Agriculture
Canada

Canadian Grain Commission
Commission canadienne des grains

GRAIN RESEARCH LABORATORY

QUALITY OF 1986 CANADIAN WHEAT

Supplementary Report

Canada

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QUALITY OF 1986 CANADIAN WHEAT

Supplementary Report

CONTENTS

INTRODUCTION

This bulletin is a supplement to crop bulletin No. 168 Quality of 1986 Canadian Wheat which, due to the extremely late, wet harvest in Western Canada, contained information on only the top grades for five classes of spring wheat.

Quality data are presented for composite samples of lower grade wheat of the classes Canada Western Red Spring, Canada Western Amber Durum, Canada Prairie Spring and Canada Western Soft White Spring collected up to the middle of November. Supplementary baking data (sponge-and-dough and short process methods) are published for the first time for No. 1 and No. 2 Canada Western Red Spring wheat composites.

Lower grade composites may still not be fully representative of new crop production because although Saskatchewan's wheat harvest was virtually complete by October 23, Manitoba and Alberta harvests were only about two-thirds completed by that time. In particular, wheat falling number and flour amylograph viscosity values may be somewhat lower in cargo shipments than for new crop composites of these grades.

Since most top grade wheat was harvested before the period of continuous rain that interrupted Prairie harvesting during September, the quality data published in crop bulletin No. 168 are thought to represent a reasonably good prediction of the quality of cargoes of top grade wheat that will move during the present shipping season.

Statistics Canada has revised its estimate of Prairie spring wheat production (Field Crop Reporting Series No. 8, December 3, 1986) to 25.57 million tonnes from 11.44 million hectares. The durum wheat production estimate has been revised to 4.04 million tonnes from 1.88 million hectares.

Due to the late harvest conditions in Western Canada the official Canadian Grain Commission grade distribution estimates were unavailable at the time of publication of crop bulletin No. 168. The Grain Inspection Division now estimates that 36% of the 1986 Canada Western Red Spring wheat crop will qualify for the grade No. 1 C.W., 21% for No. 2 C.W., 27% for No. 3 C.W., with the remaining 16% grading Canada Feed. Grade estimates for amber durum wheat are 34% No. 1 C.W.A.D., 17% No. 2 C.W.A.D., 19% No. 3 C.W.A.D. and 30% No. 4 C.W.A.D. and lower.

Final protein content estimates plus detailed quality data now follow in a series of tables.

1. Protein Content of 1986 and 1985 Crop Canadian Wheat Classes (Final — December 4, 1986)

Class	1986		1985	
	Number of Samples	Protein Content, %*	Number of Samples	Protein Content, %*
Canada Western Red Spring	10,439	13.1	6,106	13.4
Canada Western Amber Durum	1,764	12.9	1,182	14.1
Canada Utility	91	12.0	202	12.4
Canada Prairie Spring	295	11.5	638	11.6
Canada Western Red Winter	890	10.9	1,417	11.5
Canada Western Soft White Spring	283	10.6	158	10.6
Canada Eastern White Winter	262	9.6	274	9.3

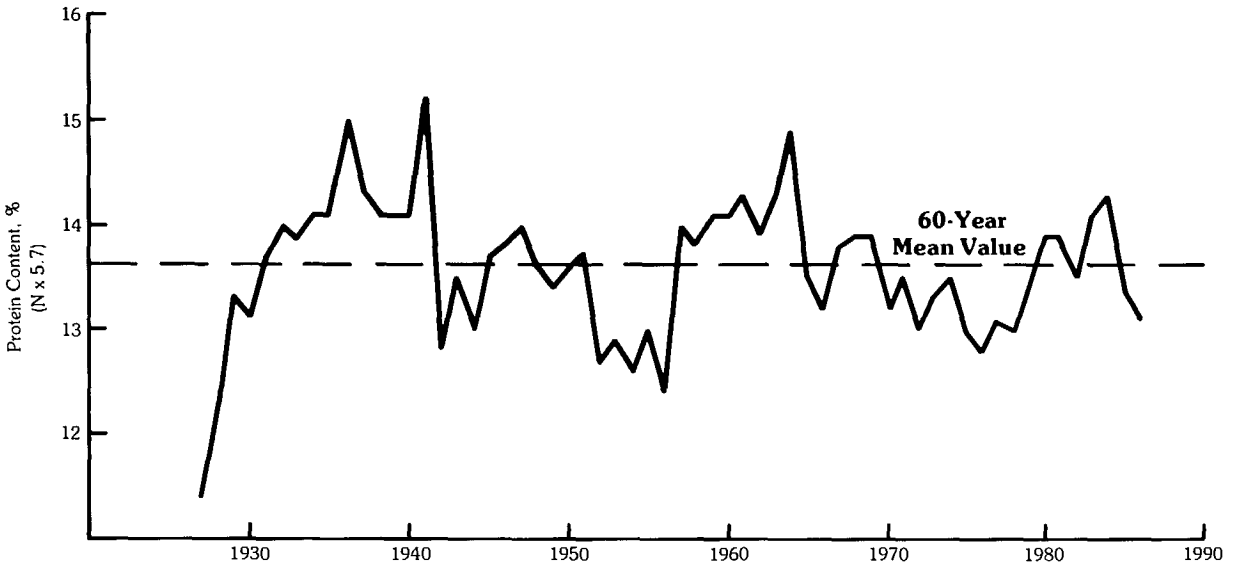
* Mean Value (All Grades), N x 5.7, 13.5% moisture content basis.

