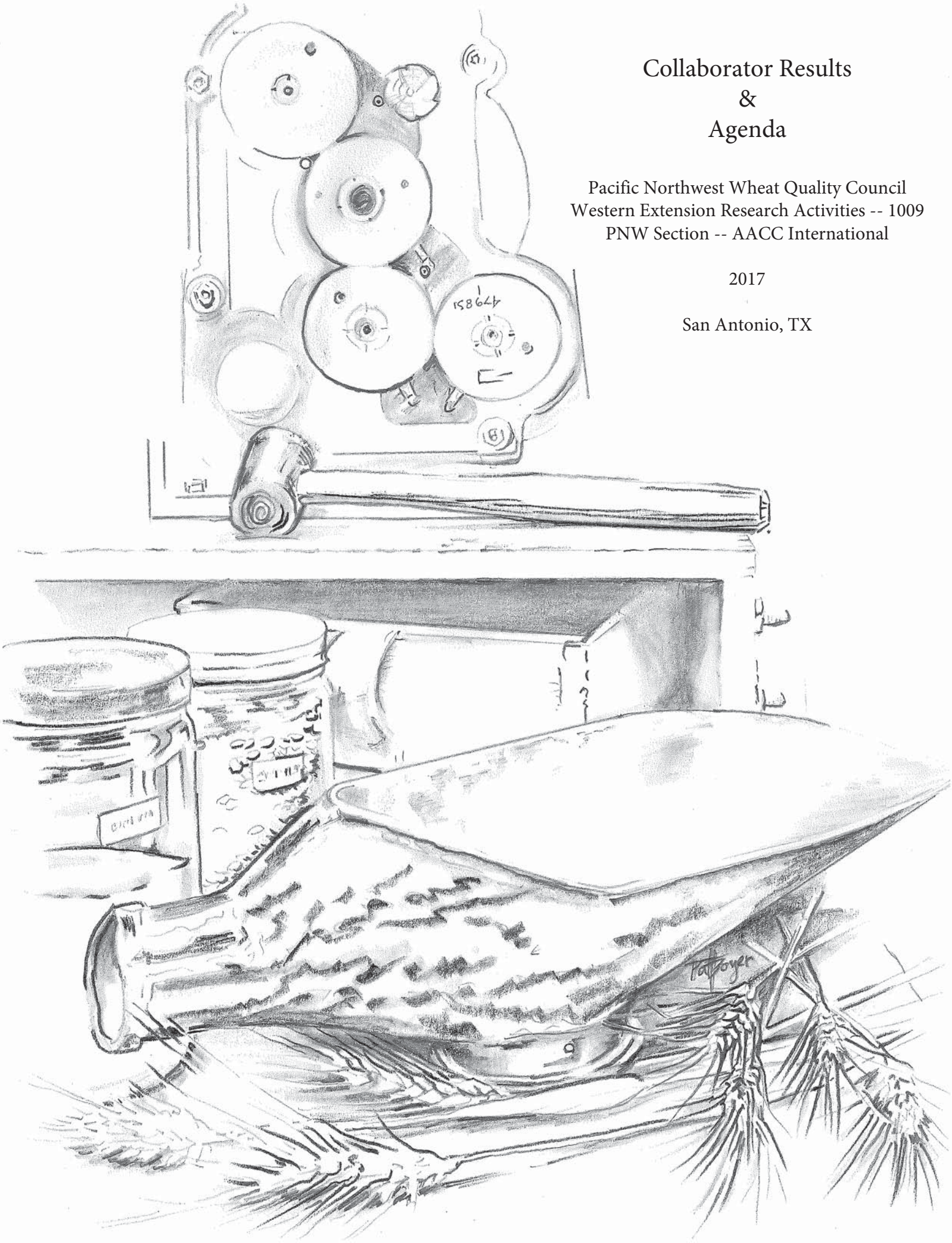

Collaborator Results & Agenda

Pacific Northwest Wheat Quality Council
Western Extension Research Activities -- 1009
PNW Section -- AACC International

2017

San Antonio, TX

Cover art depicting 3rd in the 'tools of the trade' of wheat quality analysis series courtesy of Pat Boyer, technician at the USDA-ARS Western Wheat Quality Lab.

Pacific Northwest Wheat Quality Council

Serving the Needs of the Wheat Industry

Mission Statement

To enhance the quality of wheat produced in the Western States by promoting the development of superior cultivars

The PACIFIC NORTHWEST WHEAT QUALITY COUNCIL is a not-for-profit organization comprised of wheat breeders, cereal chemists, and producers, marketers, inspectors, processors and users of wheat. Through its Technical Committee of volunteer collaborators, the Council aims to solicit and evaluate advanced-generation wheat breeding lines, thereby providing direct feed-back as to the merits of individual breeding lines and more general information as to the technical requirements of wheat end-users. In this way, longer-term breeding objectives are defined.

first convened in Portland, Oregon, 1995

Agenda
Pacific Northwest Wheat Quality Council
Western Extension Research Activity-1009
PNW Section AACCI

January 25th through January 27th 2017
Hotel Contessa
San Antonio, Texas

Wednesday, January 25th Wheat Industry Tours

12:00-12:30 pm Meet in the lobby of the Hotel Contessa & board bus

1:00-2:30 Tour Sandy Oakes Olive Orchard *125195 Mathis Rd, Elmendorf*

3:15-4:30 Tour Ranger Creek Brewstillery *4834 Whirlwind Dr, San Antonio*

5:00-6:30 Reception and Dinner at Barriba Cantina *111 W. Crockett St, San Antonio*

6:45 Return to Hotel Contessa (Walking, about 3 minutes by Google)

Thursday, January 26th

7:30-8:00 Registration *Magnolia Room*

Welcome & Opening Remarks *Craig Morris*

USDA-Agricultural Research Service

Western Extension Research Activity 1009

8:00-10:00 WERA-1009 Meeting (open to all) *Jay Noller*
Oregon State University

Systems to Improve End-use Quality of Wheat

State Reports

10:00-10:30 Break

PNW AACCI Technical Presentations

10:30-10:35	PNW AACCI Section	Hayley Butler, *Section Chair* *Limagrain Wheat Quality Lab*
10:35-11:00	Falling Number & Baking Quality	*Alecia Kiszonas* *Western Wheat Quality Lab*
11:00-12:30	Falling Number Roundtable Discussion Alecia Kiszonas Western Wheat Quality Lab Rhonda Lyne Federal Grain Inspection Mike Pumphrey Washington State University Reuben McLean Grain Craft Joe Anderson Grower	*Cathy Wilson, Moderator* *Idaho Wheat Commission*
12:30-1:30	Lunch	*Contessa Ballroom*
1:30-2:45	Observations of US Wheat in Overseas Markets	US Wheat OVA Presentation *Yongseok Choi* *SaJoDongaone Milling, Korea* *Koji Ishizuka* *Nisshin Flour Milling, Japan*
2:45-3:15	Break	
3:15-4:00	Wheat Quality Target Review	*Steve Wirsching* *US Wheat Associates*
4:00-4:15	PNW WQC Collaborator's Meeting	
4:15-5:00	PNW AACCI Section Meeting	
5:30-8:30	Sponsor's Reception	*Contessa Ballroom*
7:00-8:30	Dinner Buffet & *Lifetime Achievement Presentation*	*Contessa Ballroom*

Friday, January 22nd

7:30-8:00 Registration *Magnolia Room*

Pacific Northwest Wheat Quality Council

8:00-8:05 Welcome & Opening Remarks *Pat Donahue*
Chair, PNW WQC

USDA-FGIS Grain Grading Report *Scott Cooley*
Federal Grain Inspection Service

8:05-10:00 PNW-WQC Quality Roundtable (* denotes check)

Group 1 Hard Red Winter (MT1348, Yellowstone*)

Group 2 Hard Red Winter (SY Touchstone, Whetstone*)

Group 3 Hard Red Spring (WB9200)

Group 4 Hard Red/White Spring (IDO1602S, IDO1603S, IDO1604S, UI Winchester*)

Group 5 Hard Red Spring (SY3015-8, Bullseye*)

Group 6 Soft White Spring (Ryan, Whit*)

10:00-10:30 Break

10:30-12:00 PNW-WQC Quality Roundtable

Group 7 Soft White Spring (LCS Silk, Louise*)

Group 8 Soft White Spring (WB6430)

Group 9 Soft White Spring (IDO1403S, UI Stone*)

Group 10 Soft White Winter (UI Sparrow, Stephens*)

Group 11 Soft White Winter (WA8232, Jasper*)

Group 12 Soft White Winter (UI Castle, UI Magic, Brundage 96*)

12:00-1:00 Lunch *Contessa Ballroom*

1:00-2:15 Group 13 Soft White Winter (OR2101043, Kaseberg*)

Group 14 Soft White Winter (SY Assure, 09PN046#16, 09PN062#18, SY Ovation*)

Group 15 Soft White Winter (04PN066-7, 09PN005#25, Eltan*)

2:15-2:45 Finalize meeting site for 2018 CY meeting & election of new Secretary

2:45 Adjourn & Break

Table of Contents

Thank you Pacific Northwest Wheat Quality Council

2016 Crop Year Sponsors!

Kellogg's

OWC
OREGON WHEAT COMMISSION

ADM

Bay State Milling
Where change cultivates opportunity.

GRAIN CRAFT

Limagrain
Cereal Seeds

Mondelēz International

Ardent Mills

Idaho Wheat
COMMISSION

CM
CONTINENTAL MILLS
FOOD PRODUCTS OF CHOICE

WASHINGTON GRAIN COMMISSION

WestBred®
IMPROVING NATURE'S GRAINS®

U.S. WHEAT ASSOCIATES

syngenta

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- 1 -

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- 2 -

Pacific Northwest Wheat Quality Council

These collaborative flour tests are supported by the wheat commissions of Washington, Oregon, and Idaho in cooperation with the USDA-ARS Western Wheat Quality Laboratory. The purpose is to maintain and improve the milling and baking quality of wheat in the Western region. It is an attempt to keep current with the needs of wheat processors and flour users. The information gained from the data and opinions of the collaborators is of significant value to the wheat breeding programs of the region. The project aims to provide each collaborator an opportunity to express their opinion as to whether or not the tested selections would satisfy the end-use demands of their industry.

We would like to thank each of the collaborators for their participation in this annual project.

Collaborators
2016 Crop Year

ADM Milling

Ardent Mills

Aryzta

Bay State Milling

California Wheat Commission

Colorado State University

Continental Mills Inc.

General Mills

Grain Craft

Japan Nisshin Flour Milling

Korea Sajo Donga One

Limagrain Cereal Seeds

Mondelēz International

Montana State University Cereal Quality Laboratory

Northern Seed

Oregon State University

Syngenta

University of Idaho

USDA-ARS Hard Red Spring Wheat Quality Laboratory

CGAHR, USDA-ARS Hard Winter Wheat Quality Laboratory

USDA-ARS Soft Wheat Quality Laboratory

USDA-ARS Western Wheat Quality Laboratory

USDA-GIPSA Federal Grain Inspection Service

USDA-GIPSA Technical Services Division

Washington State University Wheat Quality Program

WestBred

Wheat Marketing Center

- 3 -

1995 Portland, OR

WA7663	SWW	
WA7690	SWW	PI 597665
WA7717	SWW	
WA7622	W.Club	Rulo
IDO392	SWS	Whitebird
IDO421	HRW	Bonneville

1996 Park City, UT

IDO448	SWS	Pomerelle
IDO488	SWS	PI 592986
OR880494	SWW	
OR880510	SWW	
OR880525	SWW	
OR870012	SWW	
OR870337	SWW	
OR870831	SWW	
OR898120	SWW	Weatherford
OR908377	SWW	
WA7677	SWS	Alpowa
WA7712	SWS	Wawawai
WA7806	SWS	
IDO447	HRW	
IDO467	HRW	Boundary
WA7802	HRS	Scarlet
OR850513	HWW	Ivory
OR889176	HWW	

1997 Coeur d'Alene, ID

UC896	HWS	
OR870082	SWW	
OR939515	SWW	
IDO462	HRS	Jefferson
IDO492	HRS	Iona
ID14502B	SWW	Brundage
WA7802	HRS	Scarlet
WA7805	SWS	
WA7831	SWS	
WA7752	W.Club	Coda

1998 Portland, OR

OR00542	SWW	
OR880172	SWW	Foote
XWH1020	SWW	
XWH1017	SWW	Quantum 7817
OR92CL0054	W.Club	Temple
UC1085	HRW	
Q542	HRW	Quantum 542
MT7811	HWW	NuWest

1999 Bozeman, MT

WA7850	SWS	Zak
ID10420A	SWW	Hubbard
OR939476	SWW	
OR933528	SWW	
WA7824	HRS	Tara
IDO533	HWS	Lolo
IDO523	HWS	
IDO509	HRW	
UT1944-158	HWW	Golden Spike
BZ991-408	HWS	Pristine
ML455	HWS	ML455

2000 Honolulu, HI

WA7839	HRS	Rosa
OR4870453	HWS	Winsome
MT9432	HRW	BigSky
MTW9441	HWW	NuSky
IDO525	SWS	Jubilee
IDO526	SWS	Alturas
BZ692-108	SWS	Challis
S9700459	S.Club	
WA7833	W.Club	Bruehl
ID87-52814A	SWW	
OR939526	SWW	Tubbs
XWH5019	Q5019	
XWH7415	Q7415	

- 4 -

2001 Seattle, WA

IDO513	HRW	DW
IDO550	HWW	Gary
WA7899	HWS	Macon
ID-B-96	SWW	Brundage 96
BZ96W93-477-D	SWW	Mohler
BZ96W93-481-B	SWW	Beamer
OR941904	SWW	
OR941899	SWW	
OR9443560	SWW	
KW943683	SWW	
WA7902	S.Club	Eden

2002 Carson City, NV

ARS96105	SWW	
ARS96277	SWW	
Chukar	W.Club	
Finch	SWW	
960195p7007	SWW	
OR900553	SWW	
OR941550	SWW	
OR951431	SWW	
IDO556	S.Club	PI 620633
MT9426	HRW	Paul
UT203032	HRW	Deloris
WA7859	HRS	Hollis
IDO517	HRW	Moreland
BZ998-447W	HWS	Waikea
BZ992-463W	HWS	Not Released
Kern	HRS	

2003 Oakland, CA

IDO566	HRS	Jerome
IDO545	HRS	PI 632710
ML18A-3-38	HWS	
BZ992-632	HRS	Not Released
BZ698-31	SWS	Nick
WA7905	SWS	Not Released
WA7906	SWS	Not Released
IDO576	SWW	PI 620637
OR2010051	SWW	ORCF-101
OR9900553	SWW	
ID9120503A	SWW	Dune
ID9134302A	SWW	Simon

Overseas Varietal Analysis Program:

Edwin	W.Club
Finch	SWW

2004 Coeur d'Alene, ID

WA7936	HWW	MDM
WA7939	HRW	Bauermeister
WA7931	HWS	Otis
WA7925	HRS	tabled
IDO587	SWW	Idaho 587
WA7921	SWS	Louise
OR2010007	SWW	ORCF-102
BZ698-528	SWW	WB-528
WA7916	SWW	Masami

Overseas Varietal Analysis Program:

Brundage 96	SWW
OR9900553	SWW
Zak	SWS
Weatherford	SWW
Finch	SWW
Jubilee	SWS

2005 Portland, OR

IDO597	HWS	Lochsa
IDO575	HRW	Juniper
IDO573	HRW	
MTS0031	HRW	Genou
MT00159	HRW	Yellowstone
MT00097	HRW	
W96-355	HRW	AgriPro Paladin
BU6W99-456	SWW	WB-456
KW9016	SWW	
KW9043	SWW	PI 639106
ORH01092	SWW	Goetze

Overseas Varietal Analysis Program:

Stephens	SWW
OR9801757	SWW
Jubilee	SWS
Finch	SWW
Zak	SWS
ORCF-101	SWW
Simon	SWW

- 5 -

2006 San Diego, CA

MTCL0316	HRW	Norris
MTCL0318	HRW	Bynum
BZ9W02-2060	HRW	Carter
IDO604	HWW	UI Darwin
BZ6WM02-1154	SWW	
ID99-435	SWW	UICF Lambert
ID92-22407A	SWW	Bitterroot
ID99-419	SWW	UICF Orca
OR2010239	SWW	
KSW3017	SWW	
WA7964	SWS	
IDO632	SWS	UI Pettit

Overseas Varietal Analysis Program:

Finch	SWW	
Simon	SWW	
Alturas	SWS	
Zak	SWS	
ORSS-1757	SWW	
ORCF-101	SWW	

2007 Salt Lake City, UT

IDO2-859	SWW	
ORH010085	SWW	Skiles
WA8008	SWS	Whit
ACS52610	HRS	Volt
BZ999-592	HRS	ONeal
BZ9M03-1024	HRS	Not Released
IDO578	HRS	UI Winchester
ORN00B553	HRW	Norwest 553
Palomino	HWW	
IDO641	HWW	
Patwin	HWS	

Overseas Varietal Analysis Program:

Alturas	SWS	
Louise	SWS	
Masami	SWW	
ORCF-101	SWW	
Simon	SWW	
ORSS-1757	SWW	

2008 Portland, OR

Cataldo	SWS	
WA8039	SWS	Babe
OR2050910	SWW	
ID93-64901A	SWW	Bruneau
WA7975	HRW	Farnum
IDO621	HRW	
UT9325-55	HRW	Curlew
Cabernet	HRS	
WA7954	HRS	Kelse
BZ903-445WP	HWS	Hartline
BZ904-336WP	HWS	WB-Idamax
Snowcrest	HWS	

Overseas Varietal Analysis Program:

Bitterroot	SWW	
ORCF-102	SWW	
ORSS-1757	SWW	
Alturas	SWS	
Masami	SWW	
Louise	SWS	

2009 Sacramento, CA

IDO671	SWS	UI Whitmore
IDO655	SWW	IDO 655
Xerpha	SWW	
OR2050293	SWW	
OR2060324	SWW	
OR2040726	SWW	Mary
KW05W02370	SWW	
Cara	Club	
WA8047	Club	JD
UT9743-42	HRW	Greenville
IDO653	HRW	
IDO651	HWW	UICF Grace
APB02-0081	HRS	Bullseye
10348W	HWS	RSI10348W
Blanca Royale	HWS	
BZ902-413W	HWS	
BZ903-461W	HWS	Prestea
BZ903-464W	HWS	Not Released

Overseas Varietal Analysis Program:

Bitterroot	SWW	
Skiles	SWW	
Cataldo	SWS	
ORCF-102	SWW	
Louise	SWS	
Cara	Club	

2010 Phoenix, AZ

WA8090	SWS	Diva
BZ604-002	SWS	Not Released
BZ6M06-1001 CL2	SWS	WB-1035CL2
IDO599	SWS	Stone
IDO644	SWS	
OR2040726	SWW	Mary
OR2060395	SWW	
ID9364901A	SWW	Bruneau
KW006	SWW	
KW7003	HRW	
IDO658	HWW	UI Silver
IDO660	HWW	Not Released
SJ908-203W	HWS	

Overseas Varietal Analysis Program:

Bitterroot	SWW
Skiles	SWW
ORCF102	SWW
Xerpha	SWW
UI Cataldo	SWS
Cara	Club

2011 Seattle, WA

IDO686	SWS	
IDO687	SWS	
WA8092	SWW	Otto
9616702A	SWW	
03PN-107#3	SWW	SY 107
03PN-108#20	SWW	Not Released
03PN-108#21	SWW	SY Ovation
ARS960277L	SWW	Amber
ARS970075-3C	Club	Chrystal
ARS970163-4C	Club	Crescent
IDO656	HRW	UI SRG
WB Quake	HRW	
Esperia	HRW	
IDO835	HWW	LHS
IDO702	HRS	Not Released
BZ906-491R	HRS	Not Released
BZ906-491W	HWS	Not Released

Overseas Varietal Analysis Program:

Bruneau	SWW
ORCF103	SWW
Skiles	SWW
Xerpha	SWW
UI Cataldo	SWS
Cara	Club

2012 San Diego, CA

IDO669	SWS	
WA8124	SWS	
OR2070870	SWW	
OR2071628	SWW	
OR208047P94	SWW	
WA8134	SWW	
99-06202A	SWW	
BZ6W07-436	SWW	
NSA2350A	SWW	
WA8074	HRS	Glee
B04-1418	HRS	Not Released
97S0621-05	HRS	SY Steelhead
IDO862	HRS	
IDO694	HWS	
WA8118	HRW	
WA8119	HRW	

Overseas Varietal Analysis Program:

Diva	SWS
ORCF103	SWW
Xerpha	SWW
Bruneau	SWW
Goetze	SWW
AP Legacy	SWW

- 7 -

2013 Scottsdale, AZ

Dayn	HWS	
ID862E	HRS	
BZ6W03-414	SWW	
BZ6W07-436	SWW	
BZ6W07-427	SWW	WB 1529
BZ6W07-458	SWW	WB 1604
WA8151	SWW	
Rosalyn	SWW	
KWAW010	SWW	
WA8143	SWW	Curiosity CL+
ORCF102	SWW	
LWW04-4009	SWW	
ID02-10606A	SWW	
Selbu	SWW	

Overseas Varietal Analysis Program:

Diva	SWS
Stone	SWS
Bruneau	SWW
Goetze	SWW
AP Legacy	SWW
ORCF103	SWW
Chrystal	Club

2014 Portland, OR

Blanca Grande	HWS	
LCS Star	HWS	
BZ908-418	HRS	
BZ908-552	HRS	WB 9668
WB9229	HRS	
IDO1203S	HRS	
Jefferson	HRS	
SY240R	HRS	SY Basalt
Solano	HRS	
WA8165	HRS	Chet
WA8166	HRS	Alum
DAS001	HRW	
DAS002	HRW	
Whetstone	HRW	
IDO1108DH	SWW	
Stephens	SWW	

Overseas Varietal Analysis Program:
Due to 2013 U.S. Government shutdown no OVA varieties will be available for analysis.

2015 San Francisco, CA

SY3001-2	HRS	SY Selway
SY40292R	HRS	SY Coho
SY0136	HWS	SY Teton
IDO1101	HWW	
WA8158	HWW	
WA8184	HWW	Earl
WA8162	SWS	Seahawk
WA8189	SWS	Tekoa
WA8177	SWW	
WA8169	SWW	Jasper
WA8212	SWW	
LCS Biancor	SWW	
WB1376CLP	SWW	
BZ6W06-440	SWW	

Overseas Varietal Analysis Program:

UI Stone	SWS
Whit	SWS
Bobtail	SWW
Otto	SWW
WB Trifecta	SWW
Kaseberg	SWW
LCS Artdeco	SWW
ARS Chrystal	Club

2016 Scottsdale, AZ

KWHR001	HRS	
K070526	HRS	
10SB0087-B	HRS	LCS Luna
SY3051-9	HRS	
Eagan	HRS	
IDO1203S-A	HWS	
WB7328	HWS	
WB7589	HWS	
OR2100081H	HWW	
OR2110679	HWW	
OR2111025	HWW	
IDO1101	HWW	
WA8180	HRW	Sequoia
LCS Jet	HRW	
SY3024-2	SWS	
WA8187	SWW	
Huffman	SWW	
Melba	Club	

- 8 -

Overseas Varietal Analysis Program:

Whit	SWS
Otto	SWW
Huffman	SWW
WB Trifecta	SWW
Kaseberg	SWW
LCS Artdeco	SWW
Bobtail	SWW
ARS Crescent	Club

This concludes the U.S. Wheat Associates OVA program in this format. Beginning in 2017, selected overseas collaborators will be included as PNW WQC cooperators.

2017 San Antonio, TX

WB9200	HRS
IDO1603S	HRS
SY3015-8	HRS
IDO1602S	HWS
IDO1604S	HWS
MT1348	HRW
SY Touchstone	HRW
Ryan	SWS
LCS Silk	SWS
WB6430	SWS
IDO1403S	SWS
UI Sparrow	SWW
WA8232	SWW
UI Castle	SWW
UI Magic	SWW
OR2101043	SWW
SY Assure	SWW
09PN046#16	SWW
09PN062#18	SWW
04PN066-7	SWW
09PN005#25	SWW

NB: the 1995 meeting evaluated 1993-crop samples; at the subsequent meeting (1996) both 1994- and 1995-crop samples were evaluated. Since the 1997 meeting, "current" crop samples have been evaluated.

Disclaimer: these lists are subject to correction; variety names may be added to experimental line designations at future times.

Sample	Variety	Group	Check	Class	Sample Location	Breeder	Organization
1	MT1348	1		HRW	Bozeman	Phil Bruckner	Montana State University
2	YELLOWSTONE	1	x	HRW	Bozeman	Phil Bruckner	Montana State University
3	SY TOUCHSTONE	2		HRW	Walla Walla/Cheney	John Moffatt	Syngenta
4	WHETSTONE	2	x	HRW	Walla Walla/Cheney	John Moffatt	Syngenta
5	WB9200	3		HRS	Napa	Lindsay Crigler	WestBred
6	ID1602S	4		HWS	Aberdeen	Jianli Chen	University of Idaho
7	ID1603S	4		HRS	Aberdeen	Jianli Chen	University of Idaho
8	ID1604S	4		HWS	Aberdeen	Jianli Chen	University of Idaho
9	UI WINCHESTER	4	x	HRS	Aberdeen	Jianli Chen	University of Idaho
10	SY3015-8	5		HRS	Three Forks/Cheney/Walla Walla	Jim Helmerick	Syngenta
11	BULLSEYE	5	x	HRS	Three Forks/Cheney/Walla Walla	Jim Helmerick	Syngenta
12	RYAN	6		SWS	Pullman	Mike Pumphrey	Washington State University
13	WHIT	6	x	SWS	Pullman	Mike Pumphrey	Washington State University
14	LCS SILK	7		SWS	Walla Walla	Frank Curtis	Limagrain
15	LOUISE	7	x	SWS	Walla Walla	Frank Curtis	Limagrain
16	WB6430	8		SWS	Warden	Lindsay Crigler	WestBred
17	ID1403S	9		SWS	Aberdeen	Jianli Chen	University of Idaho
18	UI STONE	9	x	SWS	Aberdeen	Jianli Chen	University of Idaho
19	UI SPARROW	10		SWW	Aberdeen	Jianli Chen	University of Idaho
20	STEPHENS	10	x	SWW	Aberdeen	Jianli Chen	University of Idaho
21	WA8232	11		SWW	Pullman	Arron Carter	Washington State University
22	JASPER	11	x	SWW	Pullman	Arron Carter	Washington State University
23	UI CASTLE	12		SWW	Moscow	Yueguang Wang	University of Idaho
24	UI MAGIC	12		SWW	Moscow	Yueguang Wang	University of Idaho
25	BRUNDAGE 96	12	x	SWW	Moscow	Yueguang Wang	University of Idaho
26	OR2101043	13		SWW	Pendleton	Bob Zemetra	Oregon State University
27	KASEBERG	13	x	SWW	Pendleton	Bob Zemetra	Oregon State University
28	SY ASSURE	14		SWW	Walla Walla	John Moffatt	Syngenta
29	09PN046#16	14		SWW	Walla Walla	John Moffatt	Syngenta
30	09PN062#18	14		SWW	Walla Walla	John Moffatt	Syngenta
31	SY OVATION	14	x	SWW	Walla Walla	John Moffatt	Syngenta
32	04PN066-7	15		SWW	Moses Lake	John Moffatt	Syngenta
33	09PN005#25	15		SWW	Moses Lake	John Moffatt	Syngenta
34	ELTAN	15	x	SWW	Moses Lake	John Moffatt	Syngenta

- 10 -

MT1348 *Hard Red Winter*

MT1348 – a hollow stemmed hard red winter wheat line which is a selection from a composite of 2 crosses: 04X494, (PI572290 = STARS-9303W = (Bobwhite/PI 149898), rwa2)//BigSky and 04X495, (Yellowstone sib, MT9982)/PI572290. MT1348 has above average yield and test weight and average protein. Over 31 location-years, yield of MT1348 was 0.2 bu/a lower than Yellowstone (leading winter wheat variety planted in Montana, 2012-2016). MT1348 has below average winter hardiness and would not be suitable for eastern Montana and western North Dakota. MT1348 has medium heading date (0.9da earlier than Yellowstone). MT1348 is shorter (1.1in) in height than Yellowstone. MT1348 is susceptible to stem rust, like Yellowstone, and resistant to stripe rust. MT1348 is a low PPO line with above average flour yield and average flour protein in MSU tests. Ash is average and lower than Yellowstone. Mix times are shorter than most Montana varieties, including Yellowstone. Mixing tolerance is average. Mix and bake absorption is average. Loaf volume is average, slightly lower than Yellowstone. Besides low PPO, MT1348 has good 24 hour noodle stability and noodle score.

2016 Crop Year – Bozeman, MT – The Post Agronomy Farm, west of Bozeman, had a 9% decrease in rainfall for the 2016 crop year (14.3in vs. 15.8 for the 59yr average). There was adequate snow cover during the winter months and no winterkill was observed. Heading (June 10th) was 8 days earlier than the previous 10 years. Temperatures from March to August (except May) were above average with below average moisture in April, June, and August and above average moisture in March. Stripe rust infection in our elite (Intrastate) nursery averaged 25% on June 16th (range 2-87% flag leaf involvement) may have contributed to a 6% yield reduction in this nursery over the previous 10 year average.

SY Touchstone *Hard Red Winter*

(AgriPro Paladin / French Experimental) (28B-3)

Hard Red Winter Wheat for intermediate to high moisture environments

- Increased performance over Whetstone
- Short semi-dwarf with medium maturity
- Good winter hardiness and snow mold tolerance
- Good test weight patterns
- Excellent C-stripe and soilborne mosaic resistant
- Good quality – slightly lower protein than Whetstone with higher flour extraction and stronger tolerance and larger loaf volume

WB9200 *Hard Red Spring*

A hard red spring wheat released by WestBred (a unit of Monsanto) in 2015. WB9200 is best adapted to irrigated and high rainfall acres with excellent yield potential and test weight. It is an early maturing variety and overall height is medium-short offering excellent standability. WB9200 also has very good tolerance to yellow (stripe) rust.

IDO 1602S *Hard White Spring*

IDO1602S (A08421S-19) hard white spring wheat line was derived from the cross Blanca Royale x Snow Crest. IDO1602S has improved grain yield and test weight, resistance to stripe rust than both parents, but maintained good bread-baking quality of Snow Crest. IDO1602S has similar days to heading and height to Dayn.

IDO 1603S *Hard Red Spring*

IDO1603S (A09438S-143-18) hard red spring wheat line was developed from the cross A03767S-IJ-3 (Jefferson*4/IDO584) x Lassik using molecular marker assisted selection for stripe rust (Yr36), Hessian Fly (H25), and FHB (Umn10). IDO1603S has high grain yield, excellent bread baking quality, immune resistance to hessian fly, and very good resistance to stripe rust. IDO1603S has similar height, but earlier and better bread baking quality than Lassik.

IDO 1604S *Hard White Spring*

IDO1604S (A08515S-28) hard white spring wheat line was derived from the cross IDO694 x Blanca Royale. IDO1604S has improved grain yield, bread-baking quality, test weight, and resistance to stripe rust compared to either or both parents. IDO1604S was 4 to 5 days earlier, but 2 to 4 inches taller than Blanca Royale.

SY 3015-8 *Hard Red Spring*

Hard Red Spring Wheat developed by Syngenta Seeds, Inc. SY3015-8 was derived from a cross between Syngenta Northern plains experimental (01S0340-10) and Bullseye. It has higher yield potential, very good protein and end use quality. SY 3015-8 is a semi-dwarf (Bullseye plant height) with very good straw strength, medium to early maturity, white chaff color and tapered head type. SY3015-8 has a good general foliar disease package which includes moderate resistance reaction to current stripe rust races and tolerance to Fusarium head blight (FHB). The primary target area for SY3015-8 is the intermediate to high rain fall and irrigate areas of Washington, Idaho and Western/Centurial area of Montana. May have adaptation to fall planted production in the Columbia Basin, more testing is needed. SY3015-8 was on Breeder Seed production in 2016 and will be reviewed by Syngenta's release committee first quarter of 2017.

Ryan *Soft White Spring*

WA8214 ('Ryan'; Diva/IDO644) is a broadly-adapted soft white spring wheat released in 2016 by Washington State University that may be grown in all production zones of the Pacific Northwest. It has early maturity, very good resistance to stripe rust, shorter height with very good straw strength, good test weight, Hessian fly resistance, aluminum tolerance, consistently good falling numbers, and excellent yield potential in low, intermediate, high rainfall, and irrigated production areas. Ryan represents a unique combination of traits desirable for soft white spring wheat production in the intermediate and high rainfall areas. The most relevant comparison varieties include WB6341, WB6121, Whit, Babe, Diva, and Louise. Collectively, these represent almost all soft spring wheat acres. WB6341, WB6121, and Whit are prone to low falling numbers. WB6341, Whit, and Babe are weaker on stripe rust resistance. Diva and Louise are later maturing with weak straw and lack aluminum tolerance, which limits their

production in >20" rainfall areas, and complicates seed production. WA8214 has consistently been a top yielding line since plot testing started in 2011, across cool-wet and hot-dry locations and years. WA8214 will provide a valuable opportunity for wheat producers with lower risk and higher reward compared to current varieties.

LCS Silk *Soft White Spring*

LCS Silk produced very low falling number results in 215 and 2016 crop years across multiple growing environments. Release of LCS Silk has been withdrawn.

WB6430 *Soft White Spring*

A soft white spring wheat released by WestBred (a unit of Monsanto) in 2013. WB6430 is best adapted to irrigated and high rainfall acres with excellent yield potential, test weight, milling and baking quality and resistance to yellow (stripe) rust. Maturity is medium-early and overall height is shorter than average offering excellent standability. WB6430 also has very good tolerance to Fusarium Head Blight (Scab).

IDO1403S *Soft White Spring*

IDO1403S (A06026S) soft white spring wheat line was derived from the cross Yr5/6*Avocet//2*IDO645. IDO1403S has very good resistance to stripe rust and the best resistance to alpha amylase damage in SWS class. Grain yield and days to heading of IDO1403S were similar to UI Stone. IDO1403S was 3 to 5 inches shorter than UI Stone. However, flour yield content and cookie diameter were slightly less than UI Stone.

UI Sparrow *Soft White Winter*

'UI Sparrow' soft white winter wheat (Triticum aestivum L.) was released by the Idaho Agricultural Experiment Station in August of 2016. UI Sparrow was selected for high yield, complex resistance to fungal diseases, and cold tolerance using wheat by maize dihapoid method. Grain yields of UI Sparrow were comparable to check cultivars (SY Ovation, Rosalyn, LCS Artdeco, UI-WSU Huffman, and Mary) under irrigation and better than dryland cultivar Eltan and Otto in ID and WA environments. Height and heading date of UI Sparrow were similar to Eltan, but lodging resistance was much better than Eltan. End-use quality of UI Sparrow was comparable to Bruneau and Eltan. UI Sparrow is adapted in most of areas in ID and WA, both irrigated and dryland. UI Sparrow has immune resistance to dwarf bunt, all-stage resistance to all tested predominant races except for PSTv-40, and moderate to high level of HTAP resistance to stripe rust. The resistance level was similar to Otto, but better than Eltan. UI Sparrow has very good winter hardness, comparable level of resistance to snow mold (5, 0 to 9, 9 is the best) with Eltan (4.5) and Otto (4). Resistance to eyespot of UI Sparrow (disease index = 41) was similar to Madsen (35) but better than Eltan (67). Resistance to C-stripe of UI Sparrow (disease index = 63) was similar to Madsen (66) but worse than Eltan (33). UI Sparrow has SrTmp gene to stem rust UG99. Foundation and registered seed will be available in Fall of 2017.

WA8232 *Soft White Winter*

WA8232 is a soft white winter wheat with the pedigree UI Bruneau/Mary. WA8232 is best adapted to the higher rainfall zones of the state of Washington and Northern Idaho, as well as in some irrigated regions. WA8232 has very good stripe rust resistance to current races of the pathogen. This line is medium maturity, medium plant height, with stiff straw and good cold

tolerance. WA8232 has good test weight, averaging above 60 lbs/bu when averaged across all locations, with good protein levels for a soft white. It has acceptable end-use quality attributes for traditional soft white markets. When tested for falling number values, the average of 12 locations in 2015 and 2016 was 345, with a range from 294 to 402.

UI Castle *Soft White Winter*

UI Castle CL+ (UI-09-DH10) is a new 2-gene IMI soft white winter wheat release from the University of Idaho. The plant color at boot stage is green with recurved, twisted and wax absent flag leaf. The heads are awned and tapering. The pedigree is 07-688-10/Bitterroot. Bitterroot is a released line from University of Idaho. 07-688-10 is an experimental line from University of Idaho used as a donor for the 2 IMI resistance genes. UI Castle CL+ has shown the best dryland performance and is characterized by high test weight, full-season maturity, a medium-tall plant height, good resistance to strip rust and broad PNW adaptation. Summarize multi-year and multi-location data, the agronomic features of UI Castle CL+ showed that: Test weight was 62.0 Lb/Bu, a little higher than ORCF-102 (60.0), ORCF-101 (59.2), SY Ovation (60.2) and Stephens (59.3). Grain protein content was 11.4%, a little higher than ORCF-102 (10.5), ORCF-101 (11.0), SY Ovation (10.6) and Stephens (10.9). Heading date (Julian) was 153.0 days, 4 days longer than ORCF-102 (148.5) and ORCF-101 (148.5), 5 days longer than SY Ovation (147.7) and 6 days longer than Stephens (147.3). Plant height was 35.5 inches, a little shorter than ORCF-102 (36.3), a little taller than ORCF-101 (33.0), SY Ovation (35.0) and Stephens (33.2).

UI Magic *Soft White Winter*

UI Magic CL+ (UI-09-DH11) is a new 2-gene IMI soft white winter wheat release from the University of Idaho. The plant color at boot stage is blue-green with erect, not twisted and wax present flag leaf. The heads are awned and strap. The pedigree is 07-688-10/Bitterroot. Bitterroot is a released line from University of Idaho. 07-688-10 is an experimental line from University of Idaho used as a donor for the 2 IMI resistance genes. UI Magic CL+ has shown top-end yield potential, excellent test weight, a shorter overall plant height and broad PNW adaptation. Summarize multi-year and multi-location data, the agronomic features of UI Magic CL+ showed that: Test weight was 62.0 Lb/Bu, higher than ORCF-102 (60.0), ORCF-101 (59.2), SY Ovation (60.2) and Stephens (59.3). Grain protein content was 10.7%, a little higher than ORCF-102 (10.5) and SY Ovation (10.6), a little lower than ORCF-101 (11.0) and Stephens (10.9). Heading date (Julian) was 147.0 days, 2 days longer than ORCF-102 (148.5) and ORCF-101 (148.5), 1 day longer than SY Ovation (147.7) and similar as Stephens (147.3). Plant height was 30.5 inches, shorter than ORCF-102 (36.3), a little taller than ORCF-101 (33.0), SY Ovation (35.0) and Stephens (33.2).

Contributing breeders:

Robert Zemetra, Jenny Hansen, Thomas Koehler, Mackenzie Ellison, Jack Brown, Yueguang Wang.

OR2101043 *Soft White Winter*

OR2101043 Soft White Winter Wheat – pedigree is ORSS-1757/OR9902026. ORSS-1757 was released from Oregon State University as a ‘super soft’ wheat and had excellent end-use

quality. OR9902026 was an advanced line in the OSU breeding program. OR2101043 is a soft white winter wheat targeted at the intermediate to high rainfall production zones in the Pacific Northwest. It has good stripe rust resistance, good straw strength, intermediate heading date, good yield potential, good test weight and good milling and baking quality. It is susceptible to strawbreaker foot rot, Septoria, and soilborne Wheat Mosaic virus. It has shown a consistent level of performance in the extension trials in the tri-state area, being similar to SY-Ovation and Norwest Duet for heading date, yield and test weight.

SY Assure *Soft White Winter*

(OSU Experimental / OSU Experimental // WB 528) (96-2)

Soft White Winter Wheat for intermediate to high moisture environments

- Increased performance over WB 528
- Short semi-dwarf with early maturity
- Adequate winter hardiness and improved snow mold tolerance over SY Ovation
- Heavy test weight patterns
- Excellent stripe rust resistance with C-stripe equivalent to WB 528
- Good quality – equivalent to SY Ovation with slightly greater cookie diameter

09PN046#16 *Soft White Winter*

(French / OSU Experimental // SY Ovation sib)

Consistent Performance over Seasons

- High performance under irrigation and high moisture dryland production
- Short semi-dwarf with early maturity
- Good adult plant resistance to stripe rust
- Heavy test weight
- Excellent quality - lower protein, lower solvent retention scored than SY Ovation with higher flour extraction and greater cookie diameter

09PN062#18 *Soft White Winter*

(SY Ovation sib / SY 107)

High Yield potential for Intermediate Rainfall

- #1 Experimental Average yield, 16-20" WSU Variety Testing Soft White Winter Wheat, 2016
- Tied for #1 yield in Mayview WSU Variety Testing SW Winter Wheat Trial, 2016
- Well adapted for Southern and Palouse regions
- Good Cephalosporium, stripe rust tolerance and soilborne mosaic resistant
- Good quality – lower protein, similar solvent retention scores to SY Ovation with higher flour extraction and greater cookie diameter

04PN066-7 *Soft White Winter*

(Finch / OSU Experimental // Madsen)

Superior Performance for dryland regions

- #1 Variety, OSU Soft White Winter Wheat Elite Yield Trials - Low to Intermediate Rainfall, 2016
- #1 Experimental Average Yield, <12" WSU Variety Testing Soft White Winter Wheat, 2016

- #1 variety in WSU Connell trial for both released and experimental varieties
- Good winter hardiness
- Short semi-dwarf with medium maturity
- Good resistance to current strains of stripe rust
- Adequate quality – lower protein and solvent retention scores than Xerpha with roughly equivalent flour extraction and equal cookie diameter

09PN005#25 *Soft White Winter*
(Xerpha / Madsen)

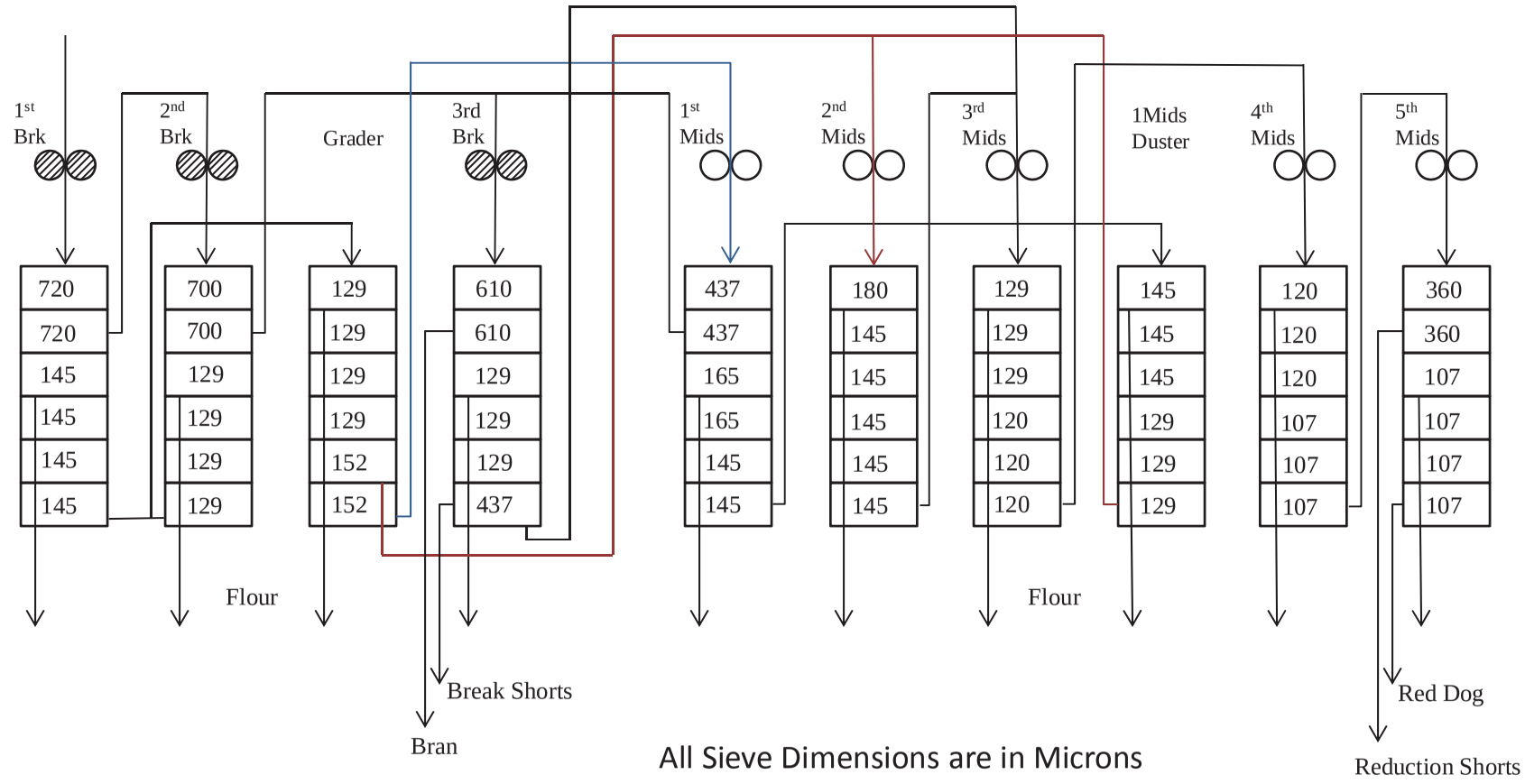
Extremely well adapted for HWY 2 dryland production

- Increased performance over parents Madsen and Xerpha
- PCH1 Footrot resistance
- Great winder hardiness and snow mold tolerance
- Medium maturity
- Good stripe rust resistance
- Excellent C-stripe tolerance
- Adequate quality – lower protein and solvent retention scores than Xerpha with higher flour extraction and equivalent cookie diameter

- 16 -

WWQL Miag Multomat Flow Sheet

PNW WQC 2016 Crop Year



	# of Teeth	α	β	Land	Radius	Spiral	Break Setting Targets
1st Break	14	40	70	0.004”	0.024”	8% = 1”	43% Through 707 micron
2nd Break	20	40	75	0.002”	0.012”	10% = 1¼”	64% Through 707 micron
3rd Break	24	35	75	0.002”	0.008”	10% = 1¼”	Bran Appearance

Western Wheat Quality Laboratory,
MIAG MULTOMAT

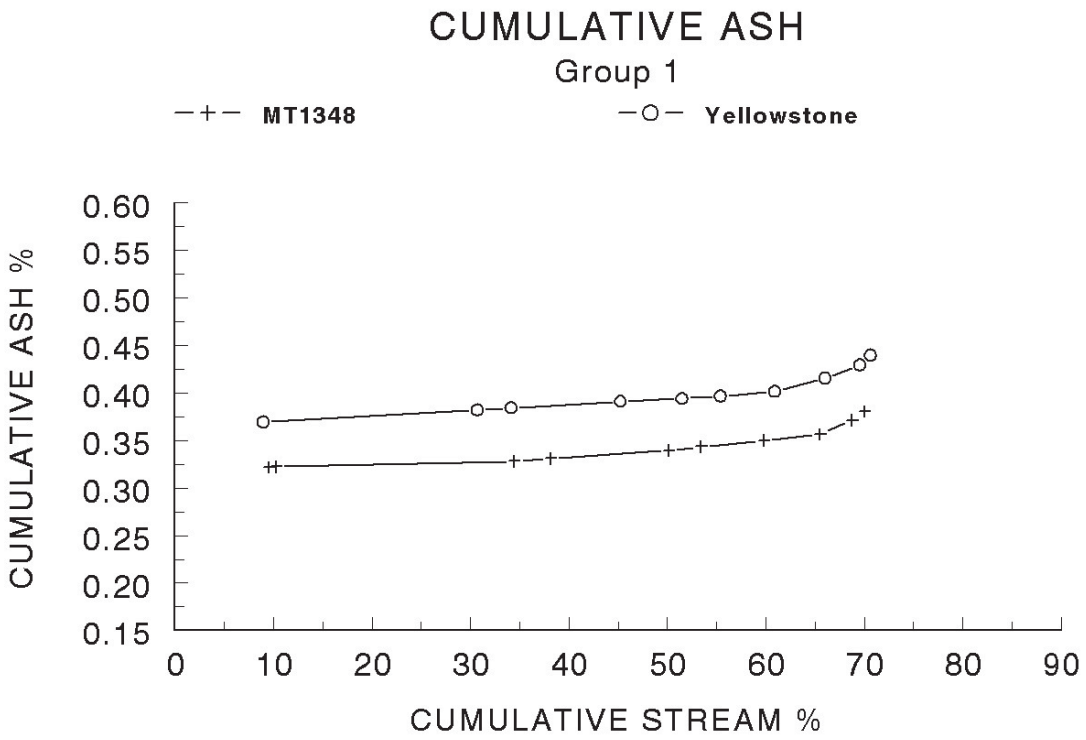
Break Roll Speed
Fast Rolls: 340rpm
Slow Rolls: 145rpm
Differential: 2.34 : 1

Temper
14% Soft Wheat
16% Hard Wheat
0.5% Pre-Temper

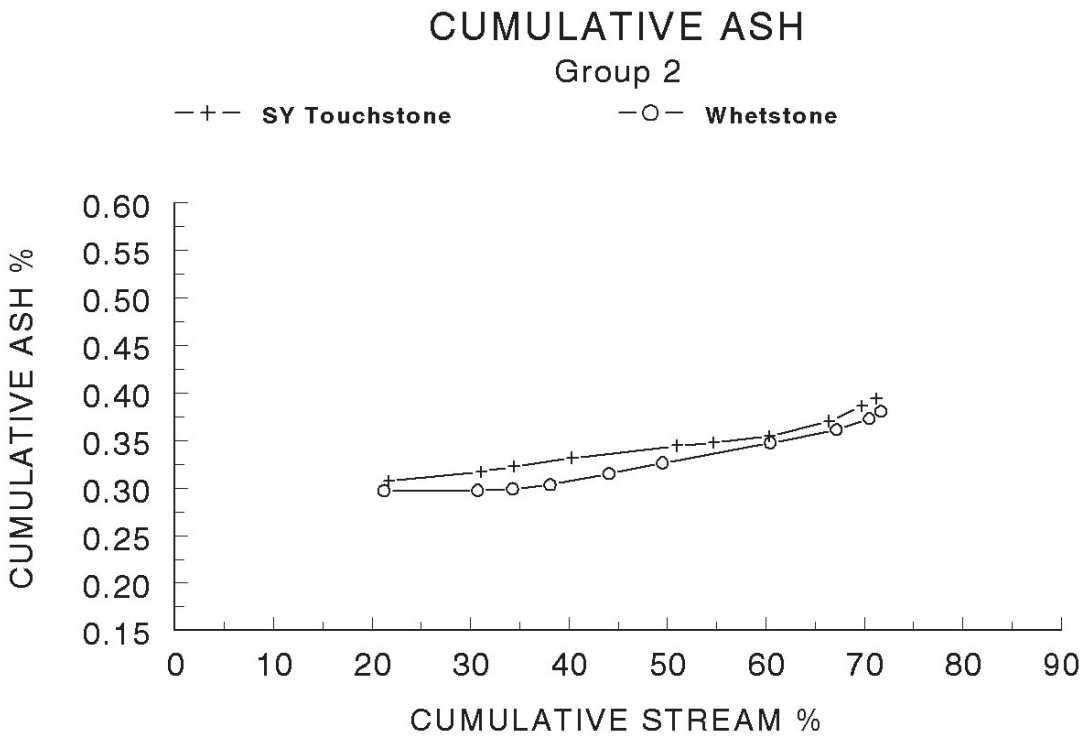
Reduction Roll Speed
Fast Rolls: 340rpm
Slow Rolls: 250rpm
Differential: 1.36 : 1

