Marketing High-Protein Wheat in the Northern Great Plains

By Clive R. Harston

For years, individual problems raised by the marketing of high-protein wheat have been overlooked, or at best only mentioned in passing. But recently they have been investigated in a study conducted at Montana State College by the Endowment and Research Foundation under contract with the United States Department of Agriculture. This basic survey included personal contacts with many producers, country and terminal elevator operators, flour millers, and commission firms. The complete report, which is due for release soon, analyzes supply responses, country elevator operations, and demand conditions. It recommends changes designed to improve the handling of high-protein wheat. The following article contains some of the highlights of the report. The contribution is from Montana State College, Agricultural Experiment Station, and is Paper No. 392, Journal Series.

CONSUMER'S DEMAND for wheat products as reflected through bakers, millers, and elevator buyers is distorted and lacking in clarity for producers. Hence they find it difficult to produce what consumers desire. Standards of quality at the consumer level apparently are foreign to factors of grade that dictate prices at country elevators. In turn, grade factors that influence the price of wheat at the country level are unknown to consumers.

Moisture content and wheat damage, the storage problems faced by those who hold wheat, are of no concern to consumers. On the other hand, contamination is a problem of vital concern to consumers, yet they have practically no way of differentiating clean from contaminated wheat when they buy wheat products in grocery stores. But consumers may learn of the existence of this quality factor through the publicity given contamination by our institutional agencies assigned to protect consumer health.

Marketing the percentage of protein contained in wheat embodies several characteristics. Protein cannot be separated from the wheat berry, yet its marketing is a part of the marketing of wheat. It is not a grade factor, although it is quoted and priced separately. The premium actually paid is for the percentage of protein, not for protein by weight.

The premium for protein percentage is partly a function of the relationship between the supplies of a high-protein wheat relative to the supplies of hard red wheat in general. Wheat supplies respond partially to the price of wheat—as price increases, growers increase production. But the supply of high-protein wheat that is produced has a limited response to price stimulus. It is primarily a function of climate. However, with the current programs demanding considerable storage of wheat, the supplies of the high-protein wheat placed on the market do have a noticeable response to market premiums. High-protein wheat tends to move directly to the milling trade through the free market.

Test weight of wheat has an important influence on price, but it is of milling concern only and of no interest to bakers or consumers. Though foreign material is of consequence to the marketers who handle wheat, consumers know nothing about it. Even percentage of protein as a price determinant loses its identity to a great extent as it goes to consumers because the dietary value of protein is not the main consideration. Its importance is in the processing to produce a desired loaf, but the relationship of protein percentage to quality is not absolute nor certain. Consumers register demand for protein only in their demand for a large loaf of bread or for the specialty breads that require high-protein flour.

Demand for Wheat Quality by Flour Millers

Consumer demand is reflected by bakers as they attempt to satisfy consumer preferences, but they add demand factors peculiar to the baking proc-

esses. Added to these is the miller's demand for a wheat that will mill out a good percentage and maintain quality while being held in bins.

Important milling qualities in wheat that flour millers want are: (1) Heavy test weight wheat; this quality is directly related to yield of flour. (2) Round, well-shaped, uniform kernels, a quality associated with yield and ease of milling. (3) Low moisture content, which reduces storage problems. (4) Freedom from smut, damage, and contamination. To a great extent, all these factors are reflected through wheat grades, and wheat price differentials for different grades give producers an incentive to produce what millers want.

In addition to their own desires for a good milling wheat, millers' demand for wheat must reflect the peculiarities of bakers' demand for flour. Important baking qualities of wheat demanded by bakers include: (1) Desirable mixing, tolerance, mellowness, elasticity, water absorption, low ash content, and gassing power or loaf volume; (2) desirable texture of the flour and bread; (3) desirable color of bread; and (4) fermentation time. These qualities are not directly related to the grain grades, but to a greater or lesser degree they are associated with the crude protein in wheat.

Protein Quality

Baking quality is not accurately measured by the crude protein test, but the degree of association is high enough to warrant the establishment of protein premiums on the market as a means of allocating the desirable wheat to its best use.

