Project Title: Evaluation of spring wheat cultivar performance under continuous-crop and crop-crop-fallow systems in central Montana

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Objective:
Evaluate relative performance spring wheat cultivars and development lines in central Montana crop environments.

Results:
All three NTCC site mean yields, Moccasin-27.3 bu/a, Denton-27.9 bu/a, Geraldine-32.4 bu/a, exceeded the recent five year average (Tables 4-6). Reeder was the highest yielding cultivar for two of the locations, while Vida was the highest yielder on the Moccasin trial. Both Geraldine and Denton trials had test weights that exceeded their five year averages; with both locations containing a 2013 average of 63.0 lb/bu (Tables 8-9). The 2013 Moccasin mean test weight was identical to the five year average at 58.3 lb/bu (Table 7). Volt had the high test weight at two of the three locations and produced the third highest test weight in the other trial. Fortuna was the high test weight for the Moccasin trial at 60.6 lb/bu (Tables 1 & 7). The mean protein content at Moccasin averaged 17.2%, which is slightly above the five year average of 16.2% (Table 10). Both Denton and Geraldine had mean protein levels that were well below five year averages at 13.3% and 11.6% respectively (Tables 11 & 12). Mott, Corbin and Volt all had protein levels above 18% at the Moccasin trial, with Mott having the highest protein content of 18.3% (Table 10). Kelby had the high protein at Denton and Geraldine with 15.0% and 12.8% respectively (Tables 11 & 12). Fortuna and Choteau both measured near the top in protein content at the Geraldine and Denton locations.

Summary:
For ease of assessing relative performances, the cultivar Vida is used as the spring wheat standard for multi-year comparison of yield, test weight, and protein. (See Tables 4-12). Vida is consistently a high grain producer across diverse locations. Vida was the highest yielding variety in Geraldine at 40.0 bu/a, but had much lower average yields at Moccasin and Denton measuring 29.6 bu/a and 29.5 bu/a respectively (Tables 4-6). The multi-year grain yield mean for Vida is below the mean yields of Oneal and Fortuna at the Moccasin. Vida maintains the highest multi-year mean for grain yield at both Geraldine and Denton. Vida is near the mean for test weight and below the mean for grain protein. Mott was frequently at or near the top for protein content. MSU-MAES Spring Wheat Breeder Luther Talbert and associate breeder Susan Lanning (now–retired) coordinated the selection of entries and the preparation of seed for the on-farm cultivar trials.

Funding Summary:
Expenditure information to be provided by OSP. No other grant support was provided.

MWBC FY2011 Grant Submission Plans:
It is planned to submit this project for funding consideration in the next fiscal year.

Table 1 2013 Moccasin No-Till Recrop spring wheat cultivar performance evaluations.
Exp139970 Central Agricultural Research Center. Moccasin, Montana.

ID	PEDIGREE	ENTRY	Head Date	Plant Height	Grain Yield	Test Weight	Protein Content
			Julian	cm	bu/ac	lbs/bu	%
CI 13596	FORTUNA	1	182.3		29.2	60.6	16.1
PI574642	MCNEAL	2	182.0		27.1	57.7	16.0
ND 695	REEDER	3	182.0		34.0	59.1	16.4
PI633974	CHOTEAU	4	182.7		31.2	57.8	16.4
PI642366	VIDA	5	182.7		29.6	58.1	16.5
PI660981	DUCLAIR	6	181.0		26.5	56.8	17.5
BZ992322	HANK	7	180.0		28.6	57.7	17.6
BZ996434	CORBIN	8	181.0		25.4	57.7	18.2
ACS52610	VOLT	9	182.3		23.0	59.2	18.1
BZ9M1044	JEDD	10	180.3		24.3	58.9	17.5
BZ999592	ONEAL	11	181.3		25.1	58.6	17.5
WB9879CL	WB9879CLP	12	182.0		26.7	58.5	16.7
AGRIPRO6	KELBY	13	180.7		30.8	58.6	17.6
AGRIPRO8	AP604CL	14	181.3		21.4	56.0	17.9
NDSW0449	MOTT	15	184.0		26.1	59.1	18.3
BZ92413R	WB GUNNISON	16	180.7		29.2	59.6	17.0
AGRIPR12	SY TYRA	17	183.3		23.0	57.0	17.2
MT 1053	VIDA/MTHW0202	18	183.3		36.3	59.1	16.9
MT 1142	06SR49/06SR175	19	181.7		28.4	56.3	18.0
MT 1172	MT0245/IMI8209-1//	20	183.0		28.0	57.5	15.8
LNR -0557(Meridia	MS Stingray	21	183.7		30.6	57.7	14.5
Mean			182.0		27.83	58.15	17.03
P - value			0.00		0.37	0.04	0.00
CV 1			0.5		21.4	1.8	0.0
LSD (0.5byt)			1.42		9.83	2.24	0.00

Seed Date: 4/19/2013 CCmustard stubble Soil: 2"depth 6C Moist Probe: 10"
Fertilizer: 10-10-10-05 NPKS w/seed 90 N top dress as urea
Harvest: 16-Aug-13
Comments:
Slow sprng growth initially due to dry conditions and stand establishment was not uniform.
Seedlings rooted well due to dry mid-spring weather.
High humidity late July - early August reduce typical late season moisture stress.

Table 2 2013 Denton spring wheat cultivar evaluations.
Exp139971 Central Agricultural Research Center. Moccasin, Montana.

ID	PEDIGREE	ENTRY	Head Date	Plant Height	Grain Yield	Test Weight	Protein Content
			Julian	cm	bu/ac	lbs/bu	%
CI 13596	FORTUNA	1		30	29.9	62.6	14.0
PI574642	MCNEAL	2		26	27.7	62.2	13.0
ND 695	REEDER	3		24	33.9	63.3	13.7
PI633974	CHOTEAU	4		23	31.2	62.6	14.3
PI642366	VIDA	5		24	29.5	62.7	12.4
PI660981	DUCLAIR	6		25	27.1	61.5	13.0
BZ992322	HANK	7		23	28.3	61.8	13.9
BZ996434	CORBIN	8		25	26.3	62.8	13.6
ACS52610	VOLT	9		22	23.8	64.2	12.2
BZ9M1044	JEDD	10		21	25.1	63.1	12.2
BZ999592	ONEAL	11		23	26.5	62.7	12.6
WB9879CL	WB9879CLP	12		24	26.9	63.1	14.6
AGRIPRO6	KELBY	13		21	31.6	64.0	15.0
AGRIPRO8	AP604CL	14		25	22.0	63.2	13.8
NDSW0449	MOTT	15		26	26.4	63.1	13.3
BZ92413R	WB GUNNISON	16		23	30.8	63.0	13.2
AGRIPR12	SY TYRA	17		23	23.6	63.9	11.9
MT 1053	VIDA/MTHW0202	18		25	38.1	62.9	11.7
MT 1142	06SR49/06SR175	19		24	29.1	61.4	13.1
MT 1172	MT0245/IMI8209-1//MT0245	20		23	28.1	61.8	12.1
LNR -0557	MS Stingray	21		25	31.9	60.8	12.0
Mean				24.05	28.46	62.68	13.12
P - value				0.00	0.46	0.00	0.00
CV 1				0.00	22.40	0.58	0.00
LSD (0.5byt)				0.0	10.52	0.76	0.0

Seed Date: 4/26/2013 NTCC after lentils Soil: 2"Temp.: 8C Moist depth: 18 "
Fertilizer: 10-10-10-05 NPKS w/seed + 60 N top dress as urea.
Harvest: 22-Aug-13

Table 3 2013 Geraldine spring wheat cultivar performance evaluations.
Exp139972 Central Agricultural Research Center. Moccasin, Montana.

