PROJECT TITLE: Off-station spring wheat variety evaluations in eastern Montana - 2006

PROJECT LEADER: Joyce Eckhoff, MSU Eastern Agricultural Research Center, Sidney, MT
phone: (406)433-2208 e-mail: jeckhoff@sidney.ars.usda.gov

PROJECT PERSONNEL:

County	Producers	CES Agents
Daniels, dryland	Bobbie Roos	Bobbie Roos
McCone, dryland	Victor Wagner	Ken Nelson
Roosevelt, dryland	Mark Swank	Gina Snyder
Sheridan, dryland	Max Aasheim	Terry Angvick
Sheridan, irrigated	Steve Brekke	Terry Angvick
Valley, dryland	Bill Lauckner	Verlin Koenig
Wibaux, dryland	David Maus	Dave Bertelsen

OBJECTIVE: To evaluate varieties of spring wheat under irrigated and dryland conditions at various sites in eastern Montana.

RESULTS: The site in Wibaux County was not harvested because of hail damage. Summaries of yields, test weights, and protein contents across all sites are shown in Tables 1-3. Vida and Reeder yielded most across dryland sites (Table 1). Choteau yielded most at the irrigated site (Table 1).

McCone County (dryland): Performance and relative values of yield, test weight and protein of spring wheat varieties at Circle are shown in Tables 4-7. Vida had greatest economic return.
Roosevelt County (dryland): Performance and relative values of yield, test weight and protein of spring wheat varieties at Poplar are shown in Tables 8-11. Hanna had greatest economic return.
Sheridan County (dryland): Performance and relative values of yield, test weight and protein of spring wheat varieties at Reserve are shown in Tables 12-15. Vida had greatest economic return.
Valley County (dryland): Performances and relative values of yield, test weight and protein of spring wheat varieties at Nashua are shown in Tables 16-19. Vida had greatest economic return.
Daniels County (dryland): Performance and relative values of yield, test weight and protein of spring wheat varieties at Scobey are shown in Tables 20-23. Vida had greatest economic return.
Sheridan County (irrigated): Performance and relative values of yield, test weight and protein of spring wheat varieties at Dagmar are shown in Table 24-27. Choteau had greatest economic return.

SUMMARY: Off-station yield trials are conducted at several sites in eastern Montana. All experiments reported under this project are of the replicated small plot type. These trials provide important information about performance of experimental lines and varieties from Montana State University, other state universities, and private companies. Regional spring wheat producers make decisions on varieties to grow based on data from these trials.

FUTURE PLANS: Off-station spring wheat yield trials will continue indefinitely. Expansion to other locations in future years is possible.

Table 1. Summary of spring wheat yields in bu/acre at six off-station sites in eastern Montana, 2006.

Variety	Circle, dryland recrop	Poplar, dryland fallow	Reserve, dryland recrop	Nashua, dryland fallow	Scobey, dryland fallow	dryland average	Dagmar, sprinkle irrigated
Vida	**14.4**	30.1	**27.9**	**37.2**	42.4	30.4	70.8
Reeder	12.9	28.2	22.9	33.3	42.3	27.9	70.1
Freyr	11.1	27.6	24.3	33.2	40.7	27.4	67.5
Knudson	12.8	28.8	22.5	32.4	39.6	27.2	68.2
Waikea*	12.0	28.3	22.1	30.8	**42.8**	27.2	63.3
Outlook	10.9	29.9	24.6	32.6	37.0	27.0	61.2
Norpro	10.7	29.7	22.7	31.2	40.4	26.9	67.2
Steele ND	10.7	26.6	24.9	34.4	36.9	26.7	66.5
Howard	11.7	26.7	21.2	32.3	40.3	26.4	65.3
Scholar	10.5	26.8	24.2	31.2	37.5	26.0	60.4
Glenn	10.6	28.0	22.1	29.9	39.5	26.0	61.5
Agawam*	10.2	27.4	22.7	30.3	37.3	25.6	56.6
Hanna	8.3	**32.0**	20.3	29.9	35.9	25.3	68.3
Choteau	10.8	22.9	24.1	30.2	37.9	25.2	**73.4**
McNeal	7.3	27.5	21.9	27.9	38.2	24.6	61.1
Granite	7.5	26.8	20.7	31.0	34.8	24.2	69.2
Dapps	8.7	28.7	19.1	28.4	34.4	23.9	59.9
Trooper	9.7	23.1	17.7	29.3	39.2	23.8	68.2
site average	10.6	27.7	22.6	31.2	38.7	26.2	65.5
probability	<0.001	0.013	<0.001	<0.001	0.797		0.008
CV (S/Mean)	14.8	8.9	8.5	6.5	13.5		7.5
CV(SE/Mean)	8.5	5.2	4.9	3.8	7.8		4.3
LSD 0.05	2.6	4.1	3.2	3.4	ns		8.1

Table 2. Summary of spring wheat test weights in lb/bu at six off-station sites in eastern Montana, 2006.

