

The Value of QUALITY PREMIUMS Paid to North Dakota Wheat Farmers

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The value of wheat produced throughout the United States is influenced by several key economic factors. This article will relate these economic factors to the value of spring and durum wheat produced in North Dakota as compared to the value of wheats produced in other sections of the United States. The major emphasis of the analysis is to measure quality premiums received by North Dakota farmers. The key economic forces influencing the value of a specific type or class of wheat highlighted in this paper will be categorized in three basic areas:

1. The location of wheat in relation to its final market demand,
2. The quality of wheat, and
3. The relative supply and demand conditions for particular qualities and quantities of wheat in a given marketing year.

(This paper will highlight the first two price determining factors and will only briefly allude to the third factor mentioned.)

Turning first to location, it is apparent that wheat prices vary across the United States with respect to location. This can most easily be observed in looking at wheat price differentials that exist

Research reported in this study supported by the North Dakota State Wheat Commission.

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in North Dakota, and noting that the highest wheat prices tend to be paid in the southeastern portion of our state with the lowest prices paid in the far northwest. The obvious explanation for the difference in prices between southeastern and northwestern portions of the state is the transportation cost of moving wheat from farms in these two areas of the state to eastern markets. The traditional flow of wheat is from the Midwest to the densely populated consuming sections of the east and west coasts. As a result of this market movement, prices generally tend to move downward as we move farther and farther from eastern markets. Stated in another way, the value of a bushel of wheat in Crosby, North Dakota, is less than the value of that same bushel of wheat located in Minneapolis or Chicago by the amount of transportation and handling costs required to move a bushel of wheat into the Chicago or Minneapolis market position.

North Dakota spring wheats traditionally have been used as an input in the wheat processing industries to upgrade and increase the processing quality of the end products. Most wheat products consist of combinations of various wheats or blends of wheat. This is particularly true in the case of flour. This is true, but to a lesser degree, in the case of durum wheat used in manufacturing of pasta products. The processing quality premiums

paid for North Dakota wheat thus become a function of the desirability of these wheats in arriving at the end product blends that are required to meet processing requirements and ultimately to satisfy consumer demand. Additionally, North Dakota wheats traditionally have been used to blend with lower quality wheats produced in foreign countries. Millers throughout the world have viewed North Dakota hard red spring and Canadian Manitoba and in certain years wheats of other countries, as high quality wheats used primarily to create satisfactory flour blends that can be utilized in the commercial baking industries of the various countries of the world. The wheats produced in the humid, warm climates of the Far East and of central Europe tend to be less acceptable for some commercial baking processes. The lower protein contents and lower gluten qualities of the bread wheats produced in these parts of the world require upgrading in the milling process if satisfactory bakery flour is to be achieved. Quality, then, however measured, and however subjective it may be in the mind's eye of the evaluator, becomes a key criterion in attempting to identify market price differentials.

The final ingredient in the quality-price mix has to center on the relative supplies of quality factors in relation to the final demand for these factors. A specific reference to this situation is revealed as one looks at the availability of high protein wheat in a given crop year and relates this to the protein premiums paid for wheat during that particular marketing year. It seems quite evident that as the protein content of the total bread wheat crop becomes quite low in the winter and spring wheat producing areas, that protein premiums paid for the higher protein qualities tend to increase substantially. Conversely, when the protein content of the bread wheat crop tends to be relatively high, the protein premiums paid for both spring and winter wheat crops tend to be depressed. This becomes a simple analysis of supply and demand of those quality characteristics in the spring and winter wheat crops that are considered desirable in producing the quality levels necessary or desired in the commercial flour blends.

Brief examination of data on protein premiums and protein levels of the wheat crops in the winter and spring wheat areas tends to substantiate the supply and demand hypothesis that premiums paid to North Dakota farmers are not constant, but rather are variable in relation to the relative supply and demand of those premium

factors being evaluated in the market place.

The following discussion will utilize market price data to indicate the amount of premium that North Dakota producers have historically received for the spring and durum wheat crops produced in this state. The objective of presenting these data is to relate to the North Dakota farmer the level of premium income that he is receiving for the quality wheats he produces. The economic decision of the individual farm producer then becomes one of relating quality to yield potential. The economic relationship between quality and output is the relevant decision to be considered with respect to varietal selection in his wheat production program.