- 17 -

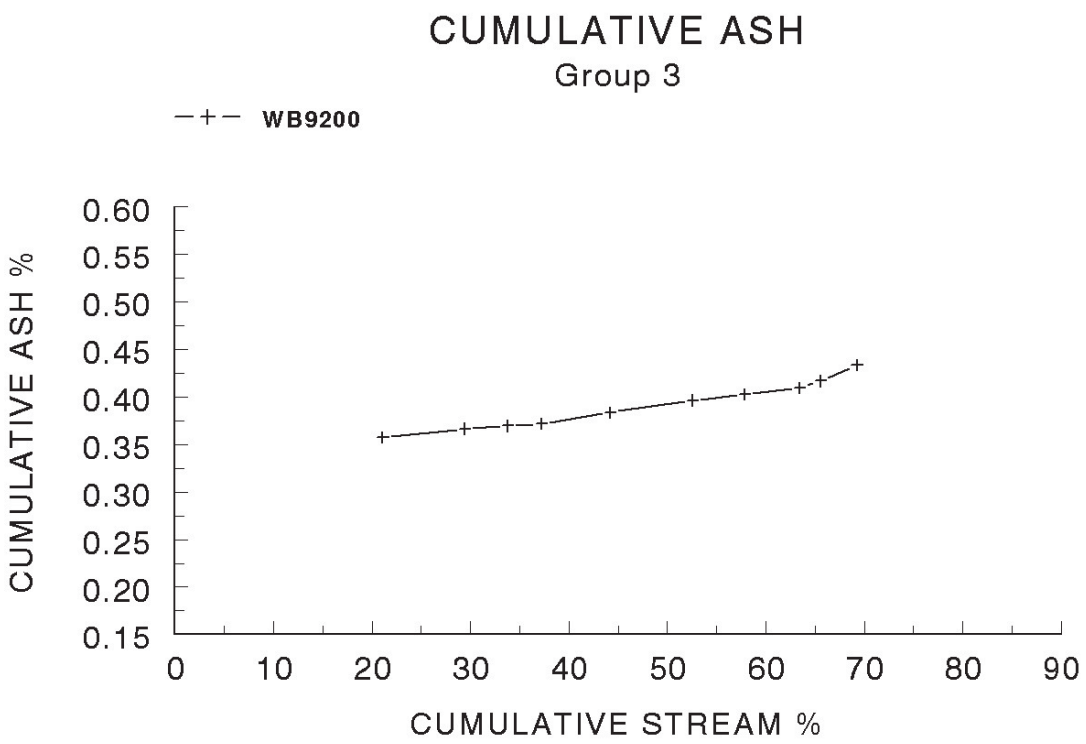
Flour Milling Ash Curves



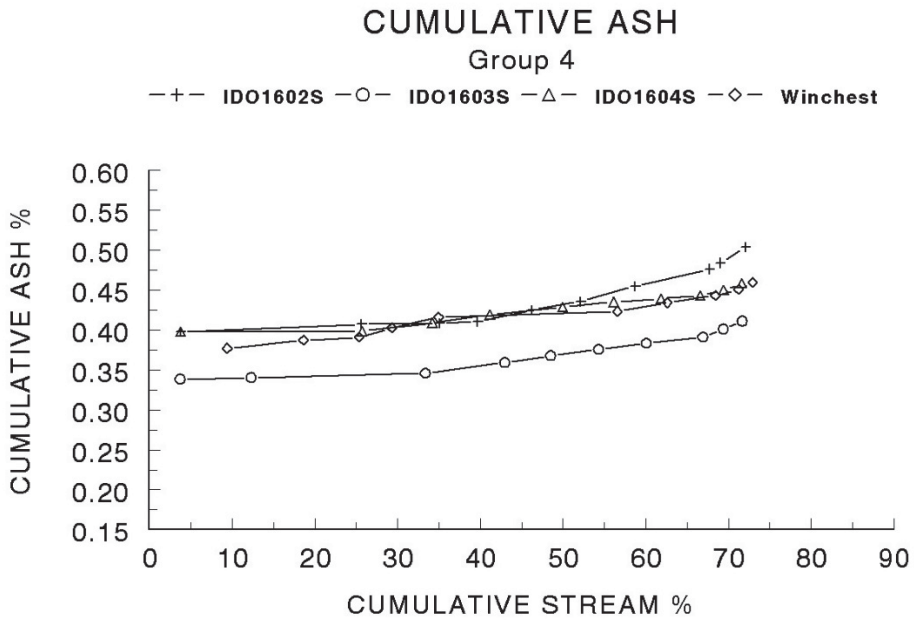
	MT1348						YELLOWSTONE			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
M1	9.6	0.32	9.6	0.32		M1	9.0	0.37	9.0	0.37
M1RD	0.7	0.33	10.3	0.32		M2	21.7	0.39	30.7	0.38
M2	24.2	0.33	34.5	0.33		M1RD	3.4	0.41	34.1	0.38
M3	3.7	0.36	38.2	0.33		B2	11.1	0.41	45.2	0.39
B2	12.0	0.37	50.2	0.34		B1	6.3	0.42	51.5	0.39
M4	3.3	0.40	53.4	0.34		M3	3.9	0.43	55.4	0.40
B1	6.4	0.41	59.8	0.35		GR	5.5	0.45	60.9	0.40
GR	5.7	0.42	65.5	0.36		M4	5.1	0.58	66.0	0.42
B3	3.2	0.67	68.8	0.37		B3	3.6	0.69	69.6	0.43
M5	1.3	0.90	70.0	0.38		M5	1.1	1.10	70.6	0.44
REDDOG	1.2	2.12	71.3	0.41		BKSH	5.0	2.59	75.6	0.58
BKSH	5.1	2.27	76.4	0.54		REDDOG	1.1	2.73	76.7	0.61
REDSH	0.2	3.57	76.6	0.54		REDSH	0.2	4.01	76.9	0.62
BRAN	23.4	4.28	100.0	1.42		BRAN	23.1	4.41	100.0	1.50
Whole Wheat Ash		1.23				Whole Wheat Ash		1.32		
Break Flour Yield		21.6				Break Flour Yield		21.0		



	SY TOUCHSTONE						WHETSTONE			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
M2	21.7	0.31	21.7	0.31		M2	21.2	0.30	21.2	0.30
M1	9.4	0.34	31.1	0.32		M1	9.5	0.30	30.7	0.30
M1RD	3.3	0.38	34.4	0.32		M1RD	3.6	0.31	34.3	0.30
B1	5.9	0.38	40.3	0.33		M3	3.8	0.34	38.1	0.30
B2	10.6	0.39	51.0	0.34		GR	6.0	0.39	44.1	0.32
M3	3.8	0.39	54.7	0.35		M4	5.4	0.42	49.5	0.33
GR	5.6	0.42	60.4	0.35		B2	11.0	0.44	60.5	0.35
M4	6.1	0.53	66.4	0.37		B1	6.7	0.49	67.2	0.36
B3	3.3	0.71	69.8	0.39		B3	3.3	0.61	70.5	0.37
M5	1.5	0.77	71.2	0.39		M5	1.2	0.84	71.7	0.38
REDDOG	1.5	2.16	72.8	0.43		BKSH	4.9	2.07	76.6	0.49
BKSH	5.1	2.29	77.9	0.55		REDDOG	1.2	2.18	77.8	0.51
REDSH	0.2	3.94	78.1	0.56		REDSH	0.2	3.65	78.0	0.52
BRAN	21.9	4.58	100.0	1.44		BRAN	22.0	4.39	100.0	1.37
Whole Wheat Ash		1.29				Whole Wheat Ash		1.20		
Break Flour Yield		19.8				Break Flour Yield		21.0		



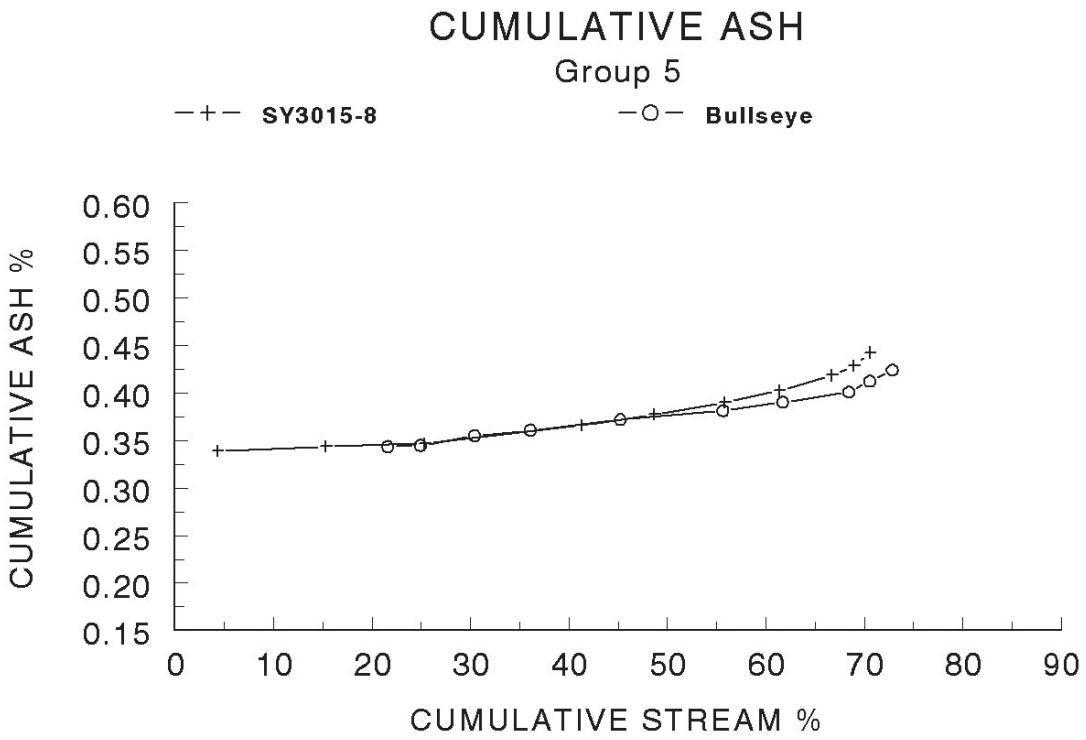
	WB9200			
			Cumulative	
Stream	Yield	Ash	Yield	Ash
M2	21.1	0.36	21.1	0.36
M1	8.3	0.39	29.4	0.37
M3	4.4	0.39	33.8	0.37
M1RD	3.4	0.39	37.2	0.37
M4	7.0	0.45	44.2	0.38
B2	8.4	0.46	52.6	0.40
B1	5.3	0.47	57.8	0.40
GR	5.6	0.48	63.4	0.41
M5	2.1	0.64	65.6	0.42
B3	3.7	0.73	69.3	0.43
REDDOG	2.2	1.50	71.5	0.47
BKSH	5.8	2.04	77.3	0.58
REDSH	0.2	4.12	77.4	0.59
BRAN	22.6	5.36	100.0	1.67
Whole Wheat Ash		1.48		
Break Flour Yield		17.4		



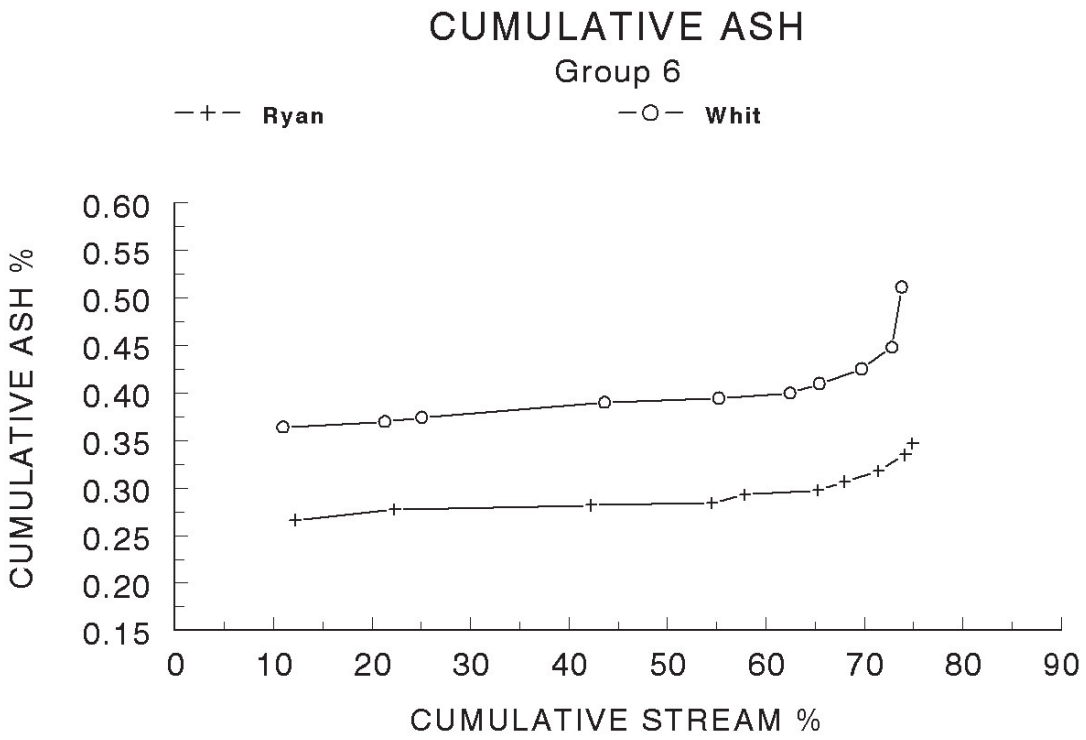
	ID1602S						ID1603S			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
M1RD	3.8	0.40	3.8	0.40		M1RD	3.7	0.34	3.7	0.34
M2	21.9	0.41	25.7	0.41		M1	8.6	0.34	12.3	0.34
M1	9.4	0.41	35.1	0.41		M2	21.1	0.35	33.4	0.35
M3	4.6	0.43	39.7	0.41		B2	9.6	0.41	43.0	0.36
GR	6.6	0.51	46.3	0.43		B1	5.5	0.44	48.5	0.37
M4	5.9	0.52	52.1	0.44		GR	5.8	0.44	54.3	0.38
B1	6.6	0.61	58.7	0.46		M3	5.8	0.46	60.1	0.38
B2	9.0	0.62	67.7	0.48		M4	6.8	0.46	66.9	0.39
M5	1.3	0.89	69.0	0.48		M5	2.5	0.67	69.4	0.40
B3	3.1	0.95	72.1	0.50		B3	2.3	0.71	71.7	0.41
REDDOG	1.1	2.29	73.2	0.53		REDDOG	2.8	1.74	74.5	0.46
BKSH	5.4	2.60	78.6	0.67		BKSH	2.8	3.38	77.3	0.57
REDSH	0.2	3.95	78.8	0.68		REDSH	0.5	3.75	77.8	0.59
BRAN	21.2	5.05	100.0	1.61		BRAN	22.2	5.21	100.0	1.61
Whole Wheat Ash		1.42				Whole Wheat Ash		1.39		
Break Flour Yield		18.70				Break Flour Yield		17.40		

	ID1604S						WINCHESTER			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
M1RD	3.8	0.40	3.8	0.40		M1RD	3.9	0.38	3.9	0.38
M2	21.9	0.40	25.7	0.40		M2	22.6	0.39	26.4	0.39
M1	8.5	0.44	34.2	0.41		M1	9.9	0.40	36.3	0.39
M4	7.0	0.47	41.2	0.42		M3	5.9	0.48	42.2	0.40
B2	8.8	0.47	49.9	0.43		B1	9.0	0.48	51.2	0.42
M3	6.2	0.48	56.1	0.44		M4	6.6	0.48	57.8	0.42
B1	5.7	0.49	61.8	0.44		B2	5.7	0.54	63.5	0.43
GR	4.8	0.49	66.6	0.44		GR	5.5	0.55	69.1	0.44
M5	2.8	0.61	69.4	0.45		M5	2.7	0.64	71.8	0.45
B3	2.2	0.74	71.6	0.46		B3	1.7	0.83	73.5	0.46
REDDOG	3.9	1.24	75.5	0.50		REDDOG	3.6	1.70	77.1	0.52
BKSH	3.3	3.16	78.7	0.61		BKSH	3.2	3.13	80.3	0.62
REDSH	0.6	3.63	79.3	0.63		REDSH	0.5	3.91	80.8	0.64
BRAN	20.7	5.38	100.0	1.61		BRAN	19.2	5.51	100.0	1.58
Whole Wheat Ash		1.44				Whole Wheat Ash		1.30		
Break Flour Yield		16.70				Break Flour Yield		16.40		

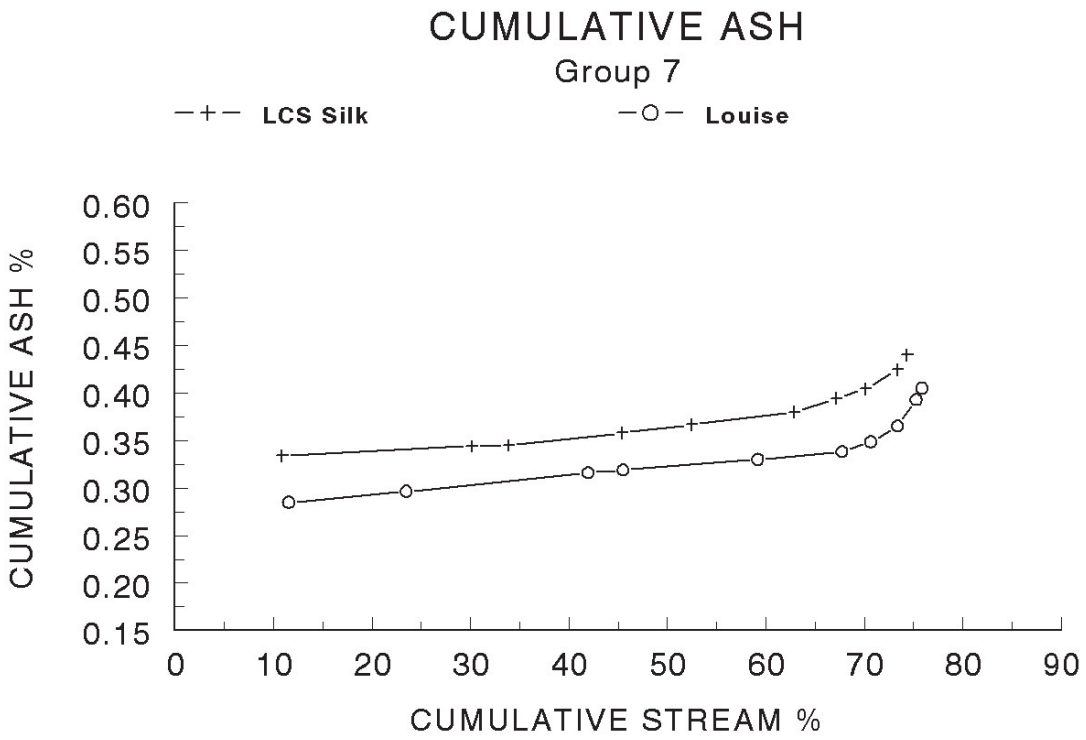
- 21 -



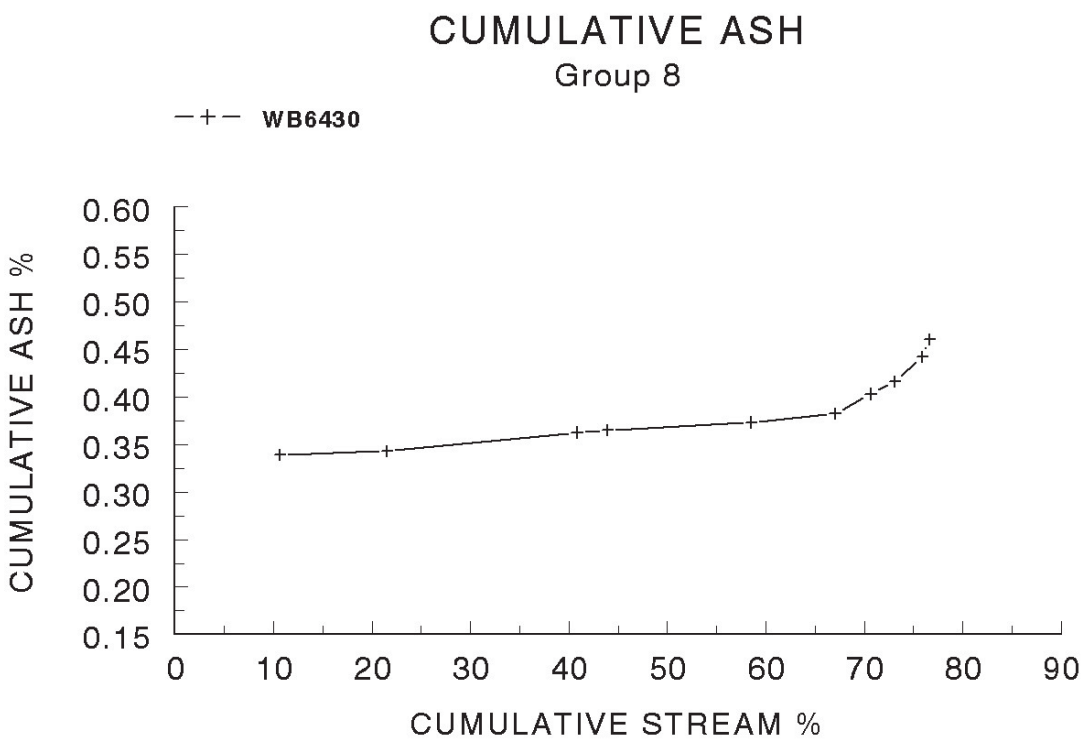
	SY3015-8					BULLSEYE			
			Cumulative					Cumulative	
Stream	Yield	Ash	Yield	Ash	Stream	Yield	Ash	Yield	Ash
M1	11.5	0.34	11.5	0.34	M1	9.5	0.34	9.5	0.34
M2	16.9	0.35	28.4	0.34	M1RD	3.3	0.35	12.8	0.34
M1RD	4.2	0.37	32.6	0.35	M2	22.3	0.36	35.1	0.35
B2	9.8	0.43	42.5	0.37	B1	6.0	0.40	41.0	0.36
B1	7.2	0.44	49.7	0.38	B2	10.3	0.42	51.3	0.37
GR	7.0	0.48	56.7	0.39	GR	6.6	0.45	57.9	0.38
M3	5.4	0.53	62.2	0.40	M3	5.4	0.49	63.3	0.39
M4	5.2	0.61	67.4	0.42	M4	5.6	0.52	68.9	0.40
B3	2.2	0.74	69.6	0.43	B3	2.3	0.76	71.2	0.41
M5	1.6	1.03	71.2	0.44	M5	2.1	0.82	73.3	0.42
REDDOG	2.1	2.72	73.3	0.51	REDDOG	3.7	1.88	76.9	0.49
BKSH	3.2	3.37	76.5	0.63	BKSH	3.6	3.61	80.6	0.63
REDSH	0.4	4.28	76.9	0.65	REDSH	0.8	3.82	81.4	0.67
BRAN	23.1	5.36	100.0	1.73	BRAN	18.6	5.07	100.0	1.49
Whole Wheat Ash		1.46			Whole Wheat Ash		1.31		
Break Flour Yield		19.2			Break Flour Yield		18.6		



	RYAN						WHIT			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
M1	12.6	0.27	12.6	0.27		M1	11.5	0.36	11.5	0.36
M2	20.8	0.28	33.5	0.28		B1	10.1	0.38	21.6	0.37
B1	9.9	0.30	43.4	0.28		M1RD	3.7	0.40	25.3	0.37
M1RD	3.3	0.31	46.6	0.28		M2	19.8	0.41	45.0	0.39
B2	12.0	0.33	58.7	0.29		B2	11.3	0.41	56.3	0.39
GR	7.3	0.34	66.0	0.30		GR	7.1	0.44	63.4	0.40
B3	2.7	0.53	68.6	0.31		B3	2.9	0.63	66.3	0.41
M3	3.3	0.55	72.0	0.32		M3	4.2	0.67	70.5	0.43
M4	2.7	0.79	74.7	0.33		M4	3.0	0.98	73.5	0.45
M5	0.7	1.56	75.4	0.35		REDDOG	1.9	2.12	75.4	0.49
REDDOG	1.2	2.52	76.6	0.38		M5	1.0	2.15	76.4	0.51
REDSH	0.4	3.21	77.0	0.40		REDSH	0.5	3.18	76.8	0.53
BKSH	2.8	3.24	79.8	0.49		BKSH	3.0	3.37	79.9	0.64
BRAN	20.2	4.09	100.0	1.22		BRAN	20.1	4.50	100.0	1.41
Whole Wheat Ash		0.97				Whole Wheat Ash		1.23		
Break Flour Yield		25.2				Break Flour Yield		24.3		

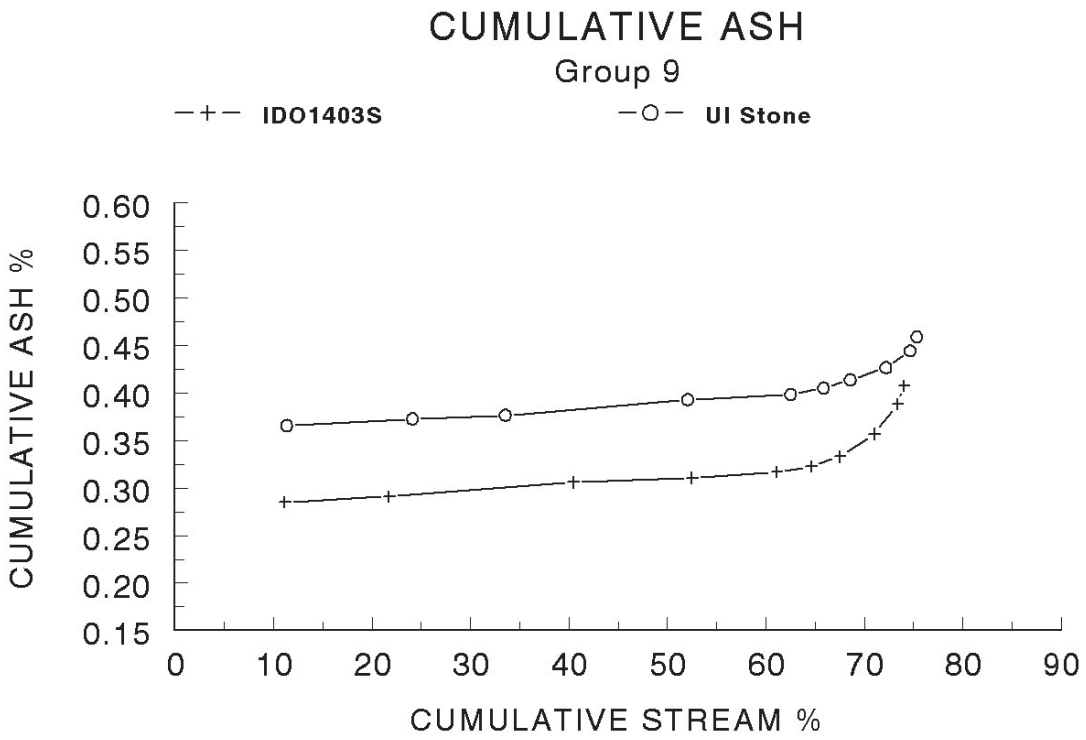


	SILK						LOUISE			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
M1	10.9	0.33	10.9	0.33		M1	11.5	0.28	11.5	0.28
M2	19.3	0.35	30.1	0.34		B1	11.9	0.31	23.5	0.30
M1RD	3.7	0.35	33.9	0.34		M2	18.5	0.34	41.9	0.32
B2	11.5	0.40	45.4	0.36		M1RD	3.5	0.35	45.5	0.32
GR	7.1	0.42	52.5	0.37		B2	13.7	0.37	59.2	0.33
B1	10.4	0.45	62.9	0.38		GR	8.6	0.39	67.7	0.34
M3	4.3	0.61	67.2	0.39		B3	2.9	0.59	70.7	0.35
B3	3.0	0.63	70.1	0.40		M3	2.7	0.80	73.4	0.37
M4	3.3	0.86	73.4	0.42		M4	1.9	1.48	75.3	0.39
M5	1.0	1.61	74.4	0.44		M5	0.6	1.95	75.9	0.41
REDDOG	1.7	2.47	76.1	0.49		REDDOG	1.1	2.70	76.9	0.44
BKSH	2.9	3.34	78.9	0.59		REDSH	0.3	3.61	77.2	0.45
REDSH	0.4	3.35	79.4	0.61		BKSH	2.6	3.69	79.9	0.56
BRAN	20.6	5.39	100.0	1.59		BRAN	20.1	5.58	100.0	1.57
Whole Wheat Ash		1.23				Whole Wheat Ash		1.23		
Break Flour Yield		24.9				Break Flour Yield		28.5		

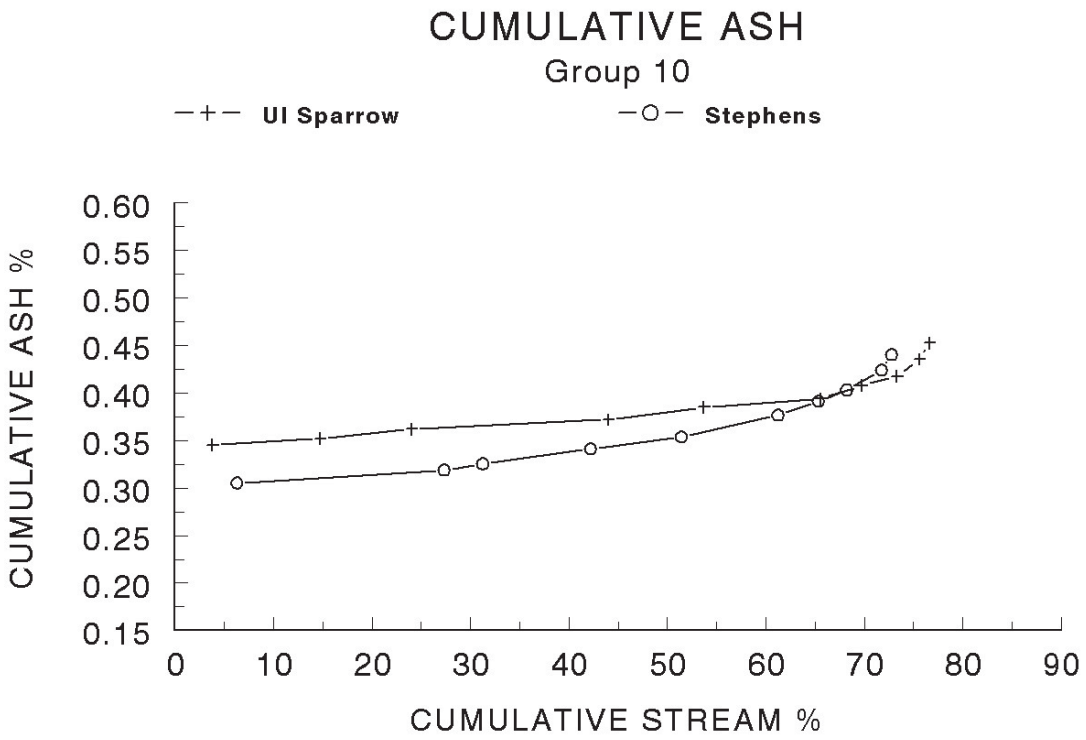


	WB6430			
			Cumulative	
Stream	Yield	Ash	Yield	Ash
B1	10.7	0.34	10.7	0.34
M1	10.9	0.35	21.6	0.34
M2	19.3	0.38	40.8	0.36
M1RD	3.1	0.39	43.9	0.37
B2	14.6	0.40	58.5	0.37
GR	8.5	0.45	67.0	0.38
M3	3.6	0.78	70.7	0.40
B3	2.5	0.79	73.1	0.42
M4	2.8	1.14	75.9	0.44
M5	0.7	2.33	76.6	0.46
REDDOG	1.5	2.99	78.2	0.51
REDSH	0.6	4.02	78.7	0.53
BKSH	3.0	4.14	81.7	0.67
BRAN	18.3	5.80	100.0	1.61
Whole Wheat Ash		1.49		
Break Flour Yield		27.8		

- 25 -

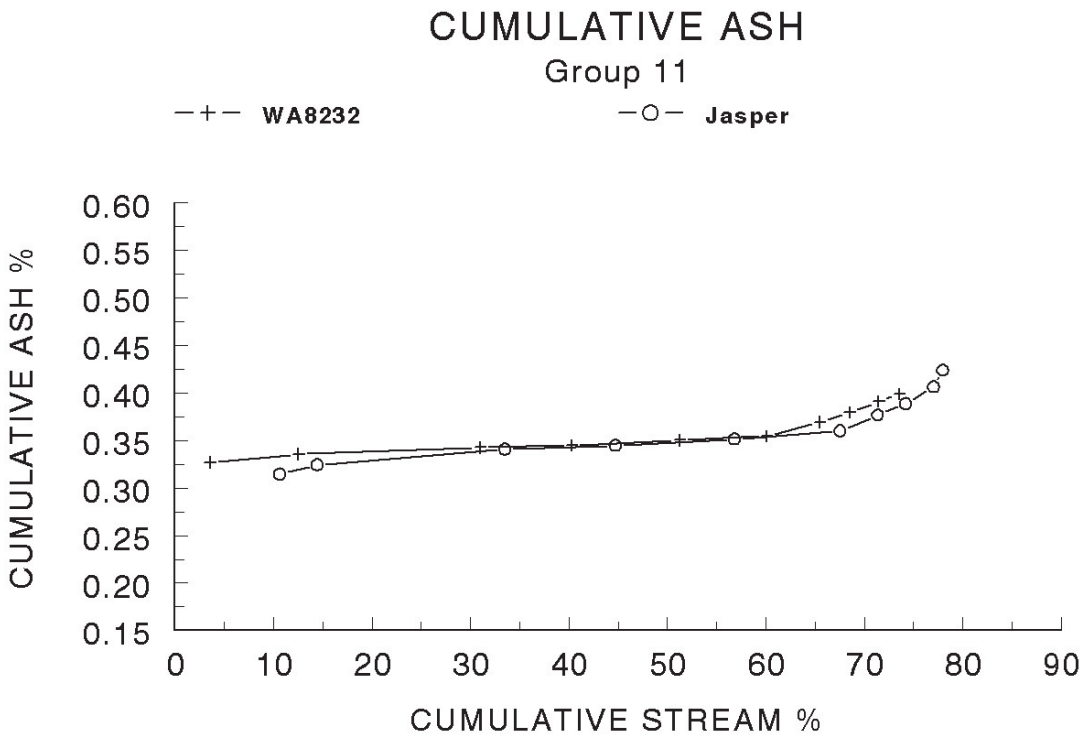


	ID1403S						STONE			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
M1	11.2	0.29	11.2	0.29		M1	11.0	0.37	11.0	0.37
B1	10.6	0.30	21.8	0.29		B1	11.1	0.38	22.1	0.37
M2	18.7	0.32	40.4	0.31		M1RD	3.3	0.40	25.3	0.38
B2	12.1	0.33	52.5	0.31		M2	19.7	0.41	45.0	0.39
GR	8.6	0.36	61.1	0.32		B2	12.5	0.42	57.5	0.40
M1RD	3.5	0.42	64.6	0.32		GR	9.2	0.45	66.7	0.41
B3	2.9	0.56	67.5	0.33		B3	2.6	0.63	69.3	0.41
M3	3.5	0.82	71.0	0.36		M3	3.5	0.68	72.9	0.43
M4	2.4	1.32	73.4	0.39		M4	2.4	0.99	75.3	0.44
M5	0.7	2.56	74.1	0.41		M5	0.6	2.16	75.9	0.46
REDDOG	1.1	3.05	75.2	0.45		REDDOG	1.3	2.80	77.2	0.50
BKSH	2.9	3.66	78.0	0.56		REDSH	0.4	3.80	77.6	0.52
REDSH	0.3	3.81	78.4	0.58		BKSH	2.7	4.13	80.3	0.64
BRAN	21.6	4.89	100.0	1.51		BRAN	19.7	5.17	100.0	1.53
Whole Wheat Ash		1.38				Whole Wheat Ash		1.23		
Break Flour Yield		25.6				Break Flour Yield		26.2		



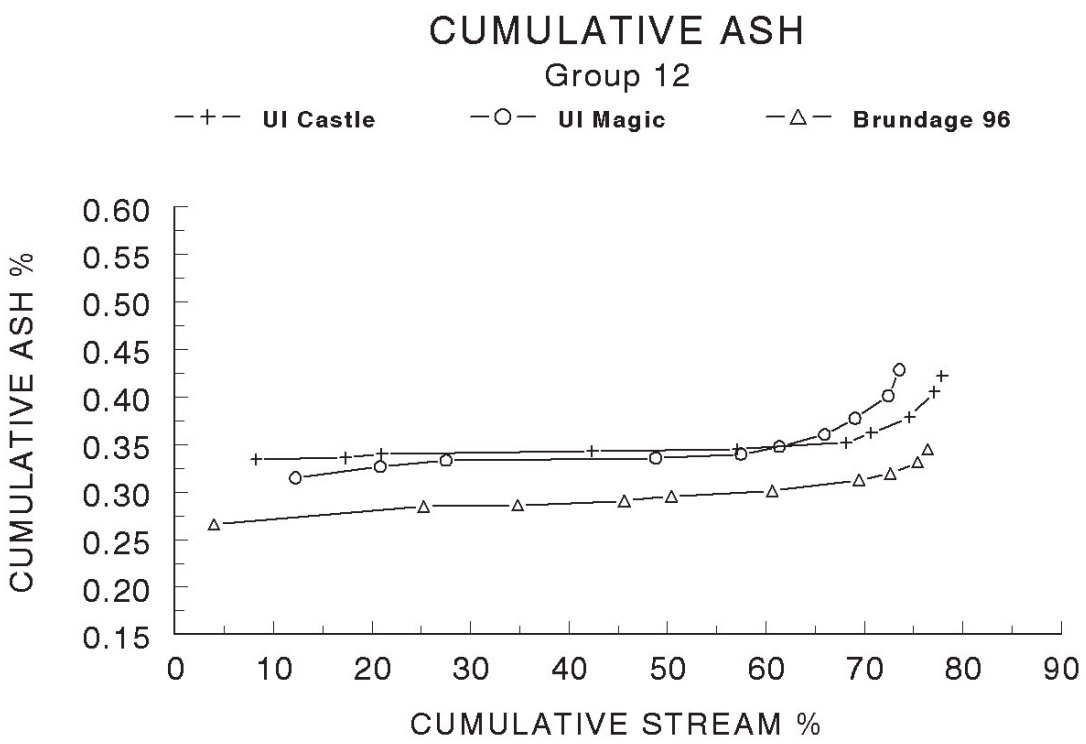
	SPARROW						STEPHENS			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
M1	11.7	0.35	11.7	0.35		M1	6.3	0.31	6.3	0.31
M1RD	3.7	0.37	15.3	0.35		M2	21.0	0.32	27.3	0.32
B1	9.0	0.38	24.3	0.36		M1RD	3.9	0.37	31.3	0.33
M2	21.6	0.38	45.9	0.37		B2	10.9	0.39	42.2	0.34
B2	11.5	0.44	57.4	0.39		GR	9.2	0.41	51.4	0.35
GR	9.4	0.45	66.7	0.39		B1	9.8	0.50	61.2	0.38
M3	4.0	0.64	70.8	0.41		M3	4.1	0.61	65.3	0.39
B3	2.2	0.73	73.0	0.42		B3	2.9	0.67	68.2	0.40
M4	3.5	0.81	76.4	0.44		M4	3.5	0.83	71.8	0.42
M5	1.0	1.75	77.4	0.45		M5	1.0	1.58	72.8	0.44
REDDOG	2.0	3.00	79.4	0.52		REDDOG	1.6	2.75	74.4	0.49
BKSH	3.1	3.96	82.5	0.65		BKSH	2.8	3.83	77.1	0.61
REDSH	0.6	4.07	83.1	0.67		REDSH	0.4	3.99	77.5	0.62
BRAN	16.9	4.96	100.0	1.39		BRAN	22.5	5.61	100.0	1.75
Whole Wheat Ash		1.34				Whole Wheat Ash		1.36		
Break Flour Yield		22.7				Break Flour Yield		23.6		

- 27 -

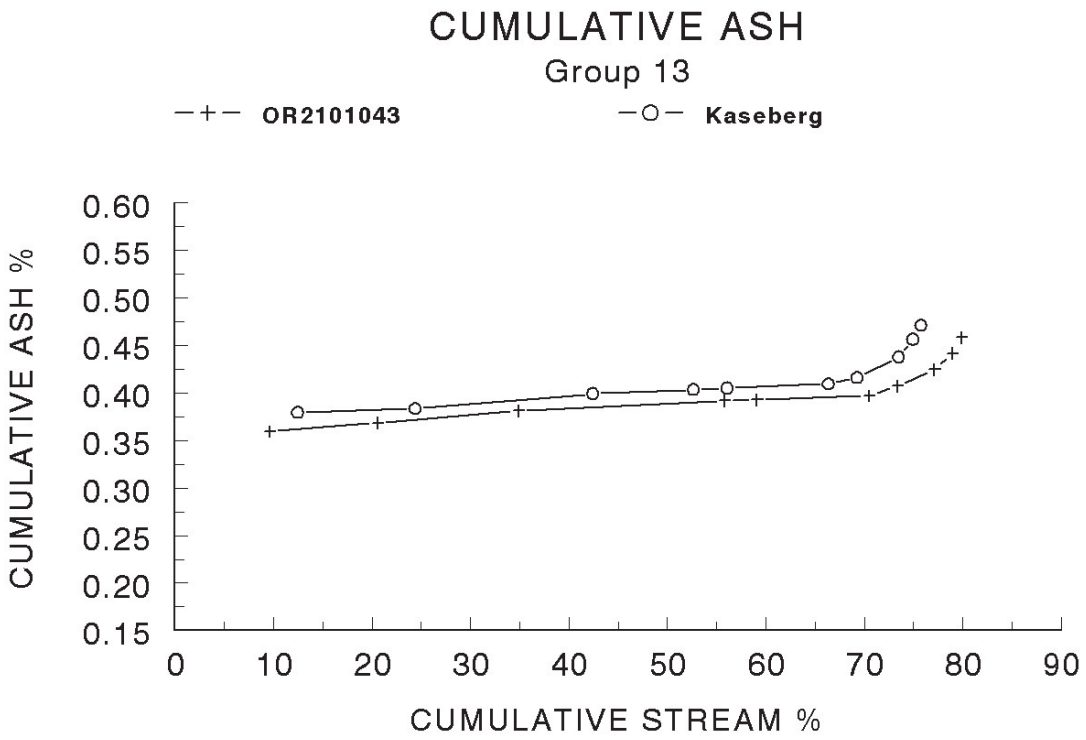


	WA8232						JASPER			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
M1RD	3.6	0.33	3.6	0.33		M1	10.6	0.31	10.6	0.31
M1	9.0	0.34	12.5	0.34		M1RD	3.8	0.35	14.4	0.32
M2	18.4	0.35	31.0	0.34		M2	19.1	0.35	33.5	0.34
B1	9.3	0.35	40.3	0.34		B1	11.2	0.36	44.7	0.34
B2	10.9	0.37	51.2	0.35		B2	12.1	0.38	56.8	0.35
GR	8.9	0.38	60.1	0.35		GR	10.7	0.41	67.5	0.36
M3	5.4	0.53	65.5	0.37		M3	3.8	0.67	71.4	0.38
B3	3.0	0.60	68.5	0.38		B3	2.8	0.69	74.2	0.39
M4	3.0	0.66	71.5	0.39		M4	2.9	0.87	77.0	0.41
M5	2.1	0.67	73.6	0.40		M5	0.9	1.88	78.0	0.42
REDDOG	3.7	1.46	77.2	0.45		REDDOG	1.4	2.57	79.3	0.46
REDSH	0.8	3.32	78.1	0.48		BKSH	2.5	3.64	81.8	0.56
BKSH	3.0	3.32	81.1	0.59		REDSH	0.4	3.69	82.3	0.57
BRAN	18.9	4.82	100.0	1.39		BRAN	17.7	5.58	100.0	1.46
Whole Wheat Ash		1.32				Whole Wheat Ash		1.13		
Break Flour Yield		23.2				Break Flour Yield		26.0		

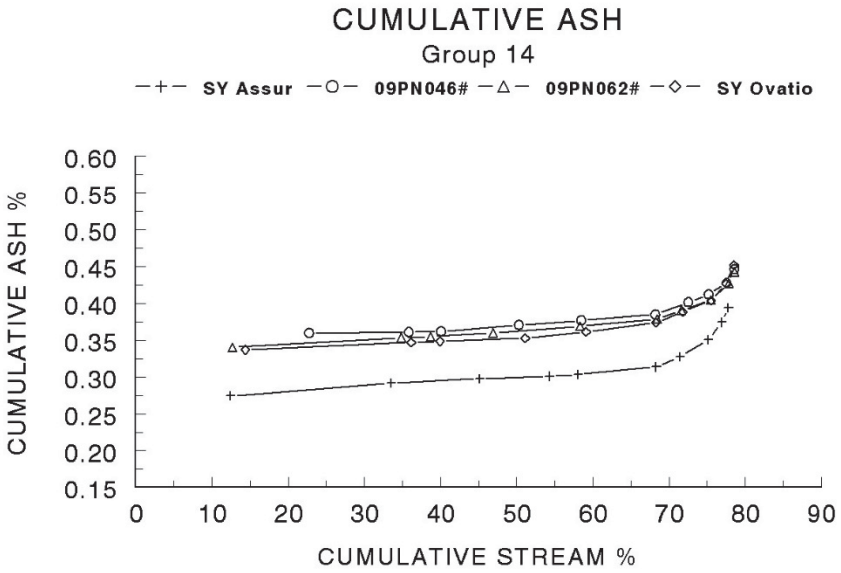
- 28 -



	CASTLE					MAGIC					BRUNDAGE96			
			Cumulative					Cumulative					Cumulative	
Stream	Yield	Ash	Yield	Ash	Stream	Yield	Ash	Yield	Ash	Stream	Yield	Ash	Yield	Ash
M1	14.8	0.33	14.8	0.33	M1	12.2	0.31	12.2	0.31	M1	10.8	0.27	10.8	0.27
M1RD	3.7	0.34	18.5	0.34	M2	21.3	0.33	33.5	0.33	M2	21.3	0.29	32.1	0.29
M2	21.4	0.34	39.8	0.34	B1	8.6	0.36	42.1	0.33	M1RD	4.0	0.30	36.1	0.29
B2	9.1	0.36	48.9	0.34	M1RD	3.9	0.36	46.0	0.34	B1	9.5	0.31	45.6	0.29
B1	8.2	0.36	57.1	0.35	B2	6.7	0.37	52.7	0.34	B2	10.2	0.32	55.9	0.30
GR	11.0	0.39	68.1	0.35	GR	8.7	0.40	61.4	0.35	GR	8.8	0.34	64.7	0.30
B3	2.6	0.64	70.7	0.36	B3	3.1	0.61	64.5	0.36	M3	4.7	0.47	69.4	0.31
M3	3.8	0.68	74.6	0.38	M3	4.6	0.61	69.1	0.38	B3	2.8	0.48	72.2	0.32
M4	2.5	1.19	77.1	0.41	M4	3.4	0.89	72.5	0.40	M4	3.2	0.60	75.4	0.33
M5	0.8	2.08	77.9	0.42	M5	1.1	2.19	73.6	0.43	M5	1.1	1.31	76.5	0.34
REDDOG	1.3	2.97	79.2	0.46	REDDOG	1.8	3.10	75.3	0.49	REDDOG	1.8	2.22	78.3	0.39
REDSH	0.4	3.75	79.5	0.48	REDSH	0.6	4.20	76.0	0.52	REDSH	0.6	3.63	78.9	0.41
BKSH	2.5	4.10	82.0	0.59	BKSH	3.0	4.28	79.0	0.67	BKSH	2.9	3.76	81.8	0.53
BRAN	18.0	5.58	100.0	1.49	BRAN	21.0	6.09	100.0	1.81	BRAN	18.2	4.55	100.0	1.26
Whole Wheat Ash		1.30			Whole Wheat Ash		1.57			Whole Wheat Ash		1.13		
Break Flour Yield		19.9			Break Flour Yield		18.4			Break Flour Yield		22.5		