Variety	Circle, dryland recrop	Poplar, dryland fallow	Reserve, dryland recrop	Nashua, dryland fallow	Scobey, dryland fallow	dryland average	Dagmar, sprinkle irrigated
Glenn	60.8	55.2	60.7	62.7	63.2	60.5	62.3
Granite	60.5	55.7	60.7	61.8	62.7	60.3	61.8
Agawam*	60.2	56.5	60.3	60.2	62.2	59.9	60.7
Freyr	58.8	53.2	59.0	61.5	60.8	58.7	60.7
Scholar	59.8	53.2	58.7	60.3	60.8	58.6	60.5
Hanna	58.5	53.8	58.7	60.2	60.8	58.4	61.2
Trooper	60.3	51.0	58.3	60.7	61.2	58.3	60.8
Knudson	59.7	52.7	58.3	60.0	60.3	58.2	60.5
Choteau	58.8	51.5	57.8	60.0	60.8	57.8	59.8
Norpro	59.5	50.8	57.5	58.8	61.0	57.5	60.2
Reeder	58.3	51.3	57.7	58.3	61.3	57.4	60.3
Vida	58.0	51.7	58.0	59.0	59.8	57.3	59.3
Howard	58.0	49.3	57.5	59.8	59.5	56.8	60.3
Dapps	57.7	51.0	57.2	59.5	58.3	56.7	60.0
Steele ND	58.5	49.0	57.7	58.7	59.5	56.7	59.7
Outlook	56.7	51.0	57.0	57.7	58.3	56.1	59.0
Waikea*	57.5	49.7	55.7	58.0	57.8	55.7	57.2
McNeal	55.7	50.5	56.4	56.5	59.3	55.7	59.3
site average	58.7	52.1	58.2	59.7	60.4	57.8	60.2
probability	<0.001	<0.001	<0.001	0.011	<0.001		<0.001
CV (S/Mean)	1.4	1.6	1.2	2.8	1.8		0.9
CV(SE/Mean)	0.8	0.9	0.7	1.6	1.0		0.5
LSD 0.05	1.4	1.4	1.2	2.8	1.8		0.9

Table 3. Summary of spring wheat protein contents in percent at six dryland off-station sites in eastern Montana, 2006.

Variety	Circle, dryland recrop	Poplar, dryland fallow	Reserve, dryland recrop	Nashua, dryland fallow	Scobey, dryland fallow	dryland average	Dagmar, sprinkle irrigated
Granite	16.62	20.19	17.67	14.50	14.63	16.72	18.09
Dapps	16.15	17.66	16.08	13.64	16.52	16.01	18.12
Reeder	15.95	17.94	16.54	14.78	12.80	15.60	17.11
Vida	15.04	17.57	16.04	13.78	14.09	15.30	16.98
Scholar	14.71	17.62	16.78	11.96	13.10	14.83	16.34
Glenn	15.14	16.52	16.00	12.65	13.42	14.75	17.64
Hanna	15.64	16.81	16.01	12.79	12.32	14.71	16.85
Norpro	15.01	16.94	16.21	13.62	11.79	14.71	15.56
Choteau	14.75	16.92	15.83	13.06	12.75	14.66	16.00
Knudson	15.70	16.14	15.21	13.06	12.60	14.54	15.57
Freyr	15.07	16.83	15.12	11.86	13.78	14.53	16.03
Trooper	14.48	17.17	15.38	12.40	12.99	14.48	15.80
Outlook	15.20	17.12	14.77	12.19	12.89	14.43	15.90
Steele ND	15.39	16.06	15.42	12.70	12.23	14.36	16.52
McNeal	14.46	17.33	14.82	12.79	11.95	14.27	15.12
Howard	14.64	16.26	15.18	12.18	12.60	14.17	16.04
Waikea*	13.21	16.61	15.15	11.78	12.47	13.84	14.63
Agawam*	13.70	15.24	14.33	13.43	11.71	13.68	14.22
site average	15.05	17.05	15.70	12.92	13.04	14.75	16.25
probability	<0.001	<0.001	<0.001	0.624	0.106		<0.001
CV (S/Mean)	3.6	1.9	3.1	12.3	12.1		2.3
CV(SE/Mean)	2.1	1.1	1.8	7.1	7.0		1.3
LSD 0.05	0.91	0.54	0.82	ns	ns		0.62

Table 4. Performance of spring wheat grown under dryland continuous cropping conditions at Circle, MT. Planted: May 5, 2006 Harvested: Aug 4, 2006 Cooperator: Victor Wagner

Variety	Grain protein	Test weight	Yield, bu/acre	$/acre[1] +/- McNeal
Vida	15.04	58.0	14.4	35.06
Reeder	15.95	58.3	12.9	27.80
Knudson	15.70	59.7	12.8	27.32
Howard	14.64	58.0	11.7	21.50
Freyr	15.07	58.8	11.1	19.06
Outlook	15.20	56.7	10.9	18.08
Choteau	14.75	58.8	10.8	17.17
Norpro	15.01	59.5	10.7	17.11
Steele ND	15.39	58.5	10.7	17.11
Glenn	15.14	60.8	10.6	16.63
Scholar	14.71	59.8	10.5	15.72
Trooper	14.48	60.3	9.7	11.48
Dapps	16.15	57.7	8.7	7.39
Hanna	15.64	58.5	8.3	5.45
Granite	16.62	60.5	7.5	1.56
McNeal	14.46	55.7	7.3	0.00
Waikea*	13.21	57.5	12.0	*
Agawam*	13.70	60.2	10.2	*
average	15.05	58.74	10.6	
probability	<0.001	<0.001	<0.001	
CV (S/Mean)	3.6	1.4	14.8	
CV(SE/Mean)	2.1	0.8	8.5	
LSD 0.05	0.91	1.4	2.6	

[1] Wheat prices summarized by G. Carlson, NARC, Havre, MT, from 10-yr (1996-2005) average daily market values for PNW, supplied by the Montana Wheat and Barley Committee, and compiled by Gregg Carlson, MSU Northern Agricultural Research Center, Havre, MT.

