

This is a nomination for the release of the winter triticale lines 110WCF57 and 111WCF57 for forage production in Montana cropping districts 4, 3, 2, 1 and milder winter parts of district 5. No name is currently proposed for 110WCF57. Propose the name **Deer Lodge** for 111WCF57. Prepared by Dave Wichman, Research Agronomist CARC, Moccasin .

## Background

In the fall of 2004, seven winter triticale segregating F5 winter triticale populations, descending from cross pollinations made by then MSU/MAES associate plant breeder, Pat Hensleigh, were seeded at the Central Agricultural Research Center. The populations consisted of an array of plant heights, head types and growth habit (spring, facultative and true winter types). Plants were selected on a visual basis for reduced awn, awnlette and awnless head types, and more robust foliar growth for greater forage production. The nurseries were seeded in shallow furrows in black fallow on wind exposed berm to enhance winter kill. Head rows planting were initiated in the fall 2005. Triticale, in general, has tendency for some outcrossing which varies in frequency and degree across lines and is possibly influenced by environmental conditions at flowering. This character makes developing a fixed pure line difficult. In 2006 to 2008 spring plantings were made to aide in selecting against facultative growth habits. This strategy had worked, previously, in the development of Koldtana and Pompey winter triticale cultivars, for eliminating facultative plants. Surviving spring seeded plants surviving plants, which produced seed 14 month post seeding, were assumed to be true winter types. The apparent evolution in green bridge cereal diseases, possibly the High Plains Complex, resulted in complete fall-winter mortality of the spring seeded winter triticale plants. Fall- late winter 2008-2009, 200 + heads, of awnless and awnlette plants types, of lines exhibiting good forage production yields, were split in two and one head part was seeded in head hills. The other head part was planted in paired hill in May 2009. Heads were collected from fall planted head part, with awnless and awnlette head types, and the paired spring planted hill plants did not produce an elongated stems and reproductive parts prior to early August and had good agronomic appearance were kept for continued evaluation and increase.

## Justification

The two lines, **110WCF57** and **111WCF57**, provide for awnlette/awnless head types which is a desired character for those producers feeding cereal forages as long stem hay. Trical 102, most popular and widely grown winter triticale, has awns but does not retain all of the lateral floret awns through the growing season. Awns contribute to livestock developing lump-jaw and/or sore eyes. Yield performance of these triticale lines may not be as stable over diverse geographical areas as is the performance of modern wheat cultivars like Yellowstone. In winter stress areas, like Havre, there have been low performing years. These lines exhibit excellent stem strength. Crops that retain a more up right plant later into the season can provide for shelter from visibility for deer in annual wildlife food plot plantings. Seed production is not outstanding but is equal or better than the grain yield of Willow Creek. Further, these lines have not exhibited susceptibility to shatter or head breakage. These lines head earlier than Willow Creek which can be viewed as an asset or detriment in various production scenarios.

Data from 20 location years is presented in the following tables. As means of assessing the relative performance, the entries are ranked in each nursery by yield. Those yield rankings have been assembled in summary tables by year.

Line **111WCF57** produced forage dry matter yields equal or greater than the yields of Willow Creek awnless winter wheat and Trical 102 reduced winter triticale at: three of six locations in 2013 [Table 7], 4 of 5 in 2012 [Table 9] , 4 of 5 in 2011 [Table 11] and 3 of 4 in 2010 [Table 22]. Grain yield is presented in tables 1, 13, 16 and 15. Mean quality data from four 2010 locations is summarized in table 23. No quality features stood out in this data set. Line 111 WCF 57 frequently is 3 to 5 inches taller than line 110WCF57. This additional height may be less attractive to some forage producers. At the same, the additional height may be desirable for those wanting habitat which promotes the presence of deer and elk. Therefore, the name Deer Lodge is suggested.

Line **110WCF57** produced forage dry matter yields equal or greater than the yields of Willow Creek, awnless winter wheat, and Triticale 102, reduced awned winter triticale at: three of six locations in 2013 [Table 7], 5 of 7 locations in 2012, and 2 of 4 locations in 2010 [Table 22]. Over all yield performance of Line **110WCF57** is similar to Line **111WCF57**. **Line 110WCF57 may be preferred by some forage producers due to it frequently being shorter than 111WCF57.** No quality data is presented here for 110WCF57. Quality information will be assembled prior to committee meeting. No name has been suggested for Line 110WCF57 .

