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Economic Effects of Standardizing Wheat Protein Reporting

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ABSTRACT

Wheat protein content has traditionally been reported on an "as-is" moisture basis by the U.S. wheat trade. In an effort to provide inspection results which are easier to evaluate and compare, the Federal Grain Inspection Service (FGIS) began reporting protein content on a constant 12-percent moisture basis as of May 1, 1987. Nominal protein readings for either domestic or export wheat were not significantly affected at the national level. However, changes were more apparent at the State or local level. Although protein premiums should adjust to these changes and compensate the seller for real protein content, this adjustment was not apparent in all markets. Changes in nominal protein would not significantly change protein premiums for price support loans in many States because CCC premiums are changed on the basis of 0.5 percent.

Keywords: Wheat protein reporting, wheat protein premiums, wheat marketing system, wheat grades and standards

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SUMMARY

Nominal wheat protein readings were not significantly affected at the national level by the recent change in protein reporting procedure. However, protein levels for most Hard Red Winter (HRW) wheat production had a lower nominal protein percentage when reported under the new standardized moisture base, while most Hard Red Spring (HRS) wheat production had a slightly higher nominal protein percentage. Reported protein declined by an estimated average of 0.05 percent for eight major HRW wheat States, and HRS wheat protein increased by an estimated average of 0.01 percent for five major HRS wheat States. The new recording procedure reduced nominal protein for HRW and HRS wheat exports by about 0.1 percent in 1987. Thus, the effects of this change appear to be spread unevenly throughout the system.

The protein supply has not been affected by the change in protein reporting procedure. Prices received by farmers are determined by the amount of actual protein in the final processed product and competition in the handling industry. A change in moisture content does not change the value of protein in the final processed product or competitive relationships within the industry. The protein market is expected to adjust and premiums should increase in those markets where there was a decline in nominal protein supply and decline in markets where nominal protein supply rose.

Because of imperfections in the protein market, protein premium adjustments might take time to work their way back to the producer. Two scenarios were analyzed. Under scenario A (the producer absorbs full loss or gain), farmers would experience an overall average loss of $0.01 per bushel for HRW wheat, with most States experiencing a slight decline in premiums. In contrast, HRS wheat producers would notice little change on average. However, producers in the Northwest would lose, while those in the North Central States would gain.

Based on results from scenario B (market premiums adjust to reflect the change in protein certification procedures), protein premiums should rise in those markets where nominal protein declined, and vice versa. Thus, the calculated losses or gains as shown under scenario A would be reduced by the markets' adjustment in protein premiums. However, examination of wheat protein premiums for a period of 8 months (May through December 1987) in the Portland and Minneapolis markets indicates that adjustments were not made immediately to reflect the change in reporting protein percentages. The Kansas City market tentatively supports the adjustment hypothesis. Exact quantification of the markets' adjustment is not possible due to the short time span since this change was made.

Changes in nominal protein would not significantly change the protein premiums for price support loans because CCC premiums are changed on the basis of 0.5 percent. For example, protein premiums could remain the same or drop as much as $0.02 per bushel for the HRW States analyzed. For the HRS States, many of the premiums would remain unchanged, but Idaho and Washington producers could experience a decline by as much as $0.03 per bushel.

Economic Effects of Standardizing Wheat Protein Reporting

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INTRODUCTION

Millers, producers, and Government policymakers have become concerned about the ability of U.S. grain standards to accurately describe the physical and biological properties of wheat. One area of concern is the reporting of protein content, a chemical property important to flour millers. An accurate statement of protein content is important to all buyers and sellers of wheat, especially for Hard Red Winter (HRW) and Hard Red Spring (HRS) wheats because their protein levels usually receive a price premium in the market place.

The protein content has traditionally been reported on an "as-is" moisture basis. Reporting protein in this manner has become a concern of many buyers since the protein content varies inversely with the moisture content. In an effort to provide inspection results which are easier to evaluate and compare, the Federal Grain Inspection Service (FGIS) began reporting protein content on a constant 12-percent moisture basis as of May 1, 1987. Temporary procedures were instituted for one year (May 1, 1987--May 1, 1988) which allowed the option for protein content to be recorded on the original "as-is" moisture basis.

The change in the protein reporting procedure was made by FGIS for several reasons. When reported on an "as is" moisture basis, the protein content of different lots of wheat with different moisture levels cannot be easily compared since protein content is inversely related to moisture percentage. Protein certificated on a constant moisture basis of 12 percent will provide buyers, sellers, and users of U.S. wheat with results which can easily be evaluated and compared. Last, a constant moisture basis will conform with protein reporting procedures used by other major wheat exporting countries. For example, Canada uses a constant 13.5-percent moisture basis while Australia uses 11 percent.

The change in this procedure was made with near unanimous support of producers, producer and industry trade associations, and members of the Grain Quality Workshop. The change has generated complaints by some wheat producers, however. Producers from the Northwest (Washington, Oregon, Idaho,

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and Montana) claimed that their low-moisture, high protein wheat received a lower market price under the new system. This is based on the fact that the nominal protein content of their wheat is reduced because of the change to recording protein on a constant 12-percent moisture basis. Also, many producers who pledge their wheat as collateral for nonrecourse loans from the Commodity Credit Corporation (CCC) feel that the new reporting procedure reduces the amount they receive from CCC in the form of a protein premium.

While the selection of the fixed moisture basis was nearly unanimous by the industry, any fixed level could have served equally well. For example, a dry matter basis of 0-percent moisture is preferred by some. If a basis of 0-percent moisture had been selected, all nominal protein levels would have increased compared with the "as-is" basis. The 12-percent level was chosen because it was equal to the average moisture content of wheat exported from the United States and was close to the crop average of about 11.5-percent moisture. Thus, this basis should represent the smallest change in nominal protein values when changing from the "as-is" basis.

The objectives of this analysis are to: (1) provide a brief background on the issue of wheat protein certification, (2) document the change in nominal protein reported by inspections of HRW and HRS wheats in important producing States, and (3) assess the economic effects on producers.

BACKGROUND

U.S. wheat marketing is facilitated by the grades and standards administered by FGIS. One goal of the Official United States Standards for grain is to provide information on the physical and biological properties of grain to buyers and sellers (2). Standards are specified for 7 classes and 10 subclasses of wheat (app. table 1). There are six grades within each class and subclass, based on measured physical properties of the inspected sample. The country elevator purchases grain from the farmer on the basis of Federal standards. These standards and grades help determine marketing channels since products derived from different classes and grades have different values and are marketed for different uses.

Most intrastate and interstate wheat shipments are not officially inspected to verify or establish the official grade. However, as wheat passes through the marketing system beyond the country elevator, it may be officially inspected at the request of the buyer or seller. All export shipments must be officially inspected. If official inspections are requested, they are normally made by State or private inspectors designated by FGIS. All wheat pledged as collateral for a CCC loan must be inspected at the time wheat is placed in commercial storage under the authority of the U.S. Warehouse Act (USWA), and the grade designation is included as part of the official (USWA) warehouse receipt. Wheat placed in the loan program and stored in onfarm facilities must be inspected, although an official inspection is not immediately required.

Protein premiums are paid by the CCC on price support loans for only two classes: hard red winter and hard red spring. Protein content must be specified on the warehouse receipt if stored in off-farm facilities. Farm-stored wheat requires an official inspection to determine protein content.

Protein is a special factor that can be recorded on the official inspection certificate under the U.S. Grain Standards Act. Based on the new method of certificating protein content, nominal protein percentages recorded on the grade certificate will be lower for wheat with a moisture content of less than 12 percent but higher for wheat with a moisture content in excess of 12 percent (use conversion formula below).

Protein Conversion Formula

$$\text{Protein content (\%) a/} = \frac{(\text{Percent protein b/}) \times 88}{(100 - \text{moisture c/})}$$

where: a/ Protein content certified on 12-percent moisture basis.
b/ Protein content of sample measured on an "as is" moisture basis.
c/ Actual moisture content of sample.

Thus, the new protein reporting procedure may provide some producers with a gain in nominal protein while others may experience a loss. For example, a sample of wheat from the Northwest with a 13.5-percent protein content at an 11-percent moisture level will now be certified at 13.3-percent protein content based on a constant 12-percent moisture basis. A sample of wheat from North Dakota with a 13-percent moisture level and a 13.5-percent protein content recorded on an "as-is" moisture basis will be certified as 13.7-percent protein content based on a standardized 12-percent moisture base.

