a result they do not germinate uniformly. Grain standards provide that no more than 5 percent other type barley is allowed in malting barley.

Few South Dakota elevators have any special equipment for determining the malting quality of barley varieties. Operators must either rely upon general appearance of the barley to determine grade, or they may ship the grain and wait for the grade assigned by the terminal elevator.

The 105 elevator operators were asked if they considered mixed varieties at the farm level to be a problem in marketed grains. Twenty-six indicated it to be important in barley, 13 in wheat, and 9 in oats. A slightly lower percent of farmers regarded this problem as significant.

Farmers and elevator operators attributed the problem of mixed varieties to the following causes: (1) carelessness on the farm in grain handling, seeding and harvesting operations, (2) lack of adequate grain handling and storage facilities on farms to keep different varieties separated, and (3) failure of elevators and seed selling concerns to maintain pure seed varieties, (4) too many varieties being produced on farms. Assuming these to be the major reasons, the mixed variety could be materially reduced through more careful supervision by farmers in their grain production and handling practices.

Adapted and Recommended Varieties. Over a period of years crop

varieties are subject to new diseases and insects which greatly reduce their productivity and general adaptability in an area. To replace them new and improved varieties are continually being developed, tested and released. Before being released to farmers in an area any new variety undergoes a thorough testing period within that area in order to compare its performance and adaptability with the existing varieties. Not until the overall superiority of a new variety has been well established will it replace the existing varieties on the recommended list. Seed development and testing work in South Dakota is carried on by the State Experiment Station, and to a lesser extent by private seed-grain interests. Varieties are certified and released through the State Crop Improvement Association.

Despite the frequent introduction of new and improved crop varieties, some farmers continue to plant old varieties which have been removed from the recommended list for the area. The elevator men were asked the extent to which farmers planted inferior, or non-recommended grain varieties. Barley was listed by 39 of the operators. Wheat was named by 24, oats by 12, while four indicated the use of inferior varieties also to be a problem in flaxseed. In general, farmers regarded the problem to be considerable less important than did elevator men. Also, the farmers reversed the order of importance, listing oats, wheat and barley in that order.

Elevator operators and farmers gave similar reasons for common use of non-recommended grain varieties: (1) failure of farmers to accept and use new improved varieties, (2) an excessive number of varieties being released and recommended, (3) non-recommended varieties frequently

yield as well or better than the improved varieties under certain circumstances.

Effect of Variety Problems on Marketing. Normally variety problems are not too serious at the farm level since most farmers produce single or possibly two similar varieties of a grain crop. The major difficulties arise at the local elevator in attempting to handle and store a dozen unlike varieties from as many different farmers. Numerous bins and careful supervision are required.

The number, kind, or mixture of crop varieties are of minor consequence if the grain involved is to be used for feed purposes. It is primarily with cash grain crops such as wheat and malting barley where variety problems arise with respect to handling, storing and pricing. Wheat varieties differ in yielding ability, in milling qualities, and in protein content. For maximum returns from wheat production each of these three factors should be taken into consideration when selecting seed varieties. Generally there are several varieties quite well adapted to the area, from which farmers may chose. 6/ The selection of specific varieties of grain must be made by the farmer in the formulation of production plans. This decision should be based on three considerations: (1) probable yield relationships, (2) probable price relationships, and (3) probable use to be made of the grain produced. In selection of a barley variety, for example, the fact that varieties are normally slightly higher yielding should be taken into consideration. Thus if the grain is definitely to be used for feed purposes, a feed type

6/ "Varieties Recommended for South Dakota in 1955", South Dakota Agricultural Experiment Station, Leaflet 167, March, 1955.

barley should be planted. If the barley is to be sold, or if there is some doubt as to whether it will pass for malting barley, the decision should depend upon the relative prices and yields expected. If the expected yield differences are great relative to anticipated price differences (at marketing time), then the feed variety should still be produced. If the anticipated price margin is great relative to expected yield difference the farmer would be better off sowing a malting variety.

Variety problems are more important in cash grain marketing than many farmers realize. Mixed or inferior varieties materially reduce market value. The severity of market price penalties can be reduced by adhering to four simple principles: (1) know and use varieties which are adapted and recommended for the area, (2) produce only one or two varieties of a particular grain within any one year, (3) be certain that seed is a pure strain, and (4) use every precaution possible in seeding, harvesting and handling of grains to minimize mixing of different varieties.

MIXED GRAINS

Since the majority of farmers do not have grain cleaning equipment, most grain is marketed containing varying amounts of other types of grain and foreign materials. The seriousness of this problem varies with the type grain involved and with the ultimate use to be made of the grain.

The responses obtained from the elevator operators regarding the seriousness of mixed grains are quite comparable with those given by farmers. The mixtures most frequently mentioned by both groups were oats in barley, barley in oats, and "other grains" in spring wheat. Twenty-

one percent of the elevator operators mentioned the barley-oats mixture while 16 percent of the farmers considered it to be important. Thirty-four elevator operators and 31 farmers indicated that other grains in spring wheat was a problem.

Three major causes for mixed grains at the farm level were listed by the elevator operators: 62 percent felt that farmers are too careless in the handling and cleaning of their seed grains, 30 percent attributed it to volunteer grains (this applied to rye or winter wheat in spring wheat), while 8 percent thought the major cause was farmers producing mixed grains for feed purposes later deciding to sell them.

Farmers reporting a mixed grain problem also were asked what they considered to be the major factors responsible for the condition. Thirty-nine responses were obtained involving three causes: four listed failure of elevators and seed-houses to clean the seed properly to be the major cause; 19 placed the blame primarily on volunteer grains, particularly rye and winter wheat mixed into spring wheats; while the remaining 16 felt that the fault rested with farmers through carelessness in the seeding, harvesting handling and storing of grains.

All of the above mentioned factors undoubtedly contribute to the mixed grain problem. Many farmers either save seed from their own grain from year to year, or they purchase it from other farmers. In either case protection against mixed seeds depends upon the precautions exercised by the farmers themselves. When seed grains are purchased from commercial concerns care still should be taken to make sure the seeds are in no way contaminated. Farmers cannot afford to waste land by using inferior seeds so the best policy is to purchase good clean seed.

Volunteer grain which contributes to mixed grain is a problem which only the individual farmer can remedy. There are several possible methods of dealing with it. First and most simple, when the land is capable of a second year of small grain the field can be reseeded to the same crop variety. Since this procedure cannot be continued indefinitely, some other solution must be found. Alternatives are planting to a feed grain, or forage, or fallowing the following year.

The thing to avoid is seeding a different type cash grain such as spring wheat, malting barley or flax after a crop that is likely to produce considerable volunteer grain.

Mixed seeds resulting from seeding, harvesting, handling or storage operations, are each individual farmer's responsibility. Carefulness on the part of the farmer is the best safeguard. Custom combining often contributes to mixed grains and mixed varieties. Where a farmer has a pure variety of a high quality grain he should make every possible effort to protect it from any type of contamination resulting from custom combines. Most combine crews are quite careful in cleaning their machine between jobs. However, unless farmers know this to be the case it is their responsibility to check. If the combine operator is in too big a hurry to observe minimum precautions, the best policy is to find a more obliging operator.

A second method by which the farmer can avoid mixed grains and mixed varieties is to keep the first two or three tanks of grain separate. This grain can then be used for poultry or livestock feed or separately sold or stored so that it cannot contaminate the rest of the grain.

When mixed grain is to be sold on the cash market it is sometimes

possible for the farmer or the elevator operator to separate the mixed grains, This increases the market value of the grain, but it also adds to cost. For oats it is doubtful if the increase in price received normally justifies the cost of cleaning unless the oats is intended for seed. Wheat cannot be used for milling nor malting barley for malting until cleaned. Depending upon the local dockage discounting practices, a farmer often stands to realize a substantial price increase through cleaning of such grains, For example, malting barley containing from 3 to 5 percent of other grains is generally purchased as feed barley. If a farmer has malting barley with an excess of 5 percent foreign grain and is equipped to clean it, he stands to gain the difference between malting and feed barley price. He also will salvage the other grain which may be of considerable value for feeding purposes.

Assuming cleaning and handling facilities are available the decision as to whether cleaning is profitable or not depends on the following considerations: (1) the probable per bushel price increase due to cleaning, (2) the value of the screenings for feed or for sale, (3) the farmer's ability to perform an adequate job of cleaning, and (4) the alternative value of the farmers time.

CHPATER III GRAIN STORAGE FACILITIES IN SOUTH DAKOTA

One of the major problems in recent years, particularly under the price support program, has been lack of adequate storage facilities. Storage space may be inadequate because of lack of physical space to accommodate the grain to be held, because of poor quality and supervision of structures, or a combination of the two. The problem of quality and supervision of available storage to prevent deterioration and contamination is particularly important in the case of food grains such as wheat and rye.