*no price for white wheat

Table 5. Relative yielding abilities of spring wheat varieties as compared to McNeal when grown under dryland conditions in McCone County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Waikea*	--	--	--	--	12.0	12.0	164.4
Howard	--	--	--	--	11.7	11.7	160.3
Agawam*	--	--	--	--	10.2	10.2	139.7
Trooper	--	--	--	--	9.7	9.7	132.9
Reeder	16.4	26.1	32.4	36.2	12.9	24.8	118.1
Knudson	--	--	--	30.7	12.8	21.8	115.1
Outlook	13.9	26.6	33.0	35.2	10.9	23.9	113.9
Vida	--	--	34.2	29.0	14.4	25.9	112.6
Scholar	17.9	25.5	33.6	28.7	10.5	23.2	110.7
Norpro	--	--	29.0	30.6	10.7	23.4	102.0
Freyr	--	--	28.4	30.3	11.1	23.3	101.3
Glenn	--	--	--	27.5	10.6	19.1	100.8
McNeal	13.2	22.9	31.1	30.5	7.3	21.0	100.0
Steele ND	--	--	27.7	27.8	10.7	22.1	96.1
Choteau	9.1	23.5	28.7	25.3	10.8	19.5	92.8
Granite	--	--	24.0	28.8	7.5	20.1	87.5
Hanna	--	--	24.5	22.3	8.3	18.4	80.0
Dapps	--	--	22.6	23.0	8.7	18.1	78.8

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 6. Relative test weights of spring wheat varieties as compared to McNeal when grown under dryland conditions in McCone County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Trooper	--	--	--	--	60.3	60.3	108.3
Agawam*	--	--	--	--	60.2	60.2	108.1
Glenn	--	--	--	62.3	60.8	61.6	106.7
Granite	--	--	61.5	62.7	60.5	61.6	105.9
Scholar	61.4	61.2	61.0	61.5	59.8	61.0	105.0
Norpro	--	--	61.8	61.7	59.5	61.0	104.9
Freyr	--	--	62.0	62.0	58.8	60.9	104.8
Knudson	--	--	--	61.2	59.7	60.5	104.8
Steele ND	--	--	61.3	62.0	58.5	60.6	104.2
Howard	--	--	--	--	58.0	58.0	104.1
Reeder	59.8	60.3	61.8	61.7	58.3	60.4	104.0
Vida	--	--	61.3	61.3	58.0	60.2	103.6
Hanna	--	--	61.3	60.5	58.5	60.1	103.4
Waikea*	--	--	--	--	57.5	57.5	103.2
Choteau	59.7	59.6	60.8	60.5	58.8	59.9	103.1
Dapps	--	--	60.6	60.3	57.7	59.5	102.4
Outlook	58.3	57.7	59.8	59.5	56.7	58.4	100.6
McNeal	58.7	57.3	59.0	59.7	55.7	58.1	100.0

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 7. Relative protein contents of spring wheat varieties as compared to McNeal when grown under dryland conditions in McCone County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Dapps	--	--	15.9	14.4	16.2	15.5	118.9
Granite	--	--	15.5	13.5	16.6	15.2	116.6
Reeder	12.7	15.7	14.1	13.7	16.0	14.4	110.7
Glenn	--	--	--	13.8	15.1	14.5	110.7
Steele ND	--	--	14.8	12.7	15.4	14.3	109.7
Scholar	11.8	15.9	14.5	14.0	14.7	14.2	108.7
Hanna	--	--	13.9	12.8	15.6	14.1	108.2
Knudson	--	--	--	12.5	15.7	14.1	108.0
Freyr	--	--	13.6	13.0	15.1	13.9	106.6
Choteau	12.2	15.1	14.2	13.2	14.8	13.9	106.6
Norpro	--	--	14.6	12.0	15.0	13.9	106.4
Vida	--	--	13.8	11.8	15.0	13.5	103.8
Outlook	11.5	14.9	12.9	12.4	15.2	13.4	102.6
Howard	--	--	--	--	14.6	14.6	100.7
McNeal	11.2	14.9	13.0	11.6	14.5	13.0	100.0
Trooper	--	--	--	--	14.5	14.5	100.0
Agawam*	--	--	--	--	13.7	13.7	94.5
Waikea*	--	--	--	--	13.2	13.2	91.0

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.

Table 8. Performance of spring wheat grown under dryland conditions at Poplar, MT.
Planted: Apr 27, 2006 Harvested: Aug 7, 2006 Cooperator: Mark Swank

Variety	Grain protein	Test weight	Yield, bu/acre	$/acre[1] +/- McNeal
Hanna	16.81	53.8	**32.0**	21.87
Vida	17.57	51.7	30.1	12.64
Outlook	17.12	51.0	29.9	11.66
Norpro	16.94	50.8	29.7	10.69
Knudson	16.14	52.7	28.8	6.32
Dapps	17.66	51.0	28.7	5.83
Reeder	17.94	51.3	28.2	3.40
Glenn	16.52	55.2	28.0	2.43
Freyr	16.83	53.2	27.6	0.49
McNeal	17.33	50.5	27.5	0.00
Scholar	17.62	53.2	26.8	-3.40
Granite	20.19	55.7	26.8	-3.40
Howard	16.26	49.3	26.7	-3.89
Steele ND	16.06	49.0	26.6	-4.37
Trooper	17.17	51.0	23.1	-21.38
Choteau	16.92	51.5	22.9	-22.36
Waikea	16.61	49.7	28.3	**
Agawam	15.24	56.5	27.4	**
average	17.05	52.1	27.7	
probability	<0.001	<0.001	0.013	
CV (S/Mean)	1.9	1.6	8.9	
CV(SE/Mean)	1.1	0.9	5.2	
LSD 0.05	0.54	1.4	4.1	

[1] Wheat prices summarized by G. Carlson, NARC, Havre, MT, from 10-yr (1996-2005) average daily market values for PNW, supplied by the Montana Wheat and Barley Committee, and compiled by Gregg Carlson, MSU Northern Agricultural Research Center, Havre, MT.