The relationship of protein content with baking quality for hard red spring wheat has been studied by Aitken and Geddes, who made the following statement: "In studying this phase of the question, Larmour (1930) concluded that correlation coefficients for wheat protein quality, as measured by the bromate baking method, were in practically all cases sufficiently high to warrant concluding that the relation is significant enough to justify the commercial use of the protein test as a factor in the classification of hard spring wheat." [1]

To most producers of high-protein wheat, protein content is assumed to be the indicator of quality. The quantitative measure has been assumed to be the qualitative measure because in the past there has been little or no difference in protein premiums for different varieties of wheat. The premiums for 15-percent Thatcher (highly desirable wheat) and 15-percent Spinkota were the same for a long time, even though Spinkota produced an undesirable loaf of bread. Currently, a price discount is quoted for Spinkota.

Millers and bakers are unanimous in their agreement that the protein test and the old gluten test are not adequate measures of baking quality. It is agreed that the only conclusive measure of baking quality in use today is actually to bake the loaf of bread. But each miller has a different definition of quality based on his judgment of the importance of each quality characteristic.

Aitken and Anderson conducted a study to ascertain the suitability of new varieties by tests performed simultaneously by 20 collaborating chemists in Canada, the United States, and Great Britain. There was a general lack of agreement among the cereal chemists as to the value of the seven varieties of hard red spring wheat submitted with respect to overall quality. They concluded the result of their findings with the following statement:

"Several explanations are offered which may account for the variations in opinion found, and among these are: The use the collaborator intends to make of the wheat; the properties given most weight in assessing overall quality; the volume of testing done; the interpretation of the data; and the principles underlying comparisons. On the other hand, some collaborators have opposite opinions on specific qualities of the same variety that are difficult to understand.

"The results of the investigation show that cereal chemists hold different opinions on what constitutes bread-making quality and on how this should be measured. The difficulties of reaching decisions on the merits of new varieties are all too apparent." [2]

[1] AITKEN, T. R. AND GEDDES, W. F. THE BEHAVIOR OF STRONG FLOURS OF WIDELY VARYING PROTEIN CONTENT WHEN SUBJECTED TO NORMAL AND SEVERE BAKING PROCEDURES. Board of Grain Commissioners, Grain Research Laboratory, Winnipeg, Canada. Reprinted from Cereal Chemistry, 11: 487. Sept. 1934.

[2] AITKEN, T. R., AND ANDERSON, J. ANSEL. CONFLICTING OPINIONS ON THE QUALITY OF BREAD WHEATS. Grain Research Laboratory, Board of Grain Commissioners for Canada, Winnipeg, Manitoba. April 1947. p. 18.

Millers are constantly faced with the danger of buying by protein content but finding the delivered wheat of inferior quality regardless of its desirable protein percentage. As soon as possible in each harvest season the quality control laboratory conducts tests of wheat from the many different supply areas, and purchases throughout the year are conditioned by the results of these tests.

Millers in the spring wheat area are interested in preserving the high-quality varieties now grown in the Northern Great Plains and preventing undesirable varieties from being produced. The milling trade in Minneapolis finances the Northwest Crop Improvement Association which is established to encourage the production of desired varieties of wheat from the milling standpoint. The secretary of this association works closely with State experiment stations, producers, and wheat handlers.

Producers are becoming more aware of the long-run advantages of fitting production to the needs of millers and bakers. Recently organized crop-improvement associations of producers are meeting with favorable producer response. Leaders of these groups believe that continued production of varieties that are high yielding, but are poor in milling and baking quality will result in the loss of the favorable competitive position of hard red spring wheat among other classes of wheat.

Major Marketing Problems

Country elevator operators must grade and describe wheat accurately if they are to serve farmers properly and protect their operating margin. To grade down means to pay farmers less than the market dictates; to overgrade means to cut their own margins. It is not always easy to ascertain a test and grade in the country that will coincide with the terminal description. Herein lies a problem of the marketing channel. Care in sampling, skill in grading, accuracy of the protein test, precise test for moisture, and similar technical precautions are of constant concern to alert operators.

