

59th Annual Soft Wheat Quality Research Review

SRW Wheat Quality Targets Forum



March 19-20, 2013

**USDA-ARS
Soft Wheat Quality Laboratory**



Grain and Milling Quality Targets

Category / Method	Pastry Flour	Cracker Flour
TestWeight/GrainCondition		
Test Weight	> 58 lb/bu	> 58 lb/bu
Shriveling Factor	< 15 %	< 15 %
1000 Kernel Weight	> 27 g	> 27 g
Wheat Density (g/cc)	> 1.31	> 1.31
SKCS Diameter (mm)	> 2.1	> 2.1
SKCS Weight (mg)	> 2.7	> 2.7
Field Sprouting		
Viscograph (Amylograph)	> 500 bu	> 500 bu
Alpha-Amylase Activity	< 0.08 abs	< 0.08 abs
Falling Number	> 350 sec	> 350 sec
Kernel Texture-Milling		
Break Flour Yield	30 – 37 %	25 -37 %
Miag-Multomat Break Flour Yield	24 – 35 %	21 -35 %
Quadrumat Sr. Break Flour Yield	32 – 41 %	25 -41 %
Quadrumat Jr. Softness	53 – 64 %	45 -64 %
Equivalence		
SKCS Hardness Index	< 40.0	10.0 -40.0
MillingQuality		
Quadrumat Jr. Flour Yield	> 67.5 %	> 67.5 %
Quadrumat Sr. Flour Yield	> 62 %	> 62 %
Quadrumat Sr. Flour Ash	< 0.420 %	< 0.420 %
Allis-Chalmers Flour Yield	> 75.7 %	>75.7%
Allis-Chalmers Flour Ash	< 0.430 %	< 0.430 %
Allis-Chalmers E.S.I.	< 11.5 %	< 11.5 %
Allis-Chalmers Milling Score	> 52	> 52
Allis-Chalmers Friability	> 27.2 %	>27.2%
Miag-Multomat Flour Yield	> 71 %	> 71 %
Miag Damaged Starch	< 3.5 %	<3.5%
Miag Flour Ash	< 0.500 %	< 0.500 %
Agtron Color	> 50 Units	> 50 Units

Flour Quality Targets for Pastry and Cracker Flour

Category / Method	Pastry Flour	Cracker Flour
Protein Content		
Wheat Protein	9 -11.5 %	9 – 12 %
Flour Protein	8 -10 %	8 -11 %
Protein Strength		
Mixograph Absorption	52 -58 %	53 -59 %
Mixograph Peak Time	> 2.0 min	> 2.5 min
Mixograph Peak Height	> 2.8 mu	> 3.0 mu
Alveograph Peak	24 -38 mm	> 30 mm
Alveograph Length	106 -150 mm	> 150 mm
Alveograph Work	70 – 127 Joules (x 10 ⁻⁴)	> 127 Joules (x 10 ⁻⁴)
Farinograph Stability/Tolerance	2 – 4 min	3 -7 min
Farinograph Peak Time	> 0.75 min	> 1.0 min
Farinograph Absorption	51 -55 %	52 -56 %
Acidulated Flour Viscosity	90-173 cps	150-300 cps
Solvent Retention Capacity		
50% Sucrose	<89%	<89%
5% Lactic Acid	>87%	>87%
5% Sodium Carbonate	<64%	<64%
Distilled Water	<51%	<51%
Baking Qualities, Cookie		
Wire-Cut Method 10-53 Width	62.9 -66 cm	62.9-66 cm
Wire-Cut Method 10-53 Height	<8.4 cm	<8.4 cm
Sugar-Snap Method 10-52 Width*	17.2 -18.0 cm	17.2-18.0 cm
Sugar-Snap Method 10-52 Height*	< 1.65 cm	< 1.65 cm
Sugar-Snap Method 10-50D Width	48.6 -52.1 cm	48.6 -52.1 cm
Sugar-Snap Method 10-50D Height	< 5.7 cm	< 5.7 cm
Cookie Instrumental Hardness	< 26.6 kg	< 26.1 kg

