OPTIMUM DISTRIBUTION PATTERNS FOR DURUM, HARD RED SPRING, HARD RED WINTER WHEAT, AND FLOUR

By

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OPTIMUM DISTRIBUTION PATTERNS FOR DURUM, HARD RED SPRING, HARD RED WINTER WHEAT AND FLOUR CONSIDERING SUBSTITUTABILITY IN DOMESTIC AND EXPORT MARKETS 1965 AND PROJECTED TO 1970 AND 1975

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FOREWARD

This report is one of a series of five reports prepared for the North Dakota State Wheat Commission under a project entitled IMPACT OF CHANGING RAIL FREIGHT RATES ON MARKETS FOR NORTH DAKOTA HARD RED SPRING AND DURUM WHEAT. The preparation of this report was financed in part through a contract grant from the Commission to the Upper Great Plains Transportation Institute. Other reports in this series are:

Optimum Distribution Patterns for Durum Wheat and Flour in Domestic and Export Markets, 1965, and Projected to 1970 and 1975, UGPTI Report No. 3

Optimum Distribution Patterns for Hard Red Spring Wheat and Flour in Domestic and Export Markets, 1965, and Projected to 1970 and 1975, UGPTI Report No. 4

Competitive Transportation Rate Ranges for North Dakota Hard Red Spring and Durum Wheat and Flour in Domestic and Export Markets, 1965, and Projected to 1970 and 1975, UGPTI Report No. 6

Statistical Appendix to UGPTI Reports 3, 4, 5, and 6, UGPTI Report No. 7

Alternative market outlets for wheat production of North Dakota and the Upper Great Plains are important. Hard red spring and durum wheat produced in this area can now be sold in either domestic or export markets. These alternatives provide more competition among buyers for these products. This situation provides a partial solution to a basic problem that has faced area farmers for many years. That is, the production of spring wheat has been tied to the activity of the Minneapolis and Duluth markets. During periods of labor problems and/or when the Great Lakes become impassable, these markets become narrower or disappear. There is evidence that the remaining mills located in the Twin Cities and southern Minnesota are looking toward hard winter wheat supply areas for more and more wheat inputs. In addition, a trend exists toward moving milling capacity to points of consumption i.e., where population is centralizing and expanding at rapid rates. Reductions in the costs of hauling the raw product encourage these types of changes.

Reductions in westbound export rail rates on wheat have played an important role in providing an additional market outlet for spring wheat produced in the Upper Great Plains. It is important to recognize, however, that these reductions apply only on westbound movements consigned to destinations outside of the United States. Therefore, this product is not legally available to millers of the Northwest and the West Coast of the United States except through the existing structure of high domestic freight rates.

In order to intelligently negotiate adjustments in rail rates, railroad management and farm producers must possess objective analyses of the impact of such adjustments. The effects of adjustments on existing distribution patterns for substitutable wheats must be known. The several reports from this study are intended to partially satisfy the requirements for information to answer the questions of carriers and producers.

David C. Nelson
Director

OPTIMUM DISTRIBUTION PATTERNS FOR DURUM, HARD RED SPRING, HARD RED WINTER WHEAT AND FLOUR CONSIDERING SUBSTITUTABILITY IN DOMESTIC AND EXPORT MARKETS, 1965 AND PROJECTED TO 1970 AND 1975

Clair W. Cudworth*

INTRODUCTION

The Nature of the Problem

The wheat-flour-bakery industry is constructed from the wheat-grain producer to the bakery product buyer or consumer. Country elevators, subterminals, terminals, numerous marketing interests, flour millers, flour blenders and processors, and bakeries exist between the two ends of this spectrum. The movement of raw wheat from the farm to the consumer is influenced by a myriad of artificial, metroligical, economical, and political forces. As wheat is moved from the producer to the consumer, several participants compete for their share of the consumer's dollar for the final product in this movement. In recent years, the wheat producer has been receiving relatively the same reward (price) for his participation in this movement, whereas the consumer has to pay a considerable amount more than he did in previous years. It is consequential for the producer to be aware and soberly concerned about his fair share of the marketing value to the consumer.

North Dakota grown wheat can be marketed in two types of markets: the domestic market and the export market. Wheat that is produced in a state and not used in the same state is said to be in surplus or available for transport to states or areas that are in short supply of wheat. These states or areas are said to be in deficit. The wheat marketing system has to perform the function of distributing wheat from the surplus area to the deficit area (from the producer to the consumer). The specific means used to implement this distribution function is the available transportation system.

North Dakota wheat can be marketed only where it is in demand. The demand for North Dakota wheat is primarily influenced by the price at which the buyers will take it off the market. The difference between the price of wheat in a surplus area and a deficit area is theoretically a transportation bill, shipping cost, or freight rate. Therefore, relationships between prices in surplus and deficit areas (defined here as transportation costs) influence the volume of wheat moving within the marketing distribution system.

A reduction in a transportation cost between two areas would tend to increase prices for the producer in the surplus area, decrease prices to the buyers in the deficit area, and increase the volume transported or shipped between the two areas. An additional effect such a decrease

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in transportation cost will have is that this decrease will sometimes also affect the prices and volume transported to other surplus and deficit areas.

A change in supply or demand (price - defined as transportation cost) between surplus and deficit areas will create a new equilibrium distribution pattern and will cause changes in volume of grain moving between particular areas. Changes in supply-demand relationships (price) or transportation costs are basically short-run changes. Long-run changes, such as production and use in each of the areas, also affect movements of wheat distribution.[1]

There are basically three alternatives in the transportation of wheat: rail, truck, or barge. Basically, trucks are used for short transporting distances, whereas railroads and barges are basically used for longer transportation distances. All three modes of transportation are used for intermediate hauls. Each method has inherent advantages that lead to varying transportation costs. Transportation costs appear to be one of the main causes in the changes of the grain marketing structure. Both the size and location of merchandising, processing, and storage facilities are influenced by the transportation costs or freight rates. The number, size, and location of merchandising, processing, and storage facilities that handle the volume of grain and its by-products and perform an efficient marketing process, can do so only when the inherent advantages of the three modes of transportation are realized.

Objectives

Basically, the three objectives of this study are:

1. To determine the potential West Coast market for hard red spring and durum wheat.

2. To assess the existing and potential capacity for producing spring wheat in North Dakota.

3. To determine the impact on the North Coast and Intermountain flour milling industry of reductions in westbound domestic rail freight rates on hard red spring and durum wheat.

The following procedure and methodology were used in fulfilling these objectives.

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[1] Marketing Grain, Proceedings of NCM-30 Grain Marketing Symposium, North Central Regional Research Publication No. 7, Agricultural Experiment Station, Purdue University, Lafayette, Indiana, January, 1968, pp. 109-110.

RESEARCH PROCEDURE, ASSUMPTIONS, AND DATA USED

Major Assumption

The western half of the United States was divided into smaller areas than the eastern half. This was done because Thompson's study[2] showed that about 80 percent of the expected increase in the domestic demand by 1975 for hard red spring wheat will occur in the western area. The export market on the West Coast is also expanding. One hundred percent of the expected increase for the domestic demand for durum by 1975 will occur in this area. This half of the United States also supplies 99 percent of the spring wheat, 100 percent of the durum wheat, and over 70 percent of the winter wheat. Therefore, a more specific analysis of this area was needed. The western portion of the United States was divided into 17 states representing the domestic market and one export area representing the West Coast export market. The remaining portion of the country was divided into nine regions representing the domestic market and three areas representing the Great Lakes export market, the Gulf export market, and the Atlantic export market. This division was made on the basis of production, consumption, population, geographic size, number of flour mills, and the existing markets for wheat and flour (Figure 1).

A particular point was selected within each area to represent an origin or destination of particular shipments for that region or state. These points were selected on the basis of population, existence of markets, and available railroad service (Table 1).

A number of different points were selected according to the distance from the supply area for the export areas considered. For further illustrations, see the export rate appendix tables in the Statistical Report.

Time Periods of Analysis

There were three time periods that were analyzed. The first time period analyzed was the year 1965. This year was chosen because it is the latest year in which actual data was available. The years 1970 and 1975 were chosen to provide a basis for future decisions for those concerned. To predict beyond this point would certainly involve some highly intuitive reasoning.

The calendar year defined the years of 1965, 1970, and 1975 for production data. The calendar year also defined the years 1965, 1970,

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[2]Nelson, David C., and Robert G. Thompson, An Economic Analysis of the Domestic Demand for Wheat by Class in the United States, Agricultural Economics Report No. 64, Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota, March, 1969, pp. 41-42.

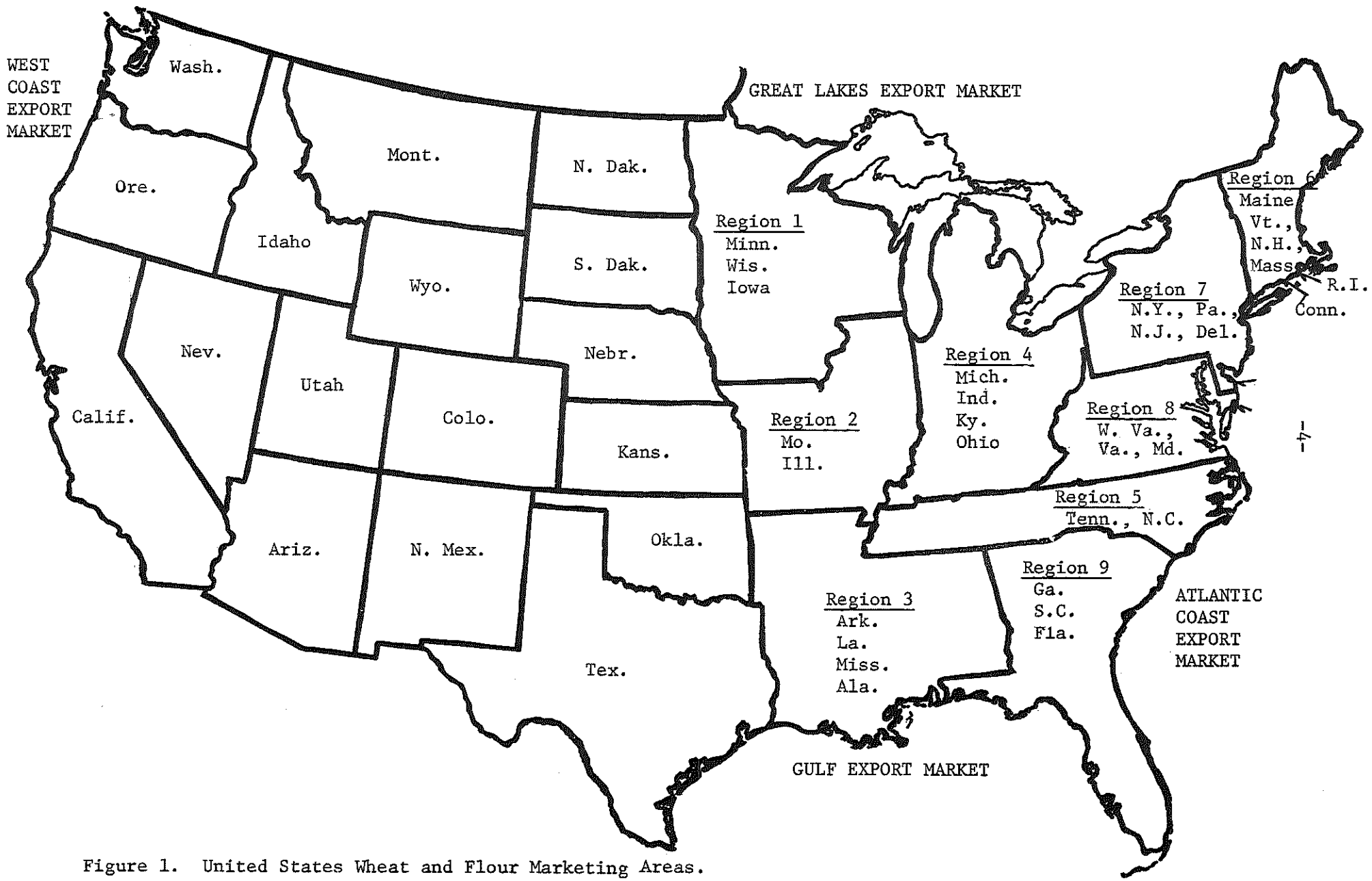

Figure 1. United States Wheat and Flour Marketing Areas.

and 1975 for flour millers' demand for raw wheat. These same years were also defined for total per capita consumption of wheat by the calendar year.

TABLE 1. DOMESTIC SURPLUS AND DEFICIT AREAS WITH THEIR SELECTED POINTS OF ORIGIN AND DESTINATION

State	Origin and Destination
Washington	Spokane
Oregon	Portland
California	Los Angeles
Idaho	Idaho Falls
Nevada	Winnemucca
Utah	Salt Lake City
New Mexico	Albuquerque
Arizona	Phoenix
Montana	Billings
Wyoming	Cheyenne
Colorado	Denver
North Dakota	Minot
South Dakota	Huron
Nebraska	Lincoln
Kansas	Hutchinson
Oklahoma	Oklahoma City
Texas	Houston
Minnesota, Iowa, Wisconsin	Minneapolis
Illinois, Missouri	St. Louis
Arkansas, Louisiana, Mississippi, Alabama	New Orleans
Michigan, Indiana, Ohio, Kentucky	Cincinnati
Tennessee, North Carolina	Knoxville
Maine, Vermont, New Hampshire, Rhode Island, Connecticut, Massachusetts	Boston
New York, Pennsylvania, New Jersey, Delaware	Buffalo
West Virginia, Virginia, Maryland	Baltimore
South Carolina, Georgia, Florida	Savannah

The government fiscal year of June 30 through July 1 was used for export data. The reason for this was that export sales are usually made well in advance (months in advance) of actual exportation. Therefore, in order to match export sales with more immediate sales to flour millers, a "slack" time period for export shipments was used to correspond with the calendar year purchases, production, and consumption data.

Production Data Used

Production data for the 1965 analysis were taken from statistics of the U. S. Department of Agriculture. Production data for the 1970

and 1975 analyses were derived from a supply response study conducted by the departments of agricultural economics at universities in the Great Plains and Pacific Northwest states in cooperation with the U. S. Department of Agriculture.[3] This study was a result of a joint venture of two regional technical committees. The two projects of these committees were GP-5 and W-54. They determined profitable adjustments on typical wheat farms which include individual and aggregate farm supply response for alternative price relationship and levels with emphasis on wheat, feed grains, and livestock. The studies included over 98 percent of the 1964 acreage and production of hard red winter wheat and 90 percent of the acreage and production of hard red spring wheat.

Total production was estimated from the ratio of production by class of each state in the study to the total production by class for the United States in the 1964-1965 crop year. The states that were not included in this study were allocated a portion of the estimated total which was based on the percentage of total production of each state by class in the 1964-1965 crop year.[4]

Durum wheat that was not included in the supply response study was assumed to have production increases by the average percentage increase of the classes included in the study. The estimated total was allocated according to the proportion of production by class and state to the total production by class for the 1964-1965 crop year.

Production data by state and region for the classes of hard red spring, hard winter, and durum wheat appear in the Statistical Report, Appendix Tables 1, 2, and 3.

Domestic Consumption Data Used

The consumption data used in this analysis consisted of three types: total flour millers' demand for raw wheat, total per capita demand for raw wheat and flour, and total per capita demand for flour.

Flour Millers' Demand for Raw Wheat

Data on domestic wheat purchases by flour millers were based on a mail survey of all wheat processors in the United States.[5] Ratio

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[3] Proceedings of the Meeting of the Great Plains Agricultural Council, Denver, Colorado, August 1-2, 1968, mimeograph paper, p. 151-.

[4] Luessen, Frederick W., Wheat Distribution Patterns by Class, Master of Science Thesis, Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota, September, 1968, pp. 8-9.

[5] Survey made by Robert G. Thompson, former Graduate Assistant, Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota.

estimators or total wheat ground divided by reported wheat ground were used to expand the data received from the millers who did report (Statistical Report, Appendix Table 4). Thus, by multiplying reported wheat purchases (Statistical Report, Appendix Table 5) by class and by state times the ratio estimator for that area would yield the total purchases for that class of wheat for that particular area (Statistical Report, Appendix Table 6). This procedure was used to estimate the 1965 domestic wheat purchases by the millers.

Projected total wheat purchases for 1970 and 1975 (Statistical Report, Appendix Table 7) were estimated by adding the average change in the proportion of the total wheat purchased in that region or state to the proportion of the total wheat purchased in that region for 1965 (Statistical Report, Appendix Table 8). Projected wheat purchases by class for 1970 and 1975 were made by adding the average changes in the proportion of that particular class of wheat purchased in that region or state to the proportion of that class of wheat purchased in that region or state for 1965. The quantity of wheat purchases by region or state and by class was derived by multiplying the proportions by the projected total wheat purchases. Statistical Report, Appendix Table 9 contains the proportions of wheat purchased by class.

Total Per Capita Demand for Raw Wheat and Flour

Population estimates that appear in the Statistical Report, Appendix Table 10 are the Series I-B type which is considered to be one of the more liberal projection types. These population figures are multiplied by the actual and projected per capita consumption requirements for the years 1965, 1970, and 1975 (Table 2).

TABLE 2. PER CAPITA CONSUMPTION OF FLOUR FROM HARD WHEATS, UNITED STATES, 1965, 1970, AND 1975[a]

Year	Class of Flour		
	Hard Red Winter	Hard Red Spring	Durum
	pounds		
1965	49.62	24.34	5.63
1970	47.42	23.26	5.38
1975	45.22	22.19	5.13

[a]Estimated from data reported in the Wheat Situation, U. S. Department of Agriculture, Washington, D. C., November, 1967, p. 5.

The per capita consumption figures are based on the assumption of a decrease in the total per capita wheat consumption of one pound per year. It is also assumed that the proportion of each class consumed will remain constant. Combining the data from the Statistical Report, Appendix Table 10 and Table 2 yields the Statistical Report, Appendix Tables 1, 2, and 3 which include the total per capita consumption of wheat and flour by class, region or state, and year. These data were obtained by multiplying population figures times the per capita consumption figures.

Total Demand for Flour From Existing Milling System

The third and final set of consumption demand data necessary in this analysis is the demand for the flour that has been milled by the existing milling industry. Bakeries purchase at least three-fourths of all domestic flour produced. After the flour is transformed into bakery products, the market for these products typically consists of a metropolitan area and a rural-urban fringe. Most of the bread is distributed within 50 miles of the bakery.[6] Therefore, bakeries appear to be located according to population density. Since sufficient data representing the actual flour demand by bakeries was not available, a population density method was used to estimate the flour demand of the bakeries. In comparison, the wheat-flour consumed by bakeries and the total per capita demand for flour were very close in magnitude when analyzing the data that was available.