ID	PEDIGREE	ENTRY	Head Date	Plant Height	Grain Yield	Test Weight	Protein Content
			Julian	cm	bu/ac	lbs/bu	%
CI 13596	FORTUNA	1		33	27.1	62.8	12.6
PI574642	MCNEAL	2		27	27.5	62.1	11.9
ND 695	REEDER	3		28	33.2	63.2	11.9
PI633974	CHOTEAU	4		26	32.2	62.7	12.1
PI642366	VIDA	5		29	40.0	62.9	10.8
PI660981	DUCLAIR	6		28	36.0	61.8	11.2
BZ992322	HANK	7		26	34.0	61.0	11.2
BZ996434	CORBIN	8		26	33.3	62.5	10.8
ACS52610	VOLT	9		26	35.9	64.5	10.7
BZ9M1044	JEDD	10		22	34.3	63.4	10.7
BZ999592	ONEAL	11		28	33.8	63.0	10.9
WB9879CL	WB9879CLP	12		26	34.3	63.2	11.2
AGRIPRO6	KELBY	13		24	28.8	63.5	12.8
AGRIPRO8	AP604CL	14		28	31.8	63.7	11.3
NDSW0449	MOTT	15		28	33.1	63.4	12.0
BZ92413R	WB GUNNISON	16		25	29.4	62.9	12.3
AGRIPR12	SY TYRA	17		24	32.1	64.0	11.2
MT 1053	VIDA/MTHW0202	18		25	34.7	62.8	11.1
MT 1142	06SR49/06SR175	19		25	33.1	61.9	11.7
MT 1172	MT0245/IMI8209-1//M	20		25	35.6	62.1	11.6
LNR -0557	MS Stingray	21		27	33.9	61.4	10.8
Mean				26.48	33.06	62.77	11.47
P - value				0.00	0.00	0.00	0.00
CV 1				0.00	8.84	0.54	0.00
LSD (0.5byt)				0	4.823	0.7058	0

Seed Date: 06-May -13 NTCC winter wht stubble. Soil: 2"Temp.: 18C Moist depth: 24 "
Fertilizer: 10-10-10-05 w/sd 60 lbs N preplant top dress (90 N more ideal rate)
Harvest: 23-Aug-13 Field: strip by east fence
Comments:
Heavy straw residue interfered with obtaining the ideal stand. However, the stands were uniform across treatments. A sequential application of an additional 30 lbs N was planned for but not carried out on the spring wheat portion of the trial site. Feed barley was seeded around the trial site.

Table 4 Moccasin multi-year NTCC spring wheat cultivar yield performance.
Exp 139970 Central Agricultural Research Center. Moccasin, Montana.

Selected Entries	2009	2010	2011	2012	2013	Average	Vida Same Yrs
			(bu/a)				
FORTUNA	25.5	33.7	32.3	22.9	29.2	**28.7**	27.9
AP604CL	15.7	26.2	28.0	16.4	21.4	21.5	27.9
CHOTEAU	25.5	26.5	28.3	21.4	31.2	26.6	27.9
CORBIN	23.2	31.1	24.8	19.4	25.4	24.8	27.9
DUCLAIR			32.0	21.2	26.5	26.6	27.6
KELBY	17.5	24.9	30.3		30.8	25.9	29.6
MCNEAL	28.2	29.8	27.2	22.8	27.1	27.0	27.9
MOTT		32.9	28.5	19.7	26.1	26.8	28.3
ONEAL	28.4	33.0	33.5	24.5	25.1	**28.9**	27.9
REEDER	23.7	28.1	32.1	20.1	34.0	27.6	27.9
SY TYRA			23.0	18.8	23.0	21.6	27.6
VIDA	**26.5**	**30.4**	**32.0**	**21.2**	**29.6**	**27.9**	**27.9**
VOLT	21.1	23.7	27.2	20.2	23.0	23.0	27.9
WB GUNNISON			26.1	21.9	29.2	25.7	27.6
Yearly Mean	23.4	29.3	28.6	21.1	27.8		

Varieties with multi-year mean yield > than Vida for the same years are in bold.

(Figure 1)