Subsequent to grain harvest methods of handling and storing grain may exert an important influence on final quality of the grain when it reaches the processor or feeder. Most of the grain intended for livestock feed is stored on the farm. Grain produced for cash sales is more often hauled directly to the elevator for storage or for immediate sale. However, farm storage still represents an important part of total storage of such typical cash grains as wheat and rye.

There are several considerations which determine whether grains will be farm stored for later sale or marketed directly at harvest. They include: (1) the adequacy of farm storage facilities, (2) the market price of grains at harvest relative to anticipated future prices, (3) the quality of grains produced, (4) the degree of uncertainty as to whether grains might be needed for future livestock feed, (5) the capital position of the farmer, and (6) the ability of elevators to handle the supply of grains at harvest time.

ADEQUACY OF FARM GRAIN STORAGE FACILITIES

The extent to which grains are stored on individual farms depends primarily upon the capacity and quality of farm storage facilities. The lack of adequate farm storage forces the operator to haul grain to the elevator at harvest time.

The total small grain storage capacity on South Dakota farms as of October 1, 1949, was slightly over two-hundred million bushels, (Table 1), Approximately 95 percent of the total capacity in every production area was in permanent type grain storage buildings. Permanent facilities were sufficient to store the entire 1944-48 average small grain production in all except areas 2, 3 and 4. During this same period total farm storage facilities were adequate in all areas except 2 and 3, and only slightly deficient in area 4.

The foregoing comparisons consider the adequacy to provide on-farm storage facilities for all small grains produced. The final portion of Table 1 shows actual bushels of all small grains reported in farm storage as of October 1, 1949, and the percentages of storage capacities being utilized in the various production areas with the normal quantities being marketed at harvest time. These figures indicate that existing total farm small grain storage facilities were adequate in all production areas.

Grain storage data were secured from the 140 farms used in the study. The capacities and types of small grain storage facilities are presented in Table 2. Average farm storage capacities were quite comparable for all production areas except area 6 where the average was considerably

Table 1. Small Grain Storage Facilities and Production on South Dakota Farms*

	Production Areas							
	1	2	3	4	5	6	7	State
	(thousand bushels)							
Average small grain production (1944-48) 1/	25,355	30,850	39,001	33,044	16,852	22,046	28,115	195,263
Percent of permanent storage required to store annual production	93.7	118.4	109.0	101.6	92.7	91.6	85.6	99.4
Percent of total storage required to store annual production	87.5	113.5	104.0	98.4	88.1	87.7	81.6	94.8
Total storage capacity 2/	28,965	27,180	37,495	33,595	19,130	25,125	34,435	205,925
Permanent buildings	27,060	26,050	35,770	32,520	18,170	24,070	32,860	196,500
Temporary buildings	1,905	1,130	1,725	1,075	960	1,055	1,575	9,425
Total small grain stored on farms 3/	13,416	14,152	19,202	20,882	9,508	11,443	18,824	107,427
Percent of permanent storage utilized	49.6	54.3	53.7	64.2	52.3	47.5	57.3	54.7
Percent of total storage utilized	46.3	52.1	51.2	62.3	49.7	45.5	54.7	52.2

* Data obtained from South Dakota Crop and Livestock Reporting Service publications, South Dakota Agriculture, (annual) and South Dakota Market Supplies and Storage Facilities, Small Grain and Corn, respectively.

1/ Includes wheat, oats, barley, rye, flaxseed and sorghums.

2/ Capacity reported as of October 1, 1949.

3/ Small grains in storage as reported on October 1, 1949, including wheat, oats, barley, rye, flaxseed, sorghum grain and soybeans.

Table 2. Small Grain Storage Facilities on 140 South Dakota Farms

	Production Areas							
	1	2	3	4	5	6	7	State
Total granary capacity (bu)	109,900	131,850	125,750	104,700	103,250	59,400	88,950	723,800
Average granary capacity (bu)	5,495	6,592	6,288	5,235	5,162	2,970	4,448	5,170
Average number of bins	5.4	5.8	7.1	5.6	6.2	4.0	3.9	5.4
Central granary capacity (bu)	61,700	56,700	94,150	65,100	79,200	39,800	73,900	470,550
Number farmers reporting	15	12	16	15	17	17	17	109
Average capacity (bu)	4,113	4,725	5,884	4,340	4,659	2,341	4,347	4,317
Average number of bins	5.2	5.4	7.1	5.2	5.6	3.7	3.7	5.1
Other granary capacity (bu)	48,200	75,150	31,600	39,600	24,050	19,600	15,050	253,250
Number of farmers reporting	7	16	8	14	13	6	7	71
Average capacity (bu)	6,886	4,572	3,950	2,829	1,850	3,267	2,150	3,567
Average number bins	4.1	3.2	3.5	2.5	2.1	3.0	2.1	2.9
Types other storage: 1/								
Wood granaries	6	11	6	6	7	4	4	44
Metal bins and tanks	2	11	4	4	8	5	4	38
Misc. storage	4	7	2	4	3	0	1	21

1/ Indicates number of farmers reporting the various types of storage, but does not show the total number of each type storage facilities.

lower. The data suggest that this smaller average storage capacity in area 6 was due to more than a chance selection of farms with small storage capacity. Seven farms in area 6 reported total storage capacities of 1,500 bushels or less, while only six farms in all other production areas combined reported storage capacities that low.

Considerable variation exists between farms with respect to adequacy of grain storage facilities. Some farms have excess storage facilities at all times. Some farms have excess storage facilities in years of maximum production while others lack adequate storage even in years of sub-normal production. Thus area averages are not too meaningful when analyzing the adequacy of farm storage to accommodate annual grain production. In order to obtain some idea of grain storage adequacy on individual farms, detailed data on 1951 grain production and grain storage facilities were secured for the 140 farms in the study, (Table 3).

The first portion of Table 3 pertains to the entire 140 farms. On the basis of area totals, farm storage facilities were adequate to store the entire 1951 small grain production in areas 3, 4 and 7; between 90 and 100 percent in areas 2, 5 and 6; but only 69 percent in area 1. For the entire state over 95 percent of the entire production could have been stored on the farms. However, only between 51 and 81 percent of the total production was actually stored on the farms in the various areas. For the entire 140 farms about 66 percent of the total production was stored, utilizing 69 percent of the total small grain storage facilities. The percentage storage utilization is relatively low in area 7. If shelled corn in storage were considered, the percentage storage utilization would be materially increased in area 7, and increased

Table 3. Small Grain Production, and Grain Storage Facilities on 140 South Dakota Farms, 1951

	Production Areas							
	1	2	3	4	5	6	7	State
Total production, 1951 (bu)	159,300	136,100	125,600	98,700	112,300	65,300	61,200	758,500
Total stored on farms (bu)	81,900	109,600	77,000	71,400	67,900	44,600	47,600	500,000
Percent of production stored	51.4	80.5	61.3	72.3	60.5	68.3	77.8	65.9
Total storage facilities (bu)	109,900	131,850	125,750	104,700	103,250	59,400	88,950	723,800
Percent storage utilized	74.5	83.1	61.2	68.2	65.8	75.1	53.5	69.1
Storage facilities as a percent of total production	69.0	96.9	100.0	106.1	91.9	91.0	145.3	95.4
Number of farms unable to store entire 1951 production	13	7	7	10	8	12	5	62
Total production on these farms, 1951 (bu)	133,100	67,000	69,000	60,400	47,200	40,600	21,900	439,200
Total stored on farms (bu)	59,400	48,100	37,100	37,900	21,600	21,900	10,200	236,200
Percent of production stored	44.6	71.8	53.8	62.7	45.8	53.9	46.6	53.8
Total storage facilities (bu)	68,400	50,000	39,800	40,500	24,200	23,900	11,900	258,700
Percent storage utilized	86.8	96.2	93.2	93.6	89.3	91.6	85.7	91.3
Storage facilities as a percent of total production	51.4	74.6	57.7	67.1	51.2	58.9	54.4	58.9

to a lesser extent in areas 4, 5 and 6.

On 62 of the 140 farms included in the sample, 1951 small grain production exceeded farm storage capacity. As would be expected the percentage utilization of storage facilities on these farms is considerably higher than for the other farms. With average small grain production, existing on-farm storage facilities are not fully utilized in any area.

Each farmer was asked to estimate the percent of his total 1951 production of various grains he stored on the farm at harvest. A very high percentage of the major feed grains, particularly corn and oats, were stored on farms in all production areas. State averages for the three cash crops--wheat, flax and rye--show that 57 percent of the wheat and about 40 percent of both flax and rye were stored on the farm at harvest time.

Farmers were asked how long, in months, the various grains intended for market were stored on the farm before the major portion of each was sold. This inquiry was made concerning both the 1951 crop and the usual marketing procedure. The data indicate that the majority of farmers marketing feed grains held them on the farms for eight months or longer. The marketing of farm stored wheat, flax and rye was spread more uniformly through the year.

