

Factors Influencing the Economic Impacts
of Establishing a Utility
Grade for Wheat in the PNW Region*

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Abstract

Pacific Northwest grain firms were surveyed regarding a utility wheat grade. Respondents indicated less effort should be given to establishing a utility wheat grade relative to reducing unfair trade and other methods of improving service to importers. Smaller and very large operations felt they would incur significant problems with the program.

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Introduction

A combination of a lower export market share and increases in quality complaints from foreign buyers has focused attention on the quality of U.S. grain exports. A report by the Office of Technology Assessment (OTA)¹ identified several factors that could increase the quality of US grain for international trade. Development and release of new varieties, grain handling technology, domestic farm policies, grain standards, and the demand for end-use characteristics all influence quality. The OTA study emphasized the importance of developing policies that have a coordinated impact on all of the factors that influence quality. However, much of the emphasis on quality improvement has focused on changing grain grades and standards.

The US is currently the fourth largest wheat producing country in the world, and the largest wheat exporting country. Since the early 1970's, world wheat trade increased from about 60 million metric tons (MMT) to over 100 MMT (about a 65 percent increase). During the same period, US wheat exports increased from about 25 MMT to between 30 to 35 MMT (about a 30 percent increase). Thus, the US share of world wheat trade has declined from nearly 50 percent in the early 1970's to a current level of under 30 percent².

There is a general perception among several groups in the US wheat industry that quality and customer service are important factors influencing competitiveness in the world market. Although much of the work on assessing exported wheat quality has focused on dockage and foreign material, several factors related to wheat quality have been analyzed. Similar to other grains, much of the effort has focused on modifying grades and standards. One potential change involves implementing an identity preserved "utility" classification (sometimes termed "feed wheat") for lower quality wheat. In this study, respondents were informed this class would be comprised of wheat that presently comprises U.S. grades 4, 5 and sample. If properly implemented, such a designation could improve the overall quality of US wheat exported for

milling purposes. The establishment of this classification may also provide another "product" to better serve selected foreign and domestic markets. Before the implementation of a utility grade can be undertaken, it is necessary to better understand industry attitudes about such a proposed change.

Relevant Literature

There have been a number of studies investigating wheat quality and its impact on wheat exports. Webb, Haley and Leetmaa³ interviewed major importers of U.S. wheat and developed a model of world wheat trade. Their analysis indicated that there could be net gains to the U.S. wheat industry if all U.S. export wheat were cleaned to a dockage level between 0.35 and 0.40 percent. However, these gains could be offset if other exporters responded to protect market share. Mercier⁴, focused on the economic feasibility of increasing U.S. wheat exports by improving wheat quality, particularly by reducing dockage. Mercier's research included evaluation of criteria relevant to the import decisionmaking process in major U.S. wheat importing countries.

Scherping, et al.⁵, analyzed wheat cleaning costs and benefits of removing dockage using current technology. They concluded that this type of decision should be made by individual operations, and suggested that contractual agreements regarding dockage levels could be an appropriate solution to the cleaning problem.

The OTA⁶ compared wheat quality of major U.S. competitors in the world wheat market. The study found that Canadian wheat receives export price premiums over U.S. wheat of more than 10 percent. Australia controls wheat marketing through the Australian Wheat Board, and below standard wheat is precluded from the market and can only be sold in the feed market.

Lin and Leath⁷ evaluated the economic feasibility of removing dockage and foreign material from all exported U.S. wheat. They determined that a feasible alternative is the cleaning

of U.S. wheat targeted for quality conscious markets. In addition, they concluded that wheat quality will increase in importance in the future.

Objectives

The objectives of this research effort were: 1) to assess the opinions of participants in the PNW grain handling industry with regard to the challenges and economic impacts of introducing a specified utility grade designation for wheat; 2) to determine if particular grain handling groups have similar views regarding a possible utility grade; and 3) to identify commonalities among potential problems associated with a utility grade.

The Survey

A telephone survey of the Pacific Northwest (PNW) grain handling industry (including country, sub-terminal and export elevators) was conducted in the fall of 1994. A total of 123 randomly selected grain handling firms in Washington, Idaho and Oregon were selected from the PNW Grain and Feed Association directory, which lists 260 Pacific Northwest grain handling firms. The sample was stratified to assure representation in two ways. First, the number of potential respondents was determined by the state's contribution to total PNW wheat production on average for the past 10 years (Washington 47.5 percent, Idaho 32.1 percent and Oregon 20.3 percent). Secondly, the sample was stratified to assure representation from various types of grain handling firms (country elevators, inland sub-terminals, river sub-terminals, and exporters).