Seed increase drill strips were planted in October 2013. If the cultivars were released to a seed company for increase and marketing, the 2014 production could be transferred to that company for increase. If the lines are released and retained by MAES for marketing through the foundation seed program, the first producer sales would be in fall 2015.

I would like to express appreciation of the efforts put forth by several colleagues, producer cooperators, and support staff in facilitating and conducting field performance evaluations on numerous triticale lines that have been evaluated in the Montana winter cereal forage trials over the past several years. These people include Pat Hensleigh, Matt Kolding, Jim Berg, Phil Bruckner, Peggy Lamb, Roger Hybner, Ken Kephart, Dennis Cash, Valtcho Jeliazkov, Robert Bold, Tom Butcher, Sally Dahlhausen, Joe Vavrovsky, and seasonal student employees.

Table 1.  
Exp 13223807

2013 Winter cereal cultivar evaluation under crop-fallow near Moccasin.  
Central Agricultural Research Center. Moccasin, Montana.

Cultivar ID	trt	Head Date	Height 10-Jul	Dry Matter	Forage Yield	Grain Yield	Test Weight	Forage Yield Rank
		Julin	cm	%	t/a	lbs/a	lbs/bu	#
10PreWCF 60	1	168	150	38	4.135	2181	46.1	6
10 PreWcf 78	2	169	161	38	4.125	2146	54.1	7
12 wcf A 18 (P0029)	3	168	157	35	3.885	2873	55.5	11
10 PreWcf 68	4	168	153	35	3.961	2578	50.7	10
<b>110 WCF 57</b>	<b>5</b>	<b>170</b>	<b>141</b>	<b>38</b>	<b>4.381</b>	<b>2690</b>	<b>48.1</b>	<b>2</b>
12 WCF A 21 (P0059)	6	169	165	37	4.497	2407	54.5	1
12 WCF A 41 (P1085)	7	165	144	38	3.989	2627	50.8	9
<b>111 WCF 57</b>	<b>8</b>	<b>168</b>	<b>151</b>	<b>38</b>	<b>4.060</b>	<b>2554</b>	<b>49.4</b>	<b>8</b>
12 WCF A 35 (11Adv10)	9	166	149	38	4.242	2599	52.3	3
12 WCF A 27 (P0086)	10	170	157	38	4.213	2092	47.0	4
<b>Willow Creek</b>	<b>11</b>	<b>178</b>	<b>130</b>	<b>37</b>	<b>3.452</b>	<b>2053</b>	<b>59.3</b>	<b>15</b>
<b>Trical 102</b>	<b>12</b>	<b>170</b>	<b>147</b>	<b>38</b>	<b>4.168</b>	<b>2053</b>	<b>44.8</b>	<b>5</b>
<b>Yellowstone</b>	<b>13</b>	<b>172</b>	<b>90</b>	<b>37</b>	<b>3.693</b>	<b>3557</b>	<b>59.1</b>	<b>13</b>
M7F1232	14	176	117	37	3.697	3007	58.0	12
M7F1229	15	175	92	35	3.422	3183	56.1	16
<b>Newturk</b>	<b>16</b>	<b>173</b>	<b>128</b>	<b>37</b>	<b>3.640</b>	<b>2440</b>	<b>60.0</b>	<b>14</b>
Mean		170	140	37.2	3.972	2565	52.9	
P value		0.00	0.00	0.00	0.00	0.00	0.00	
CV1		0.5	4.1	1.8	7.3	12.0	1.3	
LSD(0.05 by t)		1.56	9.62	1.00	0.49	515.10	1.17	

Table 2  
Exp 13223870

2013 Winter cereal forage cultivar evaluation under NTCC near Moccasin  
Central Agricultural Research Center. Moccasin, Montana.