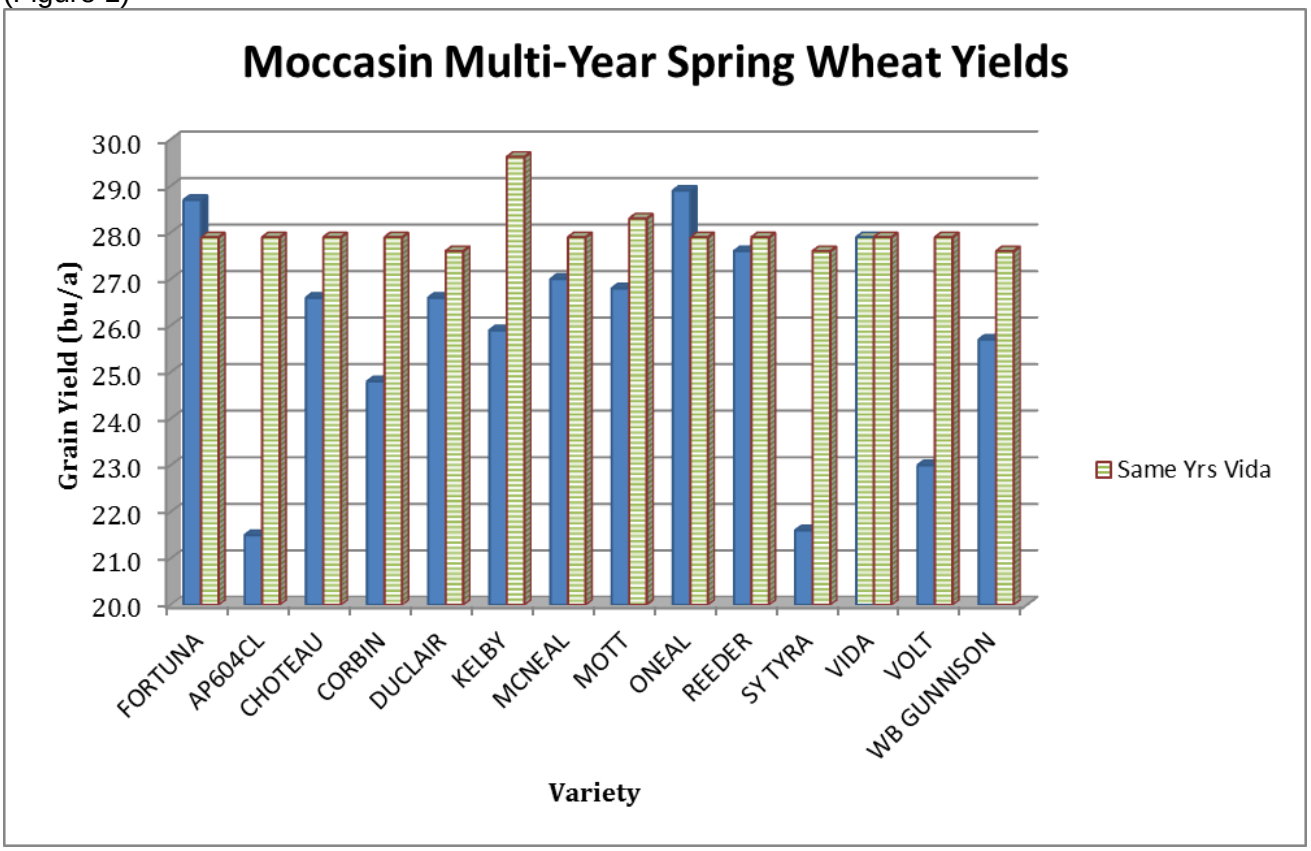


Table 5 Denton multi-year NTCC spring wheat cultivar yield performance.
Exp 139971 Central Agricultural Research Center. Moccasin, Montana.

Selected Entries	2009	2010	2011	2012	2013	Average	Vida Same Yrs
			(bu/a)				
FORTUNA	25.6	32.0	15.6	22.6	29.9	25.1	29.1
AP604CL	25.8	28.0	16.2	21.2	22.0	22.6	29.1
CHOTEAU	25.6	37.0	15.5	20.4	31.2	25.9	29.1
CORBIN	28.3	35.1	15.9	22.7	26.3	25.7	29.1
DUCLAIR			15.4	20.0	27.1	20.8	24.7
KELBY	22.2	24.1	15.5		31.6	23.4	29.7
MCNEAL	22.2	30.2	15.8	20.3	27.7	23.2	29.1
MOTT		32.5	16.3	22.3	26.4	24.4	27.6
ONEAL	32.6	37.5	16.3	25.9	26.5	27.8	29.1
REEDER	27.2	28.0	17.1	22.3	33.9	25.7	29.1
SY TYRA			16.4	22.9	23.6	21.0	24.7
VIDA	**35.2**	**36.4**	**17.7**	**26.9**	**29.5**	**29.1**	29.1
VOLT	28.6	22.2	16.2	21.2	23.8	22.4	29.1
WB GUNNISON			16.9	25.6	30.8	24.4	24.7
Yearly Mean	27.8	31.0	16.3	23.2	28.5		

Varieties with multi-year mean yield > than Vida for the same years are in bold.

(Figure 2)

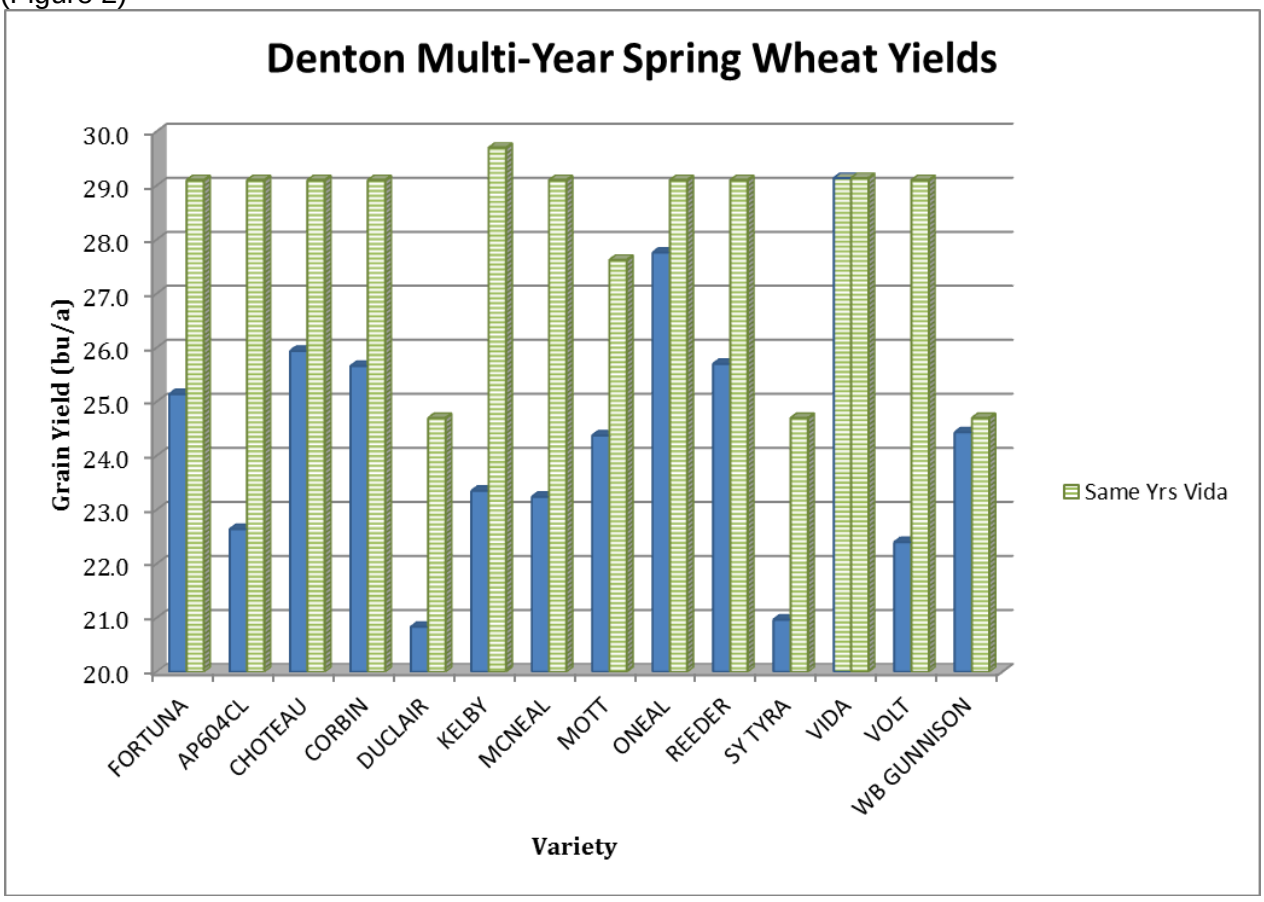


Table 6 Geraldine multi-year NTC-C-F spring wheat cultivar yield performance.
Exp 139972 Central Agricultural Research Center. Moccasin, Montana.