Fourteen firms from the original sample of 123 were found to be ineligible to participate in the survey. The 14 were either not connected to the wheat industry or no current telephone number could be found. The eligible sample included a total of 109 firms. Eight firms (7 percent) refused to participate, leaving a total of 101 completed interviews and a response rate of 93 percent. The survey was conducted by the Social Survey Research Unit (SSRU) at the University of Idaho. Telephone interview times ranged from five to 43 minutes, with an average

time of 17 minutes.

The survey instrument was developed in cooperation with the Washington Wheat Commission, the principal investigators at the University of Idaho's Department of Agricultural Economics and Rural Sociology, and the SSRU. The survey instrument was designed to focus on industry concerns about the proposed utility grade designation, and participant perceptions about the economic impacts. A copy of the survey instrument is available from the authors.

Results

Respondent Characteristics

Table 1 provides an overall summary of respondent characteristics. Country elevators accounted for 70 of the respondents, sub-terminals for 21 responses and 7 classified themselves as export terminals. The largest number of firms were agricultural cooperatives (41 respondents) followed by individual ownership (30 respondents). Storage capacity of the firms covered a broad range. Thirteen percent had less than 250,000 bushels of storage and thirty percent exceeded 2,000,000 bushels. Protein analysis equipment was available on-site for 41 of the firms, 59 did not have such equipment on-site, and one firm did not indicate whether or not protein analysis equipment was available.

Seventy-one of the responding firms indicated they currently sell feed (utility) wheat (Table 2). The remaining firms indicated they did not sell feed wheat or did not answer. For those respondents selling feed wheat, most (60 or about 86 percent) said their market was either in-state or in the PNW region. The remaining firms indicated their feed wheat was marketed outside the PNW or they indicated "other." Thirty-five of the firms handling feed wheat indicated they would prefer not to handle it, and 29 said they preferred to handle feed wheat. Most of the firms handling feed wheat segregated the feed wheat in a separate storage bin.

General Attitude About Wheat Handling

Table 3 presents respondent attitudes about the importance of certain merchandising practices used to generate income for grain handling firms. Transportation and storage were identified as the two most important sources of income for grain handlers. Blending and arbitrage were identified as "very" to "somewhat important" by a significant majority of the respondents. Cleaning was the only merchandising practice that was considered to be "slightly important" or "not important" by most of the respondents.

Future of the Wheat Industry

Several questions in the survey focused on the perception of respondents regarding the importance of certain issues facing the U.S. wheat industry (Table 4). Generally, responding firms attached the highest level of importance to international competitiveness and marketing issues.

Eighty-six percent of the firms felt the issue of international competitiveness was a very important issue facing the US wheat industry. Similarly, marketing and domestic policy issues were considered as very important by over three-fourths (78.0 percent) and over three-fifths (64.7 percent) of the respondents, respectively. Although still considered important, environmental factors and production practices were not considered to be as important as the other three issues.

With regard to future changes in international and domestic wheat trade for the PNW region, respondents generally felt growth will occur in international trade rather than in the domestic market (Table 5). Differences came from whether survey participants felt international or domestic wheat trade would increase or stay the same. For both international and domestic markets, respondents did not expect to see a decrease in trade.

Surveyed firms were asked to identify the relative level of effort needed by the industry to address certain issues (Table 6). Working with the government to reduce unfair trade was

selected as the issue needing a lot of effort by the largest number of respondents. Improving service to international customers was also felt to need a lot of effort by a majority of those surveyed. It is interesting to note that the two specific issues related to marketing (increasing segregation and establishing a utility grade for feed wheat) need less effort according to respondents. Generally, increasing segregation was felt to need some or a lot of effort. However, respondents indicated establishing a utility grade for feed wheat should receive less effort relative to the other three issues.

Factor and Multiple Classification Analysis

Responses were selected from questions regarding the relative level of seriousness of problems associated with wheat segregation. These data were factor-analyzed to yield classifications of these problems. Factor analysis involves identifying interrelationships among variables in an effort to find subsets of the variables that can be grouped together in a meaningful way⁸.