Cultivar ID	trt	Head Date	Height 10-Jul	Dry Matter %	Forage Yield t/a	Grain Yield lbs/a	Test Weight lbs/bu	Forage Yield Rank #
10PreWCF 60	1	167	121	29	1.961			7
10 PreWcf 78	2	168	117	28	1.798			12
12 wcf A 18 (P0029)	3	168	121	32	2.106			3
10 PreWcf 68	4	167	121	31	2.096			4
110 WCF 57	5	169	97	27	1.863			11
12 WCF A 21 (P0059)	6	169	123	31	2.131			2
12 WCF A 41 (P1085)	7	165	106	32	1.929			8
111 WCF 57	8	168	113	32	2.204			1
12 WCF A 35 (11Adv10)	9	169	106	30	1.875			9
12 WCF A 27 (P0086)	10	169	114	30	2.069			5
Willow Creek	11	182	77	39	2.052			6
Trical 102	12	170	106	28	1.761			14
Yellowstone	13	171	74	29	1.557			16
M7F1232	14	174	82	30	1.872			10
M7F1229	15	173	77	30	1.716			15
Newturk	16	170	95	31	1.773			13
MEAN TRT MEANS=		170	103	30.5	1.923			
P-VALUE TRTS =		0.00	0.00	0.00	0.00			
CV (S/MEAN) % =		0.6	5.0	2.9	6.3			
LSD(0.05 by t)=		1.71	8.6	1.0	0.203			

Table 3. 2013 Winter cereal cultivar evaluation under crop-fallow near Winifred.  
Exp 13223874 Central Agricultural Research Center. Moccasin, Montana.

Cultivar ID	Height	Dry Matter	Forage Yield
	"	%	t/a
10PreWCF 60	63	24.0	4.911
10 PreWcf 78	67	36.3	4.889
12 wcf A 18 (P0029)	63	38.3	4.764
10 PreWcf 68	67	36.7	4.73
110 WCF 57	54	34.7	4.535
12 WCF A 21 (P0059)	67	38.0	5.352
12 WCF A 41 (P1085)	57	35.7	4.401
111 WCF 57	63	37.0	5.128
12 WCF A 35 (11Adv10)	64	36.7	4.678
12 WCF A 27 (P0086)	64	36.0	4.263
Willow Creek	51	32.0	3.471
Trical 102	60	33.0	4.333
Yellowstone	35	32.0	3.236
M7F1232	47	33.0	3.531
M7F1229	40	31.7	3.248
Newturk	47	36.3	3.872
Mean	56.81	34.46	4.334
P-value		0.234	0.000
CV 1		15.34	7.869
LSD(0.05)		8.814	0.569

Table 4 2013 Evaluation of winter cereal forages in fallow environment.  
 Exp. 132238WY Sheridan Research & Extension Center, Sheridan Wyoming

Entry	Dry Matter %	Forage Yield t/a
<b>Willow Creek</b>	<b>44.2</b>	<b>4.373</b>
12 WCF A 35 (11Adv10)	29.0	4.009
12 WCF A 41 (P1085)	31.8	3.964
12 WCF A 27 (P0086)	25.3	3.962
12 wcf A 18 (P0029)	30.5	3.961
<b>111 WCF 57</b>	<b>27.3</b>	<b>3.929</b>
10 PreWcf 68	31.3	3.820
12 WCF A 21 (P0059)	31.3	3.785
10PreWCF 60	30.3	3.742
<b>110 WCF 57</b>	<b>27.8</b>	<b>3.595</b>
M7F1232	28.3	3.528
10 PreWcf 78	28.0	3.442
Newturk	31.7	3.380
<b>Trical 102</b>	<b>26.8</b>	<b>3.115</b>
M7F1229	26.7	3.057
<b>Yellowstone</b>	<b>27.0</b>	<b>3.012</b>
Mean	29.84	3.667
P-value	0.00	0.00
CV1	7.8	9.1
LSD(0.05)	3.89	0.558

Table 6

2013 Multi-Location Winter cereal forage cultivar **Forage Yield Summary**.  
Central Agricultural Research Center. Moccasin, Montana.