A major problem of an elevator manager is to ascertain the protein content of each producer's wheat. It is difficult to estimate protein content accurately by inspection. It is not easy to obtain an accurate sample of a producer's wheat for a laboratory test. Considerable time is required to obtain results of a protein test from a laboratory. As a result, operators tend to modify and average out the premiums paid for protein to help cover losses from unplanned blending and errors in protein determination.

Elevator managers are much interested in a type of quick protein test that might be done at country elevators. If used, such a test would be a binning aid primarily, not a replacement for the Kjeldahl laboratory test as a basis for determining protein for buying.

Though elevator operators surveyed indicated they were eager to learn of any development that might lead to a simple and quick protein test, none had had any experience with such a test.

At least four quick tests for protein in wheat have been developed: (1) Sedimentation test, (2) photometric method, (3) biuret reaction method, and (4) a method developed by the Western Wheat Quality Laboratory of the Agricultural Research Service at Pullman, Wash.

Those who have developed quick protein tests are confident that the tests are useful in the country. This is particularly true of the sedimentation test. The problem is to inform those who handle wheat in the country of the equipment required, how to conduct the test, and how to use the results.

Baking quality is not adequately reflected in the grade, class, protein, and other such factors. Millers buying on a point-of-origin basis rely upon their detailed baking tests of wheats from their supply points. This practice complicates the problems of elevators. One year an operator may have just what he wants, and the next year his wheat sells at a discount with no explanation that can be found in existing grading practices.

Accurate sampling and testing for protein is a problem. It is difficult to guess protein by inspection, yet wheat must be bought on today's market though results from a protein test will be delayed several days. Errors in the protein test may occur, but the main difficulty is in sampling.

Variations in Protein Percentages

Individual elevators received an average variation in wheat protein percentage of 5 percent in 1953 and 6.6 percent in 1954. In both years, the greatest variation occurred in eastern Montana. Table 1 indicates that all elevators do not face the

TABLE 1.—*Variation in percentage of protein in wheat delivered to 44 elevators in the Northern Great Plains*

Area	Average variation	Range in variations	Frequency distribution of variations (number of firms)				
			Below 3.0%	3.0–4.9%	5.0–6.9%	7.0–8.9%	9.0% and over
1953							
	Percent	*Percent*					
Central Montana	4. 92	3. 0– 7. 3	0	8	4	3	0
Eastern Montana	5. 95	2. 0–12. 0	2	3	9	3	1
Western North Dakota	3. 70	. 7– 7. 1	3	4	3	1	0
Total	5. 0	. 7–12. 0	5	15	16	7	1
1954							
Central Montana	6. 22	3. 0– 9. 0	0	3	6	2	3
Eastern Montana	7. 35	4. 5–11. 0	0	2	6	6	5
Western North Dakota	5. 66	3. 0– 9. 0	0	5	3	2	1
Total	6. 6	3. 0–11. 0	0	10	15	10	9

same severity of the problem. During 1954 the range in variations was from 3 to 11 percent.

According to law, country elevators must accept storable wheat delivered to them if they have bin space. The acuteness of the segregation problem is clear from the number of different grades and the range in protein content of wheat delivered to the typical elevator. In addition to wheat, they must handle other types of grain, reserve working space, and keep Government loan grain separated from nonloan grain.

Price Determination

Country markets learn terminal market conditions without delay through radio broadcasts and telephone conversations. Most managers receive written reports from the grain exchange within 24 hours after the market closes.

Up-to-the-minute price reports for buying in the country do not assure elevator operators a profitable sale price, hence they tend to modify and to delay making price changes. To a limited extent, the pricing is done for them by firms and individuals supplying price letters and cards. Margins allowed by the Minneapolis Bulletin Card quotations are wider than necessary for Montana wheat. This fact is pointed out by the custom of paying Card price plus. The Card quotes a price for low-quality wheat that would permit a small, below-average operator a reasonable profit.

The market does not always quote premiums for 17 percent protein or higher, and when it does the premiums quoted are low relative to the value of this high-protein wheat for blending with lower protein. In this instance neither the country elevator nor the terminal market is adequately reflecting the true value of wheat.