Price Differentials Among Classes of Wheat at Selected Market Locations

The data presented in Table 1 indicate price differentials that have existed in the terminal loan rates at the major wheat markets across the United States. While these values are administratively set, and do not represent specific market responses to quality differentials among wheats of different classes and quality levels, they do provide a basis for insight into pricing differentials that are established among wheat classes. The loan rates in many years have been a dominating pricing factor in the marketplace and therefore have been representative of price differentials between markets. The annual data from 1963 through 1969 indicate that the Minneapolis hard spring wheat market has consistently been from 10 to 20 cents per bushel higher than the Kansas City hard red winter and Chicago soft red winter wheat market. The 1963-69 average of these prices shows the Minneapolis market 15 cents above the Kansas City market price, 16 cents above the Chicago market price, and 21 cents above the Portland No. 1 white wheat market price.

As pointed out earlier, geographic location influences the value of a given quality of wheat. To remove the location effect, the average 1963-69 prices were adjusted by adding transportation costs to the Kansas City and Minneapolis wheat prices to make them approximately equal, based on geographic location. This was accomplished by adjusting the Minneapolis wheat price at an FOB Chicago delivery location and by adjusting Kansas City wheat prices to an FOB St. Louis delivery location. The Chicago and St. Louis locations would be approximately equal value locations in terms of the value of wheats moving from west to east into the east coast market areas. When these adjustments

were taken into account, Minneapolis hard red spring price for 14 per cent protein was approximately 16.2 cents above the Kansas City price delivered at St. Louis (Table 1). The Minneapolis price was approximately 32.5 cents above the price of Chicago soft red winter wheat.

Table 1. Terminal loan rates¹ for selected classes of wheat at the major terminal markets, 1963-69.

	Minneapolis	Kansas City	Chicago	Portland
	Number 1 H.R.S. 14% Pro.	Number 1 H.R.W. 13% Pro.	Number 2 Soft Red Winter	Number 1 White Wheat
	— dollars per bushel —			
1963	\$2.21	\$2.10	\$2.09	\$2.00
1964	1.68	1.56	1.56	1.47
1965	1.655	1.475	1.48	1.44
1966	1.635	1.475	1.48	1.46
1967	1.625	1.475	1.46	1.44
1968	1.635	1.485	1.45	1.44
1969	1.645	1.495	1.45	1.45
1963-69 Ave.	1.73	1.58	1.57	1.52
Adjusted Price Eastern Gateway Basis ²	\$1.895	\$1.733	\$1.57	—

¹United States Department of Agriculture, CCC Grain Support Regulation, Part 1421.

²Adjustment based on rail rates of 27.5 cents per cwt. from Minneapolis to Chicago and 25.5 cents per cwt. from Kansas City to St. Louis.

This, in summary, indicates that significant quality premiums for hard red spring wheat have historically been recognized in the loan program. The 32 cent premium for spring wheat in the Minneapolis market represents approximately \$10 per acre in quality premiums to North Dakota farmers, given state average yields in recent years.

Market Price Differentials for Wheat in United States Grain Markets

A second and more significant indication of price differentials among classes of wheat of different qualities and different end uses is expressed by market prices in the major grain markets throughout the country. Table 2 represents price levels for the major classes of wheat produced in the United States at each of the major grain markets and provides a basis for evaluating price differentials among different classes and qualities of wheat. In observing the annual data from the 1960-61 crop year through the 1968-69 crop year, it becomes apparent that price differentials among the individual classes of wheat varied considerably throughout the period. For example, No. 1 hard amber durum was selling at \$1.22 per bushel over the price of No. 2 red winter at Chicago during the 1961-62 crop year. The price differential between hard amber durum in Minneapolis and red winter wheat in Chicago narrowed to 41 cents a bushel the following crop year. These data indicate that there is an apparent annual fluctuation in price premi-

Table 2. Average cash price of wheat in the major United States grain markets, by class of wheat, crop years 1960-61 to 1968-69.

Year Beginning July 1	Kansas City ¹	Chicago ²	H.R.S. Minneapolis	Durum ³ Minneapolis	Portland ⁴
	— dollars per bushel —				
1960-61	\$1.98	\$1.98	\$2.18	\$2.27	\$2.04
1961-62	2.08	2.05	2.41	3.27	2.10
1962-63	2.23	2.10	2.51	2.56	2.17
1963-64	2.12	2.03	2.30	2.25	2.08
1964-65	1.59	1.49	1.78	1.66	1.51
1965-66	1.63	1.60	1.87	1.65	1.53
1966-67	1.82	1.76	1.97	1.94	1.76
1967-68	1.58	1.46	1.82	2.02	1.62
1968-69	1.38	1.30	1.79	1.95	1.47
9 Year Ave. Adj. Price	1.82	1.76	2.07	2.17	1.81
Eastern Gateway Basis	1.973	1.76	2.235	2.335	—
Adj. Premiums Over Chicago	+\$.213	0	+\$.475	+\$.575	—

¹Number 1 hard winter, ordinary protein.