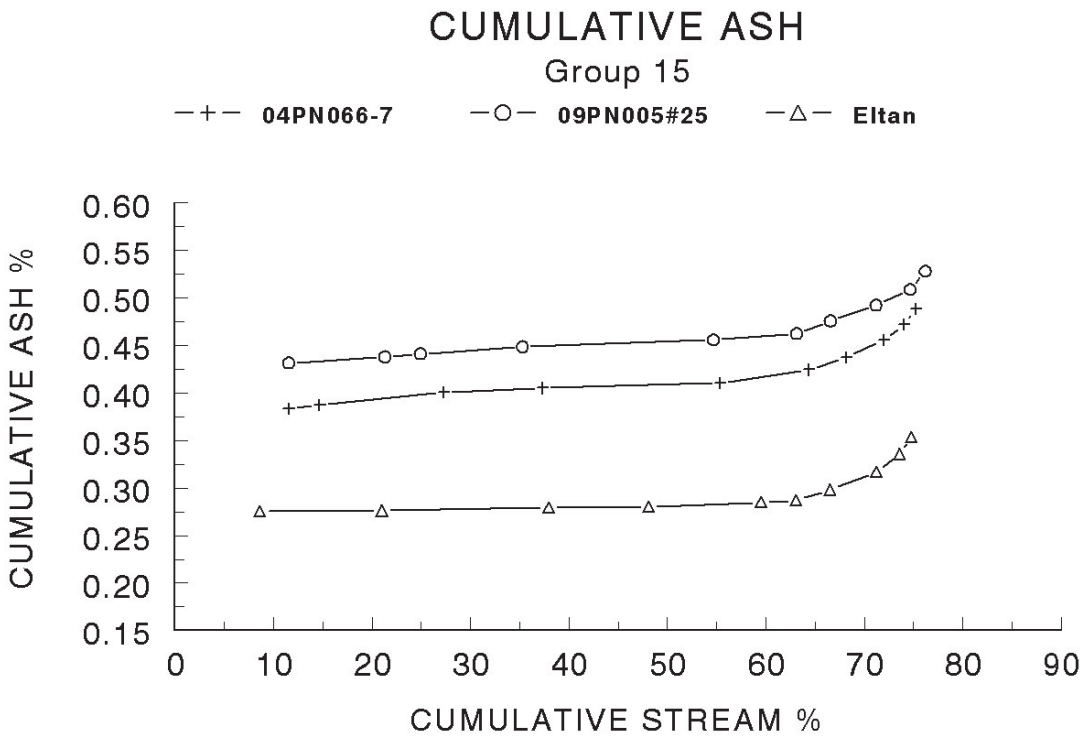
	OR2101043						KASEBERG			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
B1	9.6	0.36	9.6	0.36		B1	12.5	0.38	12.5	0.38
M1	10.9	0.38	20.6	0.37		B2	11.9	0.39	24.4	0.38
B2	14.3	0.40	34.9	0.38		M2	18.1	0.42	42.4	0.40
M2	20.9	0.41	55.8	0.39		M1	10.2	0.42	52.6	0.40
M1RD	3.3	0.41	59.1	0.39		M1RD	3.4	0.43	56.1	0.41
GR	11.4	0.42	70.5	0.40		GR	10.3	0.43	66.4	0.41
B3	2.9	0.66	73.4	0.41		B3	2.9	0.57	69.3	0.42
M3	3.8	0.76	77.1	0.42		M3	4.2	0.79	73.5	0.44
M4	1.8	1.17	79.0	0.44		M4	1.4	1.41	74.9	0.46
M5	0.9	1.93	79.9	0.46		M5	0.8	1.82	75.8	0.47
REDDOG	1.6	2.69	81.4	0.50		REDDOG	1.7	2.80	77.5	0.52
REDSH	0.6	3.50	82.0	0.52		BKSH	3.2	3.23	80.6	0.63
BKSH	2.7	3.61	84.7	0.62		REDSH	0.6	3.34	81.3	0.65
BRAN	15.3	4.53	100.0	1.22		BRAN	18.7	3.89	100.0	1.26
Whole Wheat Ash		1.04				Whole Wheat Ash		1.18		
Break Flour Yield		26.8				Break Flour Yield		22.8		



	SY ASSURE						09PN046#16			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
M1	12.4	0.27	12.4	0.27		M2	22.8	0.36	22.8	0.36
M2	21.0	0.30	33.5	0.29		M1	13.1	0.36	35.8	0.36
B2	11.6	0.32	45.1	0.30		M1RD	4.2	0.37	40.1	0.36
B1	9.2	0.32	54.3	0.30		B2	10.2	0.41	50.3	0.37
M1RD	3.8	0.34	58.1	0.30		B1	8.2	0.42	58.5	0.38
GR	10.3	0.37	68.3	0.31		GR	9.7	0.43	68.2	0.38
B3	3.1	0.62	71.4	0.33		M3	4.3	0.67	72.5	0.40
M3	3.7	0.79	75.2	0.35		B3	2.7	0.70	75.2	0.41
M4	1.7	1.40	76.9	0.37		M4	2.4	0.92	77.6	0.43
M5	0.9	2.11	77.8	0.39		M5	1.0	1.84	78.6	0.45
REDDO	1.5	2.92	79.3	0.44		REDDOG	1.7	2.45	80.3	0.49
REDSH	0.5	3.80	79.8	0.46		BKSH	2.9	3.68	83.2	0.60
BKSH	2.7	3.86	82.6	0.58		REDSH	0.6	3.78	83.8	0.62
BRAN	17.4	5.26	100.0	1.39		BRAN	16.2	5.01	100.0	1.33
Whole Wheat Ash		1.05				Whole Wheat Ash		1.27		
Break Flour Yield		23.9				Break Flour Yield		21.1		

	09PN062#18						SY OVATION			
			Cumulative						Cumulative	
Stream	Yield	Ash	Yield	Ash		Stream	Yield	Ash	Yield	Ash
M1	12.7	0.34	12.7	0.34		M1	14.4	0.34	14.4	0.34
M2	22.1	0.36	34.8	0.35		M2	21.8	0.35	36.1	0.35
M1RD	3.9	0.37	38.7	0.35		M1RD	3.8	0.36	39.9	0.35
B1	8.2	0.39	46.9	0.36		B1	11.2	0.37	51.1	0.35
B2	11.5	0.41	58.3	0.37		B2	8.0	0.42	59.1	0.36
GR	10.1	0.43	68.4	0.38		GR	9.2	0.45	68.3	0.37
B3	3.2	0.65	71.6	0.39		B3	3.5	0.68	71.8	0.39
M3	3.9	0.67	75.5	0.40		M3	3.7	0.70	75.5	0.40
M4	2.3	1.16	77.8	0.43		M4	1.9	1.31	77.5	0.43
M5	0.8	1.99	78.6	0.44		M5	1.1	2.27	78.5	0.45
REDDO	1.4	2.94	80.0	0.49		REDDOG	1.6	3.15	80.2	0.51
REDSH	0.5	3.63	80.4	0.50		BKSH	2.7	3.99	82.9	0.62
BKSH	2.8	3.67	83.2	0.61		REDSH	0.7	4.02	83.6	0.65
BRAN	16.8	5.14	100.0	1.37		BRAN	16.4	5.15	100.0	1.39
Whole Wheat Ash		1.3				Whole Wheat Ash		1.39		
Break Flour Yield		22.9				Break Flour Yield		22.7		

- 31 -



	04PN066-7					09PN005#25					ELTAN			
			Cumulative					Cumulative					Cumulative	
Stream	Yield	Ash	Yield	Ash	Stream	Yield	Ash	Yield	Ash	Stream	Yield	Ash	Yield	Ash
M1	11.5	0.38	11.5	0.38	M1	11.6	0.43	11.6	0.43	GR	8.6	0.28	8.6	0.28
M1RD	3.1	0.40	14.7	0.39	B1	9.8	0.45	21.3	0.44	B1	12.4	0.28	21.0	0.28
B1	12.6	0.42	27.3	0.40	M1RD	3.6	0.46	24.9	0.44	M2	16.9	0.28	37.9	0.28
B2	10.1	0.42	37.3	0.41	B2	10.4	0.47	35.3	0.45	M1	10.2	0.28	48.1	0.28
M2	18.0	0.42	55.4	0.41	M2	19.4	0.47	54.7	0.46	B2	11.4	0.31	59.5	0.29
GR	9.0	0.51	64.4	0.42	GR	8.5	0.50	63.1	0.46	M1RD	3.6	0.32	63.1	0.29
B3	3.8	0.66	68.2	0.44	B3	3.4	0.72	66.6	0.48	B3	3.4	0.50	66.5	0.30
M3	3.8	0.78	72.0	0.46	M3	4.6	0.73	71.2	0.49	M3	4.7	0.58	71.2	0.32
M4	2.1	1.04	74.1	0.47	M4	3.5	0.85	74.7	0.51	M4	2.4	0.90	73.6	0.34
M5	1.2	1.50	75.3	0.49	M5	1.5	1.47	76.2	0.53	M5	1.2	1.42	74.8	0.35
REDDOG	2.8	2.15	78.0	0.55	REDDOG	3.4	1.83	79.6	0.58	REDDOG	2.7	2.03	77.5	0.41
BKSH	2.8	3.71	80.8	0.66	REDSH	0.8	3.62	80.4	0.62	REDSH	0.5	3.51	78.0	0.43
REDSH	0.7	3.75	81.5	0.68	BKSH	3.0	3.64	83.4	0.72	BKSH	2.7	3.53	80.7	0.54
BRAN	18.5	5.59	100.0	1.59	BRAN	16.6	5.45	100.0	1.51	BRAN	19.3	5.22	100.0	1.44
Whole Wheat Ash		1.75			Whole Wheat Ash		1.53			Whole Wheat Ash		1.37		
Break Flour Yield		26.5			Break Flour Yield		23.6			Break Flour Yield		27.2		

USDA Federal Grain Inspection Service
Olympia, Washington

Sample	Variety	Group#	Check	Class	FGIS Grade & Comments
1	MT1348	1		HRW	HRW
2	YELLOWSTONE	1	ck	HRW	HRW – Yellowstone?
3	SY TOUCHSTONE	2		HRW	Split – Sprinter?
4	WHETSTONE	2	ck	HRW	HRW
5	WB9200	3		HRS	HRS
6	ID1602S	4		HWS	HDWH
7	ID1603S	4		HRS	HRW – Bauermeister?
8	ID1604S	4		HWS	HDWH
9	WINCHESTER	4	ck	HRS	Split
10	SY3015-8	5		HRS	HRS
11	BULLSEYE	5	ck	HRS	HRS
12	RYAN	6		SWS	SWH
13	WHIT	6	ck	SWS	SWH
14	SILK	7		SWS	SWH
15	LOUISE	7	ck	SWS	SWH
16	WB6430	8		SWS	SWH
17	ID1403S	9		SWS	SWH
18	STONE	9	ck	SWS	SWH
19	SPARROW	0		SWW	SWH
20	STEPHENS	0	ck	SWW	SWH
21	WA8232	1		SWW	SWH
22	JASPER	1	ck	SWW	SWH
23	CASTLE	2		SWW	SWH
24	MAGIC	2		SWW	SWH
25	B96	2	ck	SWW	SWH
26	OR2101043	3		SWW	SWH
27	KASEBERG	3	ck	SWW	SWH
28	SY ASSURE	4		SWW	SWH
29	09PN046#16	4		SWW	SWH
30	09PN062#18	4		SWW	SWH
31	SY OVATION	4	ck	SWW	SWH
32	04PN066-7	5		SWW	SWH
33	09PN005#25	5		SWW	SWH
34	ELTAN	5	ck	SWW	

- 33 -

Grain Craft
Blackfoot, ID

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	Bread	5	Sl low abs., good dev. time, dev. dough, strong farinograph.	5	Sl low abs., sl low volume.	5		
YELLOWSTONE	ck	HRW	1	2	Bread	6	Good abs., bucky dough, strong farinograph.	7	Good bake abs, very good volume.	7	Better than experimental.	Protein content 2% higher than experimental and not representative of class.
TOUCHSTONE		HRW	2	3	Bread	5	Sl low abs., good dev. time, bucky dough, strong farinograph.	7	Good bake abs, very good volume.	7	Very similar to Check.	Protein content 2% higher target for class.
WHETSTONE	ck	HRW	2	4	Bread	6	Very good abs., bucky dough, strong farinograph.	7	Good bake abs, very good volume.	8	Sl better than experimental.	Protein content 2% higher target for class.
WB9200		HRS	3	5	Bread	7	Very good abs., good dev. time, bucky dough, strong farinograph.	6	Excellent bake abs., average volume.	6	Good performance, even at low protein level.	Low protein for HRS.
ID1602S		HWS	4	6	Bread	5	Very low abs., good dev. time, dev. dough, strong farinograph.	4	Sl low abs., low volume.	4		
ID1603S		HRS	4	7	Bread	6	Sl low abs., good dev. time, bucky dough, strong farinograph.	7	Good bake abs, good volume	7	Better than check.	
ID16042		HWS	4	8	Bread	6	Good abs., good dev. time, dev. dough, good farinograph.	5	Good bake abs., low volume.	5	Sl better than other hard white.	
WINCHESTER	ck	HRS	4	9	Bread	6	Sl low abs., good dev. time, dev. dough, good farinograph.	4	Good bake abs., poor volume.	4		Very low protein for class.
SY3015-8		HRS	5	10	Bread	6	Sl low abs., good dev. time, bucky dough, strong farinograph.	7	Good bake abs, good volume	7	Very similar to Check.	
BULLSEYE	ck	HRS	5	11	Bread	6	Sl low abs., good dev. time, bucky dough, strong farinograph.	8	Good bake abs, excellent volume	8	Sl better than experimental.	

- 34 -

GRAIN CRAFT

PNW Wheat Quality Council

Hard Wheat Samples

			Milling - WWQL Data						Farinograph				Bake Evaluation									
Sample	Class	Group	Wheat Pro.	Protein Loss	Flour Mst.	Flour Pro.	Flour Ash	Flour Yld	Absorption	Peak	MTI	Stability	Bake Absorption	Mix Time	Dough Score	Dough Comments	Bake Volume	Color	Grain	Texture	External	Evaluator Comments
16-1	HRW	1	12.0	0.9	13.4	11.1	0.34	71.2	57.6	9.4	13	30+	59.0	25.0	8	Dry, Dev	2809	3	6	6	4	Sl. Open, Variable, Sl. Coarse Grain, Low Vol
16-2*	HRW	1	14.7	1.7	13.4	13.0	0.42	72.0	58.2	13.1	1	40+	61.0	25.0	2	Dry, Bucky	3045	3	6	6	8	Sl. Open, Variable, Sl. Coarse Grain, Very Good Vol
16-3	HRW	2	13.9	1.7	13.3	12.2	0.36	72.4	57.8	8.1	8	35+	61.0	25.0	2	Dry, Bucky	3045	3	6	6	8	Sl. Open, Consistent, Sl. Coarse Grain, Very Good Vol
16-4*	HRW	2	14.0	2.1	12.7	11.9	0.32	72.8	61.9	24.2	3	35+	62.0	25.0	2	Dry, Bucky	3015	3	7	7	8	Tight, Variable, Smooth Grain, Very Good Vol
16-5	HRS	3	12.6	1.4	12.9	11.2	0.39	70.6	63.4	8.5	2	40+	65.0	25.0	4	Dry, Bucky	2868	4	7	7	5	Tight, Consistent, Smooth Grain, Average Vol
16-6	HWS	4	12.2	1.7	14.1	10.5	0.44	72.8	56.8	9.4	17	35+	59.0	21.0	8	Dry, Dev	2780	3	6	6	3	Sl. Open, Consistent, Sl. Coarse Grain, Low Vol
16-7	HRS	4	14.9	2.2	13.4	12.7	0.37	72.7	60.8	9.2	12	40+	62.0	25.0	4	Dry, Bucky	2986	4	8	7	7	Very Tight, Consistent, Smooth Grain, Good Vol
16-8	HWS	4	13.4	1.4	13.8	12.0	0.40	72.3	60.6	8.2	22	29.2	62.0	25.0	8	Dry, Dev	2750	3	6	6	3	Sl. Open, Consistent, Sl. Coarse Grain, Low Vol
16-9*	HRS	4	12.2	0.5	13.8	11.7	0.43	73.7	60.7	9.6	24	28.4	62.0	25.0	8	Dry, Dev	2662	4	5	5	1	Open, Variable, Coarse Grain, Poor Vol
16-10	HRS	5	13.4	0.5	13.7	12.9	0.43	71.6	60.6	14.5	12	40+	62.0	25.0	2	Dry, Bucky	3015	3	7	6	8	Tight, Variable, Sl. Coarse Grain, Very Good Vol
16-11*	HRS	5	13.8	0.8	13.5	13.0	0.40	73.4	59.6	8.3	14	40+	61.0	25.0	2	Dry, Bucky	3104	3	7	7	9	Tight, Variable, Smooth Grain, Excellent Vol

- Check

- 35 -

GRAIN CRAFT

PNW Wheat Quality Council

Soft Wheat Samples

			Milling						Solvent Retention Capacity				Pancake Model		
Sample	Class	Group	Wheat Pro.	Protein Loss	Flour Mst.	Flour Pro.	Flour Ash	Flour Yld	Water	Lactic Acid	Sodium Carbonate	Sucrose	Bostwick (cm)	Height (in)	Diameter (in)
16-12	SWS	6	9.6	0.9	13.5	8.7	0.42	75.4	55.0	108.3	70.4	88.4	14.50	1.40	3.92
16-13*	SWS	6	10.3	1.7	12.8	8.6	0.44	74.5	55.3	91.0	70.5	89.8	13.00	1.28	4.15
16-14	SWS	7	11.4	1.4	12.5	10.0	0.43	75.1	55.0	88.8	69.7	91.5	11.50	1.47	4.06
16-15*	SWS	7	11.8	1.8	12.7	10.0	0.45	76.6	53.3	129.7	67.4	92.3	13.50	1.34	4.08
16-16	SWS	8	11.6	1.5	13.3	10.2	0.46	77.8	55.5	61.8	62.1	83.4	14.50	1.27	4.54
16-17	SWS	9	11.6	1.9	12.0	9.7	0.41	74.9	52.3	106.4	66.9	88.6	12.75	1.36	4.12
16-18*	SWS	9	10.1	1.5	13.2	8.6	0.39	76.0	52.7	105.4	64.4	84.8	13.75	1.33	4.13
16-19	SWW	10	10.7	1.8	12.7	8.9	0.42	77.4	55.2	86.1	69.7	86.2	14.25	1.28	4.25
16-20*	SWW	10	11.7	2.0	12.5	9.7	0.40	73.9	54.8	89.1	69.0	98.7	10.75	1.38	4.21
16-21	SWW	11	10.8	2.8	13.7	8.0	0.37	74.4	55.0	94.0	69.7	87.9	15.75	1.15	4.34
16-22	SWW	11	9.7	1.5	13.2	8.2	0.34	78.7	52.7	92.7	65.0	84.7	16.50	1.47	4.32
16-23	SWW	12	10.9	1.6	13.1	9.3	0.4	77.9	55.4	110.2	67.2	88.9	14.00	1.33	4.08
16-24	SWW	12	11.2	1.7	13.1	9.5	0.36	73.6	53.9	111.2	67.5	87.2	13.75	1.36	4.19
16-25*	SWW	12	10.5	1.9	13.0	8.6	0.32	76.5	53.2	99.9	68.0	85.3	16.50	1.16	4.39
16-26	SWW	13	10.2	1.3	13.3	8.9	0.40	80.0	54.6	99.6	68.5	86.5	14.50	1.18	4.49
16-27*	SWW	13	10.8	2.1	12.7	8.7	0.41	75.7	52.3	105.5	68.4	84.4	16.50	1.02	4.47
16-28	SWW	14	12.2	1.7	12.6	10.5	0.42	77.8	54.5	86.7	65.5	87.8	13.25	1.34	4.30
16-29	SWS	14	11.8	2.0	12.8	9.8	0.40	78.6	56.3	69.3	68.5	87.0	15.00	1.33	4.36
16-30	SWW	14	12.4	2.4	12.7	10.0	0.42	78.6	56.3	93.2	68.5	89.0	13.50	1.35	4.37
16-31*	SWW	14	12.9	2.6	13.1	10.3	0.38	78.6	54.9	92.9	66.7	86.3	13.75	1.32	4.31
16-32	SWW	15	7.3	1.7	13.0	5.6	0.37	75.4	54.6	68.1	69.8	86.6	23.50	0.93	4.98
16-33	SWW	15	7.4	1.6	12.5	5.8	0.36	76.3	53.6	65.8	71.8	88.2	20.50	0.95	4.84
16-34*	SWW	15	7.6	1.8	12.7	5.8	0.40	74.8	53.7	90.5	68.5	90.6	19.50	1.03	4.72

* - Check

- 36 -

General Mills
Minneapolis, Minnesota

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	1 lb Bread	9	Extensible	8	Loaf Volume cc=2717.8	9	Good grain texture and color	
YELLOWSTONE	ck	HRW	1	2	1 lb Bread	8	Tough	7	Loaf Volume cc=2704.5	7	Slight open grain	
SY TOUCHSTONE		HRW	2	3	1 lb Bread	8	Tough	6	Loaf Volume cc=2680.6	7	Open grain and dry texture	
WHETSTONE	ck	HRW	2	4	1 lb Bread	8	Tough	8	Loaf Volume cc=2702.1	6		
WB9200		HRS	3	5	1 lb Bread	9	Extensible	7	Loaf Volume cc=2496.8	7	Bright cumb color. Low loaf volume	Very good aborption
ID1602S		HWS	4	6	1 lb Bread	9	Extensible	8	Loaf Volume cc=2636.3	7		Low protein but had a good volume
ID1603S		HRS	4	7	1 lb Bread	9	Extensible	8	Loaf Volume cc=3032.3	9	Good crumb color but dry texture	High loaf volume
ID1604S		HWS	4	8	1 lb Bread	9	Extensible	7	Loaf Volume cc=2644.7	7	Open grain	
WINCHESTER	ck	HRS	4	9	1 lb Bread	7	Wet tacky	8	Loaf Volume cc=2749.2	7	Bright cumb color.	Dough handling was wet
SY3015-8		HRS	5	10	1 lb Bread	7	Wet tacky	7	Loaf Volume cc=2804.4	7	Open grain. Slightly yellow crumb	High Stability.
BULLSEYE	ck	HRS	5	11	1 lb Bread	7	Wet tacky	7	Loaf Volume cc=2888.4	8	Bright crumb color	Dough handling was wet
RYAN		SWS	6	12	AACC Cookie	9	Dough wt(g)=141; Cookie Wt(g)=121	8	Width*=467mm; Thickness*=56mm;(W/T)*=8; Spread Factor(SF)=83	8		
WHIT	ck	SWS	6	13	AACC Cookie	9	Dough wt(g)= 145; Cookie Wt(g)=125	7	Width*=488mm; Thickness*=53mm;(W/T)*=9; Spread Factor(SF)=92	8	Slightly dark color. Too much spread	
SILK		SWS	7	14	AACC Cookie	9	Dough wt(g)= 141; Cookie Wt(g)=122	9	Width*=466mm; Thickness*=54mm;(W/T)*=9; Spread Factor(SF)=86	8		
LOUISE	ck	SWS	7	15	AACC Cookie	9	Dough wt(g)= 143; Cookie Wt(g)=123	8	Width*=476mm; Thickness*=56mm;(W/T)*=9; Spread Factor(SF)=85	7	Slight dark color	Uneven surface texture
WB6430		SWS	8	16	AACC Cookie	9	Dough wt(g)= 147; Cookie Wt(g)=126	8	Width*=475mm; Thickness*=54mm;(W/T)*=9; Spread Factor(SF)=88	8		
ID1403S		SWS	9	17	AACC Cookie	9	Dough wt(g)= 147; Cookie Wt(g)=127	7	Width*=483mm; Thickness*=53mm;(W/T)*=9; Spread Factor(SF)=91	7	Slightly pale color	
STONE	ck	SWS	9	18	AACC Cookie	9	Dough wt(g)=147; Cookie Wt(g)=126	8	Width*=483mm; Thickness*=50mm;(W/T)*=10; Spread Factor(SF)=97	8	Too much spread	
SPARROW		SWW	10	19	AACC Cookie	9	Dough wt(g)= 147; Cookie Wt(g)=127	7	Width*=464mm; Thickness*=59mm;(W/T)*=8; Spread Factor(SF)=79	7	Tight spread	
STEPHENS	ck	SWW	10	20	AACC Cookie	9	Dough wt(g)= 147; Cookie Wt(g)=128	8	Width*=460mm; Thickness*=54mm;(W/T)*=9; Spread Factor(SF)=85	8		
WA8232		SWW	11	21	AACC Cookie	9	Dough wt(g)=146; Cookie Wt(g)=128	7	Width*=463mm; Thickness*=56mm;(W/T)*=8; Spread Factor(SF)=83	8		
JASPER	ck	SWW	11	22	AACC Cookie	9	Dough wt(g)=148; Cookie Wt(g)=128	7	Width*=483mm; Thickness*=53mm;(W/T)*=9; Spread Factor(SF)=91	6	Dark/Dull	
CASTLE		SWW	12	23	AACC Cookie	9	Dough wt(g)=142; Cookie Wt(g)=123	9	Width*=465mm; Thickness*=56mm;(W/T)*=8; Spread Factor(SF)=83	8		Uniform spread
MAGIC		SWW	12	24	AACC Cookie	9	Dough wt(g)=144; Cookie Wt(g)=125	9	Width*=457mm; Thickness*=56mm;(W/T)*=8; Spread Factor(SF)=81	8		Uniform spread
B96	ck	SWW	12	25	AACC Cookie	9	Dough wt(g)= 144; Cookie Wt(g)=125	9	Width*=476mm; Thickness*=54mm;(W/T)*=9; Spread Factor(SF)=88	8		Uniform spread
OR2101043		SWW	13	26	AACC Cookie	9	Dough wt(g)=146; Cookie Wt(g)=127	8	Width*=474mm; Thickness*=53mm;(W/T)*=9; Spread Factor(SF)=89	8		
KASEBERG	ck	SWW	13	27	AACC Cookie	9	Dough wt(g)=147; Cookie Wt(g)=128	8	Width*=471mm; Thickness*=53mm;(W/T)*=9; Spread Factor(SF)=89	7	Dark/Dull	
SY ASSURE		SWW	14	28	AACC Cookie	9	Dough wt(g)= 145; Cookie Wt(g)=126	8	Width*=467mm; Thickness*=55mm;(W/T)*=8; Spread Factor(SF)=85	8		
09PN046#16		SWW	14	29	AACC Cookie	9	Dough wt(g)= 142; Cookie Wt(g)=124	8	Width*=452mm; Thickness*=56mm;(W/T)*=8; Spread Factor(SF)=80	7	Dark/Dull	
09PN062#18		SWW	14	30	AACC Cookie	9	Dough wt(g)=146; Cookie Wt(g)=126	8	Width*=460mm; Thickness*=58mm;(W/T)*=8; Spread Factor(SF)=79	8		
SY OVATION	ck	SWW	14	31	AACC Cookie	9	Dough wt(g)=146; Cookie Wt(g)=127	8	Width*=458mm; Thickness*=57mm;(W/T)*=8; Spread Factor(SF)=80	8		
04PN066-7		SWW	15	32	AACC Cookie	9	Dough wt(g)=148; Cookie Wt(g)=129	7	Width*=467mm; Thickness*=56mm;(W/T)*=8; Spread Factor(SF)=83	6	Less browning.	
09PN005#25		SWW	15	33	AACC Cookie	9	Dough wt(g)=146; Cookie Wt(g)=127	7	Width*=455mm; Thickness*=57mm;(W/T)*=8; Spread Factor(SF)=79	7	Less browning.	
ELTAN	ck	SWW	15	34	AACC Cookie	9	Dough wt(g)=149; Cookie Wt(g)=130	7	Width*=467mm; Thickness*=56mm;(W/T)*=8; Spread Factor(SF)=83	8	Very good	

- 37 -

Sample	Bake Absorption%	Mix time (min)	Dough Temperature (°F)	Dough Characteristics	Bread Volume cc
1	**59.7**	10.0	81.1	Extensible	2717.8
2	**61.3**	10.0	81.2	Tough	2704.5
3	**61.7**	10.0	80.0	Tough	2680.6
4	**62.8**	10.0	81.5	Tough	2702.1
5	**65.6**	10.0	81.2	Extensible	2496.8
6	**59.5**	8.3	80.3	Extensible	2636.3
7	**62.1**	8.3	82.2	Extensible	3032.3
8	**62.7**	8.3	81.5	Extensible	2644.7
9	**62.4**	8.3	80.7	Wet Tacky	2749.2
10	**62.3**	10.0	80.4	Wet Tacky	2804.4
11	**61**	10.0	81.6	Wet Tacky	2888.4

- 38 -

Bay State Milling
Winona, Minnesota

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	Bread	8	dry	7	white crumb, good oven spring	6	long stability	Strong good for blending
YELLOWSTONE	ck	HRW	1	2	Bread	7	stiff	6	good volume	5	long stability	Strong good for blending
SY TOUCHSTONE		HRW	2	3	Bread	7	stiff	6	white crumb, lower volume	4	long stability	Strong good for blending
WHETSTONE	ck	HRW	2	4	Bread	7	stiff	6	good volume	6	long stability	Strong good for blending
WB9200		HRS	3	5	Bread	8	good abs	6	white crumb, good oven spring	6	long stability	Strong good for blending
ID1602S		HWS	4	6	Bread	7	low abs	6	open with holes	4	long stability	Strong good for blending
ID1603S		HRS	4	7	Bread	8	good balance extensiblity vs elasticity	7	good oven spring, holes, non uniform	6	long stability	Strong good for blending
ID1604S		HWS	4	8	Bread	8	good balance extensiblity vs elasticity	8	open, non uniform	8	good performance	Good balance strength & Abs
WINCHESTER	ck	HRS	4	9	Bread	8	good balance extensiblity vs elasticity	8	holes, slightly uneven break & shred	8	good performance	Good balance strength & Abs
SY3015-8		HRS	5	10	Bread	7	slightly bucky	6	open, holes, slightly uneven	6	long stability	Strong good for blending
BULLSEYE	ck	HRS	5	11	Bread	7	slightly bucky	5	non uniform	3	Lacks stability, high MTI	

- 39 -

ADM Milling
Overland Park, Kansas

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	Bread	9	Good strong dough	9	Lower protein than the check	9	Still produced excellent baking qualities	All breads produced acceptable baking quality and dough handling.
YELLOWSTONE	ck	HRW	1	2	Bread	9	Higher protein	9	Tough and bucky dough	9	Excellent volume	All breads had slightly open grain and slightly creamy interior.
SY TOUCHSTONE		HRW	2	3	Bread	9	Long mix tough and bucky dough	9	Better volume than check	9	Good baking quality	
WHETSTONE	ck	HRW	2	4	Bread	8	Strong dough	8	Average mix time	8	Lowest volume	
WB9200		HRS	3	5	Bread	8	Low protein for a spring wheat	8	Low volume and tough	8	Bucky dough Long mix time	
ID1602S		HWS	4	6	Bread	7	Lowest protein of group	7	Good volume	7	Average mixing time Good overall	Group 4 had the lowest protein but still had good baking
ID1603S		HRS	4	7	Bread	8	Good baking properties	8	Produced best volume	8	Average mixing time Good overall	Best overall in group
ID16042		HWS	4	8	Bread	8	Good dough handling	8	Avg mix and volume	8	Average baking quality	
WINCHESTER	ck	HRS	4	9	Bread	8	Good pliable dough	8	Average mix and good volume	8	Average baking quality	
SY3015-8		HRS	5	10	Bread	9	Good protein Long mix time	9	Tough bucky dough	9	Would be good for blending	Equal to the check
BULLSEYE	ck	HRS	5	11	Bread	9	Strong dough	9	Good volume and mix time	9	Good baking qualities	
RYAN		SWS	6	12	Cookie	8	Good dough handling	6	Slight checking	7	Avg. spread, smaller than check	
WHIT	ck	SWS	6	13	Cookie	6	Soft, sticky dough	8	Nice checking	7	Avg. spread	
SILK		SWS	7	14	Cookie	8	Good dough handling	6	Slight checking	7	Avg. spread, slightly bigger than check	Lowest moistures overall, lower falling number than check
LOUISE	ck	SWS	7	15	Cookie	6	Soft, sticky dough	6	Slight checking	6	Avg. spread	
WB6430		SWS	8	16	Cookie	6	Soft, slightly sticky dough	7	Light in color	6	Nice spread	
ID1403S		SWS	9	17	Cookie	8	Good dough handling	6	Slight checking	7	Avg. spread	
STONE	ck	SWS	9	18	Cookie	6	Soft, slightly sticky dough	8	Nice checking	7	Nice spread, better than check	
SPARROW		SWW	10	19	Cookie	8	Good dough handling	6	Slight checking	8	Avg. spread, slightly bigger than check	

- 40 -

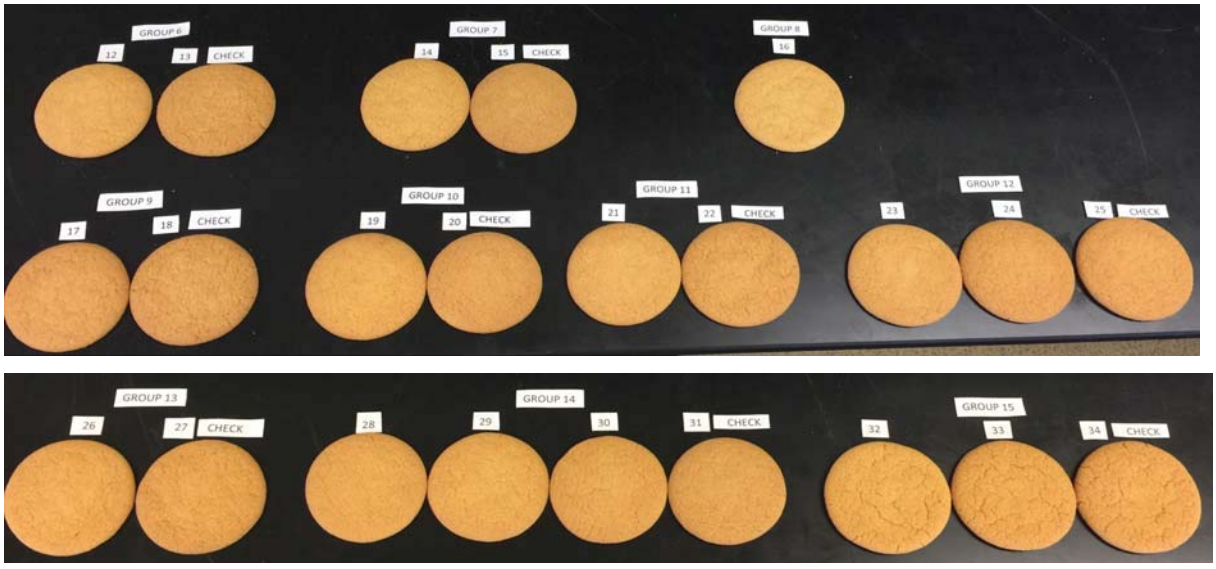
						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
STEPHENS	ck	SWW	10	20	Cookie	8	Good dough handling	6	Slight checking	7	Avg. spread, similar to experimental	
WA8232		SWW	11	21	Cookie	8	Good dough handling	6	Slight checking	7	Avg. spread	
JASPER	ck	SWW	11	22	Cookie	8	Good dough handling	8	Nice checking	8	Nice spread, better than the experimental	
CASTLE		SWW	12	23	Cookie	8	Good dough handling	6	Slight checking	7	Avg. spread	
MAGIC		SWW	12	24	Cookie	6	Soft, slightly sticky dough	6	Slight checking	6	Avg. spread	
B96	ck	SWW	12	25	Cookie	8	Good dough handling	6	Slight checking	7	Better spread than both experimentals	Lower falling number than both of the experimentals.
OR1201043		SWW	13	26	Cookie	8	Good dough handling	6	Slight checking	7	Nice spread, better than check	
KASEBERG	ck	SWW	13	27	Cookie	8	Good dough handling	6	Slight checking	7	Nice spread	
SY ASSURE		SWW	14	28	Cookie	8	Good dough handling	8	Spread similar to #29, better than check	8	Avg. spread	Highest protein levels overall
09PN046#16		SWW	14	29	Cookie	8	Good dough handling	8	Best spread in this group, better than check	8	Avg. spread	Group 14 had slight variations in all areas but very similar
09PN062#18		SWW	14	30	Cookie	8	Good dough handling	6	Slight checking	6	Low spread, similar to check	
SY OVATION	ck	SWW	14	31	Cookie	8	Good dough handling	6	Slight checking	6	Low spread	
04PN066-7		SWW	15	32	Cookie	6	Soft, slightly sticky dough	8	Nice checking	7	Nice spread, comparable to check	Group 15 very low proteins
O9PN005#25		SWW	15	33	Cookie	8	Good dough handling	8	Nice checking	7	Avg. spread	
ELTAN	ck	SWW	15	34	Cookie	6	Slightly dry	8	Nice checking	7	Nice spread	

- 41 -

SampleID	SampleDesc	ProjectNo	LotNumber	Flour Moisture	Flour Protein	Flour Ash	CookieSpread	clAbsorption	clPeak	clStability	clMTI	SRC H2O	SRC Sucrose	SRC Lactic	SRC Sodium
161103040	PNW Group 1	39	1					59.5	16	20	20				
161103041	PNW Group 1 - Check	39	2					60.4	18	20	20				
161103042	PNW Group 2	39	3					58.6	13	18	20				
161103043	PNW Group 2 - Check	39	4					59.6	17	15	20				
161103044	PNW Group 3	39	5					62.6	16	18	20				
161103045	PNW Group 4	39	6					57	11	17.5	20				
161103046	PNW Group 4	39	7					61.4	15	18	10				
161103047	PNW Group 4	39	8					63.2	13.5	16	30				
161103048	PNW Group 4 - Check	39	9					62.6	12.5	17	20				
161103049	PNW Group 5	39	10					62.5	17	14	10				
161103050	PNW Group 5 - Check	39	11					60.6	11	18	10				
161103051	PNW Group 6	40	12	13.11	8.34	0.39	7.42	50.9	1.5	6	35	55.53	108.55	97.42	78.70
161103052	PNW Group 6 - Check	40	13	12.75	8.49	0.426	7.7	50.1	2	2.5	75	57.70	116.32	77.38	77.74
161103053	PNW Group 7	40	14	12.61	9.73	0.457	7.49	53.6	2	2.5	90	58.40	110.67	82.04	76.92
161103054	PNW Group 7 - Check	40	15	12.53	10.17	0.413	7.36	50.4	2.5	7	20	55.70	109.75	129.33	73.44
161103055	PNW Group 8	40	16	13.35	9.95	0.483	9.1	48.8	1	1.5	120	52.56	118.00	62.72	67.33
161103056	PNW Group 9	40	17	13.06	9.69	0.373	8.1	53.2	1.5	3.5	80	53.41	108.91	88.95	74.94
161103057	PNW Group 9 - Check	40	18	13.06	8.59	0.457	8.98	49.3	3	8	35	53.93	106.28	98.14	72.40
161103058	PNW Group 10	40	19	12.98	9.01	0.427	7.58	54.1	1.5	2	90	57.81	102.09	80.18	76.80
161103059	PNW Group 10 - Check	40	20	12.67	9.77	0.406	7.42	54.9	2	2.5	90	54.51	119.21	80.85	72.45
161103060	PNW Group 11	40	21	13.48	8.08	0.4	7.83	53.9	1.5	1.5	100	59.04	109.79	88.12	76.14
161103061	PNW Group 11 - Check	40	22	13.29	8.3	0.416	8.45	51.6	1.5	1.5	100	54.67	101.15	87.12	71.74
161103062	PNW Group 12	40	23	13.09	8.99	0.427	7.48	51.7	2	4	55	55.03	103.60	97.69	70.79
161103063	PNW Group 12	40	24	13.07	9.26	0.397	7.2	51.3	1.5	4.5	50	56.28	107.80	104.55	76.09
161103064	PNW Group 12 - Check	40	25	13.05	8.9	0.327	7.99	50.7	2	3	105	59.10	104.19	88.33	75.25
161103065	PNW Group 13	40	26	13.31	8.59	0.366	8.84	51.4	1.5	2.5	90	55.54	107.23	86.09	80.53
161103066	PNW Group 13 - Check	40	27	12.79	8.6	0.423	8.51	50.1	1	1.5	115	56.80	106.49	97.42	75.42
161103067	PNW Group 14	40	28	12.65	10.25	0.407	7.47	54.3	1.5	1.5	115	53.52	105.41	77.85	69.71
161103068	PNW Group 14	40	29	12.69	9.69	0.433	7.61	54	2	2	105	54.32	97.27	65.02	72.85
161103069	PNW Group 14	40	30	12.77	9.84	0.413	7.01	53.9	2.5	3.5	65	55.14	102.93	82.34	73.88
161103070	PNW Group 14 - Check	40	31	13.27	9.99	0.42	7.07	54.4	2.5	4.5	55	55.85	105.85	87.43	72.05
161103071	PNW Group 15	40	32	13.03	5.89	0.47	8.71	50.9	1	1	160	63.07	98.92	71.08	75.51
161103072	PNW Group 15	40	33	12.94	6	0.493	7.83	52.4	1	1	135	62.54	99.90	70.50	74.41
161103073	PNW Group 15 - Check	40	34	12.86	6.3	0.437	8.96	51.8	1	1.5	65	57.76	109.04	95.13	74.42

SampleID	SampleDesc	ProjectNo	LotNumber	Flour Moisture	Flour Protein	Flour Ash	BAbsorption	BMixingTime	BLoafVolume	BGrain	BTexture	BCrumbColor	BDoughCond
161103040	PNW Group 1	39	1	14.53	11.24	0.397	57	15	2900	Slightly Open	Soft	Slightly Crmy	Good
161103041	PNW Group 1 - Check	39	2	14.15	13.62	0.437	59	20	2900	Slightly Open	Soft	Slightly Crmy	Tough
161103042	PNW Group 2	39	3	14.07	12.67	0.373	58	20	2950	Slightly Open	Soft	Slightly Crmy	Tough
161103043	PNW Group 2 - Check	39	4	13.87	12.36	0.363	58	14	2750	Open	Soft	Slightly Crmy	Good
161103044	PNW Group 3	39	5	13.65	11.37	0.427	57	20	2500	Slightly Open	Soft	Slightly Crmy	Tough
161103045	PNW Group 4	39	6	14.27	10.35	0.467	56	12	2950	Slightly Open	Soft	Slightly Crmy	Good
161103046	PNW Group 4	39	7	14.39	12.62	0.397	59	14	3000	Slightly Open	Soft	Slightly Crmy	Good
161103047	PNW Group 4	39	8	14.04	11.93	0.46	58	12	2850	Slightly Open	Soft	Slightly Crmy	Good
161103048	PNW Group 4 - Check	39	9	14.11	11.64	0.48	58	13	2950	Slightly Open	Soft	Slightly Crmy	Good
161103049	PNW Group 5	39	10	13.97	13.04	0.456	59	20	3000	Slightly Open	Soft	Slightly Crmy	Tough
161103050	PNW Group 5 - Check	39	11	14.66	13.04	0.47	59	15	2900	Slightly Open	Soft	Slightly Crmy	Good

- 42 -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- 43 -

Ardent Mills
Denver, CO

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	Pan Bread	7	sl.dry; sl.bucky	7	average volume/height	8		
YELLOWSTONE	ck	HRW	1	2	Pan Bread	6	long mixing time > 18 min	4	low volume, small B&D	5	long mixing time (too strong), small volume	the dough may be too strong and bucky
SY TOUCHSTONE		HRW	2	3	Pan Bread	6	long mixing time >18 min; feel weak at benching	7	sl.ragged B&D	7	long mixing time (too strong)	too strong and long mixing time
WHETSTONE	ck	HRW	2	4	Pan Bread	8		6	sl.open	8		
WB9200		HRS	3	5	Pan Bread	8		8	good volume	9	high water absorption and good volume	excellent water absorption
ID1602S		HWS	4	6	Pan Bread	8	short mixing time	9	good volume and good grain	9	short mixing time and good volume	perform good volume under its protein category
ID1603S		HRS	4	7	Pan Bread	8		8	good volume	9	high water absorption and good volume	
1D1604S		HWS	4	8	Pan Bread	8		6	no mix tolerance	7	no mix tolerance	
WINCHESTER	ck	HRS	4	9	Pan Bread	8		6	slightly small; slightly round grain	7	slighlty small	
SY3015-8		HRS	5	10	Pan Bread	6	long mixing time > 18 min	7	average volume/height	8		
BULLSEYE	ck	HRS	5	11	Pan Bread	6	long mixing time = 17 min	8	good volume	8		
RYAN		SWS	6	12	Cookies	8		8		8		
WHIT	ck	SWS	6	13	Cookies	8		9	big spread	9		
SILK		SWS	7	14	Cookies	8		7	small spread	7		
LOUISE	ck	SWS	7	15	Cookies	8		7	small spread	7		
WB6430		SWS	8	16	Cookies	8		8		8		high protein and stilll good spread factor
ID1403S		SWS	9	17	Cookies	8		8		8		
STONE	ck	SWS	9	18	Cookies	8		8		8		
SPARROW		SWW	10	19	Cookies	8		7	slightly thick	7		
STEPHENS	ck	SWW	10	20	Cookies	8		8		8		high protein and stilll good spread factor
WA8232		SWW	11	21	Cookies	8		8	nice cracking and medium spread	8		
JASPER	ck	SWW	11	22	Cookies	7	slightly sticky dough	9	nice cracking and big spread	9		
CASTLE		SWW	12	23	Cookies	8		9	big spread	9		
MAGIC		SWW	12	24	Cookies	8		8		8		
B96	ck	SWW	12	25	Cookies	8		9	big spread and thin cookies	9		
OR2101043		SWW	13	26	Cookies	8		9	big spread and thin cookies	9		
KASEBERG	ck	SWW	13	27	Cookies	8		8		8		
SY ASSURE		SWW	14	28	Cookies	8		8		9		high protein and still good spread factor
09PN046#16		SWW	14	29	Cookies	8		8		8		
O9PN062#18		SWW	14	30	Cookies	8		8		8		
SY OVATION	ck	SWW	14	31	Cookies	8		8		8		
04PN066-7		SWW	15	32	Cookies	8		8		8		too low protein
09PN005#25		SWW	15	33	Cookies	8		7	slightly thick and slightly wide cracking	6		too low protein; slightly high ash content
ELTAN	ck	SWW	15	34	Cookies	8		8	slightly wide cracking	8		too low protein

- 44 -

Sample ID	Variety	Bake Score Total (Max =100)	Strength Score (45 to 65)	Bake Absorption % (Optimal dough)	Mix time (min) (Optimal dough)	Proof Time (min) (Optimal dough)	Volume (cc) (Optimal dough)	Height (inch) (Optimal dough)	Volume (cc) (Stressed dough)	Height (inch) (Stressed dough)	Baker's Notes *
PNW-1	Group 1	86	55	60	12	60	2725	4.828	2700	4.735	sl mellow at benching, pliable
PNW-2	Group 1	65	60	62	18	51	2500	4.43	2450	4.362	sl mellow at benching
PNW-3	Group 2	92	65	62	18	68	2800	4.315	2600	4.685	
PNW-4	Group 2	90	60	62	12	58	2700	4.615	2700	4.591	
PNW-5	Group 3	90	60	64	11	55	2600	4.295	2650	4.513	tacky at benching
PNW-6	Group 4	85	55	60	6	60	2525	4.605	2700	4.852	
PNW-7	Group 4	88	55	63	10	54	3000	5.037	3000	5.31	
PNW-8	Group 4	88	60	62	9	57	2700	4.747	2600	4.284	mellow at benching
PNW-9	Group 4	83	55	62	9	52	2550	4.463	2625	4.469	mellow at benching; good at cut
PNW-10	Group 5	94	65	62	18	55	2600	4.63	2600	4.735	sl round bread crumb
PNW-11	Group 5	90	60	62	17	64	2700	4.617	2700	4.676	

**** sl.means slightly***

Sample ID	Variety	Spread for 6 Cookies (mm)	Thickness for 6 Cookies (mm)	Spread Factor	Crust *	Comments
PNW-12	Group 6	481.5	48	94.6	4	smaller spread compared to check
PNW-13	Group 6	511.5	46.5	103.7	4	
PNW-14	Group 7	463.5	52.5	83.3	3	
PNW-15	Group 7	485	53.5	85.5	3	
PNW-16	Group 8	491	48	96.5	4	
PNW-17	Group 9	484.5	46.5	98.3	4	
PNW-18	Group 9	493.75	48	97.0	4	
PNW-19	Group 10	468	53.5	82.5	4	slightly thicker compared to check
PNW-20	Group 10	459	45	96.0	4	
PNW-21	Group 11	465	44.5	98.3	4	
PNW-22	Group 11	490	44	104.8	4	
PNW-23	Group 12	468.5	43	102.5	4	
PNW-24	Group 12	460.5	46	94.2	4	
PNW-25	Group 12	479.5	45	100.3	3	
PNW-26	Group 13	479.5	43	104.9	4	
PNW-27	Group 13	474.5	45	99.2	4	
PNW-28	Group 14	473.5	46.5	96.0	4	
PNW-29	Group 14	461	50	86.9	4	
PNW-30	Group 14	462.5	50	87.2	4	
PNW-31	Group 14	466.5	52	84.6	4	
PNW-32	Group 15	491.5	48	96.6	3	
PNW-33	Group 15	469	54	81.9	2	slightly wild cracking top, thicker than check
PNW-34	Group 15	94.3	2	94.3	2	slightly wild cracking top, thicker than check

* Crust: Bigger number indicates finer cookier cracking top. Max = 5; Min = 1.