*no price for white wheat

Table 9. Relative yields of spring wheat varieties as compared to McNeal when grown under dryland conditions in Roosevelt County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Freyr	--	--	50.6	46.3	27.6	41.5	109.6
Norpro	--	--	50.8	43.6	29.7	41.4	109.2
Vida	--	--	48.3	45.2	30.1	41.2	108.8
Hanna	--	--	48.2	41.5	32.0	40.6	107.1
Reeder	46.4	56.8	45.0	44.9	28.2	44.3	105.4
Knudson	--	--	--	43.9	28.8	36.4	104.8
Outlook	41.7	56.5	47.2	42.9	29.9	43.6	103.9
Waikea*	--	--	--	--	28.3	28.3	102.9
Glenn	--	--	--	42.0	28.0	35.0	100.9
McNeal	37.1	59.3	44.2	41.9	27.5	42.0	100.0
Dapps	--	--	45.1	39.4	28.7	37.7	99.6
Agawam*	--	--	--	--	27.4	27.4	99.6
Granite	--	--	46.9	38.8	26.8	37.5	99.0
Howard	--	--	--	--	26.7	26.7	97.1
Scholar	37.8	53.0	42.6	39.2	26.8	39.9	95.0
Choteau	40.7	53.7	38.7	42.7	22.9	39.7	94.6
Steele ND	--	--	40.1	40.4	26.6	35.7	94.3
Trooper	--	--	--	--	23.1	23.1	84.0

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 10. Relative test weights of spring wheat varieties as compared to McNeal when grown under dryland conditions in Roosevelt County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Agawam*	--	--	--	--	56.5	56.5	111.9
Glenn	--	--	--	60.3	55.2	57.8	107.7
Granite	--	--	64.5	61.2	55.7	60.5	107.7
Scholar	60.0	62.8	62.0	58.5	53.2	59.3	104.7
Freyr	--	--	63.2	59.2	53.2	58.5	104.3
Hanna	--	--	62.2	59.0	53.8	58.3	103.9
Reeder	60.5	62.2	62.7	57.7	51.3	58.9	103.9
Knudson	--	--	--	58.0	52.7	55.4	103.3
Choteau	58.5	61.5	62.3	56.5	51.5	58.1	102.5
Dapps	--	--	62.5	57.7	51.0	57.1	101.7
Outlook	58.2	59.8	61.0	57.7	51.0	57.5	101.6
Vida	--	--	62.2	57.0	51.7	57.0	101.5
Trooper	--	--	--	--	51.0	51.0	101.0
Norpro	--	--	63.2	55.8	50.8	56.6	100.8
McNeal	54.2	60.7	61.2	56.7	50.5	56.7	100.0
Steele ND	--	--	61.8	56.8	49.0	55.9	99.5
Waikea*	--	--	--	--	49.7	49.7	98.4
Howard	--	--	--	--	49.3	49.3	97.6

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 11. Relative protein contents of spring wheat varieties as compared to McNeal when grown under dryland conditions in Roosevelt County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Granite	--	--	11.6	19.4	20.2	17.1	112.5
Reeder	15.6	14.3	12.0	18.2	17.9	15.6	108.5
Dapps	--	--	11.7	18.2	17.7	15.9	104.6
Scholar	14.7	13.1	11.0	18.3	17.6	14.9	103.9
Vida	--	--	11.5	17.5	17.6	15.5	102.4
Choteau	14.5	13.3	11.2	17.4	16.9	14.7	101.9
McNeal	13.9	12.5	11.0	17.2	17.3	14.4	100.0
Glenn	--	--	--	18.0	16.5	17.3	100.0
Trooper	--	--	--	--	17.2	17.2	99.4
Outlook	13.6	12.9	10.4	17.0	17.1	14.2	98.7
Freyr	--	--	10.8	17.2	16.8	14.9	98.5
Steele ND	--	--	10.8	17.4	16.1	14.8	97.4
Norpro	--	--	9.1	17.7	16.9	14.6	96.0
Waikea*	--	--	--	--	16.6	16.6	96.0
Knudson	--	--	--	17.0	16.1	16.6	95.9
Hanna	--	--	9.7	16.9	16.8	14.5	95.4
Howard	--	--	--	--	16.3	16.3	94.2
Agawam*	--	--	--	--	15.2	15.2	87.9

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.

Table 12. Performance of spring wheat grown under dryland conditions at Reserve, MT.
Planted: Apr 28, 2006 Harvested: Aug 8, 2006 Cooperator: Max Aasheim

Variety	Grain protein	Test weight	Yield, bu/acre	$/acre[1] +/- McNeal
Vida	16.04	58.0	27.9	30.03
Steele ND	15.42	57.7	24.9	15.45
Outlook	14.77	57.0	24.6	13.01
Freyr	15.12	59.0	24.3	12.54
Scholar	16.78	58.7	24.2	12.06
Choteau	15.83	57.8	24.1	11.57
Reeder	16.54	57.7	22.9	5.73
Norpro	16.21	57.5	22.7	4.76
Knudson	15.21	58.3	22.5	3.79
Glenn	16.00	60.7	22.1	1.85
McNeal	14.82	56.4	21.9	0.00
Howard	15.18	57.5	21.2	-2.53
Granite	17.67	60.7	20.7	-4.96
Hanna	16.01	58.7	20.3	-6.90
Dapps	16.08	57.2	19.1	-12.73
Trooper	15.38	58.3	17.7	-19.54
Agawam	14.33	60.3	22.7	**
Waikea	15.15	55.7	22.1	**
average	15.70	58.2	22.6	
probability	<0.001	<0.001	<0.001	
CV (S/Mean)	3.1	1.2	8.5	
CV(SE/Mean)	1.8	0.7	4.9	
LSD 0.05	0.82	1.2	3.2	

[1] Wheat prices summarized by G. Carlson, NARC, Havre, MT, from 10-yr (1996-2005) average daily market values for PNW, supplied by the Montana Wheat and Barley Committee, and compiled by Gregg Carlson, MSU Northern Agricultural Research Center, Havre, MT.