2. Protein Content of 1986 Crop Red Spring Wheat (Final — November 28, 1986)

Grade	Number of samples Prairies 1986	Protein Content, %*					
		Prairies			1986		
		1986	1985	1976-85	Manitoba	Saskatchewan	Alberta
No. 1 C.W.	3,020	13.4	14.0	13.9	13.4	13.4	13.5
No. 2 C.W.	2,250	13.3	13.4	13.4	13.6	13.2	13.0
No. 3 C.W.	4,641	12.8	12.7	13.0	13.0	12.8	12.8
Canada Feed	528	12.9	13.0	-	12.9	12.9	12.9
All Grades	10,439	13.1	13.4	13.5	13.3	13.0	13.1

* N x 5.7; 13.5% moisture content basis.

Mean Protein Content of New Crop Canadian Red Spring Wheat 1927-1986



3. Protein Content of 1986 Crop Amber Durum Wheat (Final — December 4, 1986)

Grade	Number of Samples Prairies 1986	Protein Content, %*					
		Prairies			1986		
		1986	1985	1980-84	Manitoba	Saskatchewan	Alberta
No. 1 C.W.A.D.	590	13.2	14.5	13.8	12.1	13.1	13.3
No. 2 C.W.A.D.	286	12.9	14.2	13.7	12.8	12.9	13.3
No. 3 C.W.A.D.	344	13.1	13.7	14.1	13.1	13.0	14.5
No. 4 C.W.A.D.	504	12.5	12.9	13.6	12.8	12.4	12.8
No. 5 C.W.A.D.	40	12.5	13.7	-	12.3	12.2	12.8
All Grades	1,764	12.9	14.1	13.8	12.9	12.8	13.3

* N x 5.7; 13.5% moisture content basis.

4. NO. 2 AND NO. 3 CANADA WESTERN RED SPRING WHEAT
Quality Data for Eastern Prairie Grade Composite Samples of 1986 Crop

Quality Parameter	No. 2 C.W. Minimum Protein Level 13.5	No. 2 C.W. Minimum Protein Level 12.5	No. 3 C.W.
Number of Samples Represented	1,415	1,217	2,869
WHEAT			
Test Weight, kg/hL	80.1	80.6	79.0
1000 Kernel Weight, g	32.6	32.1	32.0
Protein Content, % (N x 5.7)	13.8	12.6	12.9
Ash Content, %	1.65	1.59	1.58
Alpha-amylase Activity, units/g	4.5	6.1	41.6
Falling Number, s	415	390	275
Flour Yield, %	75.8	75.6	75.8
FLOUR			
Protein Content, %	13.3	12.3	12.4
Wet Gluten Content, %	37.7	34.7	35.0
Ash Content, %	0.52	0.51	0.52
Color, units	-0.7	-1.0	-0.4
Alpha-amylase Activity, units/g	2.4	2.4	11.5
Amylograph Peak Viscosity, B.U.	490	530	135
Maltose Value, g/100 g	2.0	2.1	2.9
Starch Damage, Farrand units	30	34	32
Baking Absorption, %	64	63	63
BREAD			
Loaf Volume, cm^3	870	770	815
Appearance	7.8	7.5	7.5
Crumb Structure	6.8-o	7.0-o	7.0-o
Crumb Color	6.5-d	5.5-dy	5.8-d
Blend Loaf Volume, cm^3	730	690	695
FARINOGRAM			
Absorption, %	64.8	64.3	64.2
Development Time, min	4.25	3.50	3.75
M.T.I., B.U.	35	40	40
Stability, min	7.00	5.50	5.50
EXTENSIGRAM			
Length, cm	22	21	22
Height at 5 cm, B.U.	240	250	210
Maximum Height, B.U.	345	350	310
Area, cm^2	105	105	95
ALVEOGRAM			
Length, mm	125	116	128
P (height x 1.1), mm	94	98	95
W, x 10^3 ergs	334	327	364