The 140 farmers were asked if additional small grain storage facilities could normally be utilized on their farms. Forty-two farmers indicated their existing storage facilities were normally insufficient, (Table 3). Sixty-two farmers indicated their facilities were inadequate in 1951. Only 28 of these 62 farmers reported a need for additional storage facilities. Data from the 28 farms and the total additional storage capacities

which they indicated were needed are presented by production areas in Table 4.

Of the 42 farmers indicating they normally had need for additional grain storage facilities only 23 had definite plans for increasing their capacity within the following three-year period, (Table 4). Eleven of the remaining 19 were tenant farmers and thus were unable to make any definite plans regarding the possible addition of grain storage facilities on their farms.

CONDITION OF STORAGE FACILITIES

Adequacy of grain storage facilities includes the quality aspect as well as capacity. If grain storage facilities are not structurally good enough to protect and maintain the quality of stored grains against the weather and to a reasonable extent from rodents and insects, then the facilities cannot be considered as adequate. Condition of small grain storage facilities on the 140 farms were reported by the farmers. Central granaries were reported on 109 farms. Seventy-seven of the 109 central granaries were reported to be in good or excellent condition, 24 were rated as fair, while eight were in poor condition. For other granaries, 55 percent were rated as good or excellent, 37 percent as fair, and 6 percent as poor. Assuming that facilities rated good or excellent for storage are suitable for all grains, and storage rated as fair is suitable only for feed grains, 66 percent of the total, was suitable for storage of food grains. An additional 27 percent, was rated fair or satisfactory for storage of feed grains. A total of 93 percent of all small grain storage facilities on the 140 farms were rated as fair or better.

Table 4. Farm Small Grain Storage Facilities and Planned Changes*

	Production Areas							
	1	2	3	4	5	6	7	State
Number farmers reporting inadequate storage capacity	8	5	7	6	4	8	4	42
Total capacity needed (bu)	19,700	10,300	24,500	9,000	10,500	11,500	5,200	90,500
Average capacity needed (bu)	2,462	2,060	3,500	1,500	2,625	1,412	1,300	2,151
Number farmers unable to store entire 1951 production reporting lack of storage facilities.	7	2	5	5	2	5	2	28
Total storage reported as needed by these farms (bu)	18,700	6,500	18,500	8,000	3,500	6,500	3,200	64,900
Number farmers reporting planned grain storage increases 1/	5	4	6	2	2	4	0	23
Total increase planned (bu)	10,200	9,300	22,500	3,000	7,000	6,000	---	58,000
Average increase planned (bu)	2,040	2,325	3,750	1,500	3,500	1,500	---	2,522

* Data secured from 140 South Dakota Farmers.

1/ Storage changes planned within the next three-year period.

If the foregoing percentages are applied to the 206 million bushel total farm small grain storage capacity in the state, over 145 million bushel capacity would be rated structurally adequate for storage of all grains. An additional 45 million bushel capacity would be satisfactory for feed grains. This sum of 190 million bushels represents storage accommodations for over 97 percent of the total average 1944-1948 small grain production in South Dakota

Adequacy of storage facilities implies protection of grains from deterioration due to weather conditions, rodent damage, and excessive insect infestation. Data were obtained on types of damage to grains stored on farms. The results are presented in the following tabulation.

	Production Areas							
	1	2	3	4	5	6	7	State No.
Grain spoiled in storage:								
Wheat	3	5	2	0	2	0	0	12
All other grains	2	1	2	0	2	1	0	8
Rodent Damage: All grains	7	4	12	5	9	13	10	60
Insect infestation:								
Wheat	5	6	6	2	2	1	1	23
Oats	0	0	0	1	1	3	4	9
Barley	0	1	0	1	2	0	0	4

Of the 20 cases of grain spoilage, 14 farmers attributed it primarily to poor storage facilities and in six cases the major cause was storing grains with too high moisture content. However, 12 of the 20 farmers felt that both poor facilities and high moisture at the time the grain was placed in storage were responsible to a considerable degree.

Rodent damage results both from poor structural characteristics and from the lack of rodent control measures by farmers. Rodent-proofing of grain storage facilities and continuous efforts by farmers to

eliminate rodents are the only solutions to this grain storage problem.

Where insect infestation occurred it was generally due to the weevil although a few farmers indicated that other insects were a serious problem in some years. Condition of storage facilities is only partially responsible for insect infestation. Poor building structures encourage the hibernation and perpetuation of grain insects, although the major cause of insect damage is usually the failure of farmers to handle and chemically treat stored grains properly.

In summary, the various data indicate that with average crops, total over-all farm storage capacity is adequate to accommodate all small grains that are stored on farms at harvest time. Any necessary addition to or improvement in small grain storage facilities in any production area is confined to a relatively small percent of individual farms. However, there is considerable need for improvement in control of rodents and insects in stored grains.

EAR-CORN STORAGE

Due to the ease of construction of temporary corncribs, storage of ear-corn is much less of a problem than storage of small grains. Total permanent ear-corn storage facilities as reported on October 1, 1949, was approximately 106 million bushels, (Table 5). This made up between 45 and 58 percent of the total ear-corn storage capacity as of that date, in the various production areas. Total permanent storage facilities for ear-corn would accommodate between 44 and 65 percent of the 1944-1948 average corn production for the areas, but only 34 to 50 percent of the 1948 crop.

Table 5. Corn Production and Storage Facilities on South Dakota Farms*

	Production Areas							State
	1	2	3	4	5	6	7	
	(thousand bushels)							
Total storage capacity 1/	5,020	6,720	10,770	14,700	12,750	21,240	34,720	105,920
Permanent cribs	2,815	3,200	5,250	8,120	5,780	10,200	20,110	55,475
Permanent as percent of total	56.1	47.6	48.7	55.2	45.3	48.0	57.9	52.4
Average production (1944-48) 2/	4,257	7,121	12,442	16,531	13,063	22,043	37,801	113,258
Permanent storage capacity as percent of production	66.1	44.9	42.2	49.1	44.2	46.3	53.2	49.0
Total production, 1948 3/	5,279	7,532	14,119	18,273	16,866	25,923	43,030	131,472
Permanent storage as percent of total storage required	49.1	42.5	37.2	44.4	34.3	39.3	46.7	42.2

* Data obtained from South Dakota Crop and Livestock Reporting Service publications, South Dakota Agriculture, (annual) and South Dakota Market Supplies and Storage Facilities, Small Grain and Corn, respectively.

1/ Capacity reported as of October 1, 1949. Total storage includes all temporary cribs available for use on that date. Since temporary corn storage facilities are so flexible volumewise, the bushel capacities have not been included in the table.

2/ Production figures include corn used for all purposes.

3/ Total corn production was greatest in 1948 of the years in the 1944-1948 period.

Ear-corn storage facilities were also inadequate to accommodate the average annual corn production on the majority of the 140 farms included in the study. The amounts of the estimated 1952 corn production which could be stored on farms in existing facilities ranged from 6.5 percent in area 1 up to 82.5 percent in area 6, (Table 6).

Of the 140 farmers interviewed, 131 reported they normally produce corn. Of these, 109 indicated that a portion of the crop was usually put in some temporary type storage. Fifty-four farmers reported that all corn produced was either stored in temporary cribs or piled on the ground. Due to the comparative ease of providing satisfactory temporary corncribs the ear-corn storage problem is of minor concern to the majority of South Dakota farmers. There are advantages in the use of temporary type cribs: (1) the fixed cost in buildings is lower, (2) flexibility in amount and location of storage facilities is greater.

GRAIN STORAGE IN ELEVATORS

The amount of farm storage of grains is influenced by the ability of elevators to handle the amount of grain farmers wish to market at harvest time. Many South Dakota elevators became clogged for at least some portion of the harvest season because of the rush of grains from farms and the inability of transportation facilities to move the grains on to the terminal markets. The 140 farmers were asked the extent to which elevators in their respective localities were clogged during the harvest period. The responses are shown in Table 7. It is interesting to note that both reported frequency in years and number of days per year increased for production areas from east to west. Possible explanations

Table 6. Ear-Corn Storage Facilities on 140 South Dakota Farms.

	Production Areas							
	1	2	3	4	5	6	7	State
Central corncrib capacity (bu)	500	1,000	2,500	10,950	13,800	28,650	28,300	28,700
Number farmers reporting	1	1	4	9	9	14	13	51
Average capacity (bu)	500	1,000	625	1,217	1,533	2,046	2,177	1,680
Corncrib condition 1/								
Number excellent	0	0	0	3	1	1	6	11
Number good	1	1	1	4	4	6	4	21
Number fair	0	0	3	2	3	5	2	15
Number poor	0	0	0	0	1	2	1	4
Other permanent facilities (bu) 2/	800	8,050	8,500	17,050	13,000	16,700	10,900	75,000
Number farmers reporting	1	8	8	9	6	9	8	49
Average capacity (bu)	800	1,006	1,062	1,894	2,167	1,856	1,362	1,531
Estimated 1952 production 3/	20,000	36,000	33,000	44,000	71,000	55,000	87,000	346,000
Percent stored in permanent cribs	6.5	25.1	33.3	63.6	37.7	82.5	45.1	46.4
Number of farmers normally using temporary cribs	15	16	17	13	18	13	17	109
Number of farmers using only temporary cribs	14	10	10	7	9	2	2	54

1/ Condition ratings were made by the farmers.