Low-moisture wheat is often thought to be more valuable by some producer groups than high-moisture wheat because during the tempering process more water can be added and so the drier wheat would produce a larger volume of flour. Whether the larger flour yield of low-moisture wheat could compensate for a lower than expected protein content would depend on the miller. The miller may not be able to market the lower protein flour and may not have the facilities to blend it. Therefore, the higher yield would be meaningless because of failure to meet protein specifications. Also, many millers cannot process very low moisture wheat because their tempering machinery is not designed to handle it. Thus, while low-moisture wheat may be desirable to some millers and may be able to command a premium, the value of low moisture in providing a higher flour yield should not confuse the relationship between moisture and protein content (1).

Most domestic wheat millers favor the change in protein reporting procedures because it standardizes the reporting of protein content on grade certificates. Protein percentage computed on a 12-percent constant moisture basis would ease the millers' calculations when purchasing wheat. Moisture in wheat and flour can be changed, but the ratio between protein and dry matter cannot. Therefore, it is important to the processor for the reported protein level not to be influenced by the actual moisture content. The miller is not interested in the "as is" moisture level protein content but with the level that will be present when tempering is complete. For the baker, it is the relative amount of protein in the flour compared with the other dry matter that determines whether there is the proper amount of protein for the intended end use (1). Protein specifications for flour are always quoted at a fixed moisture basis (usually 14-percent moisture). The flour mill best able to screen potential sources of wheat to obtain minimum cost blends of wheat often has a competitive advantage in products offered for sale.

ANALYTICAL PROCEDURE

The analysis is divided into three sections. First, changes in nominal protein values are identified from important producing States. Special emphasis is given to HRW and HRS wheats since the majority of protein premiums are paid to these two classes. The change in nominal protein is estimated from data obtained from FGIS on the protein and moisture content of truck-lots and submitted samples inspected at interior points following the 1986 and 1987 harvest. Comparable data for export inspections are also presented.

Next, producer price effects are estimated and changes in actual protein premiums are assessed. Because of imperfections in the protein market, adjustments to protein premiums could take time to work their way back to the producer. Therefore, two different producer price scenarios are examined.

The two different price effects are equal in size, but opposite in sign, depending on whether producers would absorb the change or whether markets would adjust to offset changes in nominal protein. Scenario A assumes that the market does not adjust and therefore the farmers' gains or losses depend upon the nominal change in protein and its corresponding value. It is assumed that any change in market protein value (gain or loss) will be passed entirely back to the producer.

Scenario B assumes the market adjusts and the producer is no worse off than before the change in recording procedures. For example, a farmer could experience a gain in protein premium equal to the premium loss (scenario A) created by the change in protein recording procedure. On the other hand, a producer could experience a loss in protein premium equal to the gain (scenario A) created by the change in recording protein.

To determine whether the protein premium market actually changed due to changes in the protein recording procedure, protein premiums are analyzed at the Kansas City, Minneapolis, and Portland markets for HRW and HRS wheats. Monthly, May through December, and annual average premiums are determined for both classes of wheat at each market for calendar years 1981-87 to assess whether a premium adjustment occurred in response to the May 1st change in protein reporting. In addition, the data are examined for seasonality using procedures found in the X-11 statistical package. Historical protein premiums are computed for the Portland, Minneapolis, and Kansas City markets based on U.S. Department of Agriculture data sources (app. tables 2-6).

Last, effects on price support loan premiums are estimated.

CHANGES IN REPORTED PROTEIN PERCENTAGE

Based on 1987 interior-point sample data provided by FGIS, most HRW wheat inspections received a lower nominal protein percentage with the constant 12-percent moisture basis than with the "as is" moisture basis (table 1). In contrast, over half of the HRS wheat inspections received a higher nominal protein percentage because the moisture content exceeded 12 percent. However, since FGIS reports protein to the nearest 0.1 percent, this change in reporting protein appears to have had minimal effects at the national level. But, these changes were greater at some State and local levels.

Table 1--Estimated changes to nominal wheat protein due to a change in reporting protein percentage, by selected wheat class and State, 1987 crop

Wheat class and State	1987 production	Percent of total	Number of samples	Percent of total	Protein measurement "as is" moisture	Protein measurement Constant 12-percent Moisture	Gain or loss	
	1,000 Bushels	Pct.	No.		Percent			
Hard Red Winter:								
California	35,386	3	1,351	25	11.74	11.42	-0.32	
Idaho	18,000	2	66	1	11.20	10.84	- .36	
Kansas	366,300	36	602	26	11.63	11.62	- .01	
Montana	79,200	8	161	3	12.87	12.73	- .14	
Nebraska	85,800	8	856	15	11.90	11.90	- .00	
Oklahoma	129,600	13	217	4	13.01	12.96	- .05	
Texas	94,752	9	524	10	12.44	12.37	- .07	
Washington	17,684	2	70	1	12.46	12.10	- .36	
Subtotal	815,877	81	3,255	85			- .05	1/
Total	1,018,561	100	5,470	100				
Hard Red Spring:								
Idaho	15,810	3	157	7	14.05	13.59	- .46	
Minnesota	98,400	22	486	22	13.82	13.86	+ .04	
Montana	66,700	15	128	6	13.97	13.86	- .11	
North Dakota	189,100	42	689	31	13.90	13.98	+ .08	
Washington	5,130	1	437	20	14.35	14.00	- .35	
Subtotal	395,193	83	1,314	86			+ .01	2/
Total	450,578	100	2,210	100				

1/ Weighted average based on HRW production of listed States.
2/ Weighted average based on HRS production of listed States.

Source: (7).

Nominal protein content for HRW declined by an estimated 0.05 percent for eight major producing States under the new system. Nearly all of the States analyzed experienced a decline in nominal protein ranging from 0.01 percent for Kansas to 0.36 percent for Idaho and Washington. Nebraska, an exception, did not experience a change in protein percentage. Results for different years could vary because of different protein and moisture contents. Results for 1986 inspections were somewhat similar to those found in 1987 (app. table 7).

Protein reported for HRS inspections increased by an estimated 0.01 percent for five major producing States (table 1). Wheat from Minnesota and North Dakota experienced a slight increase in nominal protein by 0.04 percent and 0.08 percent because it had a moisture content greater than 12 percent. In contrast, wheat from the Northwest States such as Washington, Idaho, and Montana received a lower nominal protein of 0.11 to 0.46 percent because the moisture content in these States was less than 12 percent.

Based on sample data for 1987, export shipments (FGIS inspections), exporters of HRS and HRW wheat would also receive a lower nominal protein by about 0.1 percent (table 2). Results for 1986 export shipments are nearly similar to 1987 (app. table 8). Thus, the effects of the new protein reporting procedure appears to be spread unevenly throughout the system.

ESTIMATED PRODUCER PRICE EFFECTS

Prices received by farmers are determined by the amount of actual protein in final processed form and competition in the handling industry (4). A change in moisture content does not change protein in final processed form or competitive relationships within the industry.

Since the protein recording procedures were changed for wheat, some producers are claiming that a lower nominal protein will consequently mean a lower price. However, the total protein supply has not changed despite the change in nominal protein recording procedures. Therefore, protein premiums should

Table 2--Estimated changes to 1987 export wheat protein averages due to a change in reporting protein percentages

Wheat class	Number of sample lots	Percent of class volume represented	Protein average "as is" moisture	Protein average Constant 12-percent moisture	Gain or loss
	No.		Percent		
Hard Red Winter	480	48.7	11.9	11.8	-0.1
Soft Red Winter	16	7.2	10.8	10.9	+ .1
White Wheat	236	50.8	10.5	10.3	- .2
Hard Red Spring	435	79.3	14.1	14.0	- .1
Durum	21	8.6	13.6	13.6	0

Source: (9).

rise for those markets where the nominal protein supply has declined. Premiums should decline in those markets where the nominal supply rose. However, imperfections in the market could cause a delay in these adjustments reaching the producer.

Scenario A

If protein premium markets are imperfect and do not adjust, the farmer bears the full adjustment of a change in protein determination. Prices for the eight major HRW States would decline by a weighted average of $0.007 per bushel (table 3). Producers would experience an estimated decline in price ranging from $0.001 per bushel for Kansas and Texas to $0.061 per bushel for Washington. An exception was Nebraska which did not experience a change in protein percentage because its moisture content was very close to 12 percent. In comparison, results from 1986 suggest that prices from the eight States would decline by a weighted average of $0.009 per bushel (app. table 9). These values could differ significantly by regions or individual markets within a State.

The weighted average price for the five major HRS wheat states was virtually unchanged. However, Minnesota and North Dakota would experience a $0.005 and $0.010 per bushel gain in price, while Montana, Washington, and Idaho producers would absorb a per bushel loss of $.015 to $.065.

Scenario B

If the protein premium market adjusts to the change in protein recording procedure, producers should be no worse off than before the change. Based on the 1987 inspection data provided by FGIS, HRW producers in the eight major States should experience an estimated increase in protein premiums by $0.007 per bushel (table 3). Likewise, producers in these States, excluding Nebraska, should experience an estimated rise in premiums ranging from $0.001 per bushel for Kansas and Texas to $0.061 per bushel for Washington.