Approaches for Modifying the Quality Targets

- ❑ Reduce the number of quality target parameters
- ❑ Combine the pastry and cracker targets, with exception of protein content and quality parameters
- ❑ Include Quad Jr. milling parameters instead of Miag milling ones
- ❑ Reduce the number of dough rheology test parameters

**Proposed SRW
Wheat Quality
Targets**

Quality Parameter	Current Target	SWQL Average *
Grain		
Test Weight	58 lb/bu	60
SKCS		
Hardness Index	< 40.0	35
Diameter (mm)	> 2.1	-
Weight (mg)	> 2.7	-
Falling Number	> 350 sec	350
Grain Protein (%)	9 - 11.5%	10
Milling Quality (Quad. Jr.)		
Flour Yield	> 67.5%	70
Break Flour Yield	30 – 37%	-
Softness Equivalent	53 – 64%	59
Milling Quality (Miag)**		
Flour Yield	>71%	74
Break Flour Yield	21 - 35%	32
Flour (Quad. Jr. Mill)		
Protein	8-10% (pastry), 8-11% (cracker)	8.3
Ash**	<0.5%	0.4
SRC		
Water	<51%	53.4
Sodium Carbonate	<64%	68.4
Sucrose	<89%	93.3
Lactic Acid	>87%	106.3
Sugar-Snap Width	17.2 - 18.0 cm	18.8

Discussion on SRW Wheat Quality Targets

- Do you agree with the approaches I am taking for the modification of the Quality Targets?
- Are there any other quality parameters we want to add back to the targets
- Do you agree with the current target values for each quality parameter

QUALITY TARGETS FOR SOFT WHITE WHEAT**Grain Quality Parameter**

Test Weight (lb/bu)	>60
Kernel Hardness (SKCS 4100)	<35
Kernel Diameter (mm) (SKCS 4100)	>2.5
Kernel Weight (mg) (SKCS 4100)	>35
Falling Number (seconds) (in absence of sprout)	≥ 300
Protein (% , 12% mb)	10.5
Ash (% , 12% mb)	≤1.30

Flour Quality Parameter

Protein (% , 14% mb) ¹	<8.71
Ash (% , 14% mb) at 67% extraction ²	<0.38
Flour Yield (%) ²	>68.15
Break flour yield (%) ²	>46.75
Milling Score ²	>83.47
Wet Gluten (% , 14% mb)	<27
Farinograph Absorption (% , 14% mb) @ 8.7% protein ³	<55
Farinograph Stability (minutes) ³	<7.0
Mixograph Absorption (%) @ 8.7% protein	<53.97
Color / Polyphenol Oxidase (L-DOPA A ₄₇₅)	<0.5
Solvent Retention Capacity: Water (%)	<58
Solvent Retention Capacity: Carbonate (%)	<75
Solvent Retention Capacity: Sucrose (%)	<95
Solvent Retention Capacity: Lactic acid (%)	90-120
SDS Sedimentation Volume (mL/g) @ 8.7% protein	7.0-14.0

Sugar-Snap Cookie Diameter (cm) @ 8.7% protein

9.3

Sponge Cake Volume (cc)

1280

SWQL Quality Characteristics of SRW Wheat Breeding Lines and Varieties Tested in 2008-2011

Quality Parameter	Mean	Median	STDDEV	Min	Max	N
Test wt (lb/bu)	59.9	60.0	2.3	35.2	66.7	19612
Hard (NIR)	20.3	19.7	10.0	-25.0	61.4	9226
Grain Protein (% , 12% mb)	10.4	10.5	1.4	5.8	14.9	9156
Flour Yield (% , Quad)	69.8	69.9	1.7	61.9	78.5	5155
Softness Eq. (%)	59.0	59.2	5.5	27.6	75.1	5155
Flour Protein (% , 14% mb)	8.3	8.4	1.1	5.1	12.9	4908
Water SRC (%)	53.4	53.1	2.6	47.0	72.0	2460
Carbonate SRC (%)	68.4	68.1	3.9	59.9	98.6	2659
Sucrose SRC (%)	93.3	92.9	7.8	74.5	132.0	5215
Lactic SRC (%)	106.3	106.2	16.3	61.0	168.3	5207
Sugar-Snap Cookie (cm)	18.8	18.8	0.7	14.8	20.7	4739