In the population density method that was used, after the amount of flour produced by class and by region or state had been determined, the total per capita demand was subtracted from this. Therefore, it was assumed that the needs of a region will be satisfied first. If this demand cannot be satisfied within the region, it is said to be a deficit region. If a region can oversupply its own flour needs, it is said to be in surplus of flour and will be in a position to distribute to other deficit regions. The surplus and deficit regions and states are listed in the Statistical Report, Appendix Tables 1, 2, and 3.

Export Data Used

Since wheat has two alternative markets: the export market and the domestic market, both had to be considered. The four export market areas analyzed were the Great Lakes area, the Gulf area, the West Coast area, and the Atlantic Coast area.

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[6] Organization and Competition in the Milling and Baking Industries, Technical Study No. 5, National Commission on Food Marketing, U. S. Government Printing Office, Washington, D. C., June, 1966, p. 51 (Based on a survey of 78 plants milling hard wheat).

Actual export figures for wheat-grain were used for 1965 (Statistical Report, Appendix Table 11). Flour exports were eliminated from all years, because flour exports are not broken down by class of wheat. Exports of flour do not make up a large portion of the total wheat-flour export market; therefore, no attempt was made to determine the amount of flour exports by class and coastal area. No projections were made for flour exports for 1970 and 1975.

For 1970 and 1975, estimates or projections were made for the amount of wheat-grain that will be exported. The determinants of changes in volume of United States exports are many and very complicated. The 1970 projections were based on a study designed to project exports (Statistical Report, Appendix Table 11).[7] To determine shares of the total market by class of wheat, an average proportional change method was utilized to show the growth and decline in the particular export areas. An allowance was also made for those export areas in which large volume changes have occurred in recent years. The 1975 projections were based on the assumption that India and Pakistan would no longer import United States hard wheats. The assumption in no way asserts a probability but only provides a contrast to the normal "growth in exports" projection year of 1970.

Transportation Costs

Truck Costs

Since there were no available truck rates on hauling the exempt commodity of wheat by either regulated or unregulated truckers, a system of estimating truck rates was employed.

The truck rates used in this study were computed from estimates of the operating costs of trucking firms.[8] Truck rates (Statistical Report, Appendix Tables 14--domestic and 15--export) were computed assuming a 22 cent per mile one-way operating cost and a trailer capacity of 750 bushels of wheat. A one cent per mile one-way charge was added to the 22 cent charge to allow for increases in cost due to inflation. Therefore, to obtain an estimated truck rate, the highway distance (Statistical Report, Appendix Tables 12 and 13) between the origin and destination is multiplied by 46 cents.

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[7] Bratland, Robert P., World Wheat Trade Projections for 1975 and 1985, Master of Science Thesis, Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota, January, 1968, p. 94.

[8] Casavant, Kenneth L., and David C. Nelson, An Economic Analysis of the Costs of Operating Grain Trucking Firms in North Dakota, Agricultural Economics Report No. 54, Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota, July, 1967, p. 41.

Barge Costs

Barging was the second mode of transportation considered in this study. The obtained barge rates (Statistical Report, Appendix Table 16) apply at ports on the Mississippi, Illinois, Ohio, Cumberland, and Tennessee rivers and the Gulf ports. These are published rates and do not necessarily indicate that they are effective or actual rates (rates may be negotiable on exempt products such as grain). These rates are general indications of what is charged, but the actual charge may be lower or higher.

Rail Costs

The following two types of rail transportation costs were considered: the costs experienced under the existing railroad rate structure and the costs reported under a railroad rate structure based on fully distributed costs.

Existing Rail Rate Structure

The existing rail rate structure was developed by obtaining rates from railroads and government sources. They generally represent the lowest applicable rate between the specific origin and destination.

Rail rates for raw wheat are listed in the Statistical Report, Appendix Tables 17--domestic and 18--export. Rail rates for flour are listed in the Statistical Report, Appendix Table 19. Both types of rail rates are based upon a variety of factors. They may or may not be the same for wheat and flour.

Rail Rate Structure Based on Fully Distributed Costs

Fully distributed or fully apportioned costs reflect costs over a long-run period. They include all revenue needs covering 100 percent of the freight operating expenses, rents, taxes (excluding Federal income taxes), the passenger train and less than carload operating deficits, and a return of 4 percent after the Federal income taxes on 100 percent of road property and 100 percent of equipment used in freight service. These revenue needs were given a pro rata ton and ton-mile distribution over all revenue traffic without distinction as to type or class.

Fully distributed carload costs were obtained from Summary I of the rail cost formula, Rail Form A, and based on the 1966 operations. An allowance of 13 percent circuity is used to adjust short line distances. The short line mileage was increased by 13 percent and the resulting increased mileage used as the actual mileage.

The carload mileage cost scales for the Western, Official, and Southern regions were used in calculating "cost-oriented rates". The

particular cost scale used corresponded to the region in which all or most of the distance occurred. If the distance appeared to be equally distributed between regions, the region with the highest cost scale was used (Statistical Report, Appendix Table 20).

By applying the carload mileage costs to the short line rail distances between various points (Statistical Report, Appendix Tables 21--domestic and 22--export), rail rates were developed that were based on fully distributed costs. Two fully distributed cost rate structures were developed for wheat-grain shipments and one developed for wheat-flour shipments.

The first rate structure assumed that an average load of wheat-grain was 1,300 hundredweight, one transit included (Statistical Report, Appendix Tables 23--domestic and 24--export); and the average load of wheat-flour was 800 hundredweight, one transit included (Statistical Report, Appendix Table 25). The second rate structure assumed that an average load of wheat was 1,800 hundredweight, a covered hopper was utilized, and included one transit (Statistical Report, Appendix Tables 26--domestic and 27--export); and the same average load of flour was used as in the first rate structure.

Transportation Costs Used in the Analysis

Five systems of transportation costs were used in the analysis. Each system represented the least-cost combination of the three modes of transportation discussed previously. The best rates to use in this type of analysis would be the true least-cost rates determined by a weighted average method, but these rates are too difficult to obtain.

Least-Priced Rate System I

Least-priced Rate System I is a formation of existing least-priced rates from all modes of transportation for the distribution of wheat-grain (Statistical Report, Appendix Table 30).

Least-Priced Rate System II

With the exception of railroad rates, the least-priced Rate System II is a formation of existing least-priced rates from all modes of transportation. Rail rates were based on fully distributed costs adjusted to short line mileages for general service boxcars (Statistical Report, Appendix Table 28).

Least-Priced Rate System III

With the exception of railroad rates, the least-priced Rate System III is a formation of existing least-priced rates from all modes

of transportation. Rail rates were based on fully distributed costs adjusted to short line mileages for covered hopper cars (Statistical Report, Appendix Table 29).

Least-Priced Rate System IV

Least-priced Rate System IV is a formation of existing least-priced rail rates for wheat-flour distribution (Statistical Report, Appendix Table 19). Rate System I rates were used for export shipments.

Least-Priced Rate System V

Least-priced Rate System V is a formation of least-priced rail rates for wheat-flour distribution and were based on fully distributed costs adjusted to short line mileages for general service boxcars (Statistical Report, Appendix Table 25). Rate System II rates were used for export shipments.

In all five systems of transportation costs, no rates were obtained or developed for flour shipped by truck or flour shipped in large size rail shipments such as the hopper car. Truck rates for flour were not used, because the trucking of bulk flour has not been particularly adaptive either economically or technologically.[9] The rates for large shipments of flour by rail were not determined on the fully distributed cost basis, because individual flour deliveries historically have only been a fraction of the size of individual wheat shipments.[10] However, the importance of the cost of shipping large flour shipments should not be overlooked. If large shipments become adaptable to the marketing system, then more favorable rates for flour as compared to wheat should be sought.

THEORETICAL FRAMEWORK OF THE STUDY

Discussion of the Models Used

Transportation costs are contracted in three separate distributions of the wheat-flour economy.[11] They are:

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[9] Maillie, Jeff, and Dale Solum, An Analysis and Evaluation of Factors Which are Deleterious to the Competitive Interests of the Mid-America Wheat Flour Milling Industry, Midwest Research Institute, Kansas City, Missouri, July 1, 1968, p. 22

[10] Ibid., p. 16

[11] Wright, Bruce H., Impacts of Alternative Transportation Policies on Industrial Location and Regional Agricultural Development, Doctor's Thesis, Department of Economics, Iowa State University, Ames, Iowa, 1968, p. 66.

Distribution I. Transportation costs incur in effective rates on raw grain from the production area to the location of the flour mill.

Distribution II. Transportation costs incur in effective flour rates from the location of the mill to the consuming location.

Distribution III. Transportation costs incur in effective export rates for wheat from the production area to the point of export.

Assuming that the bulk of transportation costs in the wheat-flour economy remain within these three phases, the analysis will follow this procedure:

Step 1. Transportation costs of all three phases outlined will be determined under least-cost existing rates of any rail-truck-barge combination or individualization. The present location and flour production of existing flour mills will be honored.

Step 2. Transportation costs will again be measured in the same manner as Step 1 with the exception that any rail rate involved will not reflect the effective rate, but the rate will be based on fully distributed costs.

Step 3. Transportation costs will again be measured in the same manner as Step 2 with the exception that the present location and flour production of existing flour mills will be ignored.

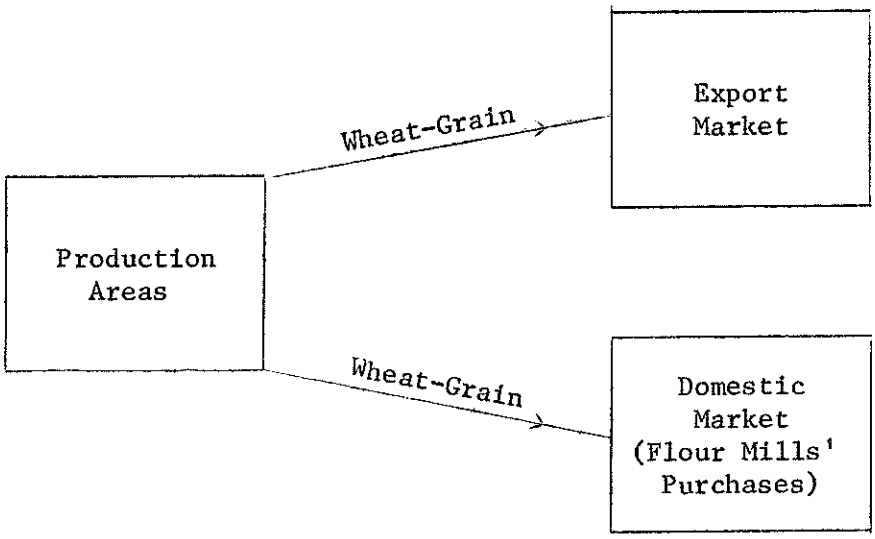
This analysis was performed through the use of three models illustrated as follows:

Model I. In Model I there were two phases of the distribution system: Phase I considered wheat-grain going from production or surplus areas to export markets and flour mills and Phase II considered wheat-flour from flour mills to consumption areas. This model was used to show transportation costs under existing flour milling capacities and locations. Both Phase I and Phase II together make up the total distribution system under these assumptions (Figure 2).

Model II. Model II consisted of only one phase which was wheat-grain going to the export markets and wheat-flour going to the consumption areas. Flour mills were assumed to be located in the production areas (Figure 3).

Model III. Model III also consists of only one phase which was wheat-grain going to the export markets and wheat-grain going to flour mills. The flour mills were assumed to be located in the consumption areas (Figure 4).

Model I, Phase I



Model I, Phase II

1965 Flour Mill Locations Assumed

Figure 2. Wheat-Grain and Wheat-Flour Market Flow Chart for Model I, Phases I and II.

Model II, Phase I

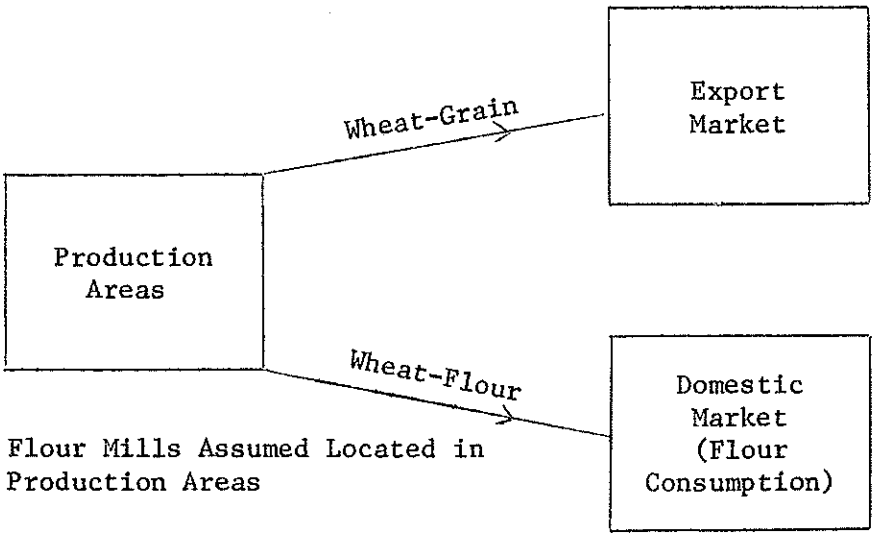


Figure 3. Wheat-Grain and Wheat-Flour Market Flow Chart for Model II, Phase I.

Model III, Phase I

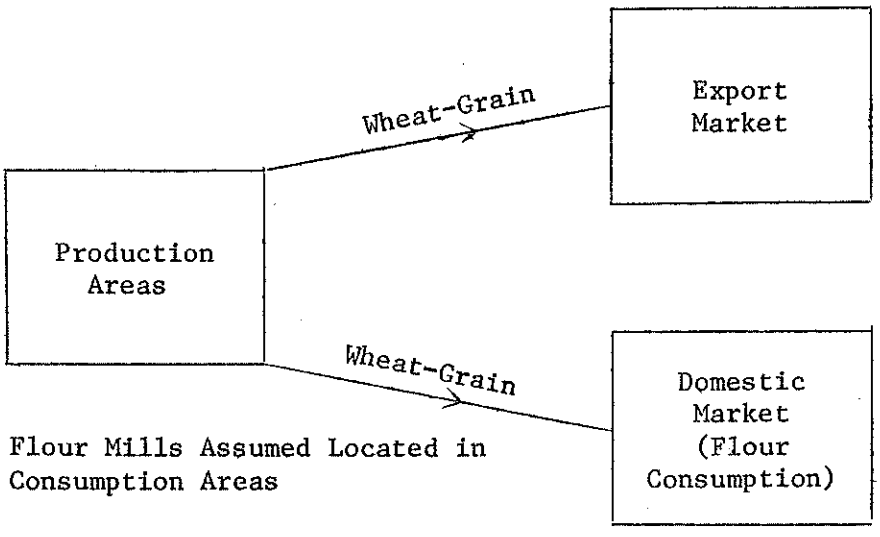


Figure 4. Wheat-Grain Market Flow Chart for Model III, Phase I.

Importance of Mathematical System Used in the Analysis

The analysis performed in this study was facilitated through the application of a special class of linear programming.[12] This class of programming is known as a spatial or transportation model. In this model, the objective is to determine the least-cost flow of wheat from surplus areas to deficit areas.

By using the 1965, 1970, and 1975 data, the application of this model will determine the minimum cost distribution pattern for wheat. The minimum cost distribution pattern will be determined under each of the five systems of transportation rates used.

There are many conditional assumptions under which this model functions.[13] They are as follows:

1. The supply of any one region or origin serves equally well to satisfy the demands of any destination or consuming center.

2. Each region meets its demand from its own domestic production; and in this process, intraregional transportation costs are not considered in the analysis.

3. Total demand has to equal total supply. If the supply is greater than the quantity demanded in terms of consumption, then the excess supply moves into storage.

4. The cost (rate) of moving supply from origins to destinations is known and is independent of the number of units moved. Particularly, the total cost of inter-regional transfers must be constant or linear.

5. There is a cost minimizing objective.

6. Movements from origins to destinations can only be carried on at non-negative levels.

7. Each region will be expected to make buying and selling decisions on the basis of perfect knowledge and maximization of profits.

8. There can be no cross hauling of the product, deficit regions cannot ship out, and surplus regions can only ship to deficit regions.

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[12]The data compiled was applied to linear programming through the use of the Mathematical Programming System/360 (360A-CO-14X) Linear and Separable Application Program.

[13]Heady, E. O., and Wilfred Candler, Linear Programming Methods, Iowa State College Press, Ames, Iowa, 1963, p. 332.

9. The buying or selling of a surplus or deficit area will have no effect on the buying or selling activities of another area.

10. There is a complete mobility of supply.

OPTIMUM DISTRIBUTION PATTERNS

The optimum or least-cost distribution patterns of all hard wheats and flour are presented in the following analysis under various conditions. The tables presented exhibit origin and destination, class of wheat shipped, class of wheat demanded, volume of shipment, applicable transportation rate, total shipments of each surplus area, amount of storage in each surplus area, and total cost of distribution.

The assumptions used to form a basis for determining substitution were as follows:

1. One bushel of hard red spring wheat will substitute for one bushel of hard red winter wheat and vice versa for making bread products.

2. One bushel of hard red winter wheat will substitute for one bushel of durum wheat for making macaroni products.

3. One bushel of hard red spring wheat will substitute for one bushel of durum wheat for making macaroni products.

4. All substitutions between classes and among classes are on an equal grade basis.

The hard wheats are very substitutable as indicated in a small questionnaire study which was sent to domestic flour millers. The following responses were obtained from the millers assuming average quality crops for the past five-year period and equal acquistion at each mill:

1. One bushel of Pacific Northwest grown hard red spring wheat equals .84 bushel of Plains grown hard red spring wheat.

2. One bushel of Pacific Northwest grown hard red spring wheat equals .92 bushel of Plains grown hard red winter wheat.

3. One bushel of Pacific Northwest grown hard red winter wheat equals .72 bushel of Plains grown hard red spring wheat.

4. One bushel of Pacific Northwest grown hard red winter wheat equals .86 bushel of Plains grown hard red winter wheat.

5. One bushel of Pacific Northwest grown hard red spring wheat equals 1.18 bushels of Pacific Northwest grown hard red winter wheat.

6. One bushel of Plains grown hard red spring wheat equals 1.07 bushels of Plains grown hard red winter wheat.

7. One bushel of Pacific Northwest grown hard red spring wheat equals .70 bushel of Plains grown durum wheat.

8. One bushel of Pacific Northwest grown hard red winter wheat equals .80 bushel of Plains grown durum wheat.

9. One bushel of Plains grown hard red winter wheat equals .93 bushel of Plains grown durum wheat.

10. One bushel of Plains grown hard red spring wheat equals .88 bushel of Plains grown durum wheat.

All figures indicated represent averages. They clearly show intraclass and interclass substitution. Consequently, these figures may represent more accurate substitution ratios than the 1:1 ratios used in this study's substitution analysis. Due to the time limitation, they could not be used.