The average premium for the five major HRS States should not change much, but premiums for each State may change. For example, producers in Idaho, Montana, and Washington encountered a decline in nominal protein and should experience a rise in protein premiums of $0.065, $0.015, and $0.035 per bushel. On the other hand, nominal protein for Minnesota and North Dakota rose, and their protein premiums should drop by $0.005 and $0.010 per bushel.

OBSERVED CHANGES IN WHEAT PROTEIN PREMIUMS

Although wheat protein requirements remain fairly constant over time, the protein content of each crop may vary greatly from year to year. Ideal growing conditions, producing high yields, usually result in lower protein content and vice versa. In years when the HRW crop was low in protein, domestic flour millers generally purchased larger amounts of HRS for blending with the lower protein HRW. Protein premiums for HRS can then be quite high, particularly if the HRW protein content is lower than normal. However, if the protein content of HRW is high, less HRS is demanded for blending and protein premiums for this class decline.

Table 3--Estimated effects on producers' premiums due to a change in reporting protein percentages, by selected wheat class and State, 1987 crop

Wheat class and State	Change in nominal protein (from table 1)	Protein premium	Scenario A Farmer absorbs gain or loss	Scenario B Premium market adjusts
	Percent	------- Dollars per bushel -------		
Hard Red Winter:				
California	-0.32	0.14 1/	-0.045	+0.045
Idaho	- .20	.14 1/	- .028	+ .028
Kansas	- .01	.07 4/	- .001	+ .001
Montana	- .14	.17 2/	- .024	+ .024
Nebraska	.00		0	0
Oklahoma	- .05	.14 3/	- .008	+ .008
	.01	.10 5/		
Texas	- .07	.14 3/	- .001	+ .001
Washington	- .36	.17 2/	- .061	+ .061
Total	- .01		- .007 6/	+ .007 6/
Hard Red Spring:				
Idaho	- .05	.15 9/	- .065	+ .065
	.41	.14 7/		
Minnesota	+ .04	.12 10/	+ .005	- .005
Montana	- .11	.14 7/	- .015	+ .015
North Dakota	+ .08	.12 10/	+ .010	- .010
Washington	- .35	.10 8/	- .035	+ .035
Total	+ .01		+ .001 11/	- .001 11/

1/ Based on a Portland premium of HRW (12%-11%), 1981-85 crop year average (app. table 1).
2/ Based on a Portland premium of HRW (13%-12%), 1981-85 crop year average (app. table 1).
3/ Based on a Kansas City premium of HRW (13%-12%), 1981-85 crop year average (app. table 1).
4/ Based on a Kansas City premium of HRW (12%-11%), 1981-85 crop year average (app. table 1).
5/ Based on a Kansas City premium of HRW (14%-13%), 1981-85 crop year average (app. table 1).
6/ Weighted average based on production of the listed HRW States.
7/ Based on a Portland premium of dark northern spring (14%-13%), 1981-85 crop year average (app. table 3).
8/ Based on a Portland premium of dark northern spring (15%-14%), 1981-85 crop year average (app. table 3).
9/ Based on a Minneapolis premium of dark northern spring (15%-14%), 1981-85 crop year average (app. table 4).
10/ Based on a Minneapolis premium of dark northern spring (14%-13%), 1981-85 crop year average (app. table 4).
11/ Weighted average based on production of the listed HRS States.

Seasonality of Protein Premiums

Protein premiums did not exhibit stable seasonality at the 0.1-percent level, based on results from the X-11 statistical package (app. tables 2-6). An analysis was performed to determine whether wheat protein premiums exhibited a degree of seasonality. For example, premiums could rise during the crop year as supply diminished and could drop during harvest as protein supply became plentiful. If results were positive, this information would need to be considered when one analyzes the potential effects of changing protein premiums caused by changes in protein reporting procedures.

Protein Premium Markets

Portland's HRW and HRS average premiums generally declined for May through December 1987, compared with the 1981-86 average (tables 4 and 5 and figs. 1 and 2). Protein premiums from the Portland market were selected as representative of the Northwest States. Protein changes for Washington, Idaho, and Montana suggest a gain in protein premiums for HRW under Scenario B of 2-6 cents per bushel and for HRS a gain of 2-7 cents per bushel. However, protein premiums declined slightly, instead of gaining. For example, the May-December 1987 average for HRW was $0.09 per bushel compared with the 1981-86 average of $0.23 per bushel; the May-December 1987 average for HRS was $0.46 per bushel compared with the 1981-86 average of $0.61 per bushel. The market will apparently take longer than the observed 8 months (May-December) to adjust to the new recording procedure. Also, increased HRW yields in the Pacific Northwest have apparently reduced those protein premiums, while HRS premium levels may have declined due to larger yields. Thus, the detection of changes in protein premiums due to changes in protein reporting procedures could be difficult given the simultaneous changes of other factors affecting protein premiums.

Protein premiums from the Kansas City market have not changed much since the change in protein reporting procedures. Kansas City HRW protein premiums were used as the market for the Mid-Central and South Central States (table 6, fig. 3). Based on Scenario B, protein premium adjustments for Kansas, Texas, and Oklahoma should rise from 0.1 to 0.8 cents per bushel. The average protein premium for May-December 1987 was $0.21 per bushel, compared with $0.21 per bushel for the 1981-86 average. Monthly premiums for May-December 1987 rose slightly but so did those for the 1981-86 average. Protein premiums generally did not appear to change much, which supported the hypothesis of an insignificant change.

Protein premiums for HRS at the Minneapolis market rose during the May-December period compared with the 1981-86 average. The Minneapolis HRS protein market was used to represent premium conditions for North Dakota and Minnesota (table 7, fig. 4; table 8, fig. 5). Under Scenario B, changes in HRS nominal protein for Minnesota and North Dakota suggest a 1-cent-per-bushel decrease in premiums. However, the average 14-percent protein premium at Minneapolis for May through December 1987 was $0.34 per bushel, compared with the 1981-86 average of $0.31 per bushel. The 15-percent average protein premium for 1987 was $1.00 per bushel, nearly double the $0.51 per bushel premium for the 1981-86 average. The rise in HRS exports apparently gave a significant boost to the protein premiums, thereby offsetting any minor effects caused by a change in protein recording procedure.

Table 4--Monthly, annual, and May-December average protein premiums at the Portland market (12-percent HRW less ordinary HRW)

Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual average	May-Dec. Average	May-Dec. Standard deviation
							Dollars per bushel								
1981	0.10	0.13	0.14	0.19	0.28	0.43	0.21	0.19	0.21	0.21	0.20	0.20	0.21	0.24	0.08
1982	.25	.41	.62	.57	.42	.51	.40	.30	.15	.21	.19	.18	.35	.30	.13
1983	.12	.07	.06	.06	.20	.34	.31	.35	.35	.45	.39	.38	.26	.35	.07
1984	.42	.36	.34	.35	.41	.40	.33	.20	.09	.10	.10	.08	.27	.21	.14
1985	.07	.12	.13	.17	.20	.21	.22	.21	.19	.25	.27	.02	.17	.20	.07
1986	.15	.12	.13	.13	.16	.12	.12	.11	.11	.10	.10	.09	.12	.11	.02
1981-86 avg.	.19	.20	.24	.25	.28	.34	.27	.23	.18	.22	.21	.16	.23	.23	.05
1987	.08	.07	.06	.05	.12	.11	.09	.08	.08	.08	.1	.05	.08	.09	.02

Source: (5).

Table 5--Monthly, annual, and May-December average protein premiums at the Portland market (14-percent HRW less ordinary HRW)

Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual average	May-Dec. Average	May-Dec. Standard deviation
							Dollars per bushel								
1981	0.54	0.61	0.72	0.90	1.05	1.00	0.74	0.59	0.36	0.35	0.32	0.38	0.63	0.60	0.28
1982	.52	.67	1.05	.95	.73	.78	.71	.48	.22	.32	.29	.15	.57	.46	.23
1983	.05	.12	.16	.29	.46	.65	.76	.72	.63	.67	.64	.63	.48	.65	.08
1984	.68	.75	.75	.78	.86	.85	.90	.57	.41	.44	.40	.42	.65	.61	.21
1985	.45	.43	.50	.63	.70	.79	.82	.72	.67	.79	.75	.75	.67	.75	.05
1986	.81	.87	.92	.94	.94	.67	.70	.59	.54	.52	.50	.48	.71	.62	.14
1981-86 avg.	.51	.58	.68	.75	.79	.79	.77	.61	.47	.52	.48	.47	.62	.61	.14
1987	.45	.36	.37	.44	.53	.56	.57	.46	.45	.43	.41	.26	.44	.46	.09

Source: (5).