Risk and Uncertainty

A binning problem results from deliveries of two or more kinds of grain, more than one class of wheat, a variety of grades, and wheat of differing protein content delivered during a rushed harvest. Government-loan wheat that is stored in country elevators aggravates the situation. Blending becomes haphazard and uncontrolled, rather than deliberate for quality control.

Wise blending can prove profitable when premium spreads are not uniform, but unplanned mixing limits operators' ability to take advantage of premium spreads.

To all who handle wheat, a major problem is the risk and uncertainty of changes in price. Country elevator operators feel the strain because they maintain title to wheat for a considerable time. Grain shipped from most elevators in the Northern Great Plains takes from 1 to 2 weeks to reach terminal markets. Boxcar shortages extend the time that wheat must be held and increase uncertainties as to price.

A partial hedge can be carried on the base price of wheat, but the protein premium cannot be hedged on the futures market. Yet premiums represent from a tenth to a fifth of the total price of wheat.

The problem of risk and uncertainty can be emphasized by summarizing the causes of price uncertainty.

Wheat prices change over time. Protein premiums change over time but not always directly with the base price of wheat. The premium spreads between protein categories fluctuate. Where buyers buy on the individual protein basis and are forced to mix before shipping, there is a risk of premium loss from a difference between the average of premiums paid and the premium received. Premiums paid are based on the laboratory test for protein, yet the value of the premium is based on baking tests in the mills. Price discrimination results on an area basis, for reasons that do not appear in the grading or protein test.

Recommended Practices for Handling and Marketing

Producers normally respond to premiums by increasing production, but in the case of high-protein wheat the response appears to be relatively small. All productive input factors that affect percentage of protein are not, however, beyond the control of producers. Farmers can plant varieties with known high-quality and high-protein content. They can fertilize to increase not only yield but protein content as well. Their tillage practices—summer fallow, clean fallow, rotation—also affect protein. In this process, each producer must attempt to increase the percentage of protein in his wheat up to the point where the additional cost of these practices is equal to the average added premium from the wheat sold. But a good deal of uncertainty will still be associated with attempts to increase protein content, because premiums are unpredictable and results from the practices mentioned are not precisely known, owing to adversities of the weather.

Farm Handling and Marketing to Satisfy Market Demands

Handling wheat after it is grown offers an opportunity to comply with the peculiar demands of the market. Country elevator operators and progressive farmers have recommendations for farmers that, if carried out, would facilitate elevator operations, permit a smoother flow of the product through the market, and permit farmers to take advantage of protein premiums.[3]

1. Farmers should store wheat on the farm until after harvest.
2. If farmers hold back deliveries until after the rush of harvest they can do a better job of merchandising wheat of different protein content. Rapid deliveries during harvest force elevator operators to commingle and, upon occasions, to sell at a disadvantage. Wheat that is suspected by producers of having a different protein content from other wheat should be kept separate to as great an extent as possible. Where considerable variation in protein is found, the binning of wheat from different fields separately would be required in many cases.
3. Farm-stored wheat should be sampled and results of the protein test learned before delivery.
4. It is desirable to know the approximate protein percentage of wheat delivered to elevators regardless of whether it is farm-stored. With this knowledge, producers can wisely choose between selling or placing grain under Government loan.
5. Farmers should be alert to price changes that might mean profits if Government loans are redeemed. Some wheat remains in storage under loan after premiums have increased enough to make it profitable to sell on the market, because producers do not watch current price and premium changes relative to the loan price.
6. Producers should take the utmost care when sampling bins for protein tests. Frequently, the discrepancy between laboratory protein tests could be attributed to careless sampling rather than to errors in the test. Many elevator operators have refused to accept results of protein tests from samples submitted by producers primarily because samples have not been randomly selected.

Producers who make these suggestions are not unaware of the difficulty of carrying out some of them. At harvest time the pressing problem is to get the entire crop harvested and to make the fullest use of the existing farm storage facilities. At this time, protein segregation is often regarded as a less important management consideration than others.