These responses from the millers may not, however, be representative of any one mill. Each mill has its own desired mix specifications which vary a great deal from one mill to another. However, the buying of the right mix of classes of wheat is a complicated process for the miller, and many are using computers to determine their least-cost mix.

No specific ratios could be obtained pertaining to the substitution of classes of wheat for export, but there was indication that there is the same substitution process taking place. The substitution that does occur is with respect to price and quality of the class.

Some more comparisons should be made among the substitution analysis and the analyses made by class of wheat.

Substitution among classes of wheat may have been sufficiently identified in the analyses by class of wheat, i.e., for hard red spring wheat analyzed alone and durum wheat analyzed alone. The millers and exporters were assumed to have identified their rates of substitution with respect to quality and price when purchasing the ingredients for the final demand for the flour produced from the various classes of wheat.

Therefore, to allow additional substitution of the ingredients as in this study's substitution analysis, allows exaggerated pressures on market outlets. Consequently, this allows distorted distribution patterns and transportation rate ranges. On the other hand, in case of exceptional or irregular crop quality years, such substitution as considered in this study's substitution analysis may be permissible.

For example, if the protein content of hard red winter wheat is equal or greater than that of hard red spring wheat, then the miller or exporter may substitute more hard red winter wheat for hard red spring wheat than normally expected.

The value of this substitution analysis then is to observe the consequence of abnormal conditions. The analyses of wheat by class

represent a more natural set of circumstances, whereas the substitution analysis represents a more exceptional set of circumstances.

There are three sections in this portion of the analysis done under the assumptions of Model I, Phase I, for 1965, 1970, and 1975. The conditional assumption No. 2 (page 16) was changed to the extent that intra-regional transfers were permitted at the cost of one cent per hundredweight. This leniency allowed interclass transfers within states or regions. There were two transportation rate systems applied to Model I, Phase I. They were Rate Systems I and II.

Section B includes the optimum distribution patterns of wheat-flour to domestic markets and wheat-grain to export markets under the assumptions of Model II, Phase I, for 1965, 1970, and 1975. Again, the conditional assumption No. 2 (page 16) was liberalized to the same extent as in Section A. Rate Systems I and II and Rate Systems IV and V were applied.

Section C includes the optimum distribution patterns of wheat-grain to domestic markets and wheat-grain to export markets under the assumptions of Model III, Phase I, for 1965, 1970, and 1975. Again, the conditional assumption No. 2 (page 16) was liberalized to the same extent as in Sections A and B.

A descriptive analysis and discussion is not presented for each table. The primary purpose or objective of this study was not to perform this type of analysis. However, these tables were included in this report for two reasons. First, for those interested in determining the specific markets for North Dakota under the various assumptions, the data is readily available. Second, for those who wish to determine specific markets for states and/or regions other than North Dakota, the data is also readily available in table form.

In the summary and conclusions, a more general analysis appears discussing the total distribution of North Dakota's spring wheat and flour.

SECTION A

Model I, Phase I
Rate Systems I and II

TABLE 3. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1965, MODEL I, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Idaho(HRS)	California(HRW)	2,379	59.1
Idaho(HRS)	West Coast Export(HRW)	3,785	44.6
Idaho(HRW)	California(HRS)	1,592	59.1
Idaho(HRW)	Oregon(HRS)	1,397	39.4
Idaho(HRW)	Oregon(HRW)	4,139	39.4
Idaho(HRW)	West Coast Export(HRW)	7,349	44.6
Idaho(HRW)	Oregon(D)	84	39.4
Idaho(HRW)	California(D)	78	59.1
Idaho(HRW)	Idaho(D)	32	1.0
TOTAL SHIPMENTS		20,835	
STORAGE		(0)	
New Mexico(HRW)	California(HRW)	2,954	62.5
STORAGE		(0)	
Utah(HRS)	Utah(HRW)	231	1.0
STORAGE		(0)	
Montana(HRW)	Utah(HRW)	3,425	51.1
Montana(HRW)	West Coast Export(HRS)	11,957	65.0
Montana(HRW)	Region 7(HRW)	11,970	99.0
Montana(D)	Washington(D)	494	51.5
Montana(HRS)	Washington(HRS)	1,666	51.5
Montana(HRS)	West Coast Export(HRW)	16,799	65.0
Montana(HRW)	Washington(HRW)	2,018	51.5
Montana(HRW)	West Coast Export(HRW)	14,915	65.0
TOTAL SHIPMENTS		63,244	
STORAGE		(28,378)	
South Dakota(D)	Region 1(D)	1,360	28.6
South Dakota(HRS)	Region 1(HRS)	11,897	28.6
South Dakota(HRS)	Gulf Export(HRS)	1,369	50.7
South Dakota(HRS)	Region 1(D)	2,491	28.5
South Dakota(HRW)	Region 1(D)	7,907	28.5
TOTAL SHIPMENTS		25,024	
STORAGE		(0)	
Wyoming(HRS)	Gulf Export(HRW)	158	69.0
Wyoming(HRW)	Gulf Export(HRW)	1,286	69.0
TOTAL SHIPMENTS		1,444	
STORAGE		(0)	
Colorado(HRW)	Colorado(HRS)	79	1.0
Colorado(HRW)	Great Lakes Export(D)	5,925	44.0
TOTAL SHIPMENTS		6,004	
STORAGE		(0)	
Nebraska(HRW)	Region 9(HRS)	182	40.6
Nebraska(HRW)	East Coast Export(HRS)	23,762	40.8
Nebraska(HRW)	East Coast Export(HRW)	638	40.8
Nebraska(HRW)	Gulf Export(HRW)	4,046	30.0
TOTAL SHIPMENTS		28,628	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	1,560	1.0
Kansas(HRW)	Missouri(HRS)	1,940	12.8
Kansas(HRW)	Region 4(HRS)	1,361	20.8
Kansas(HRW)	Region 4(HRW)	800	20.8
Kansas(HRW)	Region 9(HRW)	514	34.8
Kansas(HRW)	Gulf Export(HRW)	87,160	24.2
TOTAL SHIPMENTS		93,335	
STORAGE		(0)	
Oklahoma(HRW)	Oklahoma(HRS)	109	1.0
Oklahoma(HRW)	Gulf Export(HRS)	5,284	29.0
Oklahoma(HRW)	Gulf Export(HRW)	64,915	29.0
TOTAL SHIPMENTS		70,308	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	90	1.0
Texas(HRW)	Gulf Export(HRW)	27,185	21.5
TOTAL SHIPMENTS		27,275	
STORAGE		(0)	

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TABLE 3. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1965, MODEL I, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Region 5(HRW)	Region 9(HRW)	136	16.4
STORAGE		(0)	
North Dakota(D)	Region 1(D)	5,216	44.5
North Dakota(D)	Great Lakes Export(D)	95	44.5
North Dakota(D)	East Coast Export(D)	8,790	95.5
North Dakota(D)	Gulf Export(D)	4,803	66.6
North Dakota(HRS)	Region 8(HRS)	76	122.0
North Dakota(HRS)	North Dakota(HRW)	350	1.0
North Dakota(HRS)	Region 7(HRS)	19,514	69.5
North Dakota(HRS)	Great Lakes Export(HRS)	7,701	44.5
North Dakota(HRS)	Region 7(HRW)	309	69.5
North Dakota(HRS)	Gulf Export(HRW)	30,583	66.6
North Dakota(HRS)	Great Lakes Export(D)	697	44.5
TOTAL SHIPMENTS		78,134	
STORAGE		(16,130)	
TOTAL COST =	$181,136,041		

D - durum wheat

HRS - hard red spring wheat

HRW - hard red winter wheat

TABLE 4. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1970, MODEL I, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Idaho(HRW)	California(HRW)	2,471	59.1
Idaho(HRS)	Washington(HRS)	1,517	39.4
Idaho(HRS)	Oregon(HRW)	4,052	39.4
Idaho(HRS)	West Coast Export(HRW)	2,529	44.6
Idaho(HRS)	Oregon(D)	318	39.4
Idaho(HRS)	California(D)	49	59.1
Idaho(HRW)	West Coast Export(HRW)	10,053	44.6
Idaho(HRW)	Idaho(D)	9	1.0
TOTAL SHIPMENTS		20,998	
STORAGE		(0)	
New Mexico(HRW)	California(HRW)	2,904	62.5
STORAGE		(0)	
Utah(HRS)	Utah(HRW)	350	1.0
STORAGE		(0)	
Colorado(HRW)	Utah(HRW)	2,665	30.0
Colorado(HRW)	Colorado(HRS)	73	1.0
Colorado(HRW)	Great Lakes Export(D)	22,510	44.0
TOTAL SHIPMENTS		25,248	
STORAGE		(0)	
South Dakota(HRW)	Region 1(HRW)	8,518	28.6
South Dakota(D)	Gulf Export(D)	1,836	50.7
South Dakota(HRS)	Gulf Export(HRS)	6,428	50.7
South Dakota(HRS)	Gulf Export(HRW)	7,699	50.7
South Dakota(HRS)	Region 1(D)	11,022	28.6
South Dakota(HRS)	Gulf Export(D)	1,817	50.7
South Dakota(HRW)	California(HRS)	1,759	62.5
South Dakota(HRW)	Gulf Export(HRW)	2,658	50.7
TOTAL SHIPMENTS		41,737	
STORAGE		(0)	
Montana(D)	Washington(D)	578	51.5
Montana(HRS)	Washington(HRS)	330	51.5

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TABLE 4. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1970, MODEL I, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(HRS)	Washington(HRW)	725	51.5
Montana(HRS)	West Coast Export(HRW)	16,946	65.0
Montana(HRW)	Washington(HRS)	1,112	51.5
Montana(HRW)	West Coast Export(HRS)	42,413	65.0
TOTAL SHIPMENTS		62,104	
STORAGE		(18,875)	
Wyoming(HRS)	Nebraska(D)	175	44.0
Wyoming(HRW)	Nebraska(D)	1,355	44.0
TOTAL SHIPMENTS		1,530	
STORAGE		(0)	
Nebraska(HRW)	East Coast Export(HRS)	12,197	40.8
Nebraska(HRW)	East Coast Export(HRW)	2,665	40.8
Nebraska(HRW)	Nebraska(D)	1,892	1.0
Nebraska(HRW)	East Coast Export(D)	3,076	40.8
TOTAL SHIPMENTS		19,830	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	2,504	1.0
Kansas(HRW)	Region 2(HRS)	1,289	12.8
Kansas(HRW)	Region 9(HRS)	292	34.8
Kansas(HRW)	Region 9(HRW)	1,185	34.8
Kansas(HRW)	Gulf Export(HRW)	134,932	24.2
TOTAL SHIPMENTS		140,202	
STORAGE		(0)	
Oklahoma(HRW)	Oklahoma(HRS)	149	1.0
Oklahoma(HRW)	Gulf Export(HRW)	39,330	29.0
TOTAL SHIPMENTS		39,479	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	113	1.0
Texas(HRW)	Gulf Export(HRW)	6,452	21.5
TOTAL SHIPMENTS		6,565	
STORAGE		(0)	
North Dakota(HRS)	Region 1(HRW)	2,086	44.5
North Dakota(D)	Region 1(D)	3,910	44.5
North Dakota(D)	Great Lakes Export(D)	719	44.5
North Dakota(HRS)	Region 1(HRS)	6,312	44.5
North Dakota(HRS)	Region 7(HRS)	19,824	69.5
North Dakota(HRS)	Region 8(HRS)	65	122.0
North Dakota(HRS)	Great Lakes Export(HRS)	7,354	44.5
North Dakota(HRS)	Region 7(HRW)	12,223	69.5
North Dakota(HRS)	Region 8(HRW)	27	122.0
North Dakota(HRS)	Great Lakes Export(D)	2,750	44.5
TOTAL SHIPMENTS		55,270	
STORAGE		(89,768)	
TOTAL COST =	$165,323,262		

D - durum wheat

HRS - hard red spring wheat

HRW - hard red winter wheat

TABLE 5. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1975, MODEL I, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Idaho(HRS)	California(HRW)	2,373	59.1
Idaho(HRS)	West Coast Export(HRS)	676	44.6

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TABLE 5. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1975, MODEL I, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Idaho(HRS)	Oregon(HRS)	1,459	39.4
Idaho(HRS)	Oregon(HRW)	3,575	39.4
Idaho(HRS)	Oregon(D)	258	39.4
Idaho(HRS)	California(D)	128	59.1
Idaho(HRW)	Oregon(HRS)	181	39.4
Idaho(HRW)	West Coast Export(HRW)	12,468	44.6
TOTAL SHIPMENTS		21,118	
STORAGE		(0)	
New Mexico(HRW)	California(HRW)	2,916	62.5
STORAGE		(0)	
Utah(HRS)	Utah(HRW)	350	1.0
STORAGE		(0)	
Colorado(HRW)	Utah(HRW)	3,832	30.0
Colorado(HRW)	Great Lakes Export(HRS)	7,354	44.0
Colorado(HRW)	Denver(HRS)	58	1.0
Colorado(HRS)	Great Lakes Export(D)	11,629	44.0
TOTAL SHIPMENTS		22,873	
STORAGE		(2,623)	
South Dakota(HRS)	Region 1(HRW)	11,734	28.6
South Dakota(D)	Gulf Export(D)	1,936	50.7
South Dakota(HRS)	Region 1(D)	4,724	28.6
South Dakota(HRS)	Great Lakes Export(D)	10,488	40.0
South Dakota(HRW)	California(HRS)	1,892	62.5
South Dakota(HRW)	Region 1(HRS)	5,195	28.6
TOTAL SHIPMENTS		(35,869)	
STORAGE		(0)	
Montana(HRS)	Washington(HRS)	1,218	32.8
Montana(HRS)	West Coast Export(HRW)	17,059	65.0
Montana(HRW)	West Coast Export(HRS)	32,475	65.0
Montana(HRW)	Washington(HRW)	327	32.9
Montana(HRW)	Washington(D)	610	51.5
TOTAL SHIPMENTS		51,689	
STORAGE		(28,202)	
Nebraska(HRW)	East Coast Export(HRS)	12,197	40.8
Nebraska(HRW)	East Coast Export(HRW)	2,265	40.8
Nebraska(HRW)	Nebraska(D)	4,116	1.0
Nebraska(HRW)	East Coast Export(D)	3,076	40.8
TOTAL SHIPMENTS		21,654	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	2,473	1.0
Kansas(HRW)	Region 2(HRS)	632	12.8
Kansas(HRW)	Region 8(HRS)	55	110.0
Kansas(HRW)	Region 9(HRS)	431	34.8
Kansas(HRW)	Gulf Export(HRS)	6,428	24.2
Kansas(HRW)	Region 8(HRW)	21	110.0
Kansas(HRW)	Region 9(HRW)	1,514	34.8
Kansas(HRW)	Gulf Export(HRW)	52,099	24.2
Kansas(HRW)	Nebraska(D)	4,737	31.0
Kansas(HRW)	Gulf Export(D)	1,817	24.2
TOTAL SHIPMENTS		70,207	
STORAGE		(71,549)	
Oklahoma(HRW)	Oklahoma(HRS)	175	1.0
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	133	1.0
Texas(HRW)	Gulf Export(HRW)	7,816	21.5
TOTAL SHIPMENTS		8,124	
STORAGE		(0)	
North Dakota(D)	Great Lakes Export(D)	719	44.5
North Dakota(HRS)	Region 7(HRS)	12,386	69.5

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TABLE 5. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1975, MODEL I, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
North Dakota(HRS)	Region 7(HRW)	12,111	69.5
TOTAL SHIPMENTS		25,216	
STORAGE		(119,853)	
TOTAL COST =	$111,082,027		

D - durum wheat

HRS - hard red spring wheat

HRW - hard red winter wheat

TABLE 6. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1965, MODEL I, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Idaho(HRW)	California(HRW)	5,333	54.5
Idaho(HRW)	Utah(HRW)	3,425	24.3
Idaho(HRS)	California(HRS)	1,592	54.5
Idaho(HRS)	Oregon(HRW)	4,139	44.5
Idaho(HRS)	West Coast Export(HRW)	355	44.6
Idaho(HRS)	California(D)	78	54.5
Idaho(HRW)	Oregon(HRS)	1,397	44.6
Idaho(HRW)	West Coast Export(HRW)	4,400	44.6
Idaho(HRW)	Oregon(D)	84	44.6
Idaho(HRW)	Idaho(D)	32	1.0
TOTAL SHIPMENTS		20,835	
STORAGE		(0)	
Utah(HRW)	Utah(HRW)	231	1.0
STORAGE		(0)	
Montana(HRW)	Region 7(HRS)	6,199	78.1
Montana(HRW)	Region 9(HRS)	182	63.2
Montana(HRW)	West Coast Export(HRS)	11,957	50.2
Montana(HRW)	Region 7(HRW)	8,074	78.1
Montana(HRW)	Region 9(HRW)	849	63.2
Montana(HRW)	West Coast Export(HRW)	19,628	50.2
Montana(HRW)	East Coast Export(HRW)	638	53.1
Montana(D)	Washington(D)	494	51.5
Montana(HRW)	Washington(HRS)	1,666	51.5
Montana(HRW)	Washington(HRW)	2,018	51.5
Montana(HRS)	West Coast Export(HRW)	18,465	50.2
TOTAL SHIPMENTS		70,170	
STORAGE		(0)	
South Dakota(D)	Gulf Export(D)	1,360	49.1
South Dakota(HRS)	Great Lakes Export(HRS)	7,701	30.9
South Dakota(HRS)	Region 1(D)	8,056	27.0
South Dakota(HRW)	Region 1(D)	3,702	27.0
South Dakota(HRW)	Region 7(HRW)	4,205	55.9
TOTAL SHIPMENTS		25,024	
STORAGE		(0)	
Wyoming(HRW)	Region 7(HRS)	1,286	72.7
STORAGE		(0)	
Colorado(HRW)	Region 7(HRS)	2,274	73.6
Colorado(HRW)	Colorado(HRS)	79	1.0
Colorado(HRW)	Gulf Export(HRW)	3,651	55.6
TOTAL SHIPMENTS		6,004	
STORAGE		(0)	