Cultivar ID	Moccasin Crop-Fallow	Moccasin Re-Crop	Sheridan Fallow	Fort Ellis Fallow	Winifred Fallow	Havre Fallow	5 Loc. average
	<u>t/a</u>	<u>t/a</u>	<u>t/a</u>	<u>t/a</u>	<u>t/a</u>	<u>t/a</u>	
12 WCF A 21 (P0059)	4.497	2.131	3.785	3.556	5.352	3.186	3.751
12 WCF A 35 (11Adv10)	4.242	1.875	4.009	4.029	4.678	2.951	3.631
110 WCF 57	4.381	1.863	3.595	4.588	4.535	3.141	3.684
111 WCF 57	4.060	2.204	3.929	3.364	5.128	3.156	3.640
12 WCF A 27 (P0086)	4.213	2.069	3.962	3.843	4.263	3.178	3.588
10 PreWCF 60	4.135	1.961	3.742	3.832	4.911	3.408	3.665
12 WCF A 41 (P1085)	3.989	1.929	3.964	4.230	4.401	2.732	3.541
12 wcf A 18 (P0029)	3.885	2.106	3.961	3.724	4.764	3.908	3.725
10 PreWcf 68	3.961	2.096	3.820	3.649	4.730	3.621	3.646
Trical 102	4.168	1.761	3.115	4.375	4.333	3.418	3.528
10 PreWcf 78	4.125	1.798	3.442	3.725	4.889	3.379	3.560
Willow Creek	3.452	2.052	4.373	3.757	3.471	3.892	3.500
M7F1232	3.697	1.872	3.528	4.318	3.531	3.527	3.412
Newturk	3.640	1.773	3.380	4.128	3.872	2.932	3.287
M7F1229	3.422	1.716	3.057	4.534	3.248	2.934	3.152
Yellowstone	3.693	1.557	3.012	4.278	3.236	2.814	3.098
Mean	3.972	1.923	3.667	3.996	4.334	3.261	3.525

Table 7

2013 Multi-Location winter cereal forage cultivar **forage yield ranks**.  
Central Agricultural Research Center. Moccasin, Montana.

Cultivar ID	Moccasin Crop-Fallow	Moccasin Re-Crop	Sheridan Fallow	Fort Ellis Fallow	Winifred Fallow	NARC Fallow	Mean Forage Yield Rank
	<u>#</u>	<u>#</u>	<u>#</u>	<u>#</u>	<u>#</u>	<u>#</u>	<u>#</u>
12 WCF A 21 (P0059)	1	2	8	15	1	8	6
12 WCF A 35 (11Adv10)	3	9	2	8	7	12	7
110 WCF 57	2	11	10	1	8	11	7
111 WCF 57	8	1	6	16	2	10	7
12 WCF A 27 (P0086)	4	5	4	9	11	9	7
10 PreWCF 60	6	7	9	10	3	6	7
12 WCF A 41 (P1085)	9	8	3	6	9	16	9
12 wcf A 18 (P0029)	11	3	5	13	5	1	6
10 PreWcf 68	10	4	7	14	6	3	7
Trical 102	5	14	14	3	10	5	9
10 PreWcf 78	7	12	12	12	4	7	9
Willow Creek	15	6	1	11	14	2	8
M7F1232	12	10	11	4	13	4	9
Newturk	14	13	13	7	12	14	12
M7F1229	16	15	15	2	15	13	13
Yellowstone	13	16	16	5	16	15	14

Table 8 2012 Multi-Location Winter cereal forage cultivar **Forage Yield Summary.**  
Central Agricultural Research Center, Moccasin, Montana.

Entry	Moccasin Fallow Early	Moccasin Fallow Late	Moccasin Re-Crop Early	Moccasin Re-Crop Late	Winifred Late	Havre Fallow	4 location Average	Bozeman Yield
	t/a	t/a	t/a	t/a	t/a	t/a	t/a	t/a
FO-16 07x 198 x 4	1.859	4.139	1.285	1.923	3.824	4.13	2.860	
FO - 21	2.263	3.299	1.082	1.813	3.813	3.83	2.683	
FO - 4 07 x 197 x	2.146	2.974	1.234	1.951	3.964	3.42	2.615	
FO-9 07 x 197-3	1.898	3.217	0.972	1.750	3.645	2.71	2.365	
Trical 102	2.095	2.740	1.293	1.871	4.298	4.05	2.725	4.323
Willow Creek	1.851	3.830	1.003	1.674	3.593	3.63	2.597	4.510
Newturk	1.952	3.484	1.209	1.971	4.802	3.85	2.878	4.584
9 10AdvWcf 9	2.550	3.202	1.359	2.034	4.713	3.79	2.941	4.051
20 10AdvWCF20	2.190	3.237	1.416	1.957	4.887	3.39	2.846	
110 WCF 57	2.881	3.567	1.373	2.017	5.025	3.80	3.111	4.675
12 10Advwcf12	2.323	3.877	1.380	1.807	4.930	4.00	3.053	
108 WCF 28	2.408	2.293	1.425	1.813	5.174	3.90	2.836	
F289	2.020	3.472	1.099	1.667	4.179	3.79	2.705	4.307
111 WCF 57	2.365	3.354	1.364	2.061	4.562	3.97	2.946	4.851
10Pre WCF 81	2.605	3.103	1.563	2.095	5.566	3.71	3.107	5.005
10PreWCF 60	2.842	3.093	1.682	1.965	4.312	4.03	2.987	4.520
Mean	2.266	3.305	1.296	1.898	4.455	3.75		4.645
	Hail	Hail	Hail	Hail	**2012 Bozeman trial contained unique cultivar set			