Selected Entries	2009	2010	2011	2012	2013	Average	Same Yrs Vida
			(bu/a)				
FORTUNA	22.8	35.4	24.6	26.3	27.1	27.2	34.0
AP604CL	23.8	24.0	23.4	28.5	31.8	26.3	34.0
CHOTEAU	25.7	32.0	27.2	31.1	32.2	29.6	34.0
CORBIN	25.0	35.9	30.1	29.0	33.3	30.7	34.0
DUCLAIR			26.6	30.4	36.0	31.0	34.4
KELBY	19.4	30.1	24.0		28.8	25.6	34.4
MCNEAL	26.1	25.6	26.2	28.1	27.5	26.7	34.0
MOTT		33.2	24.2	27.6	33.1	29.5	34.6
ONEAL	28.9	35.3	27.9	30.6	33.8	31.3	34.0
REEDER	27.3	27.6	26.7	32.1	33.2	29.4	34.0
SY TYRA			23.1	28.6	32.1	27.9	34.4
VIDA	**31.9**	**34.9**	**30.8**	**32.6**	**40.0**	**34.0**	34.0
VOLT	30.3	23.3	27.8	29.7	35.9	29.4	34.0
WB GUNNISON			28.6	30.5	29.4	29.5	34.4
Yearly Mean	25.4	30.2	26.5	30.4	33.1		

Varieties with multi-year mean yield > than Vida for the same years are in bold.

(Figure 3)

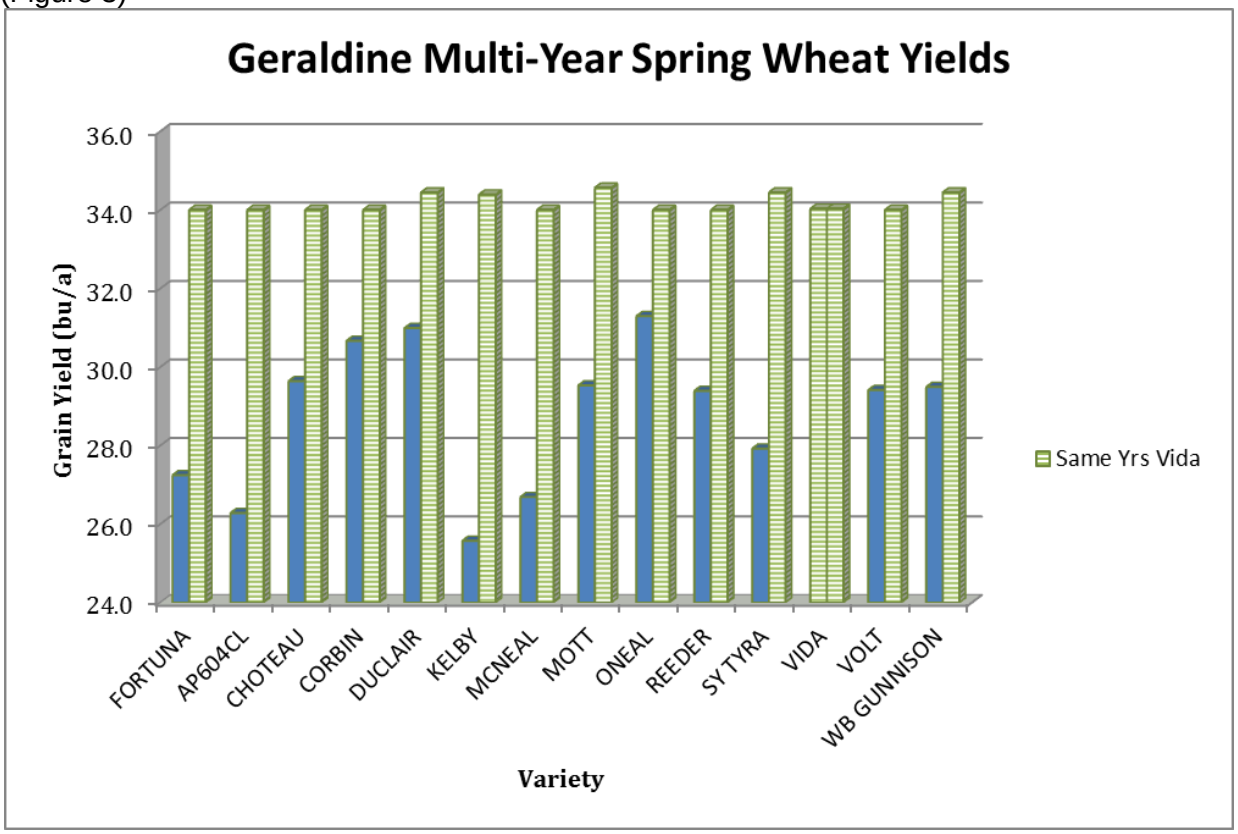


Table 7 Moccasin multi-year NTCC spring wheat cultivar test weight performance.
Exp 139970 Central Agricultural Research Center. Moccasin, Montana.

Selected Entries	2009	2010	2011	2012	2013	Average	Vida Same Yrs
			(lb/bu)				
FORTUNA	59.2	59.8	60.2	54.6	60.6	**58.9**	58.2
AP604CL	59.8	58.8	59.6	53.7	56.0	57.6	58.2
CHOTEAU	58.7	59.8	60.1	55.4	57.8	**58.3**	58.2
CORBIN	60.5	59.0	59.0	55.1	57.7	58.2	58.2
DUCLAIR			57.9	54.3	56.8	56.3	57.4
KELBY	59.8	60.1	61.1		58.6	**59.9**	59.1
MCNEAL	59.8	59.1	58.9	53.7	57.7	57.8	58.2
MOTT	n/a	59.0	59.2	54.5	59.1	57.9	58.0
ONEAL	61.2	60.4	60.2	55.7	58.6	**59.2**	58.2
REEDER	60.7	60.6	61.1	56.6	59.1	**59.6**	58.2
SY TYRA			60.1	54.9	57.0	57.3	57.4
VIDA	**59.3**	**59.7**	**59.4**	**54.7**	**58.1**	**58.2**	58.2
VOLT	60.9	60.6	60.8	56.7	59.2	**59.6**	58.2
WB GUNNISON			59.7	54.4	59.6	**57.9**	57.4
Yearly Mean	60.0	59.4	59.7	55.0	58.2		

Varieties with multi-year mean yield > than Vida for the same years are in bold.