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TABLE 6. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1965, MODEL I, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Nebraska(HRW)	Gulf Export(HRW)	23,412	30.0
Nebraska(HRW)	Nebraska(D)	5,216	1.0
TOTAL SHIPMENTS		28,628	
STORAGE		(0)	
Kansas(HRW)	Region 2(HRS)	1,682	12.8
Kansas(HRW)	West Coast Export(HRS)	1,361	20.8
Kansas(HRW)	Kansas(HRS)	1,560	1.0
Kansas(HRW)	Region 4(HRW)	800	20.8
Kansas(HRW)	Gulf Export(HRW)	87,932	24.2
TOTAL SHIPMENTS		93,335	
STORAGE		(0)	
Oklahoma(HRW)	Oklahoma(HRS)	109	1.0
Oklahoma(HRW)	Gulf Export(HRW)	70,199	32.6
TOTAL SHIPMENTS		70,308	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	90	1.0
Texas(HRW)	Gulf Export(HRW)	27,185	21.5
TOTAL SHIPMENTS		27,275	
STORAGE		(0)	
Region 5(HRW)	Region 8(HRS)	76	36.7
Region 5(HRW)	Region 9(HRW)	59	26.1
TOTAL SHIPMENTS		135	
STORAGE		(0)	
North Dakota(HRS)	North Dakota(HRW)	350	1.0
North Dakota(HRS)	Region 1(HRW)	8,639	34.0
North Dakota(D)	Great Lakes Export(D)	95	34.6
North Dakota(D)	East Coast Export(D)	7,430	68.9
North Dakota(D)	Gulf Export(D)	4,804	56.1
North Dakota(HRS)	Region 1(HRS)	11,897	34.0
North Dakota(HRS)	Region 7(HRS)	9,597	65.5
North Dakota(HRS)	East Coast Export(HRS)	23,762	66.1
North Dakota(HRS)	Gulf Export(HRS)	6,653	30.0
North Dakota(HRS)	Great Lakes Export(D)	6,622	34.6
TOTAL SHIPMENTS		79,849	
STORAGE		(23,056)	
TOTAL COST =	$158,969,853		

D - durum wheat

HRS - hard red spring wheat

HRW - hard red winter wheat

TABLE 7. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1970, MODEL I, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Idaho(HRS)	California(HRW)	2,471	54.5
Idaho(HRS)	Utah(HRW)	2,665	24.2
Idaho(HRS)	West Coast Export(HRW)	3,329	44.6
Idaho(HRW)	California(HRS)	249	54.5
Idaho(HRW)	Oregon(HRS)	1,517	44.6
Idaho(HRW)	Oregon(HRW)	4,052	44.6
Idaho(HRW)	West Coast Export(HRW)	6,339	44.6
Idaho(HRW)	Oregon(D)	318	44.6
Idaho(HRW)	California(D)	49	54.5

-continued-

TABLE 7. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1970, MODEL I, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Idaho(HRW)	Idaho(D)	9	1.0
TOTAL SHIPMENTS		20,998	
STORAGE		(0)	
New Mexico(HRW)	California(HRW)	2,904	44.0
STORAGE		(0)	
Utah(HRS)	Utah(HRW)	350	1.0
STORAGE		(0)	
Montana(D)	Washington(D)	578	51.5
Montana(HRS)	West Coast Export(HRS)	16,559	50.2
Montana(HRS)	Washington(HRS)	1,442	51.5
Montana(HRW)	West Coast Export(HRS)	25,854	50.2
Montana(HRW)	Washington(HRW)	725	51.5
Montana(HRW)	West Coast Export(HRW)	19,860	50.2
TOTAL SHIPMENTS		65,018	
STORAGE		(15,961)	
South Dakota(D)	Gulf Export(D)	1,836	49.1
South Dakota(HRS)	Region 7(HRS)	17,975	55.9
South Dakota(HRS)	Great Lakes Export(HRS)	7,354	30.9
South Dakota(HRS)	Region 7(HRW)	1,610	55.9
South Dakota(HRS)	Region 8(HRW)	27	70.6
South Dakota(HRW)	Region 8(HRS)	64	70.6
South Dakota(HRW)	Region 1(D)	11,022	27.0
TOTAL SHIPMENTS		39,888	
STORAGE		(0)	
Wyoming(HRW)	Region 8(HRW)	1,187	59.0
STORAGE		(168)	
Colorado(HRW)	Colorado(HRS)	73	1.0
STORAGE		(25,176)	
Nebraska(HRW)	California(HRS)	1,510	44.0
Nebraska(HRW)	Gulf Export(HRW)	10,987	30.0
Nebraska(HRW)	Nebraska(D)	7,332	1.0
TOTAL SHIPMENTS		19,829	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	2,504	1.0
Kansas(HRW)	Region 2(HRS)	1,288	12.8
Kansas(HRW)	Gulf Export(HRW)	136,411	24.2
TOTAL SHIPMENTS		140,203	
STORAGE		(0)	
Oklahoma(HRW)	Oklahoma(HRS)	149	1.0
Oklahoma(HRW)	Region 9(HRS)	292	46.8
Oklahoma(HRW)	Gulf Export(HRW)	37,221	32.6
Oklahoma(HRW)	Gulf Export(D)	1,817	32.6
TOTAL SHIPMENTS		39,479	
STORAGE		(0)	
North Dakota(HRS)	North Dakota(HRW)	719	1.0
North Dakota(HRS)	Region 1(HRW)	10,604	34.0
North Dakota(D)	Great Lakes Export(D)	719	34.6
North Dakota(D)	East Coast Export(D)	3,076	68.9
North Dakota(HRS)	Region 1(HRS)	6,312	34.0
North Dakota(HRS)	East Coast Export(HRS)	12,197	66.1
North Dakota(HRS)	Gulf Export(HRS)	6,428	30.0
North Dakota(HRS)	Region 7(HRW)	10,613	65.5
North Dakota(HRS)	East Coast Export(HRW)	2,665	68.9
North Dakota(HRS)	Great Lakes Export(D)	25,261	34.6
TOTAL SHIPMENTS		78,594	
STORAGE		(66,444)	
TOTAL COST =	$146,525,570		

D - durum wheat
HRS - hard red spring wheat
HRW - hard red winter wheat

TABLE 8. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1975, MODEL I, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Idaho(HRS)	California(HRW)	2,501	54.5
Idaho(HRS)	Utah(HRW)	495	24.3
Idaho(HRW)	Utah(HRW)	3,337	24.3
Idaho(HRS)	Oregon(HRS)	1,640	44.6
Idaho(HRS)	Oregon(HRW)	3,575	44.6
Idaho(HRS)	Oregon(D)	258	44.6
Idaho(HRW)	West Coast Export(HRW)	9,312	44.6
TOTAL SHIPMENTS		21,118	
STORAGE		(0)	
New Mexico(HRW)	California(HRW)	2,788	44.0
New Mexico(HRW)	California(D)	128	44.0
TOTAL SHIPMENTS		2,916	
STORAGE		(0)	
Utah(HRS)	Utah(HRW)	350	1.0
STORAGE		(0)	
Montana(D)	Washington(D)	610	51.5
Montana(HRS)	West Coast Export(HRW)	18,278	50.2
Montana(HRW)	West Coast Export(HRS)	33,151	50.2
Montana(HRW)	Washington(HRS)	1,218	51.5
Montana(HRW)	Washington(HRW)	327	51.5
Montana(HRW)	West Coast Export(HRW)	1,938	50.2
TOTAL SHIPMENTS		55,522	
STORAGE		(24,370)	
South Dakota(HRS)	Region 1(HRW)	11,734	27.0
South Dakota(D)	Gulf Export(D)	1,836	49.1
South Dakota(HRS)	Region 1(HRS)	5,195	27.0
South Dakota(HRS)	Great Lakes Export(HRS)	7,354	30.9
South Dakota(HRS)	Region 7(HRW)	1,202	55.9
South Dakota(HRS)	Region 1(D)	1,461	27.0
South Dakota(HRW)	Region 7(HRS)	3,824	55.9
South Dakota(HRW)	Region 1(D)	9,149	27.0
TOTAL SHIPMENTS		41,755	
STORAGE		(0)	
Colorado(HRW)	Colorado(HRS)	58	1.0
STORAGE		(25,438)	
Nebraska(HRW)	California(HRS)	1,892	44.0
Nebraksa(HRW)	Region 7(HRW)	10,909	55.7
Nebraska(HRW)	Nebraska(D)	8,853	1.0
TOTAL SHIPMENTS		21,654	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	2,473	1.0
Kansas(HRW)	Region 2(HRS)	632	12.8
Kansas(HRW)	Region 7(HRS)	8,562	60.7
Kansas(HRW)	Region 8(HRS)	54	69.4
Kansas(HRW)	Gulf Export(HRS)	6,428	24.2
Kansas(HRW)	Region 8(HRW)	22	69.4
Kansas(HRW)	Gulf Export(HRW)	59,915	24.2
Kansas(HRW)	Gulf Export(D)	1,817	24.2
TOTAL SHIPMENTS		79,903	
STORAGE		(28,217)	
Oklahoma(HRW)	Oklahoma(HRS)	175	1.0
Oklahoma(HRW)	Region 9(HRS)	431	46.8
Oklahoma(HRW)	East Coast Export(HRS)	6,646	56.9
Oklahoma(HRW)	Region 9(HRW)	1,514	46.8
Oklahoma(HRW)	East Coast Export(D)	3,076	56.9
TOTAL SHIPMENTS		11,842	
STORAGE		(28,217)	
Texas(HRW)	Texas(HRS)	133	1.0
Texas(HRW)	East Coast Export(HRS)	5,551	51.9
Texas(HRW)	East Coast Export(HRW)	2,265	51.9
TOTAL SHIPMENTS		7,949	
STORAGE		(0)	

-continued-

TABLE 8. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1975, MODEL I, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
North Dakota(HRS)	North Dakota(HRW)	678	1.0
North Dakota(D)	Great Lakes Export(D)	719	34.6
North Dakota(HRS)	Great Lakes Export(D)	22,117	34.6
TOTAL SHIPMENTS		23,514	
STORAGE		(121,555)	
TOTAL COST =	$96,317,913		

D - durum wheat

HRS - hard red spring wheat

HRW - hard red winter wheat

SECTION B

Model II, Phase I
Rate Systems I and IV
and
Rate Systems II and V

TABLE 9. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1965, MODEL II, PHASE I, RATE SYSTEMS I AND IV, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Washington(D)	167	51.5
Montana(D)	Oregon(D)	109	65.0
Montana(D)	California(D)	911	102.5
Montana(D)	Nevada(D)	24	105.5
Montana(D)	West Coast Export(D)	69	89.0
Montana(HRS)	Oregon(HRS)	321	65.0
Montana(HRS)	California(HRS)	45	102.5
Montana(HRS)	West Coast Export(HRS)	5,655	89.0
Montana(HRS)	Nevada(HRW)	215	105.5
Montana(HRS)	Region 3(HRW)	5,407	77.5
Montana(HRS)	West Coast Export(HRW)	3,363	89.0
Montana(HRW)	Oregon(HRW)	962	65.0
Montana(HRW)	West Coast Export(HRW)	27,916	89.0
TOTAL SHIPMENTS		45,164	
STORAGE		(178)	
South Dakota(D)	Region 7(D)	1,143	104.5
South Dakota(HRS)	Region 7(HRS)	8,093	104.5
South Dakota(HRS)	Region 7(HRW)	2,565	104.5
South Dakota(HRS)	Region 7(D)	910	104.5
South Dakota(HRW)	Region 7(HRW)	3,078	104.5
TOTAL SHIPMENTS		15,789	
STORAGE		(0)	
Region 1(D)	Gulf Export(D)	674	30.1
Region 1(HRS)	Region 7(HRW)	5,762	71.0
Region 1(HRS)	Gulf Export(D)	552	30.1
TOTAL SHIPMENTS		6,988	
STORAGE		(0)	
Idaho(HRS)	Washington(HRS)	672	33.7
Idaho(HRS)	California(HRS)	4,053	65.0
Idaho(HRS)	California(HRW)	241	65.0
Idaho(HRS)	Idaho(D)	39	1.0
Idaho(HRW)	California(HRW)	8,891	65.0
TOTAL SHIPMENTS		13,896	
STORAGE		(0)	
Utah(HRS)	Arizona(HRW)	45	48.1
STORAGE		(0)	
Wyoming(HRS)	Region 7(HRS)	35	72.5
Wyoming(HRW)	Region 7(HRS)	746	72.5
TOTAL SHIPMENTS		781	
STORAGE		(0)	
Washington(HRW)	West Coast Export(HRS)	2,482	1.0
STORAGE		(0)	
Colorado(HRW)	Colorado(HRS)	459	1.0
Colorado(HRW)	Nebraska(HRS)	355	44.0
Colorado(HRW)	Region 4(HRS)	6,018	83.5
Colorado(HRW)	Region 4(HRW)	12,809	83.5
Colorado(HRW)	Wyoming(D)	19	24.0
Colorado(HRW)	Colorado(D)	110	1.0
Colorado(HRW)	Nebraska(D)	82	44.0
Colorado(HRW)	Region 4(D)	1,499	83.5
TOTAL SHIPMENTS		21,351	
STORAGE		(0)	
New Mexico(HRW)	Arizona(HRS)	383	90.0
New Mexico(HRW)	New Mexico(HRS)	247	1.0
New Mexico(HRW)	California(HRW)	381	62.5
New Mexico(HRW)	Arizona(HRW)	737	90.0
New Mexico(HRW)	New Mexico(D)	57	1.0
TOTAL SHIPMENTS		1,805	
STORAGE		(0)	
Nebraska(HRW)	Region 9(HRS)	3,100	41.5
Nebraska(HRW)	East Coast Export(HRS)	4,937	55.9
Nebraska(HRW)	Region 9(HRW)	6,320	41.5

-continued-

TABLE 9. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1965, MODEL II, PHASE I, RATE SYSTEMS I AND IV, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Nebraska(HRW)	East Coast Export(HRW)	466	55.9
Nebraska(HRW)	Region 9(D)	717	41.5
TOTAL SHIPMENTS		15,540	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	547	1.0
Kansas(HRW)	Gulf Export(HRW)	135,292	33.1
Kansas(HRW)	Kansas(D)	127	1.0
TOTAL SHIPMENTS		135,966	
STORAGE		(0)	
Oklahoma(HRW)	Oklahoma(HRS)	596	1.0
Oklahoma(HRW)	Region 3(HRS)	2,659	59.2
Oklahoma(HRW)	Region 5(HRS)	2,138	50.0
Oklahoma(HRW)	Region 5(HRW)	4,260	50.0
Oklahoma(HRW)	Gulf Export(HRW)	23,359	39.7
Oklahoma(HRW)	Oklahoma(D)	138	1.0
Oklahoma(HRW)	Region 3(D)	636	59.2
Oklahoma(HRW)	Region 5(D)	495	50.0
TOTAL SHIPMENTS		34,281	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	2,578	1.0
Texas(HRW)	Gulf Export(HRW)	5,779	29.5
Texas(HRW)	Texas(D)	596	1.0
Texas(HRW)	Gulf Export(D)	2,281	29.5
TOTAL SHIPMENTS		11,234	
STORAGE		(0)	
Region 2(HRW)	Region 6(HRS)	2,715	40.0
Region 2(HRW)	Region 6(HRW)	5,530	40.0
Region 2(HRW)	Region 7(HRW)	6,666	50.5
Region 2(HRW)	Region 6(D)	627	40.0
TOTAL SHIPMENTS		15,538	
STORAGE		(0)	
North Dakota(D)	East Coast Export(D)	6,417	130.8
North Dakota(HRS)	Region 2(HRS)	3,683	81.5
North Dakota(HRS)	Region 4(HRS)	462	103.0
North Dakota(HRS)	Region 8(HRS)	2,500	115.5
North Dakota(HRS)	West Coast Export(HRS)	592	95.9
North Dakota(HRS)	East Coast Export(HRS)	1,480	130.8
North Dakota(HRS)	Gulf Export(HRS)	4,857	91.2
North Dakota(HRS)	Great Lakes Export(HRS)	5,622	61.0
North Dakota(HRS)	North Dakota(HRW)	324	1.0
North Dakota(HRS)	Region 1(HRW)	4,608	41.0
North Dakota(HRS)	Region 8(HRW)	2,869	115.5
North Dakota(HRS)	Gulf Export(HRW)	14,260	91.2
North Dakota(HRS)	Region 2(D)	852	81.5
North Dakota(HRS)	Region 8(D)	578	115.5
North Dakota(HRS)	Great Lakes Export(D)	8,834	61.0
TOTAL SHIPMENTS		57,938	
STORAGE		(29,042)	
TOTAL COST =	$212,012,750		

D - durum flour

HRS - hard red spring flour

HRW - hard red winter flour

TABLE 10. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1970, MODEL II, PHASE I, RATE SYSTEMS I AND IV, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(HRS)	California(HRW)	451	102.5
Montana(D)	Oregon(D)	112	65.0
Montana(D)	West Coast Export(D)	525	89.0
Montana(HRS)	West Coast Export(HRS)	13,929	89.0
Montana(HRS)	California(HRW)	451	102.5
Montana(HRW)	West Coast Export(HRS)	17,033	89.0
Montana(HRW)	Oregon(HRW)	984	65.0
Montana(HRW)	West Coast Export(HRW)	19,107	89.0
Montana(HRW)	Washington(D)	167	51.5
Montana(HRS)	Oregon(HRS)	274	65.0
TOTAL SHIPMENTS		66,961	
STORAGE		(7,463)	
South Dakota(D)	Region 7(D)	1,144	104.5
South Dakota(HRS)	Region 1(HRW)	1,552	30.0
South Dakota(HRS)	Region 7(HRW)	18,125	104.5
South Dakota(HRW)	Region 7(HRS)	6,279	104.5
South Dakota(HRW)	Region 1(HRW)	3,535	30.0
TOTAL SHIPMENTS		30,635	
STORAGE		(0)	
Region 1(D)	Region 7(D)	918	71.0
Region 1(D)	Great Lakes Export(D)	18	18.9
Region 1(HRS)	Region 7(HRS)	1,805	71.0
Region 1(HRS)	Great Lakes Export(D)	7,915	18.9
TOTAL SHIPMENTS		10,656	
STORAGE		(0)	
Idaho(HRS)	Washington(HRS)	653	33.7
Idaho(HRS)	California(HRW)	6,015	65.0
Idaho(HRW)	California(HRS)	4,482	65.0
Idaho(HRW)	California(HRW)	3,494	65.0
Idaho(HRW)	California(D)	879	65.0
Idaho(HRW)	Idaho(D)	39	1.0
TOTAL SHIPMENTS		15,562	
STORAGE		(0)	
Utah(HRS)	Arizona(D)	3	48.1
STORAGE		(0)	
Wyoming(HRS)	Region 7(HRW)	49	72.5
Wyoming(HRW)	Region 7(HRS)	831	72.5
TOTAL SHIPMENTS		880	
STORAGE		(0)	
Washington(HRW)	West Coast Export(HRW)	2,448	1.0
STORAGE		(0)	
Nevada(HRW)	Nevada(HRS)	127	1.0
Nevada(HRW)	California(D)	103	55.0
Nevada(HRW)	Nevada(D)	29	1.0
TOTAL SHIPMENTS		259	
STORAGE		(0)	
Colorado(HRW)	Colorado(HRS)	476	1.0
Colorado(HRW)	New Mexico(HRS)	254	36.1
Colorado(HRW)	Nebraska(HRS)	346	44.0
Colorado(HRW)	Region 2(HRS)	1,698	69.5
Colorado(HRW)	Region 4(HRS)	4,635	83.5
Colorado(HRW)	Region 9(HRS)	2,151	101.8
Colorado(HRW)	Region 9(HRW)	6,679	101.8
Colorado(HRW)	Wyoming(D)	18	24.0
Colorado(HRW)	Colorado(D)	114	1.0
Colorado(HRW)	New Mexico(D)	59	36.1
Colorado(HRW)	Nebraska(D)	80	44.0
Colorado(HRW)	Region 2(D)	847	69.5
Colorado(HRW)	Region 4(D)	1,495	83.5
Colorado(HRW)	Region 9(D)	758	101.8
Colorado(HRW)	Great Lakes Export(D)	1,701	60.3
TOTAL SHIPMENTS		21,311	
STORAGE		(0)	