2/ Includes all permanent storage structures, other than central corncribs, temporary wire or slat cribs are not included.

3/ Area production totals for 1952 are calculated from farmer-estimated 10-year acreage yields and the 1952 corn acreages for the farms in each area.

Table 7. Number, Frequency, and Duration of Clogged Elevator Conditions as Reported by 140 South Dakota Farmers

	Production Areas							State
	1	2	3	4	5	6	7	
Number farmers reporting clogged elevator condition	18	20	18	15	18	19	15	123
Average number of year clogged out of 10	8.7	7.8	7.2	5.0	6.6	5.6	3.3	6.4
Average number of days clogged per year	43	34	23	12	24	26	17	26

for this are: (1) rail facilities are more adequate in the eastern sections of South Dakota, (2) production and marketing fluctuate less from year to year in the eastern part of the state, (3) grain is not harvested in as short a period of time in eastern South Dakota, (4) less facilities exist in the western part of the state because there is less demand for storage throughout the year.

Type and Age of Storage Facilities. The majority of country grain elevators in South Dakota are wood structures. New structures are continually being built to supplement and replace the older buildings, but many of the older structures are still in operating condition. Information on number, age and type of elevator buildings, and on the number of other type grain storage facilities, was obtained for the 105 elevators included in the study (Table 8).

Nearly all elevators in the western sections, areas 1 and 5, were single units, while in the northern and the southeastern areas of the state a considerable number had two or more elevator buildings.

Thirty-five buildings were estimated to be over 50 years old, 65 were estimated to have been built prior to 1920, 29 during the 1920's,

Table 8. Grain Storage Facilities of 105 South Dakota Elevators

	Production Areas							
	1	2	3	4	5	6	7	State
Number licensed elevator bldgs.	16	30	20	26	18	24	21	155
Average elevator age (years)	27	30	35	42	39	37	25	34
Type of elevator construction:								
Number wood-frame buildings	10	23	19	18	12	22	10	114
Number wood and metal sheeting	6	7	1	8	5	2	11	40
Number concrete	0	0	0	0	1	0	0	1
Number reporting other types of grain storage facilities:								
Wood-frame buildings	4	6	4	3	3	2	3	25
Metal clad buildings	-	-	-	-	-	1	1	2
Steel bins and quonsets	5	-	3	2	-	2	1	13
Other construction	1	-	1	-	-	-	-	2

11 between 1930 and 1945, and 15 after World War II. The average age for all elevators was 34 years.

Grain storage facilities besides the main elevator building were generally either wood-frame structures or steel bins. The latter type, including quonsets, made up most of the storage capacity changes made between 1945 and 1951.

Storage Capacity. In most areas of South Dakota elevator storage capacity normally is not sufficient to accommodate the entire volume of grain farmers wish to market during the harvest period. Even under favorable rail transportation conditions many elevators quickly become clogged and are unable to accept additional quantities of grains. Elevator owners in areas where this situation frequently occurs are confronted with a serious problem. On the one hand they are faced with the need to

provide sufficient capacity to meet the requirements of the peak in seasonal marketings. On the other hand they are concerned with achieving maximum utilization of capacity throughout the year.

Total elevator storage capacity in South Dakota as of October 1, 1949, is shown by production areas in Table 9. Between 36 and 66 percent of the total storage capacity in the various areas was being utilized as of that date. For the entire state about 54 percent of the storage capacity was being utilized.

A greater part of total cash grain was marketed in August than in any other month. The approximate average quantities of the major small grains sold during that month for the 1944-1948 period in the different production areas are presented in Table 10. These figures suggest that the total elevator capacity was sufficient to accommodate the total small grains marketed during August in all except areas 1 and 2. However: (1) the figures show only bushels marketed and not the quantities which farmers were unable to market because elevators were clogged temporarily (2) the bulk of the August sales frequently come during a one or two week period thus further complicating the storage problem where elevator capacity was inadequate (3) necessity of keeping different varieties separate means that space can not be used to capacity, (4) some space may be tied up in storage at the beginning of the month, (5) small amounts of grains not included in these figures (corn, sorghum and soybeans) also may have been marketed during the peak small grain marketing period.

These figures compare only bushels marketed and elevator capacity. They do not make allowances for grains shipped to terminal markets during the period. Shipments to terminals will tend to relieve the congestion

Table 9. Total Grain Storage Capacity of South Dakota Elevators and Grain in Storage, October 1, 1949*

	Production Areas							
	1	2	3	4	5	6	7	State
Total elevator capacity (000 bu) 1/	2,683	3,319	6,326	4,940	2,152	2,693	3,791	25,904
Total grain in storage (000 bu) 2/	1,433	1,912	4,162	2,812	1,031	1,248	1,366	13,964
Percent of storage capacity being used	53.4	57.6	65.8	56.9	47.9	46.3	36.0	53.9

* Data obtained from South Dakota Crop and Livestock Reporting Service publication, Market Supplies and Storage Facilities, Small Grain and Corn.

1/ Excludes sacked storage capacity which averages about 1 percent of total elevator capacity in the State. Does not include government owned or controlled storages.

2/ Includes wheat, oats, barley, rye, flaxseed, sorghum grains, soybeans, plus old crop shelled corn which totalled 2,630,000 bushels for the State.

Table 10. Total Production and Marketings of Various Small Grains and August Marketings in South Dakota, 1944-1948*

		Production Areas							
		1	2	3	4	5	6	7	State
		(thousand bushels)							
Wheat:	Total production	13,174	12,078	12,963	4,158	3,340	2,205	912	48,830
	Total marketed	11,633	10,665	11,446	3,672	2,949	1,947	805	43,117
	Sold in August	2,489	2,282	2,450	786	631	417	172	9,227
Oats:	Total production	6,285	11,899	19,173	23,244	6,221	13,836	25,417	106,075
	Total marketed	2,495	4,724	7,612	9,228	2,470	5,493	10,090	42,112
	Sold in August	554	1,049	1,690	2,048	548	1,220	2,240	9,349
Barley:	Total production	5,008	5,799	4,977	2,665	6,356	4,956	1,109	30,870
	Total marketed	2,734	3,166	2,718	1,455	3,470	2,706	606	16,855
	Sold in August	661	766	658	352	840	655	147	4,079
Flax:	Total production	289	468	989	2,507	17	82	492	4,844
	Total marketed	277	449	950	2,407	16	79	472	4,650
	Sold in August	85	137	291	737	5	24	144	1,423
Rye:	Total production	499	572	856	452	614	880	178	4,051
	Total marketed	422	483	723	382	519	744	150	3,423
	Sold in August	133	153	229	121	164	235	47	1,082
Total grain sold in August		3,922	4,387	5,318	4,044	2,188	2,551	2,750	25,160
Total elevator capacity		2,683	3,319	6,326	4,940	2,152	2,693	3,791	25,904

* Grain production totals and marketing percentages derived from data presented in South Dakota Crop and Livestock Reporting Service publication, Market Supplies and Storage Facilities, Small Grain and Corn.

at harvest time. However, transportation facilities are generally least adequate in the western areas where elevator storage facilities also appear to be least adequate.

Data on capacity of the 105 elevators included in the study are shown in Table 11. Average licensed capacity and maximum possible capacity are listed by elevator types. Licensed and maximum capacities are generally the same, however many elevators have buildings that are normally used for other purposes but which can be converted into grain storage if necessary.

Adequacy of Storage Capacity. Fluctuations in annual grain production and the uneven flow of grains from farms to market throughout the year make it extremely difficult for elevator owners to determine how much grain storage capacity it is economical to have. The elevator operators were questioned regarding the adequacy of grain storage facilities. Fifty-nine of the 105 operators interviewed reported insufficient capacity. These 59 houses had an average capacity of 40 thousand bushels, and expressed a need for an average increase of 34 thousand bushels. The largest average capacity need was in area 1. There the average licensed capacity for all type elevators was less than in any other area (Table 12).

A 50 percent increase in the number of bins was needed according to reports of the 59 elevator operators. A considerable number of the operators indicated that need for additional bins to allow more adequate separation of grain types and varieties was more urgent than an increase in total storage capacity.