(Figure 4)

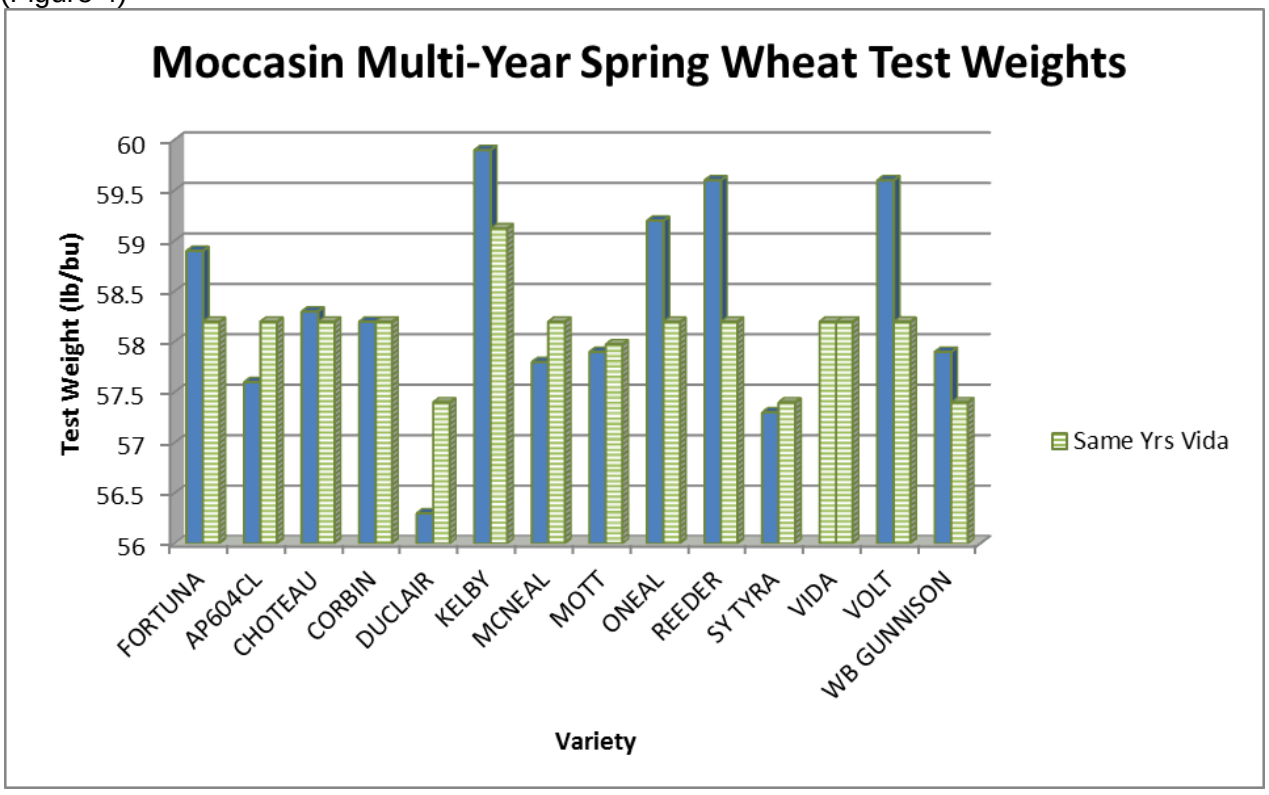


Table 8 Denton multi-year NTCC spring wheat cultivar test weight performance.
Exp 139971 Central Agricultural Research Center. Moccasin, Montana.

Selected Entries	2009	2010	2011	2012	2013	Average	Same Yrs Vida
			(lb/bu)				
FORTUNA	62.4	60.1	61.2	56.2	62.6	**60.5**	60.2
AP604CL	62.9	61.1	62.3	55.2	63.2	**60.9**	60.2
CHOTEAU	61.7	60.4	61.5	57.2	62.6	**60.7**	60.2
CORBIN	61.9	60.1	61.5	54.6	62.8	60.2	60.2
DUCLAIR			61.3	53.8	61.5	58.9	59.9
KELBY	63.0	60.8	62.8		64.0	**62.7**	61.3
MCNEAL	61.9	59.0	58.7	55.4	62.2	59.4	60.2
MOTT		59.9	62.6	57.3	63.1	**60.7**	59.8
ONEAL	62.3	61.3	61.0	57.3	62.7	**60.9**	60.2
REEDER	63.4	60.3	61.0	56.8	63.3	**61.0**	60.2
SY TYRA			64.6	57.0	63.9	**61.8**	59.9
VIDA	**61.8**	**59.7**	**60.9**	**56.0**	**62.7**	**60.2**	60.2
VOLT	63.0	61.7	62.9	57.5	64.2	**61.9**	60.2
WB GUNNISON			61.7	57.0	63.0	**60.6**	59.9
Yearly Mean	62.5	60.2	61.7	56.2	62.7		

Varieties with multi-year mean yield > than Vida for the same years are in bold.

(Figure 5)

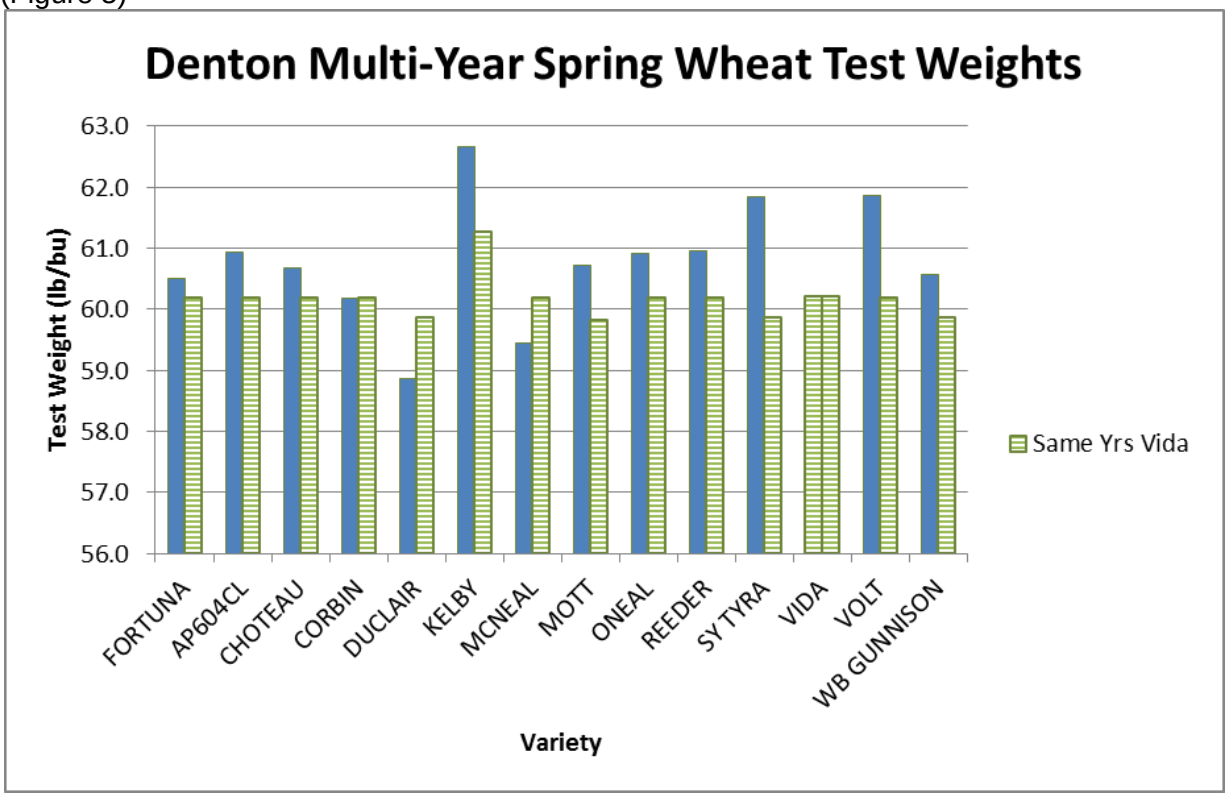


Table 9 Geraldine multi-year NTCC spring wheat cultivar test weights.
Exp 139972 Central Agricultural Research Center. Moccasin, Montana.

