



# USDA SEDIMENTATION TEST

It Does Not Affect Hard Red Spring Wheat Variety Choices

L. A. Jensen  
Extension Agronomist

Dr. Kenneth Gilles, Chairman  
Cereal Technologist  
Agricultural Experiment Station

S  
544.3  
.N9  
A8  
no. 360

## NDSU LIBRARIES

EXTENSION SERVICE  
NORTH DAKOTA STATE UNIVERSITY  
OF AGRICULTURE AND APPLIED SCIENCE

## THE USDA SEDIMENTATION TEST

The United States Department of Agriculture has announced that, beginning with the 1962 crop year, price support premiums for high quality hard wheats will be based on the "Sedimentation Test" instead of on the protein test. This will apply to all farm stored loans and also to elevator loans, if the warehouse receipt or a supplemental certificate carries the sedimentation value.

Wheat strength for bread baking purposes is best measured by controlled milling and baking tests, using a baking method that is sensitive to small differences in flour strength. This method, however, requires considerable time and a skilled miller and baker and rather elaborate equipment for performing the test.

Spring wheat varieties have been selected for quality by experiment stations on the basis of milling and baking tests; consequently, named and recommended varieties are recognized as being good to excellent in milling and baking properties.

### What is the Sedimentation Test

The sedimentation test has been designed as a simple and rapid method to estimate the strength of wheat. This test can be completed in about 30 minutes and the equipment required is relatively simple. It is based on the known facts that (1) the gluten protein absorbs water and swells enormously when treated with dilute lactic acid, and (2) the amount of water absorbed and, consequently the extent of swelling, depend on the quality of the gluten.

A small amount of wheat is ground into a type of flour and mixed with water and lactic acid in a glass cylinder according to a prescribed procedure. The volume of "sediment" is read from a graduated scale and is dependent on both the quantity and the quality of the gluten in the wheat.

Sedimentation values range from less than 20 for very weak wheats up to 70 or more for the strongest wheats.

The protein test measures the quantity of protein. This has been a very satisfactory basis on which to determine premiums for the spring wheat varieties recommended for and grown in North Dakota, because all are high quality varieties. Protein content in North Dakota is influenced largely by seasonal growing conditions. Protein quality is influenced largely by the heredity of the variety. For many years, experiment stations in the spring wheat area have released and recommended for growing only varieties of high protein quality.

### Sedimentation Value Premiums

Table 1 compares the higher premiums paid on the basis of sedimentation value with the lower premiums paid on the basis of a protein test. When studying these comparisons, it must be remembered that this table is based on average correlations — that is 12 per cent protein wheat does not always have a 40 sedimentation value and so on down the list. Moreover, two changes have been made, (1) a new and higher premium schedule will be in effect, and (2) the sedimentation test will be used as a basis for paying premiums.

Table 1. Comparison of Announced Premium Schedules

PROTEIN		SEDIMENTATION	
Premium Cents per bu.	Per cent	Premium Cents per bu.	Sed. Value
0	Below 11.0		
1	11.0 – 11.9	0	Below 40
2	12.0 – 12.9	3	40 – 44
3	13.0 – 13.9	6	45 – 49
4	14.0 – 14.4	10	50 – 54
5	14.5 – 14.9		
6	15.0 – 15.4	14	55 – 59
7	15.5 – 15.9	19	60 – 64
8	16.0 – 16.4		
10	16.5 – 16.9	24	65 & over
12 *	17.0 – 17.4		

\*Plus 2 cents for each 1/2 per cent protein over 17.4.

### Variety and Sedimentation Test Comparisons

Field plot samples of named varieties grown on summerfallow at each of the North Dakota experiment stations in 1961 were subjected to both the sedimentation and the protein tests by the Department of Cereal Technology, North Dakota State University. Tables 2, 3 and 4 summarize the data for each station and for each variety.

All of the experiment stations, except at Fargo, produced wheat which tested in the highest premium range based on sedimentation value. Because of the drouth, the protein content of the 1961 crop likely is higher than normal. This would tend to increase the apparent sedimentation reading.

Table 2  
SEDIMENTATION VALUES, 1961 HARD RED SPRING WHEAT VARIETIES

Variety	North Dakota stations						Variety average 6 stations
	Edgeley	Fargo	Langdon	Minot	Williston	Dickinson	
* Thatcher	70	54	67	76	75	72	69
* Mida	67	47	65	75	74	70	66
* Lee	69	51	68	76	75	70	68
* Selkirk	70	46	66	76	75	75	68
* Conley	69	55	70	74	75	72	69
* Pembina	70	60	70	77	77	73	71
* Canthatch	72	57	71	76	74	73	70
Centana					75		
Sawtana					75		
Rescue				77	77		
Chinook					75	73	
Rushmore					75	73	
Station average (* Std. Var.)	70	53	68	76	75	72	

All values corrected to 14 per cent moisture.