-continued-

TABLE 10. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1970, MODEL II, PHASE I, RATE SYSTEMS I AND IV, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
New Mexico(HRW)	Arizona(HRS)	425	90.0
New Mexico(HRW)	California(HRW)	404	62.5
New Mexico(HRW)	Arizona(HRW)	867	90.0
New Mexico(HRW)	Arizona(D)	95	90.0
TOTAL SHIPMENTS		1,791	
STORAGE		(0)	
Nebraska(HRW)	Region 9(HRS)	1,125	41.5
Nebraska(HRW)	East Coast Export(HRS)	8,904	55.9
Nebraska(HRW)	East Coast Export(HRW)	1,945	55.9
Nebraska(HRW)	East Coast Export(D)	3,586	55.9
TOTAL SHIPMENTS		15,560	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	536	1.0
Kansas(HRW)	Gulf Export(HRS)	4,692	33.1
Kansas(HRW)	Gulf Export(HRW)	130,637	33.1
Kansas(HRW)	Kansas(D)	124	1.0
TOTAL SHIPMENTS		135,989	
STORAGE		(0)	
Oklahoma(HRW)	Oklahoma(HRS)	590	1.0
Oklahoma(HRW)	Region 3 (HRS)	2,781	59.2
Oklahoma(HRW)	Region 4(HRS)	1,797	68.0
Oklahoma(HRW)	Region 5(HRS)	2,164	50.0
Oklahoma(HRW)	Region 3(HRW)	5,669	59.2
Oklahoma(HRW)	Region 4(HRW)	13,177	68.0
Oklahoma(HRW)	Region 5(HRW)	4,442	50.0
Oklahoma(HRW)	Gulf Export(HRW)	2,393	39.7
Oklahoma(HRW)	Oklahoma(D)	136	1.0
Oklahoma(HRW)	Region 3(D)	643	59.2
Oklahoma(HRW)	Region 5(D)	501	50.0
TOTAL SHIPMENTS		34,293	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	2,664	1.0
Texas(HRW)	Gulf Export(HRW)	6,452	29.5
Texas(HRW)	Texas(D)	616	1.0
Texas(HRW)	Gulf Export(D)	1,326	29.5
TOTAL SHIPMENTS		11,058	
STORAGE		(0)	
Region 2(HRW)	Region 2(HRS)	1,966	1.0
Region 2(HRW)	Region 6(HRS)	2,721	40.0
Region 2(HRW)	Region 8(HRS)	2,568	40.0
Region 2(HRW)	Region 6(HRW)	5,547	40.0
Region 2(HRW)	Region 8(HRW)	3,257	40.0
Region 2(HRW)	Region 6(D)	613	40.0
Region 2(HRW)	Region 8(D)	594	40.0
TOTAL SHIPMENTS		17,266	
STORAGE		(0)	
North Dakota(HRS)	Great Lakes Export(HRS)	5,398	61.0
North Dakota(HRS)	North Dakota(HRW)	313	1.0
North Dakota(HRS)	Great Lakes Export(D)	8,807	61.0
TOTAL SHIPMENTS		14,518	
STORAGE		(88,973)	
TOTAL COST =	$198,745,672		

D - durum flour

HRS - hard red spring flour

HRW - hard red winter flour

TABLE 11. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1975, MODEL II, PHASE I, RATE SYSTEMS I AND IV, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Washington(D)	169	51.5
Montana(D)	Oregon(D)	115	65.0
Montana(D)	Nevada(D)	32	105.5
Montana(HRS)	West Coast Export(HRS)	12,114	89.0
Montana(HRS)	California(HRW)	2,252	102.5
Montana(HRS)	Nevada(HRW)	286	105.5
Montana(HRW)	Oregon(HRS)	288	65.0
Montana(HRW)	West Coast Export(HRS)	12,086	89.0
Montana(HRW)	Oregon(HRW)	1,012	65.0
Montana(HRW)	West Coast Export(HRW)	19,092	89.0
Montana(HRW)	West Coast Export(D)	525	89.0
TOTAL SHIPMENTS		47,971	
STORAGE		(12,071)	
Region 1(D)	East Coast Export(D)	935	75.3
Region 1(HRS)	East Coast Export(HRS)	1,686	75.3
Region 1(HRS)	East Coast Export(HRW)	2,265	75.3
Region 1(HRS)	East Coast Export(D)	2,650	75.3
Region 1(HRS)	Great Lakes Export(D)	3,040	18.9
TOTAL SHIPMENTS		10,576	
STORAGE		(0)	
Idaho(HRS)	Washington(HRS)	663	33.7
Idaho(HRS)	California(HRW)	6,014	65.0
Idaho(HRW)	California(HRS)	5,125	65.0
Idaho(HRW)	California(HRW)	2,645	65.0
Idaho(HRW)	California(D)	1,090	65.0
Idaho(HRW)	Idaho(D)	39	1.0
TOTAL SHIPMENTS		15,576	
STORAGE		(0)	
Utah(HRS)	Arizona(D)	12	48.1
STORAGE		(0)	
Wyoming(HRS)	Region 7(HRW)	49	72.5
Wyoming(HRW)	Region 7(HRS)	644	72.5
TOTAL SHIPMENTS		693	
STORAGE		(0)	
South Dakota(HRS)	Great Lakes Export(HRS)	4,957	54.8
South Dakota(HRS)	Great Lakes Export(D)	14,723	54.8
South Dakota(HRW)	Great Lakes Export(HRS)	411	54.8
South Dakota(HRW)	Region 1(HRW)	5,096	30.0
TOTAL SHIPMENTS		25,187	
STORAGE		(5,460)	
Washington(HRW)	Nevada(HRS)	140	90.0
Washington(HRW)	West Coast Export(HRW)	2,463	1.0
TOTAL SHIPMENTS		2,603	
STORAGE		(0)	
Colorado(HRW)	Colorado(HRS)	501	1.0
Colorado(HRW)	New Mexico(HRS)	270	36.1
Colorado(HRW)	Wyoming(D)	18	24.0
Colorado(HRW)	Colorado(D)	120	1.0
Colorado(HRW)	New Mexico(D)	62	36.1
TOTAL SHIPMENTS		971	
STORAGE		(20,289)	
New Mexico(HRW)	Arizona(HRS)	472	90.0
New Mexico(HRW)	California(HRW)	229	62.5
New Mexico(HRW)	Arizona(HRW)	961	90.0
New Mexico(HRW)	Arizona(D)	97	90.0
TOTAL SHIPMENTS		1,759	
STORAGE		(0)	
Nebraska(HRW)	Region 9(HRS)	3,491	41.5
Nebraska(HRW)	East Coast Export(HRS)	7,218	55.9
Nebraska(HRW)	Region 9(HRW)	4,052	41.5
Nebraska(HRW)	Region 9(D)	807	41.5
TOTAL SHIPMENTS		15,568	
STORAGE		(0)	

-continued-

TABLE 11. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1975, MODEL II, PHASE I, RATE SYSTEMS I AND IV, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Kansas(HRW)	Nebraska(HRS)	341	38.0
Kansas(HRW)	Kansas(HRS)	532	1.0
Kansas(HRW)	Region 2(HRS)	2,283	50.5
Kansas(HRW)	Region 7(HRS)	8,398	97.5
Kansas(HRW)	Gulf Export(HRS)	4,692	33.1
Kansas(HRW)	Region 7(HRW)	18,377	97.5
Kansas(HRW)	Gulf Export(HRW)	59,915	33.1
Kansas(HRW)	Nebraska(D)	79	38.0
Kansas(HRW)	Kansas(D)	123	1.0
Kansas(HRW)	Region 2(D)	857	50.5
Kansas(HRW)	Region 7(D)	2,090	97.5
Kansas(HRW)	Gulf Export(D)	1,326	33.1
TOTAL SHIPMENTS		99,013	
STORAGE		(37,684)	
Oklahoma(HRW)	Oklahoma(HRS)	589	1.0
Oklahoma(HRW)	Region 3(HRS)	1,871	59.2
Oklahoma(HRW)	Region 4(HRS)	6,554	68.0
Oklahoma(HRW)	Region 5(HRS)	2,206	50.0
Oklahoma(HRW)	Region 4(HRW)	13,357	68.0
Oklahoma(HRW)	Region 5(HRW)	4,495	50.0
Oklahoma(HRW)	Region 9(HRW)	3,062	86.4
Oklahoma(HRW)	Oklahoma(D)	136	1.0
Oklahoma(HRW)	Region 4(D)	1,515	68.0
Oklahoma(HRW)	Region 5(D)	510	50.0
TOTAL SHIPMENTS		34,295	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	2,770	1.0
Texas(HRW)	Region 3(HRS)	976	59.0
Texas(HRW)	Region 3(HRW)	5,800	59.0
Texas(HRW)	Texas(D)	640	1.0
Texas(HRW)	Region 3(D)	658	59.0
TOTAL SHIPMENTS		10,844	
STORAGE		(0)	
Region 2(HRW)	Region 2(HRS)	1,426	1.0
Region 2(HRW)	Region 6(HRS)	2,767	40.0
Region 2(HRW)	Region 8(HRS)	2,657	40.0
Region 2(HRW)	Region 6(HRW)	5,639	40.0
Region 2(HRW)	Region 8(HRW)	3,436	40.0
Region 2(HRW)	Region 6(D)	640	40.0
Region 2(HRW)	Region 8(D)	614	40.0
TOTAL SHIPMENTS		17,179	
STORAGE		(0)	
North Dakota(HRS)	North Dakota(HRW)	306	1.0
STORAGE		(103,159)	
TOTAL COST =	$165,530,856		

D - durum flour

HRS - hard red spring flour

HRW - hard red winter flour

TABLE 12. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1965, MODEL II, PHASE I, RATE SYSTEMS II AND V, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Oregon(D)	109	57.5
Montana(HRS)	West Coast Export(HRS)	8,729	68.8
Montana(HRS)	West Coast Export(HRW)	6,041	68.8
Montana(HRS)	Washington(D)	167	41.2
Montana(HRS)	West Coast Export(D)	69	68.8
Montana(HRW)	Oregon(HRS)	321	57.5
Montana(HRW)	West Coast Export(HRW)	22,756	68.8
TOTAL SHIPMENTS		38,192	
STORAGE		(7,240)	
South Dakota(D)	Region 4(D)	1,143	54.8
South Dakota(HRS)	Region 4(HRS)	3,402	54.8
South Dakota(HRS)	Region 4(HRW)	8,166	54.8
South Dakota(HRW)	Region 4(HRS)	3,078	54.8
TOTAL SHIPMENTS		15,789	
STORAGE		(0)	
Region 1(D)	Gulf Export(D)	674	30.3
Region 1(HRS)	Gulf Export(HRS)	1,427	30.3
Region 1(HRS)	Region 1(HRW)	2,055	1.0
Region 1(HRS)	Gulf Export(D)	2,833	30.3
TOTAL SHIPMENTS		6,989	
STORAGE		(0)	
Idaho(HRS)	Washington(HRS)	672	39.5
Idaho(HRS)	Oregon(HRW)	962	39.5
Idaho(HRS)	California(HRW)	3,156	60.6
Idaho(HRS)	Nevada(HRW)	215	35.9
Idaho(HRW)	California(HRS)	2,898	60.6
Idaho(HRW)	Nevada(HRS)	105	35.9
Idaho(HRW)	California(HRW)	5,825	60.6
Idaho(HRW)	Nevada(D)	24	35.9
Idaho(HRW)	Idaho(D)	39	1.0
TOTAL SHIPMENTS		13,896	
STORAGE		(0)	
Utah(HRS)	California(HRS)	45	49.5
STORAGE		(0)	
Wyoming(HRS)	California(HRS)	35	71.8
Wyoming(HRW)	California(D)	727	71.8
Wyoming(HRW)	Wyoming(D)	19	1.0
TOTAL SHIPMENTS		781	
STORAGE		(0)	
Washington(HRW)	West Coast Export(HRW)	2,482	1.0
STORAGE		(0)	
Colorado(HRW)	Arizona(HRS)	383	62.3
Colorado(HRW)	Colorado(HRS)	459	1.0
Colorado(HRW)	Kansas(HRS)	547	35.4
Colorado(HRW)	Region 8(HRS)	2,500	95.7
Colorado(HRW)	California(HRW)	151	76.5
Colorado(HRW)	Arizona(HRW)	782	62.3
Colorado(HRW)	Region 4(HRW)	4,643	70.4
Colorado(HRW)	Region 5(HRW)	4,174	76.0
Colorado(HRW)	Region 9(HRW)	2,869	95.7
Colorado(HRW)	California(D)	184	76.5
Colorado(HRW)	Arizona(D)	90	62.3
Colorado(HRW)	Colorado(D)	110	1.0
Colorado(HRW)	Kansas(D)	127	35.4
TOTAL SHIPMENTS		17,019	
STORAGE		(4,332)	
New Mexico(HRW)	California(HRS)	1,501	47.8
New Mexico(HRW)	New Mexico(HRS)	247	1.0
New Mexico(HRW)	New Mexico(D)	57	1.0
TOTAL SHIPMENTS		1,805	
STORAGE		(0)	

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TABLE 12. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1965, MODEL II, PHASE I, RATE SYSTEMS II AND V, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Nebraska(HRW)	Nebraska(HRS)	355	1.0
Nebraska(HRW)	Gulf Export(HRW)	15,103	41.1
Nebraska(HRW)	Nebraska(D)	82	1.0
TOTAL SHIPMENTS		15,540	
STORAGE		(0)	
Oklahoma(HRW)	Oklahoma(HRS)	596	1.0
Oklahoma(HRW)	Region 3(HRS)	2,659	42.0
Oklahoma(HRW)	Region 5(HRS)	2,138	51.7
Oklahoma(HRW)	Region 9(HRS)	3,100	62.4
Oklahoma(HRW)	Region 3(HRW)	5,407	42.0
Oklahoma(HRW)	Region 5(HRW)	86	51.7
Oklahoma(HRW)	Region 9(HRW)	6,320	62.4
Oklahoma(HRW)	Great Lakes Export(HRW)	11,989	44.7
Oklahoma(HRW)	Oklahoma(D)	138	1.0
Oklahoma(HRW)	Region 3(D)	636	42.0
Oklahoma(HRW)	Region 5(D)	495	51.7
Oklahoma(HRW)	Region 9(D)	717	62.4
TOTAL SHIPMENTS		34,281	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	2,578	1.0
Texas(HRW)	Gulf Export(HRW)	8,060	29.5
Texas(HRW)	Texas(D)	596	1.0
TOTAL SHIPMENTS		11,234	
STORAGE		(0)	
Kansas(HRW)	Gulf Export(HRW)	135,966	33.1
STORAGE		(0)	
Region 2(HRW)	Region 2(HRS)	3,683	1.0
Region 2(HRW)	Gulf Export(HRS)	3,431	18.9
Region 2(HRW)	Gulf Export(HRW)	7,572	18.9
Region 2(HRW)	Region 2(D)	852	1.0
TOTAL SHIPMENTS		15,538	
STORAGE		(0)	
North Dakota(D)	Region 4(D)	356	67.3
North Dakota(D)	Region 6(D)	627	98.9
North Dakota(D)	Region 7(D)	2,053	75.3
North Dakota(D)	Region 8(D)	578	93.9
North Dakota(D)	Great Lakes Export(D)	4,834	47.4
North Dakota(D)	East Coast Export(D)	6,417	94.4
North Dakota(HRS)	Region 6(HRS)	2,715	98.9
North Dakota(HRS)	Region 7(HRS)	8,874	75.3
North Dakota(HRS)	East Coast Export(HRS)	6,417	94.4
North Dakota(HRS)	Great Lakes Export(HRS)	5,622	47.4
North Dakota(HRS)	North Dakota(HRW)	324	1.0
North Dakota(HRS)	Region 1(HRW)	2,553	35.5
North Dakota(HRS)	Region 6(HRW)	5,530	98.9
North Dakota(HRS)	Region 7(HRW)	18,071	75.2
North Dakota(HRS)	East Coast Export(HRW)	466	94.4
TOTAL SHIPMENTS		65,437	
STORAGE		(20,174)	
TOTAL COST =	$180,809,826		