Recommendations to Country Elevator Operators

A few managers of country elevators have learned to handle high-protein wheat in a way

[3] A survey was made of country elevator operators and farmers in the high-protein-wheat-producing areas of Montana and North Dakota.

that permits them to pay the highest protein premiums to producers. Following are recommendations by operators of this type, together with suggestions made by commission merchants, millers, and wheat producers.

The Money Is In the Mix

Elevator operators who pay big refunds to patrons or profits to owners assert that blending and mixing know-how makes the money. To take best advantage of protein premiums, blending must be done wisely in accordance with premium spreads. This means constant changing of mixes. Because of changing premiums no one mix will always pay. In fact, blending for protein alone will not pay if the spread between each protein category widens as the protein increases, but this is not the case at all times.

Mixing wheat to control not only protein content, but also test weight, moisture, grade, dockage, and other similar factors, is recommended. Sometimes a loss from mixing the test weight down will be offset by an increased protein test; at other times the compensation will be from an improved test weight at the expense of the protein test.

Minneapolis and west coast markets seldom establish premiums for 17-percent protein, with a margin above 16 percent equal to the spread between 15 percent and 16 percent. For this reason, grain handlers have found it less profitable to ship 17-percent wheat than to use it in a blend to bring up the protein of other wheat. The same would apply for wheat above 17 percent. The spreads tend to increase up to 16 percent but decline above 16 percent protein.

The prerequisite to careful, controlled mixing of wheats is a knowledge of what is in each bin and a comparatively complete job of segregation. Constant observation of prices and premiums is a necessity. A flexible program for mixing and selling is required.

Measure Grade and Quality With Precision

The protein content of wheat purchased must be ascertained as accurately and as soon as possible. Although many grain men discredit the claim of others to be able to estimate protein content of wheat from inspection, it is nevertheless worth while to develop such skill, and some operators are profiting from it. They are aided by a knowledge of the past history of protein content of each producer's wheat, by careful observation of differences by area within their trade boundaries, by an understanding of factors that have an influence on the protein content, by ability to distinguish between varieties, and by a notion as to the kernel appearance—color and vitreousness—of high- and low-protein wheat.

Early protein tests aid in estimating protein content. Samples should be submitted frequently for as many lots of wheat as practicable. Preharvest tests have not proved reliable enough to give much help, but there is a question whether they have been given an adequate trial. Among elevators in areas of considerable protein variation, the probing of farm bins before delivery is of greatest importance. With a knowledge of the protein content of wheat yet to be delivered, an operator is prepared to bin and to sell in such a way as to gain maximum benefits for both producer and elevator.

Many errors in pricing result from inaccurate samples. Only one gram of wheat is actually used for the test, but that one gram must accurately represent an entire carload of wheat. Each truckload should be sampled by taking at least 5 to 10 drafts from various parts of the load. Samples taken from bins can be representative only if the probe picks up wheat from several places in the bin and not just from the most convenient places.

Samples of wheat held in elevators in uncovered containers will dry out to 8.5- or 9-percent moisture in a few days. The protein test on this sample will be too high for the wheat in the bin. It is imperative that samples be taken carefully, and held in elevators and shipped to laboratories in moisture-proof containers.

The adoption of a quick test for protein that could be done in the elevator would help solve some elevator problems.

Segregate by Protein Content to as Great an Extent as Possible

The degree of segregation will depend upon the variation in the percentage of protein found in wheat delivered to each elevator. Two categories in the low-protein areas may suffice, but three separate groups as a minimum are suggested for areas of considerable variation.