Japan Nisshin Flour Milling
Tokyo, Japan

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	BREAD	4		5		4		
YELLOWSTONE	ck	HRW	1	2	BREAD	3	less extensivity	5		4		
SY TOUCHSTONE		HRW	2	3	BREAD	3	less extensivity	7		4		
WHETSTONE	ck	HRW	2	4	BREAD	4		6		5		
WB9200		HRS	3	5	BREAD	3	less extensivity	8	soft	5		
ID1602S		HWS	4	6	BREAD	3	less extensivity	6		4		flour protein is too low
ID1603S		HRS	4	7	BREAD	6		6		6		
ID1604S		HWS	4	8	BREAD	3	low mixing tolerance	4		3		
WINCHESTER	ck	HRS	4	9	BREAD	4		5		4		
SY3015-8		HRS	5	10	BREAD	4		4		4		
BULLSEYE	ck	HRS	5	11	BREAD	3	less springness	4		3		
RYAN		SWS	6	12	sponge cake	4		3	bad texture	3		
WHIT	ck	SWS	6	13	sponge cake	4		3	bad texture	3		
SILK		SWS	7	14	sponge cake	4		3	bad texture	3		
LOUISE	ck	SWS	7	15	sponge cake	4		4		4		
WB6430		SWS	8	16	sponge cake	4		5		5		
ID1403S		SWS	9	17	sponge cake	4		4		4		
STONE	ck	SWS	9	18	sponge cake	3	heavy	4		4		
SPARROW		SWW	10	19	sponge cake	3	heavy	4		4		
STEPHENS	ck	SWW	10	20	sponge cake	3	heavy	4		4		
WA9232		SWW	11	21	sponge cake	5		3	bad texture	4		
JASPER	ck	SWW	11	22	sponge cake	4		4		4		
CASTLE		SWW	12	23	sponge cake	3	heavy	3	bad texture	3		
MAGIC		SWW	12	24	sponge cake	3	heavy	4		4		
B96	ck	SWW	12	25	sponge cake	4		4		4		
OR2101043		SWW	13	26	sponge cake	3	heavy	4		4		
KASEBERG	ck	SWW	13	27	sponge cake	3	heavy	4		4		
SYASSURE		SWW	14	28	sponge cake	3	heavy	3	dark colour	3		flour protein is too high
09PNP46#16		SWW	14	29	sponge cake	3	heavy	4		4		
09PN062#18		SWW	14	30	sponge cake	4		3	bad texture	3		
SY OVATION	ck	SWW	14	31	sponge cake	4		3	bad texture	3		
04PN066-7		SWW	15	32	sponge cake	4		4		4		
09PN005#25		SWW	15	33	sponge cake	4		4		4		
ELTAN	ck	SWW	15	34	sponge cake	4		4		4		

- 46 -

Korea Sajo Donga One
Dangjin-Si, Korea

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	Steamed Bread	6	Extensibility and Moderate Stickiness	2	Dark Color, Dry Texture	3.3	Dark Color and Bad Texture	
YELLOWSTONE	ck	HRW	1	2	Steamed Bread	5		5		5.0		
SY TOUCHSTONE		HRW	2	3	Steamed Bread	4	Lack of Extensibility, Slight Hardness	4	Dry But Chewy Texture	4.3	Dry Texture	
WHETSTONE	ck	HRW	2	4	Steamed Bread	5		5		5.0	Good Overall Quality	
WB9200		HRS	3	5	Pan Bread	4	Lack of Elasticity, Stickiness	3	Dry, Lack of Chewiness	4.3	Dry Texture	
ID1602S		HWS	4	6	Pan Bread	4	Lack of Elasticity, Stickiness	5	Dry, Lack of Chewiness	5.3	Good Volume But Dry Texture	
ID1603S		HRS	4	7	Pan Bread	6	Good Elasticity and Moderate Stickiness	7	Chewy and Moist Texture	6.7	Good Volume, Moist Texture, White Color	
ID1604S		HWS	4	8	Pan Bread	7	Good Elasticity and Moderate Stickiness	5	Lack of Moistness	6.3	Good Volume, Moist Texture	
WINCHESTER	ck	HRS	4	9	Pan Bread	5		5		5.0		
SY3015-8		HRS	5	10	Pan Bread	4	Lack of Elasticity, Slight Stickiness	4	Moist and Slight Chewy Texture	4.3	Good Texture, But Low Volume	
BULLSEYE	ck	HRS	5	11	Pan Bread	5		5		5.0		
RYAN		SWS	6	12	Sponge Cake	6	Low Specific Gravity	5	Good Symmetry	5.7	Soft Texture	
WHIT	ck	SWS	6	13	Sponge Cake	5		5	Good Symmetry	5.0		
SILK		SWS	7	14	Sponge Cake	4	High Specific Gravity	6	Large Volume	5.3	Nothing Significant To Report	
LOUISE	ck	SWS	7	15	Sponge Cake	5		5		5.0		
WB6430		SWS	8	16	Sponge Cake	5	Nothing Significant to Report	4	Bad Symmetry, Big Center Height	4.3	Hard Texture	
ID1403S		SWS	9	17	Sponge Cake	4	High Specific Gravity	6	Good Symmetry	5.0	Nothing Significant To Report	
STONE	ck	SWS	9	18	Sponge Cake	5		5		5.0		
SPARROW		SWW	10	19	Sponge Cake	5	Nothing Significant to Report	5	Nothing Significant to Report	5.0	Nothing Significant To Report	
STEPHENS	ck	SWW	10	20	Sponge Cake	5		5		5.0		
WA8232		SWW	11	21	Sponge Cake	6	Relativly Low Specific Gravity	7	Excellent Volume	6.7	Soft and Fine Texture	
JASPER	ck	SWW	11	22	Sponge Cake	5		5		5.0		
CASTLE		SWW	12	23	Sponge Cake	4	High Specific Gravity	6	Good Symmetry	6.3	Soft and Fine Texture	
MAGIC		SWW	12	24	Sponge Cake	5	Nothing Significant to Report	5	Nothing Significant to Report	4.7	Nothing Significant To Report	
B96	ck	SWW	12	25	Sponge Cake	5		5	Shrinkage in Edge	5.0		
OR2101043		SWW	13	26	Sponge Cake	5	Nothing Significant to Report	4	Bad Symmetry	4.7	Nothing Significant To Report	
KASEBERG	ck	SWW	13	27	Sponge Cake	5		5		5.0		
SY ASSURE		SWW	14	28	Sponge Cake	5	Nothing Significant to Report	5	Nothing Significant to Report	4.7	Hard Texture	
09PN046#16		SWW	14	29	Sponge Cake	3	Lumpy Batter	2	Low Volume, Dark Crust Color	2.7	Hard and Rough Texture	
09PN062#18		SWW	14	30	Sponge Cake	4	High Specific Gravity	6	Good Symmetry, White Crumb	5.0	Nothing Significant To Report	
SY OVATION	ck	SWW	14	31	Sponge Cake	5		5		5.0		
04PN066-7		SWW	15	32	Sponge Cake	6	Low Specific Gravity	6	Fine Crumb, Good Volume	5.7	Soft Texture and Good Volume	
09PN005#25		SWW	15	33	Sponge Cake	5	Nothing Significant to Report	6	Fine Crumb	5.3	Nothing Significant To Report	
ELTAN	ck	SWW	15	34	Sponge Cake	5		5		5.0		

- 47 -

Aryzta
Swedesboro, NJ

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	White Artisan Loaf	8		8	held definition well after baking. Seemed to tolerate fermentation.	8		overall, the flower preformed well. The photos of the finished loaf do not accurately reflect performance. Final proof was about 15 mins late, causing cuts not to open. Dough hydration was comparable to our in-use flour. Surprisingly, this flour with it's high falling number proofed at the same rate as our control flour.
YELLOWSTONE	ck	HRW	1	2	White Artisan Loaf	8		8		8		this flour performed much like flour 1.Same mix time, same hydration. Dough feel is very similar. 60 % hydration.
SY TOUCHSTONE		HRW	2	3	White Artisan Loaf	9	nice strong dough. Had to increase mix time, but with added water, hydration could drop.	9	was easy to shape with enoguh bench relaxation.	9	like this dough the best as it held up well, was a strong dough but at 12.2 protien, it would not be the most expensive and could be offset by added water to lower cost.	very strong flour. Could have taken 2-3 % additional water with no issues. Due to the increased strength, additional mix time was needed to fully develop the dough. With the addition of the additional water, mix time could be reduced.
WHETSTONE	ck	HRW	2	4	White Artisan Loaf	8	average	7	average	7	average	normal mix time. Baking and fereentation were the same as well. Proofed slower than the others, but that corresponds with the higher falling number.
WB9200		HRS	3	5	White Artisan Loaf	8	average	7	average	7	average	normal mix time. Baking and fereentation were the same as well.
ID1602S		HWS	4	6	White Artisan Loaf	5	mixed very fast, dough felt slack, may need to reduce hydration.	5	overproofed quickly. Did not hold shape or definition. Dough puddled in the proofer and had excessive spread.	5	liked this flour the least. Would not want to use this in a production facility.	mixed fast. Lower protien flour at 10+. Different than the others. Product did not hold up to final fermentation either. I proofed for 100 minutes final but this should have been 30 minutes less or more. Does not tolerate ferentation well. This faster fermentation could also be due to the ash content, while not high by standards, this is the highest ash content of the 10 samples tested.
ID1603S		HRS	4	7	White Artisan Loaf	5	mixed very fast, dough felt slack, may need to reduce hydration.	6	while this loaf proofed quickly, it did nold up better than the previous dough. It did puddle, but didn't overproof.	6	did not like this flour. In a production facility, it would be hard to deal with the tempermental characteristics.	mixed very fast. 3 mins slow and 4 minutes fast. All other flours have taken 3 mins slow and atleast 6-8 minutes. Bulk fermentation was also faster at 90 minutes vs. 100 to 120 minutes bulk. The dough feel was very good. Lots of aeration. However, it did not hold definition on the cuts after final fermentation. This is very odd as the flour protien is at 12.7.
ID1604S		HWS	4	8	White Artisan Loaf	6	nice mix. Used more mix time, but this could be reduced by adding more water.	7	good, solid loaf	7	could use this.	dough feels very good. Took an extra 2 minutes to mix to intensive mix. Could possibly hold more water…. If so, the mix time could be reduced.
WINCHESTER	ck	HRS	4	9	White Artisan Loaf	6	dough mixed well. Had no issues. Normal mxi time, hydration	5	loaf was gassy on the bench. When proofing, it didn't hold it's shape / height. Puddled excessively. After baking it had a very thin eyelash, but did not break and tear as it should have.	6	would not be worth the added cost of the high protein content.	dough color is very white. Very soft silky feel. Can't hold more water, but this does not feel bad. After bench resting, the dough felt very gassy. This is the reason for the faster final feremntation. Did not hold definition well after proofing, when baking, it filled out, but did not break and tear as it should have The high flour protien content makes sense when looking at the increased mix time from the standard 2 minutes. .
SY3015-8		HRS	5	10	White Artisan Loaf	6	dough mixed well. Had no issues. Normal mxi time, hydration	5	dough shaped well on the bench, but didn't hold up to feremtnatuion like I though ti twould.	6	would not be worth the added cost of the high protein content.	did not get good volume even with increased mix time. Cannot hold more water than the 60% that the recipe gives. Dough is very soft on the bench These atributes seem odd since the flour protien is at 14% I would have thought it would have held up much better and although flour protien is not a direct correlation to hydratuion, I would have thought it could have held more water. .

- 48 -

1		base recipe in pounds	baker's %	actual recipe in pounds	baker's %	difference in pounds	difference baker's %
11/15/2016	flour	5.0	100.00%	5.00	100.00%	0.00	0.00%
	water	3.0	60.00%	3.00	60.00%	0.00	0.00%
	salt	0.1	2.00%	0.10	2.00%	0.00	0.00%
	yeast	0.1	2.00%	0.10	2.00%	0.00	0.00%
		8.20		8.20			

mix time			
slow	3.00	minutes	
fast	6.00	minutes	
bulk fermentation	90 mins	minutes	70 degrees 80% humidity
final fermentation	110 mins	minutes	

2		base recipe in pounds	baker's %	actual recipe in pounds	baker's %	difference in pounds	difference baker's %
	flour	5.0	100.00%	5.50	100.00%	0.50	0.00%
	water	3.1	62.00%	3.00	54.55%	-0.10	-7.45%
	salt	0.1	2.00%	0.10	1.82%	0.00	-0.18%
	yeast	0.1	2.00%	0.10	1.82%	0.00	-0.18%
		8.30		8.70			

mix time			
slow	3.00	minutes	
fast	6.00	minutes	
bulk fermentation	80 mins	minutes	70 degrees 80% humidity
final fermentation	90.00	minutes	

3		base recipe in pounds	baker's %	actual recipe in pounds	baker's %	difference in pounds	difference baker's %
	flour	5.0	100.00%	5.50	100.00%	0.50	0.00%
	water	3.1	62.00%	3.00	54.55%	-0.10	-7.45%
	salt	0.1	2.00%	0.10	1.82%	0.00	-0.18%
	yeast	0.1	2.00%	0.10	1.82%	0.00	-0.18%
		8.30		8.70			

mix time			
slow	3.00	minutes	
fast	7.00	minutes	
bulk fermentation	80.00	minutes	70 degrees 80% humidity
final fermentation	110.00	minutes	

4		base recipe in pounds	baker's %	actual recipe in pounds	baker's %	difference in pounds	difference baker's %
	flour	5.0	100.00%	5.50	100.00%	0.50	0.00%
	water	3.1	62.00%	3.00	54.55%	-0.10	-7.45%
	salt	0.1	2.00%	0.10	1.82%	0.00	-0.18%
	yeast	0.1	2.00%	0.10	1.82%	0.00	-0.18%
		8.30		8.70			

mix time			
slow	3.00	minutes	
fast	6.00	minutes	
bulk fermentation	90.00	minutes	70 degrees 80% humidity
final fermentation	130.00	minutes	

5		base recipe in pounds	baker's %	actual recipe in pounds	baker's %	difference in pounds	difference baker's %
	flour	5.0	100.00%	5.50	100.00%	0.50	0.00%
	water	3.1	62.00%	3.00	54.55%	-0.10	-7.45%
	salt	0.1	2.00%	0.10	1.82%	0.00	-0.18%
	yeast	0.1	2.00%	0.10	1.82%	0.00	-0.18%
		8.30		8.70			

mix time			
slow	3.00	minutes	
fast	6.00	minutes	
bulk fermentation	100 mins	minutes	70 degrees 80% humidity
final fermentation	100 mins	minutes	

- 49 -

6

	base recipe in pounds	baker's %	actual recipe in	baker's %	difference in pounds	difference baker's %
flour	5.0	100.00%	5.50	100.00%	0.50	0.00%
water	3.1	62.00%	3.00	54.55%	-0.10	-7.45%
salt	0.1	2.00%	0.10	1.82%	0.00	-0.18%
yeast	0.1	2.00%	0.10	1.82%	0.00	-0.18%
	8.30		8.70			

mix time			
slow	3.00	minutes	
fast	5.00	minutes	
bulk fermentation	90.00	minutes	70 degrees 80% humidity
final fermentation	100.00	minutes	

7

	base recipe in pounds	baker's %	actual recipe in	baker's %	difference in pounds	difference baker's %
flour	5.0	100.00%	5.00	100.00%	0.00	0.00%
water	3.1	62.00%	3.00	60.00%	-0.10	-2.00%
salt	0.1	2.00%	0.10	2.00%	0.00	0.00%
yeast	0.1	2.00%	0.10	2.00%	0.00	0.00%
	8.30		8.20			

mix time			
slow	3.00	minutes	
fast	4.00	minutes	
bulk fermentation	90.00	minutes	70 degrees 80% humidity
final fermentation	100.00	minutes	

8

	base recipe in pounds	baker's %	actual recipe in	baker's %	difference in pounds	difference baker's %
flour	5.0	100.00%	5.50	100.00%	0.50	0.00%
water	3.1	62.00%	3.00	54.55%	-0.10	-7.45%
salt	0.1	2.00%	0.10	1.82%	0.00	-0.18%
yeast	0.1	2.00%	0.10	1.82%	0.00	-0.18%
	8.30		8.70			

mix time			
slow	3.00	minutes	
fast	8.00	minutes	
bulk fermentation	90.00	minutes	70 degrees 80% humidity
final fermentation	85.00	minutes	

9

	base recipe in pounds	baker's %	actual recipe in	baker's %	difference in pounds	difference baker's %
flour	5.0	100.00%	5.00	100.00%	0.00	0.00%
water	3.1	62.00%	3.00	60.00%	-0.10	-2.00%
salt	0.1	2.00%	0.10	2.00%	0.00	0.00%
yeast	0.1	2.00%	0.10	2.00%	0.00	0.00%
	8.30		8.20			

mix time			
slow	3.00	minutes	
fast	8.00	minutes	
bulk fermentation	100.00	minutes	70 degrees 80% humidity
final fermentation	85.00	minutes	

10

	base recipe in pounds	baker's %	actual recipe in	baker's %	difference in pounds	difference baker's %
flour	5.0	100.00%	5.00	100.00%	0.00	0.00%
water	3.1	62.00%	3.00	60.00%	-0.10	-2.00%
salt	0.1	2.00%	0.10	2.00%	0.00	0.00%
yeast	0.1	2.00%	0.10	2.00%	0.00	0.00%
	8.30		8.20			

mix time			
slow	3.00	minutes	
fast	8.00	minutes	
bulk fermentation	100.00	minutes	70 degrees 80% humidity
final fermentation	85.00	minutes	

- 50 -

Mondeléz International
Toledo, Ohio

PNW 2016 flour samples

Meets Target **Corrector** **Not Suitable**

Sample Id	Flour protein	Flour ash	SRC, %					Comments
			Water	Sucrose	Na Carbonate	Lactic acid	GPI	
16-12	7.9	0.33	54.5	95.2	75.0	94.7	0.55	Good gluten potential, high pentosans and damaged starch, marginal quality for cookies & crackers
16-13 (CK)	8.2	0.39	54.6	100.2	78.5	76.3	0.43	Low gluten potential, high pentosans and damaged starch, marginal quality for cookies
16-14	9.4	0.39	56.2	100.0	78.8	82.5	0.47	Low gluten potential, high pentosans and damaged starch, marginal quality for cookies
16-15 (CK)	9.6	0.36	52.3	99.0	75.0	127.0	0.72	Strong gluten potential, high pentosans and damaged starch. marginal quality for crackers
16-16	9.6	0.42	50.2	86.8	65.3	59.5	0.39	Poor gluten potential, marginal quality for cookies
16-17	9.4	0.34	49.0	99.7	70.7	98.3	0.58	Good gluten potential, high pentosans, marginal quality for cookies & crackers
16-18 (CK)	8.4	0.41	51.2	97.6	72.0	97.5	0.57	Good gluten potential, high pentosans, marginal quality for cookies & crackers
16-19	8.7	0.41	55.5	97.4	76.1	80.4	0.45	Low gluten potential, high pentosans and damaged starch, marginal quality for cookies
16-20 (CK)	9.5	0.39	54.2	100.9	83.0	80.7	0.43	Low gluten potential, high pentosans and damaged starch, marginal quality for cookies
16-21	7.9	0.37	55.6	95.1	77.4	84.5	0.50	Low gluten potential, high pentosans and damaged starch, marginal quality for cookies
16-22 (CK)	8.0	0.39	54.2	98.5	69.9	88.0	0.52	Low gluten potential, high pentosans , marginal quality for cookies
16-23	9.0	0.36	53.0	98.1	71.5	96.1	0.57	Good gluten potential, pentosans are on high side, marginal quality for cookies & crackers

- 51 -

PNW 2016 flour samples

Meets Target Corrector Not Suitable

Sample Id	Flour protein	Flour ash	SRC, %					Comments
			Water	Sucrose	Na Carbonate	Lactic acid	GPI	
16-24	9.1	0.38	54.8	98.8	72.7	100.0	0.58	Good gluten potential, high pentosans, marginal quality for cookies & crackers
16-25 (CK)	8.3	0.32	54.8	102.7	71.5	84.3	0.48	Low gluten potential, high pentosans, marginal quality for cookies
16-26	8.7	0.39	54.3	91.7	74.5	84.5	0.51	Low gluten potential, starch damage is on high side, marginal quality for cookies
16-27 (CK)	8.5	0.40	53.8	99.8	72.0	95.8	0.57	Good gluten potential, high pentosans, marginal quality for cookies & crackers
16-28	10.4	0.37	54.5	99.1	68.9	74.9	0.44	Poor gluten potential, high pentosans, not suitable for crackers
16-29	9.7	0.38	54.5	96.1	69.1	64.5	0.38	Poor gluten potential, high pentosans, not suitable for crackers
16-30	9.7	0.39	55.7	99.7	69.6	83.2	0.50	Low gluten potential, high pentosans, marginal quality for cookies
16-31 (CK)	9.8	0.41	54.9	94.0	66.5	84.7	0.52	Good gluten potential, pentosans are on high end, marginal quality for cookies
16-32	5.8	0.44	55.9	95.9	74.8	68.9	0.41	Poor gluten potential, high pentosans and damaged starch, not suitable for crackers
16-33	5.8	0.50	57.7	98.4	74.3	69.1	0.40	Poor gluten potential, high pentosans and damaged starch, not suitable for crackers
16-34 (CK)	6.2	0.38	56.7	102.4	73.4	93.4	0.53	Good gluten potential, high pentosans and damaged starch, marginal quality for cookies
TARGET		<0.49	<55	<93	<71	>98	>0.60	

- 52 -

Northern Seed
Bozeman, Montana

Northern Seed, LLC
Let's Grow

Variety	Check	Class	Group	Sample#	Whole Seed Protein	Sedimentation- Milled Flour SDS
MT1348		HRW	1	1	12.59	115
YELLOWSTONE	ck	HRW	1	2	14.82	118
SY TOUCHSTONE		HRW	2	3	14.34	118
WHETSTONE	ck	HRW	2	4	13.61	117
WB9200		HRS	3	5	12.17	113
ID1602S		HWS	4	6	11.75	110
ID1603S		HRS	4	7	14.27	114
ID1604S		HWS	4	8	13.31	116
WINCHESTER	ck	HRS	4	9	13.12	113
SY3015-8		HRS	5	10	15.22	115
BULLSEYE	ck	HRS	5	11	14.88	116
RYAN		SWS	6	12	9.18	68
WHIT	ck	SWS	6	13	9.97	59
SILK		SWS	7	14	11.7	63
LOUISE	ck	SWS	7	15	12.03	92
WB6430		SWS	8	16	11.17	42
ID1403S		SWS	9	17	11.03	76
STONE	ck	SWS	9	18	9.53	76
SPARROW		SWW	10	19	10.01	70
STEPHENS	ck	SWW	10	20	11.75	62
WA8232		SWW	11	21	9.22	56
JASPER	ck	SWW	11	22	9.43	60
CASTLE		SWW	12	23	9.93	84
MAGIC		SWW	12	24	10.3	83
B96	ck	SWW	12	25	10.19	66
OR2101043		SWW	13	26	10.24	64
KASEBERG	ck	SWW	13	27	10.3	66
SY ASSURE		SWW	14	28	12.15	59
09PN046#16		SWW	14	29	11.05	48
09PN062#18		SWW	14	30	10.98	66
SY OVATION	ck	SWW	14	31	11.5	67
04PN066-7		SWW	15	32	6.39	22
09PN005#25		SWW	15	33	6.55	20
ELTAN	ck	SWW	15	34	6.8	50

- 53 -

Limagrain Cereal Seeds
Fort Collins, CO

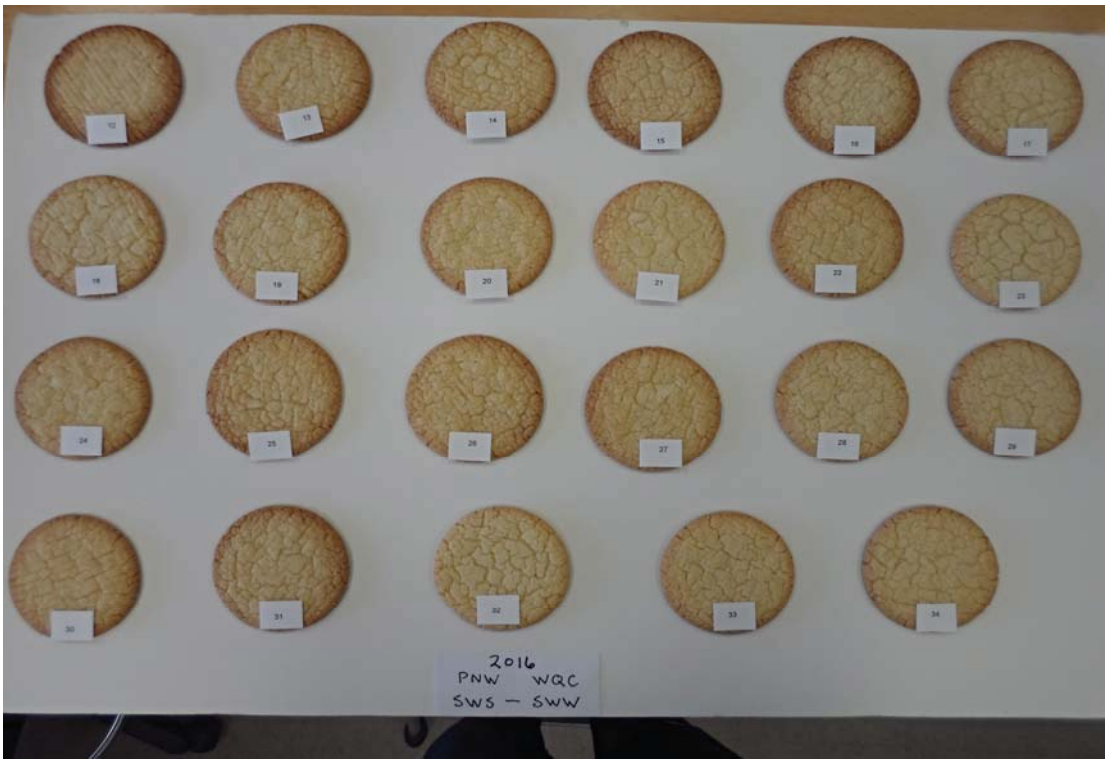
						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	bread	5		5		5		
YELLOWSTONE	ck	HRW	1	2	bread	7		6		8		
SY TOUCHSTONE		HRW	2	3	bread	8		6		3		
WHETSTONE	ck	HRW	2	4	bread	6		7		4		
WB9200		HRS	3	5	bread	8		5		7		good for lower protein
ID1602S		HWS	4	6	bread	5		7		4		
ID1603S		HRS	4	7	bread	7		7		8		good for lower protein
ID1604S		HWS	4	8	bread	6		6		8		good for lower protein
WINCHESTER	ck	HRS	4	9	bread	7		8		7		good for lower protein
SY3015-8		HRS	5	10	bread	4		5		7		good for lower protein
BULLSEYE	ck	HRS	5	11	bread	6		7		7		
RYAN		SWS	6	12	cookie	6		6		6		
WHIT	ck	SWS	6	13	cookie	4		6		6		
SILK		SWS	7	14	cookie	5		6		7		
LOUISE	ck	SWS	7	15	cookie	4		7		7		
WB6430		SWS	8	16	cookie	9		8		7		
ID1403S		SWS	9	17	cookie	8		6		7		
STONE	ck	SWS	9	18	cookie	9		6		6		
SPARROW		SWW	10	19	cookie	5		7		6		
STEPHENS	ck	SWW	10	20	cookie	4		5		7		
WA8232		SWW	11	21	cookie	6		5		6		
JASPER	ck	SWW	11	22	cookie	8		8		6		
CASTLE		SWW	12	23	cookie	7		8		7		
MAGIC		SWW	12	24	cookie	6		5		7		
B96	ck	SWW	12	25	cookie	7		7		6		
OR2101043		SWW	13	26	cookie	8		9		6		
KASEBERG	ck	SWW	13	27	cookie	7		6		6		
SY ASSURE		SWW	14	28	cookie	6		8		8		good diameter given high protein
09PN046#16		SWW	14	29	cookie	6		8		7		good diameter given high protein
09PN062#18		SWW	14	30	cookie	4		8		8		good diameter given high protein
SY OVATION	ck	SWW	14	31	cookie	8		8		7		good diameter given high protein
04PN066-7		SWW	15	32	cookie	8		6		5		not good diameter given low protein
09PN005#25		SWW	15	33	cookie	5		6		5		not good diameter given low protein
ELATN	ck	SWW	15	34	cookie	6		6		5		not good diameter given low protein

- 54 -

					Flour Color			% SRC			
Variety	Check	Class	Group	Sample#	L	a	b	H2O	LA	Na2CO3	Sucrose
Group 1		HRW	1	1	90.76	-2.23	12.34	66	166	83	100
Group 1	ck	HRW	1	2	90.45	-1.76	11.27	66	162	82	99
Group 2		HRW	2	3	90.96	-1.78	10.03	67	131	84	96
Group 2	ck	HRW	2	4	90.78	-1.83	10.82	67	175	83	98
Group 3		HRS	3	5	90.80	-1.27	8.27	70	154	92	106
Group 4		HWS	4	6	91.92	-1.83	9.32	62	142	86	100
Group 4		HRS	4	7	91.67	-1.25	8.18	67	103	89	117
Group 4		HWS	4	8	91.77	-1.34	8.24	65	151	84	103
Group 4	ck	HRS	4	9	91.45	-1.00	7.33	67	148	88	107
Group 5		HRS	5	10	90.96	-1.67	10.40	61	149	78	98
Group 5	ck	HRS	5	11	90.63	-1.48	9.98	66	161	80	99
Group 8		SWS	8	16	91.95	-1.67	8.12	54	61	65	76
Group 9	ck	SWS	9	18	92.63	-1.65	7.48	54	96	69	80
Group 14	ck	SWW	14	31	92.44	-1.40	7.50	56	88	70	81
Group 9		SWS	9	17	92.32	-1.76	8.10	53	108	72	82
Group 11	ck	SWW	11	22	92.76	-2.13	9.46	56	96	74	79
Group 15		SWW	15	32	92.99	-1.77	7.79	56	97	69	83
Group 13		SWW	13	26	92.55	-1.96	9.29	55	101	72	82
Group 12	ck	SWW	12	25	92.61	-2.16	9.38	56	104	74	80
Group 13	ck	SWW	13	27	92.57	-2.04	9.43	55	112	73	82
Group 12		SWW	12	23	92.40	-1.94	9.35	58	112	72	82
Group 15	ck	SWW	15	34	93.55	-2.13	8.55	57	96	73	84
Group 6		SWS	6	12	92.37	-1.83	8.77	58	106	74	82
Group 12		SWW	12	24	92.79	-2.01	9.17	57	116	74	83
Group 11		SWW	11	21	92.67	-1.85	8.50	57	93	74	83
Group 14		SWW	14	29	92.25	-1.57	8.35	59	73	73	85
Group 14		SWW	14	28	92.32	-1.75	8.60	59	91	72	85
Group 15		SWW	15	33	92.66	-1.94	8.70	59	71	78	83
Group 10		SWW	10	19	92.13	-2.16	9.98	60	89	77	83
Group 7		SWS	7	14	92.10	-2.31	10.75	59	89	74	89
Group 6	ck	SWS	6	13	92.08	-1.89	8.65	55	86	80	89
Group 7	ck	SWS	7	15	92.52	-1.55	7.86	57	133	76	92
Group 14		SWW	14	30	92.51	-1.62	8.12	60	95	75	90
Group 10	ck	SWW	10	20	92.41	-1.98	9.24	57	88	76	93

- 55 -

Variety	Check	Class	Group	Sample#	Top Grain	Diameter cm	Thick cm	D/T Ratio cm	Protein	Ash
Group 6		SWS	6	12	2	9.4	0.67	14.03	8.51	0.4
Group 6	ck	SWS	6	13	2	9.2	0.70	13.26	8.46	0.4
Group 7		SWS	7	14	2	8.9	0.76	11.74	9.7	0.4
Group 7	ck	SWS	7	15	3	9.2	0.67	13.67	10.21	0.4
Group 8		SWS	8	16	3	9.3	0.64	14.47	9.92	0.4
Group 9		SWS	9	17	2	9.1	0.70	13.04	9.72	0.4
Group 9	ck	SWS	9	18	2	9.1	0.62	14.55	8.59	0.4
Group 10		SWW	10	19	2	9.0	0.67	13.42	8.92	0.4
Group 10	ck	SWW	10	20	2	8.9	0.73	12.21	9.8	0.4
Group 11		SWW	11	21	3	8.8	0.68	12.88	8.19	0.3
Group 11	ck	SWW	11	22	2	9.2	0.69	13.36	8.25	0.3
Group 12		SWW	12	23	3	8.8	0.71	12.29	9.45	0.4
Group 12		SWW	12	24	2	8.8	0.76	11.55	9.56	0.4
Group 12	ck	SWW	12	25	3	9.1	0.68	13.42	8.88	0.4
Group 13		SWW	13	26	3	9.0	0.72	12.59	8.94	0.4
Group 13	ck	SWW	13	27	2	9.0	0.65	13.79	8.78	0.4
Group 14		SWW	14	28	2	8.9	0.71	12.50	10.82	0.4
Group 14		SWW	14	29	3	8.7	0.73	11.83	10.05	0.4
Group 14		SWW	14	30	3	8.6	0.77	11.21	10.23	0.4
Group 14	ck	SWW	14	31	3	8.8	0.72	12.27	10.29	0.4
Group 15		SWW	15	32	3	8.7	0.72	12.22	5.96	0.3
Group 15		SWW	15	33	3	8.7	0.79	11.06	6.13	0.3
Group 15	ck	SWW	15	34	3	8.9	0.70	12.77	6.11	0.3



- 56 -

Variety	Check	Class	Group	Sample#	Flour Pro	%ABS	Bread Bake Mix Time	Bread Bake Loaf Vol	Bread Bake Predicted LV	Bread Bake Grn	Bread Bake Color
Group 1		HRW	1	1	11.65	65.6	**4.30**	**865**	897	**4**	**2**
Group 1	ck	HRW	1	2	13.34	65.6	**6.00**	**1025**	1007	**5**	**4**
Group 2		HRW	2	3	12.72	66.9	**6.00**	**745**	967	**3**	**4**
Group 2	ck	HRW	2	4	12.64	66.8	**4.30**	**825**	962	**3**	**2**
Group 3		HRS	3	5	11.48	70.0	**4.00**	**940**	886	**4**	**5**
Group 4		HWS	4	6	10.77	62.2	**4.00**	**830**	840	**3**	**4**
Group 4		HRS	4	7	12.91	66.8	**4.00**	**1065**	979	**5**	**5**
Group 4		HWS	4	8	12.29	64.7	**3.00**	**1020**	939	**5**	**5**
Group 4	ck	HRS	4	9	12.04	67.1	**3.45**	**960**	923	**6**	**5**
Group 5		HRS	5	10	13.24	61.5	**4.00**	**965**	1001	**4**	**4**
Group 5	ck	HRS	5	11	13.38	65.6	**4.30**	**990**	1010	**4**	**4**

- 57 -

AgriPro Wheat
Berthoud, Colorado

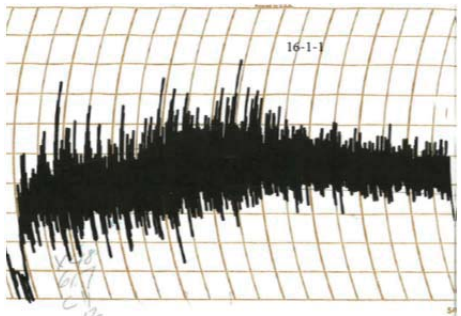
						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	Bread	7	Nice dough	6	Good grain and vol for lower prot	6	Baked better loaf than ck	Lower prot,Exc ash
YELLOWSTONE	ck	HRW	1	2	Bread	7	Nice dough	6		6	Long strong	
SY TOUCHSTONE		HRW	2	3	Bread	5	Bucky dough	6		6	Long strong	Exc Ash, stronger that ck, sl higher prot
WHETSTONE	ck	HRW	2	4	Bread	6	Good dough	6	poorer color	6	Yellow crumb	Exc Ash
WB9200		HRS	3	5	Bread	6	Good dough	7	Good grain	7	Stronger dough	Hard SKCS,?milling, good FABS for prot
ID1602S		HWS	4	6	Bread	5	Slighty weak dough	6		4	Weak gluten, Good LV for prot	Lower prot
ID1603S		HRS	4	7	Bread	5	Slighty weak dough	7	Exc loaf vol, Exc color	5	Weak, but good bread, Exc color	Higher prot
ID1604S		HWS	4	8	Bread	6	Good dough	7	Good grain-color	5	Short/weak, but good bread, Exc color	Lowest FN, lower Stab
WINCHESTER	ck	HRS	4	9	Bread	6	Good dough	8	Good grain,exc color	5	Weak, Exc color	lower Stab
SY3015-8		HRS	5	10	Bread	6	Good dough	7	Equal to check	6	Very comparable to chk, sl stronger/low FlrYld	
BULLSEYE	ck	HRS	5	11	Bread	6	Good dough	7		6		Good miller
RYAN		SWS	6	12	Cookie	7		4	Average spread, poorer TG	4		Vlow Ash
WHIT	ck	SWS	6	13	Cookie	7		7	Nice spread, poorer TG	6		
SILK		SWS	7	14	Cookie	7		6	Slightly above average cookie	6		LowFN,HiH2O/SUC
LOUISE	ck	SWS	7	15	Cookie	7		7	Nice spread, poorer TG	7		HiH2O/LA
WB6430		SWS	8	16	Cookie	7		8	Very good cookie, Nice spread	8		VG Mill, Vlow SRC's
ID1403S		SWS	9	17	Cookie	7		6	Average spread, poorer TG	6	Comparable SRC to chk	Lower Ash than Chk
STONE	ck	SWS	9	18	Cookie	7		9	Excellent cookie	7		LowFN
SPARROW		SWW	10	19	Cookie	5	more like a hard wheat	4	Average spread, poorer TG	5		?H2O,milled bettter than Chk
STEPHENS	ck	SWW	10	20	Cookie	5	more like a hard wheat	4	Good TG, Small Spread	4		?H2O
WA8232		SWW	11	21	Cookie	7		5	Average spread, poorer TG	5	Not as good as ck	
JASPER	ck	SWW	11	22	Cookie	7		9	Excellent cookie	8	VG SRC/Milling	LowFN
CASTLE		SWW	12	23	Cookie	7		6	Slightly above average cookie	6		Low ash
MAGIC		SWW	12	24	Cookie	7		6	Slightly above average cookie	5		?mill,low ash
B96	ck	SWW	12	25	Cookie	7		8	Very good cookie, Nice spread	8		LowFN/ash milling/SRC best of set
OR2101043		SWW	13	26	Cookie	7		8	Good Spread, Very good TG	8		Exc Mill
KASEBERG	ck	SWW	13	27	Cookie	7		8	Good Spread, Very good TG	7		
SY ASSURE		SWW	14	28	Cookie	7		5	Average cookie	5		Exc Mill
09PN046#16		SWW	14	29	Cookie	5	more like a hard wheat	4	Good TG, Small Spread	5		Exc Mill,?H2O
09PN062#18		SWW	14	30	Cookie	5	more like a hard wheat	4	Average spread, poorer TG	5		Exc Mill,?H2O
SY OVATION	ck	SWW	14	31	Cookie	5	more like a hard wheat	3	Small, Poorer TG	4		Exc Mill
04PN066-7		SWW	15	32	Cookie	7		7	Good Spread, Very good TG	6		Vlow prot, hiH2O/lowLA
09PN005#25		SWW	15	33	Cookie	7		5	Average cookie	5		Vlow prot, hi ash, hiH2O+SC/lowLA
ELTAN	ck	SWW	15	34	Cookie	7		6	Slightly above average cookie	6		Vlow prot

- 58 -

	Sample No	Class	NIR FlrMst	Nir FlrAsh	NIR FlrHrd	NIR FlrProt	Mixo Pktime	Mixo Pkht	Mixo Tol	Mixo Rate	Mixo Abs	Babs	Bake PkTime	Watt Hr	Loaf	Grain	Tex	Color	PredLoaf	PredLoaf Diff
			%	%		14%mb	min			1=excel	%	%	min	engery	cc	1=excel	1=excel	1=excel		
Grp 1	1	HRW	13.4	0.398	144	11.1	4.25	4.85	1142	4.5	61.5	62.0	3.43	7.5	920	3.5	3	3	881	39
Grp 1 CHK	2	HRW	13.4	0.406	148	13.0	7.25	5.05	1433	3.5	65.0	65.5	5.03	10.4	1060	4	3	3	985	75
Grp 2	3	HRW	13.3	0.393	131	12.2	7.00	4.75	1698	3	65.0	68.0	7.00	9.7	965	4.5	3	3	940	26
Grp 2 CHK	4	HRW	12.7	0.397	127	11.9	4.00	5.00	1224	4	64.5	64.5	3.21	6.6	970	4	3	4	927	44
Grp 3	5	HRS	12.9	0.447	120	11.2	4.25	5.10	1087	4.5	66.0	65.5	3.28	7.4	955	3.5	3	2	862	94
Grp 4	6	HWS	14.1	0.440	100	10.5	3.50	4.90	871	7	60.5	60.5	3.29	5.3	**970**	4	3	3	816	154
Grp 4	7	HRS	13.4	0.457	107	12.7	3.50	5.00	889	7	64.0	63.5	3.20	6.5	1075	4.5	2	1.5	953	123
Grp 4	8	HWS	13.8	0.481	99	12.0	3.00	5.20	670	7.5	64.0	64.0	2.92	6.8	1035	3.5	2	2	907	128
Grp 4 CHK	9	HRS	13.8	0.484	112	11.7	3.50	5.40	851	7	63.5	63.5	3.08	6.5	995	3.5	2	1.5	888	108
Grp 5	10	HRS	13.7	0.461	123	12.9	4.25	5.35	1089	4.5	66.5	66.5	3.97	7.5	1075	4	3	3	972	103
Grp 5 CHK	11	HRS	13.5	0.467	132	13.0	4.00	5.00	1126	4	65.5	65.5	3.48	6.2	1070	4	2	3	972	98

	Sample No	Class	NIR FlrMst	Nir FlrAsh	NIR FlrHrd	NIR FlrProt	SRCH2O	SRCSC	SRCLA	SRCSUC	Cdiam	Top Grain
			%	14%mb		14%mb	14%mb	14%mb	14%mb	14%mb	Sugar Snap	1=excel 5=unaccept
Grp 6	12	SWS	12.1	0.407	50	7.9	56.5	71.4	98.5	91.8	18.0	3
Grp 6 CHK	13	SWS	11.6	0.391	44	8.2	56.3	74.2	84.4	99.9	18.7	3
Grp 7	14	SWS	11.5	0.451	46	9.4	59.2	72.9	83.0	100.1	18.2	1
Grp 7 CHK	15	SWS	11.4	0.439	54	9.6	58.4	71.1	122.8	97.8	18.8	3
Grp 8	16	SWS	11.7	0.491	46	9.6	52.0	61.8	58.2	83.6	19.0	1
Grp 9	17	SWS	12.6	0.412	43	9.4	54.2	67.7	99.2	93.1	18.6	3
Grp 9 CHK	18	SWS	12.5	0.453	36	8.4	52.9	68.1	98.9	90.3	19.2	1
Grp 10	19	SWW	12.1	0.460	57	8.7	58.0	73.0	80.6	90.3	18.0	3
Grp 10 CHK	20	SWW	12.4	0.467	53	9.5	57.6	72.5	84.4	101.5	17.7	1
Grp 11	21	SWW	13.4	0.431	37	7.9	55.1	70.8	83.9	90.1	18.2	3
Grp 11 CHK	22	SWW	13.0	0.428	33	8.0	53.7	68.0	86.0	86.6	19.2	1
Grp 12	23	SWW	12.8	0.462	53	9.0	56.3	67.4	101.9	90.5	18.2	1
Grp 12	24	SWW	11.8	0.458	48	9.1	57.3	69.6	105.6	92.2	18.2	1
Grp 12 CHK	25	SWW	11.9	0.431	32	8.3	54.9	69.9	98.5	89.1	18.8	1
Grp 13	26	SWW	12.9	0.460	40	8.7	53.2	68.7	88.8	89.3	18.6	1
Grp 13 CHK	27	SWW	12.4	0.490	27	8.5	54.4	70.8	100.9	91.9	18.6	1
Grp 14	28	SWW	12.3	0.483	49	10.4	56.1	68.9	79.4	92.4	18.0	1
Grp 14	29	SWW	12.5	0.481	57	9.7	58.3	70.5	66.3	90.1	17.8	1
Grp 14	30	SWW	12.2	0.497	49	9.7	58.4	71.2	87.1	94.2	18.0	3
Grp 14 CHK	31	SWW	13.1	0.535	43	9.8	55.2	67.5	89.0	89.2	17.6	3
Grp 15	32	SWW	12.9	0.433	23	5.8	60.2	72.6	67.7	89.4	18.4	1
Grp 15	33	SWW	12.7	0.402	46	5.8	59.6	76.2	67.5	91.8	18.0	1
Grp 15 CHK	34	SWW	12.7	0.471	7	6.2	56.6	71.3	91.2	92.3	18.2	1

- 59 -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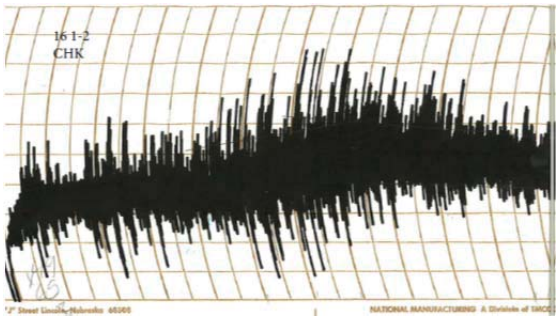
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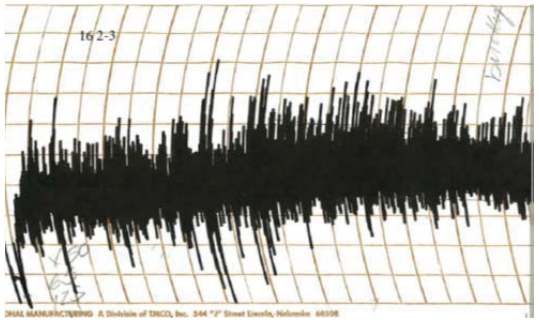
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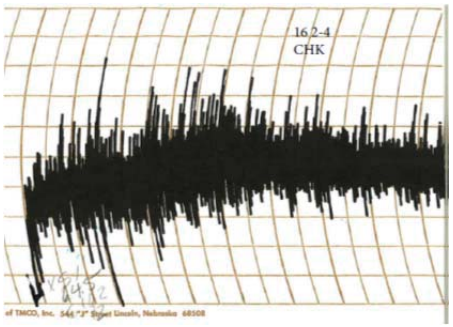
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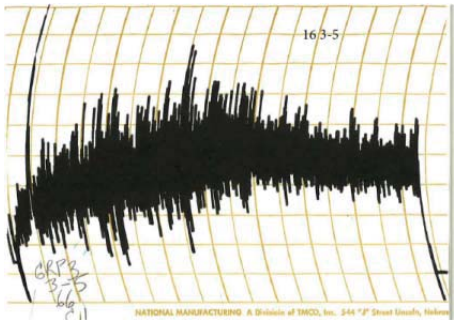
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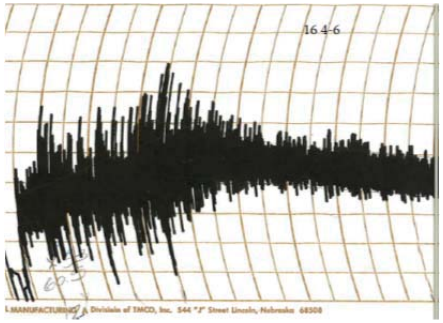
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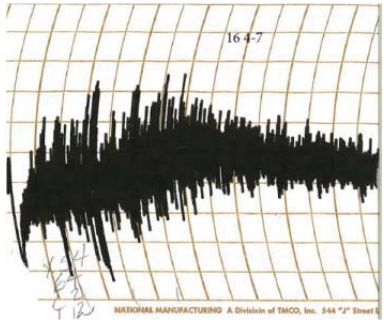
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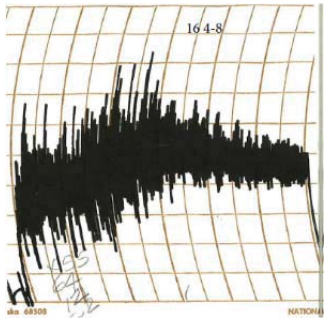
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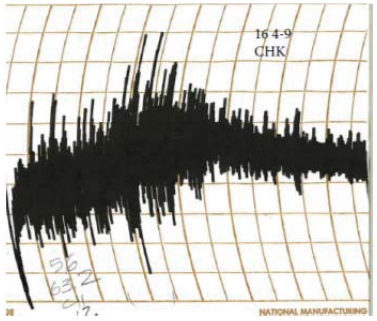
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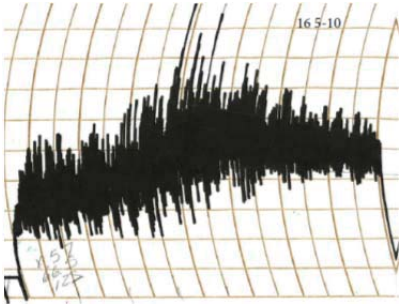
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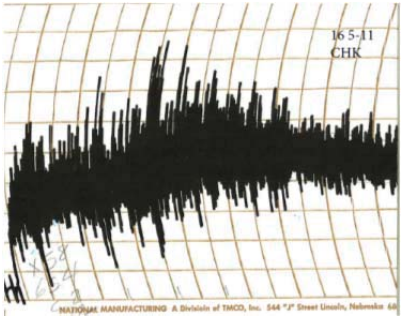
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CHK

- 60 -

California Wheat Quality Laboratory
Woodland, California

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	AACCI Puploaf	7	stiff, low water absorption	7	slightly creamy and open crumb	7	not as good as check sample	long stability
YELLOWSTONE	ck	HRW	1	2	AACCI Puploaf	8	stiff/good volume after molding	8	good loaf volume, slightly open, good mix tol.	8	strong, good absorption, good loaf volume	w value > 450, long stability
SY TOUCHSTONE		HRW	2	3	AACCI Puploaf	5	stiff/ hard to mold	5	crumb is open with rounded cells, long mix	5	to tough, blending wheat, not as good as check	long stability
WHETSTONE	ck	HRW	2	4	AACCI Puploaf	7	stiff	6	good loaf volume and slightly open. Long mix	7	strong, blending wheat	long stability, WG>35%
WB9200		HRS	3	5	AACCI Puploaf	7	stiff/ high absorption	7	open crumb	7	strong, blending wheat	long stability
ID1602S		HWS	4	6	AACCI Puploaf	7	good dough handling/develop fast	8	good volume, fine consistent cells	7	low water absorption, white crumb	long stability
1D1603S		HRS	4	7	AACCI Puploaf	8	good dough handling/develop fast/gassy	8	good volume, slightly open crumb	8	like the dough handling and loaf volume	long stability
ID1604S		HWS	4	8	AACCI Puploaf	6	slightly soft	6	good volume, flat top, slighlty open, short mix	6	rank slightly lower than check, white crumb	mellow gluten
WINCHESTER	ck	HRS	4	9	AACCI Puploaf	8	good dough handling/develop fast	8	good volume, symmetry, slightly open	8	good dough handling, good volume	mellow gluten
SY3015-8		HRS	5	10	AACCI Puploaf	7	slightly stiff	8	excellent volume, over 1000cc	8	better than check, excellent loaf volume	long stability
BULLSEYE	ck	HRS	5	11	AACCI Puploaf	7	stiff/tough gluten	8	good volume and symmetry, long mix tol.	8	strong, good volume, symmetry	wet gluten >35%

- 61 -

	FLOUR ANALYSIS					FARINOGRAPH					ALVEOGRAPH				BAKING ANALYSIS								
PNW ID#	FLOUR PROTEIN (14% M.B.)	MOIS %	FALL NO. (SEC)	WET GLUTEN (14% mb)	GLUTEN INDEX	ABSORPTION	PEAK	STABILITY	MTI	BREAKDOWN	P	L	P/L	W	VOL C.C	SP VOL C.C/G	CRUMB COLOR L value	CRUMB COLOR b value	DOUGH HANDLING (1-10)	Symmetry (1-10)	TEXTURE (1-10)	CRUMB (1-10)	BAKE SCORE (1-10)
16-1	11.24	14.3	431	32.22	97.95	59.90	31.5	37.1	16.0	40.0	113	70	1.61	318	920	6.80	65.78	11.38	8.00	8.0	8	7	7.8
16-2	13.02	14.1	541	32.03	99.38	62.10	26.0	30.3	13.0	37.9	116	92	1.26	469	980	7.21	67.00	9.28	8.00	9.0	9	9	8.8
16-3	12.15	13.9	381	29.47	99.15	62.70	27.8	38.1	13.0	39.1	154	56	2.75	384	875	6.25	67.29	9.77	6.00	7.0	6	6	6.3
16-4	12.03	13.6	467	35.15	90.22	63.70	18.8	28.5	8.0	34.6	136	62	2.19	342	925	6.61	69.13	10.56	8.00	8.0	6	6	7.0
16-5	11.00	13.5	414	31.78	97.03	66.20	28.4	29.7	24.0	34.5	147	67	2.19	362	935	6.68	65.00	7.69	8.00	8.0	8	9	8.3
16-6	10.28	14.1	369	25.83	97.87	58.10	8.2	23.9	11.0	19.1	81	90	0.9	255	900	6.70	71.30	8.75	8.00	8.0	7	9	8.0
16-7	12.55	14.2	384	33.94	96.46	64.10	14.7	16.9	6.0	24.0	102	80	1.27	318	985	7.30	70.89	7.88	9.00	9.0	9	8	8.8
16-8	11.86	14.1	377	33.85	91.12	63.10	9.2	19.1	15.0	24.5	112	89	1.26	335	920	6.60	70.17	8.36	6.00	8.0	8	8	7.5
16-9	11.50	14.1	430	29.32	96.93	62.40	9.0	20.3	20.0	24.0	96	108	0.89	358	965	6.90	67.08	6.95	8.00	9.0	8	8	8.3
16-10	12.91	13.6	455	31.95	97.82	62.00	21.7	34.5	7.0	40.0	88	93	0.95	330	1000	7.40	67.77	9.29	8.00	9.0	9	9	8.8
16-11	12.90	14.7	430	35.15	97.56	61.70	9.0	21.9	17.0	17.0	112	87	1.29	380	985	7.20	68.41	9.06	8.00	9.0	9	9	8.8