Selected Entries	2009	2010	2011	2012	2013	Average	Vida Same Yrs
			(lb/bu)				
FORTUNA	59.1	59.3	61.1	59.0	62.8	**60.2**	59.4
AP604CL	61.3	58.5	60.0	58.3	63.7	**60.3**	59.4
CHOTEAU	59.9	57.1	58.8	59.5	62.7	**59.6**	59.4
CORBIN	60.3	58.2	60.2	57.8	62.5	**59.8**	59.4
DUCLAIR			58.7	56.3	61.8	**58.9**	59.8
KELBY	60.6	59.3	62.0		63.5	**61.3**	59.8
MCNEAL	60.1	57.6	58.5	57.3	62.1	59.1	59.4
MOTT		58.6	61.3	59.2	63.4	**60.6**	59.2
ONEAL	61.7	59.6	60.2	58.7	63.0	**60.6**	59.4
REEDER	60.7	59.1	59.3	58.8	63.2	**60.2**	59.4
SY TYRA			60.5	57.8	64.0	**60.7**	59.8
VIDA	**60.4**	**57.3**	**58.5**	**58.1**	**62.9**	**59.4**	**59.4**
VOLT	62.7	60.2	62.2	60.3	64.5	62.0	59.4
WB GUNNISON			59.9	58.5	62.9	60.4	59.8
Yearly Mean	60.6	58.5	59.9	58.5	62.8		

Varieties with multi-year mean yield > than Vida for the same years are in bold.

(Figure 6)

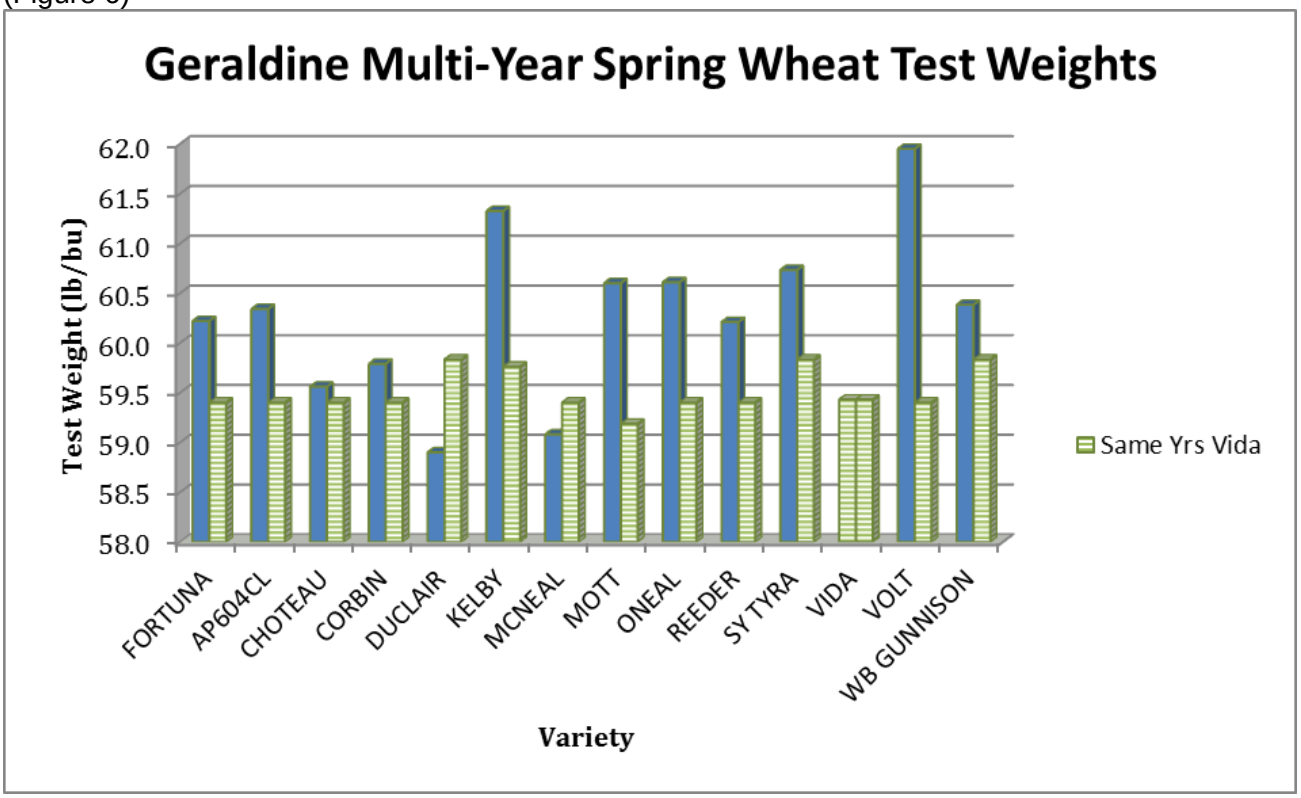


Table 10 Moccasin multi-year NTCC spring wheat cultivar protein performance.
Exp 139970 Central Agricultural Research Center. Moccasin, Montana.

Selected Entries	2009	2010	2011	2012	2013	Average	Vida Same Yrs
			(%)				
FORTUNA	16.2	12.7	15.8	18.2	16.1	**15.8**	15.5
AP604CL	17.8	12.9	15.1	19.2	17.9	**16.6**	15.5
CHOTEAU	17.6	12.6	15.8	17.3	16.4	**15.9**	15.5
CORBIN	18.1	12.8	14.6	18.6	18.2	**16.5**	15.5
DUCLAIR			14.8	17.4	17.5	**16.6**	16.2
KELBY	15.2	13.7	16.2		17.6	**15.7**	15.1
MCNEAL	17.5	12.9	16.2	18.2	16.0	**16.2**	15.5
MOTT	n/a	13.7	15.4	19.3	18.3	**16.7**	15.1
ONEAL	17.3	12.9	15.0	18.8	17.5	**16.3**	15.5
REEDER	16.3	12.4	15.5	17.5	16.4	**15.6**	15.5
SY TYRA			15.4	18.3	17.2	**17.0**	16.2
VIDA	**17.4**	**11.7**	**14.8**	**17.3**	**16.5**	**15.5**	**15.5**
VOLT	16.0	13.7	13.8	18.1	18.1	**15.9**	15.5
WB GUNNISON			15.4	18.3	17.0	**16.9**	16.2
Yearly Mean	16.9	12.9	15.3	18.1	17.0		

Varieties with multi-year mean yield > than Vida for the same years are in bold.