²Number 2 soft red winter.

³Number 1 dark northern spring, 15 per cent protein.

⁴Number 1 hard amber durum.

⁵Number 1 soft white.

SOURCE: Wheat Situation Report, ERS, United States Department of Agriculture, August, 1967, p. 27 and July, 1969, p. 22.

ums paid for different classes and different types of wheat in response to supply and demand conditions that occur during each crop year. It is equally apparent when examining the 15 per cent protein hard red spring wheat as compared with the Kansas ordinary protein that there has been considerable variation in the price differentials between these two qualities of bread wheat. This provides a direct indication that premiums paid for high protein milling wheat vary significantly from year to year in response to the relative supply of high protein milling wheats.

Prices of No. 1 soft white wheat basis Portland included in this table, however, are not directly comparable with the prices of the other four classes of wheat considered because of the geographic differences between the markets on the west coast and the markets for those classes of wheat that traditionally move into the eastern markets of the United States.

The data in Table 2 were adjusted for geographic differences in the same manner as in Table 1 and a comparative analysis of the price differentials between the four major classes of wheats produced in the Midwestern area of the United States was made. Comparing the other three classes of wheat to Chicago prices, we find that when transportation adjustments are made that Kansas City hard winter wheat ordinary protein was selling

at approximately 21 cents over the Chicago market price. In the case of hard red spring wheat, basis Chicago, the price premium was approximately 47.5 cents over the Chicago price of No. 2 red winter. Again looking at the nine-year average price differential for durum wheat, we find that approximately a 57.5 premium was paid for durum wheat over soft red winter when a Chicago location was assumed for both classes of wheat. The adjusted price figures provide a rather significant indication as to the value of quality as it is appraised in the marketplace. If market prices could be viewed as they are established at different points across the United States, one would very likely see the highest prices prevailing along the eastern seaboard areas with prices becoming progressively lower towards the central part of the United States. This means that the closer production areas are to the ultimate markets for the finished products, the higher the prices will be to the raw material producers. Therefore, it is not adequate to compare Chicago prices with Minneapolis prices or Chicago prices with prices in North Dakota local elevators because of the costs involved in moving the raw materials from North Dakota into eastern metropolitan markets.

The conclusion that one might reach from observing the data in Table 2 would indicate that North Dakota farmers have been paid substantial premiums for the quality of wheats that have been grown in this state. Another way of viewing this would be to say that the prices that North Dakota farmers have received for the wheat they are producing would have been substantially lower had the quality levels of the wheat been similar to the type of wheat grown in the area adjacent to the Chicago market. For example, the value of soft red winter wheat produced in North Dakota, if this were possible, would very likely have been somewhere from 40 to 50 cents lower in value at the farm market than the hard red spring and durum wheats that are currently produced in North Dakota. Similarly, if wheat comparable in quality to hard red winter ordinary protein had been produced in North Dakota, the market price at the farm level would very likely have been 20 to 30 cents less than farmers receive for the types of wheat that were produced in North Dakota during the 1960-69 period.

Analysis of Prices Received by Farmers for Wheat in Selected States

Another market expression of value of wheat that moves through the marketing system is ex-

pressed by prices received by farmers. Data published by the United States Department of Agriculture indicate that over the 1962-69 period, prices received by North Dakota farmers were approximately 10 cents per bushel greater than the average prices received by Kansas and Illinois farmers. The 1962-69 average price was \$1.65 per bushel in North Dakota, as compared with \$1.55 per bushel in Kansas and \$1.56 per bushel in Illinois (Table 3). Again, in an effort to equalize North Dakota, Kansas, and Illinois prices on a geographic basis, an effort was made to adjust these prices on the basis of prevailing rail rates that existed throughout the period. North Dakota prices were adjusted to an FOB Chicago location, Kansas prices were adjusted to an FOB St. Louis location, and Illinois farm prices were adjusted to an FOB Chicago location by adding the cost of rail transportation from central points in each of these states to the selected terminal market in order to provide an equal price comparison. These price adjustments ignore the costs of handling wheat at the country elevator and at the terminal market locations; however, it is assumed that these costs would be approximately similar at each of the terminal market locations and country delivery points.

As indicated in Table 3, when adjustments for location were made, the average value of North Dakota produced wheats delivered at Chicago was approximately \$2.06 per bushel. Similarly, the average value for Kansas produced wheat delivered in a St. Louis location was approximately \$1.84 per bushel and the price of Illinois produced wheat delivered in a Chicago location was approximately \$1.70 per bushel.

Table 3. Average prices received¹ by farmers for wheat, by selected states, 1962-63 to 1966-67.