Table 9 2012 Multi-Location Winter cereal forage cultivar **Forage Yield Ranking Summary.**  
Central Agricultural Research Center, Moccasin, Montana.

Entry	Moccasin Fallow Early	Moccasin Fallow Late	Moccasin Re-Crop Early	Moccasin Re-Crop Late	Winifred Late	Havre	Yield Ave. Rank	Bozeman Ranking
	#	#	#	#	#	#	#	#
FO-16 07x 198 x 4	15	1	10	9	13	1	8	
FO - 21	8	8	14	12	14	8	11	
FO - 4 07 x 197 x	10	14	11	8	12	14	12	
FO-9 07 x 197-3	14	10	16	14	15	16	14	
Trical 102	11	15	9	10	10	2	10	12
Willow Creek	16	3	15	15	16	13	13	10
Newturk	13	5	12	5	6	7	8	8
9 10AdvWcf 9	4	11	8	3	7	10	7	16
20 10AdvWCF20	9	9	4	7	5	15	8	
110 WCF 57	1	4	6	4	3	9	5	7
12 10Advwcf12	7	2	5	13	4	4	6	
108 WCF 28	5	16	3	11	2	6	7	
F289	12	6	13	16	11	11	12	13
111 WCF 57	6	7	7	2	8	5	6	6
10Pre WCF 81	3	12	2	1	1	12	5	3
10PreWCF 60	2	13	1	6	9	3	6	
	Hail	Hail	Hail	Hail				



Table 10 2011 Multi-Location Winter cereal forage cultivar **Forage Yield Summary.**  
 Central Agricultural Research Center. Moccasin, Montana.

Entry	Moccasin Crop-Fallow	Moccasin Re-Crop	Lewistown	Bozeman	Havre	5 Location ave
	<u>t/a</u>	<u>t/a</u>	<u>t/a</u>	<u>t/a</u>	<u>t/a</u>	<u>t/a</u>
08TRS398	2.766	1.275	1.584	4.907	3.70	2.846
106 WCF 57	3.608	1.334	1.380	6.160	3.54	3.204
108 WCF 28	3.639	1.157	2.005	5.413	3.76	3.195
111 WCF 57	3.795	1.342	2.110	5.680	3.73	3.331
12 10Advwcf1	4.144	1.412	2.418	5.067	3.15	3.238
120 WCF 57	3.215	1.049	1.353	6.133	3.01	2.953
19 WCFBz2207	3.056	1.135	2.111	5.093	3.34	2.947
20 10AdvWCF20	3.997	1.98	2.550	6.293	2.96	3.556
43 WCFBz2207	2.805	0.79	1.849	3.573	2.77	2.357
9 10AdvWcf 9	3.706	1.753	3.009	6.373	3.79	3.726
Elduraldo	3.011	1.241	1.337	4.107	2.59	2.458
F289	3.905	1.937	1.941	3.840	4.18	3.161
Newturk	3.137	1.735	1.346	4.784	2.83	2.766
Trical 102	3.958	1.616	2.576	5.067	3.94	3.431
WCFKP61	2.784	1.606	2.142	5.467	3.36	3.072
Willow Creek	3.105	1.186	1.420	4.747	3.70	2.832
Mean	3.414	1.409	1.946	5.169	3.40	3.067

Table 11 2011 Multi-Location Winter cereal forage cultivar **Forage Yield Ranking Summary**  
Central Agricultural Research Center. Moccasin, Montana.