*no price for white wheat

Table 13. Relative yielding abilities of spring wheat varieties as compared to McNeal when grown under dryland conditions in Sheridan County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Vida	--	--	56.4	40.5	27.9	41.6	124.7
Outlook	39.6	41.9	53.5	30.6	24.6	38.0	114.4
Reeder	38.3	39.2	52.7	33.7	22.9	37.4	112.4
Freyr	--	--	50.8	31.3	24.3	35.5	106.3
Norpro	--	--	50.7	30.8	22.7	34.7	104.1
Agawam*	--	--	--	--	22.7	22.7	103.7
Scholar	28.2	39.0	49.6	28.1	24.2	33.8	101.7
Waikea*	--	--	--	--	22.1	22.1	100.9
Choteau	35.4	38.5	44.5	25.1	24.1	33.5	100.8
McNeal	28.2	37.9	47.4	30.8	21.9	33.2	100.0
Steele ND	--	--	45.8	28.8	24.9	33.2	99.4
Howard	--	--	--	--	21.2	21.2	96.8
Hanna	--	--	48.1	28.1	20.3	32.2	96.4
Glenn	--	--	--	28.4	22.1	25.3	95.8
Granite	--	--	40.8	30.9	20.7	30.8	92.3
Knudson	--	--	--	26.0	22.5	24.3	92.0
Dapps	--	--	42.6	23.7	19.1	28.5	85.3
Trooper	--	--	--	--	17.7	17.7	80.8

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 14. Relative test weights of spring wheat varieties as compared to McNeal when grown under dryland conditions in Sheridan County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Agawam*	--	--	--	--	60.3	60.3	106.9
Glenn	--	--	--	62.7	60.7	61.7	104.8
Granite	--	--	63.0	63.2	60.7	62.3	104.7
Trooper	--	--	--	--	58.3	58.3	103.4
Reeder	59.7	60.7	62.2	61.7	57.7	60.4	102.6
Scholar	59.2	60.3	62.2	61.5	58.7	60.4	102.6
Hanna	--	--	61.8	61.7	58.7	60.7	102.1
Freyr	--	--	61.8	61.3	59.0	60.7	102.0
Knudson	--	--	--	61.7	58.3	60.0	102.0
Howard	--	--	--	--	57.5	57.5	102.0
Steele ND	--	--	61.5	62.3	57.7	60.5	101.7
Norpro	--	--	61.5	62.3	57.5	60.4	101.6
Choteau	58.8	59.2	60.0	60.8	57.8	59.3	100.8
Vida	--	--	60.8	60.5	58.0	59.8	100.4
McNeal	58.3	57.5	60.8	61.3	56.4	58.9	100.0
Outlook	58.5	57.8	60.7	60.3	57.0	58.9	100.0
Dapps	--	--	60.2	60.7	57.2	59.4	99.8
Waikea*	--	--	--	--	55.7	55.7	98.8

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 15. Relative protein contents of spring wheat varieties as compared to McNeal when grown under dryland conditions in Sheridan County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Granite	--	--	14.9	17.0	17.7	16.5	117.5
Dapps	--	--	14.8	18.2	16.1	16.4	116.4
Glenn	--	--	--	17.0	16	16.5	111.9
Norpro	--	--	14.0	16.4	16.2	15.5	110.4
Knudson	--	--	--	17.1	15.2	16.2	109.5
Steele ND	--	--	13.3	17.1	15.4	15.3	108.5
Scholar	14.5	17.1	13.7	15.4	16.8	15.5	107.5
Vida	--	--	14.2	15.0	16.0	15.1	107.1
Freyr	--	--	13.4	16.4	15.1	15.0	106.4
Reeder	14.1	17.2	13.7	15.1	16.5	15.3	106.2
Choteau	13.9	16.8	13.5	16.1	15.8	15.2	105.5
Hanna	--	--	13.0	15.5	16.0	14.8	105.5
Trooper	--	--	--	--	15.4	15.4	104.1
Waikea*	--	--	--	--	15.2	15.2	102.7
Howard	--	--	--	--	15.2	15.2	102.7
McNeal	13.1	16.8	12.7	14.7	14.8	14.4	100.0
Outlook	13.2	16.4	12.6	14.4	14.8	14.3	99.0
Agawam*	--	--	--	--	14.3	14.3	96.6

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.

Table 16. Performance of spring wheat grown under dryland conditions at Nashua, MT.
Planted: Apr 14, 2006 Harvested: Aug 3, 2006 Cooperator: Bill Lauckner

Variety	Grain protein	Test weight	Yield, bu/acre	$/acre[1] +/- McNeal
Vida	13.78	59.0	37.2	49.66
Reeder	14.78	58.3	33.3	38.31
Steele ND	12.70	58.7	34.4	28.47
Granite	14.50	61.8	31.0	25.98
Knudson	13.06	60.0	32.4	20.68
Norpro	13.62	58.8	31.2	19.76
Freyr	11.86	61.5	33.2	15.91
Outlook	12.19	57.7	32.6	15.37
Howard	12.18	59.8	32.3	14.11
Choteau	13.06	60.0	30.2	10.98
Hanna	12.79	60.2	29.9	8.76
Scholar	11.96	60.3	31.2	7.59
Glenn	12.65	62.7	29.9	7.27
Dapps	13.64	59.5	28.4	7.02
Trooper	12.40	60.7	29.3	4.67
McNeal	12.79	56.5	27.9	0.00
Waikea	11.78	58.0	30.8	*
Agawam	13.43	60.2	30.3	*
average	12.92	59.7	31.2	
probability	0.624	0.011	<0.001	
CV (S/Mean)	12.3	2.8	6.5	
CV(SE/Mean)	7.1	1.6	3.8	
LSD 0.05	2.64	2.8	3.4	

[1] Wheat prices summarized by G. Carlson, NARC, Havre, MT, from 10-yr (1996-2005) average daily market values for PNW, supplied by the Montana Wheat and Barley Committee, and compiled by Gregg Carlson, MSU Northern Agricultural Research Center, Havre, MT.