Definite plans for storage increases within the next two-year

Table 11. Grain Storage Capacities of 105 South Dakota Elevators

Areas	Capacity Measure	Average Capacities by Elevator Types: Farmers' Coops	Line Elevators	Privately Owned	Total
		(thousand bushels)			
1	Licensed	26	23	29	26
	Maximum*	45	33	54	44
2	Licensed	60	49	32	47
	Maximum	64	57	35	52
3	Licensed	31	38	34	34
	Maximum	38	65	38	47
4	Licensed	42	39	38	40
	Maximum	42	43	39	41
5	Licensed	41	20	25	29
	Maximum	44	24	27	32
6	Licensed	34	41	42	39
	Maximum	45	50	43	46
7	Licensed	84	30	53	56
	Maximum	85	38	53	59
State	Licensed -1590-	45 -1207-	34 -1267-	36	39
	Maximum -1817-	52 -1546-	44 -1481-	42	46

* Maximum storage includes all facilities which could be used for grain storage if necessary.

Table 12. Utilization of Elevator Grain Storage Facilities by Months as Reported by 105 South Dakota Elevators

Storage Used (Percent)	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Ave.
	(number reporting)												
0-29	6	7	10	16	27	39	10	0	0	0	0	1	0
30-49	9	11	15	12	19	20	19	2	1	2	2	4	9
50-69	23	21	17	32	29	17	34	4	5	5	13	18	31
70-89	21	23	28	22	12	14	16	16	15	24	31	23	49
90-100	41	38	30	18	13	10	21	78	79	69	54	54	11

period had been made for 14 of the 59 elevators reporting inadequate storage facilities. The total planned increase would give all of the 14 elevators the additional storage desired. This planned increase represents over 30 percent of the entire amount desired by all 59 elevators. The most substantial increase was planned in area 1. Average annual use exceeded 70 percent in 60 percent of the elevators. An additional 31 percent indicated an average yearly utilization of between 50 and 69 percent.

In order to make fuller utilization of storage facilities most elevators follow the practice of storing grains for farmers during the slack periods. In recent years a large portion of the available space in many elevators has been utilized for storing Government grains.

APPRAISAL OF GOVERNMENT STORAGE PROGRAM

The 140 farmers were asked for their opinion of the Government grain storage program, and what effect, if any, it has had on farm grain storage and grain prices received by farmers. One-hundred-twelve farmers considered the program favorable, 17 felt it had no effect either way, while 11 farmers looked on the program with disfavor. Nearly half of the 112 farmers who considered the program beneficial cited its influence in holding grain prices at higher level. The main reason for dissatisfaction of the 11 farmers was restriction of farmers' freedom to decide how they would run their farms.

In every production area except 6 and 7 the majority of farmers expressed the view that both the quality and quantity of farm grain storage facilities were benefited by the government program. Seventy-nine

farmers in all production areas estimated that the total grain storage facilities on all farms in the state were increased by an average of 36 percent due to the storage program. Most farmers in all areas attributed higher grain prices to the program. In all but area 6 a majority of farmers indicated that the program had been responsible for holding grains off the market at harvest time. For the entire state 101 farmers estimated that an average of 42 percent of the grain normally marketed at harvest was held back as a result of the storage program.

The elevator operators also were asked to appraise the various aspects of the government farm storage program. Fifty-five percent of the elevator men considered quality of farm storage facilities to be improved as measured by the quality of the government grains purchased. Over 85 percent of the operators felt that the quantity of farm storage had been increased. The average percentage capacity increase for the entire state was estimated at 39 percent. Ninety-three percent of the elevator men expressed the opinion that the government program tended to result in storing more grain on farms. They estimated that an average of 44 percent of the grain that would normally be marketed at harvest time was retained on the farm as a result of the program. On the basis of these highly comparable estimates by the two groups it would appear that the government farm grain storage program has been helpful in solving the problem of lack of adequate storage and transportation facilities to handle grain at harvest time.

The elevator operators were also questioned regarding the grading policy on government stored grains, and as to whether or not there were appreciable differences between their own grading and that by government

graders. Thirty-one of the operators indicated that important differences did exist between grades assigned by government graders and the elevator grade when the grain was delivered. Eight felt that any differences which occurred were the result of normal grain deterioration while in storage and not due to differences in grading methods. The remaining 66 either were not aware of any important grading discrepancies or were located in areas in which grading was performed by elevator personnel.

CHAPTER IV GRAIN TRANSPORTATION

The longer the distance involved, the greater grain transportation problems are likely to be. Transportation is particularly important in South Dakota since nearly all cash grains are shipped to out-of-state destinations.

METHOD OF SHIPMENT

Rail transportation is the principal means for moving grains to terminal markets. Only in recent years has motor truck transportation entered into the picture in South Dakota. The amount of grains moved by trucks is relatively small, but has gained considerably in importance in some areas during the past few years.

The number of elevators using trucks to transport grains to terminal markets, and the average percentages of grains moved in this manner by those elevators during both peak and slack grain periods, are presented in the following tabulation. Percentages shipped by truck are considerably

	Production Areas							State
	1	2	3	4	5	6	7	
Peak grain period:								
Number using trucks	2	7	6	7	10	9	8	49
Grain sent by truck (%)	1.5	12.1	16.3	26.7	12.6	18.4	16.0	16.2
Slack grain period:								
Number using trucks	2	5	3	4	5	7	6	32
Grain sent by truck (%)	1.5	4.2	8.3	28.0	13.0	18.6	43.7	19.3

lower in the western portion of the state due primarily to the relatively higher costs involved in trucking long distances.

A number of elevator managers in various areas expressed the intention of increasing truck transportation in the future, particularly during harvest season in years when rail facilities are inadequate. However, there are several disadvantages connected with trucking of grains to terminal markets. One of the major handicaps is the lack of equipment to unload trucks at many of the terminal elevators. Some terminal elevators have installed or are in the process of installing the facilities required to handle truck shipments. Many have been reluctant about making this addition to their present facilities. Many local elevators can not load and unload trucks at the same time. Thus in order to ship out by truck it is necessary to discontinue receiving grain when the trucks are being loaded.

A third obstacle to truck transportation of grains is the inability to obtain the stop in transit privilege granted to rail shippers. Stop in transit is a provision whereby after grain is sold it can be unloaded from the boxcar, processed, reloaded, and shipped on to the final destination under a single shipping contract with no increase in transportation rate. Grains delivered by truck must be reloaded under a separate contract after sale and processing. This means additional transportation costs before reaching the final destination.

Truckers lose this exemption under the Interstate Commerce Act if they carry non-agricultural products. If it were not for this, more hauling of goods, such as machinery, commercial fertilizers, or any other manufactured products, would be undertaken on the return trip. This would increase returns to truckers transporting grain.

Finally, Sunday truck laws in some major cities prohibit movement

of semi-trailer type trucks on Sunday within certain distance of the metropolitan area. Such laws curtail week-end truck movement of grains to market.

ADEQUACY OF TRANSPORTATION FACILITIES

The transportation problem is most acute in the western sections of South Dakota due to the lack of rail lines crossing that portion of the state. There are approximately 1,050 miles of railroad in main lines and spurs serving the entire area in South Dakota west of the Missouri River. Only one line completely crosses the western half of the state, two lines extend most of the distance across, while several spurs, each of 150 miles or less, project into various scattered localities.

Rail facilities are relatively more plentiful in the eastern half of the state. However, there are still numerous localities, particularly in the vicinity of the Missouri River, where facilities and services are inadequate for transporting grains, especially during the harvest period.

Elevator operators were asked if a boxcar shortage normally existed. The responses obtained are tabulated below.

	Production Areas							State
	1	2	3	4	5	6	7	
Number reporting boxcar shortage	13	15	14	11	15	14	11	93
Average length of shortage period:								
Number reporting 1 month or less	1	1	5	1	0	0	2	10
Number reporting 1 to 2 months	8	9	5	4	5	10	6	47
Number reporting 2 to 3 months	1	2	2	1	4	1	2	13
Number reporting 3 to 6 months	2	2	1	4	5	1	1	16
Number reporting year around	1	1	1	1	1	2	0	7

The least number of operators reporting boxcar shortages were in areas 4 and 7. This apparently is due to the greater availability of rail facilities in these areas as well as their proximity to terminals. The lengths of reported boxcar shortages varied widely both between and within areas. The majority of the operators indicated that the boxcar shortage extended over portions of at least two months. The worst shortage nearly always occurred during the period immediately after the start of harvest, primarily during August and early September.

Some rail lines received more criticism than others but in general elevator operators expressed the opinion that all companies could improve the transportation facilities and service, particularly during the harvest period.

CHAPTER V OTHER ASPECTS OF GRAIN MARKETING

The quality of grain produced sometimes determines the most profitable time and method of disposing of it. High quality grains which will bring top market prices are frequently marketed directly at harvest time rather than risk quality deterioration through farm storage. This is particularly true of malting barley and high quality wheat for which market value may decrease rapidly with relatively small quality deterioration. Immediate marketing at harvest is often the most profitable policy for grain which is subject to serious quality deterioration unless given special attention, such as drying, turning or treating. Such grain can often be handled by elevators so as to minimize deterioration or it can be shipped on to terminals for treatment before serious damage occurs.