(Figure 7)

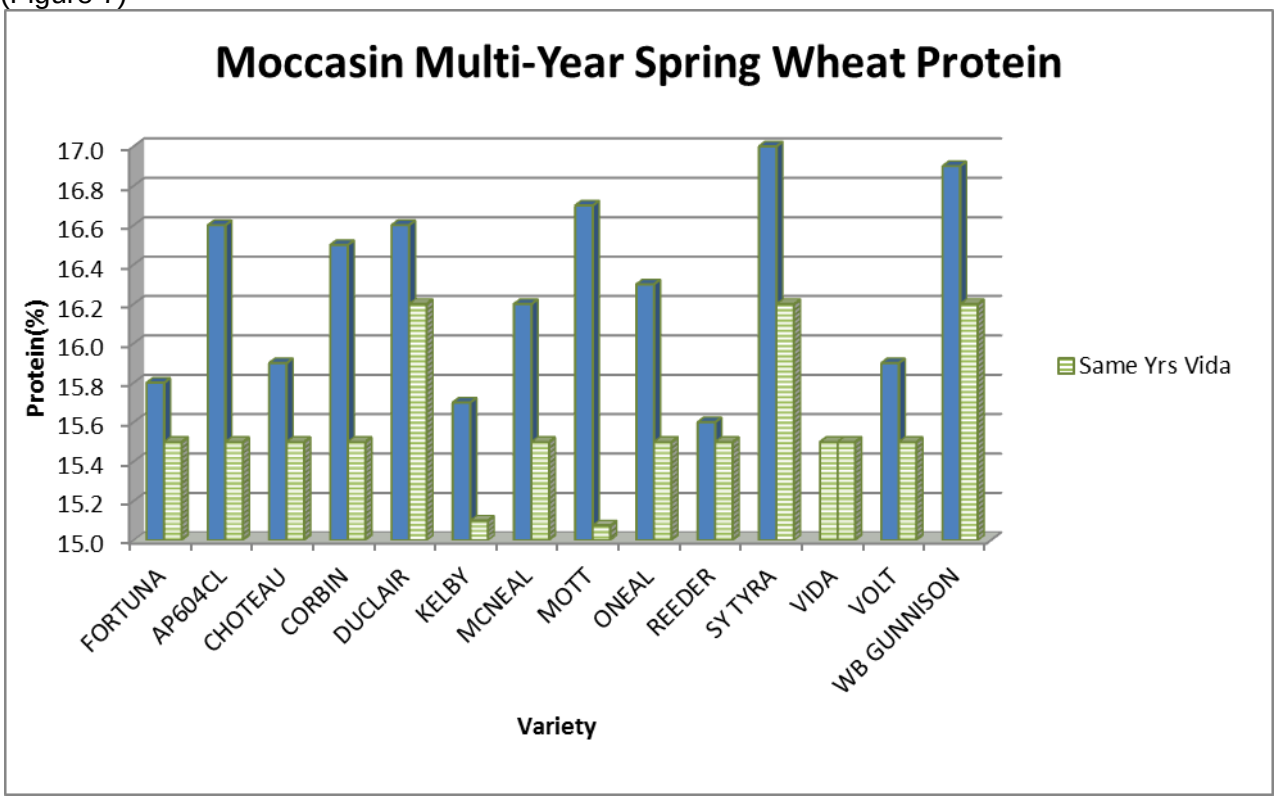


Table 11 Denton multi-year NTCC spring wheat cultivar protein performance.
Exp 139971 Central Agricultural Research Center. Moccasin, Montana.

Selected Entries	2009	2010	2011	2012	2013	Average	Vida Same Yrs
			(%)				
FORTUNA	14.6	13.2	14.6	14.7	14.0	**14.2**	13.4
AP604CL	14.8	14.2	14.1	16.6	13.8	**14.7**	13.4
CHOTEAU	15.0	13.9	14.6	14.9	14.3	**14.5**	13.4
CORBIN	14.6	13.3	13.9	16.1	13.6	**14.3**	13.4
DUCLAIR			13.6	15.6	13.0	**14.1**	13.4
KELBY	16.8	13.7	14.9		15.0	**15.1**	13.0
MCNEAL	14.2	13.2	14.2	15.8	13.0	**14.1**	13.4
MOTT		14.1	14.0	16.9	13.3	**14.6**	13.3
ONEAL	13.7	13.1	13.8	15.5	12.6	**13.7**	13.4
REEDER	14.3	13.5	14.3	15.1	13.7	**14.2**	13.4
SY TYRA			12.4	15.1	11.9	13.1	13.4
VIDA	**13.9**	**13.1**	**12.6**	**15.2**	**12.4**	**13.4**	**13.4**
VOLT	13.4	12.9	12.7	16.0	12.2	13.4	13.4
WB GUNNISON			13.2	15.5	13.2	**14.0**	13.4
Yearly Mean	14.4	13.4	13.7	15.4	13.1		

Varieties with multi-year mean yield > than Vida for the same years are in bold.

(Figure 8)