A first order factor analysis of the 8 selected problems associated with wheat segregation identified two first-order factors (Table 7). The Cronbach alpha was used to evaluate the internal consistency of the set of variables in each factor⁹. The higher the alpha, the higher the correlation between individual items and the total correlation among items within the factor.

The attributes identified by the factor analysis are described as: 1) costs of segregating, and 2) physical separation. The "costs of segregating" factor is comprised primarily of items that contribute to increased expense associated with wheat segregation, such as needing additional bin space and increases in operating expenses. The physical separation factor is primarily made up of elements that go along with actually separating the grain when it is received. Examples include: additional time needed for grading, the accuracy of being able to measure the characteristics that define the grade and slower operations resulting from the time it takes to

segregate the wheat.

To determine the influence of firm characteristics on how responding firms viewed wheat segregation problems, a multiple classification analysis (MCA) was performed on the two factors. Multiple classification analysis is a multivariate statistical procedure similar to multiple regression. However, it is able to handle independent variables that are nominal or ordinal in nature, as well as categorical dependent variables. In a sense, it is the same as multiple regression using dummy variables^{10,11}.

The original questions were measured on a Likert scale ranging from 1 to 4, with 1 being a "serious problem," 2 "moderate problem," 3 "slight problem," and 4 being "not a problem." MCA was then utilized with "seriousness of problem" as the dependent variable and the following independent variables: storage capacity only, then with the addition of the firm's primary activity (country elevator, inland sub-terminal, river sub-terminal or export elevator), with the addition of a variable that represented whether or not someone from the firm had attended an export seminar, then with the addition of a variable that captured whether or not the firm had hosted a foreign trade team, and finally with the addition of a variable that measured whether the firm handled feed wheat or not. Results are shown in Table 8.

For Factor 1, the impact of capacity was ambiguous, and not statistically significant. Firms with smaller capacity (less than 250,000 bushels) and firms with large capacity (greater than 2,000,000 bushels) were found to have more serious difficulties with wheat segregation as measured by the problems presented. A firm's primary activity also provided diverse results, though again statistically insignificant. Inland and river subterminals both were found to have greater concerns regarding problems with wheat segregation on Factor 1.

As firms attended more export seminars, they had a lower propensity to rank wheat segregation problems in Factor 1 as serious. In a similar fashion, firms that hosted trade teams

viewed Factor 1 wheat segregation problems as less of a concern. Though these results were not statistically significant, it may be an indication that with increasing knowledge and understanding of what foreign wheat buyers want, firm managers recognize that some of the problems associated with separating wheat are not as serious as they may have originally thought. Finally, it was found that firms that presently handle feed wheat ranked Factor 1 segregation problems more seriously. Although not statistically significant, perhaps firms already handling a utility type wheat are familiar with the process and recognize how much difficulty it presents to their operation.

Capacity had an ambiguous and statistically significant impact on Factor 2. Smaller and larger capacity firms were found to rank Factor 2 wheat segregation problems more seriously. Country elevators and inland sub-terminals indicated that they would have more serious problems with the implementation of a utility wheat grade compared to river sub-terminals or export elevators. However, the relationship was not statistically significant.

Similar to the results found for Factor 1, firms that attended more export seminars had a propensity to rank Factor 2 wheat segregation problems as less serious. However, firms that had hosted trade teams viewed Factor 2 wheat segregation problems as more of a concern. Unlike Factor 1 problems, firms that handled feed wheat indicated that Factor 2 problems were less of a concern to them.

Conclusions

One thing is clear as a result of this study. There is no significant consensus of opinion regarding what approach should be taken to recoup lost export market share for wheat. Responding firms seem to be in agreement that something should be done to improve service to international customers. What respondents mean by "service" is not well defined. As a result, limited agreement can be found for increasing wheat segregation, and even less support for

using a utility grade.

Part of this reluctance to accept a utility grade comes from several source. First, a premium for better quality wheat is not guaranteed. Second, blending is a source of income for the grain handling industry. Based on survey results, blending is less important than transportation or storage income, but blending is still significant. Part of the revenue received from being able to "blend up" poorer quality grain may allow elevators to generate additional revenue and pay farmers better than a "feed wheat price" for lower quality wheat. Finally, the industry is wary of significant grade changes. Prior changes have clearly impacted grain handlers when grain came out of storage under a different grading regime compared to when the grain went into storage.