On the other hand, if grain is of very poor quality it is sometimes impossible, or at least impractical to market it at any time. Elevators may refuse to accept very poor quality grains due to the serious handling and storage problems which they create. If these poor quality grains are purchased by elevators, a large price discount is likely. In such case the grains may be more valuable to farmers as livestock feed. This was the case with much of the 1951 corn crop in South Dakota.

GRADING

Quality problems which influence the grading and pricing policies in the purchasing of grains also determine the manner in which the grains

must be handled preparatory for resale. Both the prices paid to farmers and the prices received by elevators for marketed grains are determined according to grade classifications. The major considerations determining grade as set forth by official grade standards include: test weight; presence of foreign materials; broken or damaged kernels; purity of variety and grain type; moisture content; condition, which includes freedom from heat damage, mustiness, objectionable odors, smutty or diseased kernels, discoloration, sprouted kernels, and insect infestation; and in certain grains factors such as size of kernels and protein content are important.

Test Weight. The test weight is one of the initial considerations in the process of determining grain grades. Market price quotations are expressed in terms of grades, and each grade has specific minimum test weight limits per bushel. For example, number one grade barley must have a test weight of 47 pounds per bushel or greater. Test weight between 46 and 47 pounds places it in grade two regardless of how favorable other quality aspects might be. Forty-three to 46 pound barley falls in grade number three, from 40 to 43 pound in grade number four, from 35 to 40 pound in grade number five, and barley below 35 pound test weight is classified as sample grade. Barley with test weight below 43 pounds generally is not accepted for malting purposes. Even grade three barley is not desirable for malting since it contains a substantial percentage of undersized kernels.

The determination of test weight present little or no problem in purchasing of grains by elevators. The operation may be performed in the presence of both buyer and seller. Care should be exercised to weigh

the sample accurately. For wheat, barley, flax and rye, the dockage should be removed from the sample prior to making the test.

In resale of grains by elevators test weight is an important consideration. Achieving the desired test weight in carload shipments is one of the major reasons for mixing or blending of grains by elevator operators. Since grades, (and prices) are contingent on test weight, generally it is profitable to blend grain such that they just make the minimum for the particular grade. The average test weights on all carloads shipped should be such as to net the greatest total dollar return. An elevator operator with one carload each of 49 pound and 45 pound barley, of otherwise comparable quality probably would find it more profitable to blend them into two carloads of 47 pound, number one barley than to sell them separately as one carload of number three and one carload of number one subject to special premium for high test weight. The special premium on the 49 pound barley generally will not compensate for the loss of two grades on the lighter carload.

Mixing or blending of grains is not an uncommon practice among elevator operators. Seventy of the 105 operators indicated that it was customary for them to do a certain amount of this. Three major reasons were given: 15 indicated that it was done because of a lack of storage facilities to maintain grains separately, 15 indicated that mixing was done because an excessive number of grain varieties were being produced. The others indicated it was a matter of blending grain qualities to improve resale value.

Approximately 20 percent of the farmers interviewed felt that mixing of grains by elevators acted as a price penalty for farmers producing the

higher quality grains. However, this was emphatically denied by the elevator men. Elevator operators who practices grain mixing asserted that no price penalties were inflicted on any farmers as a result of the practice. Several operators pointed out that under certain circumstances it enabled the payment of better prices.

Protein Content. Elevators rarely have the equipment necessary to determine protein content in wheat or to test the malting quality of barley. The most common procedure, particularly for protein in wheat, is for elevators to pay premiums on the basis of the station average. At the beginning of the harvest season representative grain samples from the locality are sent to the terminal elevator for analysis. Premiums, if warrented, are paid to all farmers on the basis of these tests.

This system generally benefits farmers producing grain of below average protein content and penalizes those in the area whose grain is above average. It will not be possible to eliminate this inequity completely until it becomes possible for elevators to run tests on all grain delivered, even during the rush season. However, presently if a farmer has sufficient grain to fill a carload, most elevators will arrange for a separate shipment to market and testing if the farmer so desires. Ordinarily, grains from numerous farmers are mixed together before shipping.

There is frequently some misunderstanding on the part of farmers regarding the eligibility of high protein wheat for premiums. There is no specific protein percentage content in wheat which qualifies it for such payments. Uniform protein content is desired in flour for baking purposes. In years when the average protein content in wheats is below this desired level any wheat above the average may be eligible for a

premium. In years when the average protein content is extremely high it is possible that premiums may be paid on low protein wheat in order to secure a sufficient quantity to maintain the desired flour uniformity.

Dockage. The presence of foreign materials or damaged and undersized kernels are undesirable for several reasons. Foreign materials frequently have little or no commercial use, yet shipping them to market results in additional transportation expense. Often dockage which is shipped to market with grain would have value to farmers as livestock feed if it were kept on the farm. A few elevators make a practice of reimbursing farmers to the extent of at least some of the value of the screenings, but when numerous grain purchases are binned together and cleaned at a later date, as if often the case during the harvest season, this policy is almost impossible to follow.

Grain grading standards stipulate dockage testing procedures and dockage limits by grades for the various grains except corn and oats for which there are no provisions for dockage. Dockage testing equipment for nearly all elevators consisted of a set of hand sieve pans. Only one of the 105 elevators reported an electrically operated dockage tester.

Much of the foreign materials commonly found in grains, such as dirt, chaff, stems and most weed seeds, can be removed through normal cleaning operations. The most serious problem arises when mixed grains or weed seeds cannot be separated sufficiently to qualify grains for certain commercial uses. Two of the more difficult mixtures to separate according to the elevator men are rye in wheat, and wild oats in all small grains. Excess foreign material may cause substantial price reductions if it cannot be removed. Even when separation is possible grains are

often discounted for dockage because special binning and cleaning are required.

Sixty of the 105 elevators reported grain cleaning equipment. The majority of these clean grain for farmers prior to marketing, at least during the slack periods. Many indicated that they could not possibly handle all cleaning requests during the harvest period. They generally make it a policy not to clean grain for farmers at that time. A few operators indicated that their cleaning equipment was used strictly for purchased grains, and to clean seed grain for farmers during the slack periods.

As with foreign materials it is generally profitable for local elevators to remove as many of the broken and undersized kernels as possible if this will improve the grade.

Grade requirements for malting barley are the most exacting with respect to foreign material content. In order to grade number one, barley can contain no more than one percent foreign material. Each percentage increase in dockage thereafter reduces the grain one grade until grade five which permits .6 percent foreign materials.

Damaged and Undersized Kernels. The size and condition of the grain kernel is also of major importance, particularly in wheat for milling purposes and in malting barley. Broken or shrivelled wheat kernels materially reduce flour yield. Official grain standards limit shrunken or broken kernels to 7 percent of the top two grades in Hard Red Spring wheat, and to 10 percent for grade three.

Damaged and thin barley kernels have little or no value for malting. Damaged barley includes broken, skinned and frayed kernels. Frayed

kernels refers to those on which the tip end has been peeled or broken, whereas skinned implies that all or part of the butt, or germ end is exposed. If barley is skinned or frayed the hull may be removed more easily in the initial stages of the malting process, thereby exposing the germ or the sprout to injury.

In order to grade number one, barley must contain no more than four percent damaged kernels, while grades two and three permit 8 and 12 percents, respectively. However, standards for malting barley stipulate that there cannot be in excess of 15 percent thin kernels or 5 percent skinned and broken kernels. Thus on the basis of kernel damage no more than the top two grades are acceptable for malting purposes.

COMPETITION IN GRAIN PURCHASING BY ELEVATORS

The grain purchasing and pricing policies of elevators may be influenced to some extent by the degree of competition that exists. In the early years of country elevator development grain pricing and grading policies were quite flexible for the individual elevator operators. This permitted individual elevators to pursue monopolistic or discriminatory practices. This possibility has been eliminated almost completely through a combination of factors. An increase in the number of elevators, adoption of grading standards, improved methods and equipment for grading, development of better communication which make possible daily and hourly market reports available to both elevators and farmers, and improved farm transportation facilities have all contributed.

The degree of competition between elevators varies for the different

sections of South Dakota. Information was obtained from the elevator operators regarding the extent of their normal supply area and the number of competing elevators sharing a significant portion of the supply area. On the average supply areas in the western part of the state extended out 24 miles. The average for the eastern part of the state was under 10 miles. Supply areas decreased from north to south, as well as from west to east. Several elevator operators in area one reported supply areas extending out as far as 150 miles while many elevators in the southern and eastern sections reported supply areas of less than five miles in any direction.