*no price for white wheat

Table 17. Relative yielding abilities of spring wheat varieties as compared to McNeal when grown under dryland conditions in Valley County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Howard	--	--	--	--	32.3	32.3	115.8
Glenn	--	--	--	57.7	29.9	43.8	113.9
Vida	--	--	63.2	48.6	37.2	49.7	113.6
Freyr	--	--	58.5	57.1	33.2	49.6	113.4
Outlook	48.7	42.7	61.7	58.0	32.6	48.7	112.7
Norpro	--	--	55.9	59.3	31.2	48.8	111.6
Knudson	--	--	--	52.7	32.4	42.6	110.7
Waikea*	--	--	--	--	30.8	30.8	110.4
Agawam*	--	--	--	--	30.3	30.3	108.6
Reeder	51.6	39.7	59.2	50.4	33.3	46.8	108.3
Trooper	--	--	--	--	29.3	29.3	105.0
Scholar	46.7	37.6	52.9	54.2	31.2	44.5	103.0
McNeal	45.6	39.4	54.3	49.0	27.9	43.2	100.0
Granite	--	--	49.2	49.2	31.0	43.1	98.6
Steele ND	--	--	51.2	40.4	34.4	42.0	96.0
Tioga	--	--	--	--	26.6	26.6	95.3
Hanna	--	--	46.4	47.2	29.9	41.2	94.1
Dapps	--	--	45.9	48.9	28.4	41.1	93.9
Choteau	42.3	33.6	48.1	47.7	30.2	40.4	93.4

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 18. Relative test weights of spring wheat varieties as compared to McNeal when grown under dryland conditions in Valley County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Glenn	--	--	--	63.7	62.7	63.2	107.6
Trooper	--	--	--	--	60.7	60.7	107.4
Agawam*	--	--	--	--	60.2	60.2	106.5
Tioga	--	--	--	--	60.0	60.0	106.2
Howard	--	--	--	--	59.8	59.8	105.8
Granite	--	--	63.0	63.3	61.8	62.7	105.4
Freyr	--	--	62.5	61.2	61.5	61.7	103.8
Scholar	60.5	60.2	61.7	61.7	60.3	60.9	103.0
Knudson	--	--	--	60.7	60.0	60.4	102.7
Waikea*	--	--	--	--	58.0	58.0	102.7
Steele ND	--	--	61.0	62.3	58.7	60.7	102.0
Hanna	--	--	62.0	59.5	60.2	60.6	101.8
Reeder	60.0	58.2	62.2	61.5	58.3	60.0	101.6
Norpro	--	--	61.3	61.2	58.8	60.4	101.6
Choteau	59.0	59.0	61.3	60.7	60.0	60.0	101.6
Vida	--	--	60.3	60.7	59.0	60.0	100.8
Dapps	--	--	60.2	60.3	59.5	60.0	100.8
McNeal	59.7	57.2	61.0	61.0	56.5	59.1	100.0
Outlook	58.8	57.2	59.7	60.5	57.7	58.8	99.5

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 19. Relative protein contents of spring wheat varieties as compared to McNeal when grown under dryland conditions in Valley County in cooperation with CES.

Cultivar	2002	2003	2004	2005	2006	Ave	as % of McNeal
Granite	--	--	15.0	13.7	14.5	14.4	118.4
Dapps	--	--	15.4	14.0	13.6	14.3	117.8
Reeder	14.1	18.0	13.4	12.0	14.8	14.5	114.9
Vida	--	--	15.6	12.4	13.8	13.9	114.5
Glenn	--	--	--	14.5	12.6	13.6	108.8
Choteau	12.4	15.7	13.2	12.0	13.1	13.3	105.6
Freyr	--	--	13.2	13.4	11.9	12.8	105.5
Agawam*	--	--	--	--	13.4	13.4	104.7
Hanna	--	--	12.4	12.6	12.8	12.6	103.6
Scholar	12.6	16.1	12.5	11.4	12.0	12.9	102.7
Outlook	12.3	15.5	12.8	11.3	12.2	12.8	101.9
Norpro	--	--	12.2	11.2	13.6	12.3	101.4
McNeal	11.0	15.4	11.6	12.1	12.8	12.6	100.0
Steele ND	--	--	13.6	10.2	12.7	12.2	100.0
Knudson	--	--	--	11.4	13.1	12.3	98.4
Trooper	--	--	--	--	12.4	12.4	96.9
Tioga	--	--	--	--	12.4	12.4	96.9
Howard	--	--	--	--	12.2	12.2	95.3
Waikea*	--	--	--	--	11.8	11.8	92.2

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.

Table 20. Performance of spring wheat grown under dryland conditions at Scobey, MT.
Planted: April 27, 2006 Harvested: August 15, 2006 Cooperator: Bobbie Roos

Variety	Grain protein	Test Weight	Yield Bu/acre	$/acre[1] +/- McNeal
Vida	14.09	59.8	42.4	39.95
Freyr	13.78	60.8	40.7	29.12
Reeder	12.80	61.3	42.3	26.36
Glenn	13.42	63.2	39.5	20.81
Howard	12.60	59.5	40.3	15.59
Trooper	12.99	61.2	39.2	13.96
Knudson	12.60	60.3	39.6	12.56
Norpro	11.79	61.0	40.4	9.15
Dapps	16.52	58.3	34.4	8.27
Granite	14.63	62.7	34.8	7.43
Choteau	12.75	60.8	37.9	7.09
Scholar	13.10	60.8	37.5	6.47
Outlook	12.89	58.3	37.0	4.26
McNeal	11.95	59.3	38.2	0.00
Steele ND	12.23	59.5	36.9	-3.19
Hanna	12.32	60.8	35.9	-7.41
Waikea	12.47	57.8	42.8	**
Agawam	11.71	62.2	37.3	**
average	13.04	60.4	38.7	
probability	0.106	<0.001	0.797	
CV (S/Mean)	12.1	1.8	13.5	
CV(SE/Mean)	7.0	1.0	7.8	
LSD 0.05	2.62	1.8	8.7	

[1] Wheat prices summarized by G. Carlson, NARC, Havre, MT, from 10-yr (1996-2005) average daily market values for PNW, supplied by the Montana Wheat and Barley Committee, and compiled by Gregg Carlson, MSU Northern Agricultural Research Center, Havre, MT.