TABLE 2.—*Average number of bins required for adequate segregation suggested by elevator managers, by volume of grain handled*

Bushels of grain handled (thousands)	Operators making recommendations	Number of bins	Number of bins by size of bins										
			500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,100–5,000	5,100–10,000	11,000 and over
	Number		*Average number*										
Under 200	8	25	0.6	6.1	0.3	5.3	1.7	2.0	1.4	5.1	2.0	0.3	0.4
200 to 400	12	24	.5	3.2	1.7	4.0	2.6	4.3	0	4.4	2.0	.3	.4
400 to 600	10	23	1.2	1.8	1.9	5.3	.6	.4	2.7	4.0	2.8	1.1	1.2
600 to 800	4	32	.5	.7	.5	5.2	2.5	4.5	1.5	2.0	5.5	10.0	.0
800 to 1,000	3	26	.0	.0	1.7	2.0	3.3	.0	.0	15.0	1.3	2.3	.0
Over 1,000	2	36	.0	6.0	.0	10.0	.0	.0	.0	7.0	5.0	8.0	.0

The purpose of separate binning is to be in a position either to sell each category separately or to blend proteins to obtain a blend that will sell to an advantage. How failure to separate high-protein wheat can penalize trade in grain is highlighted in an article in the *Farm Journal* for August 1954, which states:

"Japan wanted to buy eight cargoes of 11 percent or 12 percent protein wheat this month, but CCC officials in the Pacific Northwest, who have 85 million bushels of 1953 wheat on hand, couldn't scrape up one cargo because practice has been to dump all wheat in the same bin, regardless of protein content."

Recommended number and size of bins.—Lack of enough bin space is one of the most difficult restrictions on separate binning. There should be a trend toward building elevators to accommodate the needs under the current marketing structure. Elevator operators were requested to recommend the number of bins of different sizes that would permit adequate segregation of wheat by protein content. Table 2 is a compilation of the suggestions made by 39 elevator operators in the area of Montana and North Dakota that produces high-protein wheat.

Based on these suggestions by elevator operators and other observations, recommendations were compiled for number and size distribution of elevator bins (table 3).

Not only number of bins but their size is important. Some of the better managers emphasize the importance of having at least two or three small bins (probably overhead bins) for temporary storage of a truckload of grain of uncertain quality. Operators find it difficult to force producers to take their wheat back home if it is too wet, for example. So they receive it, store it separately in a small bin, and ask the growers to deliver no more grain with the same undesirable characteristics.

Bins of 10,000-bushel capacity or more are not desirable because it is impossible to segregate wheat placed in them. Any operator finds it difficult to guess how much of each grade or protein percentage will be delivered to him in a season. If he starts to fill a large bin with a specific grade and receives enough to fill only half of the bin he is faced with unused storage capacity or the necessity of commingling wheat of different qualities.

Recommended unloading and elevating facilities.—According to the great majority of elevator operators, only one unloading pit is necessary. If bins are divided into two houses, a receiving dump is necessary in each.

Two elevator legs are recommended for each elevator, regardless of size, except when volume approximates a million bushels per year. For that quantity an extra leg, to be used primarily for cleaning, would greatly facilitate handling of the grain. Elevators with a small annual volume may require a third leg if cleaning of grain represents an important and sizable part of the services rendered.

Elevator legs with an hourly capacity of 2,500 bushels are suggested for elevators that handle up to 400,000 bushels per year. Elevators with a greater volume may find a faster leg worth while, but probably not over 3,500 to 3,800 bushels per hour. If an elevator leg is added for cleaning grain, 1,500 to 2,000 bushels per hour is the desirable size. Two legs with a capacity of 2,500 bushels each could unload about 16 trucks in an

TABLE 3.—*Recommended elevator bin number and size distribution for adequate segregation*

Bushels of grain handled (thousands)	Number of bins	Number of bins by size of bins						
		500	1,000–1,500	2,000–2,500	3,000–3,500	4,000	5,000	5,500–10,000
		Number						
Under 400	25	2	4	8	4	5	2	0
400 to 800	30	2	2	6	4	5	5	6
800 to 1200	35	2	2	6	0	10	5	10

hour. This is more trucks than can be weighed, emptied, and cleaned in an hour. Hence, usually one leg is free to load out cars while the other is elevating grain from the receiving pit.

It is absolutely necessary to have two legs if wheat is to be segregated adequately by grade and protein, according to several of the more successful elevator managers. If there is considerable variation in grade and protein percentage, the two legs available will permit emptying the pit between loads. One leg of 3,500 to 5,000 bushels per hour capacity could empty the pit between loads, but the inability to unload trucks and load out a car at the same time would be a disadvantage.