The degree of elevator competition varied slightly between production areas. From each elevator in the sample, data were obtained on the number of other elevators with the same supply areas and the number of other elevators which competed in part of the supply area. Results are shown below. In spite of fewer elevators in the western areas a consider-

	Production Areas							
	1	2	3	4	5	6	7	State
Average number elevators:								
With the same supply area	2.0	2.0	2.1	1.1	1.7	2.2	1.3	1.8
Which competed in part of the supply area	4.3	7.7	8.3	8.5	5.1	7.8	6.6	6.9

able degree of competition still prevailed. Improved roads and good truck transportation facilities enable farmers to haul grains long distances to elevators which offer the best deal.

Excessive overlapping of elevator supply areas probably prevails in many places. Fixed costs including such items as rent, insurance, taxes, manager's salary, and depreciation on buildings and equipment make up a

substantial portion of grain elevator costs. These are all more or less constant regardless of the annual volume of grains handled. Where existing number of elevators are adequately serving the farmers of an area and their scale of operations permits a high level of efficiency, the entry of new elevators only reduces the annual grain volume handled by each elevator and increases the per bushel cost of operation. This higher per bushel cost is likely to be reflected back to the farmers in the form of lower grain prices. Generally when additional elevator facilities are needed in an area, the most economical method of accomplishing this is through expansion of facilities at existing elevators.

QUANTITY OF GRAIN MARKETED

The amounts of various grains which must be retained for feeding purposes depend upon the types and quantities of livestock on the individual farms. Since these grains are almost always stored on the farm they involve no problems beyond those occurring through production and storage.

The annual production and disposition of the six major grain crops in South Dakota for the 1944-1949 period are presented in Table 13. As is to be expected amounts of different grains sold vary more than amounts used on farms. In feed grains a relatively constant amount is retained each year for seed and feeding purposes and the remainder sold. The quantity marketed fluctuates directly with annual production. Since production is quite variable from year to year the quantity sold also tends to fluctuate considerably. For some cash grains farm use is confined almost entirely to seed. Unless there are drastic changes from year to year in acreages sown, quantities used on farms are relatively constant.

Table 13. Production and Disposition of Grains on South Dakota Farms, 1944-1949

		1944	1945	1946	1947	1948	1949	Average
				(thousands of bushels)				
Wheat:	Total production	37,278	49,656	53,197	53,628	50,391	34,276	46,404
	Used on farms	5,252	5,139	5,385	5,739	6,107	5,183	5,468
	Sold	32,026	44,517	47,812	47,889	44,284	29,093	40,933
	Percent sold	85.9	89.6	89.9	89.3	87.9	84.9	88.3
Corn:	Total production	128,601	110,484	120,300	75,430	131,472	82,824	108,185
	Used on farms	85,877	83,538	85,292	57,469	82,292	55,849	75,063
	Sold	42,724	26,946	35,008	17,961	49,180	26,975	33,132
	Percent sold	33.2	24.4	29.1	23.8	37.4	32.6	30.6
Oats:	Total production	86,837	143,377	100,389	95,511	104,252	67,988	99,727
	Used on farms	56,444	80,291	64,255	63,992	68,806	47,592	63,563
	Sold	30,393	63,086	36,143	31,519	35,446	20,396	36,164
	Percent sold	35.0	44.0	36.0	33.0	34.0	30.0	36.3
Barley:	Total production	25,813	31,826	30,294	31,504	34,914	14,958	28,218
	Used on farms	13,939	14,003	11,815	13,862	15,013	8,227	12,810
	Sold	11,874	17,823	18,479	17,642	19,901	6,731	15,408
	Percent sold	46.0	56.0	61.0	56.0	57.0	45.0	54.6
Flaxseed:	Total production	2,509	4,630	3,440	5,850	7,788	4,956	4,862
	Used on farms	138	135	164	244	276	196	192
	Sold	2,371	4,495	3,276	5,606	7,512	4,760	4,670
	Percent sold	94.5	97.1	95.2	95.9	96.4	96.0	96.0
Rye:	Total production	3,959	4,205	2,530	4,858	4,704	2,470	3,788
	Used on farms	1,137	485	359	446	659	432	587
	Sold	2,822	3,720	2,171	4,412	4,045	2,038	3,201
	Percent sold	71.3	88.5	85.8	90.8	86.0	82.5	84.5
All grains:	Total production	284,997	344,178	310,159	266,781	333,521	207,472	291,185
	Used on farms	162,787	183,591	167,270	141,752	173,153	117,479	157,672
	Sold	122,210	160,587	142,889	125,029	160,368	89,993	133,513
	Percent sold	42.9	46.7	46.1	46.9	48.1	43.4	45.9

Source: Data compiled from South Dakota Crop and Livestock Reporting Service publication, Market Supplies and Storage Facilities, Small Grain and Corn.

Marketings of various grains through elevators as a percent of 1951 productions are shown in the tabulation below for the 140 farms

Average percent sold:	State
Wheat	85.9
Corn	17.5
Oats	25.5
Barley	39.5
Flaxseed	97.9
Rye	95.0

in the survey. The remainder of the grain was used on the farms where produced except for small quantities sold directly to other farmers.

TIME OF MARKETING

When adequate farm grain storage facilities are available farmers frequently store cash grains for future marketing. In general farmers expect grain prices to be lowest during and immediately after the harvest period and then to increase at later dates. This is substantiated by the data showing the average monthly grain prices received by South Dakota farmers over a 42-year period and a six year post World War II period, (Table 14). Average prices received were the lowest during and immediately after the normal harvest in both periods.

The decision to market cash grains at harvest or to store them for later sale depends primarily on the price expected. Grain should be stored only when the farmer's anticipated future price minus storage costs exceeds the price at harvest. Otherwise it would be more profitable to dispose of the cash grains directly at harvest time. In some years it is highly profitable to store grain while in other years extremely unprofitable. In the long run a farmer with adequate grain storage facilities

Table 14. Average Monthly Grain Prices Received by South Dakota Farmers

Grain	Time period	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
						(price in dollars)							
Corn	1910-1951	.72	.71	.73	.76	.79	.81	.85	.86	.85	.77	.71	.72
	1946-1951	1.32	1.20	1.29	1.36	1.39	1.44	1.55	1.53	1.56	1.44	1.26	1.33
Wheat	1910-1951	1.21	1.20	1.21	1.22	1.24	1.21	1.22	1.18	1.17	1.18	1.18	1.21
	1946-1951	2.04	1.96	2.05	2.05	2.07	2.03	2.08	1.95	2.01	2.08	2.12	2.15
Oats	1910-1951	.44	.44	.44	.45	.45	.44	.43	.39	.39	.40	.41	.43
	1946-1951	.78	.73	.78	.78	.77	.76	.72	.65	.70	.71	.74	.79
Barley	1910-1951	.70	.69	.71	.72	.72	.68	.67	.64	.65	.66	.66	.69
	1946-1951	1.35	1.27	1.33	1.31	1.31	1.29	1.26	1.19	1.24	1.26	1.30	1.34
Flax	1910-1951	2.47	2.47	2.53	2.52	2.43	2.37	2.35	2.34	2.36	2.33	2.41	2.45
	1946-1951	5.01	4.88	5.10	4.91	4.33	4.19	4.17	4.16	4.31	4.33	4.97	5.09
Rye	1910-1951	.89	.89	.91	.92	.91	.86	.86	.81	.83	.84	.85	.87
	1946-1951	1.76	1.70	1.86	1.86	1.86	1.63	1.66	1.43	1.58	1.60	1.69	1.75

Source: Data obtained from South Dakota Crop and Livestock Reporting Service pubilications, Price Trends of South Dakota Agricultural Products, and South Dakota Agriculture, (annual).

on his farm could expect to realize a greater return by storing grains than by selling them at harvest time. However, lack of storage facilities or boxcars to move grain out limits the quantity of grain that an elevator can accept at harvest time.

The 93 elevator operators reporting boxcar shortage conditions were asked how they thought more adequate transportation service during the harvest period would affect prices received for grain. Sixty-two elevator operators felt there would be no appreciable effect on prices received in the long run. Eighteen indicated it would generally mean smaller returns since prices are usually slightly lower during the harvest period. Thirteen operators thought that better prices could be realized if transportation facilities were available at all times. 7/ The latter group contended that price penalties resulting from grain deterioration were greater than the slightly lower market prices which might prevail during the peak grain period. Many of the 62 operators who expected no effect on price based their opinion on the fact that nearly all purchased grains were hedged immediately.

SELECTION OF ELEVATORS BY FARMERS

In the marketing of cash grains farmers not only must decide when to sell but also where to sell. This latter factor is important from the standpoint of prices received for grains and the cost of transporting the grain. Information was obtained from the 140 farmers regarding their basis for deciding where grains are sold, amount of grain going

7/ It was generally recognized by elevator operators that with present terminal capacity adequate transportation facilities to move all of the grain to terminals at harvest would result in a bottleneck at the terminal.

to different elevators.