FIGURE 1--PROTEIN PREMIUMS, PORTLAND

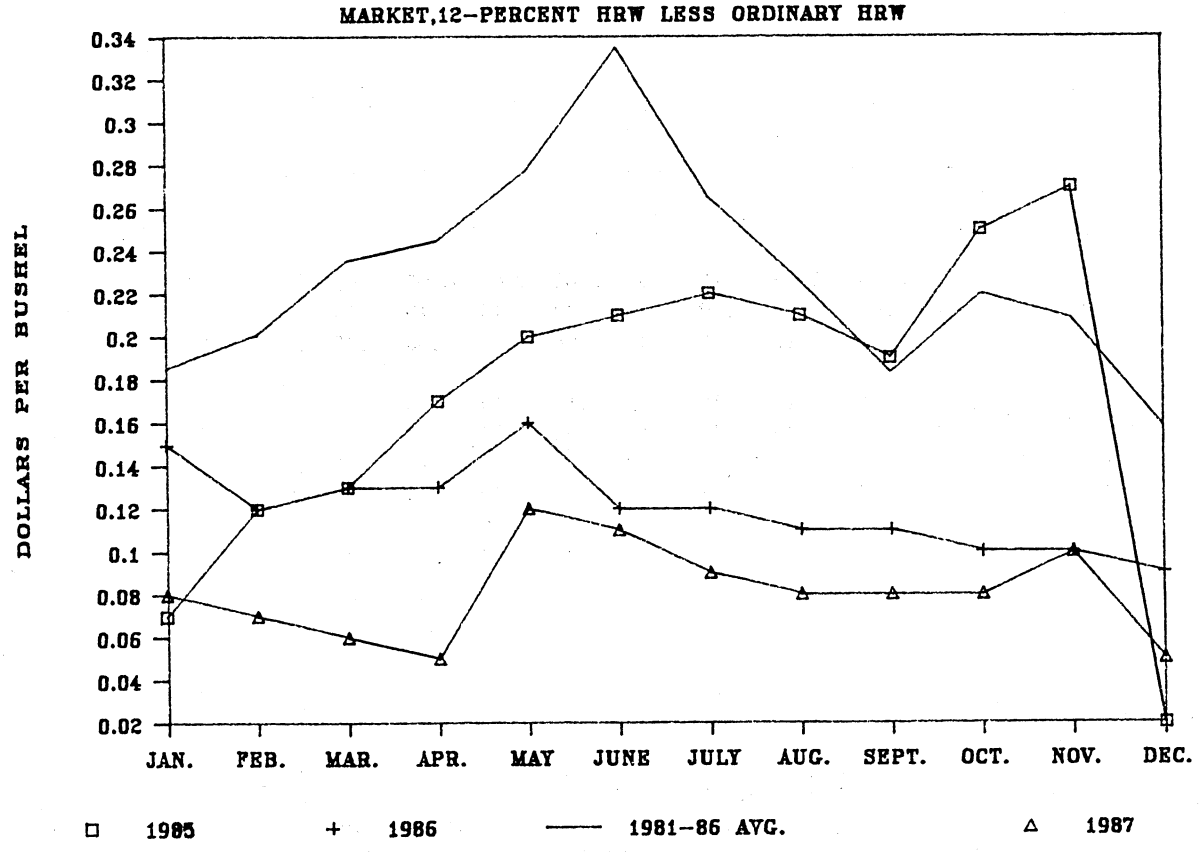


FIGURE 2--PROTEIN PREMIUMS, PORTLAND

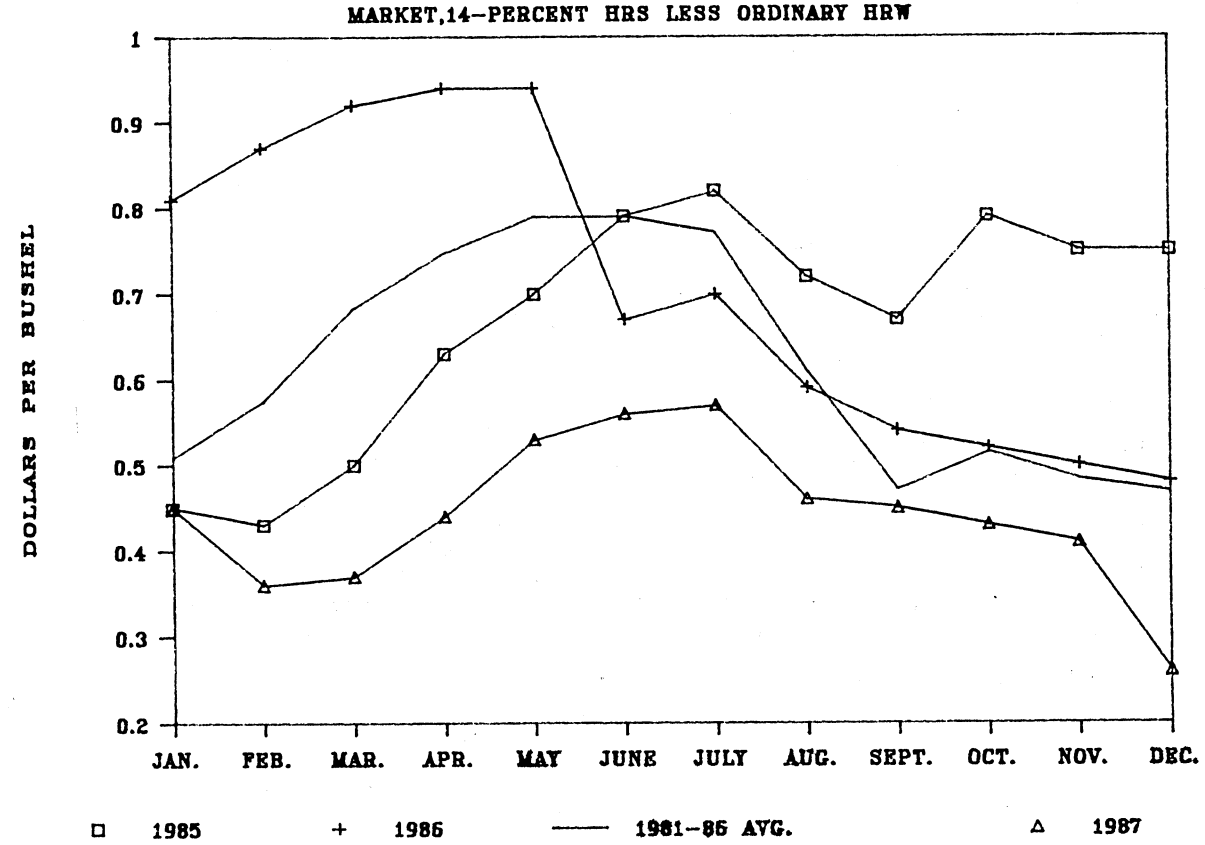


Table 6—Monthly, annual, and May-December average protein premiums at the Kansas City market (13-percent HRW less ordinary HRW)

Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual average	May-Dec. Average	May-Dec. Standard deviation
							Dollars per bushel								
1981	0.07	0.03	0.05	0.09	0.08	0.12	0.01	0.02	0.03	-0.02	-0.02	-0.02	0.04	0.03	0.05
1982	.02	.06	.04	.04	.02	.09	.38	.30	.19	.19	.23	.26	.15	.21	.11
1983	.19	.09	.09	.14	.17	.30	.44	.28	.31	.36	.35	.26	.25	.31	.07
1984	.25	.24	.27	.29	.28	.35	.32	.18	.14	.15	.14	.15	.23	.21	.08
1985	.11	.13	.13	.22	.30	.34	.36	.33	.34	.35	.35	.39	.28	.35	.03
1986	.37	.35	.31	.25	.25	.10	.20	.07	.13	.15	.10	.21	.21	.16	.06
1981-86 avg.	.17	.15	.15	.17	.18	.22	.29	.20	.19	.20	.20	.21	.19	.21	.03
1987	.25	.18	.10	.15	.15	.25	.27	.25	.23	.2	.25	.1	.20	.21	.06

Source: (5).