Crop Year	North Dakota	Kansas	Illinois
	— dollars per bushel —		
1962-63	\$2.22	\$2.06	\$2.03
1963-64	1.97	1.86	1.82
1964-65	1.42	1.37	1.37
1965-66	1.39	1.35	1.35
1966-67	1.67	1.64	1.74
1967-68	1.51	1.37	1.39
1968-69 ²	1.38	1.22	1.19
Ave. Price	1.65	1.55	1.56
Adj. Prices Basis Eastern Terminals ³	\$2.061	\$1.845	\$1.704

¹Includes allowance for unredeemed loans and purchases by the government, valued at the average loan and purchase rate, by state.

²Preliminary.

³Price adjustments as follows:

North Dakota — Rail rate from Carrington to Chicago 41.1c/bu.

Kansas — Rail rate from Ellsworth, Kansas, to St. Louis 29.5c/bu.

Illinois — Rail rate from Effingham, Illinois, to Chicago 14.4c/bu.

SOURCE: Statistical Reporting Service, United States Department of Agriculture, Crop Reporting Board, Washington, D.C.

In summarizing the data of this table, it is apparent that North Dakota produced wheats were valued in the market at approximately 36 cents per bushel higher than soft red winter wheats produced in the Illinois market area. The value of hard red winter wheat produced throughout Kansas areas was valued approximately 22 cents lower than the types of wheat produced in the state of North Dakota. The results of this table provide a relatively good measure of the price differentials established for the three major classes of wheat moving into eastern markets as expressed by market prices paid to farmers. These data take into consideration differences in qualities of wheat produced from year to year in each state, as well as different prices for the individual classes of wheat that passed through the market in the past seven-year period.

The price differentials varied considerably from year to year. For example, in the 1966-67 market year the value paid to Illinois farmers was \$1.74 a bushel as compared to \$1.67 a bushel paid to North Dakota farmers. In the same year Kansas wheat prices averaged at \$1.64 per bushel at the farm level. In the 1967-68 market year, Illinois farm prices for wheat were at \$1.39 a bushel, while during the same year North Dakota farm prices averaged \$1.51 a bushel. It is apparent from these year to year variations there is a direct reflection of supply and demand differences that have occurred among the individual classes of wheat on a year to year basis. Similarly, these data indicate that premiums paid for quality are not constant over time, but have a tendency to vary substantially from year to year. As pointed out earlier, quality premiums vary directly with the market requirement for specific quality characteristics and the relative supply of those quality characteristics in a given marketing year. **North Dakota farmers, having consistently produced high quality wheats, have been rewarded in the marketplace through higher prices.**

It is important to keep in mind that the products produced by farmers throughout the United States find their way into markets to satisfy specific requirements or demands by processors and ultimately by consumers. As consumers' habits and preferences change over time, the requirements for raw materials produced at the farm level also change. Increases in consumption of particular types of products or changes in the patterns of consumption and utilization of products can substantially alter the requirements for the basic raw materials produced by United States farmers.

Markets for North Dakota wheats have traditionally been in those areas where specific quality characteristics have been required by the processors and ultimate consumers. The durum wheats produced in North Dakota have been used as a mark of quality in the production of pasta products. The hard red spring wheats produced in this state have been used principally as a blending ingredient to upgrade the wheats produced in other parts of the United States and throughout world markets to upgrade wheats produced in foreign countries. The future of high quality wheat production in North Dakota depends on the characteristics of the growth in these market areas. Data from recent years suggest there is a growing demand throughout the world for both quality durum and quality hard red spring wheat for use in the upgrading of domestically produced wheats in the production of both pasta and bread products. The movement of many developing countries of the world from small hand-bake shops to larger, more commercialized baking industries has placed a requirement for higher and more consistent quality flour blends in order to meet the processing requirements of the commercial bakery. Similarly, pasta products have been introduced into markets of the world that have not traditionally been consumers of these products, thus expanding their total utilization.

Farmers, plant breeders, and the whole agricultural complex must continually reevaluate market demands for agricultural products. The job of the agricultural researcher, the plant breeder, and ultimately the farmer in making decisions as to quality standards for their production programs will largely be determined by the demand characteristics that exist throughout the market. Certainly in management decisions the production programs that are pursued must in the long run be geared to market requirements. Both domestic and world markets must be continuously evaluated to identify the types of products that are in greatest demand and production programs must be geared to those kinds of demands if long-term returns to the farmers are to be maximized. It, therefore, becomes important that we continually scrutinize changes in market patterns and attempt to identify those quality characteristics in the products that we produce that are most desired in the marketplace. The only accurate way of finally identifying market demand is through price responses to the total supply and to the varying quality characteristics of the raw product in the market.