Table 3  
PROTEIN VALUES, 1961 HARD RED SPRING WHEAT VARIETIES

Variety	North Dakota stations						Variety average
	Edgeley	Fargo	Langdon	Minot	Williston	Dickinson	
* Thatcher	16.2	12.6	17.0	16.6	18.2	17.4	16.3
* Mida	16.2	12.6	16.6	16.4	17.0	17.0	16.0
* Lee	16.8	13.5	17.6	17.3	17.8	18.4	16.9
* Selkirk	15.6	12.6	16.4	16.2	17.1	17.7	15.9
* Conley	16.0	13.2	17.4	16.5	16.8	16.9	16.1
* Pembina	16.3	12.8	17.2	16.4	17.8	17.2	16.3
* Canthatch	16.4	13.6	17.1	16.4	18.4	17.5	16.6
Centana					17.5		
Sawtana					17.2		
Rescue				16.6	17.4		
Chinook					17.1	17.1	
Rushmore					17.6	17.0	
Station average (* Std. var.)	16.2	13.0	17.0	16.5	17.5	17.3	

Table 4. Summary Of Average Protein And Sedimentation Values  
1961 Hard Red Spring Wheat Varieties At North Dakota Experimental Stations

Variety	Protein	Sed. value	Location	Protein	Sed. value
Thatcher	16.3	69	Edgeley	16.2	70
Mida	16.0	67	Fargo	13.0	53
Lee	16.9	68	Langdon	17.0	68
Selkirk	15.9	68	Minot	16.5	76
Conley	16.1	69	Williston	17.5	75
Pembina	16.3	71	Dickinson	17.3	72
Canthatch	16.6	70			

The preceding tables show that there is little or no significant difference in sedimentation value among these varieties. This indicates clearly that your choice of variety for 1962 planting should continue to be based on yield, disease resistance, straw strength and other agronomic factors rather than on sedimentation values.

#### Recommended Hard Red Spring Wheat Varieties for North Dakota

For rust areas – Selkirk, Pembina, Conley and Lee.

Where rust is less common – Selkirk, Pembina, Conley, Lee and Canthatch. Mida and Thatcher will also do well in nonrust years.

For sawfly areas – Chinook and Rescue.

Table 5. Average Yields of Recommended Wheat Varieties

	Fargo	Edgeley	Langdon	Minot	Dickinson	Williston	
	1959-61	1959-61	1959-61	1959-61	1958-61	1958-61	1958-61
						Dryland	Irrigated
Lee	24.8	15.4	29.2	23.9	18.7	14.5	43.7
Selkirk	24.2	18.2	29.3	23.3	19.7	15.5	41.6
Pembina	23.1	16.8	25.7	24.2	-----	-----	-----
Canthatch	27.2	15.4	26.6	24.5	21.6	16.1	45.0
Thatcher	24.6	17.2	26.5	25.0	18.9	15.1	43.6
Conley	22.7	16.4	31.8	23.1	17.9	14.2	44.8
Mida	-----	20.1	30.4	24.3	19.7	14.4	42.2
Rushmore	-----	-----	-----	-----	19.1	-----	-----
Chinook	-----	-----	-----	-----	19.1	14.8	-----
Rescue	-----	-----	-----	22.4	-----	13.3	-----

Data from North Dakota Agricultural Experiment Station annual reports.

### **Production Factors That May Influence Sedimentation Value**

1. SELECT RECOMMENDED NAMED VARIETIES FOR PLANTING BECAUSE THEY WERE DEVELOPED AND RELEASED FOR THEIR HIGH QUALITY AS WELL AS FOR THEIR DESIRABLE AGRONOMIC CHARACTERISTICS.
2. SEASONAL MOISTURE AND TEMPERATURE DURING THE GROWING SEASON WILL INFLUENCE THE QUANTITY OF PROTEIN AND, THUS, THE SEDIMENTATION VALUE. HIGH YIELD USUALLY IS ASSOCIATED WITH LOWER PROTEIN CONTENT AND LOW YIELDS WITH HIGH PROTEIN CONTENT. A HIGH YIELDING CROP LIKELY WILL HAVE A LOWER AVERAGE SEDIMENTATION VALUE THAN A LOW YIELDING CROP.
3. WHEAT GROWN ON SUMMERFALLOW BECAUSE OF HIGHER YIELD PER ACRE OFTEN HAS A LOWER PROTEIN CONTENT THAN WHEAT GROWN ON SUMMERFALLOW.
4. COMMERCIAL NITROGEN APPLIED AT OR BEFORE PLANTING TIME CAN INCREASE YIELD PER ACRE, BUT IT USUALLY IS NOT PROFITABLE TO APPLY ENOUGH TO INCREASE THE PROTEIN PERCENTAGE OF THE HARVESTED WHEAT CROP.
5. NORMALLY, WHEAT GROWN IN WESTERN NORTH DAKOTA HAS A HIGHER PROTEIN CONTENT THAN WHEAT GROWN IN EASTERN NORTH DAKOTA.
6. OTHER THAN SELECTING PURE SEED OF A RECOMMENDED NAMED VARIETY TO PLANT, AND FOLLOWING GENERALLY GOOD CROPPING PRACTICES, THE PRODUCER CANNOT INFLUENCE TO ANY EXTENT THE SEDIMENTATION VALUE OF THE HARVESTED WHEAT CROP.

The Agronomy Department of NDSU, and the Branch Experiment Stations provided wheat samples and yield data. The North Dakota State Wheat Commission provided funds for the research on which this information is based.