Entry	Moccasin Crop-Fallow	Moccasin Re-Crop	Lewistown	Bozeman	Havre	Mean Forage Yield Rank
	#	#	#	#	#	#
9 10AdvWcf 9	6	3	1	1	3	3
20 10AdvWCF20	2	1	3	2	13	4
Trical 102	3	5	2	9	2	4
111 WCF 57	5	8	7	5	5	6
F289	4	2	9	15	1	6
12 10Advwcf1	1	7	4	10	11	7
108 WCF 28	7	13	8	7	4	8
106 WCF 57	8	9	13	3	8	8
WCFKP61	15	6	5	6	9	8
19 WCFBz2207	12	14	6	8	10	10
08TRS398	16	10	11	11	6	11
120 WCF 57	9	15	14	4	12	11
Newturk	10	4	15	12	14	11
Willow Creek	11	12	12	13	7	11
Elduraldo	13	11	16	14	16	14
43 WCFBz2207	14	16	10	16	15	14

Table 12 2012 Winter Cereal forage cultivar development on **fallow** near Moccasin.  
**Exp.12223807** Central agricultural Research Center. Moccasin, Montana.

Entry	ID code	Harvest Stage	Hail Damage	Head Date	Plant Height	9-Jun DryMat	9-Jun Yield	25-Jun Dry Mat	25-Jun Yield
			1 to 10	Julian	cm	%	t/a	%	t/a
FO-16 07x 198 x 4-	12WCF 01	10	1.3	170	53	24	1.859	44	4.139
12 10Advwcf12	12WCF 11	10	3.7	165	69	24	2.323	44	3.877
Willow Creek	12WCF 06	9	2.3	173	59	25	1.851	45	3.830
110 WCF 57	12WCF 10	10	7.0	165	81	26	2.881	42	3.567
Newturk	12WCF 07	10	5.7	166	79	24	1.952	43	3.484
F289	12WCF 13	10	2.0	170	54	25	2.020	47	3.472
111 WCF 57	12WCF 14	10	6.0	166	81	25	2.365	42	3.354
FO - 21	12WCF 02	10	2.3	170	57	28	2.263	46	3.299
20 10AdvWCF20	12WCF 09	10	6.3	166	79	24	2.190	43	3.237
FO-9 07 x 197-3	12WCF 04	10	1.3	170	52	26	1.898	43	3.217
9 10AdvWcf 9	12WCF 08	10	5.3	166	78	25	2.550	44	3.202
10Pre WCF 81	12WCF 15	10	6.3	166	80	26	2.605	44	3.103
10PreWCF 60	12WCF 16	10	4.7	166	83	26	2.842	43	3.093
FO - 4 07 x 197 x	12WCF 03	10	1.7	170	55	25	2.146	46	2.974
Trical 102	12WCF 05	10	6.3	166	78	26	2.095	42	2.740
108 WCF 28	12WCF 12	10	5.3	166	80	25	2.408	46	2.293
Means		10.0	4.23	167.6	69.8	25.26	2.266	44.08	3.305
P-value		0.00	0.00	0.00	0.00	0.45	0.01	0.02	0.03
CV1		0.1	22.6	0.4	5.9	7.1	15.2	4.4	15.7
LSD(0.05)		0.02	1.597	1.038	6.827	ns	0.5733	3.217	0.8629

Table 13

2012 Winter cereal forage cultivar development trial on **recrop** near Moccasin.**Exp 12223870**

Central Agricultural Research Center. Moccasin, Montana.