This study found that grain handling firms feel that less effort should be given to the establishment of a utility wheat grade relative to working with government to reduce unfair trade practices and other methods of improving service to importers. In general, smaller and very large operations as measured by capacity felt they would incur significant problems with the implementation of this grading scheme. In addition, two factors were identified with problems associated with wheat segregation. One factor was associated with the costs of segregating wheat and the other aligned with the physical aspects of separation.

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Table 1. Selected Characteristics of Responding Sample Firms and Population Firms

Primary Activity	Number of Firms	Sample %	Population %
Country Elevator	70	69	84
Inland Sub-Terminal	6	6	8
River Sub-Terminal	15	15	4
Export Terminal	7	7	4
Other ^a	3	2	0
<u>Organizational Structure</u>			
Investor Corporation	17	17	NA ^b
Ag Co-op	41	41	NA
Proprietorship	30	30	NA
Partnership	10	10	NA
Other ^a	3	2	NA
<u>Storage Capacity (bu.)</u>			
<250,000	13	13	18
250,001-500,000	15	15	17
500,001-1,000,000	23	23	27
1,000,001-2,000,000	16	16	16
>2,000,000	30	30	23
Other ^a	4	4	0
<u>Availability of Protein Analysis Equipment</u>			
Available On-site	41	41	NA
Not Available On-site	59	58	NA
Other ^a	1	1	NA

^a "Other" includes those respondents that did not select one of the designated response categories and respondents that did not provide a response on the particular question.

^b NA = Not available -- the PNWGFA directory does not list firm organizational structure.

Table 2. Selected Information on Responding Firms that Currently

Selected Information	Number of Respondents
Firms Selling Feed Wheat	71
Firms Not Seeling Feed Wheat	29
Location of Feed Wheat Markets	
In-State	34
In the PNW	26
Outside the PNW	8
Other	2
Prefer to Handle Feed Wheat	29
Prefer not to Handle Feed Wheat	35
Method of Segregating Feed Wheat	
Separate Storage Bin	57
Ship Out as Received	3
Other Method	11

Table 3. Respondent Perceptions Regarding the Relative Importance of Selected Merchandising Practices Used to Generate Income for Grain Handling Firms

Merchandising Practice	Level of Importance			
	Very Important	Somewhat Important	Slightly Important	Not Important
	Number of Respondents (% of Respondents)			
Transportation	82 (82.0)	9 (9.0)	5 (5.0)	4 (4.0)
Storage	58 (58.0)	29 (29.0)	6 (6.0)	7 (7.0)
Blending	37 (37.0)	38 (38.0)	10 (10.0)	15 (15.0)
Arbitrage	31 (32.9)	38 (39.2)	16 (16.5)	12 (12.4)
Cleaning	9 (9.2)	34 (34.7)	21 (21.4)	34 (34.7)

Table 4. Respondent Perceptions Regarding the Relative Importance of Selected Issues Facing the U.S. Wheat Industry

Issue	Level of Importance			
	Very Important	Somewhat Important	Slightly Important	Not Important
	Number of Respondents (% of Respondents)			
International Competitiveness	86 (86.0)	11 (11.0)	1 (1.0)	2 (2.0)
Marketing	78 (78.0)	21 (21.0)	1 (1.0)	0 (0.0)
Domestic Policy	64 (64.7)	30 (30.3)	2 (2.0)	3 (3.0)
Environmental Factors	47 (47.5)	39 (39.4)	11 (11.1)	2 (2.0)
Production Factors	30 (29.7)	61 (60.3)	5 (5.0)	5 (5.0)

Table 5. Respondent Expectations Regarding Changes in International and Domestic Wheat Trade for the PNW Region

	Expected Change		
	Increase	Stay the Same	Decrease
	Number of Respondents (% of Respondents)		
International Wheat Trade in the PNW will:	63 (66.3)	26 (27.4)	6 (6.3)
Domestic Wheat Trade in the PNW will:	30 (31.3)	61 (63.5)	5 (5.2)

Table 6. Respondent Perceptions Regarding the Relative Level of Effort Needed by the U.S. Wheat Industry to Address Selected Marketing Issues