FIGURE 3--PROTEIN PREMIUMS, KANSAS CITY MARKET,13-PERCENT HRW LESS ORDINARY HRW

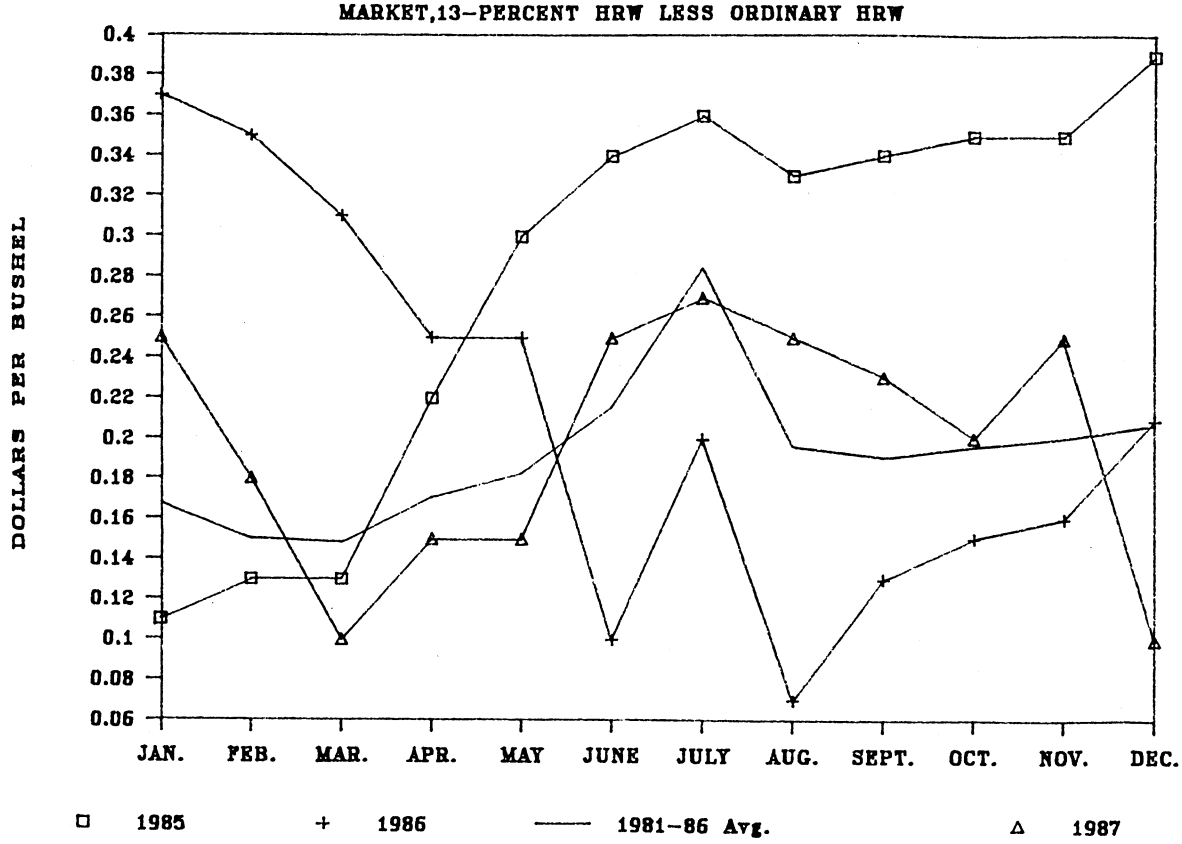


Table 7--Monthly, annual, and May-December average protein premiums at the Minneapolis market (14-percent HRS less ordinary HRS)

Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual average	May-Dec. Average	May-Dec. Standard deviation
							Dollars per bushel								
1981	0.16	0.25	0.35	0.39	0.33	0.27	0.32	0.22	0.16	0.07	0.09	0.07	0.22	0.19	0.10
1982	.07	.04	.06	.04	.04	.05	.08	.18	.23	.22	.23	.20	.12	.15	.08
1983	.13	.10	.07	.06	.15	.24	.31	.13	.03	.00	.02	.01	.10	.11	.11
1984	.02	.02	.04	.09	.06	.05	.13	.35	.40	.39	.38	.44	.20	.28	.15
1985	.43	.40	.39	.45	.47	.45	.48	.69	.79	.90	.67	.71	.57	.65	.15
1986	.59	.58	.67	.75	.98	.66	.83	.47	.21	.28	.28	.27	.55	.50	.27
1981-86 avg.	.23	.23	.26	.30	.34	.29	.36	.34	.30	.31	.28	.28	.29	.31	.03
1987	.26	.48	.58	.57	.48	.41	.42	.34	.30	.30	.30	.17	.38	.34	.09

Source: (5).

Table 8--Monthly, annual, and May-December average protein premiums at the Minneapolis market (15-percent HRS less ordinary HRS)

Calendar Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual average	May-Dec. Average	May-Dec. Standard deviation
							Dollars per bushel								
1981	0.41	0.52	0.60	0.71	0.66	0.60	0.53	0.31	0.28	0.12	0.13	0.10	0.41	0.34	0.21
1982	.09	.06	.07	.06	.04	.05	.16	.26	.37	.36	.38	.30	.18	.24	.13
1983	.22	.18	.17	.15	.21	.35	.44	.18	.08	.05	.04	.06	.18	.18	.14
1984	.05	.07	.09	.16	.09	.08	.13	.57	.66	.63	.64	.76	.33	.45	.27
1985	.76	.70	.69	.75	.74	.74	.73	1.00	1.25	1.24	1.02	1.05	.89	.97	.20
1986	.93	.91	.92	1.05	1.32	.93	1.14	.83	.57	.64	.72	.82	.90	.87	.24
1981-86 avg.	.41	.41	.42	.48	.51	.46	.52	.53	.54	.51	.49	.52	.48	.51	.02
1987	.70	.92	1.07	1.22	1.46	1.48	1.09	.83	.85	.84	.63	.82	.99	1.00	.30

Source: (5).

FIGURE 4--PROTEIN PREMIUMS, MINNEAPOLIS

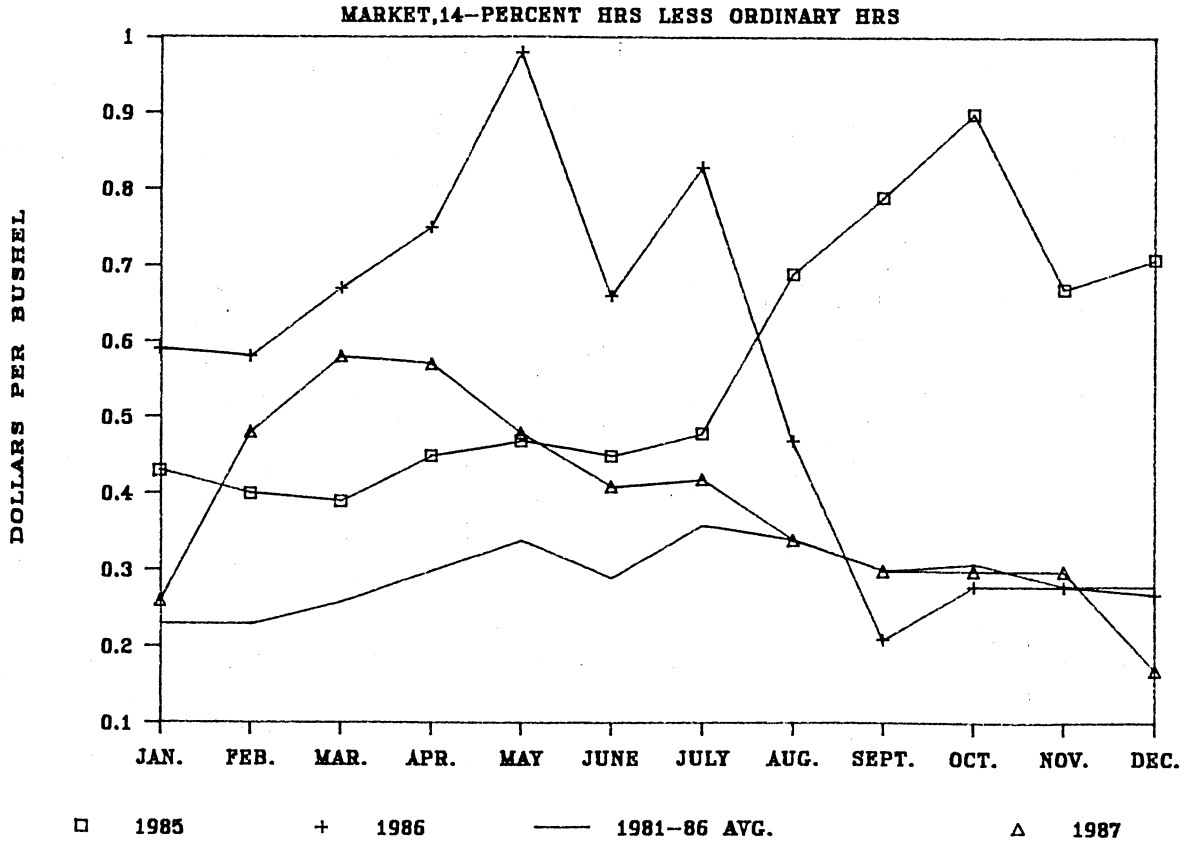
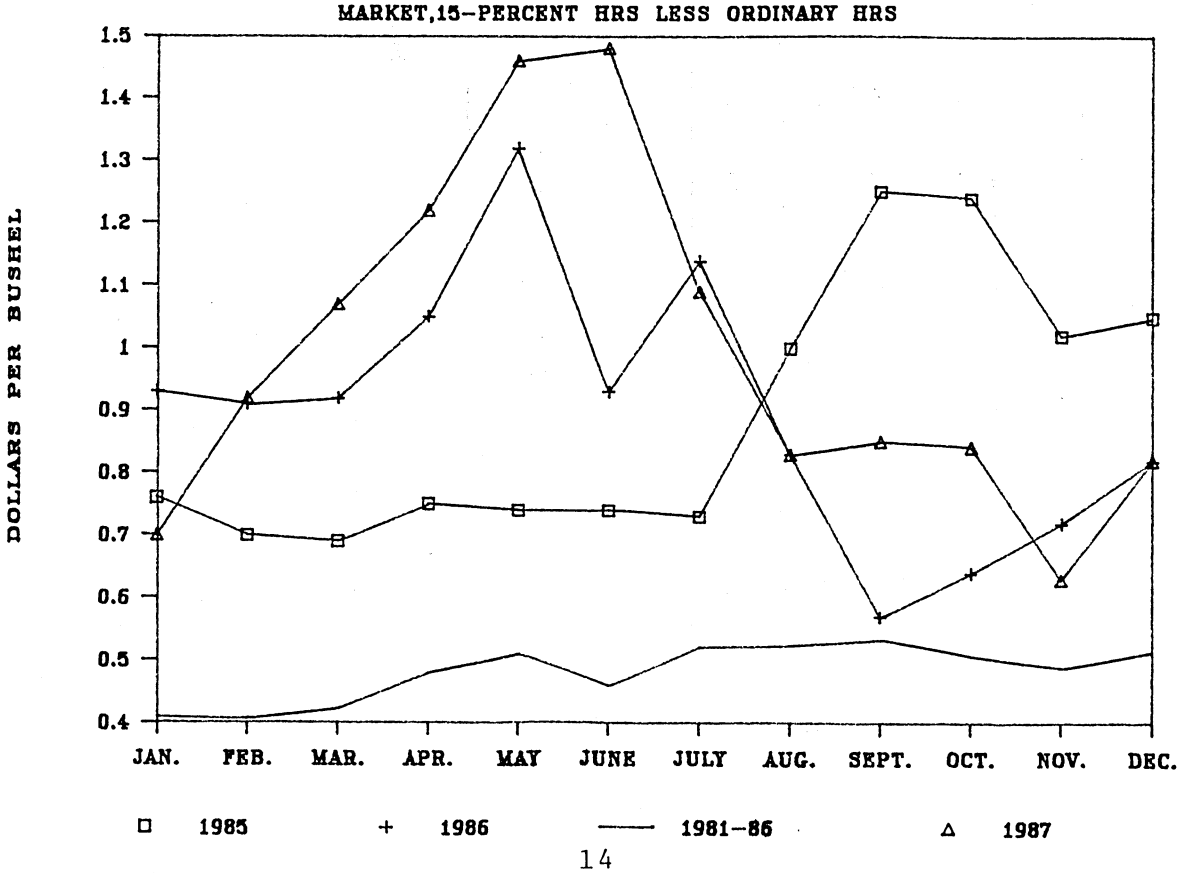