D - durum flour

HRS - hard red spring flour

HRW - hard red winter flour

TABLE 13. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1970, MODEL II, PHASE I, RATE SYSTEMS II AND V, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Washington(D)	167	41.2
Montana(D)	Oregon(D)	112	57.5
Montana(D)	West Coast Export D)	525	68.8
Montana(HRW)	Oregon(HRS)	274	57.5
Montana(HRW)	West Coast Export(HRS)	13,757	68.8
Montana(HRW)	West Coast Export(HRW)	21,555	68.8
Montana(HRS)	West Coast Export(HRS)	14,653	68.8
TOTAL SHIPMENTS		51,043	
STORAGE		(9,001)	
South Dakota(D)	Region 4(D)	1,144	54.8
South Dakota(HRS)	Region 4(HRS)	6,432	54.8
South Dakota(HRS)	Region 7(HRS)	8,915	65.2
South Dakota(HRS)	Region 4(HRW)	1,881	54.8
South Dakota(HRS)	Region 7(HRW)	36	65.2
South Dakota(HRS)	Region 4(D)	351	54.8
South Dakota(HRS)	Region 7(D)	2,062	65.2
South Dakota(HRW)	Region 7(HRW)	9,814	65.2
TOTAL SHIPMENTS		30,635	
STORAGE		(0)	
Region 1(D)	Great Lakes Export(D)	936	18.9
Region 1(HRS)	Region 1(HRW)	5,087	1.0
Region 1(HRS)	Great Lakes Export(D)	4,633	18.9
TOTAL SHIPMENTS		10,656	
STORAGE		(0)	
Idaho(HRS)	Oregon(HRW)	984	39.5
Idaho(HRS)	Washington(HRS)	653	39.5
Idaho(HRS)	California(HRW)	5,031	60.6
Idaho(HRW)	California(HRS)	4,791	60.6
Idaho(HRW)	California(HRW)	4,063	60.6
Idaho(HRW)	Idaho(D)	39	1.0
TOTAL SHIPMENTS		15,561	
STORAGE		(0)	
Utah(HRS)	California(HRW)	3	49.5
STORAGE		(0)	
Wyoming(HRS)	California(HRW)	31	71.8
Wyoming(HRS)	Wyoming(D)	18	1.0
Wyoming(HRW)	California(HRW)	831	71.8
TOTAL SHIPMENTS		880	
STORAGE		(0)	
Washington(HRW)	West Coast Export(HRS)	2,448	1.0
STORAGE		(0)	
Nevada(HRW)	Nevada(HRS)	127	1.0
Nevada(HRW)	West Coast Export(HRS)	103	39.0
Nevada(HRW)	Nevada(D)	29	1.0
TOTAL SHIPMENTS		259	
STORAGE		(0)	
Colorado(HRW)	Arizona(HRS)	24	62.3
Colorado(HRW)	Colorado(HRS)	476	1.0
Colorado(HRW)	Arizona(HRW)	867	62.3
Colorado(HRW)	Arizona(D)	98	62.3
Colorado(HRW)	Colorado(D)	114	1.0
TOTAL SHIPMENTS		1,579	
STORAGE		(19,732)	
New Mexico(HRW)	California(HRS)	95	47.8
New Mexico(HRW)	Arizona(HRS)	401	36.6
New Mexico(HRW)	New Mexico(HRS)	254	1.0
New Mexico(HRW)	California(D)	982	47.8
New Mexico(HRW)	New Mexico(D)	59	1.0
TOTAL SHIPMENTS		1,791	
STORAGE		(0)	
Nebraska(HRW)	Nebraska(HRS)	346	1.0
Nebraska(HRW)	Region 8(HRS)	581	76.1

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TABLE 13. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1970, MODEL II, PHASE I, RATE SYSTEMS II AND V, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Nebraska(HRW)	Region 4(HRW)	11,296	48.3
Nebraska(HRW)	Region 8(HRW)	3,257	76.1
Nebraska(HRW)	Nebraska(D)	80	1.0
TOTAL SHIPMENTS		15,560	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	536	1.0
Kansas(HRW)	Gulf Export(HRW)	135,329	33.1
Kansas(HRW)	Kansas(D)	124	1.0
TOTAL SHIPMENTS		135,989	
STORAGE		(0)	
Oklahoma(HRW)	Oklahoma(HRS)	590	1.0
Oklahoma(HRW)	Region 3(HRS)	2,781	42.0
Oklahoma(HRW)	Region 5(HRS)	2,164	51.7
Oklahoma(HRW)	Region 9(HRS)	2,174	62.4
Oklahoma(HRW)	East Coast Export(HRS)	8,904	77.9
Oklahoma(HRW)	Region 3(HRW)	5,669	42.0
Oklahoma(HRW)	Region 5(HRW)	4,442	51.7
Oklahoma(HRW)	East Coast Export(HRW)	1,945	77.9
Oklahoma(HRW)	Oklahoma(D)	136	1.0
Oklahoma(HRW)	Region 3(D)	643	42.0
Oklahoma(HRW)	Region 5(D)	501	51.7
Oklahoma(HRW)	Region 9(D)	758	62.4
Oklahoma(HRW)	East Coast Export(D)	3,586	77.9
TOTAL SHIPMENTS		34,293	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	2,664	1.0
Texas(HRW)	Gulf Export(HRS)	2,299	29.5
Texas(HRW)	Gulf Export(HRW)	4,153	29.5
Texas(HRW)	Texas(D)	616	1.0
Texas(HRW)	Gulf Export(D)	1,326	29.5
TOTAL SHIPMENTS		11,058	
STORAGE		(0)	
Region 2(HRW)	Region 2(HRS)	3,664	1.0
Region 2(HRW)	Region 9(HRS)	1,987	86.9
Region 2(HRW)	Region 9(HRS)	1,102	41.1
Region 2(HRW)	Gulf Export(HRS)	2,393	18.9
Region 2(HRW)	Region 9(HRW)	6,679	41.1
Region 2(HRW)	Region 2(D)	847	1.0
Region 2(HRW)	Region 9(D)	594	56.9
TOTAL SHIPMENTS		17,266	
STORAGE		(0)	
North Dakota(D)	Great Lakes Export(D)	12,872	47.4
North Dakota(HRS)	Region 6(HRS)	2,721	98.9
North Dakota(HRS)	Great Lakes Export(HRS)	5,368	47.4
North Dakota(HRS)	North Dakota(HRW)	313	1.0
North Dakota(HRS)	Region 6(HRW)	5,547	98.9
North Dakota(HRS)	Region 7(HRW)	8,324	75.3
North Dakota(HRS)	Region 6(D)	613	98.9
TOTAL SHIPMENTS		35,758	
STORAGE		(67,703)	
TOTAL COST =	$171,068,699		

D - durum flour

HRS - hard red spring flour

HRW - hard red winter flour

TABLE 14. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1975, MODEL II, PHASE I, RATE SYSTEMS II AND V, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Oregon(D)	22	57.5
Montana(D)	West Coast Export(D)	525	68.8
Montana(HRW)	Oregon(HRS)	288	57.5
Montana(HRW)	West Coast Export(HRS)	24,200	68.8
Montana(HRW)	West Coast Export(HRW)	19,092	68.9
Montana(HRW)	Washington(D)	169	41.2
Montana(HRW)	Oregon(D)	93	57.5
TOTAL SHIPMENTS		44,389	
STORAGE		(15,653)	
South Dakota(D)	Great Lakes Export(D)	1,145	42.3
South Dakota(HRS)	Region 7(HRS)	7,499	65.2
South Dakota(HRS)	Great Lakes Export(HRS)	823	42.3
South Dakota(HRS)	Region 6(D)	640	89.0
South Dakota(HRS)	Region 7(D)	2,090	65.2
South Dakota(HRS)	Great Lakes Export(D)	8,628	42.3
South Dakota(HRW)	Region 6(HRS)	2,767	89.0
South Dakota(HRW)	Great Lakes Export(D)	7,055	42.3
TOTAL SHIPMENTS		30,647	
STORAGE		(0)	
Region 1(D)	Great Lakes Export(D)	935	18.9
Region 1(HRS)	Great Lakes Export(HRS)	4,545	18.9
Region 1(HRS)	Region 1(HRW)	5,095	1.0
TOTAL SHIPMENTS		10,575	
STORAGE		(0)	
Idaho(HRS)	Washington(HRS)	663	39.5
Idaho(HRS)	Oregon(HRW)	1,012	39.5
Idaho(HRS)	California(HRW)	5,002	60.6
Idaho(HRW)	California(HRS)	3,927	60.6
Idaho(HRW)	Nevada(HRS)	140	35.9
Idaho(HRW)	California(HRW)	3,385	60.5
Idaho(HRW)	Nevada(HRW)	286	35.9
Idaho(HRW)	California(D)	1,090	60.6
Idaho(HRW)	Nevada(D)	32	35.9
Idaho(HRW)	Idaho(D)	39	1.0
TOTAL SHIPMENTS		15,576	
STORAGE		(0)	
Utah(HRS)	California(HRW)	12	49.5
STORAGE		(0)	
Wyoming(HRS)	California(HRW)	31	71.8
Wyoming(HRS)	Wyoming(D)	18	1.0
Wyoming(HRW)	California(HRW)	644	71.8
TOTAL SHIPMENTS		693	
STORAGE		(0)	
Washington(HRW)	West Coast Export(HRW)	2,463	1.0
STORAGE		(0)	
Colorado(HRW)	Arizona(HRS)	472	62.3
Colorado(HRW)	Colorado(HRS)	501	1.0
Colorado(HRW)	California(HRW)	1,837	76.5
Colorado(HRW)	Arizona(HRW)	961	62.3
Colorado(HRW)	Arizona(D)	109	62.3
Colorado(HRW)	Colorado(D)	120	1.0
TOTAL SHIPMENTS		4,000	
STORAGE		(17,260)	
New Mexico(HRW)	California(HRS)	1,427	47.8
New Mexico(HRW)	New Mexico(HRS)	270	1.0
New Mexico(HRW)	New Mexico(D)	62	1.0
TOTAL SHIPMENTS		1,759	
STORAGE		(0)	
Nebraska(HRW)	Nebraska(HRS)	341	1.0
Nebraska(HRW)	Region 7(HRS)	1,543	63.2
Nebraska(HRW)	Region 6(HRW)	5,639	87.0
Nebraska(HRW)	Region 7(HRW)	7,966	63.2

-continued-

TABLE 14. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER FLOUR, 1975, MODEL II, PHASE I, RATE SYSTEMS II AND V, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Nebraska(HRW)	Nebraska(D)	79	1.0
TOTAL SHIPMENTS		15,568	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	532	1.0
Kansas(HRW)	Region 3(HRS)	2,847	37.7
Kansas(HRW)	Region 4(HRS)	648	51.4
Kansas(HRW)	Gulf Export(HRS)	4,692	33.1
Kansas(HRW)	Region 4(HRW)	13,357	51.4
Kansas(HRW)	Region 7(HRW)	10,460	69.3
Kansas(HRW)	Gulf Export(HRW)	59,915	33.1
Kansas(HRW)	Kansas(D)	123	1.0
Kansas(HRW)	Region 4(D)	1,515	51.4
Kansas(HRW)	Gulf Export(D)	1,326	33.1
TOTAL SHIPMENTS		95,415	
STORAGE		(41,282)	
Oklahoma(HRW)	Oklahoma(HRS)	589	1.0
Oklahoma(HRW)	Region 5(HRS)	2,206	51.7
Oklahoma(HRW)	Region 9(HRS)	3,491	62.4
Oklahoma(HRW)	East Coast Export(HRS)	7,319	77.9
Oklahoma(HRW)	Region 3(HRW)	5,801	42.0
Oklahoma(HRW)	Region 5(HRW)	4,494	51.7
Oklahoma(HRW)	Region 9(HRW)	7,114	62.4
Oklahoma(HRW)	Oklahoma(D)	136	1.0
Oklahoma(HRW)	Region 3(D)	658	42.0
Oklahoma(HRW)	Region 5(D)	510	51.7
Oklahoma(HRW)	Region 9(D)	807	62.4
TOTAL SHIPMENTS		33,125	
STORAGE		(1,169)	
Texas(HRW)	Texas(HRS)	2,770	1.0
Texas(HRW)	East Coast Export(HRS)	1,585	71.1
Texas(HRW)	East Coast Export(HRW)	2,265	71.1
Texas(HRW)	Texas(D)	640	1.0
Texas(HRW)	East Coast Export(D)	3,584	71.0
TOTAL SHIPMENTS		10,844	
STORAGE		(0)	
Region 2(HRW)	Region 2(HRS)	3,709	1.0
Region 2(HRW)	Region 4(HRS)	5,906	29.1
Region 2(HRW)	Region 9(HRS)	2,657	56.9
Region 2(HRW)	Region 9(HRW)	3,436	56.9
Region 2(HRW)	Region 2(D)	857	1.0
Region 2(HRW)	Region 9(D)	614	56.9
TOTAL SHIPMENTS		17,179	
STORAGE		(0)	
North Dakota(HRS)	North Dakota(HRW)	306	1.0
STORAGE		(103,159)	
TOTAL COST =	$140,031,338		

D - durum flour

HRS - hard red spring flour

HRW - hard red winter flour

SECTION C

Model III, Phase I
Rate Systems I and II

TABLE 15. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1965, MODEL III, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Washington(D)	229	51.5
Montana(D)	Oregon(D)	149	65.0
Montana(D)	Nevada(D)	32	82.4
Montana(HRS)	West Coast Export(HRS)	10,826	65.0
Montana(HRS)	Oregon(HRW)	1,315	65.0
Montana(HRS)	Nevada(HRW)	215	82.4
Montana(HRS)	West Coast Export(HRW)	5,223	65.0
Montana(HRW)	Oregon(HRS)	440	65.0
Montana(HRW)	California(HRW)	1,399	102.5
Montana(HRW)	West Coast Export(HRW)	37,625	65.0
Montana(HRW)	West Coast Export(D)	95	65.0
TOTAL SHIPMENTS		57,548	
STORAGE		(4,770)	
South Dakota(D)	Region 7(D)	1,565	66.4
South Dakota(HRS)	Region 1(HRW)	5,628	28.6
South Dakota(HRW)	Gulf Export(HRW)	4,217	50.7
South Dakota(HRS)	Gulf Export(HRW)	10,219	50.7
TOTAL SHIPMENTS		21,629	
STORAGE		(0)	
Idaho(HRS)	California(HRW)	5,882	63.5
Idaho(HRS)	Washington(HRS)	920	20.0
Idaho(HRS)	Idaho(D)	53	1.0
Idaho(HRW)	California(HRS)	6,127	63.5
Idaho(HRW)	California(HRW)	5,148	63.5
Idaho(HRW)	California(D)	904	63.5
TOTAL SHIPMENTS		19,034	
STORAGE		(0)	
Utah(HRS)	California(HRW)	62	53.0
STORAGE		(0)	
Wyoming(HRS)	Gulf Export(HRW)	41	69.0
Wyoming(HRS)	Nebraska(HRS)	7	44.0
Wyoming(HRW)	Colorado(HRS)	629	10.1
Wyoming(HRW)	Nebraska(HRS)	478	44.0
Wyoming(HRW)	Wyoming(D)	25	1.0
TOTAL SHIPMENTS		1,180	
STORAGE		(0)	
Region 1(HRS)	Region 3(HRS)	1,997	22.1
Region 1(D)	Region 2(D)	923	12.0
Region 1(HRS)	Gulf Export(HRS)	6,653	22.1
TOTAL SHIPMENTS		9,573	
STORAGE		(0)	
Washington(HRW)	Nevada(HRS)	144	63.5
Washington(HRW)	Region 8(HRS)	2,272	82.0
Washington(HRW)	West Coast Export(HRS)	1,131	1.0
TOTAL SHIPMENTS		3,547	
STORAGE		(0)	
Colorado(HRW)	Great Lakes Export(HRS)	7,701	44.0
Colorado(HRW)	Gulf Export(HRW)	21,183	68.0
Colorado(HRW)	Colorado(D)	150	1.0
TOTAL SHIPMENTS		29,034	
STORAGE		(0)	
New Mexico(HRW)	Arizona(HRS)	524	46.9
New Mexico(HRW)	New Mexico(HRS)	337	1.0
New Mexico(HRW)	Arizona(HRW)	1,069	46.9
New Mexico(HRW)	California(D)	344	62.5
New Mexico(HRW)	Arizona(D)	122	46.9
New Mexico(HRW)	New Mexico(D)	78	1.0
TOTAL SHIPMENTS		2,474	
STORAGE		(0)	
Nebraska(HRW)	East Coast Export(HRS)	19,454	40.8
Nebraska(HRW)	East Coast Export(HRW)	638	40.8
TOTAL SHIPMENTS		20,092	
STORAGE		(0)	

-continued-

TABLE 15. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1965, MODEL III, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Kansas(HRW)	Kansas(HRS)	748	1.0
Kansas(HRW)	Region 4(HRS)	8,877	20.8
Kansas(HRW)	Region 4(HRW)	17,546	20.8
Kansas(HRW)	Region 5(HRW)	5,672	29.8
Kansas(HRW)	Gulf Export(HRW)	151,188	24.2
Kansas(HRW)	Kansas(D)	173	1.0
Kansas(HRW)	Region 4(D)	2,053	20.8
TOTAL SHIPMENTS		186,257	
STORAGE		(0)	
Oklahoma(HRW)	Oklahoma(HRS)	815	1.0
Oklahoma(HRW)	Gulf Export(HRW)	46,148	29.0
TOTAL SHIPMENTS		46,963	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	3,526	1.0
Texas(HRW)	Region 3(HRS)	1,646	21.5
Texas(HRW)	Gulf Export(HRW)	9,412	21.5
Texas(HRW)	Texas(D)	815	1.0
TOTAL SHIPMENTS		15,399	
STORAGE		(0)	
Region 2(HRW)	Region 2(HRS)	5,045	1.0
Region 2(HRW)	Region 5(HRS)	2,929	18.4
Region 2(HRW)	Region 9(HRS)	4,245	22.0
Region 2(HRW)	Region 5(HRW)	164	18.4
Region 2(HRW)	Region 9(HRW)	8,658	22.0
Region 2(HRW)	Region 2(D)	244	1.0
TOTAL SHIPMENTS		21,285	
STORAGE		(0)	
North Dakota(D)	Nebraska(D)	112	59.4
North Dakota(D)	Oklahoma(D)	188	46.4
North Dakota(D)	Region 3(D)	871	66.6
North Dakota(D)	Region 5(D)	678	74.7
North Dakota(D)	Region 6(D)	860	127.0
North Dakota(D)	Region 8(D)	792	122.0
North Dakota(D)	Region 9(D)	982	80.0
North Dakota(D)	Great Lakes Export(D)	6,622	44.5
North Dakota(D)	East Coast Export(D)	8,790	95.5
North Dakota(D)	Gulf Export(D)	4,804	66.6
North Dakota(HRS)	Region 6(HRS)	3,719	127.0
North Dakota(HRS)	Region 7(HRS)	12,156	69.5
North Dakota(HRS)	Region 8(HRS)	1,153	122.0
North Dakota(HRS)	East Coast Export(HRS)	4,308	95.5
North Dakota(HRS)	North Dakota(HRW)	442	1.0
North Dakota(HRS)	Region 1(HRW)	684	44.5
North Dakota(HRS)	Region 3(HRW)	7,406	66.6
North Dakota(HRS)	Region 6(HRW)	7,576	127.0
North Dakota(HRS)	Region 7(HRW)	24,755	69.5
North Dakota(HRS)	Region 8(HRW)	3,930	122.0
North Dakota(HRS)	Region 7(HRW)	1,248	69.5
TOTAL SHIPMENTS		92,076	
STORAGE		(19,696)	
TOTAL COST =	$229,208,698		