5. NO. 2 AND NO. 3 CANADA WESTERN RED SPRING WHEAT
Quality Data for Western Prairie Grade Composite Samples of 1986 Crop

Quality Parameter	No. 2 C.W. Minimum Protein Level 13.5	No. 2 C.W. Minimum Protein Level 12.5	No. 3 C.W.
Number of Samples Represented	485	530	1,772
WHEAT			
Test Weight, kg/hL	81.0	81.1	79.3
1000 Kernel Weight, g	33.8	33.7	34.1
Protein Content, % (N x 5.7)	13.7	12.8	12.8
Ash Content, %	1.47	1.57	1.55
Alpha-amylase Activity, units/g	6.1	6.0	43.6
Falling Number, s	390	390	250
Flour Yield, %	75.6	75.3	74.9
FLOUR			
Protein Content, %	13.3	12.3	12.1
Wet Gluten Content, %	38.4	36.0	34.4
Ash Content, %	0.49	0.52	0.50
Color, units	-0.6	-1.0	-0.4
Alpha-amylase Activity, units/g	3.1	3.0	20.7
Amylograph Peak Viscosity, B.U.	430	400	90
Maltose Value, g/100 g	2.1	2.2	3.2
Starch Damage, Farrand units	34	34	33
Baking Absorption, %	65	64	63
BREAD			
Loaf Volume, cm^3	840	760	780
Appearance	7.5	7.5	7.5
Crumb Structure	7.0-o	7.0-o	7.0-o
Crumb Color	6.0-dy	5.5-dy	5.2-d
Blend Loaf Volume, cm^3	700	655	680
FARINOGRAM			
Absorption, %	66.0	65.5	64.4
Development Time, min	4.00	3.75	3.75
M.T.I., B.U.	30	40	50
Stability, min	7.00	6.00	6.00
EXTENSIGRAM			
Length, cm	22	20	21
Height at 5 cm, B.U.	245	235	210
Maximum Height, B.U.	350	330	300
Area, cm^2	115	95	90
ALVEOGRAM			
Length, mm	129	99	114
P (height x 1.1), mm	93	98	99
W, x 10^3 ergs	337	294	344

6. NO. 3 AND NO. 4 CANADA WESTERN AMBER DURUM WHEAT
Quality Data for Grade Composite Samples of 1986 Crop

Quality Parameter	No. 3 C.W.A.D.	No. 4 C.W.A.D.
Number of Samples	344	504
WHEAT		
Test Weight, kg/hL	80.7	79.0
Weight per 1000 Kernels, g	42.0	43.9
Vitreous Kernels, %	69	59
Protein Content, %	12.9	12.6
Ash Content, %	1.71	1.55
SDS Sedimentation, mL	36	35
Falling Number, s	310	165
Milling Yield, %	76.2	76.3
Semolina Yield, %	64.8	64.6
SEMOLINA		
Protein Content, %	12.4	12.0
Wet Gluten Content, %	31.8	29.6
Ash Content, %	0.67	0.68
AGTRON Color, units	72	69
Speck Count, per 50 cm^2	50	74
SPAGHETTI		
Dried at 39°C		
Color:		
Brightness, %	48.3	48.2
Purity, %	64.6	60.7
Dominant Wavelength, nm	577.6	577.6
Cooking Quality, CQP	12.4	14.4
Stickiness, N/m^2	1210	1120
Cooking Loss, %	7.9	8.3
Dried at 70°C		
Color:		
Brightness, %	47.1	46.6
Purity, %	62.8	60.7
Dominant Wavelength, nm	577.8	577.8
Cooking Quality, CQP	26.4	23.8
Stickiness, N/m^2	748	780
Cooking Loss, %	6.4	6.6