FIGURE 5--PROTEIN PREMIUMS, MINNEAPOLIS



Adjustments reflecting the the change in protein reporting percentage apparently have not occurred for the wheat markets of Portland and Minneapolis. Therefore, initial gains or losses will be absorbed by the producer and other market participants until this market adjustment is completed. Other government program activities such as changing the posted county price, authorizing Export Enhancement Program (EEP) HRS sales to foreign countries, or recalibrating protein measurement equipment can also affect premium levels.1/

ESTIMATED EFFECTS ON PRICE SUPPORT LOAN PREMIUMS

Some producers claimed that the change in moisture basis used to determine protein percentage has resulted in losses from CCC loan protein premiums. However, depending on the moisture level, producers could gain or lose protein premiums. Present CCC wheat premiums do not relate to market premiums and are generally less than those found in the market (table 9, app. tables 10-13).

CCC premiums are changed on the basis of 0.5 percent, and changes in nominal protein would not significantly change the premium for many States (table 10). For example, protein premiums could remain the same or drop as much as $0.02 per bushel for the HRW States analyzed. For the HRS States, many of the premiums would remain unchanged but Idaho and Washington producers could experience a decline of as much as $0.03 per bushel.

Present premiums used by ASCS in its price support program do not relate to market premiums and have not been changed for some time. An argument could be made for changing the premium schedule to reflect market conditions, especially since a government action can affect premium levels.

CONCLUSIONS

Certification of protein content on a constant 12-percent moisture basis was desired by a majority of wheat industry participants. The change provides buyers, sellers, and users of U.S. wheat with a protein measure which can be easily evaluated and compared. As a result of this change, information requested by the end user is being provided. Market efficiency should consequently improve.

The initial effects of this change appear to be spread unevenly throughout the grain marketing system. This change in protein recording will lower protein percentage for producers in the West and Northwest. Wheat from these States is traditionally drier than 12-percent moisture. In contrast, some States could gain protein percentage because their wheat contains moisture levels greater than 12 percent. These effects could also differ by individual producers or by region. Export shipments would also receive a one time lower nominal protein reading by about 0.1 percent.

1/ In addition to the change from an "as-is" to a constant 12-percent moisture basis in protein reporting, FGIS made another change in its protein measurement procedures. A downward correction of 0.2 percentage points was made effective May 1, 1987, after an FGIS anslysis concluded that its protein measurement equipment was overstating wheat protein content. Thus, all wheat protein as of this date became 0.2 percentage points less than before the change (3).

Table 9--Schedule of wheat protein premiums used for price support loans

Percent protein and wheat class	1982	1983	1984	1985	1986	1987
	Cents per bushel					
Hard Red Winter:						
10.50-10.99	0.0	0.0	0.0	0.0	0.0	0.0
11.00-11.49	.5	.5	.5	.5	.5	.5
11.50-11.99	1.0	1.0	1.0	1.0	1.0	1.0
12.00-12.49	2.0	2.0	2.0	2.0	2.0	2.0
12.50-12.99	3.0	3.0	3.0	3.0	3.0	3.0
13.00-13.49	4.5	4.5	4.5	4.5	4.5	4.5
13.50-13.99	6.0	6.0	6.0	6.0	6.0	6.0
14.00-14.49	8.0	8.0	8.0	8.0	8.0	8.0
14.50-14.99	10.0	10.0	10.0	10.0	10.0	10.0
≥15.00	12.0	12.0	12.0	12.0	12.0	12.0
Hard Red Spring:						
11.50-11.99	0	0	0	0	0	0
12.00-12.49	1.0	1.0	1.0	1.0	1.0	1.0
12.50-12.99	2.0	2.0	2.0	2.0	2.0	2.0
13.00-13.49	4.0	4.0	4.0	4.0	4.0	4.0
13.50-13.99	6.0	6.0	6.0	6.0	6.0	6.0
14.00-14.49	9.0	9.0	9.0	9.0	9.0	9.0
14.50-14.99	12.0	12.0	12.0	12.0	12.0	12.0
15.00-15.49	16.0	16.0	16.0	16.0	16.0	16.0
15.50-15.99	20.0	20.0	20.0	20.0	20.0	20.0
16.00-16.49	25.0	25.0	25.0	25.0	25.0	25.0
16.50-16.99	30.0	30.0	30.0	30.0	30.0	30.0
≥17.00	36.0	36.0	36.0	36.0	36.0	36.0

Source: Agricultural Stabilization and Conservation Service, U.S. Department of Agriculture.

While the market should adjust and compensate the producer or seller for the protein present in the wheat, market imperfections may cause a lag before these changes actually take place. The record indicates no or slow adjustment. For the wheat markets of Portland and Minneapolis, it appears that adjustments have not been made to reflect the change in reporting protein percentage. The Kansas City market reflected no significant change, as expected.

Changes in nominal protein would not significantly change protein premiums for many States because CCC premiums are changed on the basis of 0.5 percent. Present premiums used by ASCS in its price support program do not relate to market premiums and have not been changed for some time. An argument could be made for changing the premium schedule to reflect market conditions, especially since a government action can affect premium levels.