The importance of various considerations in determining where they sold their grains is shown in the following tabulation. The predominant

	Production Areas							State
	1	2	3	4	5	6	7	
	(number farmers reporting)*							
Basis for determining where grains are sold:								
Highest bidder	6	9	9	13	13	8	9	67
Coop elevator member	6	7	9	7	3	6	6	44
Nearest elevator	6	7	4	5	4	7	3	36
Where space is available at harvest	5	1	1	0	1	3	0	11
Personal preference	0	4	2	0	2	0	3	11

* Each farmer was asked to give two major reasons, however, many farmers had only one basis for market determination.

factor was price, second was sale to Coop elevators by Coop members, and third was relative distance to the elevator. Farmers also were asked if they checked prices with more than one elevator before selling. Forty-one farmers indicated that they did not check prices. On the average farmers made 83 percent of their grain sales to one elevator and another 14 percent to a second elevator.

SELECTION OF MARKET OUTLETS BY ELEVATORS

The percent of purchased grains shipped to terminal markets varies with type of grain as well as between production areas. The tabulation on the following page shows the average percentages of the various grains resold locally to farmers or truckers.

The percentage local resale of corn and oats was greatest in the western portion of the state. The demand for feed grain often exceeds

Grain	Production Areas 1	2	3	4	5	6	7	State
	(percentages)							
Wheat	3.0	1.5	1.0	0.4	0.9	0.7	0.0	1.2
Corn	80.0	52.2	20.4	24.7	24.3	13.0	21.7	24.8
Oats	70.0	20.0	15.7	8.4	46.2	15.0	14.7	25.4
Barley	50.0	6.5	2.3	0.5	11.9	0.7	0.3	10.8
Flaxseed	7.0	5.0	1.6	1.1	0.0	0.0	0.3	2.7
Rye	15.0	2.3	1.0	0.2	0.1	0.3	0.0	2.7

total production in the area. As a result only a small part of the grain produced in the area ever reaches the elevators and what does generally is resold to farmers in the area.

Most farmers in areas four, five, six and seven, produce and save the amount of feed grain they will need throughout the year. Large livestock feeders who cannot produce sufficient feed grains on their farms constitute the major local outlet for grain.

Terminal Selection. The major portion of the grain received by elevators is shipped to various terminal markets. The elevator manager, is confronted with the problem deciding where the grains should be shipped. There are several nearby terminal markets to which grains can be shipped from most points in South Dakota, and there are numerous buyers and commission firms at each of the terminals.

The elevator managers were asked to rank the various terminal markets with respect to acessibility and frequency of sales. The rankings are shown in Table 15.

Minneapolis and Sioux City were the major market outlets with Omaha and Duluth next in order of importance. Minneapolis and Duluth were the principal outlets for wheat, flax and malting barley, while Sioux City

Table 15. Ranking of Various Market Outlets for Grains, Reported by Elevators in Different Production Areas of South Dakota

	Production Areas													
	1		2		3		4		5		6		7	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
	(number reporting)													
Terminal markets:														
Minneapolis	10	4	15	-	14	1	14	-	3	5	8	3	1	3
Sioux City	5	5	-	8	1	8	1	9	11	4	7	5	13	2
Omaha	-	1	-	1	-	-	-	1	1	6	-	6	1	9
Duluth	-	1	-	5	-	2	-	2	-	-	-	-	-	-
Bases for deciding where grains are sold:														
Sell to highest bidder	6	2	10	-	9	3	10	-	6	-	10	3	7	1
Deal strictly with one (or a few) reliable firms	4	1	3	3	2	-	3	1	5	2	3	1	4	2
Sell to parent organization	2	-	1	-	2	-	2	-	4	-	1	-	3	-
One firm for credit reasons	3	-	1	-	2	-	-	-	-	-	1	-	1	2

and Omaha received a substantial portion of the feed grains. Virtually all the grain shipped from the northern half of South Dakota was sent to the Minnesota terminals, while grains produced in the southern sections were quite evenly divided between Minneapolis and the southern markets.

Most elevators in the state can arrange grain shipments to any terminal market if the price quotations warrant. However, when grain prices are nearly the same, elevator operators will ship to the terminal which is most easily reached.

Commission-Firm Selection. Elevator managers have different philosophies regarding the best policy for handling the grain selling operation at the terminal markets.

Over half of the operators indicated that their first consideration was the highest price for individual lots. Nearly 25 percent considered it most profitable over the long run to deal with one, or a very few, reputable firms. About 15 percent were committed to deal with a parent organization. Eight percent indicated that they dealt with a single firm for credit reasons.

The majority of elevator men indicated they did the greatest portion of their business through from one to three commission firms at all times. The decision as to which of the few firms was consigned a specific load of grain was based upon individual price quotations. However, it seems unlikely that an appreciable difference exists between prices which could be obtained by competing commission firms for a specific type and grade of grain on a given day. Thus is appears likely that past experiences in dealing with commission firms is the major factor influencing elevator managers.

GRAIN HEDGING

As a means of protection from loss due to price change on grains between the time of purchase and sale, elevator managers may engage in some type of hedging operation. There are two methods by which this can be accomplished: (1) through sale contract at the time of purchase with the provision that the grain is to arrive at the terminal at some later time, or (2) by selling grain in the futures market. While both of these methods provide a hedge for the elevator on cash grains purchased, it is the latter procedure which is normally referred to as "hedging".

The number of elevators hedging the various grains, and the average percent of the cash grains hedged by elevators that hedged through either of the procedures mentioned above, are indicated in Table 16.

METHOD OF SALE

Local elevators can sell grains either on a "to arrive" or on a "spot" basis. "To arrive" involves selling grain while still at the local elevator with the stipulation that it will arrive at the terminal within a certain time period. The contract price is contingent upon the grade as determined after arrival at the destination. If the grade does not meet the requirements as specified in the original agreement the price is adjusted accordingly.

In the case of a "spot" sale, the ownership and control remain with the local elevator while in transit. Upon arrival at the terminal the commission firm to whom the grain is consigned has it graded and submitted to the trading floor for cash sale. Grain to be sold in this way is

Table 16. Number of Elevators Hedging Grain and Average Percent of Their Grain Hedged, 105 South Dakota Elevators 1/

	Production Areas							
	1	2	3	4	5	6	7	State
Wheat:								
Number of elevators	15	15	13	14	14	15	5	91
Percent of grain hedged	88.3	76.0	85.7	65.4	57.0	64.3	66.0	72.4
Corn:								
Number of elevators	--	--	11	12	15	15	15	68
Percent of grain hedged	--	--	54.1	42.1	49.0	57.0	48.3	50.4
Oats:								
Number of elevators	9	14	14	15	15	15	15	97
Percent of grain hedged	60.0	59.3	67.9	52.3	39.7	59.3	48.3	54.8
Flax:								
Number of elevators	13	14	12	14	4	11	6	74
Percent of grain hedged	78.1	80.0	80.0	51.4	32.5	75.0	65.8	69.8
Rye:								
Number of elevators	11	9	14	13	14	15	5	81
Percent of grain hedged	77.3	78.9	72.9	56.5	46.4	63.7	69.0	65.0

1/ Hedged either by use of futures contract or by "to arrive" sale.

usually hedged on the futures market by the local elevator at the time of purchase. As soon as the grain is sold the elevator manager buys the futures back to balance the transaction. The following tabulation shows the average percent of the different grains sold on a "spot" basis as reported by the elevator managers.

There was no definite pattern among elevators as to how the various grains were sold. Some sold entirely under one method or the other, but

the majority used both.

Grain	Production Areas 1	2	3	4	5	6	7	State
	(percentages)							
Wheat	76.7	83.0	66.8	57.1	65.0	66.7	56.0	68.9
Corn	----	----	45.5	46.2	44.3	45.0	48.0	45.8
Oats	50.6	72.5	72.5	51.3	52.7	54.3	53.3	55.7
Flaxseed	51.9	63.6	74.2	50.4	70.0	58.6	49.2	56.3
Rye	66.8	77.2	71.1	50.8	58.6	67.7	74.0	65.4

LOADING FOR SHIPMENT

The practice of mixing grains to improve it is an accepted procedure in grain marketing and involves no attempt to deceive the buyer as to the quality of the grain. However, this is not true of the practice of plugging or rigging shipments. This consists of putting small quantities of inferior grain in the bottom, ends, corner, or various places throughout carloads of higher quality grain in an attempt to pass the entire carload off as the same quality as that on top.

No elevator operator interviewed admitted that he practiced plugging cars. However, 46 of the operators interviewed reported that other elevators employ this practice to varying degrees.

There are various methods employed by terminal buyers to protect themselves and to discourage local elevator operators from plugging cars of grain. Probably the most common, buyers shy away from grains received from elevators known or suspected of plugging cars. This eliminates many of the buyers from bidding on the grain and may result in lower prices for all of the elevator's shipments. At the very best grains from suspected shippers are subject to very careful inspection by the terminal buyers.