- 62 -

Colorado State University Wheat Quality Laboratory
Fort Collins, Colorado

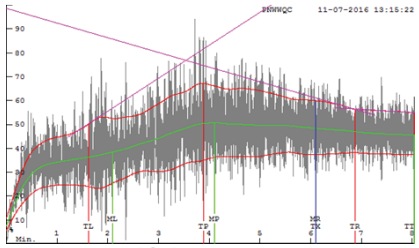
					1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
					Question #1		Question #2		Question #3		Question #4
Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
	HRW	1	1	bread	7	sl. tough out of mixer	6	nice externals	6		
ck	HRW	1	2	bread	7		6	ok, avg crumb grain, good loaf vol.	6		
	HRW	2	3	bread	7	strong! Bucky. Snowmass-like	6	white	6	strong! Dry?	maybe a good blending wheat
ck	HRW	2	4	bread	5	yellowish dough	4	cap, sl. yellow bread	4		
	HRS	3	5	bread	6	sl. tough, very white dough	5	very white, rough break and shred	5		
	HWS	4	6	bread	6		5		5		10.5% flour protein
	HRS	4	7	bread	8	nice throughout makeup	8	excellent externals and loaf volume	8		
	HWS	4	8	bread	5		4	ok, avg crumb grain	4		
ck	HRS	4	9	bread	6	very white dough	5	very white	5		
	HRS	5	10	bread	6	sl. wet out of mixer and at pan	6		6		
ck	HRS	5	11	bread	7	excellent through makeup, white	7	excellent externals, good loaf volume	7		

- 63 -

flr pro =NIR flour protein (14%mb)
flr moist=NIR flour moisture
mix tol =mixograph mixing tolerance. 0=unsatisfactory, 1=Q to U, 2=Questionable, 3=Q to S, 4=Satisfactory, 5=Excellent, 6=Outstanding
pred. %abs =1.7*NIR flour protein (14%mb)+42.6. Cheyenne Absorption Regression Line (Cnn)
act % abs = optimized mixograph absorption
mix time =bake mix time (min)
loaf vol =loaf volume (cc)
grn =crumb grain. 0=Unsatisfactory, 1=Q to U, 2=Questionable, 3=Q to S, 4=Satisfactory, 5=Outstanding, 6=Excellent
color =crumb grain color. 0=gray, 1=dark yellow, 2=yellow, 3=dull, 4=creamy, 5=white, 6=bright white
elasticity =dough elasticity out of bowl. 1=poor, 2=ok, 3=good

Variety	Lab#	Class	Check	Group	Sample#	flr pro	flr moist	mix tol	pred %abs	act %abs	mix time	loaf vol	grn	color	elasticity
Group 1	175233	HRW		1	16-1	11.4	14.5	4	62.0	62.0	4.25	960	4	5	3
Group 1	175234	HRW	X	1	16-2	13.3	14.1	5	65.1	66.1	6.25	1010	3	4	3
Group 2	175235	HRW		2	16-3	12.4	14.1	5	63.6	63.6	6.75	995	4	5	3
Group 2	175236	HRW	X	2	16-4	12.2	13.8	4	63.3	63.3	4.50	940	4	3	2
Group 3	175237	HRS		3	16-5	11.4	13.7	3	62.0	63.0	3.75	940	4	6	2
Group 4	175238	HWS		4	16-6	10.5	14.3	4	60.4	60.4	4.25	945	4	4	2
Group 4	175239	HRS		4	16-7	12.8	14.4	4	64.3	64.3	3.75	1100	4	5	3
Group 4	175240	HWS		4	16-8	12.0	14.1	3	63.0	63.0	3.25	965	3	4	2
Group 4	175241	HRS	X	4	16-9	12.0	14.1	4	62.9	62.9	3.75	965	4	6	2
Group 5	175242	HRS		5	16-10	13.2	14.0	4	65.0	67.0	4.75	1000	4	5	2
Group 5	175243	HRS	X	5	16-11	13.0	14.6	4	64.6	64.6	4.50	1035	4	4	3

- 64 -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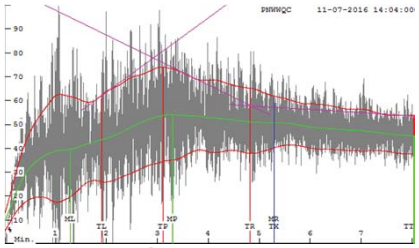
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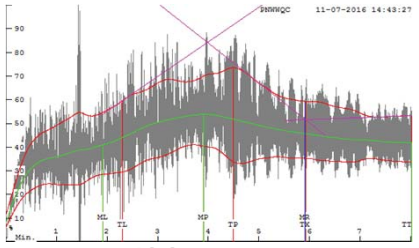
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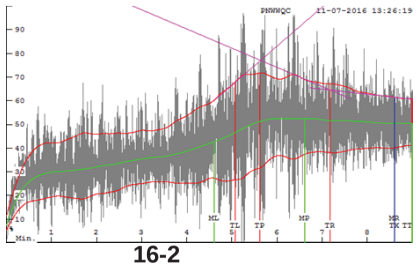
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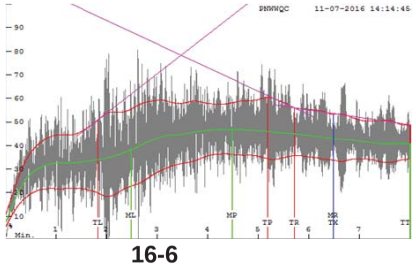
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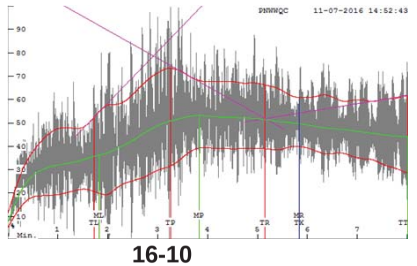
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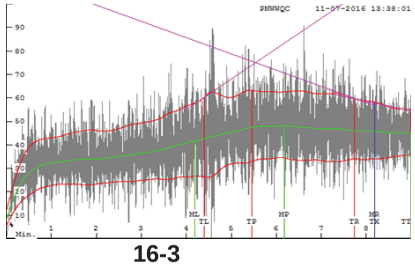
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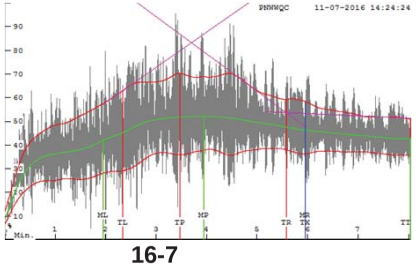
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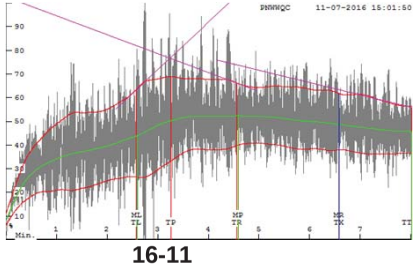
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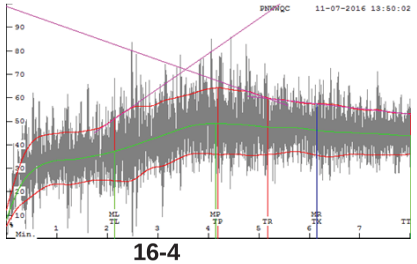
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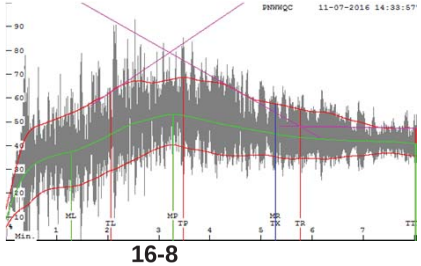
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- 65 -

University of Idaho Wheat Quality Lab
Aberdeen, Idaho

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1		5		5		5		
YELLOWSTONE	ck	HRW	1	2		6		4		5		
SY TOUCHSTONE		HRW	2	3		6		4		5		
WHETSTONE	ck	HRW	2	4		5		5		5		
WB9200		HRS	3	5		5		5		5		
ID1602S		HWS	4	6		5		4		5		
ID1603S		HRS	4	7		6		5.5		5		
ID1604S		HWS	4	8		5		5		5		
WINCHESTER	ck	HRS	4	9		5		6		5		
SY3015-8		HRS	5	10		6		5		5		
BULLSEYE	ck	HRS	5	11		6		5		5		
RYAN		SWS	6	12				4		4		
WHIT	ck	SWS	6	13				5		5		
SILK		SWS	7	14				5		5		
LOUISE	ck	SWS	7	15				6		6		
WB6430		SWS	8	16				6.5		6.5		
ID1403S		SWS	9	17				5		5		
STONE	ck	SWS	9	18				5		5		
SPARROW		SWW	10	19				4		4		
STEPHENS	ck	SWW	10	20				4		4		
WA8232		SWW	11	21				4		4		
JASPER	ck	SWW	11	22				7	overall favorite cookie	7		
CASTLE		SWW	12	23				5		5		
MAGIC		SWW	12	24				3		3		
B96	ck	SWW	12	25				6		6		
OR2101043		SWW	13	26				4		4		
KASEBERG	ck	SWW	13	27				5		5		
SY ASSURE		SWW	14	28				7		7		
09PN046#16		SWW	14	29				5		5		
09PN062#18		SWW	14	30				5	least favorite overall	5		
SY OVATION	ck	SWW	14	31				3		3		
04PN066-7		SWW	15	32				5		5		
09PN005#25		SWW	15	33				5		5		
ELTAN	ck	SWW	15	34				6		6		

- 66 -

University of Idaho														
			WWQL	mixograph	mixograph	mixograph	mixograph	mixing	dough	bake	sugar snap cookie	top		
VARIETY	**ENTRY**	**CLS**	flour protein	peak	height	tolerance	absorption	time	score	volume	diameter	grain		
				minutes	cm	degrees	%	minutes	1 to 8	cc	cm	0 to 9		
Group 1	**1**	**HRW**	11.1	3.9	6.8	70.00	60.00	3.7	4.0	1125.0				
Group 1	**2**	**HRW**	13.0	5.9	8.0	72.00	63.00	5.9	5.0	1225.0				
Group 2	**3**	**HRW**	12.2	5.4	6.6	72.00	62.00	5.5	6.0	1150.0				
Group 2	**4**	**HRW**	11.9	3.8	7.2	75.00	61.00	3.7	4.0	1075.0				
Group 3	**5**	**HRS**	11.2	3.5	7.6	72.00	63.00	3.5	5.0	1175.0				
Group 4	**6**	**HWS**	10.5	4.0	6.8	68.00	59.00	4.0	4.0	1050.0				
Group 4	**7**	**HRS**	12.7	3.7	7.2	69.00	63.00	3.5	5.0	1225.0				
Group 4	**8**	**HWS**	12.0	3.0	7.3	68.00	62.00	3.0	5.0	1175.0				
Group 4	**9**	**HRS**	11.7	3.6	8.0	63.00	61.00	3.5	4.0	1150.0				
Group 5	**10**	**HRS**	12.9	3.9	7.9	63.00	63.00	3.4	5.0	1125.0				
Group 5	**11**	**HRS**	13.0	4.0	7.3	73.00	63.00	4.0	5.0	1175.0				
Group 6	**12**	**SWS**	7.9								8.1	2.0		
Group 6	**13**	**SWS**	8.2								8.5	4.0		
Group 7	**14**	**SWS**	9.4								8.3	4.0		
Group 7	**15**	**SWS**	9.6								8.5	5.0		
Group 8	**16**	**SWS**	9.6								8.4	6.0		
Group 9	**17**	**SWS**	9.4								8.5	4.0		
Group 9	**18**	**SWS**	8.4								8.7	4.0		
Group 10	**19**	**SWW**	8.7								8.4	2.0		
Group 10	**20**	**SWW**	9.5								8.0	2.0		
Group 11	**21**	**SWW**	7.9								8.5	2.0		
Group 11	**22**	**SWW**	8.0								8.7	6.0		
Group 12	**23**	**SWW**	9.0								8.5	4.0		
Group 12	**24**	**SWW**	9.1								8.1	1.0		
Group 12	**25**	**SWW**	8.3								8.6	5.0		
Group 13	**26**	**SWW**	8.7								8.5	2.0		
Group 13	**27**	**SWW**	8.5								8.3	4.0		
Group 14	**28**	**SWW**	10.4								8.4	6.0		
Group 14	**29**	**SWW**	9.7								8.3	4.0		
Group 14	**30**	**SWW**	9.7								8.2	4.0		
Group 14	**31**	**SWW**	9.8								8.1	2.0		
Group 15	**32**	**SWW**	5.8								8.3	4.0		
Group 15	**33**	**SWW**	5.8								8.3	4.0		
Group 15	**34**	**SWW**	6.2								8.5	5.0		
								8 very strong			9 many islands 0 none			

- 67 -

University of Idaho														
VARIETY	ENTRY	CLS	WWQL flour protein	L0	a0	b0	L24	a24	b24	Ldiff	Water	Sucrose	Na2CO3	LacticAcid
Group 1	1	HRW	11.1	86.9	-1.7	22.1	74.5	-0.9	26.3	-12.4	64.2	106.5	83.0	139.7
Group 1	2	HRW	13	85.4	-0.9	22.7	69.3	-0.3	22.0	-16.1	65.6	104.1	80.0	138.7
Group 2	3	HRW	12.2	87.6	-1.4	18.8	72.7	-0.6	21.2	-14.9	66.1	106.0	80.8	156.5
Group 2	4	HRW	11.9	86.8	-1.4	21.2	70.9	-0.7	23.1	-15.9	64.9	106.9	82.7	151.8
Group 3	5	HRS	11.2	88.0	-1.3	17.7	70.2	-1.1	18.0	-17.7	69.0	114.5	91.3	136.9
Group 4	6	HWS	10.5	87.4	-1.5	20.3	70.3	-1.1	20.6	-17.1	60.5	105.0	80.0	118.3
Group 4	7	HRS	12.7	85.3	-0.7	20.3	65.6	-0.9	17.2	-19.7	67.0	123.1	89.7	147.2
Group 4	8	HWS	12	87.0	-0.7	16.9	65.7	-1.0	16.7	-21.3	63.7	110.3	82.1	129.6
Group 4	9	HRS	11.7	85.8	-0.7	18.6	64.1	-0.6	16.2	-21.7	65.8	110.3	86.0	128.1
Group 5	10	HRS	12.9	84.3	-0.9	23.0	67.2	-0.7	20.9	-17.1	60.7	104.6	76.7	131.1
Group 5	11	HRS	13	83.9	-0.7	20.9	66.4	-0.3	20.7	-17.6	64.2	105.7	80.5	145.4
Group 6	12	SWS	7.9	88.0	-2.3	21.8	78.6	-1.5	25.8	-9.4	53.0	93.7	69.6	93.8
Group 6	13	SWS	8.2	86.6	-1.9	21.5	69.2	-0.8	21.7	-17.3	52.4	99.6	72.8	82.7
Group 7	14	SWS	9.4	85.7	-2.1	24.7	73.1	-0.7	27.2	-12.6	54.5	100.6	72.1	83.0
Group 7	15	SWS	9.6	86.8	-1.7	20.7	74.4	-0.4	25.0	-12.4	51.6	97.6	67.8	112.3
Group 8	16	SWS	9.6	84.3	-1.5	20.9	71.8	-0.9	22.0	-12.6	49.8	87.2	61.3	58.8
Group 9	17	SWS	9.4	85.7	-2.0	22.6	69.1	-0.7	22.8	-16.6	51.5	98.4	68.5	97.3
Group 9	18	SWS	8.4	87.6	-2.0	21.0	75.6	-1.3	22.6	-12.0	50.5	91.8	65.1	96.8
Group 10	19	SWW	8.7	88.7	-2.2	20.4	74.7	-1.4	21.4	-14.0	54.2	92.4	70.2	79.1
Group 10	20	SWW	9.5	87.1	-2.0	21.8	70.8	-1.0	21.0	-16.3	54.8	104.3	72.2	81.2
Group 11	21	SWW	7.9	88.5	-1.9	18.9	74.9	-1.5	19.8	-13.6	54.3	96.8	69.1	84.2
Group 11	22	SWW	8	88.3	-2.2	20.9	75.6	-1.5	22.8	-12.8	51.3	89.8	66.5	82.3
Group 12	23	SWW	9	87.2	-2.2	23.6	73.0	-1.3	24.8	-14.2	52.2	92.3	65.8	97.9
Group 12	24	SWW	9.1	88.7	-2.2	20.5	78.4	-1.8	25.8	-10.2	53.5	93.9	67.2	99.8
Group 12	25	SWW	8.3	88.3	-2.1	21.3	76.0	-1.7	24.6	-12.3	51.9	92.4	67.0	94.4
Group 13	26	SWW	8.7	86.7	-2.5	24.3	74.8	-1.1	25.9	-11.9	52.7	93.6	70.2	87.0
Group 13	27	SWW	8.5	86.2	-2.3	25.1	73.4	-1.4	26.6	-12.8	50.6	93.5	70.7	93.3
Group 14	28	SWW	10.4	84.7	-1.7	22.7	69.3	-0.4	24.9	-15.5	52.4	93.8	66.3	81.1
Group 14	29	SWW	9.7	86.8	-1.5	19.6	74.4	-0.2	23.0	-12.4	52.8	91.0	68.4	68.7
Group 14	30	SWW	9.7	86.3	-1.8	21.6	74.3	-0.4	23.8	-12.1	53.8	96.0	69.2	85.2
Group 14	31	SWW	9.8	86.6	-1.4	19.9	74.6	-0.1	23.2	-12.0	53.6	92.0	65.6	86.0
Group 15	32	SWW	5.8	88.8	-2.2	19.3	76.1	-0.7	20.7	-12.7	54.5	90.5	68.2	64.7
Group 15	33	SWW	5.8	89.1	-2.4	20.1	76.4	-0.7	20.9	-12.7	55.4	94.0	72.0	63.6
Group 15	34	SWW	6.2	90.0	-3.0	21.4	82.7	-2.5	24.5	-7.3	53.7	97.0	68.0	83.6

- 68 -

Montana State University Wheat Quality Laboratory
Bozeman, Montana

					1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
					Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	100 pup loaf bread	5	Started tacky then improved, had strength	8	Very nice loaf, very good crumb	7	Nice tight cells structure	Preferred experimental,
YELLOWSTONE	ck	HRW	2	100 pup loaf bread	5	Started out nice then got bucky	6	Decent loaf	6	Open cells	despite protein difference
SY TOUCHSTONE		HRW	3	100 pup loaf bread	4	Dough drooped, improved, then got bucky	5	Decent loaf crumb	4	Small loaf volume	High H2O Absorption
WHETSTONE	ck	HRW	4	100 pup loaf bread	4	No stretch on pins, nice punch, strong	6	Darker, side tear	6	few open cells	Preferred Check
WB9200		HRS	5	100 pup loaf bread	6	Balled OK, nice at punch, has strengh	6	Nice Break n Shred	6	Nice interior	
ID1602S		HWS	6	100 pup loaf bread	6	Improved as it developed	7	Interior was very nice	7		Better than check
ID1603S		HRS	7	100 pup loaf bread	6	Improved as it developed, nice @ pan	7	Interior was very nice	7	Nice loaf volume	Better than check
ID1604S		HWS	8	100 pup loaf bread	6	Sl tear @ ball, then improved @ pan	6	Few open cells	7		Better than check
WINCHESTER	ck	HRS	9	100 pup loaf bread	6	Nice dough development	6	Few open cells	6	Nice loaf	Ranking 7,6,8,9
SY3015-8		HRS	10	100 pup loaf bread	7	Very nice dough development	8	Nice	8		Better than check
BULLSEYE	ck	HRS	11	100 pup loaf bread	5	Droop @ pins, nice @ ball, strong @ pan	5		5	OK loaf	

- 69 -

2016 PNW Wheat Quality Council MSU 2016						MIXOGRAPH				BAKE				
Sample #	Variety	Check	Group	Class	FPROT	MTYPE	MTOL	MTIME	MABS	BMTIME	LVOL	BABS	CGS	
1	MT1348		Group 1	HRW	11.3	MH	4	4.8	62.5	7.7	1045	72.2	7	SlStrong
2	Yellowstone	ck	Group 1	HRW	13.0	MH	4	8.9	61.8	14.9	1185	72.5	6	SlSTBucky
3	SY Touchstor		Group 2	HRW	12.3	MH	4	8.0	66.4	16.8	990	79.6	6	Bucky
4	Whetstone	ck	Group 2	HRW	11.8	MH	3	5.4	64.9	7.9	1085	74.6	6	STVeryStrong
5	WB9200		Group 3	HRS	11.1	MH	4	4.3	65.5	6.3	1070	75.2	6	HasStrength
6	ID1602S		Group 4	HWS	10.2	M	2	4.1	63.8	8.3	1010	74.0	7	HasStrength
7	ID1603S		Group 4	HRS	12.5	MH	3	4.0	68.2	7.5	1230	77.9	7	SeePaper
8	ID1604S		Group 4	HWS	12.0	MH	2	3.2	66.1	6.8	1150	75.8	6	STHasStrength
9	UI Wincheste	ck	Group 4	HRS	11.5	MH	3	3.5	64.7	6.8	1135	74.9	6	SlSTHasStrength
10	SY3015-8		Group 5	HRS	12.9	MH	3	4.8	69.4	14.0	1100	78.6	7	SlStrong
11	Bullseye	ck	Group 5	HRS	13.0	MH	4	4.8	69.1	10.8	1170	79.3	4	Strong

- 70 -

Hard Spring and Durum Wheat Quality Laboratory
Fargo, North Dakota

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	**1**	Bread	5	Average dough performance - dough quality deteriorated slightly thru the fermentation process, lower gas retention.	5	Poor color, very yellow. Crumb cells are elongated and even. Texture is slightly coarse	5	Lowest bake absorption of set. Yellow dough color. Overall, average performance.	
YELLOWSTONE	ck	HRW	1	**2**	Bread	6	Good dough performance however dough felt lifeless. Poor dough color-yellow.	6	Elongated and even crumb cells. Soft texture, but slightly damp/sticky to the touch.	6	Good performance but simply does not stand out. Yellow dough and bread color.	
SY TOUCHSTONE		HRW	2	**3**	Bread	8	Very good dough performance - nice elasticity, gas retention and oven spring. Longer mix time. Poor dough color - yellow.	2	Very yellow. Crumb is very irregular with large holes. Soft, but slightly sticky texture. Overall bad.	5	Bread did not reflect dough quality.	
WHETSTONE	ck	HRW	2	**4**	Bread	7	Nice dough performance - nice gas retention and elasticity.	5	Yellow, poor color. Crumb cells are elongated, even and very soft. Would be nice except for color	6	Satisfactory dough and bread performance; poor bread color.	Protein difference between wheat and flour - 2.1%.
WB9200		HRS	3	**5**	Bread	6	Good dough performance. Mix time did not reflect farinograph peak time.	6	Slightly yellow color, very soft texture. Crumb cells are elongated and slightly open.	6	Highest bake absorption of set.	High test weight.
ID1602S		HWS	4	**6**	Bread	5	Average dough performance - dough quality deteriorated slightly thru the fermentation process and had little oven spring.	4	Yellow color. Crumb cells are elongated and open, with thicker cell walls. Soft texture.	4	Flour produces an acceptable loaf, however does have lower loaf volume and poor color.	Low flour protein, highest ash.
ID1603S		HRS	4	**7**	Bread	8	Very good dough quality and performance - nice elasticity, gas retention and feel. Short mix time.	7	Slightly yellow color. Crumb structure is elongated, even, and tight. Good bread	7	Overall nice.	Protein difference between wheat and flour - 2.2%.
ID1604S		HWS	4	**8**	Bread	6	Good dough performance - good elasticity, gas retention and oven spring.	7	Crumb cells are elongated and consistent, with tight cell structure. The texture is very soft. Overall, good bread.	6	Overall good.	
WINCHESTER	ck	HRS	4	**9**	Bread	5	Average dough performance - Dough quality deteriorated slightly thru the fermentation process but still was average.	6	Crumb cells are elongated and closed, and consistent across the slice. Texture is overall soft, slightly coarse in center.	5	Good flour - not quite enough dough strength.	
SY3015-8		HRS	5	**10**	Bread	7	Nice dough quality and performance - nice elasticity, gas retention and feel. Mix time did not reflect farinograph peak time.	5	Yellow color. Crumb cells are elongated overall, with more open cells at the center. Texture was slightly coarser.	6	Bread did not reflect dough quality.	
BULLSEYE	ck	HRS	5	**11**	Bread	8	Very good dough quality and performance - nice elasticity, gas retention and feel.	6	Slightly yellow color. Crumb cells are elongated, closed, and consistent. Intermediate texture.	7	Low stability. End-product did not reflect dough performance.	

- 71 -

USDA-ARS Hard Red Spring and Durum Wheat Quality Laboratory

Sample #	Variety	Check	Group	Class	Bake Absorption (14% mb)	Mix Time	Loaf Volume (cc)	Loaf Weight (g)	Dough Characteristics	Crumb Grain	Crumb Texture	Crumb Color
1	Group 1		1	HRW	59.86	3.25	753	130.0	3	5	4	1
2	Group 1	ck	1	HRW	61.81	4.00	798	130.6	3	5	4	2
3	Group 2		2	HRW	62.54	5.00	900	132.5	4	2	4	1
4	Group 2	ck	2	HRW	62.81	3.25	828	132.8	4	4	5	1
5	Group 3		3	HRS	65.04	2.75	805	134.1	3	4	4	2
6	Group 4		4	HWS	60.22	3.00	778	131.0	3	3	4	1
7	Group 4		4	HRS	61.46	2.50	945	130.4	4	5	5	2
8	Group 4		4	HWS	62.17	2.50	863	129.6	3	5	5	2
9	Group 4	ck	4	HRS	62.62	2.25	820	130.4	3	5	4	2
10	Group 5		5	HRS	61.20	3.00	865	129.2	4	4	4	1
11	Group 5	ck	5	HRS	60.47	2.50	785	130.0	4	5	5	2

Dough characteristics (at mixing & panning): 1 weak, short, or sticky; 3 = strong, elastic; 6 = bucky, tough
Crumb grain: 1 = thick wells; 6 = fine
Crumb texture: 1 = dead; 6 = silky
Crumb Color: 0 unacceptable discoloration, 1 yellow/gray/dull, 2 light yellow/gray/dull, 3 creamy, 4 white/slightly creamy, 5 bright white

- 72 -

Sample	Variety	Class	Wheat Moisture	Wheat Falling Number	Wheat Falling Number (14%)
1	Group 1	HRW	10.1	462	442
2	Group 1	HRW	9.7	540	515
3	Group 2	HRW	8.7	492	465
4	Group 2	HRW	8.7	497	469
5	Group 3	HRS	8.7	392	370
6	Group 4	HWS	9.7	451	430
7	Group 4	HRS	9.3	470	446
8	Group 4	HWS	9.4	373	355
9	Group 4	HRS	9.5	431	410
10	Group 5	HRS	9.6	459	437
11	Group 5	HRS	9.6	399	380
12	Group 6	SWS	10.2	390	374
13	Group 6	SWS	9.9	358	342
14	Group 7	SWS	8.6	320	302
15	Group 7	SWS	8.7	479	453
16	Group 8	SWS	10.7	422	406
17	Group 9	SWS	8.9	398	376
18	Group 9	SWS	10	368	351
19	Group 10	SWW	9.3	399	379
20	Group 10	SWW	8.8	454	429
21	Group 11	SWW	9.9	407	388
22	Group 11	SWW	9.8	356	340
23	Group 12	SWW	9.3	447	425
24	Group 12	SWW	9.2	425	403
25	Group 12	SWW	9.9	354	338
26	Group 13	SWW	9.9	410	392
27	Group 13	SWW	9.8	411	392
28	Group 14	SWW	8.9	404	383
29	Group 14	SWW	8.9	369	349
30	Group 14	SWW	8.8	417	394
31	Group 14	SWW	8.9	410	388
32	Group 15	SWW	9.2	359	341
33	Group 15	SWW	9.4	370	351
34	Group 15	SWW	9.6	363	346

- 73 -

CGAHR, USDA-ARS Hard Winter Wheat Quality Laboratory
Manhattan, Kansas

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	pup bread 16-2451	8.5	Good sl tough dough, good MT and absorption	4.5	Excellent LV, open grain, yellow color	6.0	Lower than ck due to open grain, good dough and LV	Average flour protein, good LV for protein
YELLOWSTONE	ck	HRW	1	2	pup bread 16-2452	7.5	Tough dough, long MT, strong mixograph	7.0	Excellent LV, good grain, sl yellow color	7.5	Strong ck with excellent LV and grain	High flour protein, strong ck
SY TOUCHSTONE		HRW	2	3	pup bread 16-2453	6.0	Very tough dough, long MT, strong mixograph	7.5	Lower LV, nice grain, sl yellow color	6.0	Lower than ck due to strong tough dough resulting in low volume	Good flour protein. Very strong, tight dough which affected expansion in the oven, may be a good blending flour
WHETSTONE	ck	HRW	2	4	pup bread 16-2454	8.0	Sl tough dough, good MT and absorption	7.0	Excellent LV, good grain, sl yellow color	8.0	Nice check	Good flour protein
WB9200		HRS	3	5	pup bread 16-2455	8.0	Sl tough dough, good MT and absorption	7.0	Good grain, creamy color	7.5	Good overall	Average flour protein
ID1602S		HWS	4	6	pup bread 16-2456	7.0	Lower absorption, weak mixograph	8.5	Lower LV, excellent grain, creamy color	8.0	Very nice interior considering weakness of the dough and lower LV	Low flour protein, nice overall for the protein level
ID1603S		HRS	4	7	pup bread 16-2457	7.0	Weak dough, good MT and absorption	6.0	Excellent LV, creamy color	6.5	Lower than the ck, weaker dough and average grain	Good flour protein, high LV
ID1604S		HWS	4	8	pup bread 16-2458	8.0	Nice dough, short MT, weak mixograph	7.0	Good grain, creamy color	7.5	Equal to the ck	Average flour protein, nice dough during punching and panning
WINCHESTER	ck	HRS	4	9	pup bread 16-2459	8.0	Good dough at make up, weak mixograph	7.0	Excellent LV, good grain, creamy color	7.5	Good ck, excellent LV and grain	Average flour protein, high LV
SY3015-8		HRS	5	10	pup bread 16-2460	7.5	Sl tough dough, good absorption, strong mixograph	9.0	Excellent LV, excellent grain, sl yellow color	8.5	Higher than ck, strong dough, excellent LV and grain	High flour protein, very nice overall
BULLSEYE	ck	HRS	5	11	pup bread 16-2461	7.5	Tough dough, good absorption, strong mixograph	8.5	Excellent LV, excellent grain, sl yellow color	8.0	Nice check, strong dough, excellent LV and grain	High flour protein, strong ck

- 74 -

Sample	Sample ID	Flour Protn	Bake Absorp	Bake Absorp	Mix T	Out of Mix		At Make up		Loaf wt	Volume	Grain	Color
		%	%	14%	min	rating	describe	rating	describe	grams	cc	rating	describe
1	16-2451	11.3	64.7	65.4	5.63	8.5	sl tough	8.0	good,sl tough	150.2	970	4.5	yellow
2	16-2452	13.1	65.7	65.8	8.75	8.5	sl tough	7.0	tough	147.4	1090	7.0	sl yellow
3	16-2453	12.4	66.7	66.8	8.63	7.0	tough	5.0	very bucky	150.0	900	7.5	sl yellow
4	16-2454	12.2	65.7	65.7	5.13	7.5	tough	8.0	sl tough	152.6	965	7.0	sl yellow
5	16-2455	11.2	65.7	65.4	4.63	8.0	sl tough	8.0	sl tough	153.3	935	7.0	creamy
6	16-2456	10.4	62.2	62.5	4.75	8.0	sl tough	8.0	sl tough	149.5	920	8.5	creamy
7	16-2457	12.7	65.7	66.2	4.38	7.0	weak	7.0	sl slack	150.8	1090	6.0	creamy
8	16-2458	12	64.2	64.3	3.25	8.5	sl weak	9.0	nice	151.0	945	7.0	creamy
9	16-2459	11.7	64.7	64.9	4.38	7.5	weak	9.0	good	149.0	1005	7.0	creamy
10	16-2460	13	66.2	66.1	5.63	7.0	weak	8.0	sl tough	152.1	1005	9.0	sl yellow
11	16-2461	13.1	64.7	65.6	5.38	8.0	sl tough	7.0	bucky	151.4	1040	8.5	sl yellow

- 75 -

Reports from USDA-ARS-HWWQL in Manhattan, KS

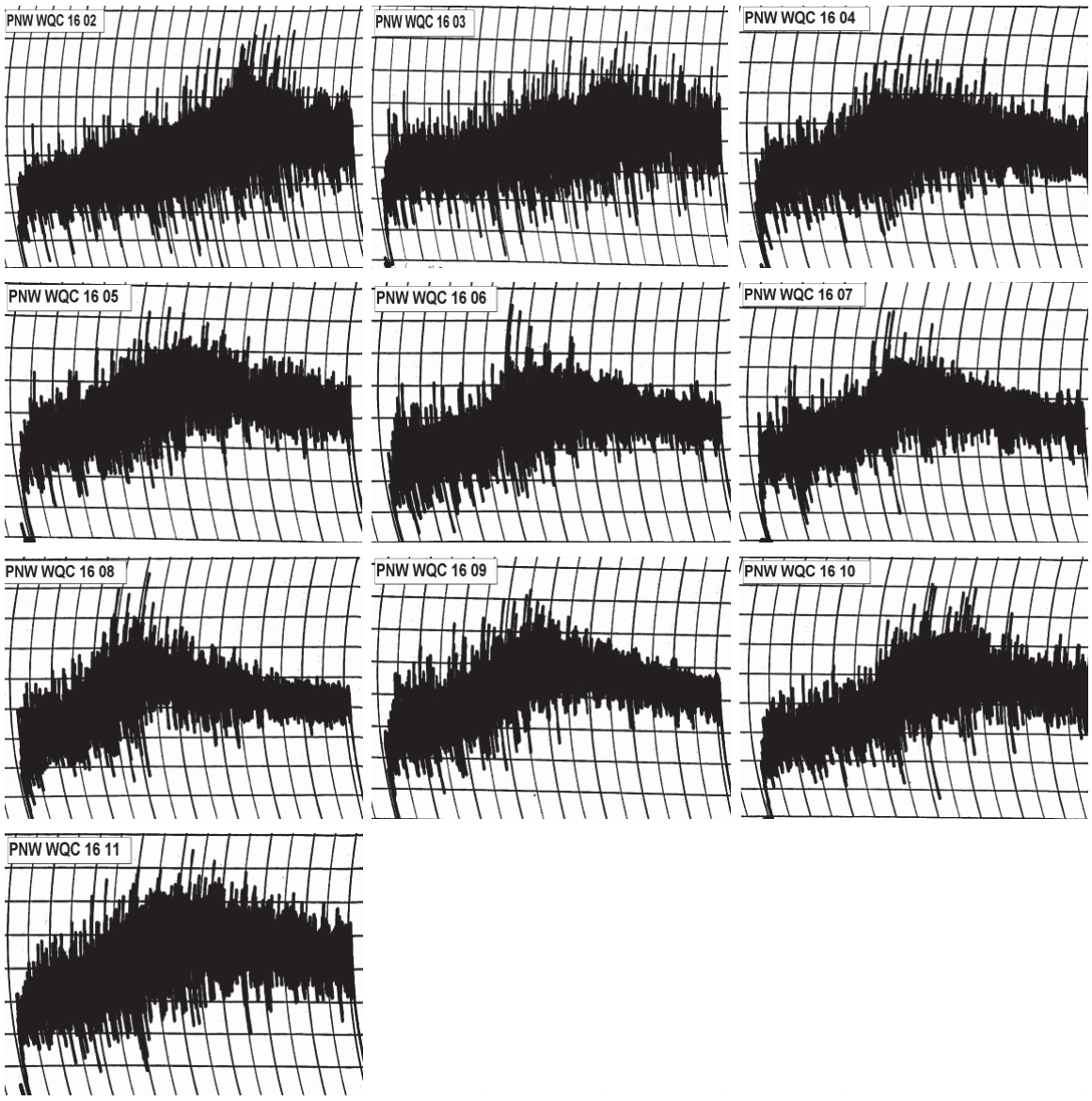
1. Mixograph Data

MIXOGRAPH DATA of 2016 PNW WQC SAMPLES

HWWQL_ID	PNW_ID	FLR-MC	FLR-PC (14%MC)	FLR-ABS (as is)	FLR-ABS (14%MC)	MIX-TM	MIX-TOL
16-0002451	PNW WQC 16 01	14.6	11.3	62.0	62.7	4.1	4
16-0002452	PNW WQC 16 02	14.1	13.1	64.6	64.7	7.0	6
16-0002453	PNW WQC 16 03	14.1	12.4	64.6	64.7	7.0	5
16-0002454	PNW WQC 16 04	14.0	12.2	64.4	64.4	4.1	4
16-0002455	PNW WQC 16 05	13.8	11.2	66.3	66.0	4.1	4
16-0002456	PNW WQC 16 06	14.3	10.4	61.4	61.7	3.6	2
16-0002457	PNW WQC 16 07	14.4	12.7	64.7	65.2	3.5	3
16-0002458	PNW WQC 16 08	14.1	12.0	63.8	63.9	3.1	2
16-0002459	PNW WQC 16 09	14.2	11.7	64.7	64.9	3.6	2
16-0002460	PNW WQC 16 10	13.9	13.0	65.6	65.5	4.9	5
16-0002461	PNW WQC 16 11	14.8	13.1	64.9	65.8	4.9	5

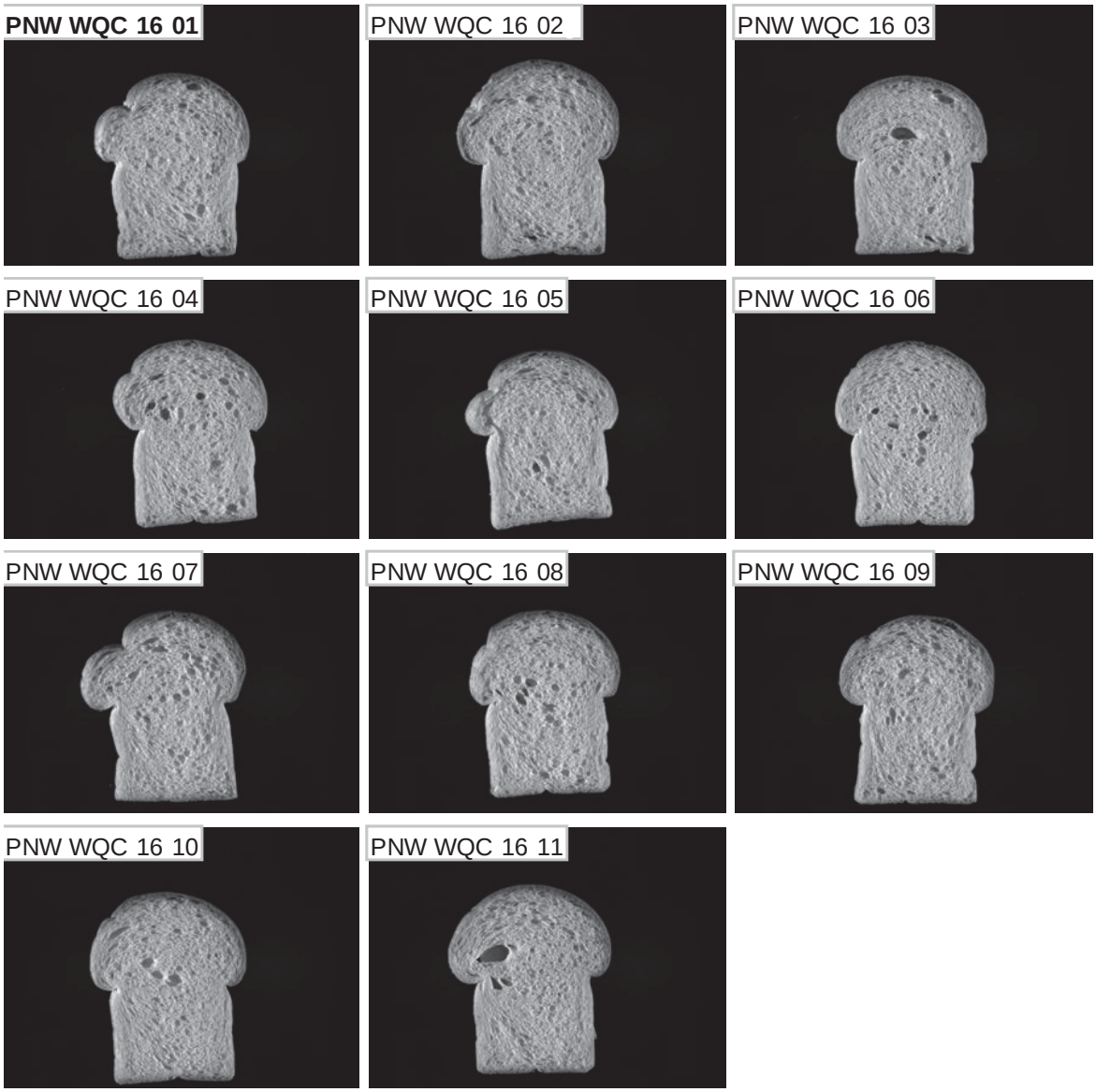
- 76 -

2. Mixograms



- 77 -

3. C-Cells Images



- 78 -

USDA-ARS Eastern Soft Wheat Quality Laboratory
Wooster, Ohio

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comm
RYAN		SWS	6	12	Sugar Snap Cookies	7		4	Small cookie diameter	6	Low grain & flour ash	
WHIT	ck	SWS	6	13	Sugar Snap Cookies	6	Wet & sticky dough	6		6		
SILK		SWS	7	14	Sugar Snap Cookies	6	Stiff dough	4	Small cookie diameter	4		High water & sucrose SRC
LOUISE	ck	SWS	7	15	Sugar Snap Cookies	6	Stiff dough	5	Poor top grain	5		High lactic acid & sucrose SRC
WB6430		SWS	8	16	Sugar Snap Cookies	8	Excellent dough consistency	6		8	Excellent SRC profile	Extremely low lactic acid SRC
ID1403S		SWS	9	17	Sugar Snap Cookies	8	Excellent dough consistency	6		7		
STONE	ck	SWS	9	18	Sugar Snap Cookies	7		6		7		
SPARROW		SWW	10	19	Sugar Snap Cookies	5	Gritty dough feel	5		4	Low break flour; high SKCS hardness	High water & sodium carb SRC
STEPHENS	ck	SWW	10	20	Sugar Snap Cookies	6	Stiff dough	4	Small cookie; Poor top grain	3		High sucrose SRC
WA8232		SWW	11	21	Sugar Snap Cookies	7		5		5	Low SKCS hardness	Low protein
JASPER	ck	SWW	11	22	Sugar Snap Cookies	8	Excellent dough consistency	8	Large cookie diameter	8		Low protein
CASTLE		SWW	12	23	Sugar Snap Cookies	7		5		4	Low break flour yield	
MAGIC		SWW	12	24	Sugar Snap Cookies	8	Excellent dough consistency	4	Small cookie diameter	4	Low break flour yield	
B96	ck	SWW	12	25	Sugar Snap Cookies	7		6		7	Low flour ash	Low protein
OR20101043		SWW	13	26	Sugar Snap Cookies	8	Excellent dough consistency	6		6	High break flour	
KASEBERG	ck	SWW	13	27	Sugar Snap Cookies	8	Excellent dough consistency	5		5	High break flour; low SKCS hardness	
09PN046#16		SWW	14	28	Sugar Snap Cookies	6	Stiff dough	5		5		High protein
09PN046#16		SWW	14	29	Sugar Snap Cookies	6	Stiff dough	4	Small cookie diameter	4		High protein & low lactic acid
09PN062#18		SWW	14	30	Sugar Snap Cookies	5	Stiff & slightly dry dough	3	Small cookie diameter	3		High protein
SY OVATION	ck	SWW	14	31	Sugar Snap Cookies	6	Stiff dough	4	Small cookie diameter	4		High protein
04PN066-7		SWW	15	32	Sugar Snap Cookies	6	Wet & sticky dough	5		5	High flour ash	Low protein
09PN005#25		SWW	15	33	Sugar Snap Cookies	6	Stiff dough	4	Small cookie diameter	3	High flour ash	Low protein; high water & SC SRC
ELTAN	ck	SWW	15	34	Sugar Snap Cookies	6	Stiff dough	5		5		Low protein

- 79 -

Pacific Northwest Wheat Quality Council, 2016 Harvest

Evaluation by the Soft Wheat Quality Laboratory-USDA ARS, Wooster OH

			Primary Flour Analysis			Solvent Retention Capacity				Rapid Visco-Analyzer								Sugar-snap cookie	
Sample No.	Variety	Class	Flour moisture	Flour protein	Flour Ash	Water	Sodium carbonate	Sucrose	Lactic acid	Peak 1	Trough 1	Breakdown	Final Visc	Setback	Peak Time	Pasting Temp.	Peak/ Final	Diameter	Top Grain
			%	14%	%	%	%	%	%	cP	cP	cP	cP	cP	(min)	℃	Ratio	cm	
12	Group 6	SWS	13.37	8.25	0.368	59.7	75.5	89.5	98.8	3136	1763	1373	3134	1371	6.00	82.8	1.00	8.7	4
13	Group 6	SWS	12.94	8.35	0.427	58.2	78.7	93.8	88.4	3194	1669	1525	2903	1235	6.00	68.2	1.10	8.9	5
14	Group 7	SWS	12.82	9.56	0.428	60.6	76.0	94.2	87.5	2423	1120	1303	2102	982	5.77	67.3	1.15	8.6	5
15	Group 7	SWS	12.91	9.85	0.394	56.7	76.6	93.2	115.3	2048	1734	314	3369	1636	6.20	84.7	0.61	8.8	3
16	Group 8	SWS	13.57	9.77	0.471	53.5	66.8	82.7	62.4	2326	1438	888	2854	1416	5.87	84.4	0.81	9.0	6
17	Group 9	SWS	13.31	9.60	0.381	57.4	73.2	90.6	102.8	2899	1779	1121	3389	1610	5.93	84.0	0.86	9.0	5
18	Group 9	SWS	13.39	8.45	0.445	55.4	70.9	86.8	101.0	2550	1488	1063	2938	1450	5.87	84.0	0.87	9.0	4
19	Group 10	SWW	13.16	9.01	0.443	60.8	78.2	88.3	85.4	2151	1647	504	3354	1707	5.97	85.6	0.64	8.8	4
20	Group 10	SWW	12.94	9.67	0.420	60.3	73.7	97.3	85.8	2718	1765	953	3229	1464	6.13	85.6	0.84	8.6	3
21	Group 11	SWW	13.78	8.21	0.400	57.9	75.7	89.9	92.0	2368	1635	733	3078	1443	6.07	86.0	0.77	8.8	3
22	Group 11	SWW	13.39	8.21	0.423	57.4	73.4	84.8	89.2	2015	1355	660	2738	1383	5.80	83.1	0.74	9.3	5
23	Group 12	SWW	13.20	9.24	0.420	59.4	73.3	88.2	101.9	2498	1716	782	3077	1362	6.17	85.6	0.81	8.7	4
24	Group 12	SWW	13.31	9.39	0.423	58.7	73.8	89.7	104.5	2550	1707	843	2996	1289	6.17	86.3	0.85	8.6	4
25	Group 12	SWW	13.23	8.70	0.356	56.7	74.2	87.5	98.8	2214	1457	757	2850	1393	5.90	84.8	0.78	8.9	4
26	Group 13	SWW	13.51	8.96	0.400	56.4	73.9	87.3	95.2	2716	1687	1029	3014	1328	6.07	80.7	0.90	9.0	4
27	Group 13	SWW	13.24	8.83	0.427	56.1	76.9	88.0	101.0	2951	1783	1169	3237	1455	5.90	71.8	0.91	8.8	4
28	Group 14	SWW	13.04	10.69	0.380	59.6	72.7	89.9	84.0	2494	1581	913	2853	1272	6.03	84.8	0.87	8.8	5
29	Group 14	SWW	13.06	9.86	0.409	59.9	72.2	87.6	74.7	2027	1252	775	2350	1099	5.97	85.2	0.86	8.6	4
30	Group 14	SWW	13.13	10.02	0.410	59.2	74.3	91.7	89.5	2561	1708	854	3125	1417	6.13	85.1	0.82	8.5	4
31	Group 14	SWW	13.69	10.14	0.406	58.2	71.4	88.8	94.5	2654	1755	900	3190	1436	6.17	84.8	0.83	8.7	4
32	Group 15	SWW	13.37	5.93	0.463	58.4	74.5	85.6	71.8	1838	1220	618	2474	1254	5.87	86.8	0.74	8.8	6
33	Group 15	SWW	13.12	6.14	0.497	61.3	78.9	89.5	69.9	2306	1392	914	2703	1311	5.90	85.1	0.85	8.6	6
34	Group 15	SWW	13.06	6.36	0.406	58.7	75.1	89.6	91.5	2674	1580	1094	2943	1363	5.97	84.0	0.91	8.8	6