7. NO. 2 CANADA PRAIRIE SPRING WHEAT AND NO. 2 AND NO. 3 CANADA WESTERN SOFT WHITE SPRING WHEAT
Quality Data for Grade Composite Samples of 1986 Crop

Quality Parameter	No. 2 C.P.S.	No. 2 C.W.S.W.S.	No. 3 C.W.S.W.S.
Number of Samples	76	81	33
WHEAT			
Test Weight, kg/hL	77.1	79.8	75.9
1000 Kernel Weight, g	33.3	33.7	28.9
Protein Content, % (N x 5.7)	11.6	10.6	11.0
Ash Content, %	1.61	1.61	1.69
Alpha-amylase Activity, units/g	79.0	12.2	119.4
Falling Number, s	200	350	130
Flour Yield, %	74.8	72.6	70.2
FLOUR			
Protein Content, %	11.1	9.6	9.8
Wet Gluten Content, %	31.9	29.8	30.2
Ash Content, %	0.55	0.49	0.48
Color, units	1.7	0.6	1.5
Alpha-amylase Activity, units/g	26.7	3.6	51.4
Amylograph Peak Viscosity, B.U.	85	600	100
Maltose Value, g/100 g	2.0	1.1	1.8
Starch Damage, Farrand units	12	9	8
Baking Absorption, %	57	-	-
AWRC, units	-	78	80
BREAD			
Loaf Volume, cm^3	725	-	-
Appearance	7.2	-	-
Crumb Structure	6.2-o	-	-
Crumb Color	4.2-g	-	-
FARINOGRAM			
Absorption, %	55.6	56.4	54.6
Development Time, min	3.25	1.00	1.00
M.T.I., B.U.	90	220	215
Stability, min	4.50	1.00	1.50
EXTENSIGRAM			
Length, cm	26	-	-
Height at 5 cm, B.U.	215	-	-
Maximum Height, B.U.	300	-	-
Area, cm^2	115	-	-
ALVEOGRAM			
Length, mm	209	98	151
P (height x 1.1), mm	36	20	19
W, x 10^3 ergs	182	40	53

8. NO. 1 CANADA WESTERN RED SPRING WHEAT
Supplementary Baking Data – Eastern Prairie Grade Composite Samples of 1986 and 1985 Crops

Quality Parameter	No. 1 C.W. 13.5		No. 1 C.W. 12.5	
	1986	1985	1986	1985
Number of Samples Represented	1158	631	996	600
SPONGE-AND-DOUGH METHOD				
Potassium Bromate, ppm	20	20	20	20
Absorption, %	67	65	66	64
Mixing*: energy, Whr/kg	3.1	3.2	3.1	3.0
Mixing*: time, min	3.2	3.0	3.4	2.9
Loaf volume, cm^3/100 g flour	1020	1105	940	970
Yield: Bread Wt/Flour Wt	1.47	1.44	1.45	1.44
Appearance	7.9	7.7	7.4	7.3
Crumb Structure	6.8-o	6.8-o	6.8-o	6.8-o
Crumb Color	7.8	8.9	7.2	8.7
CANADIAN SHORT PROCESS				
Ascorbic Acid/Bromate, ppm	37.5/30	37.5/30	37.5/30	37.5/30
Absorption, %	68	68	68	68
Mixing: energy, Whr/kg	6.7	8.4	6.1	7.4
Mixing: time, min	5.8	6.1	5.8	5.8
Loaf Volume, cm^3/100 g flour	1050	1060	1015	990
Yield: Bread Wt/Flour Wt	1.54	1.52	1.56	1.53
Appearance	7.8	7.9	7.8	7.5
Crumb Structure	6.8-o	6.8-o	6.8-o	6.8-o
Crumb Color	8.2	8.7	7.8	8.2

* Dough Stage

Note: Wheat and flour quality data for these samples may be found on page 8 of Crop Bulletin No. 168.