Table 10--Estimated effects on wheat price support loan protein premiums, as a result of changing the protein recording procedure, 1987 crop

Wheat class and State	Change in protein percentage			Potential change to protein premium
	----Percent----			Dollars per bushel
Hard Red Winter:				
California	11.74	11.42	-0.32	0 -- -0.015
Idaho	11.20	10.84	-.36	0 -- 0
Kansas	11.63	11.62	-.01	0 -- -.025
Montana	12.87	12.73	-.14	0 -- 0
Nebraska	11.90	11.90	-.00	0 -- -.001
Oklahoma	13.01	12.96	-.05	0 -- -.015
Texas	12.44	12.37	-.07	0 -- -.020
Washington	12.46	12.10	-.36	0 -- 0
Hard Red Spring:				
Idaho	14.05	13.59	-.46	0 -- -.03
Minnesota	13.82	13.86	+.04	0 -- 0
Montana	13.97	13.86	-.11	0 -- 0
North Dakota	13.90	13.98	+.08	0 -- 0
Washington	14.35	14.00	-.35	0 -- -.03

Source: (7, table 9).

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(4) Hill, Lowell D. "Buying Grain on a Dry Matter Basis," article in Evaluation of The Issues in Grain Grades and Optimum Moistures. AE-4548. Department of Agricultural Economics, University of Illinois at Urbana-Champaign. Dec. 1982.

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Appendix table 1--U.S. grain standards for wheat

Grade	Minimum limits of: Test weight per bushel: Hard Red Spring wheat or white club wheat 1/	Minimum limits of: Test weight per bushel: All other classes and subclasses	Maximum limits of: Damaged Kernels: Heat-damaged kernels	Maximum limits of: Damaged Kernels: Total 2/	Maximum limits of: Foreign material	Maximum limits of: Shrunken and broken kernels	Maximum limits of: Defects 3/	Maximum limits of: Wheat of other classes 4/: Contrasting classes	Maximum limits of: Wheat of other classes 4/: Total 5/
	Pounds		Percent						
U.S. No. 1	58	60	0.2	2	0.5	3	3	1	3
U.S. No. 2	57	58	.2	4	1.0	5	5	2	5
U.S. No. 3	55	56	.5	7	2.0	8	8	3	10
U.S. No. 4	53	54	1.0	10	3.0	12	12	10	10
U.S. No. 5	50	51	3.0	15	5.0	20	20	10	10

U.S. Sample grade

U.S. Sample grade is wheat that:

(a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, 4, or 5; or

(b) Contains 8 or more stones or any number of stones wheich have aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (Crotalaria spp.), 2 or more castor beans (Ricinus communis L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or tozic substance(s), or 2 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1,000 grams of wheat; or

(c) Has a mustly, sour, or commercially objectionable foreign odor (except smut or garlic odor); or

(d) Is heating or otherwise of distinctively low quality.

1/ The requirements also apply when Hard Red Spring wheat or white club wheat predominate in a sample of mixed wheat.

2/ Includes heat-damaged kernels.

3/ Defects include damaged kernels (total), foreign material, and shrunken and broken kernels. The sum of these three factors may not exceed the limit for defects for each grade.

4/ Unclassed wheat of any grade may contain more than 10 percent of wheat of other classes.

5/ Includes contrasting classes.

Appendix table 2--Test for the presence of seasonality assuming stability, Portland market (12-percent HRW less ordinary HRW)

Year	Months												Total
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	
	Dollars per bushel												
1981	0.10	0.13	0.14	0.19	0.28	0.43	0.21	0.19	0.21	0.21	0.20	0.20	2.40
1982	.25	.41	.62	.57	.42	.51	.40	.30	.15	.21	.19	.18	4.20
1983	.12	.07	.06	.06	.20	.34	.31	.35	.35	.45	.39	.38	3.00
1984	.42	.36	.34	.35	.41	.40	.33	.20	.09	.10	.10	.08	3.10
1985	.07	.12	.13	.17	.20	.21	.22	.21	.19	.25	.27	.02	2.00
1986	.15	.12	.13	.13	.16	.12	.12	.11	.11	.10	.10	.09	1.40
Average	.19	.20	.24	.24	.28	.34	.27	.23	.18	.22	.21	.16	

Table total = 16.46 Mean = 0.23 Standard deviation = 0.13

Test for the presence of seasonality assuming stability

	Sum of squares	Degrees of freedom	Mean square	F-value
Between months	19975.9119	11	1815.99199	1.703
Residual	51189.2558	48	1066.44283	
Total	71165.1677	59		

No evidence of stable seasonality at the 0.1 percent level

Appendix table 3--Test for the presence of seasonality assuming stability, Portland market (14-percent HRW less ordinary HRW)

Year	Months												Total
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	
	Dollars per bushel												
1981	0.54	0.61	0.72	0.90	1.05	1.00	0.74	0.59	0.36	0.35	0.32	0.38	7.50
1982	.52	.67	1.05	.95	.73	.78	.71	.48	.22	.32	.29	.15	6.80
1983	.05	.12	.16	.29	.46	.65	.76	.72	.63	.67	.64	.63	5.70
1984	.68	.75	.75	.78	.86	.85	.90	.57	.41	.44	.40	.42	7.80
1985	.45	.43	.50	.63	.70	.79	.82	.72	.67	.79	.75	.75	8.00
1986	.81	.87	.92	.94	.94	.67	.70	.59	.54	.52	.50	.48	8.40
Average	.51	.57	.68	.75	.79	.79	.77	.61	.47	.51	.48	.47	

Table total = 44.50 Mean = 0.62 Standard deviation = 0.23

Test for the presence of seasonality assuming stability

	Sum of squares	Degrees of freedom	Mean square	F-value
Between months	25568.9656	11	2324.45142	3.527
Residual	31638.4570	48	659.134520	
Total	57207.4225	59		

No evidence of stable seasonality at the 0.1 per cent level

Appendix table 4--Test for the presence of seasonality assuming stability, Kansas City market (13-percent HRW less ordinary HRW)

Year	Months												Total
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	
	Dollars per bushel												
1981	0.07	0.03	0.05	0.09	0.08	0.12	0.01	0.02	0.03	0.00	0.00	0.00	0.50
1982	.02	.06	.04	.04	.02	.09	.38	.30	.19	.19	.23	.26	1.82
1983	.19	.09	.09	.14	.17	.30	.44	.28	.31	.36	.35	.26	2.98
1984	.25	.24	.27	.29	.28	.35	.32	.18	.14	.15	.14	.15	2.76
1985	.11	.13	.13	.22	.30	.34	.36	.33	.34	.35	.35	.39	3.35
1986	.37	.35	.31	.25	.25	.10	.20	.07	.13	.15	.16	.21	2.55
Average	.17	.15	.15	.17	.18	.22	.28	.20	.19	.20	.21	.21	

Table total = 13.96 Mean = 0.19 Standard deviation = 0.12

Test for the presence of seasonality assuming stability

	Sum of squares	Degrees of freedom	Mean square	F-value
Between months	19232.2332	11	1748.38483	0.892
Residual	94035.3007	48	1959.06876	
Total	113267.5339	59		

No evidence of stable seasonality at the 0.1 per cent level

Appendix table 5--Test for the presence of seasonality assuming stability, Minneapolis market (14-percent HRW less ordinary HRW)

Year	Months												Total
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	
	Dollars per bushel												
1981	0.16	0.25	0.35	0.39	0.33	0.27	0.32	0.22	0.16	0.07	0.09	0.07	2.68
1982	.07	.04	.06	.04	.04	.05	.08	.18	.23	.22	.23	.20	1.44
1983	.13	.10	.07	.06	.15	.24	.31	.13	.03	.01	.02	.01	1.26
1984	.02	.02	.04	.09	.06	.05	.13	.35	.40	.39	.38	.44	2.37
1985	.43	.40	.39	.45	.47	.45	.48	.69	.79	.90	.67	.71	6.83
1986	.59	.58	.67	.75	.98	.66	.83	.47	.21	.28	.28	.27	6.57
Average	.23	.23	.26	.30	.34	.29	.36	.34	.30	.31	.28	.28	

Table total = 21.15 Mean = 0.29 Standard deviation = 0.24

Test for the presence of seasonality assuming stability

	Sum of squares	Degrees of freedom	Mean square	F-value
Between months	28218.2884	11	2565.29894	0.884
Residual	139333.2615	48	2902.77628	
Total	167551.5498	59		

No evidence of stable seasonality at the 0.1 per cent level

Appendix table 6--Test for the presence of seasonality assuming stability, Minneapolis market (15-percent HRW less ordinary HRW)

Year	Months												Total
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	
	Dollars per bushel												
1981	0.41	0.52	0.60	0.71	0.66	0.60	0.53	0.31	0.28	0.12	0.13	0.10	4.90
1982	.09	.06	.07	.06	.04	.05	.16	.26	.37	.36	.38	.30	2.20
1983	.22	.18	.17	.15	.21	.35	.44	.18	.08	.05	.04	.06	2.10
1984	.05	.07	.09	.16	.09	.08	.13	.57	.66	.63	.64	.76	3.90
1985	.76	.70	.69	.75	.74	.74	.73	1.00	1.25	1.24	1.02	1.05	10.60
1986	.93	.91	.92	1.05	1.32	.93	1.14	.83	.57	.64	.72	.82	10.70
Average	.41	.41	.42	.48	.51	.46	.52	.52	.54	.51	.49	.51	