- 80 -

Wheat Marketing Center
Portland, Oregon

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	Pup loaf/Raw noodle	6	Good dough	5	Less volume&score/Equivalent noodle	5		2.7% lower wheat protein
YELLOWSTONE	ck	HRW	1	2	Pup loaf/Raw noodle	6	Good dough	6		6		
SY TOUCHSTONE		HRW	2	3	Pup loaf/Raw noodle	7	Slightly bucky dough	5	More volume&score/Better noodle color	6		
WHETSTONE	ck	HRW	2	4	Pup loaf/Raw noodle	6	Good dough	4		5		
WB9200		HRS	3	5	Pup loaf/Raw noodle	5	Slightly slack dough	4	Ok pup/Bad noodle texture	4		
ID1602S		HWS	4	6	Pup loaf/Raw noodle	4	Slack dough	4	Less volume/Bad noodle texture	4		
ID1603S		HRS	4	7	Pup loaf/Raw noodle	6	Good dough	7	More volume&score/Better noodle color&texture	7		2.7% higher wheat protein
ID1604S		HWS	4	8	Pup loaf/Raw noodle	6	Good dough	6	Better noodle color	6		1.2% higher wheat protein
WINCHESTER	ck	HRS	4	9	Pup loaf/Raw noodle	5	Slightly slack dough	5		5		
SY3015-8		HRS	5	10	Pup loaf/Raw noodle	6	Good dough	6	Equivalent to check	6		
BULLSEYE	ck	HRS	5	11	Pup loaf/Raw noodle	6	Good dough	6		6		
SYAN		SWS	6	12	Sponge cake	6		6	Better crumb grain	6		
WHIT	ck	SWS	6	13	Sponge cake	6		4		5		
SILK		SWS	7	14	Sponge cake	6		4	Less volume, Worse shape & crumb	5		
LOUISE	ck	SWS	7	15	Sponge cake	6		8		7		
WB6430		SWS	8	16	Sponge cake	6		4	Hard texture	5		1.5% higher wheat protein
ID1403S		SWS	9	17	Sponge cake	6		7	Large volume, Soft texture	7		1.5% higher wheat protein
STONE	ck	SWS	9	18	Sponge cake	6		6		6		
SPARROW		SWW	10	19	Sponge cake	6		4	Small volume, Hard texture	5		1.0% lower wheat protein
STEPHENS	ck	SWW	10	20	Sponge cake	6		7		7		
WA8232		SWW	11	21	Sponge cake	6		7	Better shape	7		1.1% higher wheat protein
JASPER	ck	SWW	11	22	Sponge cake	6		6		6		
CASTLE		SWW	12	23	Sponge cake	6		5	Small volume, Soft texture	5		
MAGIC		SWW	12	24	Sponge cake	6		6	Almost equivalent to check	6		
B96	ck	SWW	12	25	Sponge cake	6		7		7		
OR2101043		SWW	13	26	Sponge cake	6		6	Equivalent to check	6		
KASEBERG	ck	SWW	13	27	Sponge cake	6		6		6		
SY ASSURE		SWW	14	28	Sponge cake	6		4	Hard texture	5		
09PN046#16		SWW	14	29	Sponge cake	6		5	Worse shape	5		1.1% lower wheat protein
09PN062#18		SWW	14	30	Sponge cake	6		5	Slightly hard texture	5		
SY OVATION	ck	SWW	14	31	Sponge cake	6		6		6		
04PN066-7		SWW	15	32	Sponge cake	6		8	Better shape	7		
09PN005#25		SWW	15	33	Sponge cake	6		5	Less volume, hard texture	5		
ELTAN	ck	SWW	15	34	Sponge cake	6		7		7		

- 81 -

USDA-ARS Western Wheat Quality Laboratory
Pullman, Washington

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
MT1348		HRW	1	1	Bread	7	good balance of strength & extens.	7	good grain	7		
YELLOWSTONE	ck	HRW	1	2	Bread	8	good balance of strength & extens.	7	good grain	8	better dough	
SY TOUCHSTONE		HRW	2	3	Bread	6	bucky	3		4		very strong good for blend
WHETSTONE	ck	HRW	2	4	Bread	6	good dough feel	5		6	better balance of str. & volume	
WB9200		HRS	3	5	Bread	6	good dough feel	6		6	solid performance	
ID1602S		HWS	4	6	Bread	6	good balance of strength & extens.	5	needs more protein	7	perform well for low prot	very good dough feel
ID1603S		HRS	4	7	Bread	7	good balance of strength & extens.	8		7		very good dough feel
ID1604S		HWS	4	8	Bread	5		6		5	low mix time	
WINCHESTER	ck	HRS	4	9	Bread	5		6		6		
SY3015-8		HRS	5	10	Bread	7	good balance of strength & extens.	6	better grain	6		very good dough feel
BULLSEYE	ck	HRS	5	11	Bread	7	good balance of strength & extens.	5		6		excellent dough feel
RYAN		SWS	6	12	Cookie	7		6		6		
WHIT	ck	SWS	6	13	Cookie	9	silky, not sticky	6		6		
SILK		SWS	7	14	Cookie	9	silky, not sticky	5		5		better cake than cookie
LOUISE	ck	SWS	7	15	Cookie	9	silky, not sticky	6		6		better cake than cookie
WB6430		SWS	8	16	Cookie	9		8		7		good SRC profile
ID1403S		SWS	9	17	Cookie	6		7		7		
STONE	ck	SWS	9	18	Cookie	8		7		7		
SPARROW		SWW	10	19	Cookie	6		7		6	coarser crumb grain in cake	
STEPHENS	ck	SWW	10	20	Cookie	5		5		6		
WA8232		SWW	11	21	Cookie	7		6		6		
JASPER	ck	SWW	11	22	Cookie	6		8	great cookie	8	much better overall	
CASTLE		SWW	12	23	Cookie	7		5		6		
MAGIC		SWW	12	24	Cookie	8		5		8		
B96	ck	SWW	12	25	Cookie	9		7		8		
OR20101043		SWW	13	26	Cookie	8		7		7		
KASEBERG	ck	SWW	13	27	Cookie	7		6		7		
SY ASSURE		SWW	14	28	Cookie	7		6		6		
09PN046#16		SWW	14	29	Cookie	6		5		5		
09PN062#18		SWW	14	30	Cookie	6		5		5		
SY OVATION	ck	SWW	14	31	Cookie	6		5		5		
04PN066-7		SWW	15	32	Cookie	7		7		7		
09PN00#25		SWW	15	33	Cookie	7		5		6		
ELTAN	ck	SWW	15	34	Cookie	7		8		8		

- 82 -

						1 poor 9 excellent		1 poor 9 excellent		1 poor 9 excellent		
						Question #1		Question #2		Question #3		Question #4
Variety	Check	Class	Group	Sample#	Product	Dough/Batter Rating	Liked/Disliked Comments	End-Product Performance	Liked/Disliked Comments	Overall Acceptability	Liked/Disliked Comments	Mitigating Physical/Chemical Properties & Comments
RYAN		SWS	6	12	Sponge Cake	8	light & stiff	6				
WHIT	ck	SWS	6	13	Sponge Cake	8		6				
SILK		SWS	7	14	Sponge Cake	9	light, puffy & stiff	6				
LOUISE	ck	SWS	7	15	Sponge Cake	8		7	Better grain & vol			
WB6430		SWS	8	16	Sponge Cake	7	streaky, sl runny	6				
ID1403S		SWS	9	17	Sponge Cake	9		8				
STONE	ck	SWS	9	18	Sponge Cake	7		7				
SPARROW		SWW	10	19	Sponge Cake	7		6				
STEPHENS	ck	SWW	10	20	Sponge Cake	9		6				
WA8232		SWW	11	21	Sponge Cake	7		6				
JASPER	ck	SWW	11	22	Sponge Cake	6	runny	7				
CASTLE		SWW	12	23	Sponge Cake	7		7				
MAGIC		SWW	12	24	Sponge Cake	8		6				
B96	ck	SWW	12	25	Sponge Cake	8		8				
OR20101043		SWW	13	26	Sponge Cake	8		7				
KASEBERG	ck	SWW	13	27	Sponge Cake	7		5				
SY ASSURE		SWW	14	28	Sponge Cake	9		6				
09PN046#16		SWW	14	29	Sponge Cake	9		6				
09PN062#18		SWW	14	30	Sponge Cake	9		6				
SY OVATION	ck	SWW	14	31	Sponge Cake	8		6				
04PN066-7		SWW	15	32	Sponge Cake	4	runny, shapeless	7				
09PN00#25		SWW	15	33	Sponge Cake	7		6				
ELTAN	ck	SWW	15	34	Sponge Cake	6	runny	8				

- 83 -

						Falling		Single Kernel					
Sample	Variety	Group	Location	Class	Test Wt	Number	Hardness	SD	Weight	SD	Size	SD
1	**MT1348**	**1**	**Bozeman**	**HRW**	62.0	473	76.6	14.3	29.7	6.8	2.2	0.4
2	**YELLOWSTONE**	**1**	**Bozeman**	**HRW**	59.2	573	73.6	13.6	29.0	6.6	2.1	0.4
3	**SY TOUCHSTONE**	**2**	**Walla Walla/Cheney**	**HRW**	63.3	412	74.5	12.8	34.4	8.2	2.4	0.5
4	**WHETSTONE**	**2**	**Walla Walla/Cheney**	**HRW**	63.4	475	78.2	17.4	31.0	8.6	2.3	0.4
5	**WB9200**	**3**	**Napa**	**HRS**	65.3	417	84.9	15.6	35.8	7.4	2.5	0.5
6	**ID1602S**	**4**	**Aberdeen**	**HWS**	63.8	414	66.3	14.6	41.2	9.6	2.7	0.5
7	**ID1603S**	**4**	**Aberdeen**	**HRS**	62.9	408	74.6	12.9	33.8	7.2	2.3	0.4
8	**ID1604S**	**4**	**Aberdeen**	**HWS**	63.9	343	69.9	15.7	42.2	7.7	2.7	0.5
9	**WINCHESTER**	**4**	**Aberdeen**	**HRS**	64.1	385	73.4	16.4	42.3	10.2	2.7	0.5
10	**SY3015-8**	**5**	**Three Forks/Cheney/WW**	**HRS**	62.9	443	65.0	16.1	32.6	8.7	2.2	0.4
11	**BULLSEYE**	**5**	**Three Forks/Cheney/WW**	**HRS**	63.8	366	75.5	20.0	32.0	9.9	2.3	0.5
12	**RYAN**	**6**	**Pullman**	**SWS**	62.3	400	28.7	14.8	38.7	9.6	2.3	0.4
13	**WHIT**	**6**	**Pullman**	**SWS**	60.5	362	20.4	16.1	35.8	8.6	2.3	0.4
14	**SILK**	**7**	**Walla Walla**	**SWS**	62.4	332	37.8	16.9	33.9	9.2	2.2	0.5
15	**LOUISE**	**7**	**Walla Walla**	**SWS**	62.9	519	16.5	16.5	39.5	11.1	2.4	0.5
16	**WB6430**	**8**	**Warden**	**SWS**	62.2	388	31.8	12.4	36.6	6.8	2.5	0.4
17	**ID1403S**	**9**	**Aberdeen**	**SWS**	62.5	362	31.6	14.5	38.7	7.6	2.4	0.4
18	**STONE**	**9**	**Aberdeen**	**SWS**	63.0	332	32.5	15.4	35.9	8.9	2.4	0.4
19	**SPARROW**	**10**	**Aberdeen**	**SWW**	62.5	371	45.4	14.2	41.8	9.3	2.5	0.5
20	**STEPHENS**	**10**	**Aberdeen**	**SWW**	62.3	379	40.3	15.0	40.6	10.5	2.6	0.5
21	**WA8232**	**11**	**Pullman**	**SWW**	62.7	390	32.3	13.4	49.4	9.9	2.8	0.5
22	**JASPER**	**11**	**Pullman**	**SWW**	61.3	331	8.7	15.9	48.8	11.3	2.7	0.6
23	**CASTLE**	**12**	**Moscow**	**SWW**	63.4	474	41.5	13.6	35.5	7.2	2.3	0.4
24	**MAGIC**	**12**	**Moscow**	**SWW**	64.1	447	41.0	13.3	41.3	9.7	2.6	0.5
25	**B96**	**12**	**Moscow**	**SWW**	62.8	327	30.9	14.7	38.7	8.6	2.4	0.4
26	**OR2101043**	**13**	**Pendleton**	**SWW**	62.6	388	26.7	14.7	37.1	8.6	2.4	0.5
27	**KASEBERG**	**13**	**Pendleton**	**SWW**	61.0	375	14.2	14.5	31.3	6.9	2.1	0.4
28	**SY ASSURE**	**14**	**Walla Walla**	**SWW**	63.0	422	33.2	14.4	41.9	9.0	2.5	0.5
29	**09PN046#16**	**14**	**Walla Walla**	**SWW**	61.9	367	36.9	12.4	43.8	8.6	2.4	0.5
30	**09PN062#18**	**14**	**Walla Walla**	**SWW**	62.5	418	39.2	13.1	39.7	7.7	2.4	0.5
31	**SY OVATION**	**14**	**Walla Walla**	**SWW**	62.7	382	30.6	12.1	49.4	9.2	2.6	0.5
32	**04PN066-7**	**15**	**Moses Lake**	**SWW**	59.6	338	23.4	13.6	41.3	11.0	2.4	0.6
33	**09PN005#25**	**15**	**Moses Lake**	**SWW**	59.9	353	24.7	18.8	51.8	14.7	2.9	0.8
34	**ELTAN**	**15**	**Moses Lake**	**SWW**	61.0	342	18.1	13.3	39.1	9.0	2.3	0.5

- 84 -

			L-DOPA	Wheat	Break	Patent		Whole		
Sample	Variety	Group	Color	Protein	Flour Yld	Flour Yld	Flour Yld	Wheat Ash	Flour Ash	Flour Protein
1	**MT1348**	**1**	0.533	12.4	21.6	58.5	70.0	1.23	0.34	11.1
2	**YELLOWSTONE**	**1**	1.057	14.3	21.0	57.0	70.6	1.32	0.42	13.0
3	**SY TOUCHSTONE**	**2**	0.691	13.3	19.8	56.6	71.2	1.29	0.36	12.2
4	**WHETSTONE**	**2**	1.227	13.5	21.0	57.9	71.7	1.20	0.32	11.9
5	**WB9200**	**3**	1.069	12.0	17.4	52.1	71.5	1.48	0.39	11.2
6	**ID1602S**	**4**	0.700	11.8	18.7	57.2	72.1	1.42	0.44	10.5
7	**ID1603S**	**4**	1.043	14.3	17.4	54.3	71.7	1.39	0.37	12.7
8	**ID1604S**	**4**	0.591	12.9	16.7	53.4	71.6	1.44	0.40	12.0
9	**WINCHESTER**	**4**	1.176	13.2	16.4	56.6	73.5	1.30	0.43	11.7
10	**SY3015-8**	**5**	1.048	14.0	19.2	56.7	71.2	1.46	0.43	12.9
11	**BULLSEYE**	**5**	1.515	14.6	18.6	57.9	73.3	1.31	0.40	13.1
12	**RYAN**	**6**	0.714	9.3	25.2	66.0	75.4	0.97	0.33	7.9
13	**WHIT**	**6**	1.355	10.1	24.3	63.4	74.5	1.23	0.39	8.2
14	**SILK**	**7**	1.186	11.0	24.9	62.9	74.4	1.23	0.39	9.4
15	**LOUISE**	**7**	1.300	11.4	28.5	67.7	75.9	1.23	0.36	9.6
16	**WB6430**	**8**	0.415	11.4	27.8	67.0	76.6	1.49	0.42	9.6
17	**ID1403S**	**9**	1.036	11.2	25.6	64.6	74.1	1.38	0.34	9.4
18	**STONE**	**9**	0.614	9.9	26.2	66.7	75.9	1.23	0.41	8.4
19	**SPARROW**	**10**	0.752	10.3	22.7	66.7	77.4	1.34	0.41	8.7
20	**STEPHENS**	**10**	1.107	11.3	23.6	61.2	72.8	1.36	0.39	9.5
21	**WA8232**	**11**	0.818	10.4	23.2	60.1	73.6	1.32	0.37	7.9
22	**JASPER**	**11**	0.942	9.5	26.0	67.5	78.0	1.13	0.39	8.0
23	**CASTLE**	**12**	1.061	10.6	19.9	68.1	77.9	1.30	0.36	9.0
24	**MAGIC**	**12**	0.838	10.8	18.4	61.4	73.6	1.57	0.38	9.1
25	**B96**	**12**	0.906	10.2	22.5	64.7	76.5	1.13	0.32	8.3
26	**OR2101043**	**13**	1.151	9.9	26.8	70.5	79.9	1.04	0.39	8.7
27	**KASEBERG**	**13**	0.935	10.6	22.8	66.4	75.8	1.18	0.40	8.5
28	**SY ASSURE**	**14**	1.090	11.7	23.9	68.3	77.8	1.05	0.37	10.4
29	**09PN046#16**	**14**	1.139	11.3	21.1	68.2	78.6	1.27	0.38	9.7
30	**09PN062#18**	**14**	1.175	11.9	22.9	68.4	78.6	1.30	0.39	9.7
31	**SY OVATION**	**14**	1.168	12.5	22.7	68.2	78.5	1.39	0.41	9.8
32	**04PN066-7**	**15**	1.532	7.0	26.5	64.4	75.3	1.75	0.44	5.8
33	**09PN005#25**	**15**	1.030	7.2	23.6	63.1	76.2	1.53	0.50	5.8
34	**ELTAN**	**15**	0.657	7.4	27.2	63.1	74.8	1.37	0.38	6.2

- 85 -

			Solvent Retention Capacity				Flour	Flour Swelling		Flour Falling
Sample	Variety	Group	%CARB	%LACTIC	%WATER	%SUCROSE	SDS	Volume	RVA	Number
1	**MT1348**	**1**	80.5	142.6	63.9	102.0	17.9	21.1	182	480
2	**YELLOWSTONE**	**1**	78.5	152.0	65.5	101.3	20.9	16.6	190	515
3	**SY TOUCHSTONE**	**2**	80.0	167.8	66.4	103.5	24.5	16.4	208	398
4	**WHETSTONE**	**2**	82.3	158.9	66.9	103.0	18.3	17.2	175	457
5	**WB9200**	**3**	89.2	143.5	70.3	112.8	18.3	19.9	248	428
6	**ID1602S**	**4**	91.7	133.2	63.6	105.0	20.9	17.5	203	459
7	**ID1603S**	**4**	85.3	158.8	67.1	119.5	22.3	17.2	190	377
8	**ID1604S**	**4**	82.0	141.0	65.9	108.9	20.3	17.6	153	377
9	**WINCHESTER**	**4**	85.6	132.7	73.7	109.2	22.5	18.4	205	478
10	**SY3015-8**	**5**	76.4	138.3	63.2	104.2	21.2	16.6	139	418
11	**BULLSEYE**	**5**	78.5	151.9	64.5	101.6	23.1	15.8	103	440
12	**RYAN**	**6**	70.0	98.6	55.9	94.5	9.2	21.9	210	377
13	**WHIT**	**6**	71.0	87.8	55.4	98.5	6.0	23.0	213	374
14	**SILK**	**7**	71.5	87.1	57.0	100.5	7.4	21.3	148	341
15	**LOUISE**	**7**	69.7	123.4	55.3	96.7	12.6	18.9	118	409
16	**WB6430**	**8**	62.9	64.1	53.0	88.8	6.0	16.4	134	358
17	**ID1403S**	**9**	68.6	106.0	54.2	96.2	10.6	18.4	180	349
18	**STONE**	**9**	67.4	103.8	53.3	92.4	9.7	17.8	143	335
19	**SPARROW**	**10**	72.2	86.1	57.2	94.0	6.0	17.6	114	376
20	**STEPHENS**	**10**	71.5	88.4	56.0	105.3	6.4	19.5	169	369
21	**WA8232**	**11**	71.7	87.7	54.5	96.3	5.7	19.6	136	385
22	**JASPER**	**11**	67.4	90.8	53.0	91.0	4.8	18.9	105	345
23	**CASTLE**	**12**	67.7	105.1	55.3	96.0	10.6	18.9	171	381
24	**MAGIC**	**12**	67.3	107.9	54.9	94.2	10.8	18.9	154	381
25	**B96**	**12**	69.0	94.7	53.7	92.6	7.9	19.8	139	342
26	**OR2101043**	**13**	68.7	95.9	53.8	95.7	8.6	21.4	190	372
27	**KASEBERG**	**13**	69.6	107.3	52.1	94.4	9.3	21.4	182	375
28	**SY ASSURE**	**14**	66.5	81.3	54.7	94.4	7.4	18.6	158	366
29	**09PN046#16**	**14**	69.0	69.8	55.6	94.1	6.0	17.5	122	356
30	**09PN062#18**	**14**	70.4	92.7	57.8	98.6	8.7	18.2	172	406
31	**SY OVATION**	**14**	67.6	90.3	56.0	94.2	9.2	18.4	175	391
32	**04PN066-7**	**15**	71.4	67.1	55.7	93.3	3.5	21.6	105	339
33	**09PN005#25**	**15**	73.8	66.8	56.6	97.3	4.1	21.6	137	343
34	**ELTAN**	**15**	69.3	87.1	54.4	97.4	5.5	22.0	164	354

- 86 -

						Mixograph			Farinograph			
Sample	Variety	Group	Absorption	Type	Time	Height	Work	Width +2min	Absorption	Peak	Stability	MTI
1	**MT1348**	**1**	59.3	5H	5.0	55.0	234.1	12.3	59.7	30.2	34.8	7
2	**YELLOWSTONE**	**1**	62.3	6H	6.3	59.9	293.7	20.6	61.3	27.9	29.9	4
3	**SY TOUCHSTONE**	**2**	62.2	6H	6.3	53.6	281.6	18.7	61.7	35.2	37.7	0
4	**WHETSTONE**	**2**	60.5	5H	4.0	58.7	193.6	16.3	62.8	20.9	26.7	10
5	**WB9200**	**3**	61.7	4H	3.7	62.4	185.6	15.6	65.6	23.9	28.7	6
6	**ID1602S**	**4**	60.6	5M	4.3	54.5	193.7	13.2	59.5	7.8	23.7	10
7	**ID1603S**	**4**	62.3	4H	3.7	57.8	171.3	18.1	62.1	12.4	20.2	12
8	**ID1604S**	**4**	61.8	3H	3.1	62.2	153.5	11.2	62.7	6.8	15.8	8
9	**WINCHESTER**	**4**	61.8	3H	3.5	62.6	176.8	15.8	62.4	8.2	12.2	22
10	**SY3015-8**	**5**	63.7	4H	3.3	63.4	163.1	18.8	62.3	20.2	34.0	3
11	**BULLSEYE**	**5**	63.9	4H	3.7	58.4	169.0	17.9	61.0	10.8	29.7	21
12	**RYAN**	**6**	55.8	3M	3.2	46.8	133.8	7.8	53.8	2.8	5.2	51
13	**WHIT**	**6**	55.2	2M	1.7	45.0	66.0	3.3	50.4	1.5	1.4	116
14	**SILK**	**7**	56.6	1M	1.6	47.1	64.6	3.1	54.6	1.9	1.4	122
15	**LOUISE**	**7**	56.0	6M	4.4	44.4	174.1	9.8	51.0	4.0	7.8	34
16	**WB6430**	**8**	51.8	1M	1.8	45.5	69.8	2.5	50.1	1.4	1.6	137
17	**ID1403S**	**9**	54.4	2M	1.9	51.0	86.7	5.2	55.2	2.0	3.0	94
18	**STONE**	**9**	53.3	3M	3.1	49.1	137.4	6.1	50.4	2.2	4.0	57
19	**SPARROW**	**10**	55.8	3M	2.0	49.0	88.5	3.6	56.1	1.2	1.5	105
20	**STEPHENS**	**10**	55.6	1M	1.6	49.7	67.1	3.2	55.3	2.0	2.2	0
21	**WA8232**	**11**	55.3	2M	2.3	48.9	96.9	3.3	53.1	1.7	2.6	75
22	**JASPER**	**11**	54.8	3M	2.4	47.9	98.9	3.2	52.9	1.0	1.9	90
23	**CASTLE**	**12**	55.6	4M	2.8	50.4	127.2	7.1	54.3	2.7	4.4	50
24	**MAGIC**	**12**	55.4	3M	2.2	48.6	90.6	13.0	53.3	2.9	5.2	54
25	**B96**	**12**	53.6	2M	2.2	46.6	91.1	4.4	52.4	2.0	3.0	108
26	**OR2101043**	**13**	55.7	2M	2.3	47.0	96.7	6.3	53.9	1.7	2.4	93
27	**KASEBERG**	**13**	53.6	3M	2.8	44.8	109.3	6.5	51.8	1.2	1.8	97
28	**SY ASSURE**	**14**	56.0	4M	2.8	43.6	108.1	6.5	56.1	1.5	1.3	142
29	**09PN046#16**	**14**	54.8	1M	1.5	49.8	63.2	3.3	56.6	1.7	1.4	153
30	**09PN062#18**	**14**	55.4	3M	2.2	52.7	100.8	4.9	56.4	3.0	3.9	54
31	**SY OVATION**	**14**	57.0	3M	2.5	52.3	121.0	6.6	57.0	2.4	3.4	57
32	**04PN066-7**	**15**	52.7	1M	0.7	40.4	23.9	7.3	53.9	0.7	0.4	0
33	**09PN005#25**	**15**	53.0	2M	0.8	39.0	25.1	8.0	54.8	1.0	0.8	174
34	**ELTAN**	**15**	55.5	5M	4.9	38.3	175.2	6.0	54.5	1.0	0.9	90

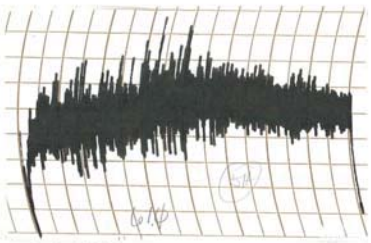
- 87 -

			Sugar Snap	Sponge	Cake	100g Pup Loaf Bread				Potential
Sample	Variety	Group	Diameter	Volume	Grain	Absorption	Mix Time	Volume	Crumb Grain	Volume
1	**MT1348**	**1**				62.5	5.3	945	3	84
2	**YELLOWSTONE**	**1**				66.0	7.5	1040	3	55
3	**SY TOUCHSTONE**	**2**				65.9	6.9	758	5	-175
4	**WHETSTONE**	**2**				63.2	4.8	865	4	-49
5	**WB9200**	**3**				66.9	4.3	965	3	97
6	**ID1602S**	**4**				64.8	4.9	925	4	103
7	**ID1603S**	**4**				66.5	4.4	1080	2	115
8	**ID1604S**	**4**				65.0	3.3	968	3	48
9	**WINCHESTER**	**4**				67.0	3.9	1028	3	128
10	**SY3015-8**	**5**				67.4	5.0	1008	3	30
11	**BULLSEYE**	**5**				68.1	4.6	980	4	-12
12	**RYAN**	**6**	9.24	1235	21					
13	**WHIT**	**6**	9.38	1238	21					
14	**SILK**	**7**	9.09	1220	19					
15	**LOUISE**	**7**	9.35	1262	22					
16	**WB6430**	**8**	9.61	1212	20					
17	**ID1403S**	**9**	9.40	1285	22					
18	**STONE**	**9**	9.55	1272	22					
19	**SPARROW**	**10**	9.39	1225	19					
20	**STEPHENS**	**10**	9.00	1225	22					
21	**WA8232**	**11**	9.27	1232	22					
22	**JASPER**	**11**	9.75	1260	20					
23	**CASTLE**	**12**	9.09	1252	21					
24	**MAGIC**	**12**	9.14	1230	21					
25	**B96**	**12**	9.54	1280	18					
26	**OR2101043**	**13**	9.46	1268	22					
27	**KASEBERG**	**13**	9.35	1295	23					
28	**SY ASSURE**	**14**	9.35	1220	19					
29	**09PN046#16**	**14**	9.13	1205	20					
30	**09PN062#18**	**14**	8.99	1215	21					
31	**SY OVATION**	**14**	9.04	1212	20					
32	**04PN066-7**	**15**	9.54	1240	20					
33	**09PN005#25**	**15**	9.18	1250	19					
34	**ELTAN**	**15**	9.60	1285	20					

- 88 -

					Alkaline Noodle Color				
Sample	Variety	Group	L* 0 Hour	a* 0 Hour	b* 0 Hour	L* 24 Hour	a* 24 Hour	b* 24 Hour	Delta L
1	**MT1348**	**1**	86.7	-1.6	17.9	78.5	-0.3	27.2	
2	**YELLOWSTONE**	**1**	86.6	-1.0	16.0	76.8	0.2	20.2	
3	**SY TOUCHSTONE**	**2**	85.2	-1.4	19.1	74.3	0.8	25.8	
4	**WHETSTONE**	**2**	88.1	-1.6	15.9	76.3	0.0	22.5	
5	**WB9200**	**3**	88.0	-1.7	15.2	77.7	-0.7	16.6	
6	**ID1602S**	**4**	88.2	-1.8	15.9	75.8	-0.4	21.8	
7	**ID1603S**	**4**	86.7	-1.0	15.6	71.9	0.1	19.3	
8	**ID1604S**	**4**	89.0	-1.3	13.0	78.1	-0.6	14.9	
9	**WINCHESTER**	**4**	87.1	-1.1	14.0	71.2	0.3	16.3	
10	**SY3015-8**	**5**	86.1	-1.1	17.3	74.5	0.0	22.9	
11	**BULLSEYE**	**5**	86.8	-1.0	14.9	75.1	0.0	17.8	
12	**RYAN**	**6**	87.3	-2.4	20.4	79.3	-0.2	28.1	
13	**WHIT**	**6**	86.2	-2.0	20.1	69.2	1.0	24.0	
14	**SILK**	**7**	85.5	-1.8	21.3	74.2	0.6	26.7	
15	**LOUISE**	**7**	87.3	-1.7	17.2	77.6	0.4	22.8	
16	**WB6430**	**8**	85.0	-1.6	18.5	74.0	0.8	25.3	
17	**ID1403S**	**9**	86.4	-2.0	18.8	71.0	0.6	22.8	
18	**STONE**	**9**	88.1	-2.0	17.7	78.2	-0.1	23.9	
19	**SPARROW**	**10**	87.0	-2.2	19.5	75.5	-0.4	21.5	
20	**STEPHENS**	**10**	86.6	-1.9	18.3	73.5	0.0	21.2	
21	**WA8232**	**11**	87.2	-2.2	19.0	75.7	-0.5	21.5	
22	**JASPER**	**11**	87.7	-2.3	19.4	77.4	-0.4	21.4	
23	**CASTLE**	**12**	88.3	-2.1	18.4	76.5	-0.1	23.7	
24	**MAGIC**	**12**	87.9	-2.4	19.9	81.1	-0.7	26.6	
25	**B96**	**12**	87.8	-2.3	19.5	77.0	-0.3	25.2	
26	**OR2101043**	**13**	85.3	-2.4	24.3	73.8	1.0	29.1	
27	**KASEBERG**	**13**	86.5	-2.2	21.6	74.5	0.1	24.9	
28	**SY ASSURE**	**14**	86.0	-1.7	19.4	72.2	0.7	23.8	
29	**09PN046#16**	**14**	86.3	-1.5	18.4	74.9	0.9	23.6	
30	**09PN062#18**	**14**	87.9	-1.8	16.3	76.8	0.3	21.7	
31	**SY OVATION**	**14**	86.9	-1.5	16.7	76.9	0.6	20.9	
32	**04PN066-7**	**15**	87.8	-2.2	17.8	76.1	0.2	19.3	
33	**09PN005#25**	**15**	89.5	-2.5	16.8	79.9	-0.3	17.9	
34	**ELTAN**	**15**	89.8	-3.1	19.1	83.9	-1.3	23.7	

- 89 -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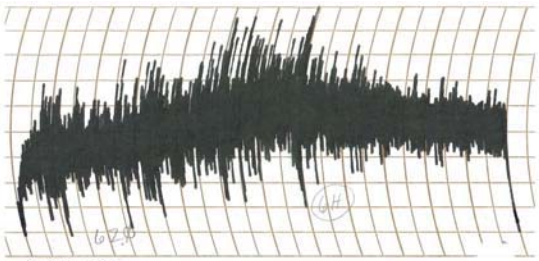
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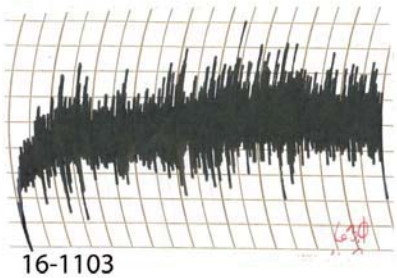
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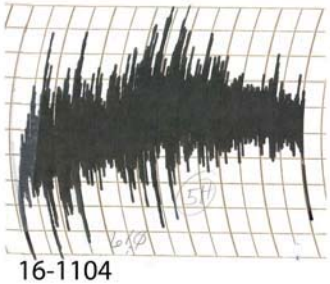
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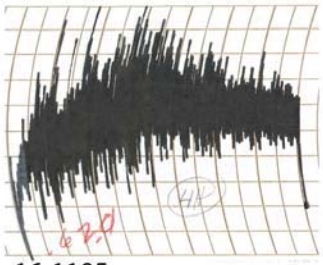
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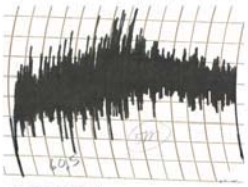
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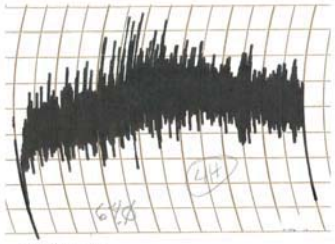
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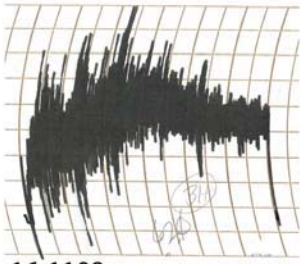
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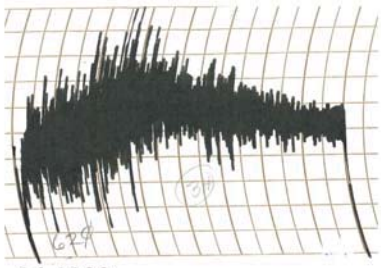
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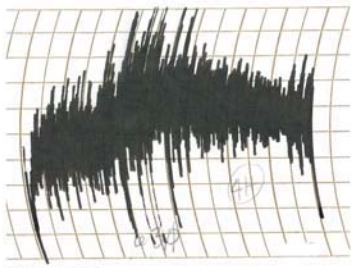
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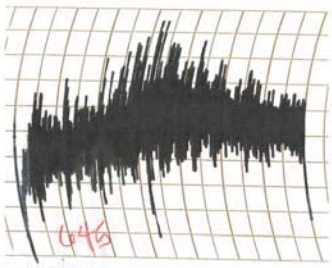
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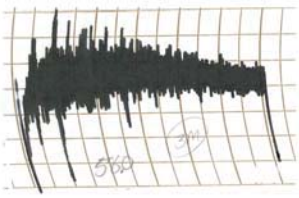
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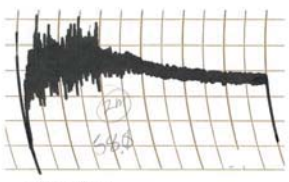
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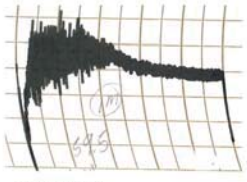
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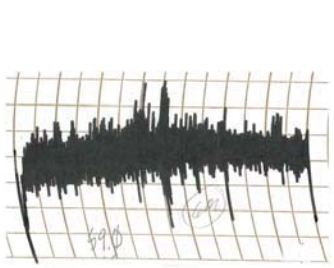
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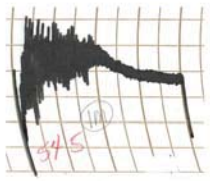
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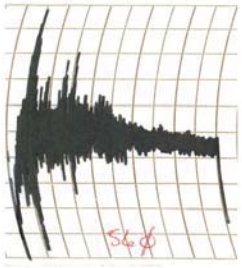
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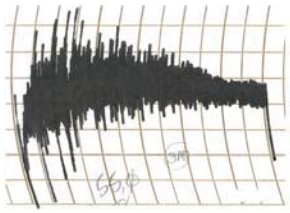
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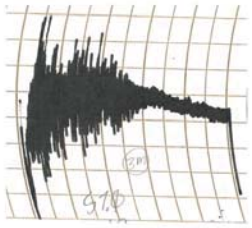
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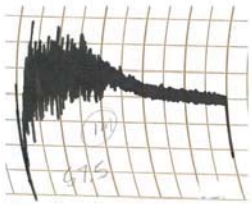
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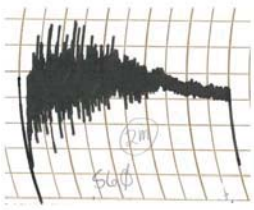
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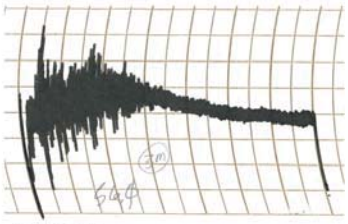
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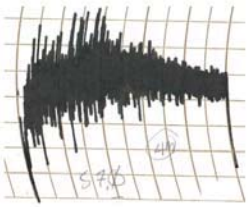
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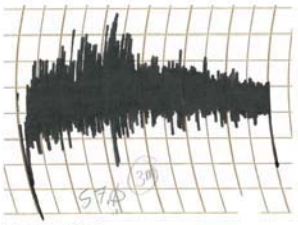
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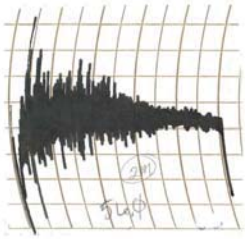
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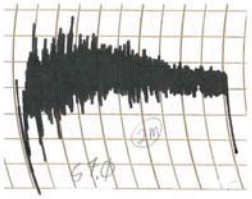
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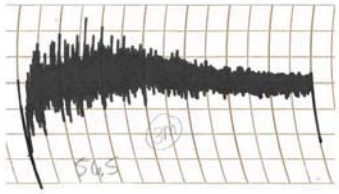
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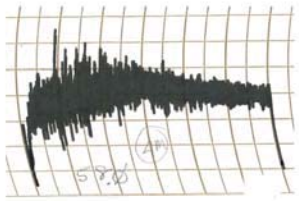
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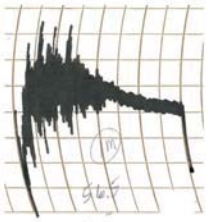
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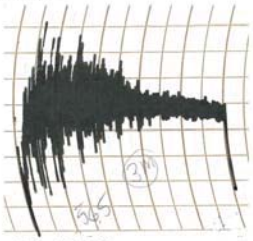
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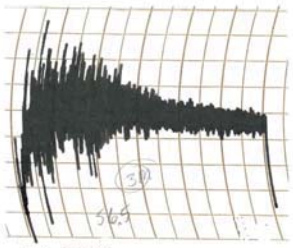
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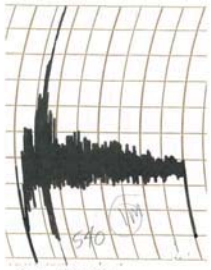
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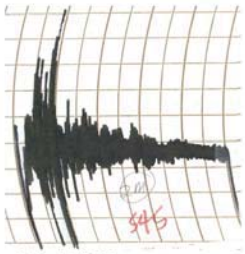
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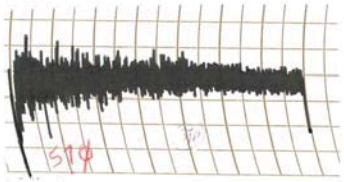
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End-Use Form Summary Tables

	Sample																																
Question #1 Dough	MT1348	YELLOWSTONE	SY TOUCHSTONE	WHETSTONE	WB9200	ID1602S	ID1603S	ID1604S	UI WINCHESTER	SY3015-8	BULLSEYE	RYAN	WHIT	LCS SILK	LOUISE	WB6430	ID1403S	UI STONE	UI SPARROW	STEPHENS	WA8232	JASPER	UI CASTLE	UI MAGIC	BRUNDAGE 96	OR2101043	KASEBERG	SY ASSURE	09PN046#16	09PN062#18	SY OVATION	04PN066-7	09PN005#25	ELTAN
Collaborator	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**
ADM (Bread & Cookie)	9.0	9.0	9.0	8.0	8.0	7.0	8.0	8.0	8.0	9.0	9.0	8.0	6.0	8.0	6.0	6.0	8.0	6.0	8.0	8.0	8.0	8.0	8.0	6.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	6.0	8.0	6.0
Ardent Mills (Bread & Cookie)	7.0	6.0	6.0	8.0	8.0	8.0	8.0	8.0	8.0	6.0	6.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Arytza (Bread)	8.0	8.0	9.0	8.0	8.0	5.0	5.0	6.0	6.0	6.0																								
Bay State Milling (Bread)	8.0	7.0	7.0	7.0	8.0	7.0	8.0	8.0	8.0	7.0	7.0																							
California WQL (Bread)	7.0	8.0	5.0	7.0	7.0	7.0	8.0	6.0	8.0	7.0	7.0																							
Colorado State (Bread)	7.0	7.0	7.0	5.0	6.0	6.0	8.0	5.0	6.0	6.0	7.0																							
General Mills (Bread & Cookie)	9.0	8.0	8.0	8.0	9.0	9.0	9.0	9.0	7.0	7.0	7.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Graincraft (Bread)	5.0	6.0	5.0	6.0	7.0	5.0	6.0	6.0	6.0	6.0	6.0																							
HRS & Durum WQL (Bread)	5.0	6.0	8.0	7.0	6.0	5.0	8.0	6.0	5.0	7.0	8.0																							
CGAHR (Bread)	8.5	7.5	6.0	8.0	8.0	7.0	7.0	8.0	8.0	7.5	7.5																							
Japan Flour Millers Association (Bread & Sponge Cake)	4.0	3.0	3.0	4.0	3.0	3.0	6.0	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0	5.0	4.0	3.0	3.0	4.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0
Korea Sajo Donga One (Bread & Sponge Cake)	6.0	5.0	4.0	5.0	4.0	4.0	6.0	7.0	5.0	4.0	5.0	6.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0	6.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	3.0	4.0	5.0	6.0	5.0	5.0
Limagrain (Bread & Cookie)	5.0	7.0	8.0	6.0	8.0	5.0	7.0	6.0	7.0	4.0	6.0	6.0	4.0	5.0	4.0	9.0	8.0	9.0	5.0	4.0	6.0	8.0	7.0	6.0	7.0	8.0	7.0	6.0	6.0	4.0	8.0	8.0	5.0	6.0
Montana State (Bread)	5.0	5.0	4.0	4.0	6.0	6.0	6.0	6.0	6.0	7.0	5.0																							
SWQL (Cookie)												7.0	6.0	6.0	6.0	8.0	8.0	7.0	5.0	6.0	7.0	8.0	7.0	8.0	7.0	8.0	8.0	6.0	6.0	5.0	6.0	6.0	6.0	6.0
Syngenta (Bread & Cookie)	7.0	7.0	5.0	6.0	6.0	5.0	5.0	6.0	6.0	6.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0	7.0	7.0	7.0
U of Idaho (Bread & Cookie)	5.0	6.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0	6.0	6.0																							
WWQL (Bread & Cookie)	7.0	8.0	6.0	6.0	6.0	6.0	7.0	5.0	5.0	7.0	7.0	7.0	9.0	9.0	9.0	9.0	6.0	8.0	6.0	5.0	7.0	6.0	7.0	8.0	9.0	8.0	7.0	7.0	6.0	6.0	6.0	7.0	7.0	7.0
WWQL (Sponge Cake)												8.0	8.0	9.0	8.0	7.0	9.0	7.0	7.0	9.0	7.0	6.0	7.0	8.0	8.0	8.0	7.0	9.0	9.0	9.0	8.0	4.0	7.0	6.0
Wheat Marketing Center (Bread & Sponge Cake)	6.0	6.0	7.0	6.0	5.0	4.0	6.0	6.0	5.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Mean	**6.6**	**6.6**	**6.3**	**6.3**	**6.6**	**5.8**	**6.9**	**6.3**	**6.3**	**6.3**	**6.4**	**6.9**	**6.5**	**6.8**	**6.5**	**7.1**	**7.0**	**6.8**	**6.1**	**6.2**	**6.9**	**6.7**	**6.6**	**6.7**	**7.1**	**7.1**	**6.8**	**6.7**	**6.3**	**6.2**	**6.6**	**6.5**	**6.5**	**6.4**

Hard Wheat Samples Soft Wheat Samples

- 92 -

							Sample																										
Question #2 Product	MT1348	YELLOWSTONE	SY TOUCHSTONE	WHETSTONE	WB9200	ID1602S	ID1603S	ID1604S	UI WINCHESTER	SY3015-8	BULLSEYE	RYAN	WHIT	LCS SILK	LOUISE	WB6430	ID1403S	UI STONE	UI SPARROW	STEPHENS	WA8232	JASPER	UI CASTLE	UI MAGIC	BRUNDAGE 96	OR2101043	KASEBERG	SY ASSURE	09PN046#16	09PN062#18	SY OVATION	04PN066-7	09PN005#25	ELTAN
Collaborator	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**
ADM (Bread & Cookie)	9.0	9.0	9.0	8.0	8.0	7.0	8.0	8.0	8.0	9.0	9.0	6.0	8.0	6.0	6.0	7.0	6.0	8.0	6.0	6.0	6.0	8.0	6.0	6.0	6.0	6.0	6.0	8.0	8.0	6.0	6.0	8.0	8.0	8.0
Ardent Mills (Bread & Cookie)	7.0	4.0	7.0	6.0	8.0	9.0	8.0	6.0	6.0	7.0	8.0	8.0	9.0	7.0	7.0	8.0	8.0	8.0	7.0	8.0	8.0	9.0	9.0	8.0	9.0	9.0	8.0	8.0	8.0	8.0	8.0	8.0	7.0	8.0
Arytza (Bread)	8.0	8.0	9.0	7.0	7.0	5.0	6.0	7.0	5.0	5.0																								
Bay State Milling (Bread)	7.0	6.0	6.0	6.0	6.0	6.0	7.0	8.0	8.0	6.0	5.0																							
California WQL (Bread)	7.0	8.0	5.0	6.0	7.0	8.0	8.0	6.0	8.0	8.0	8.0																							
Colorado State (Bread)	6.0	6.0	6.0	4.0	5.0	5.0	8.0	4.0	5.0	6.0	7.0																							
General Mills (Bread & Cookie)	8.0	7.0	6.0	8.0	7.0	8.0	8.0	7.0	8.0	7.0	7.0	8.0	7.0	9.0	8.0	8.0	7.0	8.0	7.0	8.0	7.0	7.0	9.0	9.0	9.0	8.0	8.0	8.0	8.0	8.0	8.0	7.0	7.0	7.0
Graincraft (Bread)	5.0	7.0	7.0	7.0	6.0	4.0	7.0	5.0	4.0	7.0	8.0																							
HRS & Durum WQL (Bread)	5.0	6.0	2.0	5.0	6.0	4.0	7.0	7.0	6.0	5.0	6.0																							
CGAHR (Bread)	4.5	7.0	7.5	7.0	7.0	8.5	6.0	7.0	7.0	9.0	8.5																							
Japan Flour Miller Association (Bread & Sponge Cake)	5.0	5.0	7.0	6.0	8.0	6.0	6.0	4.0	5.0	4.0	4.0	3.0	3.0	3.0	4.0	5.0	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0	4.0	4.0	4.0	3.0	4.0	3.0	3.0	4.0	4.0	4.0
Korea Sajo Donga One (Bread & Sponge Cake)	2.0	5.0	4.0	5.0	3.0	5.0	7.0	5.0	5.0	4.0	5.0	5.0	5.0	6.0	5.0	4.0	6.0	5.0	5.0	5.0	7.0	5.0	6.0	5.0	5.0	4.0	5.0	5.0	2.0	6.0	5.0	6.0	6.0	5.0
Limagrain (Bread & Cookie)	5.0	6.0	6.0	7.0	5.0	7.0	7.0	6.0	8.0	5.0	7.0	6.0	6.0	6.0	7.0	8.0	6.0	6.0	7.0	5.0	5.0	8.0	8.0	5.0	7.0	9.0	6.0	8.0	8.0	8.0	8.0	6.0	6.0	6.0
Montana State (Bread)	8.0	6.0	5.0	6.0	6.0	7.0	7.0	6.0	6.0	8.0	5.0																							
SWQL (Cookie)												4.0	6.0	4.0	5.0	6.0	6.0	6.0	5.0	4.0	5.0	8.0	5.0	4.0	6.0	6.0	5.0	5.0	4.0	3.0	4.0	5.0	4.0	5.0
Syngenta (Bread & Cookie)	6.0	6.0	6.0	6.0	7.0	6.0	7.0	7.0	8.0	7.0	7.0	4.0	7.0	6.0	7.0	8.0	6.0	9.0	4.0	4.0	5.0	9.0	6.0	6.0	8.0	8.0	8.0	5.0	4.0	4.0	3.0	7.0	5.0	6.0
U of Idaho (Bread & Cookie)	5.0	4.0	4.0	5.0	5.0	4.0	5.5	5.0	6.0	5.0	5.0	4.0	5.0	5.0	6.0	6.5	5.0	5.0	4.0	4.0	4.0	7.0	5.0	3.0	6.0	4.0	5.0	7.0	5.0	5.0	3.0	5.0	5.0	6.0
WWQL (Bread & Cookie)	7.0	7.0	3.0	5.0	6.0	5.0	8.0	6.0	6.0	6.0	5.0	6.0	6.0	5.0	6.0	8.0	7.0	7.0	7.0	5.0	6.0	8.0	5.0	5.0	7.0	7.0	6.0	6.0	5.0	5.0	5.0	7.0	5.0	8.0
WWQL (Sponge Cake)												6.0	6.0	6.0	7.0	6.0	8.0	7.0	6.0	6.0	6.0	7.0	7.0	6.0	8.0	7.0	5.0	6.0	6.0	6.0	6.0	7.0	6.0	8.0
Wheat Marketing Center (Bread & Sponge Cake)	5.0	6.0	5.0	4.0	4.0	4.0	7.0	6.0	5.0	6.0	6.0	6.0	4.0	4.0	8.0	4.0	7.0	6.0	4.0	7.0	7.0	6.0	5.0	6.0	7.0	6.0	6.0	4.0	5.0	5.0	6.0	8.0	5.0	7.0
Mean	**6.1**	**6.3**	**5.8**	**6.0**	**6.2**	**6.0**	**7.1**	**6.1**	**6.3**	**6.3**	**6.5**	**5.5**	**6.0**	**5.6**	**6.3**	**6.5**	**6.3**	**6.6**	**5.5**	**5.5**	**5.8**	**7.2**	**6.2**	**5.6**	**6.8**	**6.5**	**6.0**	**6.1**	**5.6**	**5.6**	**5.4**	**6.5**	**5.7**	**6.5**
		Hard Wheat Samples						Soft Wheat Samples																										