9. NO. 1 CANADA WESTERN RED SPRING WHEAT
Supplementary Baking Data – Western Prairie Grade Composite Samples of 1986 and 1985 Crops

	No. 1 C.W. 13.5		No. 1 C.W. 12.5	
Quality Parameter	1986	1985	1986	1985
Number of Samples Represented	840	1076	774	729
SPONGE-AND-DOUGH METHOD				
Potassium Bromate, ppm	20	20	20	20
Absorption, %	67	66	66	66
Mixing*: energy, Whr/kg	2.8	3.2	2.9	3.1
Mixing*: time, min	3.0	2.9	3.1	3.2
Loaf volume, cm^3/100 g flour	1045	1065	940	1010
Yield: Bread Wt/Flour Wt	1.45	1.44	1.45	1.43
Appearance	8.0	7.7	7.5	7.4
Crumb Structure	6.8-o	6.8-o	6.8-o	6.8-o
Crumb Color	7.9	8.9	7.5	8.5
CANADIAN SHORT PROCESS				
Ascorbic Acid/Bromate, ppm	37.5/30	37.5/30	37.5/30	37.5/30
Absorption, %	68	68	68	68
Mixing: energy, Whr/kg	6.0	9.6	6.6	7.8
Mixing: time, min	5.6	6.8	6.0	6.6
Loaf Volume, cm^3/100 g flour	1100	1070	1100	995
Yield: Bread Wt/Flour Wt	1.57	1.52	1.55	1.54
Appearance	7.8	7.8	7.5	7.7
Crumb Structure	6.8-o	6.8-o	6.8-o	6.8-o
Crumb Color	8.3	8.7	7.9	8.8

* Dough Stage

Note: Wheat and flour quality data for these samples may be found on page 9 of Crop Bulletin No. 168.

10. NO. 2 CANADA WESTERN RED SPRING WHEAT

Supplementary Baking Data – Eastern Prairie Grade Composite Samples of 1986 and 1985 Crops

Quality Parameter	No. 2 C.W. 13.5		No. 2 C.W. 12.5	
	1986	1985	1986	1985
Number of Samples Represented	1415	618	1217	715
SPONGE-AND-DOUGH METHOD				
Potassium Bromate, ppm	20	20	20	20
Absorption, %	67	65	66	64
Mixing*: energy, Whr/kg	2.6	3.1	2.7	2.8
Mixing*: time, min	2.9	3.2	2.9	2.8
Loaf volume, cm^3/100 g flour	1015	1005	945	905
Yield: Bread Wt/Flour Wt	1.44	1.42	1.44	1.44
Appearance	7.4	7.5	7.0	7.0
Crumb Structure	6.8-o	6.8-o	6.8-o	6.8-o
Crumb Color	7.5	8.9	7.1	8.1
CANADIAN SHORT PROCESS				
Ascorbic Acid/Bromate, ppm	37.5/30	37.5/30	37.5/30	37.5/30
Absorption, %	69	68	68	67
Mixing: energy, Whr/kg	7.2	7.0	7.0	7.5
Mixing: time, min	5.9	6.0	5.8	6.8
Loaf Volume, cm^3/100 g flour	1045	1010	970	945
Yield: Bread Wt/Flour Wt	1.55	1.55	1.54	1.56
Appearance	7.9	7.3	7.3	7.3
Crumb Structure	6.8-o	6.8-o	6.7-o	6.8-o
Crumb Color	8.0	8.5	7.5	8.1

* Dough Stage

Note: Wheat and flour quality data for 1986 samples may be found on page 6 of this bulletin.

11. NO. 2 CANADA WESTERN RED SPRING WHEAT
Supplementary Baking Data – Western Prairie Grade Composite Samples of 1986 and 1985 Crops

	No. 2 C.W. 13.5		No. 2 C.W. 12.5	
Quality Parameter	1986	1985	1986	1985
Number of Samples Represented	485	485	530	388
SPONGE-AND-DOUGH METHOD				
Potassium Bromate, ppm	20	20	20	20
Absorption, %	67	65	66	65
Mixing*: energy, Whr/kg	2.7	2.9	2.6	2.7
Mixing*: time, min	2.8	2.8	2.9	2.8
Loaf volume, cm^3/100 g flour	1010	1025	945	950
Yield: Bread Wt/Flour Wt	1.44	1.43	1.44	1.44
Appearance	7.5	7.7	7.4	7.3
Crumb Structure	6.8-o	6.8-o	6.8-o	6.8-o
Crumb Color	7.7	9.0	7.4	8.5
CANADIAN SHORT PROCESS				
Ascorbic Acid/Bromate, ppm	37.5/30	37.5/30	37.5/30	37.5/30
Absorption, %	69	68	68	67
Mixing: energy, Whr/kg	7.1	6.9	6.6	7.2
Mixing: time, min	5.8	6.2	5.5	6.4
Loaf Volume, cm^3/100 g flour	1060	1070	1015	1010
Yield: Bread Wt/Flour Wt	1.56	1.54	1.55	1.55
Appearance	8.0	7.5	8.3	7.3
Crumb Structure	7.0	6.8-o	6.9-o	6.8-o
Crumb Color	8.3	8.7	8.0	8.4