D - durum wheat

HRS - hard red spring wheat

HRW - hard red winter wheat

TABLE 16. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1970, MODEL III, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Nevada(D)	40	82.4
Montana(D)	West Coast Export(D)	719	65.0
Montana(HRS)	West Coast Export(HRS)	20,073	65.0
Montana(HRW)	Oregon(HRS)	376	65.0
Montana(HRW)	West Coast Export(HRS)	18,931	65.0
Montana(HRW)	Oregon(HRW)	1,349	65.0
Montana(HRW)	Nevada(HRW)	355	82.4
Montana(HRW)	West Coast Export(HRW)	29,528	65.0
Montana(HRW)	Washington(D)	228	51.5
Montana(HRW)	Oregon(D)	153	65.0
TOTAL SHIPMENTS		71,752	
STORAGE		(10,501)	
South Dakota(D)	Great Lakes Export(D)	1,568	40.0
South Dakota(HRS)	Region 1(HRW)	3,753	28.6
South Dakota(HRS)	Great Lakes Export(D)	18,201	40.0
South Dakota(HRW)	Region 1(HRW)	3,216	28.6
South Dakota(HRW)	Region 6(HRW)	5,028	117.0
South Dakota(HRW)	Gulf Export(HRW)	5,200	50.7
TOTAL SHIPMENTS		36,966	
STORAGE		(0)	
Region 1(D)	Region 6(D)	840	85.0
Region 1(D)	Gulf Export(D)	443	22.1
Region 1(HRS)	Region 6(HRS)	3,723	85.0
Region 1(HRS)	Region 8(HRS)	3,518	80.0
Region 1(HRS)	Region 6(HRW)	2,571	85.0
Region 1(HRS)	Region 8(HRW)	3,502	80.0
TOTAL SHIPMENTS		14,597	
STORAGE		(0)	
Idaho(HRS)	California(HRS)	6,571	63.5
Idaho(HRS)	California(HRW)	1,669	63.5
Idaho(HRW)	California(HRW)	11,975	63.5
Idaho(HRW)	California(D)	156	63.5
Idaho(HRW)	Idaho(D)	53	1.0
TOTAL SHIPMENTS		20,424	
STORAGE		(0)	
Utah(HRS)	California(D)	1,190	53.0
STORAGE		(0)	
Wyoming(HRS)	Utah(HRS)	43	46.8
Wyoming(HRS)	Wyoming(D)	25	1.0
Wyoming(HRW)	Utah(HRS)	1,138	46.8
TOTAL SHIPMENTS		1,206	
STORAGE		(0)	
Washington(HRW)	Nevada(HRS)	174	63.5
Washington(HRW)	West Coast Export(HRS)	3,409	1.0
TOTAL SHIPMENTS		3,583	
STORAGE		(0)	
Colorado(HRW)	Utah(HRS)	5	46.8
Colorado(HRW)	Colorado(HRS)	652	10.1
Colorado(HRW)	Great Lakes Export(HRS)	7,354	44.0
Colorado(HRW)	Colorado(D)	157	1.0
TOTAL SHIPMENTS		8,168	
STORAGE		(21,025)	
New Mexico(HRW)	California(HRS)	121	62.5
New Mexico(HRW)	Arizona(HRS)	582	46.9
New Mexico(HRW)	New Mexico(HRS)	348	1.0
New Mexico(HRW)	Arizona(HRW)	1,187	46.9
New Mexico(HRW)	Arizona(D)	135	46.9
New Mexico(HRW)	New Mexico(D)	80	1.0
TOTAL SHIPMENTS		2,453	
STORAGE		(0)	
Nebraska(HRW)	Nebraska(HRS)	473	1.0
Nebraska(HRW)	East Coast Export(HRS)	12,197	40.8

-continued-

TABLE 16. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1970, MODEL III, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Nebraska(HRW)	Region 8(HRW)	960	89.0
Nebraska(HRW)	East Coast Export(HRW)	2,665	40.8
Nebraska(HRW)	Nebraska(D)	107	1.0
Nebraska(HRW)	East Coast Export(D)	4,912	40.8
TOTAL SHIPMENTS		21,314	
STORAGE		(0)	
Kansas(HRW)	Region 3(HRS)	3,809	24.2
Kansas(HRW)	Kansas(HRS)	734	1.0
Kansas(HRW)	Region 4(HRS)	8,854	20.8
Kansas(HRW)	Region 5(HRS)	168	29.8
Kansas(HRW)	Gulf Export(HRS)	6,428	24.2
Kansas(HRW)	Region 4(HRW)	18,048	20.8
Kansas(HRW)	Gulf Export(HRW)	139,255	24.2
Kansas(HRW)	Kansas(D)	170	1.0
Kansas(HRW)	Region 4(D)	2,048	20.8
Kansas(HRW)	Kansas(D)	686	29.8
TOTAL SHIPMENTS		180,200	
STORAGE		(0)	
Oklahoma(HRW)	Oklahoma(HRS)	808	1.0
Oklahoma(HRW)	Gulf Export(HRW)	45,982	29.0
Oklahoma(HRW)	Oklahoma(D)	187	1.0
TOTAL SHIPMENTS		46,977	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	3,649	1.0
Texas(HRW)	Region 3(HRW)	7,765	21.5
Texas(HRW)	Gulf Export(HRW)	634	21.5
Texas(HRW)	Texas(D)	844	1.0
Texas(HRW)	Region 3(D)	881	21.5
Texas(HRW)	Gulf Export(D)	1,374	21.5
TOTAL SHIPMENTS		15,147	
STORAGE		(0)	
Region 2(HRW)	Region 2(HRS)	5,019	1.0
Region 2(HRW)	Region 5(HRS)	2,997	18.4
Region 2(HRW)	Region 9(HRS)	4,488	22.0
Region 2(HRW)	Region 9(HRW)	9,149	22.0
Region 2(HRW)	Region 2(D)	1,161	1.0
Region 2(HRW)	Region 9(D)	1,038	22.0
TOTAL SHIPMENTS		23,852	
STORAGE		(0)	
North Dakota(D)	Region 7(D)	2,825	69.5
North Dakota(D)	Region 8(D)	814	122.0
North Dakota(HRS)	Region 7(HRS)	12,212	69.5
North Dakota(HRS)	North Dakota(HRW)	428	1.0
North Dakota(HRS)	Region 7(HRW)	24,896	69.5
North Dakota(HRS)	Great Lakes Export(D)	5,492	44.5
TOTAL SHIPMENTS		46,667	
STORAGE		(99,699)	
TOTAL COST =	$196,302,234		

D - durum wheat

HRS - hard red spring wheat

HRW - hard red winter wheat

TABLE 17. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1975, MODEL III, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Oregon(D)	157	65.0
Montana(D)	West Coast Export(D)	719	65.0
Montana(HRS)	West Coast Export(HRS)	20,064	65.0
Montana(HRW)	Oregon(HRS)	395	65.0
Montana(HRW)	West Coast Export(HRS)	13,087	65.0
Montana(HRW)	Oregon(HRW)	1,385	65.0
Montana(HRW)	West Coast Export(HRW)	26,151	65.0
Montana(HRW)	Washington(D)	232	51.5
TOTAL SHIPMENTS		62,190	
STORAGE		(20,052)	
South Dakota(D)	Great Lakes Export(D)	1,569	40.0
South Dakota(HRS)	Great Lakes Export(HRS)	7,354	40.0
South Dakota(HRS)	Great Lakes Export(D)	19,570	40.0
South Dakota(HRW)	Region 7(HRW)	11,992	66.4
South Dakota(HRW)	Great Lakes Export(D)	1,464	40.0
TOTAL SHIPMENTS		41,949	
STORAGE		(0)	
Idaho(HRS)	California(HRW)	8,239	63.5
Idaho(HRW)	California(HRW)	6,687	63.5
Idaho(HRW	California(D)	1,267	63.5
Idaho(HRW)	Idaho(D)	53	1.0
TOTAL SHIPMENTS		16,246	
STORAGE		(0)	
Utah(HRS)	California(HRS)	3,151	53.0
STORAGE		(0)	
Wyoming(HRS)	Utah(HRS)	68	46.8
Wyoming(HRW)	Utah(HRS)	1,094	46.8
Wyoming(HRW)	Wyoming(D)	25	1.0
TOTAL SHIPMENTS		1,187	
STORAGE		(0)	
Region 1(HRS)	Region 7(HRS)	6,226	38.8
Region 1(HRS)	Region 1(HRW)	6,981	1.0
TOTAL SHIPMENTS		13,207	
STORAGE		(0)	
Washington(HRW)	Nevada(HRS)	191	63.5
Washington(HRW)	West Coast Export(HRW)	3,377	1.0
TOTAL SHIPMENTS		3,568	
STORAGE		(0)	
Colorado(HRW)	Utah(HRS)	1,973	46.8
Colorado(HRW)	Colorado(HRS)	685	10.1
Colorado(HRW)	Colorado(D)	164	1.0
TOTAL SHIPMENTS		2,822	
STORAGE		(26,087)	
New Mexico(HRW)	Arizona(HRS)	645	46.9
New Mexico(HRW)	New Mexico(HRS)	368	1.0
New Mexico(HRW)	Arizona(HRW)	1,315	46.9
New Mexico(HRW)	California(D)	226	62.5
New Mexico(HRW)	Arizona(D)	155	46.9
New Mexico(HRW)	New Mexico(D)	85	1.0
TOTAL SHIPMENTS		2,794	
STORAGE		(0)	
Nebraska(HRW)	Nebraska(HRS)	467	1.0
Nebraska(HRW)	East Coast Export(HRS)	12,197	40.8
Nebraska(HRW)	East Coast Export(HRW)	2,265	40.8
Nebraska(HRW)	Nebraska(D)	110	1.0
Nebraska(HRW)	East Coast Export(D)	4,912	40.8
Nebraska(HRW)	Great Lakes Export(D)	1,377	27.5
TOTAL SHIPMENTS		21,328	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	727	1.0
Kansas(HRW)	Region 2(HRS)	5,081	12.8
Kansas(HRW)	Region 3(HRS)	3,461	24.2

-continued-

TABLE 17. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1975, MODEL III, PHASE I, RATE SYSTEM I, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Kansas(HRW)	Region 4(HRS)	8,979	20.8
Kansas(HRW)	Region 5(HRS)	3,022	29.8
Kansas(HRW)	Region 9(HRS)	4,782	34.8
Kansas(HRW)	Gulf Export(HRS)	6,428	24.2
Kansas(HRW)	Region 4(HRW)	18,297	20.8
Kansas(HRW)	Region 5(HRW)	6,158	29.8
Kansas(HRW)	Region 9(HRW)	9,745	34.8
Kansas(HRW)	Gulf Export(HRW)	59,915	24.2
Kansas(HRW)	Kansas(D)	168	1.0
Kansas(HRW)	Region 2(D)	1,174	12.8
Kansas(HRW)	Region 3(D)	901	24.2
Kansas(HRW)	Region 4(D)	2,076	20.8
Kansas(HRW)	Region 5(D)	699	29.8
Kansas(HRW)	Region 9(D)	1,106	34.8
TOTAL SHIPMENTS		132,719	
STORAGE		(53,581)	
Oklahoma(HRW)	Oklahoma(HRS)	806	1.0
Oklahoma(HRW)	Nevada(HRW)	391	64.0
Oklahoma(HRW)	Nevada(D)	44	64.0
Oklahoma(HRW)	Oklahoma(D)	186	1.0
TOTAL SHIPMENTS		1,427	
STORAGE		(45,555)	
Texas(HRW)	Texas(HRS)	3,789	1.0
Texas(HRW)	Region 3(HRS)	439	21.5
Texas(HRW)	Region 3(HRW)	7,946	21.5
Texas(HRW)	Texas(D)	875	1.0
Texas(HRW)	Gulf Export(D)	1,817	21.5
TOTAL SHIPMENTS		14,866	
STORAGE		(0)	
Region 2(HRW)	Region 6(HRS)	3,791	84.6
Region 2(HRW)	Region 7(HRS)	2,794	51.5
Region 2(HRW)	Region 8(HRS)	3,640	79.0
Region 2(HRW)	Region 6(HRW)	7,725	84.6
Region 2(HRW)	Region 8(HRW)	4,706	79.0
Region 2(HRW)	Region 6(D)	876	84.6
TOTAL SHIPMENTS		23,532	
STORAGE		(0)	
North Dakota(HRS)	North Dakota(HRW)	418	1.0
North Dakota(HRS)	Region 7(HRW)	13,249	69.5
North Dakota(D)	Region 7(D)	2,863	69.5
North Dakota(D)	Region 8(D)	842	122.0
TOTAL SHIPMENTS		17,372	
STORAGE		(124,701)	
TOTAL COST =	$153,685,343		

D - durum wheat

HRS - hard red spring wheat

HRW - hard red winter wheat

TABLE 18. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1965, MODEL III, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Washington(D)	229	51.5
Montana(D)	Oregon(D)	149	52.0

-continued-

TABLE 18. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1965, MODEL III, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Region 9(D)	982	63.2
Montana(D)	West Coast Export(D)	95	50.2
Montana(HRS)	Region 9(HRS)	1,907	63.2
Montana(HRS)	West Coast Export(HRS)	10,074	50.2
Montana(HRS)	Region 9(HRW)	8,658	63.2
Montana(HRW)	West Coast Export(HRW)	39,559	50.2
TOTAL SHIPMENTS		61,653	
STORAGE		(665)	
South Dakota(D)	Region 8(D)	792	70.6
South Dakota(D)	Region 7(D)	773	57.4
South Dakota(HRS)	Region 6(HRS)	3,657	76.5
South Dakota(HRS)	Region 8(HRS)	2,824	70.6
South Dakota(HRS)	Great Lakes Export(HRS)	2,077	30.9
South Dakota(HRS)	Region 6(HRW)	7,289	76.5
South Dakota(HRW)	Region 6(HRW)	287	76.5
South Dakota(HRW)	Region 8(HRW)	3,930	70.6
TOTAL SHIPMENTS		21,629	
STORAGE		(0)	
Region 1(D)	Gulf Export(D)	923	22.1
Region 1(HRS)	Region 9(HRS)	2,338	36.0
Region 1(HRS)	Region 1(HRW)	6,312	1.0
TOTAL SHIPMENTS		9,573	
STORAGE		(0)	
Idaho(HRS)	Washington(HRS)	920	37.4
Idaho(HRS)	Oregon(HRS)	440	44.6
Idaho(HRS)	California(HRW)	5,495	54.5
Idaho(HRW)	California(HRS)	5,316	54.5
Idaho(HRW)	Nevada(HRS)	144	34.3
Idaho(HRW)	West Coast Export(HRS)	1,769	44.6
Idaho(HRW)	Oregon(HRW)	1,315	44.6
Idaho(HRW)	California(HRW)	3,335	54.5
Idaho(HRW)	Nevada(HRW)	215	34.3
Idaho(HRW)	Nevada(D)	32	34.3
Idaho(HRW)	Idaho(D)	53	1.0
TOTAL SHIPMENTS		19,034	
STORAGE		(0)	
Utah(HRS)	Region 6(HRS)	62	65.7
STORAGE		(0)	
Wyoming(HRS)	California(HRW)	48	63.8
Wyoming(HRW)	California(HRW)	1,107	63.8
Wyoming(HRW)	Wyoming(D)	25	1.0
TOTAL SHIPMENTS		1,180	
STORAGE		(0)	
Washington(HRW)	West Coast Export(HRS)	114	1.0
Washington(HRW)	West Coast Export(HRW)	3,289	1.0
TOTAL SHIPMENTS		3,403	
STORAGE		(0)	
Colorado(HRW)	Arizona(HRS)	524	56.2
Colorado(HRW)	Colorado(HRS)	629	1.0
Colorado(HRW)	Region 8(HRS)	601	83.6
Colorado(HRW)	California(HRW)	2,506	67.9
Colorado(HRW)	Arizona(HRW)	1,069	56.2
Colorado(HRW)	Gulf Export(HRW)	23,433	55.6
Colorado(HRW)	Arizona(D)	122	56.2
Colorado(HRW)	Colorado(D)	150	1.0
TOTAL SHIPMENTS		29,034	
STORAGE		(0)	
New Mexico(HRW)	California(HRS)	811	44.0
New Mexico(HRW)	New Mexico(HRS)	337	1.0
New Mexico(HRW)	California(D)	1,248	44.0
New Mexico(HRW)	New Mexico(D)	78	1.0
TOTAL SHIPMENTS		2,474	
STORAGE		(0)	

-continued-

TABLE 18. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1965, MODEL III, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Nebraska(HRW)	Nebraska(HRS)	485	1.0
Nebraska(HRW)	Region 4(HRW)	17,546	26.6
Nebraska(HRW)	Nebraska(D)	112	1.0
Nebraska(HRW)	Region 3(D)	871	30.0
Nebraska(HRW)	Gulf Export(D)	1,078	30.0
TOTAL SHIPMENTS		20,092	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	748	1.0
Kansas(HRW)	Region 4(HRS)	8,877	20.8
Kansas(HRW)	Gulf Export(HRW)	174,406	24.2
Kansas(HRW)	Kansas(D)	173	1.0
Kansas(HRW)	Region 4(D)	2,053	20.8
TOTAL SHIPMENTS		186,257	
STORAGE		(0)	
Oklahoma(HRW)	Oklahoma(HRS)	815	1.0
Oklahoma(HRW)	Gulf Export(HRS)	6,653	21.5
Oklahoma(HRW)	Gulf Export(HRW)	39,307	21.5
Oklahoma(HRW)	Oklahoma(D)	188	1.0
TOTAL SHIPMENTS		46,963	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	3,526	1.0
Texas(HRW)	Region 3(HRS)	3,643	21.5
Texas(HRS)	Region 3(HRW)	2,153	21.5
Texas(HRW)	Gulf Export(HRW)	5,262	21.5
Texas(HRW)	Texas(D)	815	1.0
TOTAL SHIPMENTS		15,399	
STORAGE		(0)	
Region 2(HRW)	Region 2(HRS)	5,045	1.0
Region 2(HRW)	Region 5(HRS)	2,929	18.4
Region 2(HRW)	Region 3(HRW)	5,253	13.8
Region 2(HRW)	Region 5(HRW)	5,836	18.4
Region 2(HRW)	Region 2(D)	1,167	1.0
Region 2(HRW)	Region 5(D)	678	18.4
Region 2(HRW)	Gulf Export(D)	377	13.8
TOTAL SHIPMENTS		21,285	
STORAGE		(0)	
North Dakota(D)	Region 6(D)	860	84.4
North Dakota(D)	Region 7(D)	2,040	65.5
North Dakota(D)	Great Lakes Export(D)	6,622	34.6
North Dakota(D)	East Coast Export(D)	8,790	68.9
North Dakota(D)	Gulf Export(D)	2,426	56.1
North Dakota(HRS)	Region 7(HRS)	12,156	59.6
North Dakota(HRS)	East Coast Export(HRS)	23,762	68.9
North Dakota(HRS)	Great Lakes Export(HRS)	5,624	34.6
North Dakota(HRS)	North Dakota(HRW)	442	1.0
North Dakota(HRS)	Region 7(HRW)	24,755	59.6
North Dakota(HRS)	East Coast Export(HRW)	638	68.9
TOTAL SHIPMENTS		88,115	
STORAGE		(25,697)	
TOTAL COST =	$193,382,487		