Segregation made possible with suggested plant arrangement.—On the average, each firm could make at least two more segregations if they had the number of bins of the various capacities and other facilities that are suggested as most desirable. Present arrangement and facilities are as good as could be desired according to some; but others could double their separations with an improved elevator layout.

The number of bins is not the principal limiting factor to greater segregation in many cases. Less than half of the elevators have fewer than the suggested number of bins. The number of bins available in some cases is larger than the manager thinks is absolutely necessary to do a good segregating job.

The most effective factor in segregating adequately is the operator's skill and ability to estimate protein percentage at time of delivery. Some operators with relatively few bins are segregating to a great extent, but others with many bins segregate very little. Remodeling to increase bins, change the size of bins, or add an elavator leg, is not practicable in all cases. Adding an elevator leg is particularly expensive, yet an additional leg is the most pressing need, according to the managers interviewed.

Operational adjustments to increase protein segregation.—The majority of elevator firms have adequate facilities to permit separating wheat into at least one more protein category without building additional bin space or adding other facilities. Usually it would require an adjustment in the use of bins. Setting aside an extra bin or several bins to accommodate additional separation may result in some unused bin space if the manager cannot estimate correctly the quantities of wheat with different protein percentages that will be delivered. About two-thirds of the managers would expect a decline in volume handled if they were to increase segregations. This would not necessarily be true if wheat came in slowly, but at harvest time producers are not patient if they are delayed while the elevator pit is being emptied between loads.

More than half of the operators reported that an adjustment in the use of the unloading and elevating facilities would be necessary. Some time is lost when they must switch from bin to bin after each load. In most instances, this is a problem at harvest time but not a serious limitation after the harvest rush. Only 5 percent of the operators estimated that additional help would be required if they were to segregate into one more protein category.

Decreasing Risk and Uncertainty From Protein Premium Changes

Decreasing risk and uncertainty, though a challenge to elevator operators, is possible. It can be done in ways that follow:

1. Some shippers propose that risk is minimized if high-protein wheat is sold quickly.

2. "To-arrive" selling has many advocates, especially among the high-protein producers at the greatest distance from the terminal markets. Shippers sell wheat before it leaves the elevator. It may be loaded in the car—track sale—or held in the bin with shipping date specified. In fact, the "to-arrive" sale price might be determined and the sale consummated before the wheat is bought from the producer. Elevator operators are able to learn the margin they are to receive. They need not fear a price decline while wheat is enroute, but they must forego any advantage that might come if the price increases. A shipper must weigh his gains from decreasing the uncertainty in price by "to-arrive" pricing against the losses from discounts on "to-arrive" transactions and the probability of gains in price while wheat is enroute. Cash wheat often brings quality premiums that "to-arrive" sales do not get because buyers cannot see the wheat to make sure of quality factors. In some areas where wheat has a quality reputation of long standing, buyers will pay full spot cash or more for wheat while it is still in the country.

3. Deferred pricing (mill storage, or terminal storage) may help country elevator operators to hedge against premium changes. One way deferred pricing works is for the country shipper to ship grain to his commission merchant for future pricing. The commission firm disposes of the wheat to a miller with the future pricing agreement. When the shipper decides to sell, he notifies the commission firm, who in turn notifies the mill buyer, and the price is established as of that moment, based on the cash market. The elevator operator can buy wheat on today's market in the country and sell an equal quantity that is held in terminal storage on today's market. He ships wheat he has bought and it goes into terminal storage to take the place of wheat sold.

One of the problems of deferred pricing is to find terminal storage and a mill buyer who is willing to bear the risk that comes to him in a deferred pricing transaction. Deferred pricing is used to a limited extent but the success of this scheme might be decreased if a large number of shippers attempted to use it.

4. Grain handlers located near the line of east-west movement should carefully observe both the eastern and the western markets and ship to the one that shows the greatest differential above freight costs. A flexible marketing program is required.

5. The seriousness of the problem of uncertain protein premium suggests the need for a study of the economic feasibility of establishing an extension to the grain exchange futures contracts to cover protein premiums.