* Dough Stage

Note: Wheat and flour quality data for 1986 samples may be found on page 7 of this bulletin.

METHODS

Notes on the methods used by the Laboratory are given below. Analytical results for wheat are reported on a 13.5% moisture basis, and for flour on a 14.0% moisture basis. The AACC methods cited are those of the American Association of Cereal Chemists given in Cereal Laboratory Methods, Eighth Edition, 1983. The ICC methods are those of the International Association for Cereal Chemistry.

Test Weight is determined using the Schopper Chondrometer equipped with the 1 litre container. The weight in grams of the measured litre of wheat is divided by 10 and the result is reported on an "as is" moisture content basis.

Weight per Thousand Kernels. Broken kernels and foreign material are first removed from a sample by hand-picking. The number of kernels in a 20 g sub-sample of this cleaned material is then counted using an electronic seed counter.

Protein Content (N x 5.7) is determined by the Kjeldahl method as modified by Williams, "Journal of the Science of Food and Agriculture" 24:243,1973.

Alpha-amylase Activity of wheat and of flour is determined by the method of Kruger and Tipples, "Cereal Chem." 58:271-274, 1981.

Falling Number is determined on a 7 g sample of ground wheat by the method of Hagberg, "Cereal Chem." 38:202-203, 1961. Wheat (300 g) is ground in a Falling Number Laboratory Mill 3100 (ICC Standard Method No. 107).

Milling (flour) is carried out in an Allis-Chalmers laboratory mill using the GRL sifter flow as described by Black et al, "Cereal Foods World" 25:757-760, 1980.

Wet Gluten Content. Ten grams of flour and 6 mL of distilled water are mixed by hand for about 2 min. The dough is then washed for 12 min in a Theby Gluten Washer using a salt-phosphate buffer of pH 6.7; this is followed by 2 min hand washing. The resulting gluten is worked between the fingers until it becomes tacky, and is then weighed.

Ash Content is determined on a 4 g sample in a silica dish incinerated overnight at 585°C. After cooling, the dish plus ash are weighed, the ash brushed out, the dish reweighed, and the weight of ash determined by difference.

Flour Color. A color index is obtained with the Kent-Jones and Martin Flour Color Grader which gives the relative reflectance (with filter No. 58) of a flour-water slurry. Results are reported as arbitrary scale units; the lower the number the brighter the flour.

Starch Damage is determined on a 5 g sample by the method of Farrand, "Cereal Chem." 41:98-111, 1964.

Amylogram. Sixty-five grams of flour (14.0% moisture content basis) and 450 mL distilled water are used with the Brabender Amylograph and the pin stirrer; other details are as in the AACC method. Peak viscosity is reported in Brabender Units.

Maltose Value is determined according to AACC method 16-22.

Baking is carried out by the Remix baking test procedure of Irvine and McMullan, "Cereal Chem." 37:603-613, 1960, as described in detail by Kilborn and Tipples, "Cereal Foods World" 26: 624-628, 1981.

Remix-to-peak is a modification of the Remix method in which dough is mixed to optimum (peak) consistency.

Farinogram. Fifty grams of flour (14.0% moisture content basis) are mixed in a small stainless steel farinograph bowl (63 r.p.m. drive) for 15 min with sufficient distilled water to give a maximum dough consistency centered about the 500 Brabender Unit line. Farinograph absorption is the amount of water which must be added to a flour of 14.0% moisture content to give the required consistency, and is reported as percent. Dough development time is the time required for the curve to reach its maximum height.