- 93 -

							Sample																										
Question #3 Overall	MT1348	YELLOWSTONE	SY TOUCHSTONE	WHETSTONE	WB9200	ID1602S	ID1603S	ID1604S	UI WINCHESTER	SY3015-8	BULLSEYE	RYAN	WHIT	LCS SILK	LOUISE	WB6430	ID1403S	UI STONE	UI SPARROW	STEPHENS	WA8232	JASPER	UI CASTLE	UI MAGIC	BRUNDAGE 96	OR2101043	KASEBERG	SY ASSURE	09PN046#16	09PN062#18	SY OVATION	04PN066-7	09PN005#25	ELTAN
Collaborator	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**
ADM (Bread & Cookie)	9.0	9.0	9.0	8.0	8.0	7.0	8.0	8.0	8.0	9.0	9.0	7.0	7.0	7.0	6.0	6.0	7.0	7.0	8.0	7.0	7.0	8.0	7.0	6.0	7.0	7.0	7.0	8.0	8.0	6.0	6.0	7.0	7.0	7.0
Ardent Mills (Bread & Cookie)	8.0	5.0	7.0	8.0	9.0	9.0	9.0	7.0	7.0	8.0	8.0	8.0	9.0	7.0	7.0	8.0	8.0	8.0	7.0	8.0	8.0	9.0	9.0	8.0	9.0	9.0	8.0	9.0	8.0	8.0	8.0	8.0	6.0	8.0
Arytza (Bread)	8.0	8.0	9.0	7.0	7.0	5.0	6.0	7.0	6.0	6.0																								
Bay State Milling (Bread)	6.0	5.0	4.0	6.0	6.0	4.0	6.0	8.0	8.0	6.0	3.0																							
California WQL (Bread)	7.0	8.0	5.0	7.0	7.0	7.0	8.0	6.0	8.0	8.0	8.0																							
Colorado State (Bread)	6.0	6.0	6.0	4.0	5.0	5.0	8.0	4.0	5.0	6.0	7.0																							
General Mills (Bread & Cookie)	9.0	7.0	7.0	6.0	7.0	7.0	9.0	7.0	7.0	7.0	8.0	8.0	8.0	8.0	7.0	8.0	7.0	8.0	7.0	8.0	8.0	6.0	8.0	8.0	8.0	8.0	7.0	8.0	7.0	8.0	8.0	6.0	7.0	8.0
Graincraft (Bread)	5.0	7.0	7.0	8.0	6.0	4.0	7.0	5.0	4.0	7.0	8.0																							
HRS & Durum WQL (Bread)	5.0	6.0	5.0	6.0	6.0	4.0	7.0	6.0	5.0	6.0	7.0																							
CGAHR (Bread)	6.0	7.5	6.0	8.0	7.5	8.0	6.5	7.5	7.5	8.5	8.0																							
Japan Flour Millers Association (Bread & Sponge Cake)	4.0	4.0	4.0	5.0	5.0	4.0	6.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	3.0	4.0	3.0	3.0	4.0	4.0	4.0
Korea Sajo Donga One (Bread & Sponge Cake)	3.3	5.0	4.3	5.0	4.3	5.3	6.7	6.3	5.0	4.3	5.0	5.7	5.0	5.3	5.0	4.3	5.0	5.0	5.0	5.0	6.7	5.0	6.3	4.7	5.0	4.7	5.0	4.7	2.7	5.0	5.0	5.7	5.3	5.0
Limagrain (Bread & Cookie)	5.0	8.0	3.0	4.0	7.0	4.0	8.0	8.0	7.0	7.0	7.0	6.0	6.0	7.0	7.0	7.0	7.0	6.0	6.0	7.0	6.0	6.0	7.0	7.0	6.0	6.0	6.0	8.0	7.0	8.0	7.0	5.0	5.0	5.0
Montana State (Bread)	7.0	6.0	4.0	6.0	6.0	7.0	7.0	7.0	6.0	8.0	5.0																							
SWQL (Cookie)												6.0	6.0	4.0	5.0	8.0	7.0	7.0	4.0	3.0	5.0	8.0	4.0	4.0	7.0	6.0	5.0	5.0	4.0	3.0	4.0	5.0	3.0	5.0
Syngenta (Bread & Cookie)	6.0	6.0	6.0	6.0	7.0	4.0	5.0	5.0	5.0	6.0	6.0	4.0	6.0	6.0	7.0	8.0	6.0	7.0	5.0	4.0	5.0	8.0	6.0	5.0	8.0	8.0	7.0	5.0	5.0	5.0	4.0	6.0	5.0	6.0
U of Idaho (Bread & Cookie)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0	6.0	6.5	5.0	5.0	4.0	4.0	4.0	7.0	5.0	3.0	6.0	4.0	5.0	7.0	5.0	5.0	3.0	5.0	5.0	6.0
WWQL (Sponge Cake, Bread & Cookie)	7.0	8.0	4.0	6.0	6.0	7.0	7.0	5.0	6.0	6.0	6.0	6.0	6.0	5.0	6.0	7.0	7.0	7.0	6.0	6.0	6.0	8.0	6.0	8.0	8.0	7.0	7.0	6.0	5.0	5.0	5.0	7.0	6.0	8.0
Wheat Marketing Center (Bread, & Sponge Cake)	5.0	6.0	6.0	5.0	4.0	4.0	7.0	6.0	5.0	6.0	6.0	6.0	5.0	5.0	7.0	5.0	7.0	6.0	5.0	7.0	7.0	6.0	5.0	6.0	7.0	6.0	6.0	5.0	5.0	5.0	6.0	7.0	5.0	7.0
Mean	**6.2**	**6.5**	**5.6**	**6.1**	**6.3**	**5.6**	**7.0**	**6.2**	**6.0**	**6.5**	**6.4**	**5.8**	**6.0**	**5.7**	**6.1**	**6.6**	**6.4**	**6.4**	**5.5**	**5.7**	**6.1**	**6.8**	**6.0**	**5.8**	**6.8**	**6.3**	**6.1**	**6.2**	**5.5**	**5.5**	**5.4**	**6.0**	**5.3**	**6.3**
		Hard Wheat Samples						Soft Wheat Samples																										

- 94 -

Western Education & Research Activity
Committee 1009

Institution

Colorado State University

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Accomplishments

In fall 2016, hard red winter wheat (HRW) experimental line CO11D446 was formally released by the Colorado Agricultural Experiment Station. CO11D446 is a doubled-haploid line developed from the cross CO050270 (Hatcher/NW97S295)/Byrd made in 2009. CO11D446 will be marketed as 'Langin' by the Colorado Wheat Research Foundation (CWRF) under the PlainsGold Brand. In four years of testing in the CSU Elite Trial (35 location-years, 2013-2016), dryland yield of Langin was 104% of trial average, compared to 104% for Antero HWW, 102% for Denali HRW, Avery HRW, and Byrd HRW, 98% for LCS Mint HRW, Sunshine HWW, and Hatcher HRW, and 97% for Snowmass HWW, and 95% for Brawl CL Plus HRW. In three years of testing in the CSU Dryland Uniform Variety Performance Trial (26 location-years, 2014-2016), dryland yield of Langin was 106% of trial average, compared to 114% for Antero HWW, 106% for Oakley CL HRW, SY Monument HRW, and Avery HRW, 105% for Denali HRW, 101% for Byrd HRW, 100% for Hatcher HRW, and 90% for Ripper HRW. Langin is early maturing and medium-short, and has excellent drought stress tolerance, excellent winterhardiness, above average test weight, and fair straw strength. Langin is resistant to the prevalent biotype of the wheat curl mite and the wheat soilborne mosaic/wheat spindle streak mosaic virus complex. Langin is susceptible to leaf rust, stem rust, Hessian fly, Russian wheat aphid biotypes 1 and 2, and Greenbug biotype E, and moderately susceptible to wheat streak mosaic virus. Langin is moderately resistant to prevalent races of stripe rust, and our hopes are that this resistance will be more durable as it most likely comes from Hatcher whose resistance has endured three different race changes since 2000. Langin has good overall milling and baking properties, generally similar to both Byrd and Avery and superior to Denali. Routine screening in 2015-2016 included 1744 SKCS tests, 1008 Mixographs, 897 L-DOPA PPO tests, and 628 Quadrumat Senior milling and pup-loaf bake tests. Included among these were 238 multi-location variety trial samples and these data were reported in the CSU variety trial summary distributed to wheat producers. Genomic selection models, facilitated by single nucleotide (SNP) markers obtained via genotyping by sequencing, have been shown to provide surprisingly high prediction accuracies for quality-related traits, including mixograph and pup-loaf bake mixing time, pup loaf volume, and pre-harvest sprouting tolerance. We are currently utilizing multi-trait genomic selection as a means of leveraging correlations between different quality traits to improve prediction accuracy. Univariate and multi-trait genomic selection models are now in routine use in the breeding program to increase efficiency of selection and enable more rapid identification of breeding lines for the crossing program.

- 95 -

Impact Statements

- For the 2016 crop, CSU-developed wheat varieties occupy 69.2% of the total acreage in Colorado, or 80.2% of acreage that is explained, as estimated by the 2016 Colorado Wheat Variety Survey.
- Hard red winter wheat (HRW) experimental line CO11D446 was released as a new cultivar in fall 2016. CO11D446 will be marketed as 'Langin' by the Colorado Wheat Research Foundation (CWRF) under the PlainsGold Brand.
- End-use quality data and summary interpretation provided to wheat producers have fostered consideration of varietal differences in intrinsic quality in the variety selection process.

Publications

Cooper, J.K., J.A. Stromberger, C.F. Morris, G. Bai, and **S.D. Haley**. 2016. End-use quality and agronomic characteristics associated with the *Glu-B1al* high-molecular-weight glutenin allele in U.S. hard winter wheat. Crop Sci. 56:2348-2353.

Latshaw, S.P., M.F. Vigil, and **S.D. Haley**. 2016. Genotypic differences for nitrogen use efficiency and grain protein deviation in hard winter wheat. Agron. J. 108:2201-2213.

Stromberger, J., **S.D. Haley**, and J. Johnson. 2016. Wheat quality evaluations from the 2015 CSU dryland and irrigated variety trials. p. 34-40. *In* Colorado State University Agric. Exp. Stn. Technical Report, Wheat Field Days Edition, July 2016.

- 96 -

State Report: Montana 2016

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Collaborators:
Luther E. Talbert (Spring Wheat Breeder), Phil L. Bruckner (Winter Wheat Breeder),
Mike Giroux (Small Grain Quality), Jack Martin (Quantitative Genetics).

2016 Spring Wheat Program. Breeder: Luther Talbert, E-mail: **usslt@montana.edu**
Personnel: Nancy Blake, Hwa-Young Heo, Andrea Varella.

Approximately 2.3 million acres of hard red spring wheat were seeded in 2016. The season was characterized by early season moisture, which led to more disease than is typical. Stripe rust, tan spot and wheat streak mosaic virus occurred sporadically throughout the state. Leading varieties in Montana were Vida, Reeder, Corbin and Mott. The variety Egan, with resistance to the orange wheat blossom midge, was grown commercially in impacted areas in western Montana. Egan has the high grain protein gene introduced from the variety GluPro. A new variety, Lanning, was recommended for release. Lanning has performed well in dryland areas of Montana, and has stronger gluten than the most widely grown varieties. Major agronomic objectives for the program remain excellent yield potential in the harsh Montana environments and resistance to the wheat stem sawfly. End-use quality targets for all varieties remain excellent bread-making properties, including selection for high grain protein, strong gluten, good water absorption, and large loaf volume.

Publications:
Varella, Andrea; Weaver, David; Peterson, Robert; Sherman, Jamie; Hofland, Megan; Blake, Nancy; Martin, John; Talbert, Luther. 2016. Host plant quantitative trait loci affect specific sequences in oviposition by a stem-mining insect. Theor. Appl. Genet., in press.

Heo, H.-Y. S. P. Lanning, P. F. Lamb, D. Nash , D. M. Wichman, K. D. Kephart, R. N. Stougaard, J. Miller, G. Reddy, C. Chen, J. L. Eckhoff, W. E. Grey, N. K. Blake, and L. E. Talbert. 2016. Registration of Lanning wheat. J. Plant Reg. 10:287-290.

Nirmala, J., S. Chao, P. Olivera, E. M. Babiker, B. Abeyo, Z. Tadesse, M. Imtiaz, L. Talbert, N. K. Blake, E. Akhunov, M. O. Pumphrey, Y. Jin, and M. N. Rouse. 2016. Identification and validation of SNP markers linked to the wheat stem rust resistance gene Sr11 effective to Puccinia graminis f. sp. tritici race TKTTF. Phytopathology 106:1352-1358.

Kiszonas, Alecia M., E. Patrick Fuerst, Luther Talbert, Jamie Sherman, and Craig Morris. 2016. Effect of wheat (Triticum aestivum L.) seed color and hardness genes on the consumption preference of the house mouse (Mus musculus L.). Mammalia 80:655-662.

Nasseer, A. M., J. M. Martin, H.-Y. Heo, N. K. Blake, J. D. Sherman, M. Pumphrey, K. D. Kephart, S. P. Lanning, and L. E. Talbert. 2016. Impact of a quantitative trait locus for tiller number on plasticity of agronomic traits in spring wheat. Crop Sci. 56:595-602.

2016 Winter Wheat Program. Breeder: Phil Bruckner, E-mail: bruckner@montana.edu
Personnel: Jim Berg, Ron Ramsfield.

Montana harvested winter wheat acreage for 2016 was 2.15 million acres averaging ~49 bu/acre (total production ~105 million bushels). Leading varieties were Yellowstone (18.8%), Judee (18.1%), Warhorse (10.0%), Brawl CLP (7.3%), Decade (5.0%), Bearpaw (4.4%), and CDC Falcon (4.4%). The winter wheat program emphasizes on-farm productivity characteristics and quality characteristics to compete in a global market place. Specific objectives include productivity, adaptation (cold tolerance, maturity, stress tolerance), pest resistance (wheat stem sawfly, wheat streak mosaic virus, stem rust), and dual-purpose end-use quality. End-use quality goals are high grain protein and gluten strength, high flour extraction and low ash content, good dough mixing and bread baking quality, and superior noodle color and textural characteristics. 'Loma' (MTS1224) was released to Montana producers fall, 2016.

Publications

Berg, J.E., P.F. Lamb, J.H. Miller, D.M. Wichman, K.D. Kephart, R.N. Stougaard, G.P. Pradhan, D.L. Nash, W.E. Grey, D. Gettel, S. Gale, Y. Jin, J.A. Kolmer, X. Chen, G. Bai, T.D. Murray, and P.L. Bruckner. 2016. Registration of 'Northern' hard red winter wheat. J. Plant Reg. 10:135-138. doi:10.3198/jpr2015.10.0062crc.

Quantitative Genetics and Plant breeding: Jack Martin, E-mail jmmartin@montana.edu
Small Grain Quality: Mike Giroux, E-mail: **mgiroux@montana.edu**
Personnel: Alanna Schlosser, Andy Hogg, Darby Kammeraad, Rachel Johnston, Emma Jobson, Justin Vetch

The work we published in 2016 focused on genes that impact cereal yield and product quality. In our studies addressing yield limiting factors, we have focused on the role of leaf and seed starch in whole plant productivity. The results (Oiestad et al. 2016) indicate that increasing rice leaf and seed starch biosynthesis increases plant productivity by upregulating whole plant carbon metabolism. Recent preliminary results demonstrate that the degree to which increasing leaf seed starch and yield enhances plant productivity is dependent upon fertilization level. If/when funding becomes available we plan to conduct studies in spring wheat in which we test the degree to which increasing leaf and seed starch increases wheat productivity under varying fertilization levels. We published two studies on genes impacting wheat product quality. Hystad et al. (2016) reported that null polyphenol oxidase (PPO) alleles are useful in improving white salted noodle color stability. Null PPO alleles would be useful to incorporate in any wheat varieties destined to be used in fresh market noodles or refrigerated dough products to decrease development of off colors. Kammeraad et al. (2016) reported the impact of a series of puroindoline alleles created and selected to impart discrete grain hardness levels. Hardness was highly correlated with flour yield and particle size but did not significantly impact dough mixing or bread baking properties. The various puroindoline and null PPO alleles are available for use in wheat breeding programs.

Publications

Oiestad, A.J., J.M. Martin, and M.J. Giroux. 2016. Overexpression of ADP-glucose pyrophosphorylase in both leaf and seed tissue leads to increased biomass and seed yield in rice (Oryza sativa ssp. japonica). Functional Plant Biology 43:1194-1204.
Hystad, S.M., M.J. Giroux, and J.M. Martin. 2016. Impact of null polyphenol oxidase alleles on white salted noodles. Cereal Chemistry 93(3):255-262.
Kammeraad, J.D., M.J. Giroux, A.C. Hogg, and J.M. Martin. 2016. Mutagenesis derived Puroindoline alleles in Triticum aestivum and their impacts on milling and bread quality. Cereal Chemistry 93(2):201-208.

Developing Wheat Cultivars for Idaho and World Markets

Institution: University of Idaho Aberdeen Research & Extension Center, Aberdeen, ID 83210; 208-397-4162, ext. 229; jchen@uidaho.edu

Wheat Breeding and Genetics Team: Dr. Jianli Chen leads Mr. J. Wheeler, Ms. N. Klassen, Mr. W. Zhao, Dr. R. Wang, additional four seasonal help.

Cooperators:

University of Idaho: J. Marshall, K. O'Brien, D. Fu, Y. Wang, K. Schroeder, N. Bosque-Perez, D. Strawn, J. Kuhl, O. Welsh, X. Liang, A. Lin, A. Rasheed, Ch. Roger;

USDA-ARS: J. Bonman, G. Hu, X. Chen, D. Angle, K. Campbell, D. See, S. Xu, J. Yue, M. Guttieri, X. Shao, G. Brown-Guedira, Sh. Zhnog;

OSU: R. Zemetra, M. Flower, R. Smiley, A. Russ; KSU: A. Akhunov, G. Zhang;

WSU: R. Higginbotham, A. Carter, M. Pumphrey, T. Murray; MSU: E. Olson;

U.C. Davis: Jorge Dubcovsky, J. Zhang; MSU: L. Talbert, J. Herman.

USU: D. Hole; CSU: S. Haley, P. Byrne; UMN: J. Anderson, Y. Dong; LSU: Steve Harrison.

Industry: B. Wilkin; R. McLean; F. Curtis, J. Peterson, J. Kalous; G. Weaver, Sh. White, G. Gang, H. Jie.

Accomplishments:

Using an integrated approach combining of traditional breeding, wheat by maize dihaploid (DH) system, and molecular marker assisted selection, we evaluated around 10,000 yield plots grown in Aberdeen, Kimberly, Tetonia, Soda Springs, Rockland, and Arbon Valley in SE Idaho.

The breeding program assisted in market launch of the two released spring wheat cultivars, UI Stone and UI Platinum. UI Sparrow (IDO1108DH) was officially released in August this year. UI Sparrow was developed using wheat x maize dehaploid technology. This cultivar has high yield, immune resistance to dwarf bunt, high level of resistance to stripe rust and snow mold. It is adapted in reduced irrigation and high rainfall dryland production in ID and WA. One private company is interested in licensing in 2017. We also planted large strip trials in Aberdeen, Kimberly, Rockland, and Arbon Valley and will do field demonstration to growers and industry and other state holders in summer 2017. We also harvested breeder seed for IDO1506 (HWW), IDO1602S (HWS), IDO1604S (HWS), IDO1405S (SWS), and submitted 8 lines for quality evaluation to PNW Quality Council.

We published one referred paper in TAG, submitted two manuscripts, and prepared three manuscripts for 2017. One 2015 published paper was awarded the first place of outstanding papers in plant genetic resource. We also did three oral and two poster presentations at an international meeting and one oral at national meeting, six outreach and 10 field day presentations.

The specific progresses were summarized in each project below:

Use wheat x maize dihaploid technology to facilitate breeding and QTL mapping. The DHLs are designed from elite x elite crosses. QTL identified from DHLs can be deployed quickly in the breeding processes. The good DHLs also can be directly used in line evaluation and released as a cultivar. One DH population was used in QTL mapping of multiple traits, including yield, yield components, stripe rust, stem rust, falling number/LMA, and bread baking quality in 2015 and 2016. **Findings related to QTL of yield components were orally presented at 2016 ASA and CSSA meeting. Fine mapping and cloning of the QTL will be supported by a newly funded USDA-NIFA grant in coming four years**. One dissertation and two manuscripts will also be developed by a visiting Ph.D student in 2017-2018. Additional manuscripts will be developed by a postdoc and a new Ph.D student in 2018-2020.

Molecular marker-assisted breeding (MMAB). We routinely use molecular markers for a list of traits (FHB, stripe rust, hessian fly, *Rht* dwarfing genes, vernalization genes, PPD, Glutenin genes) in different stages of variety development. The traits list includes markers identified from our program and other published ones. As a result of marker–assisted selection from this and previous years **we selected two hard red spring wheat lines that have high yield, resistance to hessian fly, stripe rust, and good bread-baking quality. We are expecting to release one of them in 2017 or 2018.** These lines were also evaluated for stripe rust resistance in a field nursery in Pullman, WA (X. Chen), for Hessian Fly resistance in Moscow (by Nilsa) and a USDA-ARS Lab (S. Xu) in North Dakota.

Identify QTL for resistance to fusarium head blight. This is my hatch project with additional finding from USDA-ARS USWBSI. We hired one postdoc (50%) conducted association mapping of FHB resistance in 190 spring wheat lines from PNW. The 170 lines were assessed in the second year in Aberdeen, ID and St. Paul, MN under collaboration. **Research findings were presented at 2016 ASA and CSSA meeting and at 2016 National FHB Forum**. One manuscript is expected to submit in January, 2017. **FHB resistant germplasm identified will be used as parental lines in crossing in 2017**. Molecular markers identified will add to the trait lists in MMAB.

Identify molecular markers associated with dwarf bunt: We published a paper in TAG for a novel QTL associated with dwarf bunt resistance and PCR-based markers on 7DS. We also assessed dwarf bunt resistance in two additional DH populations in a dwarf bunt nursery in Logan, UT. SNP data from the two populations were analyzed and linkage maps were constructed. Additional QTL will be identified when additional dwarf bunt data become available in 2017 and 2018.

Breeding using EMS mutagenesis. Out of 390 EMS-induced lines in Moreland background, sixty lines were advanced and planted in fall of 2016. **Some of these lines showed significantly increased yield than Moreland and have good resistance to stripe rust.** A couple lines can be released as Moreland replacement and some other lines can be used in functional analysis in the future.

Publications and Presentations:

J. Chen, M. J. Guttieri, J. Zhang, D. Hole, E. Souza, B. Goates. 2016. A novel QTL associated with dwarf bunt resistance in Idaho 444 winter wheat. Theor Appl Genet. 129(12): 2313-2322. DOI 10.1007/s00122-016-2783-2.

Liu, Y., P. Li, J. Zhang, Y. Hu, and **J. Chen**. 2016. Dwarfing genes *Rht4* and *Rht-B1b* affect plant height, agronomic traits, and kernel quality traits in common wheat under two water regimes. Accepted by Field Crops Research.

Liang, X., D. Strawn, **J. Chen**, and J. Marshall. 2016. Cadmium accumulation in spring wheat grains is influenced by cadmium bioavailability and root length. Submitted.

Chen, J., R. Wang, J. Zhang, D. Hole, M. J. Guttieri, E. Souza, B. Goates. 2016. Validation and marker assisted selection for a novel QTL *Q.DB.ui-7DS* associated with dwarf bunt resistance of winter wheat. Oral presentation and abstract in the proceedings of ASA, CSSA and SSSA Int'l Annual meeting, Phoenix, AZ, Nov. 15-18.

Tyler, G., **J. Chen**, R. Wang, J.M. Bonman. 2016. Association mapping of yield components in 2-Row spring barley from the USDA National Small Grains Collection. Oral presentation and abstract in the proceedings of ASA, CSSA and SSSA Int'l Annual meeting, Phoenix, AZ, Nov. 15-18.

Liu., Y., R. Wang, **J. Chen**, D.R. See. 2016. Genome-wide linkage mapping of QTL for yield component in UI Platinum/SY Capstone double haploid population. Oral presentation and abstract in the proceedings of ASA, CSSA and SSSA Int'l Annual meeting, Phoenix, AZ, Nov. 15-18.

Wang, R., **J. Chen**, J. Zhang, W. Zhao, J. Wheeler, N.Klassen, J.A. Anderson, D.R. See and Y. Dong. 2016. Genome-Wide Association Mapping of Resistance QTL to Fusarium Head Blight in Spring Wheat Lines Grown in Pacific Northwest and CIMMYT. Poster presentation and abstract in the proceedings of ASA, CSSA and SSSA Int'l Annual meeting, Phoenix, AZ, Nov. 15-18.

Liang, X., D. Strawn, **J. Chen**, and J. Marshall. 2016. Cadmium Accumulation in Spring Wheat Grains Is Influenced By Cadmium Bioavailability and Root Length. Poster presentation and abstract in the proceedings of ASA, CSSA and SSSA Int'l Annual meeting, Phoenix, AZ, Nov. 15-18.

Wang, R., **J. Chen**, J. Zhang, W. Zhao, J. Wheeler, N.Klassen, J.A. Anderson, D.R. See and Y. Dong. 2016. Genome-Wide Association Mapping of Resistance QTL to Fusarium Head Blight in Spring Wheat Lines Grown in Pacific Northwest and CIMMYT. Poster presentation and mini talk at the 2016 FHB forum, St. Louis, MO, Dec. 4-6.

- 101 -

Wheat Marketing Center Report

December 2016

1. Wheat Marketing Center, Inc. Portland, Oregon

2. Dr. Gary Hou, Technical Director, Email: ghou@wmcinc.org, Tel: 503-295-0823

3. Accomplishments

1) Education
   Conducted 14 technical short courses and workshops to participants from around the world
   Conducted more than 20 wheat quality workshops for farmers, students, grain trades, state wheat commissions, government officials, etc.
2) Research
   Published five scientific papers in international journals (see below) on various subjects
3) US wheat crop quality survey
   Analyzed U.S. soft white and hard white crop quality and developed reports

4. Impact statements

1) Researched on the impact of whole-wheat flour particle size on the quality attributes of tortillas, developed an optimized chemical leavening system to improve whole-wheat tortilla quality, and improved whole-wheat tortilla quality with the inclusion of sprouted whole-wheat flour.
2) Improved whole-wheat noodle quality with selected enzymes and emulsifiers.
3) Optimized the blend of soft white and white club flour for Japanese sponge cake
4) Conducted a research on the use of whole-grain soft white flour in baking application and determined the effect of protein content on each product.
5) Installed a pilot-scale tortilla line that will greatly expand WMC's ability to conduct research and teach short courses related to this fastest growing ethnic food in the U.S.
6) Provided education to U.S. wheat end-users and customers about the uses and nutritional values of U.S. wheat through technical short courses and workshops.
7) Surveyed soft white and hard white crop quality and presented results to U.S. wheat customers worldwide.

6. Publications

Niu, M., Hou, G.G.*, Kindelspire, J., Krishnan, P., and Zhao, S. (2017). Microstructural, textural, and sensory properties of whole-wheat noodle modified by enzymes and emulsifiers. Food Chemistry 223 (2017) 16–24.

Liu, T., Hou, G.G., Cardin, M., Marquart, L., and Dubat, A. (2017). Quality attributes of whole-wheat flour tortillas with sprouted whole-wheat flour substitution. LWT – Food Science and Technology, 77:1-7.

Liu, T., Hou, G.G.*, Lee, B., Marquart, L., and Dubat, A. (2016). Effects of particle size on the quality attributes of reconstituted whole-wheat flour and tortillas made from it. Journal of Cereal Science, 71: 145-152.

Liu, T., Hou, G.G.*, Book, S.L., and Marquart, L. (2016). Effects of chemical leavening system and processing conditions on the opacity and other quality characteristics of whole-wheat flour tortillas. LWT – Food Science and Technology, 73:123-130.

Wang, N. Hou, G.G.*, Kweon, M., and Lee, B. (2016). Effects of particle size on the properties of whole-grain soft wheat flour and its cracker baking performance. Journal of Cereal Science, 69:187-193.

- 103 -

2016 WERA Report

Institution

USDA-ARS Western Wheat Quality Lab. As of Oct. 1, 2015, the former Wheat Genetics, Physiology and Disease Research Unit merged with the Root Disease Research Unit to form the Wheat Health, Genetics, and Quality Research Unit, which includes David Weller (RL), Patricia Okubara, Timothy Paulitz, and Linda Tomashow.

Lead Scientist

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Cooperators

Arron Carter, Kulvinder Gill, Mike Pumphrey, Ryan Higginbotham, WSU, Pullman, WA
Kim Garland-Campbell, Camille Steber, Deven See, USDA-ARS Wheat Health, Genetics, and Quality Research Unit, Pullman, WA
Andrew Ross, Robert Zemetra, Oregon State University, Corvallis, OR
David Hole, Utah State University, Logan, UT
Jorge Dubcovsky, University of California - Davis, Davis, CA
Western Regional Nursery Cooperators

Accomplishments

New research on the influence of soft kernel texture on the flour, water absorption, rheology, and baking quality of durum wheat.
Collaborated on the end-use quality of CIMMYT-derived soft kernel durum wheat germplasm.
Defined the low-molecular-weight glutenin subunit gene family members in a set of standard bread wheat varieties.
Research on the lexicon development and consumer acceptance of cooked quinoa.
Identified the evidence of intralocus recombination at the *Glu-3* loci in bread wheat.
Collaborated on the changes in the phenolic acids composition during pancake preparation.
New research on improving genomic prediction for pre-harvest sprouting tolerance in wheat by weighting large-effect quantitative trait loci.
Collaborated on the registration and release of new varieties of wheat: Jasper, Sequoia, Earl, Pritchett, Dayn, ARS Crescent,

and Glee.

Each year Doug Engle and Craig Morris organize the Pacific Northwest Wheat Quality Council, with attendance of approximately 80, there are 22 collaborators which included ADM Milling, Agri-Pro/Syngenta, Grain Craft, Ardent Mills, Mondel_z, Continental Mills, USDA-GIPSA-FGIS, Monsanto/WestBred, and others. Engle and Morris also conducted and concluded the Overseas Varietal Analysis Project, Soft White & Club Wheats for U.S. Wheat Associates.

Impact Statements

- The genetic basis for wheat grain quality was advanced.
- Methods of analyzing the physical and chemical properties of wheat grain were improved.

Publications

Cooper, J.K., Stromberger, J.A., Morris, C.F., Bai, G., and Haley, S.D. 2016. End-use quality and agronomic characteristics associated with the *Glu-B1al* high molecular weight glutenin allele in U.S. hard winter wheat. Crop Sci. 56:1-6.

Fleischman, E.F., Kowalski, R.J., Morris, C.F., Nguyen, T., Li, C., Ganjyal, G., and Ross, C.F. 2016. Physical, textural, and antioxidant properties of extruded waxy wheat flour snack supplemented with several varieties of bran. J. Food Sci. 81:E2726-E2733.

Heinze, K., Kiszonas, A.M., Murray, J.C., Morris, C.F., and Lullien-Pellerin, V. 2016. Puroindoline genes introduced into durum wheat reduce milling energy and change milling behavior similar to soft common wheats. J. Cereal Sci. 71:183-189.

Kiszonas, A.M., and Morris, C.F. 2016. Identifying genetic markers of wheat (*Triticum aestivum*) associated with flavor preference using a laboratory mouse model. J. Cereal Sci. 71:153-159.

Kiszonas, A.M., Fuerst, E.P., Talbert, L.E., Sherman, J.D., and Morris, C.F. 2016. Effect of wheat (*Triticum aestivum* L.) seed color and hardness genes on the consumption preference of the house mouse (*Mus musculus* L.). Mammalia 80:655-662.

Lottes, O.C., Kiszonas, A.M., Fuerst, E.P., and Morris, C.F. 2016. Wheat grain consumption and selection by inbred and outbred strains of mice. Physiology & Behavior 165:154-158.

Morris, C.F. 2016. Cereals–Overview of Uses: Accent on Wheat Grain. *In:* Encyclopedia of Food Grains, 2nd Edition. Wrigley, C., Corke, H., Seetharaman, K., and Faubion, J. (eds.), pp. 1-7. Oxford: Academic Press.

- 105 -

Morris, C.F. 2016. Evaluation of Wheat-Grain Quality Attributes. *In:* Encyclopedia of Food Grains, 2nd Edition. Wrigley, C., Corke, H., Seetharaman, K., and Faubion, J. (eds.), pp. 251-256. Oxford: Academic Press.

Morris, C.F. 2016. Grain Quality Attributes for Cereals Other Than Wheat. *In:* Encyclopedia of Food Grains, 2nd Edition. Wrigley, C., Corke, H., Seetharaman, K., and Faubion, J. (eds.), pp. 257-261. Oxford: Academic Press.

Murray, J.C., Kiszonas, A.M., Wilson, J.D., and Morris, C.F. 2016. Effect of soft kernel texture on the milling properties of soft durum wheat. Cereal Chem. 93:513-517.

Quayson, E.T., Atwell, W., Morris, C.F., and Marti, A. 2016. Empirical rheology and pasting properties of soft-textured durum wheat (*Triticum turgidum* ssp. *durum*) and hard-textured common wheat (*T. aestivum*). J. Cereal Sci. 69:252-258.

Wu, G., Peterson, A.J., Morris, C.F., and Murphy, K.M. 2016. Quinoa seed quality response to sodium chloride and sodium sulfate salinity. Frontiers in Plant Sci. 7:790.

- 106 -

Hard White Wheat Quality Targets

Dual Purpose -- Chinese Noodles and Western Pan Bread

Updated on March 2, 2001 at Hard White Wheat Quality Targets Workshop
Wheat Marketing Center, Portland, Oregon

	Chinese Hard-Bite Noodles (1)	**Pan Bread**
Wheat Quality Parameter		
Test Weight (lb/bu)	60 Minimum	60 Minimum
Kernel Hardness (SKCS 4100)	65 Minimum	65 Minimum
Kernel Diameter (mm) (SKCS 4100)	2.5 Minimum	2.5 Minimum
Falling Number (seconds)	300 Minimum	300 Minimum
Protein (%, 12% mb)	11-15.0	11.5-14.0
Ash (%, 14% mb)	1.4 Maximum	1.6 Maximum
PPO Level by L-DOPA (WWQL Method)	0-0.2	N/A
Flour Quality Parameter		
Protein (%, 14% mb)	10-13.5	10.2-11.5
Ash (14% mb)	0.38-0.45	N/A
Patent Flour Yield at 0.4% Ash (%)	60 (by Buhler)	N/A
Straight-Grade Flour Yield at 0.45% Ash (%)	70 (by Buhler)	N/A
L* (Minolta Colorimeter CR 310)	91 Minimum	N/A
Wet Gluten (%, 14% mb)	30 Minimum (2)	28
Farinograph Absorption (%, 14% mb)	60 Minimum (2)	60
Farinograph Stability (minutes)	12 Minimum (2)	12
Amylograph Peak Viscosity (Bu) (3)	500-850	500 minimum
Mixograph Peak Time (minutes)	N/A	3-7 @ 5.5 mm peak ht.
Mixograph Absorption (%)	N/A	60
Chinese Raw Noodle Quality Parameter (Refer to WMC Protocol) (4)		
Chinese Raw Noodle Dough Sheet L*24 h	72 Minimum	N/A
Chinese Raw Noodle Dough Sheet L*0-L*24	10 Maximum	N/A
Chinese Raw Noodle Dough Sheet b* 24 h	25 Maximum	N/A
Cooked Noodle Hardness (g)	1250 Minimum (2)	N/A
Pan Bread Quality Parameter		
Pup Loaf Volume (cc)	N/A	900 @11% flour protein

Notes:

(1) Chinese raw, Chinese wet, Chinese instant fried, Philippine instant fried, Malaysia hokkien and Thai bamee noodles.

(2) Straight-grade flour of 12% protein wheat.

(3) Method: 65 g untreated flour + 450 ml deionized water.

(4) Noodle formula: straight-grade flour, 100%; water, 28%; and sodium chloride, 1.2%.
Noodle sizes: 2.5 mm (width) x 1.2 mm (thickness).
Noodle textural measurement: cook 100 g noodles in 1000 ml deionized water for 5 min, rinse in 27^0C water and drain. Measure noodle texture on five noodle strands by compressing to 70% of noodle thickness with a 5-mm flat probe attached to TA.XT2 Texture Analyzer.

These end-use quality targets emphasize the broadest possible utilization of hard white wheats.

- 107 -

Other Product Categories

(Based on hard white wheat protein levels and blends with other U.S. wheat classes)

Updated on March 2, 2001 at Hard White Wheat Quality Targets Workshop
Wheat Marketing Center, Portland, Oregon

	Korean Instant Noodles	Chinese Northern-Type Steamed Bread	Hamburger/Hotdog Buns
Wheat Quality Parameter			
Test Weight (lb/bu)	60 Minimum	60 Minimum	60 Minimum
Kernel Hardness (SKCS 4100)	65 Minimum	65 Minimum	65 Minimum
Kernel Diameter (mm) (SKCS 4100)	2.5 Minimum	2.5 Minimum	2.5 Minimum
Falling Number (seconds)	300 Minimum	350-400	300 Minimum
Protein (%, 12% mb)	10-11.0	10-11.5	13-15.0
Ash (%, 14% mb)	1.4 Maximum	1.4 Maximum	1.6 Maximum
PPO Level by L-DOPA (WWQL Method)	0-0.2	0-0.2	N/A
Flour Quality Parameter			
Protein (%, 14% mb)	8.5-9.5	8.5-10.0	12.2-13.0
Ash (14% mb)	0.38-0.40	0.38-0.45	N/A
Patent Flour Yield at 0.4% Ash (%)	60 (by Buhler)	60 (by Buhler)	N/A
Straight-Grade Flour Yield at 0.45% Ash (%)	70 (by Buhler)	70 (by Buhler)	N/A
L* (Minolta Colorimeter CR 310)	91 Minimum	91 Minimum	N/A
Wet Gluten (%, 14% mb)	N/A	28-30	34.5
Farinograph Absorption (%, 14% mb)	58-60	60-62	64
Farinograph Stability (minutes)	7.5-8.5	4-6.0	15-18.0
Amylograph Peak Viscosity (Bu) (1)	800 Minimum	500 Minimum	500 Minimum
Amylograph Breakdown (Bu)	200 Minimum	N/A	N/A
Mixograph Peak Time (minutes)	N/A	N/A	4-7 @ 5.8 mm peak ht.
Mixograph Absorption (%)	N/A	N/A	64
Pan Bread Quality Parameter			
Pup Loaf Volume (cc)	N/A	N/A	980 @ 13% flour protein

Notes:
(1) Method: 65 g untreated flour + 450 ml deionized water.

- 108 -

QUALITY TARGETS FOR HARD RED SPRING WHEAT
Quality Targets Steering Committee
Adopted PNW WQC January 25th 2013, Scottsdale, Arizona

	HRS Targets
Grain Quality Parameter	
Test Weight (lb/bu)	≥60.0
Kernel Hardness (SKCS 4100)	60-80
Kernel Diameter (mm) (SKCS 4100)	2.8
Kernel Weight (mg) (SKCS 4100)	38
Falling Number (seconds) (in absence of sprout)	>300
Protein (%, 12% mb)	14.5
Ash (%, 12% mb) [1]	1.52

Flour Quality Parameter	
Protein (%, 14% mb) [2]	13.1
Flour Yield (%) [3]	67.4
Flour Ash (%) [1]	0.41
Mill Score [1]	81.3
Gluten Index (%, 14% mb)	
SDS Sedimentation (cc/g, 14% mb) [4]	27.4
Farinograph Absorption (%, 14% mb) [5]	63.4
Farinograph Peak (min, 14% mb) [5]	16.3
Farinograph Stability (minutes) [5]	20.7
Mixograph Absorption (%)	64.1
Mixograph Peak (min by Mixsmart)	4.9
Mixograph Tolerance (subjective by chart)	1.6

Baking Quality Parameter	
Bake Absorption (%)	67.2
Bake Mix Time (min)	4.7
Bread Loaf Volume (cc)	1021.6
Bread Crumb Grain (subjective, 1-good 9-poor)	3.2

[1] Adjusted for lower PNW whole wheat ash observed
[2] "Protein Differential" --the difference between wheat and flour is greater on the Western Wheat
[3] Western Wheat Quality Lab Quadrumat Milling System.
[4] Micro Method, 0.5g
[5] 50-gram mixing bowl. NOTE: Limited WWQL Data--Midwest numbers used

- 109 -

QUALITY TARGETS FOR HARD RED WINTER WHEAT
Quality Targets Steering Committee
Accepted PNW WQC 2007, Salt Lake City

Grain Quality Parameter	
Test Weight (lb/bu)	≥60
Kernel Hardness (SKCS 4100)	60-80
Kernel Diameter (mm) (SKCS 4100)	≥2.4
Kernel Weight (mg) (SKCS 4100)	≥30
Falling Number (seconds) (in absence of sprout)	≥ 300
Protein (%, 12% mb)	≥12.0
Ash (%, 12% mb) [1]	≤1.30

Flour Quality Parameter	
Protein (%, 14% mb) [2]	≥11.0
Flour Yield (%) [3]	≥68.0
Flour Ash (%) [1]	≤0.37
Mill Score [1]	≥85
Gluten Index (%, 14% mb)	≥95
SDS Sedimentation (cc/g, 14% mb) [4]	≥175
Farinograph Absorption (%, 14% mb) [5]	≥62.0
Farinograph Peak (%, 14% mb) [5]	4.0-8.0
Farinograph Stability (minutes) [5]	10.0-16.0
Mixograph Absorption (%)	≥60.2
Mixograph Peak (min by Mixsmart)	3.7-5.7
Mixograph Tolerance (subjective by chart)	≥1.1

Baking Quality Parameter	
Bake Absorption (%)	≥63.5
Bake Mix Time (min)	3.0-5.0
Bread Loaf Volume (cc)	≥870
Bread Crumb Grain (subjective, 1-good 9-poor)	≤5

[1] Adjusted for lower PNW whole wheat ash observed
[2] "Protein Differential" --the difference between wheat and flour is greater on the Western Wheat
[3] Western Wheat Quality Lab Quadrumat Milling System.
[4] Micro Method, 0.5g
[5] 50-gram mixing bowl. NOTE: Limited WWQL Data--Midwest numbers used

- 110 -

QUALITY TARGETS FOR SOFT WHITE WHEAT

Quality Targets Steering Committee

Adopted January 25, 2005, Portland, OR

		WWQL Data N=1249		PNW WQC Data N=78		SRW WQC N=83	
		Quad Milled G&E Data		Miag Milled Released Varieties*		Miag Milled	
		Means	STD	Means	STD	Means	STD
Grain Quality Parameter		Varieties representing 80% of PNW Crop					
Test Weight (lb/bu)	>60	61.4	1.6	62.0	1.5		
Kernel Hardness (SKCS 4100)	≤ 45 ?<35?	31.2	10.5	28.2	10.3		
Kernel Diameter (mm) (SKCS 4100)	>2.5	2.67	0.27	2.73	0.1823		
Kernel Weight (mg) (SKCS 4100)	>35	37.93	5.7	39.07	5.4551		
Falling Number (seconds) (in absence of sprout)	≥ 300						
Protein (%, 12% mb)	10.5	10.6	1.7	11.0	1.4		
Ash (%, 12% mb)	≤1.30	1.37	0.16	1.34	0.1249		
Flour Quality Parameter							
Protein (%, 14% mb) [1]	<8.71	9.0	1.6	9.3	1.3	8.6	1.2
Ash (%, 14% mb) at 67% extraction [2]	<0.38	0.39	0.05	0.45	0.05	0.40	0.40
Flour Yield (%) [2]	>68.15	68.2	2.6	77.2	1.0		
Break flour yield (%) [2]	>46.75	48.6	3.3	26.9	2.9		
Milling Score [2]	>83.47	83.0	3.9				
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	55.1	2.5	54.8	2.0	54.5	1.5
Color / Polyphenol Oxidase (L-DOPA A_{475})	<0.5	0.840	0.290	0.870	0.370		
Solvent Retention Capacity: Water (%)	<58	55.6	2.8	55.6	2.8	53.0	2.8
Solvent Retention Capacity: Carbonate (%)	<75	72.0	4.2	72.6	3.5	72.6	5.2
Solvent Retention Capacity: Sucrose (%)	<95	95.4	7.1	97.2	6.5	93.2	11.4
Solvent Retention Capacity: Lactic acid (%)	60-170	107.8	23.4	96.0	16.8	104.3	14.4
SDS Sedimentation Volume (mL/g) @ 8.7% protein	7.0-14.0	11.2	4.1	11.0	3.4	9.1	2.5
Sugar-Snap Cookie Diameter (cm) @ 8.7% protein	9.3	9.34	0.27	9.25	0.26	9.20	0.35
Sponge Cake Volume (cc)	1280	1274	69	1249	67	1314	62

[1] "Protein Differential" --the difference between wheat and flour is greater on the Western Wheat

[2] Western Wheat Quality Lab Quadrumat Milling System.

[3] 50-gram mixing bowl.

* Varieties with over 10K acres

- 111 -

QUALITY TARGETS FOR CLUB WHEAT
Quality Targets Steering Committee
Adopted January 25, 2005, Portland, OR

Grain Quality Parameter	
Test Weight (lb/bu)	>58
Kernel Hardness (SKCS 4100)	≤ 45?35
Kernel Diameter (mm) (SKCS 4100)	>2.36
Kernel Weight (mg) (SKCS 4100)	>35
Falling Number (seconds) (in absence of sprout)	≥ 300
Protein (%, 12% mb)	<10
Ash (%, 14% mb)	≤1.30

Flour Quality Parameter	
Protein (%, 14% mb) [1]	<8.3
Ash (%, 14% mb) at 67% extraction [2]	<0.39
Flour Yield (%) [2]	>69.2
Break flour yield (%) [2]	>50.64
Milling Score [2]	>84.62
Wet Gluten (%, 14% mb)	<26
Farinograph Absorption (%, 14% mb) [3]	<52.0
Farinograph Stability (minutes) @ 8.3% protein [3]	<2.0
Mixograph Absorption (%) @ 8.3% protein	<50
Color / Polyphenol Oxidase (L-DOPA A_{475})	<0.5
Solvent Retention Capacity: Water (%)	<56.0
Solvent Retention Capacity: Carbonate (%)	<72.0
Solvent Retention Capacity: Sucrose (%)	<93
Solvent Retention Capacity: Lactic acid (%)	<72.0
SDS Sedimentation Volume (mL/g) @ 8.3% protein	< 5.0

Sugar-Snap Cookie Diameter (cm) @ 8.3% protein	9.4

Sponge Cake Volume (cc)	1300

[1] "Protein Differential" --the difference between wheat and flour is greater on the Western Wheat Quality Lab Quadrumat Milling System than typical of commercial mills.
[2] Western Wheat Quality Lab Quadrumat Milling System.
[3] 50-gram mixing bowl.

- 112 -

WHEAT PRODUCTION IN THE PNW

Compiled by Stacey Sykes and Dr. Craig F. Morris
USDA-ARS Western Wheat Quality Lab, Pullman, WA. January, 2017

Winter Wheat (all classes)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
millions of bushels										
OR 40.4	45.0	42.0	54.3	63.5	51.8	48.4	40.7	34.5	35.5	
ID	51.8	60.0	56.7	58.2	63.1	59.2	61.9	58.4	57.4	66.7
WA	108.2	96.3	96.8	118.0	129.8	118.6	114.5	85.3	89.0	130.3
Total	200.4	201.3	195.5	230.5	256.4	229.6	224.8	184.4	180.9	232.5

Spring Wheat (all classes)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
millions of bushels										
OR 6.4	7.7	6.9	9.5	11.0	5.8	5.5	3.7	4.7	4.4	
ID	30.6	37.4	40.8	48.6	52.1	38.0	39.3	34.6	29.8	34.4
WA	20.6	21.2	26.3	29.9	38.1	27.8	29.7	23.2	22.5	27.0
Total	57.6	66.3	74.0	88.0	101.2	71.6	74.5	61.5	57.0	65.8

Total Wheat (all classes)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
millions of bushels										
OR 46.8	52.6	49.0	63.7	74.5	57.6	53.9	44.4	39.2	39.9	
ID	83.7	97.4	99.1	108.1	116.0	98.0	101.8	93.7	87.9	101.9
WA	128.7	117.5	123.1	147.9	167.9	146.3	144.2	108.5	111.5	157.3
Totals										
PNW	259.2	267.5	271.2	319.7	357.8	301.9	299.9	246.6	238.6	299.1
US 2066.7	2500.0	2217.0	2207.0	1999.3	2269.1	2127.5	2035.4	2051.7	2309.7	

Sources: USDA National Agricultural Statistics Service, and the Idaho, Oregon and Washington State Statistics Services.

- 113 -

Leading Soft White Common and Club Varieties in the PNW - Idaho

	2008	2009*	2010	2011	2012*	2013	2014*	2015*	2016
acreage in '000 ($ denotes spring variety, © denotes club variety, # denotes that individual varieties are planted together as mixtures)									
SY Ovation	.	-	.	.	-	60	-	-	145
Brundage	156	-	136	141	-	93	-	-	69
Eltan	7	-	-	-	-	34	-	-	59
WB 528	43	-	51	38	-	62	-	-	32
ORCF 102	7	-	36	62	-	49	-	-	26
UI Stone $	.	-	.	.	-	.	-	-	25
Stephens	82	-	49	53	-	37	-	-	15
Alturas $	93	-	92	92	-	50	-	-	10
WB 456	.	-	12	40	-	60	-	-	5
UI Pettit $	.	-	6	37	-	52	-	-	-
Madsen	69	-	34	33	-	38	-	-	-
Diva $	.	-	.	.	-	31	-	-	-
WB 528-WB 523 #.	-	.	.	-	24	-	-	-	
Louise $	24	-	28	29	-	23	-	-	-
Coda ©	10	-	17	11	-	20	-	-	-
WB 470	37	-	24	34	-	.	-	-	-
Brundage 96	26	-	19	33	-	.	-	-	-
Lambert	32	-	16	25	-	.	-	-	-
AP Legacy	.	.	.	24	-	.	-	-	-
AP700 CL	.	-	15	17	-	.	-	-	-
Lambert-Madsen #	12	-	8	15	-	.	-	-	-
Penawawa $	29	-	26	14	-	.	-	-	-
Nick $	13	-	25	12	-	.	-	-	-
Xerpha	.	-	22	12	-	.	-	-	-
Malcolm	7	-	5	9	-	.	-	-	-
Alpowa $	21	-	10	7	-	.	-	-	-
Clearfirst	9	-	22	6	-	.	-	-	-
Common Winter	585	-	535	621	-	611	-	-	440
Common Spring	190	-	193	205	-	208	-	-	750
Club	25	-	32	21	-	26	-	-	10

* No variety survey was conducted in 2009, 2012, 2014, or 2015.