*no price for white wheat

Table 21. Relative yields of spring wheat varieties as compared to McNeal when grown under dryland conditions in Daniels County in cooperation with CES.

Variety	2002	2003	2004	2005	2006	average	As % of McNeal
Waikea*	--	--	--	--	42.8	42.8	112.0
Howard	--	--	--	--	40.3	40.3	105.5
Trooper	--	--	--	--	39.2	39.2	102.6
Outlook	32.0	37.7	42.3	17.2	37.0	33.2	102.1
McNeal	29.4	31.6	47.4	16.2	38.2	32.6	100.0
Vida	--	--	41.7	16.6	42.4	33.6	98.9
Reeder	31.3	35.4	35.9	15.2	42.3	32.0	98.3
Glenn	--	--	--	13.7	39.5	26.6	97.8
Agawam*	--	--	--	--	37.3	37.3	97.6
Scholar	30.6	30.4	43.8	16.6	37.5	31.8	97.6
Knudson	--	--	--	12.4	39.6	26.0	95.6
Freyr	--	--	40.1	12.4	40.7	31.1	91.6
Hanna	--	--	40.9	12.8	35.9	29.9	88.0
Norpro	--	--	37.1	11.2	40.4	29.6	87.1
Choteau	23.1	28.2	39.6	12.4	37.9	28.2	86.7
Granite	--	--	34.2	11.3	34.8	26.8	78.9
Steele ND	--	--	29.5	13.0	36.9	26.5	78.0
Dapps	--	--	31.8	12.9	34.4	26.4	77.7

NOTE: Average yields in this summary should not be compared to each other since they are not always grown in the same years. Compare yields only to the check variety.

Table 22. Relative test weights of spring wheat varieties as compared to McNeal when grown under dryland conditions in Daniels County in cooperation with CES.

Variety	2002	2003	2004	2005	2006	average	As % of McNeal
Glenn	--	--	--	65.5	63.2	64.4	106.1
Agawam*	--	--	--	--	62.2	62.2	104.9
Granite	--	--	61.7	64.8	62.7	63.1	103.5
Trooper	--	--	--	--	61.2	61.2	103.2
Steele ND	--	--	63.3	64.3	59.5	62.4	102.4
Reeder	61.3	63.0	62.3	63.2	61.3	62.2	102.3
Freyr	--	--	61.8	63.7	60.8	62.1	101.9
Norpro	--	--	61.5	63.8	61.0	62.1	101.9
Scholar	59.8	62.7	63.0	63.4	60.8	61.9	101.8
Hanna	--	--	62.5	62.7	60.8	62.0	101.8
Knudson	--	--	--	62.8	60.3	61.6	101.5
Choteau	60.8	62.3	61.7	62.7	60.8	61.7	101.4
Vida	--	--	61.7	63.0	59.8	61.5	100.9
Howard	--	--	--	--	59.5	59.5	100.3
McNeal	59.8	61.5	61.5	62.0	59.3	60.8	100.0
Outlook	59.7	61.3	60.5	62.2	58.3	60.4	99.3
Dapps	--	--	61.0	62.2	58.3	60.5	99.3
Waikea*	--	--	--	--	57.8	57.8	97.5

NOTE: Average yields in this summary should not be compared to each other since they are not always grown in the same years. Compare yields only to the check variety.

Table 23. Relative protein contents of spring wheat varieties as compared to McNeal when grown under dryland conditions in Daniels County in cooperation with CES.

Variety	2002	2003	2004	2005	2006	average	As % of McNeal
Dapps	--	--	13.3	11.8	16.5	13.9	125.3
Granite	--	--	12.9	12.0	14.6	13.2	119.0
Glenn	--	--	--	11.6	13.4	12.5	113.6
Vida	--	--	11.5	12.1	14.1	12.6	113.6
Knudson	--	--	--	12.3	12.6	12.5	113.2
Reeder	12.4	14.7	13.4	11.6	12.8	13.0	112.9
Freyr	--	--	12.2	11.4	13.8	12.5	112.7
Trooper	--	--	--	--	13.0	13.0	108.3
Choteau	12.3	13.9	11.2	11.3	12.8	12.3	107.0
Steele ND	--	--	11.7	11.2	12.2	11.7	105.7
Howard	--	--	--	--	12.6	12.6	105.0
Outlook	11.4	13.1	12.0	10.9	12.9	12.1	104.9
Waikea*	--	--	--	--	12.5	12.5	104.2
Scholar	11.6	13.4	10.5	9.9	13.1	11.7	101.7
Norpro	--	--	10.8	11.1	11.8	11.2	101.5
Hanna	--	--	11.1	10.2	12.3	11.2	101.2
McNeal	10.7	13.6	11.2	10.0	12.0	11.5	100.0
Agawam*	--	--	--	--	11.7	11.7	97.5

NOTE: Average yields in this summary should not be compared to each other since they are not always grown in the same years. Compare yields only to the check variety.