Extensigram. Doughs are made from 300 g flour (14.0% moisture content basis), 6 g salt, and distilled water equal to the farinograph absorption less 2.0 percentage units to compensate both for the salt and for the substitution of the large stainless steel farinograph bowl. Doughs are mixed for 1 min, rested for 5 min, and mixing is then continued until the curve is centered about the 500 Brabender Unit line. Curves are drawn for duplicate doughs at 45 and at 135 min though doughs are also rounded and shaped at 90 min. Average curves for 45 and 135 min are reproduced, but measurements (length in centimeters, height in Brabender Units, and area in square centimeters) are reported only for the 135 min curve (solid line). The Extensigraph is set so that 100 Brabender Units equal a 100 g load.

Alveogram. The ICC Standard Method No. 121 is followed, using the constant pressure Model MA82 equipment.

Supplementary Baking Tests. The Sponge-and-Dough method (4.5 hr, 70% sponge) is carried out as described by Kilborn and Preston, "Cereal Chem." 58:198-201, 1981. The Canadian Short Process method is carried out as described by Preston et al, "Can. Inst. Food Sci. Technol. J.", 15:29-36, 1982. For both methods loaves are produced from 200 g of flour in baking pans that have cross-section dimensions similar to those of Canadian commercial baking pans. Preliminary baking tests are carried out to determine optimum oxidation requirements.

Vitreous Kernels. This determination is made by the Grain Inspection Division on a 25 g sample of clean wheat. The vitreous kernels are handpicked and weighed.

SDS Sedimentation values are determined by the method of Axford and Redman, "Cereal Chemistry" 56:582(1979), using 3% SDS.

Milling (semolina). Wheat is cleaned, scoured and tempered overnight to 16.5% moisture prior to milling by a modified Buhler Laboratory Mill (Black and Bushuk, "Cereal Science Today" 12:164, 1967) in conjunction with a laboratory purifier (Black, "Cereal Science Today" 11:533, 1966). The mill flow described by Dexter et al ("Canadian Institute of Food Science and Technology Journal" 15:225, 1982) was lengthened to achieve a higher extraction. Milling yield (including flour) and semlina yield (less than 1% through a 149 micron sieve) are reported, on a constant moisture basis, as a percentage of the cleaned tempered wheat. The millroom is controlled for temperature (22°C) and humidity (60%).

Semolina Color is determined according to the A.A.C.C. method. An AGTRON direct reading reflectance spectrophotometer is used.

Speck Count is determined as described by Dexter and Matsuo, "Cereal Chemistry" 59:63 (1982).

Spaghetti is processed from semolina on a DEMACO laboratory-scale continuous extrusion press as described Matsuo et al "Cereal Chemistry" 55:744 (1978) and dried both by a conventional low-temperature drying cycle (39°C) and by a high-temperature cycle (70°C) as described by Dexter et al "Journal of Food Science" 46:1741 (1981).

Spaghetti Color. Whole strands of spaghetti are mounted on white cardboard for color measurements. Dominant wavelength, purity, and brightness are determined, using the Ten Selected Ordinates method, in a Beckman Color DB-G Spectrophotometer (Daun, "Cereal Chemistry" 55:692, 1978).

Spaghetti Cooking Quality is determined according to the method of Dexter and Matsuo, "Canadian Journal of Plant Science" 57: 717-727, 1977.

Stickiness of Cooked Spaghetti is measured on the GRL Compression Tester as described by Dexter et al, "Cereal Chemistry" 60:139, 1983.

Cooking Loss, the amount of material lost in the cooking water, is determined as described by Dexter and Matsuo, "Cereal Chemistry" 56:394, 1979.

Farinogram (semolina). Fifty grams of semolina (14% moisture content basis) is mixed with distilled water (31.5% absorption) in the small stainless steel farinograph bowl (59 r.p.m. drive), using the rear sensitivity setting.

Alkaline Water Retention Capacity (AWRC) is determined by the method of Yamazaki et al, "Crop Science" 8:199, 1968.

Collection of Samples. Samples are obtained from grain companies operating primary elevators in Western Canada. The grade composites of Red Spring Wheat are prepared by using samples from Manitoba and the eastern half of Saskatchewan for the Eastern Prairie composites and from Alberta and the western half of Saskatchewan for the Western Prairie composites. Samples collected up to and including the following dates were used:

October 31 - No. 2 and No. 3 C.W. Soft White Spring Wheat.
November 21 - No. 2 and No. 3 C.W. Red Spring Wheat.
November 24 - No. 3 and No. 4 C.W. Amber Durum Wheat.
November 27 - No. 2 Canada Prairie Spring Wheat.

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