Issue	Level of Effort			
	A lot of Effort	Some Effort	A Little Effort	No Effort
	Number of Respondents (% of Respondents)			
Working with Government to Reduce Unfair Trade	70 (70.0)	25 (25.0)	4 (4.0)	1 (1.0)
Improving Service to International Customers	58 (58.6)	36 (36.4)	4 (4.0)	1 (1.0)
Increasing Segregation of Wheat	27 (27.3)	53 (53.9)	16 (16.2)	3 (3.0)
Establishing a Utility Grade for Feed Wheat	7 (7.1)	37 (37.8)	31 (31.6)	23 (23.5)

Table 7. Loadings of Problems Associated with Wheat Segregation on Two First Order Factors^a

First-Order Description	Problems Included in Factor	Factor Loadings		Cronbach Alpha
		1	2	
1) Costs of Segregating	Maintaining Separation During Transportation	.83		.7154
	Slower Operation at Shipping Time	.75		
	Required Increase in Bin Space	.66		
	Increase in Operating Expenses	.53		
2) Physical Separation	Time Needed for Measuring Segregating Characteristic		.89	.7737
	Accuracy of Measuring Segregating Characteristic		.78	
	Lack of Premium for Segregating		.68	
	Slower Operation at Receiving Time		.63	

^a Principal axis factor model using orthogonal rotation.

Table 8. Multiple Classification Analysis of the Relative Level of Seriousness of Problems Associated with Wheat Segregation

Variables	Capacity Only		Capacity and Primary		Capacity, Primary and Seminar		Capacity, Primary, Seminar and Trade Team		Capacity, Primary, Seminar, Trade Team and Feed Wheat	
	Factor 1 ^a	Factor 2 ^b	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
Grand Mean	2.05	1.68	2.05	1.68	2.07	1.69	2.05	1.66	2.05	1.66
Capacity	.17	.35*	.18	.36*	.19	.37*	.19	.33*	.18	.35*
1	-.22	-.36	-.23	-.38	-.24	-.40	-.19	-.41	-.19	-.45
2	.03	.26	.06	.31	.04	.30	-.01	.23	-.02	.25
3	.12	.08	.13	.12	.11	.10	.15	.11	.15	.09
4	.17	.32	.15	.25	.22	.32	.21	.28	.20	.32
5	-.12	-.25	-.12	-.26	-.12	-.26	-.13	-.18	-.13	-.18
Primary			.11	.23	.10	.22	.09	.25	.09	.25
Country			.00	-.05	.00	-.05	.00	-.06	.00	-.06
Inland			-.16	-.15	-.19	-.19	-.15	-.15	-.15	-.16
River			-.04	.05	-.03	.07	-.03	.06	-.03	.06
Export			.26	.60	.20	.55	.19	.64	.20	.64
Seminar					.02	.01	.02	.01	.03	.02
No					-.02	.01	-.02	-.01	-.03	.02
Yes					.01	-.01	.01	.00	-.01	-.01
Trade Team							.03	.09	.03	.08
No							-.03	.07	-.02	.06
Yes							.02	-.06	-.02	-.05
Feed Wheat									.03	.16
Yes									-.02	.07
No									.04	-.18
R ²	.03	.12	.04	.17	.05	.18	.05	.17	.05	.19

a Factor 1 includes: "Increase in Operating Expenses," "Required Increase in Bin Space," "Slower Operation at Shipping Time," and "Maintaining Separation During Transportation."

b Factor 2 includes: "Accuracy of Measuring Segregating Characteristic," "Time Needed for Measuring Segregating Characteristic," "Lack of Premium for Segregating," and "Slower Operation at Receiving Time."

* $p < 0.05$

Capacity = Storage capacity in bushels of the firm: 1 \leq 250,000, 2 = 250,001 to 500,000, 3 = 500,001 to 1,000,000, 4 = 1,000,001 to 2,000,000, 5 > 2,000,000

Primary = Primary Activity of Firm, 4 categories: Country Elevator, Inland Subterminal, River Subterminal or Export Elevator.

Seminar = Attended Export Seminar, 2 categories: No - 0 attended, Yes - 1 or more.

Trade Team = Hosted Foreign Trade Teams, 2 categories: No - 0 hosted, Yes - 1 or more.

Feed Wheat = Whether firm handles Feed Wheat or Not, 2 categories: Yes - Handle, No - Do not handle.

The coefficients listed for each general category are standardized beta coefficients, and can be interpreted in the same manner as those in multiple regression. Statistical significance is closely related to sample size. There were 101 respondents in the sample for this study, generating less statistical significance than would be expected with a larger sample.