D - durum wheat

HRS - hard red spring wheat

HRW - hard red winter wheat

TABLE 19. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1970, MODEL III, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Washington(D)	228	51.5
Montana(D)	Oregon(D)	153	52.0
Montana(D)	West Coast Export(D)	719	50.2
Montana(HRS)	Washington(HRS)	894	51.5
Montana(HRS)	West Coast Export(HRS)	17,573	50.2
Montana(HRS)	Region 9(HRW)	1,606	63.2
Montana(HRW)	Oregon(HRS)	376	52.0
Montana(HRW)	Region 9(HRS)	4,486	63.2
Montana(HRW)	West Coast Export(HRS)	21,431	50.2
Montana(HRW)	Oregon(HRW)	1,349	52.0
Montana(HRW)	West Coast Export(HRW)	29,528	50.2
TOTAL SHIPMENTS		78,345	
STORAGE		(3,908)	
South Dakota(D)	Great Lakes Export(D)	1,568	30.9
South Dakota(HRS)	Region 6(HRS)	3,723	76.5
South Dakota(HRS)	Region 6(HRW)	7,599	76.5
South Dakota(HRS)	Region 6(D)	840	76.5
South Dakota(HRS)	Region 7(D)	2,825	55.9
South Dakota(HRS)	Great Lakes Export(D)	6,967	30.9
South Dakota(HRW)	Region 7(HRW)	13,444	55.9
TOTAL SHIPMENTS		36,966	
STORAGE		(0)	
Region 1(D)	Region 9(D)	1,038	36.0
Region 1(D)	Great Lakes Export(D)	245	13.8
Region 1(HRS)	Region 1(HRW)	6,969	1.0
Region 1(HRS)	Region 9(HRW)	6,345	36.0
TOTAL SHIPMENTS		14,597	
STORAGE		(0)	
Idaho(HRS)	California(HRW)	8,240	54.5
Idaho(HRW)	California(HRS)	5,997	54.5
Idaho(HRW)	Nevada(HRS)	174	34.3
Idaho(HRW)	California(HRW)	4,219	54.5
Idaho(HRW)	Nevada(HRW)	355	34.3
Idaho(HRW)	California(D)	1,346	54.5
Idaho(HRW)	Nevada(D)	40	34.3
Idaho(HRW)	Idaho(D)	53	1.0
TOTAL SHIPMENTS		20,424	
STORAGE		(0)	
Utah(HRS)	California(HRW)	4	45.6
STORAGE		(0)	
Wyoming(HRS)	California(HRW)	43	63.8
Wyoming(HRS)	Wyoming(D)	25	1.0
Wyoming(HRW)	California(HRW)	1,138	63.8
TOTAL SHIPMENTS		1,206	
STORAGE		(0)	
Washington(HRW)	West Coast Export(HRS)	3,409	1.0
STORAGE		(0)	
Colorado(HRW)	Colorado(HRS)	652	1.0
Colorado(HRW)	Colorado(D)	157	1.0
TOTAL SHIPMENTS		809	
STORAGE		(22,810)	
New Mexico(HRW)	California(HRS)	695	44.0
New Mexico(HRW)	Arizona(HRS)	8	35.1
New Mexico(HRW)	New Mexico(HRS)	348	1.0
New Mexico(HRW)	Arizona(HRW)	1,187	35.1
New Mexico(HRW)	Arizona(D)	135	25.1
New Mexico(HRW)	New Mexico(D)	80	1.0
TOTAL SHIPMENTS		2,453	
STORAGE		(0)	
Nebraska(HRW)	Nebraska(HRS)	473	1.0
Nebraska(HRW)	Region 8(HRS)	3,518	66.1
Nebraska(HRW)	Region 4(HRW)	11,940	26.6

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TABLE 19. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1970, MODEL III, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Nebraska(HRW)	Region 8(HRW)	4,462	66.1
Nebraska(HRW)	Nebraska(D)	107	1.0
Nebraska(HRW)	Region 8(D)	814	66.1
TOTAL SHIPMENTS		21,314	
STORAGE		(0)	
Kansas(HRW)	Kansas(HRS)	734	1.0
Kansas(HRW)	Region 4(HRS)	8,854	20.8
Kansas(HRW)	Region 4(HRW)	6,109	20.8
Kansas(HRW)	Gulf Export(HRW)	166,554	24.2
Kansas(HRW)	Kansas(D)	170	1.0
Kansas(HRW)	Region 4(D)	2,048	20.8
Kansas(HRW)	Gulf Export(D)	1,817	24.2
TOTAL SHIPMENTS		186,286	
STORAGE		(0)	
Oklahoma(HRW)	East Coast Export(HRS)	808	1.0
Oklahoma(HRW)	East Coast Export(HRS)	12,197	51.9
Oklahoma(HRW)	Gulf Export(HRS)	5,405	21.5
Oklahoma(HRW)	Region 9(HRW)	1,198	46.8
Oklahoma(HRW)	East Coast Export(HRW)	2,665	51.9
Oklahoma(HRW)	Gulf Export(HRW)	24,517	21.5
Oklahoma(HRW)	Oklahoma(D)	187	1.0
TOTAL SHIPMENTS		46,977	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	3,649	1.0
Texas(HRW)	Region 3(HRW)	5,743	21.5
Texas(HRW)	Texas(D)	844	1.0
Texas(HRW)	East Coast Export(D)	4,912	51.9
TOTAL SHIPMENTS		15,148	
STORAGE		(0)	
Region 2(HRW)	Region 2(HRS)	5,019	1.0
Region 2(HRW)	Region 3(HRS)	3,809	13.8
Region 2(HRW)	Region 5(HRS)	2,965	18.4
Region 2(HRW)	Gulf Export(HRS)	1,023	13.8
Region 2(HRW)	Region 3(HRW)	2,023	13.8
Region 2(HRW)	Region 5(HRW)	6,085	18.4
Region 2(HRW)	Region 2(D)	1,161	1.0
Region 2(HRW)	Region 3(D)	881	13.8
Region 2(HRW)	Region 5(D)	686	18.4
TOTAL SHIPMENTS		23,652	
STORAGE		(0)	
North Dakota(HRS)	Region 7(HRS)	12,212	59.6
North Dakota(HRS)	Great Lakes Export(HRS)	7,354	34.6
North Dakota(HRS)	North Dakota(HRW)	428	1.0
North Dakota(HRS)	Region 7(HRW)	11,452	59.6
North Dakota(HRS)	Great Lakes Export(D)	16,480	34.6
TOTAL SHIPMENTS		47,926	
STORAGE		(93,800)	
TOTAL COST =	$173,752,856		

D - durum wheat

HRS - hard red spring wheat

HRW - hard red winter wheat

TABLE 20. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1975, MODEL III, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Montana(D)	Washington(D)	232	51.5
Montana(D)	Oregon(D)	157	52.0
Montana(D)	West Coast Export(D)	719	50.2
Montana(HRS)	Washington(HRS)	908	51.5
Montana(HRS)	Oregon(HRW)	1,385	52.0
Montana(HRS)	West Coast Export(HRW)	17,771	50.2
Montana(HRW)	Oregon(HRS)	395	52.0
Montana(HRW)	West Coast Export(HRS)	33,151	50.2
Montana(HRW)	West Coast Export(HRW)	8,380	50.2
TOTAL SHIPMENTS		63,098	
STORAGE		(19,144)	
South Dakota(D)	Great Lakes Export(D)	1,569	30.9
South Dakota(HRS)	Great Lakes Export(HRS)	7,354	30.9
South Dakota(HRS)	Region 7(HRW)	6,283	55.9
South Dakota(HRS)	Great Lakes Export(D)	13,287	30.9
South Dakota(HRW)	Region 7(HRS)	12,386	55.9
South Dakota(HRW)	Region 7(D)	1,070	55.9
TOTAL SHIPMENTS		41,949	
STORAGE		(0)	
Region 1(D)	Great Lakes Export(D)	1,281	13.8
Region 1(HRS)	Region 1(HRW)	6,981	1.0
Region 1(HRS)	Great Lakes Export(D)	6,226	13.8
TOTAL SHIPMENTS		14,488	
STORAGE		(0)	
Idaho(HRS)	California(HRS)	4,483	54.5
Idaho(HRS)	Nevada(HRS)	191	34.3
Idaho(HRS)	California(HRW)	3,512	54.5
Idaho(HRS)	Idaho(D)	53	1.0
Idaho(HRW)	California(HRW)	10,252	54.5
Idaho(HRW)	Nevada(HRW)	391	34.3
Idaho(HRW)	California(D)	1,493	54.5
Idaho(HRW)	Nevada(D)	44	34.3
TOTAL SHIPMENTS		20,419	
STORAGE		(0)	
Utah(HRS)	California(HRS)	16	45.6
STORAGE		(0)	
Wyoming(HRS)	California(HRW)	43	63.8
Wyoming(HRS)	Wyoming(D)	25	1.0
Wyoming(HRW)	California(HRW)	1,119	63.8
TOTAL SHIPMENTS		1,187	
STORAGE		(0)	
Washington(HRW)	West Coast Export(HRW)	3,377	1.0
STORAGE		(0)	
Colorado(HRW)	California(HRS)	484	67.9
Colorado(HRW)	Arizona(HRS)	645	56.2
Colorado(HRW)	Colorado(HRS)	685	1.0
Colorado(HRW)	Arizona(HRW)	1,315	56.2
Colorado(HRW)	Arizona(D)	155	56.2
Colorado(HRW)	Colorado(D)	164	1.0
TOTAL SHIPMENTS		3,448	
STORAGE		(25,461)	
New Mexico(HRW)	California(HRS)	2,341	44.0
New Mexico(HRW)	New Mexico(HRW)	368	1.0
New Mexico(HRW)	New Mexico(D)	85	1.0
TOTAL SHIPMENTS		2,794	
STORAGE		(0)	
Nebraska(HRW)	Nebraska(HRS)	467	1.0
Nebraska(HRW)	Region 7(HRW)	18,958	55.8
Nebraska(HRW)	Nebraska(D)	110	1.0
Nebraska(HRW)	Region 7(D)	1,793	55.8
TOTAL SHIPMENTS		21,328	
STORAGE		(0)	

-continued-

TABLE 20. LEAST-COST DISTRIBUTION OF DURUM, HARD RED SPRING, AND HARD RED WINTER WHEAT, 1975, MODEL III, PHASE I, RATE SYSTEM II, SUBSTITUTION ANALYSIS - continued

Origin	Destination	Shipment	Rate
		000 cwt.	cents per cwt.
Kansas(HRW)	Kansas(HRS)	727	1.0
Kansas(HRW)	Region 2(HRS)	3,129	12.8
Kansas(HRW)	Region 3(HRS)	1,027	24.2
Kansas(HRW)	Region 4(HRS)	8,979	20.8
Kansas(HRW)	Region 5(HRS)	3,022	29.8
Kansas(HRW)	Region 3(HRW)	7,946	24.2
Kansas(HRW)	Region 4(HRW)	18,297	20.8
Kansas(HRW)	Region 5(HRW)	6,158	29.8
Kansas(HRW)	Gulf Export(HRW)	48,932	24.2
Kansas(HRW)	Kansas(D)	168	1.0
Kansas(HRW)	Region 2(D)	1,174	12.8
Kansas(HRW)	Region 4(D)	2,076	20.8
Kansas(HRW)	Region 5(D)	699	29.8
Kansas(HRW)	Gulf Export(D)	1,817	24.2
TOTAL SHIPMENTS		104,151	
STORAGE		(82,149)	
Oklahoma(HRW)	Oklahoma(HRS)	806	1.0
Oklahoma(HRW)	Region 9(HRS)	4,782	46.8
Oklahoma(HRW)	East Coast Export(HRS)	12,197	51.9
Oklahoma(HRW)	Region 9(HRW)	9,745	46.8
Oklahoma(HRW)	East Coast Export(HRW)	2,265	51.9
Oklahoma(HRW)	Gulf Export(HRW)	10,983	21.5
Oklahoma(HRW)	Oklahoma(D)	186	1.0
Oklahoma(HRW)	Region 9(D)	1,106	46.8
Oklahoma(HRW)	East Coast Export(D)	4,912	51.9
TOTAL SHIPMENTS		46,982	
STORAGE		(0)	
Texas(HRW)	Texas(HRS)	3,789	1.0
Texas(HRW)	Region 3(HRS)	2,873	21.5
Texas(HRW)	Gulf Export(HRS)	6,428	21.5
Texas(HRW)	Texas(D)	875	1.0
Texas(HRW)	Region 3(D)	901	21.5
TOTAL SHIPMENTS		14,866	
STORAGE		(0)	
Region 2(HRW)	Region 2(HRS)	1,952	1.0
Region 2(HRW)	Region 6(HRS)	3,791	62.1
Region 2(HRW)	Region 8(HRS)	3,640	50.7
Region 2(HRW)	Region 6(HRW)	7,724	62.1
Region 2(HRW)	Region 8(HRW)	4,706	50.7
Region 2(HRW)	Region 6(D)	876	62.1
Region 2(HRW)	Region 8(D)	842	50.7
TOTAL SHIPMENTS		23,531	
STORAGE		(0)	
North Dakota(D)	Great Lakes Export(D)	2,898	34.6
North Dakota(HRS)	North Dakota(HRW)	418	1.0
TOTAL SHIPMENTS		3,316	
STORAGE		(138,418)	
TOTAL COST =	$135,841,440		

D - durum wheat

HRS - hard red spring wheat

HRW - hard red winter wheat

SUMMARY AND CONCLUSIONS

The market outlets for North Dakota hard red spring wheat and durum wheat-grain appear to be well mixed between domestic and export markets under an optimum least-cost distribution system (Sections A, B, and C; Tables 3-20). However, the export market appears to be more dominant in the 1965 analysis. This was true regardless of the location of the flour mill and rate system used under Model I, Phase I. North Dakota's largest market share occurred under Rate System I or the least-cost existing rate system in 1965. In 1970 North Dakota's largest market share occurred under Rate System II. The largest market share for 1975 was under Rate System I (Table 21).

TABLE 21. NORTH DAKOTA'S WHEAT-GRAIN MARKET SHARE UNDER TRANSPORTATION RATE SYSTEMS I AND II, MODEL I, PHASE I, 1965, 1970, AND 1975

Rate System	Year	Market Share
		000 hundredweight
I	1965	86,775
	1970	55,270
	1975	25,216
II	1965	79,849
	1970	78,594
	1975	23,514

Under Rate Systems I and IV, North Dakota's market share of wheat-grain showed a considerable change when the locations and demands of flour mills were changed (Table 22). North Dakota had a considerably better market position when flour mills were located in flour consuming areas as compared to locating them in wheat producing areas.

As rail rates were based on fully distributed costs under Rate Systems II and V, North Dakota's market position remained rather stable regardless of flour mill location (Table 23).

Overall, North Dakota's market share of wheat-grain and wheat-flour was the greatest in 1965 and 1970 when flour mills were located in wheat producing areas and rail rates were based on fully distributed costs. In 1975 North Dakota's market share was the greatest when flour mills were located in flour consuming areas and existing rail rates were used.

In looking at the total costs for all hard wheats in the United States, it was found that in 1965 the least-cost distribution occurred when flour mills were located in wheat producing areas and shipments of flour were based on Rate System V; export grain shipments were based on on Rate System II. This was also true for the year 1970. In 1975 the

least-cost distribution occurred under Rate Systems II and V and when flour mills were located in flour consuming areas (Table 24).

TABLE 22. NORTH DAKOTA'S WHEAT-GRAIN MARKET SHARE UNDER TRANSPORTATION RATE SYSTEMS I AND IV, BY FLOUR MILL LOCATIONS, 1965, 1970, AND 1975

Flour Mill Location	Model and Phase	Market Share		
		1965	1970	1975
		000 hundredweight		
In wheat producing areas	Model II, Phase I	73,888	19,847	419
In flour consuming areas	Model III, Phase I	92,676	43,028	17,033

TABLE 23. NORTH DAKOTA'S WHEAT-GRAIN MARKET SHARE UNDER TRANSPORTATION RATE SYSTEMS II AND V, BY FLOUR MILL LOCATIONS, 1965, 1970, AND 1975

Flour Mill Location	Model and Phase	Market Share		
		1965	1970	1975
		000 hundredweight		
In wheat producing areas	Model II, Phase I	99,734	48,986	419
In flour consuming areas	Model III, Phase I	86,075	47,927	3,316

In summary, the least-cost distribution for 1965 was when flour mills were located in wheat producing areas and rail rates for wheat-grain and wheat-flour were based on fully distributed costs. This would also give North Dakota its largest market share.

For least-cost distribution in 1970, flour mills should be located in wheat producing areas and rail rates for wheat-grain and wheat-flour should be based on fully distributed costs. This would also give North Dakota its largest market share.

TABLE 24. TOTAL DISTRIBUTION COST ANALYSIS OF HARD WHEAT IN THE UNITED STATES UNDER TRANSPORTATION RATE SYSTEMS I, II, IV, AND V, 1965, 1970, AND 1975

Model and Phase	1965		1970		1975	
	Rate Systems I and IV	Rate Systems II and V	Rate Systems I and IV	Rate Systems II and V	Rate Systems I and IV	Rate Systems II and V
	dollars					
Model I						
Phase I	181,136,041	158,969,853	165,323,262	146,525,570	111,082,027	96,317,913
Model II						
Phase I	212,012,750	180,809,826	198,745,672	171,068,699	165,530,856	140,031,338
Model III						
Phase I	229,208,698	193,382,487	196,302,234	173,752,856	153,685,343	135,841,440

The least-cost distribution for 1975 occurred when locating flour mills in flour consuming areas and when shipments of wheat-grain were based on fully distributed costs. North Dakota had its largest market share when rail rates were based on existing rates and when flour mills were located in the same location.

The results of the substitution analysis generally displays the same characteristics as the analyses by class, i.e., a savings in total distribution costs resulted by locating flour mills in wheat producing areas and basing rail rates on fully distributed costs. This would also give North Dakota its largest market share for both 1965 and 1970. Also, both analyses indicated that the 1975 least-cost distribution would be under rail rates that were based on fully distributed costs. North Dakota would also receive its largest market share when flour mills were located in flour consuming areas in all of the 1975 analyses. These are the likenesses of the substitution and nonsubstitution analyses.

The analyses by class of wheat does, however, present a more realistic market share and least-cost distribution picture. Since the substitution analysis allowed a great deal of freedom of substitution among classes of wheat, the distribution patterns that resulted were rather abnormal. On the other hand, the substitution rate range analysis was equally realistic to the nonsubstitution rate range analysis in that it does reveal market pressures from other classes of wheat that may exist in the competitive markets for substitutable hard wheats.