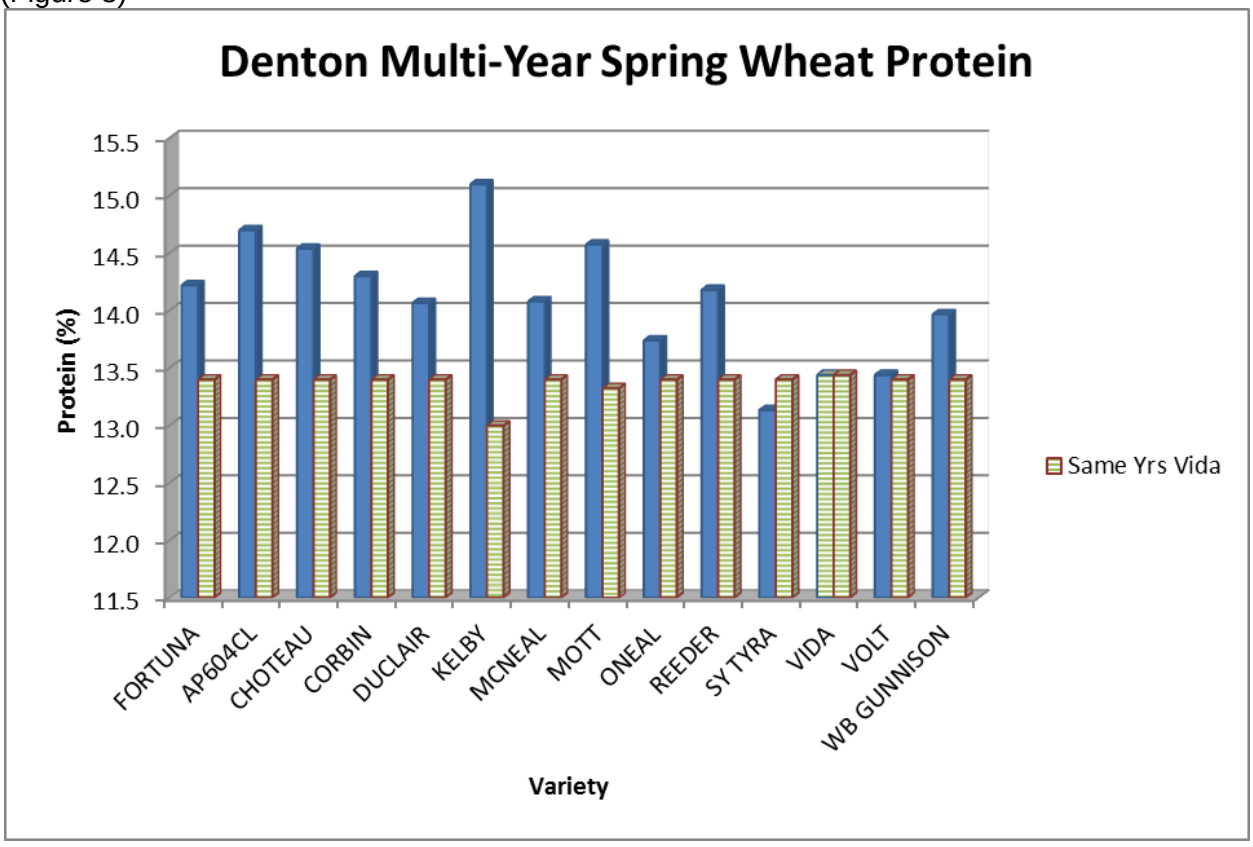
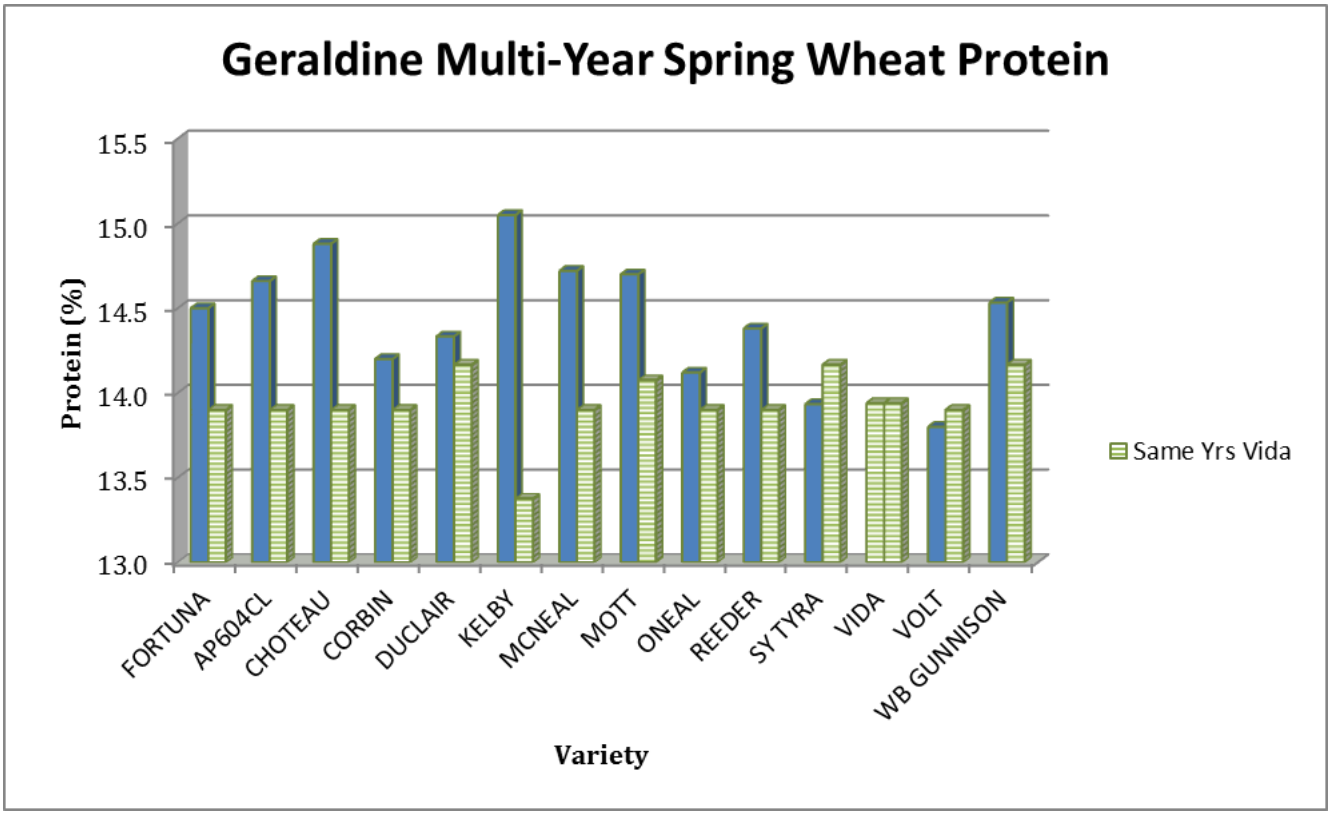


Table 12 Geraldine multi-year NTC-C-F spring wheat cultivar protein performance.
Exp 139972 Central Agricultural Research Center. Moccasin, Montana.

Selected Entries	2009	2010	2011	2012	2013	Average	Vida Same Yrs
			(%)				
FORTUNA	14.5	14.7	14.2	16.5	12.6	**14.5**	13.9
AP604CL	14.1	15.2	15.6	17.1	11.3	**14.7**	13.9
CHOTEAU	14.3	15.1	16.5	16.4	12.1	**14.9**	13.9
CORBIN	14.3	14.9	14.5	16.5	10.8	**14.2**	13.9
DUCLAIR			14.8	17.0	11.2	**14.3**	14.2
KELBY	16.0	15.8	15.6		12.8	**15.1**	13.4
MCNEAL	14.7	14.8	14.6	17.6	11.9	**14.7**	13.9
MOTT		15.4	14.2	17.2	12.0	**14.7**	14.1
ONEAL	13.6	14.5	14.9	16.7	10.9	**14.1**	13.9
REEDER	14.0	15.2	14.4	16.4	11.9	**14.4**	13.9
SY TYRA			13.9	16.7	11.2	13.9	14.2
VIDA	**13.4**	**13.8**	**15.5**	**16.2**	**10.8**	**13.9**	13.9
VOLT	13.5	13.5	13.8	17.5	10.7	13.8	13.9
WB GUNNISON			14.6	16.7	12.3	**14.5**	14.2
Yearly Mean	14.3	14.7	14.8	16.7	11.5		

Varieties with multi-year mean yield > than Vida for the same years are in bold.

(Figure 9)


Geraldine Multi-Year Spring Wheat Protein
Protein (%)
15.5
15.0
14.5
14.0
13.5
13.0
FORTUNA
AP604CL
CHOTEAU
CORBIN
DUCLAIR
KELBY
MCNEAL
MOTT
ONEAL
REEDER
SY TYRA
VIDA
VOLT
WB GUNNISON
Variety
Same Yrs Vida