Table total = 34.68 Mean = 0.48 Standard deviation = 0.36

Test for the presence of seasonality assuming stability

	Sum of Squares	Degrees of freedom	Mean square	F-value
Between months	16626.2441	11	1511.47673	0.696
Residual	104206.4093	48	2170.96686	
Total	120832.6534	59		

No evidence of stable seasonality at the 0.1 per cent level

Appendix table 7--Estimated changes to nominal protein due to a change in reported protein percentage, by selected wheat class and State, 1986 crop

Wheat class and State	1986 production of HRW	Percent of total	Number of samples	Percent of total	Protein measurement "as is" moisture	Protein measurement Constant 12-percent moisture	Gain or loss	
	1,000 bushels	Pct.	No.		Percent			
Hard Red Winter:								
California	43,650	4	1,420	45	11.40	11.10	-0.30	
Idaho	16,592	2	23	1	12.30	11.88	-.42	
Kansas	336,600	33	602	18	12.04	12.01	-.03	
Montana	64,000	6	260	8	12.88	12.63	-.25	
Nebraska	76,000	7	190	6	11.79	11.75	-.04	
Oklahoma	150,800	15	48	1	12.15	12.13	-.02	
Texas	112,800	11	607	18	13.15	13.10	-.05	
Washington	15,435	2	105	2	12.76	12.40	-.36	
Subtotal	815,877	80	3,255	96			-.06	1/
Total	1,017,831	100	3,395	100				
Hard Red Spring:								
Idaho	22,126	5	74	5	13.43	13.04	-.39	
Minnesota	98,050	22	66	4	13.90	14.07	+.17	
Montana	70,200	15	157	10	14.20	13.98	-.22	
North Dakota	198,400	44	632	40	14.52	14.68	+.16	
Washington	6,417	1	385	25	14.62	14.21	-.41	
Subtotal	395,193	87	1,314	84			+.05	2/
Total	451,417	100	1,571	100				

1/ Weighted average based on HRW production of listed States.
2/ Weighted average based on HRS production of listed States.

Source: (6).

Appendix table 8--Estimated changes to 1986 export wheat protein averages due to a change in reporting protein percentages

Wheat class	Number of sample lots	Percent of class volume represented	Protein average		Gain or loss
			"as is" moisture	Constant 12-percent moisture	
	No.		Percent		
Hard Red Winter	479	62.6	11.9	11.8	-0.1
Soft Red Winter	25	5.3	10.1	10.2	+.1
White Wheat	224	52.9	10.9	10.7	-.2
Hard Red Spring	547	87.7	14.1	14.1	0
Durum	23	7.3	14.0	13.9	-.1

Source: (8).

Appendix table 9--Estimated effects to producers' premiums due to a change in reporting protein percentages, by selected wheat class and State, 1986 crop

Wheat class and State	Change in nominal protein (from table 1)	Protein premium	Scenario A Farmer absorbs gain or loss	Scenario B Premium market adjusts
	Percent	Dollars per bushel		
Hard Red Winter:				
California	-0.30	0.140 1/	-0.042	+0.042
Idaho	-.12	.140 1/	-.068	+.068
	-.30	.170 2/		
Kansas	-.03	.140 3/	-.004	+.004
Montana	-.25	.170 2/	-.043	+.043
Nebraska	-.04	.070 4/	-.003	+.003
Oklahoma	-.02	.140 3/	-.003	+.003
Texas	-.05	.100 5/	-.005	+.005
Washington	-.36	.170 2/	-.061	+.061
Total	-.06		-.009 6/	-.009 6/
Hard Red Spring:				
Idaho	-.39	.140 7/	-.055	+.055
Minnesota	+.07	.150 9/	+.023	-.023
	+.10	.120 10/		
Montana	-.20	.100 8/	-.023	+.023
	-.02	.140 7/		
North Dakota	+.16	.150 9/	+.024	-.024
Washington	-.41	.100 8/	-.041	+.041
Total	+.05		+.002 11/	+.002 11/

1/ Based on a Portland premium of HRW (12%-11%), 1981-85 crop year average (app. table 1).
2/ Based on a Portland premium of HRW (13%-12%), 1981-85 crop year average (app. table 1).
3/ Based on a Kansas City premium of HRW (13%-12%), 1981-85 crop year average (app. table 3).
4/ Based on a Kansas City premium of HRW (12%-11%), 1981-85 crop year average (app. table 3).
5/ Based on a Kansas City premium of HRW (14%-13%), 1981-85 crop year average (app. table 3).
6/ Weighted average based on production of the listed HRW producing States.
7/ Based on a Portland premium of dark northern spring (14%-13%), 1981-85 crop year average (app. table 2).
8/ Based on a Portland premium of dark northern spring (15%-14%), 1981-85 crop year average (app. table 2).
9/ Based on a Minneapolis premium of dark northern spring (15%-14%), 1981-85 crop year average (app. table 4).
10/ Based on a Minneapolis premium of dark northern spring wheat (14%-13%), 1981-85 crop year average (app. table 4).
11/ Weighted average based on production of the listed HRS States.

Appendix table 10--Portland HRW prices and protein premiums, annual and 5-year average

Crop year	Protein level			
	Ordinary protein	11 percent	12 percent	13 percent
		Dollars per bushel		
Prices:				
1981/82	4.33	4.51	4.66	4.81
1982/83	4.30	4.37	4.50	4.68
1983/84	4.07	4.25	4.44	4.67
1984/85	4.07	4.15	4.23	4.34
1985/86	3.64	3.69	3.81	4.02
5-year average	4.08	4.19	4.33	4.50
Protein premiums: 1/				
1981/82		.18	.33	.48
1982/83		.07	.20	.38
1983/84		.18	.37	.60
1984/85		.08	.16	.27
1985/86		.05	.07	.38
5-year average		.11	.25	.42

1/ Calculated from ordinary protein base.
Source: (5).

Appendix table 11--Portland dark northern spring prices and protein premiums, annual and 5-year average

Crop year	Protein level			
	Ordinary protein	13 percent	14 percent	15 percent
		Dollars per bushel		
Prices:				
1981/82	4.33	4.84	4.97	5.10
1982/83	4.30	4.49	4.63	4.73
1983/84	4.07	4.65	4.78	4.84
1984/85	4.07	4.51	4.63	4.67
1985/86	3.64	4.24	4.45	4.60
5-year average.	4.08	4.55	4.69	4.79
Protein premiums: 1/				
1981/82		.51	.64	.77
1982/83		.19	.33	.43
1983/84		.58	.71	.77
1984/85		.44	.56	.60
1985/86		.60	.81	.96
5-year average		.47	.61	.71

1/ Calculated from ordinary protein base.
Source: (5).

Appendix table 12--Kansas City HRW prices and protein premiums, annual and 5-Year average

Crop year	Protein level			
	Ordinary protein	12 percent	13 percent	14 percent
	Dollars per bushel			
Prices:				
1981/82	4.27	4.28	4.30	4.31
1982/83	3.94	3.97	4.13	4.17
1983/84	3.84	3.95	4.14	4.27
1984/85	3.74	3.78	3.93	4.07
1985/86	3.28	3.14	3.62	3.77
5-year average	3.81	3.88	4.02	4.12
Protein premiums: 1/				
1981/82		.01	.03	.04
1982/83		.03	.19	.23
1983/84		.11	.30	.43
1984/85		.04	.19	.33
1985/86		.13	.34	.49
5-year average		.07	.21	.31

1/ Calculated from ordinary protein base.
Source: (5).

Appendix table 13--Minneapolis dark northern spring prices and protein premiums, annual and 5-year average

Crop year	Protein level				
	Ordinary protein	13 percent	14 percent	15 percent	17 percent
			Dollars per bushel		
Prices:					
1981/82	4.17	4.26	4.29	4.37	4.48
1982/83	3.94	4.05	4.09	4.18	4.31
1983/84	4.21	4.26	4.30	4.35	4.47
1984/85	3.70	3.90	4.06	4.29	4.56
1985/86	3.25	3.64	3.94	4.27	4.62
5-year average	3.85	4.02	4.14	4.29	4.49
Protein premiums: 1/					
1981/82		.09	.12	.20	.31
1982/83		.11	.15	.24	.37
1983/84		.05	.09	.14	.26
1984/85		.20	.36	.59	.86
1985/86		.39	.69	1.02	1.37
5-year average		.17	.28	.44	.63

1/ Calculated from ordinary protein base.
Source: (5).

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