- 114 -

Leading Soft White Common and Club Varieties in the PNW - Oregon

	2008	2009	2010	2011	2012*	2013	2014	2015	2016*
acreage in '000 ($ denotes spring variety, © denotes club variety, # denotes that individual varieties are planted together as mixtures)									
ORCF 101	126	153	187	199	-	382	336	309	-
ORCF 102	19	34	67	118	-	102	169	122	-
Ovation	.	.	.	.	-	6	72	84	-
Mary	.	.	.	.	-	9	51	55	-
WB 528	.	.	.	.	-	22	57	34	-
Diva $	.	.	.	.	-	38	42	31	-
Bobtail	.	.	.	.	-	.	.	26	-
Cara ©	.	.	-	2	-	6	9	18	-
WB 1035CL $	.	.	.	.	-	11	16	16	-
LCS Artdeco	.	.	.	.	-	.	-	14	-
Louise $	13	12	15	26	-	15	25	13	-
Kaseberg	-	-	-	-	-	-	11	12	-
Legion	.	.	.	.	-	74	35	9	-
Yamhill	3	7	4	4	-	5	3	7	-
Tubbs	134	133	100	4	-	5	2	6	-
Stephens	246	170	118	95	-	37	26	5	-
Skiles	.	.	.	10	-	31	9	5	-
AP700CL	-	7	11	6	-	1	5	5	-
Babe $	.	.	-	3	-	9	8	3	-
Coda ©	6	6	13	8	-	10	-	2	-
Rosalyn	.	.	.	.	-	.	.	2	-
Rod	2	4	-	2	-	2	2	2	-
WB 6341 $	.	.	.	.	-	.	.	1	-
Goetze	-	29	93	96	-	7	11	-	-
Tubbs 06	16	67	96	151	-	11	9	-	-
Alpowa $	77	36	44	44	-	17	7	-	-
Brundage 96	1	2	3	5	-	2	3	-	-
Madsen	38	25	11	4	-	1	-	-	-
Common Winter	744	725	790	782	-	721	810	729	-
Common Spring	113	74	73	97	-	96	102	64	-
Club	10	11	14	14	-	-	-	-	-

* No variety survey was conducted in 2012 or 2016.

- 115 -

Leading Soft White Common and Club Varieties in the PNW - Washington

	2008	2009	2010	2011	2012*	2013	2014	2015	2016
acreage in '000 ($ denotes spring variety, © denotes club variety, # denotes that individual varieties are planted together as mixtures; the leading mixtures are noted)									
SY Ovation	.	.	.	.	-	103	131	187	248
Otto	-	-	-	-	-	-	125	222	221
ORCF-102	62	167	166	237	-	235	265	218	209
Bruehl ©	89	97	169	165	-	110	114	147	188
Curiosity CL+	-	-	-	-	-	-	-	21	145
Xerpha	-	-	140	115	-	148	161	126	119
WB 1529	-	-	-	-	-	-	-	32	71
WB 6121 $	-	-	-	-	-	-	12	50	67
Eltan	337	372	238	202	-	140	107	53	61
ARS Crescent ©	-	-	-	-	-	-	18	41	61
Louise $	155	179	161	192	-	94	39	84	54
WB 528	32	68	84	85	-	125	108	98	46
LCS Artdeco	.	.	.	.	-	6	7	31	44
Diva $	.	.	.	.	-	73	117	71	37
Whit $	-	-	3	7	-	25	36	40	35
Mela CL+	-	-	-	-	-	-	-	6	31
Puma	-	-	-	-	-	-	-	-	24
WB 1035CL+ $	.	.	.	.	-	19	37	15	23
JD $©	.	.	.	6	-	5	15	11	22
WB 523	-	-	7	9	-	46	33	23	21
WB 6341 $	-	-	-	-	-	-	9	25	21
WB 1604	-	-	-	-	-	-	-	9	19
Madsen	125	92	63	46	-	37	46	27	17
SY 107	-	-	-	-	-	-	27	30	16
Babe $	.	.	.	4	-	27	20	13	16
Brundage 96	34	32	39	48	-	46	18	25	14
Masami	25	18	13	18	-	13	21	10	11
WB 1376CLP	-	-	-	-	-	-	-	-	11
WB 1070CL	.	.	.	.	-	36	26	19	9
Bruneau	.	.	.	.	-	12	9	7	8
Bobtail	-	-	-	-	-	-	-	21	8
Coda ©	5	3	7	6	-	18	5	6	3
ORCF-103	-	-	20	46	-	82	71	48	-
Legion	-	-	2	5	-	31	19	16	-
Stephens	79	47	21	25	-	20	15	14	-
AP700CL	4	13	48	54	-	49	38	13	-
WB 456	-	-	5	8	-	21	20	11	-
Skiles	.	.	.	2	-	18	15	10	-

- 116 -

WB 1081CL	-	-	-	-	-	-	9	9	-
Chukar ©	15	16	18	13	-	3	2	2	-
Nick $	59	48	58	62	-	28	17	-	-
Cara ©	-	-	8	18	-	33	13	-	-
SY Steelhead $	-	-	-	-	-	-	12	-	-
Rod	15	6	5	6	-	11	10	-	-
Tubbs 06	13	10	16	9	-	10	9	-	-
WB Junction	.	.	.	.	-	12	6	-	-
AP Legacy	-	-	6	14	-	10	-	-	-
AP Badger	.	.	.	5	-	9	-	-	-
Imi Bruehl ©	.	.	.	.	-	8	-	-	-
Alpowa $	56	50	13	16	-	-	-	-	-
ORCF 101	75	24	10	11	-	-	-	-	-
Tubbs	52	53	32	10	-	-	-	-	-
SWW Mixtures #	326	315	329	250	-	-	-	-	-
Trifecta Mix	.	.	.	35	-	57	43	37	33
Eltan-Tubbs	70	75	29	31	-	-	-	-	-
Eltan-Xerpha	-	-	20	30	-	-	-	-	-
Rod-Madsen	55	38	27	18	-	-	-	-	-
Eltan-Madsen	38	31	14	12	-	-	-	-	-
Rod-Tubbs	68	60	30	10	-	-	-	-	-
Other Varieties/Mixes	.	.	.	107	-	22	24	27	67
TOTALS									
Common Winter	1382	1358	1303	1328	-	1292	1365	1349	1454
Common Spring	246	289	256	300	-	270	302	304	252
Club (winter+spr)	131	136	240	240	-	179	172	207	274

* No variety survey was conducted in 2012.

Leading Hard Red Winter & Spring Wheat Varieties in the PNW

	2008	2009*	2010	2011	2012*	2013	2014*	2015*	2016
acreage in '000									
Idaho									
Keldin	-	-	-	-	-	-	-	-	26
Garland	9	-	16	9	-	21	-	-	-
Rimrock	.	-	.	.	-	20	-	-	-
Utah 100	24	-	28	22	-	-	-	-	-
Promontory	34	-	36	22	-	-	-	-	-
Boundary	41	-	13	16	-	-	-	-	-

Leading Hard Red Winter & Spring Wheat Varieties in the PNW (continued)

	2008	2009*	2010	2011	2012*	2013	2014*	2015*	2016
acreage in '000									
Idaho (continued)									
Eddy	34	-	25	15	-	-	-	-	-
Moreland	27	-	12	13	-	-	-	-	-
Weston	17	-	13	12	-	-	-	-	-
Juniper	.	-	6	10	-	-	-	-	-
Bonneville	21	-	12	10	-	-	-	-	-
Deloris	22	-	6	8	-	-	-	-	-
Total HRW	260	-	214	173	-	156	-	-	-
Jefferson	56	-	66	70	-	91	-	-	84
Bullseye	-	-	-	-	-	-	-	-	10
Westbred 936	142	-	124	123	-	-	-	-	-
Cabernet	.	-	9	18	-	-	-	-	-
Westbred 926	12	-	7	10	-	-	-	-	-
Tara 2002	21	-	14	10	-	-	-	-	-
Total HRS	270	-	258	275	-	169	-	-	-

* No variety survey was conducted in 2009, 2012, 2014, or 2015.

Oregon									
Northwest 553	-	2	17	18	-	14	10	13	-
Azimut	.	.	.	.	-	.	-	5	-
SY Clearstone CL	.	.	.	.	-	.	.	4	-
Keldin	-	-	-	-	-	1	1	3	-
Colonia	.	.	.	.	-	.	.	1	-
Brawl CL	.	.	.	.	-	.	.	1	-
Sinope	.	.	-	2	-	-	-	-	-
Declo	2	5	4	1	-	-	-	-	-
Boundary	5	2	1	1	-	-	-	-	-
Paladin	2	4	4	-	-	-	-	-	-
Finley	3	2	-	-	-	-	-	-	-
Other Varieties	6	10	11	12	-	-	9	-	-
Total HRW	25	24	37	34	-	17	20	28	-

- 118 -

Leading Hard Red Winter & Spring Wheat Varieties in the PNW (continued)

	2008	2009*	2010	2011	2012*	2013	2014*	2015*	2016
acreage in '000									
Oregon (continued)									
Buck Pronto	.	.	-	4	-	1	6	7	-
Glee	.	.	.	.	-	.	.	7	-
Jefferson	27	17	18	11	-	3	2	7	-
Kelse/Glee blend	.	.	.	.	-	.	.	5	-
Solano	3	2	6	7	-	3	8	3	-
Expresso	.	.	-	6	-	2	-	2	-
Steelhead	.	.	.	.	-	.	.	1	-
Kelse	.	.	.	.	-	.	.	1	-
Yecora Rojo	6	3	3	7	-	1	1	-	-
Rockland	-	-	-	-	-	1	1	-	-
Hank	9	7	6	6	-	-	-	-	-
Cabernet	-	6	4	4	-	-	-	-	-
Express	7	2	15	1	-	-	-	-	-
Other varieties	9	7	11	15	-	1	3	-	-
Total HRS	67	44	62	61	-	12	21	33	-

* No variety survey was conducted in 2012 or 2016.

Washington									
Keldin	-	-	-	-	-	-	5	36	99
SY Clearstone 2CL-	-	-	-	-	-	-	11	31	
LCS Jet	-	-	-	-	-	-	-	-	26
LCS Azimut	-	-	-	-	-	19	12	25	19
Farnum	-	-	11	58	-	38	50	29	18
WB Arrowhead	.	.	.	.	-	8	14	11	14
Whetstone	-	-	1	11	-	37	29	29	13
LCS Colonia	-	-	-	-	-	-	-	-	13
Norwest 553	-	-	-	16	-	68	74	44	7
Sprinter	-	-	-	-	-	-	-	13	-
Esperia	.	.	.	.	-	7	26	-	-
AP 503CL2	.	.	.	.	-	10	16	-	-
Bauermeister	75	51	30	11	-	5	-	-	-
Declo	23	18	11	11	-	3	-	-	-
Eddy	31	32	34	17	-	3	-	-	-
Total HRW	255	213	222	213	-	215	228	218	243

- 119 -

Leading Hard Red Winter & Spring Wheat Varieties in the PNW (continued)

	2008	2009	2010	2011	2012*	2013	2014	2015	2016
acreage in '000 (# denotes that individual varieties are planted together as mixtures)									
Washington (continued)									
Glee	.	.	.	.	-	4	41	51	42
WB Expresso	1	3	10	16	-	56	34	45	39
WB 9518	-	-	-	-	-	-	9	18	35
Kelse	-	-	1	18	-	46	44	14	32
Buck Pronto	20	14	12	17	-	22	21	24	18
Solano	23	18	15	14	-	33	25	26	16
SY605CL	.	.	.	.	-	10	15	12	11
SY Steelhead	-	-	-	-	-	-	-	8	7
WB Fuzion	.	.	.	10	-	10	11	12	-
Hollis	35	37	26	33	-	5	-	4	-
Jefferson	23	36	29	35	-	21	27	-	-
Cabernet	8	8	5	17	-	10	10	-	-
Tara 2002	12	28	32	14	-	3	-	-	-
Hank	41	56	45	20	-	-	-	-	-
Express	9	17	6	17	-	-	-	-	-
Total HRS	302	293	277	307	-	224	251	222	214

* No variety survey was conducted in 2012.

Hard White Wheat Varieties in the PNW

	2008	2009*	2010	2011	2012*	2013	2014*	2015*	2016
acreage in '000 ($ denotes spring variety)									
Idaho									
WB Paloma $	-	-	-	-	-	-	-	-	15
Snow Crest $	10	-	23	16	-	27	-	-	-
Klasic $	49	-	60	89	-	24	-	-	-
WB Idamax $	-	-	5	14	-	-	-	-	-
Pristine $	11	-	11	-	-	-	-	-	-
Total Hard White	77	-	108	135	-	91	-	-	-

* No variety survey was conducted in 2009, 2012, 2014, or 2015.

- 120 -

Hard White Wheat Varieties in the PNW (continued)

Washington									
WB Hartline $	.	.	.	.	-	6	-	3	1
Dayn $	-	-	-	-	-	-	-	5	1
BR7030 $	-	-	5	13	-	15	30	-	-
Blanca Grande $	5	-	-	-	-	-	-	-	-
Total Hard White	13	12	12	23	-	20	35	8	2

* No variety survey was conducted in 2012.

Durum Wheat in the PNW

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Idaho	.	.	.	.	-	26	11	10	10
Oregon	.	.	.	.	-	-	-	-	-
Washington	.	.	.	.	-	-	-	-	-

- 121 -

Cultivar Name	State Line No.	Market Class	PI No.	Other Identifier
Above	CO980894	HRW	PI 631449	PVP 200200206
Accipiter	DH00-18-196	HRW	PI 663207	PVP 201100370
AgriPro Paladin	W96-355	HRW	PI 643094	PVP 200600240
Albany	06MSP18	HRS	PI658002	PVP 200900283
Albion	GT00123M	SWW	PI 608582	PVP 9900146
Alkabo	D96604	DURUM	PI 642020	PVP 200600105
Alpowa	WA7677	SWS	PI 566596	
Alsen	ND716	HRS	PI 615543	PVP 200100066
Alturas	IDO526	SWS	PI 620631	PVP 200200265
Alum	WA8166	HRS	PI 676289	PVP 201600077
Alzada	YU894-75	DURUM	PI 634820	PVP 200400162
Amidon	ND606	HRS	PI 527682	
Anton	NW98S097	HWW	PI 651044	PVP 200800301
Anza	D6923	HRS	CItr 15284	
AP Badger	RemPop80-3	SWW	PI 658543	PVP 201000078
AP Legacy	ORF2BC9800267-0	SWW	PI 658008	PVP 200900300
AP502 CL	CO980889	HRW	PI 632374	PVP 200300044
AP503 CL2	CLO 3040-5-2	HRW	PI 654423	PVP 200800322
AP700 CL	OSUPOP 28-13	SWW	PI 654424	PVP 200800323
Arapahoe	NE82656	HRW	PI 518591	PVP 8900295
Arlin	KSSB369-7	HWW	PI 564246	PVP 9300123
ARS-Amber	ARS96277L	SWW	PI 665047	
ARS-Chrystal	ARS970075-3C	Club-W	PI 665049	
ARS-Crescent	ARS970163-4C	Club-W	PI 665048	
ARS-Selbu	ARS970161-3L	SWW	PI 667744	X970161-3L
Babe	WA8039	SWS	PI 656791	PVP 201100010
Bannock	IDO028	HRS	CItr 15318	
Basin	WA7520	SWW	PI 601238	PVP 8500177
Bauermeister	WA7939	HRW	PI 634717	PVP 200600245
Beamer	BZ6W93-481	SWW		
Bearpaw	MTS0721	HRW	PI 665228	PVP 201200407
Betty	KS84063-2W	HWW	PI 612578	PVP 200000155
Bighorn	78W296	HRW	PI 601204	PVP 8500109
BigSky	MT9432	HRW	PI 619166	PVP 200300290
Bill Brown	CO01385-A1	HRW	PI 653260	PVP 200800327
Bitterroot	ID92-22407A	SWW	PI 655042	PVP 200800411
Blanca Fuerte	02W500274	HWS	PI 655032	PVP 200800398
Blanca Grande	96WV53620	HWS	PI 631481	PVP 200200240
Blanca Royale	02W50076-W	HWS	PI 655033	PVP 200800399
Bliss	IDO172	SWS	PI 486350	
Blizzard	IDO297	HRW	PI 512302	
Bobtail	OR08047P94	SWW	PI 673133	PVP 201400488

- 122 -

Cultivar Name	State Line No.	Market Class	PI No.	Other Identifier
Bonneville	IDO421	HRW	PI 557015	PVP 9400231
Bonus	RSI31206	HRS	PI 619428	PVP 9900402
Borah	IDO0043	HRS	CItr 17267	
Boundary	IDO467	HRW	PI 603039	
Brawl CL Plus	CO06052	HRW	PI 664255	PVP 201200434
Bruehl	WA7833	Club-W	PI 606764	PVP 200100258
Brundage	ID86-14502B	SWW	PI 599193	PVP 9800376
Brundage 96	ID-B-96	SWW	PI 631486	PVP 200200245
Bruneau	ID93-64901A	SWW	PI 664304	PVP 201200014
Buchanan	WA7523	HRW	PI 532994	
Buck Pronto	T1052	HRS	PI 619397	PVP 200100067
Bullseye	B02-0081	HRS	PI 658036	PVP 200900414
Butte	ND519	HRS	CItr 17681	
Butte 86		HRS		
Bynum	MTCL0318	HRW	PI 643429	PVP 200600285
Byrd	CO06424	HRW	PI 664257	PVP 201200432
Cabernet	95WV10616	HRS	PI 646196	PVP 200700161
Cal Rojo	00WB80404	HRS	PI 651032	PVP 200700443
Calorwa	WUC657	Club-S	PI 566594	
Cara	ARS97-135-9	Club-W	PI 643435	
Carter	BZ9W022060	HRW		
Cashup		SWW	PI 601237	PVP 8500178
Cataldo	IDO642	SWS	PI 642361	
CDC Falcon	S94-4	HRW	PI 619610	PVP 200100279
Centennial	IDO312	SWS	PI 537303	PVP 9000218
Challis	BZ692-108	SWS	PI 630935	PVP 200200105
Chet	WA8165	HRS	PI 676288	PVP 201600076
Choteau	MT9929	HRS	PI 633974	PVP 200400035
Chukar	WA7855	Club-W	PI 628641	PVP 200300326
Clear White	UC 1361	HWS	PI 635044	PVP 200400244
ClearFirst		SWW	PI 636458	PVP 200400053
Coda	WA7752	Club-W	PI 594372	
Columbia-1	W9123321	HRW		
Conan	5700107	HRS	GSTR 11801	
Concept	89S*88D	SWW	PI 644021	PVP 200600278
Crown	D3117	DURUM	PI 614671	PVP 200000312
Curiosity CL+	WA8143	SWW	PI 675007	PVP 201500290
Curlew	UT932555	HRW	PI 663157	
Dayn	WA8123	HWS	PI 666941	PVP 201300130
Dash 12	DA998-12	HRS	PI 644068	PVP 200700018
Daws	WA6099	SWW	CItr 17419	
Decade	MT0552	HRW	PI 660291	PVP 201100096

- 123 -

Cultivar Name	State Line No.	Market Class	PI No.	Other Identifier
Declo	215-B	HRW	PI 619419	PVP 200100249
Deloris	UT2030-32	HRW	PI 631447	
Denali		HRW	PI 664256	PVP 201200433
Desert King		DURUM	PI 638726	PVP 200500187
DG Star		DURUM		
Dirkwin	IDO106	SWS	CItr17745	
Diva	WA8090	SWS	PI 660663	PVP 201100268
Divide	D9715-11	DURUM	PI 642021	PVP 200600106
Dumas	M95-385	HRW	PI 619199	PVP 200100218
Dune	ID9120503A	SWW		
Duraking		DURUM	PI 561928	PVP 9200227
DW	IDO513	HRW	PI 620629	PVP 200200151
Earl	WA8184	HWW		
Eddy	BZ9W96-788-e	HRW	PI 643423	PVP 200600277
Eden	WA7902	Club-S	PI 630983	PVP 200300264
Edwall	WA6831	SWS	PI 477919	
Edwin	WA7834	Club-W	PI 606765	
Elkhorn	ND8933	HRW	PI 596352	PVP 9700319
Eltan	WA7431	SWW	PI 536994	
Erhardt	MT8719	HRW	PI 564761	
Ernest Lemaire	T-1064	HRS	PI 352291	
Expedition	SD97457	HRW	PI 629060	PVP 200400245
Explorer	MTHW9710	HWS	PI 619086	PVP 200300182
Express	DA984034	HRS	PI 573003	PVP 9000012
Expresso	DA984-034SRR	HRS	PI 651616	PVP 200800002
F1182-M1-10		Club		
Fairview	IDO338	HRW	PI 557017	
Farnum	WA7975	HRW	PI 638535	PVP 200900327
Federation	CItr 4734	SWS	PI 41080	
Fergus	TR983-239	HRS	PI 587198	PVP 9500093
Fieldwin	IDO087	SWS	CItr 17425	
Finch	WA7853	SWW	PI 628640	PVP 200300327
Fineway	FX001B	HRW	PI 653509	
Finley	WA7773	HRW	PI 586757	
Foote	OR880172	SWW	PI 599663	
Fortissimo		DURUM	PI 651031	PVP 200700442
Fortuna		HRS	CItr13596	
Garland	UT1706-1	HRW	PI 583291	PVP 9400178
Gary	IDO550	HWW	PI 620632	PVP 200200152
Gene	OR8300801	SWW	PI 560129	
Genou	MTS0031	HRW	PI 640424	PVP 200500334
George	GMGQ1	SWW	PI 639737	PVP 200500288

- 124 -

Cultivar Name	State Line No.	Market Class	PI No.	Other Identifier
Glee	WA8074	HRS	PI 666940	PVP 201300129
Glenn	ND747	HRS	PI 639273	PVP 200500280
Goetze	ORH010920	SWW	PI 655029	PVP 200800393
Golden Spike	UT1944-158	HWW	PI 614813	PVP 200100033
Greenville	UT9743-42	HRW	PI 665932	PVP 201200470
Grenora	D97780	DURUM	PI 642022	PVP 200600107
Hank	BZ992-322	HRS	PI 613585	PVP 200000191
Hatcher	CO980607	HRW	PI 638512	PVP 200500340
Hatton	WA6364	HRW	CItr17772	
Havasu	PH896-21	DURUM	PI 644065	PVP 200700015
Hayden	IDO465	HRW	PI 608040	
Helios		DURUM	PI 670000	PVP 201400051
Heyne	KS85W663-42	HWW	PI 612577	PVP 200000154
Hi-Line	MT8402	HRS	PI 549275	
Hill 81	OWW68007-2M6	SWW	CItr17954	
Hiller	WA7729	Club-W	PI 587026	
Hollis	WA7859	HRS	PI 632857	
Hubbard	ID86-10420A	SWW	PI 632273	PVP 200300007
Hyalite	MTCL0306	HWW	PI 643978	PVP 200600291
Idaho 266	IDO266	SWS	PI 561074	
Idaho 352	IDO352	HRW	PI 557012	
Idaho 364	IDO364	HRW	PI 578276	
Idaho 377s	IDO377s	HWS	PI 591045	PVP 9500250
Idaho 443	IDO443	HRW	PI 578277	
Idaho 444	IDO444	HRW	PI 578278	
Idaho 472	IDO472	SWS	PI 592987	
IDO442	IDO442	HRW	PI 557016	
IDO488	IDO488	SWS	PI 592986	
IDO545	IDO545	HRS	PI 632710	
IDO556	IDO556	Club-S	PI 620633	A91329S-22
IDO562	IDO562	HRW	PI 632711	
IDO563	IDO563	SWS	PI 620634	A95631-S-Js-4-2
IDO569	IDO569	SWS	PI 620635	
IDO571	IDO571	HRW	PI 620636	A781011W-1-4
IDO576	IDO576	SWS	PI 620637	A9495W-G-1
IDO580	IDO580	HWS	PI 620638	A96203S-D-11
IDO586	IDO586	HWS	PI 632713	
IDO587	IDO587	SWW	PI 634567	PVP 200400096
IDO602	IDO602	HRS	PI 620628	A93324S-76kbr
IDO623	IDO623	SWW		
IDO629	IDO629	SWS-waxy	PI 642365	AOO149S-4
IDO630	IDO630	SWS-waxy	PI 642364	A99139-wxy-A-1

- 125 -

Cultivar Name	State Line No.	Market Class	PI No.	Other Identifier
IDO644	IDO644	SWS	PI 660549	A97067S-C-3
IDO686	IDO686	SWS	PI 660561	A01605S-B-1-4
IDO687	IDO687	SWS	PI 660562	A99038S-H-1
IDO702	IDO702	HRS	PI 660563	A99372S-F-10
Ike	KS89H48	HRW	PI 574488	PVP 9400149
Iona	IDO492	HRS	PI 618734	
Ivory	OR850513	HWW	PI 599664	
Jagalene	W98-362	HRW	PI 631376	PVP 200200160
Jagger	KS84063-9-39-3	HRW	PI 593688	PVP 9500324
Jake		HRS		
Jasper	WA8169	SWW		
JD	WA8047	Club	PI 656790	PVP 201100009
Jedd	BZ9M03-1044	HRS	PI 653530	PVP 200800169
Jefferson	IDO462	HRS	PI 603040	
Jerome	IDO566	HRS	PI 632712	PVP 200400097
Jerry	ND9257	HRW	PI 632433	
Joaquin	YU999-178	HRS	PI 644066	PVP 200700016
Jubilee	IDO525	SWS	PI 614839	PVP 200100167
Judee	MTS0713	HRW	PI 665227	PVP 201200161
Judith	MT8039	HRW	PI 584526	
Juniper	IDO575	HRW	PI 639951	
Kaseberg	OR2071628	SWW	PI 669570	PVP 201300487
Keldin	ACS55017	HRW	PI 669490	PVP 201300462
Kelse	WA7954	HRS	PI 653842	PVP 200900351
Kern		HRS	PI 612142	PVP 200000047
Klasic	NKF08022	HWS	PI 486139	PVP 8200095
Kronos	D03-21	DURUM	PI 576168	PVP 9400033
Kulm	ND671	HRS	PI 590576	PVP 9500233
KW9043	KW9043	SWW	PI 639106	
Ladd	OR2070870	SWW	PI 669569	PVP 201300486
Lakin	KS96HW115	HWW	PI 617032	PVP 200200049
Lambert	ID85-153	SWW	PI 583372	
Larry	KS060143K-2	HRW		
Lassik		HRS	PI 653535	PVP 200800176
LCS Artdeco	NSA06-2153A	SWW	PI 667102	PVP 201300198
LCS Atomo		HWS	PI 673944	PVP 201500011
LCS Azimut		HRW		
LCS Biancor		SWW		
LCS Colonia	NIC05-4711-B	HRW	PI 673087	PVP 201400489
LCS Drive		SWW		
LCS Evina		HRW		
LCS Jet	NSA10-7208	HRW		

- 126 -

Cultivar Name	State Line No.	Market Class	PI No.	Other Identifier
LCS Luna	10SB0087-B	HRS		
LCS Powerplay	09FSP18	HRS	PI 665019	PVP 201200204
LCS Silk	12-SW-068	SWS		
LCS Star	08SB0658-B	HWS	PI 673945	PVP 201500012
Ledger	BZ9W96-788-d	HRW	PI 642315	PVP 200600063
Legion	99X1009-23	SWW	PI 658035	PVP 200900413
Leona		Waxy-S		
Levante		DURUM		
Lewjain	WA6363	SWW	CItr 17909	
LHS	IDO835	HWW	PI 660547	
Lolo	IDO533	HWS	PI 614840	
Louise	WA7921	SWS	PI 634865	PVP 200500311
Lucin-CL	UT10322	HWW	PI 663156	PVP 201100464
Macon	WA7899	HWS	PI 617072	PVP 200200130
MacVicar	ORF75336	SWW	PI 552427	
Madsen	WA7163	SWW	PI 511673	
Maestrale		DURUM		
Maier	D89135	DURUM	PI 607531	PVP 9900265
Malbec	RSI50603	HRS	PI 661105	PVP 201100038
Malcolm	ORCW8113	SWW	PI 497672	
Manning	UT89099	HRW	CItr 17846	
Mary	OR2040726	SWW	PI 666373	PVP 201200472
Masami	WA7916	SWW	PI 634715	PVP 200600244
Matt	D95-434	DURUM	PI 614136	PVP 200000301
McNeal	MT8849	HRS	PI 574642	
MDM	WA7936	HWW	PI 634716	PVP 200600246
Mel	CDH01	Club-W	PI 636459	PVP 200400052
Mela CL+	WA8155	SWW	PI 675008	PVP 201500291
Melba	WA8193	Club-S		
Meridian	IDO360	HRW	PI 557013	PVP 9300027
Millennium	NE94479	HRW	PI 613099	PVP 200100236
Miwok		DURUM	PI 670040	PVP 201400031
MJ-4	MJ-4	SWW		
MJ-9	MJ-9	SWW		
ML455 ('455')	ML107455	HWS	PI 607570	PVP 9900251
Mohler	BU6W93-477	SWW	PI 635996	PVP 200400304
Moreland	IDO517	HRW	PI 620630	PVP 200200266
Morgan		HRW		
Moro	AUS 11865	Club-W	CItr 13740	
MT1159CL	MTCL01159	HRW	PI 641221	PVP 200500347
MTHW9420	MTHW9420	HWS	PI 612605	PVP 200000138
Neeley	IDO158	HRW	CItr 17860	

- 127 -

Cultivar Name	State Line No.	Market Class	PI No.	Other Identifier
New Dirkwin	UC1667	SWS	PI 664268	PVP 201100455
Newana	MT7156	HRS	CItr 17430	
Nick	BZ698-31	SWS	PI 638697	PVP 200500144
Normano		DURUM		
Norris	MTCL0316	HRW	PI 643430	PVP 200600286
Norstar	WT80	HRW	CItr 17735	
Norwest 553	ORN00B553	HRW	PI 655030	PVP 200800394
NuDakota	BC97ROM-50W	HWW	PI 643089	PVP 200600235
NuFrontier	W94-480W	HWW	PI 619089	PVP 200100199
NuHills	W98-363	HWW	PI 633916	PVP 200300337
NuHorizon	M95-610W	HWW	PI 619198	PVP 200100217
NuPlains	N94L205	HWW	PI 605741	PVP 200100266
NuSky	MTW9441	HWW	PI 619167	
NuWest	MT7811	HWW	PI 586806	PVP 9600342
ONeal	BZ999-592	HRS	PI 659480	PVP 201000272
ORCF-101	OR2010051	SWW	PI 633765	PVP 200300286
ORCF-101R	ORI2060306	SWW		
ORCF-102	OR2010007	SWW	PI 641787	PVP 200500337
ORCF-103	ORI2042037	SWW	PI 658153	PVP 200900464
ORSS-1757	OR9801757	SWW	PI 641786	PVP 200500336
Orita		DURUM	PI 628368	PVP 200200030
Otis	WA7931	HWS	PI 634866	PVP 200500312
Otto	WA8092	SWW	PI 667557	PVP 201300360
Outlook	MT9874	HRS	PI 632252	PVP 200400008
Owens	IDO185	SWS	CItr 17904	
Paha	WA4966	Club-W	CItr14485	
Palomino	W96-359W	HWW	PI 648023	PVP 200700247
Patwin	UC 1419	HWS	PI 643981	PVP 200600297
Paul	MT9426	HRW	PI 640425	PVP 200500335
Penawawa	WA6920	SWS	PI 495916	
Peregrine	DH99-37-100	HRW	PI 663208	PVP 201100371
Plata	96WV54013-W	HWS	PI 631482	PVP 200200241
Platinum		DURUM	PI 614670	PVP 200000311
Pomerelle	IDO448	SWS	PI 592983	
Pondera	MT479	HRS	CItr 17828	
Powerplay	10Fx Inc.1	HRS		
Pritchett		Club-W		
Promontory	UT1567-51	HRW	PI 555458	PVP 9100244
Pronto	T0001052	HRS	CItr 14078	
Prowers 99		HRW	PI 612420	PVP 200000315
Pryor	BZ9W96-919	HRW	PI 634564	PVP 200400072
Puma	WA8134	SWW	PI 670038	PVP 201400085

- 128 -

Cultivar Name	State Line No.	Market Class	PI No.	Other Identifier
Quantum 542	Q542	SWW		
Quantum 7817	XWH1017	SWW		
QCB36	OR9900553	SWW	PI 658244	
Rampart	MT592042	HRW	PI 593889	
Reeder	ND 695	HRS	PI 613586	PVP 200000211
Rely	WA7527	Club-W	PI 542401	
Residence	CEBECO01	HRW	PI 628987	PVP 2002000067
Rick	UT541774	HRS	PI 614834	
Rimrock	ACS52025	HRW	PI 664271	PVP 201100463
Ripper	CO00016	HRW	PI 644222	PVP 200700302
Rjames	GMGQ2	SWW	PI 639736	PVP 200500287
Rocky	NAPB 1316-76	HRW	CItr17879	PVP 7800013
Rod	WA7662	SWW	PI 558510	
Rohde	OR855	Club-W	PI 562529	
Rosalyn	OR2071071	SWW	PI 673132	PVP 201400487
RSI 220		SWS	PI 584322	PVP 9400282
Rudy	CI4873	SWW	CItr 4873	
Rulo	WA7622	Club-W	PI 578137	
Ryan	WA8214	SWS		
Salute	99X1008-02	SWW	PI 654425	PVP 200800324
Saragolla		DURUM		
Saxon	N93-3026	HRS	PI 608714	PVP 9800360
Scarlet	WA7802	HRS	PI 601814	PVP 200000190
Scarlet '09	WA8034	HRS		
Scholar	MT9433	HRS	PI 607557	PVP 200000144
Seahawk	WA8162	SWS	PI 676290	PVP 201600078
Semper	CEBECO02	HRW	PI 628988	PVP 200200068
Sequoia	WA8180	HRW		
Simon	ID9134302A	SWW	PI 636132	PVP 200500001
Skiles	ORH010085	SWW	PI 658154	PVP 200900465
Skookum	ML042-409-1,5	SWS		
Snow Crest	BZ998-247W	HWS	PI 642376	PVP 200600162
Snowmass	CO03W054-2	HWW	PI 658597	PVP 201000432
Spillman	WA7075	HRS	PI 506350	
Sprinter	WA8118	HRW	PI 671896	PVP 201400223
Stephens	OR332	SWW	CItr 17596	
Striker	CA9W07-818	HRW	PI 660653	PVP 201100049
Summit	96WV52305	HRS	PI 631480	PVP 200200239
Sunstar 50-30		SWS		
Sunstar II	SDM2	HRS	PI 559378	PVP 9200035
Sunstar Promise	SDM406	SWS	PI 585232	PVP 9500069
Survivor	IDO332	HRW	PI 509503	

- 129 -

Cultivar Name	State Line No.	Market Class	PI No.	Other Identifier
SY 107	03PN107#3	SWW	PI 664948	PVP 201200115
SY 483	MH07-7483	SRW	PI 664947	PVP 201200114
SY 901	MC07*7001W	SWW	PI 664944	PVP 201200111
SY Assure	04PN096-2	SWW	PI 678621	PVP 201600255
SY Basalt	SY240R	HRS	PI 672584	PVP 201400335
SY Coho	04W40292R	HRS	PI 676286	PVP 201600039
SY Capstone	03W10348	HWS	PI 665404	PVP 201200245
SY Clearstone CL2		HRW		
SY Harrison	B05*0154	SRW	PI 664946	PVP 201200113
SY Ovation	03PN-108#21	SWW	PI 662047	PVP 201100387
SY Selway	04PN3001-2	HRS	PI 676285	PVP 201600038
SY Steelhead	97S0621-05	HRS	PI 667769	PVP 201300338
SY Teton	08W10136	HWS	PI 676287	PVP 201600040
SY Touchstone	04PN028B-3	HRW	PI 678623	PVP 201600258
Sylvan	UT002464	HRS	PI 578867	
Symphony	TV10982-1	HRW	PI 583754	PVP 9400220
Tammy	W696-000	HRS	PI 601288	PVP 8600038
Tara 2002	WA7824	HRS	PI 617073	PVP 200200129
Tatanka	KS12H56-6-4	HRW		
Tekoa	WA8189	SWS		
Temple	OR92CL0054	Club-W	PI 599665	
Tempo		HRS	PI 428535	
Tiber	MT8003	HRW	PI 517194	
Tiburon	D1-2	DURUM	PI 669999	PVP 201400050
Treasure	IDO248	SWS	PI 468962	
Trego	KS95HW62-6	HWW	PI 612576	PVP 200100117
Tubbs	OR939526	SWW	PI 629114	PVP 200300287
Tubbs 06	OR939526-05	SWW	PI 651023	PVP 200700423
UI Alta Blanca	IDO628	HWS	PI 642378	
UI Castle	IDN 09-DH10	SWW	PI 675641	PVP 201600014
UI Cataldo	IDO642	SWS	PI 642361	
UI Darwin	IDO604	HWW	PI 639953	
UI Huffman		SWW		PVP 201500295
UI Lochsa	IDO597	HWS	PI 639952	
UI Magic	IDN 09-DH11	SWW	PI 678629	PVP 201600300
UI Palouse CL+		SWW		
UI Pettit	IDO632	SWS	PI 642363	
UI Platinum	IDO694	HWS	PI 672533	PVP 201400419
UI Silver	IDO658	HWW	PI 658467	PVP 201400011
UI Sparrow	IDO1108	SWW		
UI SRG	IDO656	HRW	PI 660546	
UI Stone	IDO599	SWS	PI 660550	PVP 201300342

- 130 -

Cultivar Name	State Line No.	Market Class	PI No.	Other Identifier
UI Whitmore	IDO671	SWS	PI 660548	
UI Winchester	IDO578	HRS	PI 642362	
UICF-Brundage	ID02-859	SWW	PI 660543	PVP 201100031
UICF-Grace	IDO651	HWW	PI 658468	PVP 201000086
UICF-Lambert	ID99-435	SWW	PI 660544	PVP 201100008
Utah-100	UT1650-150	HRW	PI 594920	
Utopia	DOI933	DURUM	PI 608756	PVP 9900209
Vandal	IDO341	HRS	PI 546056	PVP 9100144
Vanguard	MTSF2238	HRW	PI 593891	
Vanna	BZ684023	SWS	PI 587199	PVP 9500094
Vida	MT0245	HRS	PI 642366	PVP 200600225
Vista	NE87615	HRW	PI 562653	PVP 9300284
Volante		DURUM	PI 655037	PVP 200800403
Volt	ACS52610	HRS	PI 655039	PVP 200800407
WA7811	WA7811	HWW	PI 636367	VH094487
WA7832	WA7832	SWW	PI 636368	VH092245
WA7870	WA7870	SWW	PI 636370	VH094755
WA7970	WA7970	SWW	PI 645606	J00C0014
WA7971	WA7971	SWW	PI 645607	J00C0029
WA7995	WA7995	HRS	PI 638536	
WA7998	WA7998	HRS	PI 638537	
WA8059	WA8059	SWS	PI 661152	
Wahoo	NE94654	HRW	PI 619098	PVP 200100237
Waikea	BZ98-447W	HWS	PI 648029	PVP 200700256
Wakanz	WA7183	SWS	PI 506352	
Wanser	AUS10692	HRW	CItr 13844	
Wawawai	WA7712	SWS	PI 574538	
Waxy-Pen	WA7996	Waxy	PI 63779	PVP 200600005
WB 1020M	BZ6WM02-1020	SWW	PI 655031	PVP 200800397
WB 1035CL+	BZM06-1001	SWS	PI 665495	PVP 201200399
WB 1066CL	BZ6WM04-1066	SWW	PI 664099	PVP 201100477
WB 1070CL	BZWM04-1070	SWW	PI 664092	PVP 201100470
WB 1081CL+	BZ6WM06-1081	SWW	PI 669998	PVP 201300488
WB 112	XY04-112	SRW	PI 664097	PVP 201100475
WB 139	WB-139	SRW	PI 664096	PVP 201100474
WB 196	ZX04-196	SRW	PI 664095	PVP 201100473
WB 249	LA02-249	SRW	PI 664094	PVP 201100472
WB 456	BU6W99-456	SWW	PI 658148	PVP 200900445
WB 470	WPB90470	SWW	PI 599335	PVP 9700398
WB 523	BU6W00-523	SWW	PI 658149	PVP 200900446
WB 528	BZ6W98-528	SWW	PI 643142	PVP 200600273
WB 926	RC 80-8	HRS		

- 131 -

Cultivar Name	State Line No.	Market Class	PI No.	Other Identifier
WB 936	PH986-61	HRS	PI 587200	PVP 9500095
WB 1529	BZ6W07-427	SWW	PI 671989	PVP 201400230
WB 1604	BZ6W07-458	SWW	PI 671990	PVP 201400231
WB Arrowhead	ML9W05-2501	HRW	PI 664101	PVP 201100479
WB-Cedar	HV9W96-1383R	HRW	PI 661996	PVP 201100378
WB Fuzion	BZ901-717	HRS	PI 661160	PVP 201100306
WB Grainfield	HV9W06-509	HRW	PI 665062	PVP 201200153
WB Gunnison	BZ902-413R	HRS	PI 665064	PVP 201200155
WB Hartline	BZ903-445WP	HWS	PI 665065	PVP 201200156
WB Idamax	BZ904-336WP	HWS	PI 661159	PVP 201100305
WB Joaquin Oro	SJ909-369	HRS	PI 664098	PVP 201100476
WB Junction	BZ6W02-616	SWW	PI 664100	PVP 201100478
WB Matlock	CA9W07-817	HRW	PI 661215	PVP 201100362
WB Mayville	CA907-827	HRS	PI 661061	PVP 201100266
WB Mead	YU802-4	DURUM	PI 664091	PVP 201100469
WB Paloma	BZ904-331WP	HWS	PI 659489	PVP 201000293
WB Patron	YU908-017	HRS	PI 664090	PVP 201100468
WB Perla	SJ909-371	HWS	PI 664089	PVP 201100467
WB Prestea	BZ903-461W	HWS	PI 665061	PVP 201200152
WB Pristine	BZ991-408	HWS	PI 613581	PVP 200000180
WB Quake	BZ9W05-2043	HRW	PI 664093	PVP 201100471
WB Redhawk	HV9W06-727	HRS	PI 665063	PVP 201200154
WB Rockland	SJ908-247	HRS	PI 659487	PVP 201000291
WB Tucson	ML9W05-2506	HRW	PI 664088	PVP 201100466
Weatherford	OR898120	SWW	PI 602861	PVP 9900341
Westbred 906R		HRS	PI 483455	PVP 8000078
Westmore	257S11	DURUM	PI 665066	PVP 201200293
Weston	ID74-55-20	HRW	CItr 17727	
Whetstone	W98-344	HRW	PI 658009	PVP 200900301
Whit	WA8008	SWS	PI 653841	PVP 200900350
Whitebird	IDO392	SWS	PI 592982	
Winsome	OR4870453	HWS	PI 613177	PVP 200100111
Xerpha	WA7973	SWW	PI 645605	PVP 200900289
Yamhill	COR61-1227-66-7	SWW	CItr 14563	
Yecora Rojo	Bluebird	HRS	CItr 17414	
Yellowstone	MT00159	HRW	PI 643428	PVP 200600284
Zak	WA7850	SWS	PI 607839	PVP 200100257
Zeke	WPB87331	HRS	PI 607548	PVP 9900231
Zenda	KS060106M-11	HRW		

- 132 -

Pacific Northwest Wheat Quality Council, Officers, 2016

Technical Board
Pat Donahue, Chair
Claudia Carter, Vice Chair
Hayley Butler, Secretary
Juliet Marshall, Treasurer
Craig F. Morris, *Ex Officio*

Program Committee (representing)
Doug Engle, Chair
Technical Board members
Arron Carter (breeders)
Reuben McLean (collaborator)
Andrew Ross, Chair, PNW Section AACCI
Jay Noller, Administrative Coordinator, WERA-1009
Dana Herron (Tri-State Wheat Commissions)
Steve Wirsching, U.S. Wheat Associates

Pacific Northwest Section AACC International, Officers 2016
Hayley Butler, Chair
Cathy Butti, Past Chair
Claudia Carter, Vice-Chair
Craig F. Morris, Treasurer
Andrew Ross, Secretary

- 133 -

Pacific Northwest Wheat Quality Council
Charter & Mission

Adopted January 19, 2012

Mission, Policy, and Operating Procedure

The mission of the Pacific Northwest Wheat Quality Council (PNW WQC) is to provide a forum for leadership and communication in promoting continuous quality improvement among the various elements of the community of Pacific Northwest wheat interests. The PNW WQC will provide an organization structure to evaluate the quality of experimental lines and cultivars that may be grown in the traditional growing regions of the Western United States. The PNW WQC also will establish other activities as requested by the membership. The PNW WQC is an autonomous unit of AACC International, and operates under the direction and supervision of the Technical Board with the advice and counsel of the Tri-State wheat commissions of Washington, Oregon and Idaho, and U.S. Wheat Associates.

Objectives

- Encourage wide participation by all members of the wheat industry active in the Western U.S.
- Determine, through professional consulting expertise, the end-use quality parameters and ranges that adequately describe the performance characteristics that members seek in new and existing cultivars.
- Promote the enhancement of wheat quality in new cultivars.
- Emphasize the importance of communication across all sectors and provide resources for education on the continuous quality improvement and utilization of hard and soft wheat.
- Encourage the organizations vital to wheat quality enhancement to continue to make positive contributions through research and communications.
- Offer advice and support for Federal, State and private wheat quality laboratories in the region.

Membership

- The membership of the PNW WQC will consist of those registrants attending the annual collaborative baking technical conference (‘Annual Meeting’).

PNW WQC Technical Board

- The Technical Board shall be the administrative unit responsible for managing the functions of the PNW WQC.
- The Technical Board shall consist of four members elected from the membership.
- Officers of the Technical Board shall consist of a Chair, Vice-Chair and Secretary, each to serve a one-year term; and a Treasurer who may serve for up to three consecutive years.

- The Director of the Western Wheat Quality Laboratory shall serve as an *Ex Officio* member of the Technical Board with no term limit.
- Terms for elected officers start the day after the annual meeting of the PNW WQC.
- The Vice-Chair generally replaces the Chair at the conclusion of the Chair's term and the Secretary generally replaces the Vice-Chair at the conclusion of the Vice-Chair's term.
- Normally only the Secretary shall be elected annually at the Annual Meeting of the PNW WQC by nomination and majority vote; and the Treasurer as appropriate.
- Any eligible member may be reelected after being out of office for one year.
- Vacancies that occur during the term of office of the members of the Technical Board shall be filled by nomination and consensus vote of the remaining members of the Technical Board. The appointee will serve the remaining term of the vacancy.
- Exceptions to the above may be granted if voted on by the Technical Board or by majority vote of the PNW WQC at the annual meeting.

Duties of the Technical Board

- The Chair shall be responsible to establish a meeting place and preside at all meetings of the Technical Board and selected elements of the PNW WQC Annual Meeting.
- The Vice-Chair shall preside at meetings in the absence of the Chair and assume such duties as may be assigned by the Chair of the Technical Board.
- The Secretary shall be responsible for taking minutes of the Technical Board meetings.
- The Treasurer will maintain a record of income and expenditures, and shall receive and disburse funds following the actions directed by the Technical Board in furtherance of the aims of the PNW WQC.
- The Treasurer shall make available to the membership a full accounting of finances at the Annual Meeting, such accounting shall become a part of the minutes.

Compensation

- Technical Board members shall serve without compensation.

Indemnity

- The Technical Board members shall be indemnified against personal liability and be included under the AACCI Board insurance. The cost of said insurance to be a legitimate expense of the PNW WQC.

- 135 -

Fiscal Accounting, Income and Disbursement

- PNW WQC funds will be maintained at AACCI Headquarters and available for review upon written request.
- Income will be deposited with AACCI, and disbursements made by AACCI upon written request from the PNW WQC Treasurer.
- The Technical Board will authorize the paying of expenses related to the Annual Meeting and other functions relevant to the aims and operations of the PNW WQC.

Finances and Budget

- The operating expenses of the PNW WQC may come from various sources at the discretion and approval of the Technical Board. These sources are typically Annual Meeting registrations and contributions from the Tri-State Wheat Commissions and industry donors.
- The budget shall be presented to the membership for review and approval at the Annual Meeting.
- The successful operation of the PNW WQC is founded on the principle of substantial 'in-kind' contributions of members; no accounting of in-kind contributions shall be made.

Amendments

- Amendments to the policy and operation procedure of the PNW WQC can be made by majority vote of the PNW WQC members.
- The proposed changes must be submitted in writing and must be in the hands of the membership two weeks prior to voting on the change.

PNW WQC Program Committee

Committee Purpose

A committee entitled "PNW WQC Program Committee" shall be established and consist of the four Technical Board members and additional PNW WQC members as deemed appropriate. Members shall include, but not be limited to:

- The Director of the USDA Western Wheat Quality Laboratory
- One wheat breeder from the Western U.S.
- One collaborator from the wheat milling or baking industries
- A Program Chair, appointed by the Technical Committee, who is generally responsible for coordinating wheat sample acquisition/submittal, pilot flour milling, flour distribution to cooperators, data collection, and report compilation
- The current Chair of the Pacific Northwest Section of AACC International
- The Administrative Coordinator of WERA-1009
- A representative of the Tri-State Wheat Commissions
- The West Coast Director of U.S. Wheat Associates

Responsibilities

- Establish procedures and requirements for sample origination, production, handling, evaluation and reporting of the Collaborative Testing Program
- Approval of samples submitted by Western U.S. wheat breeders
- The milling and reporting of the experimental and check samples
- Distribution of samples to cooperators (companies willing to conduct testing and baking evaluations on the samples prepared)
- Approval of cooperators to participate in the Collaborative Testing Program
- Preparation of an annual quality report
- Establish the program of the Annual Meeting

Samples

- Each breeder shall have the privilege of proposing the submission of experimental test lines and check cultivar(s) each year for evaluation. The maximum number of samples, and their allocation will be determined by the Program Committee.
- All deadlines, minimum sample size and other practical constraints will be set at the discretion of the Program Committee.

Annual Meeting

- The Annual Meeting of the PNW WQC shall be established with the input of the membership at the conclusion of the previous Annual Meeting. The Program Committee will establish the Annual Meeting time and place utilizing the recommendations to the extent possible.
- The purpose of the Annual Meeting shall be to openly present and discuss the results of the Collaborative Testing Program, discuss quality issues important to the wheat industry of the Western U.S., elect board members and carry on other business as required by the PNW WQC.
- Participating cooperators shall return evaluation data and other relevant information by the date set by the Program Committee to be included in the Annual Meeting program.
- The Program Committee is encouraged to coordinate the Annual Meeting with complementary activities of the Pacific Northwest Section of AACC International and WERA-1009.
- The Technical Board may establish other meetings determined to be necessary.

- 137 -

Pacific Northwest Wheat Quality Council
Charter & Mission
Amendment No. 1

Adopted, January 25, 2013 Scottsdale, Arizona

As per the PNW WQC Charter:

"Amendments

- Amendments to the policy and operation procedure of the PNW WQC can be made by majority vote of the PNW WQC members.
- The proposed changes must be submitted in writing and must be in the hands of the membership two weeks prior to voting on the change."

Proposed Amendment No. 1.

Termination and Liquidation

- Upon majority vote of the General Membership, the PNW WQC may be terminated, no sooner than 90 days after such vote.
- Upon such action the Executive Committee shall pay all outstanding obligations, liquidate all assets, and close all bank accounts.
- Disbursements shall first fulfill all existing written agreements
- The residue of assets shall be disbursed in the following manner:
  1) Donation in whole or in part to the Student Travel Fund of AACC International
  2) Disbursement to one or more not-for-profit entities for the expressed purpose of advancing wheat grain quality in the Pacific Northwest; such disbursement(s) shall be approved by a majority vote of returned ballots from the General Membership.

- 138 -