Table 24. Performance of spring wheat grown under irrigated conditions at Dagmar, MT.
Planted: April 28, 2006 Harvested: Aug 30, 2006 Cooperator: Steve Brekke

Variety	Grain protein	Test weight	Yield, bu/acre	$/acre[1] +/- McNeal
Choteau	16.00	59.8	73.4	59.77
Vida	16.98	59.3	70.8	47.14
Reeder	17.11	60.3	70.1	43.74
Granite	18.09	61.8	69.2	39.36
Hanna	16.85	61.2	68.3	34.99
Knudson	15.57	60.5	68.2	34.50
Trooper	15.80	60.8	68.2	34.50
Freyr	16.03	60.7	67.5	31.10
Norpro	15.56	60.2	67.2	29.64
Steele ND	16.52	59.7	66.5	26.24
Howard	16.04	60.3	65.3	20.39
Glenn	17.64	62.3	61.5	1.94
Outlook	15.90	59.0	61.2	0.48
McNeal	15.12	59.3	61.1	0.00
Scholar	16.34	60.5	60.4	-3.41
Dapps	18.12	60.0	59.9	-5.84
Waikea*	14.63	57.2	63.3	**
Agawam*	14.22	60.7	56.6	**
average	16.25	60.2	65.5	
probability	<0.001	<0.001	0.008	
CV (S/mean)	2.3	0.9	7.5	
CV (SE/mean)	1.3	0.5	4.3	
LSD 0.05	0.62	0.9	8.1	

[1] Wheat prices summarized by G. Carlson, NARC, Havre, MT, from 10-yr (1996-2005) average daily market values for PNW, supplied by the Montana Wheat and Barley Committee, and compiled by Gregg Carlson, MSU Northern Agricultural Research Center, Havre, MT.

*no price for white wheat

Table 25. Relative yields of spring wheat varieties as compared to McNeal when grown under irrigated conditions in Sheridan County in cooperation with CES.

Cultivar	2000	2001	2002	2005	2006	Ave	as % of McNeal
Reeder	54.0	17.7	54.3	41.2	70.1	47.5	119.8
Vida	--	--	--	40.6	70.8	55.7	112.3
Trooper	--	--	--	--	68.2	68.2	111.6
Choteau	--	15.7	40.0	40.1	73.4	42.3	109.9
Outlook	--	16.1	57.4	33.1	61.2	42.0	109.0
Norpro	--	--	--	40.4	67.2	53.8	108.5
Howard	--	--	--	--	65.3	65.3	106.9
Freyr	--	--	--	36.9	67.5	52.2	105.2
Knudson	--	--	--	35.7	68.2	52.0	104.7
Steele ND	--	--	--	37.1	66.5	51.8	104.4
Waikea*	--	--	--	--	63.3	63.3	103.6
Granite	--	--	--	32.5	69.2	50.9	102.5
Hanna	--	--	--	31.5	68.3	49.9	100.6
McNeal	44.0	10.8	44.0	38.1	61.1	39.6	100.0
Scholar	49.4	11.0	34.2	36.8	60.4	38.4	96.9
Glenn	--	--	--	34.4	61.5	48.0	96.7
Dapps	--	--	--	34.0	59.9	47.0	94.7
Agawam*	--	--	--	--	56.6	56.6	92.6

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 26. Relative test weights of spring wheat varieties as compared to McNeal when grown under irrigated conditions in Sheridan County in cooperation with CES.

Cultivar	2000	2001	2002	2005	2006	Ave	as % of McNeal
Granite	--	--	--	62.5	61.8	62.2	105.8
Glenn	--	--	--	61.7	62.3	62.0	105.5
Hanna	--	--	--	60.5	61.2	60.9	103.6
Trooper	--	--	--	--	60.8	60.8	102.5
Freyr	--	--	--	59.7	60.7	60.2	102.5
Agawam*	--	--	--	--	60.7	60.7	102.4
Reeder	61.8	55.6	60.3	59.3	60.3	59.5	102.2
Knudson	--	--	--	59.2	60.5	59.9	101.9
Howard	--	--	--	--	60.3	60.3	101.7
Norpro	--	--	--	59.2	60.2	59.7	101.6
Scholar	62.5	56.1	56.7	59.5	60.5	59.1	101.5
Steele ND	--	--	--	59.5	59.7	59.6	101.4
Dapps	--	--	--	58.7	60.0	59.4	101.0
Vida	--	--	--	58.5	59.3	58.9	100.3
McNeal	60.7	55.0	57.7	58.2	59.3	58.2	100.0
Outlook	--	53.3	58.3	57.8	59.0	57.1	99.2
Choteau	--	52.6	56.8	57.5	59.8	56.7	98.5
Waikea*	--	--	--	--	57.2	57.2	96.5

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 27. Relative protein contents of spring wheat varieties as compared to McNeal when grown under irrigated conditions in Sheridan County in cooperation with CES.

Cultivar	2000	2001	2002	2005	2006	Ave	as % of McNeal
Dapps	--	--	--	14.2	18.1	16.2	119.2
Granite	--	--	--	13.8	18.1	16.0	117.7
Vida	--	--	--	13.9	17.0	15.5	114.0
Glenn	--	--	--	13.1	17.6	15.4	113.3
Reeder	14.2	14.2	14.4	13.7	17.1	14.7	110.2
Steele ND	--	--	--	13.2	16.5	14.9	109.6
Freyr	--	--	--	13.1	16.0	14.6	107.4
Hanna	--	--	--	12.2	16.8	14.5	107.0
Howard	--	--	--	--	16.0	16.0	106.0
Norpro	--	--	--	13.1	15.6	14.4	105.9
Scholar	12.8	14.4	14.5	12.6	16.3	14.1	105.7
Knudson	--	--	--	13.0	15.6	14.3	105.5
Trooper	--	--	--	--	15.8	15.8	104.6
Choteau	--	13.4	13.7	12.9	16.0	14.0	103.1
Outlook	--	13.8	13.6	12.6	15.9	14.0	102.9
McNeal	12.5	14.2	13.0	12.0	15.1	13.4	100.0
Waikea*	--	--	--	--	14.6	14.6	96.7
Agawam*	--	--	--	--	14.2	14.2	94.0

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.