Entry	ID code	Head	11-Jun	11-Jun	11-Jun	27-Jun	27-Jun	27-Jun	Grain	Test
		Date	Height	Dry Mat	Yield	Height	Matter	Yield	Yield	Weight
		Julian	cm	%	t/a	cm	%	t/a	lbs/a	lbs/bu
10Pre WCF 81	12WCF 15	166	64	0.21	1.563	104	42.9	2.095	1944	52.5
111 WCF 57	12WCF 14	166	63	0.20	1.364	112	42.8	2.061	1706	54.0
9 10AdvWcf 9	12WCF 08	166	67	0.20	1.359	102	43.7	2.034	1806	52.5
110 WCF 57	12WCF 10	165	63	0.20	1.373	92	40.4	2.017	2079	52.0
Newturk	12WCF 07	166	60	0.20	1.209	107	41.3	1.971	1529	53.5
10PreWCF 60	12WCF 16	166	68	0.21	1.682	102	43.3	1.965	1787	48.5
20 10AdvWCF20	12WCF 09	166	65	0.18	1.416	107	42.6	1.957	1536	52.5
FO - 4 07 x 197 x	12WCF 03	170	35	0.23	1.234	72	41.2	1.951	2990	56.5
FO-16 07x 198 x 4-	12WCF 01	170	36	0.23	1.285	69	42.6	1.923	2508	55.0
Trical 102	12WCF 05	166	57	0.20	1.293	105	43.0	1.871	1077	48.5
FO - 21	12WCF 02	170	38	0.21	1.082	76	38.9	1.813	2174	57.5
108 WCF 28	12WCF 12	166	64	0.20	1.425	93	40.4	1.813	1157	51.0
12 10Advwcf12	12WCF 11	165	53	0.20	1.380	87	38.7	1.807	1420	49.0
FO-9 07 x 197-3	12WCF 04	170	39	0.21	0.972	70	38.9	1.750	2563	55.5
Willow Creek	12WCF 06	173	47	0.21	1.003	71	41.0	1.674	1720	58.0
F289	12WCF 13	170	40	0.21	1.099	64	42.0	1.667	1964	54.5
Mean		167.6	53.79	0.2064	1.296	89.54	41.5	1.898	1872	53.19
P-value		0.00	0.00	0.23	0.14	0.00	0.03	0.55	0.00	0.00
CV1		0.4	16.2	8.2	20.6	6.4	4.6	12.5	19.5	1.0
LSD(0.05)		1.038	14.57	ns	0.4456	9.616	3.2	0.3969	608.1	1.083

**TABLE 14. Winter Cereal Forage Evaluation Grown Under No-Till Dryland Fallow Conditions. Northern Agricultural Research Center. Havre, Montana. 2012.**

<b>(Exp# 12-FR02-FR)</b>								
Species	CULTIVAR or SELECTION	FORAGE DRY YIELD		FORAGE	HEADING DATE		PLANT HT	SAWFLY
		Lb/Ac	Ton/Ac	MOISTURE %	Julian	Calendar	inches	% Cut
Winter Wheat	FO-16 07x198x4-20	<b>8264.0</b>	<b>4.13**</b>	63.2	168.0		36.3	8.3
<b>Triticale</b>	<b>Trical 102</b>	<b>8109.5</b>	<b>4.05*</b>	66.3	165.0		43.6	5.0
Triticale	10PreWCF 60	<b>8064.5</b>	<b>4.03*</b>	70.3	160.3		54.1	6.7
Triticale	12 10Advwcf12	<b>8006.6</b>	<b>4.00*</b>	69.2	163.3		39.9	3.7
<b>Triticale</b>	<b>111 WCF 57</b>	<b>7930.2</b>	<b>3.97*</b>	70.8	161.3		54.0	3.7
Triticale	108 WCF 28	<b>7791.3</b>	<b>3.90*</b>	70.0	162.3		51.3	6.7
<b>Winter Wheat</b>	<b>Newturk</b>	<b>7700.8</b>	<b>3.85*</b>	69.8	160.7		54.4	5.0
Winter Wheat	FO-21	<b>7664.9</b>	<b>3.83*</b>	63.4	168.0		41.6	10.0
<b>Triticale</b>	<b>110 WCF57</b>	<b>7594.5</b>	<b>3.80*</b>	70.6	160.3		54.5	8.3
Triticale	9 10AdvWcf 9	<b>7583.7</b>	<b>3.79*</b>	72.1	161.3		54.5	5.3
Winter Wheat	F289	<b>7575.0</b>	<b>3.79*</b>	62.9	167.3		35.8	6.7
Triticale	10Pre WCF 81	<b>7416.7</b>	<b>3.71*</b>	70.6	161.3		55.1	10.0
<b>Winter Wheat</b>	<b>Willow Creek</b>	<b>7265.1</b>	<b>3.63*</b>	62.9	173.0		44.4	13.3
Winter Wheat	FO-4 07x197x2-1	6836.2	3.42	68.7	167.0		34.8	3.7
Triticale	20 10AdvWCF20	6778.5	3.39	70.1	161.7		53.6	6.7
Winter Wheat	FO-9 07x197-3-4	5413.6	2.71	67.6	166.0		34.3	6.7
EXPERIMENTAL MEANS		7499.7	3.8	68.0	164.2	12-Jun	46.4	6.9
LSD (0.05)		1170.4	0.6	4.4	2.4	-	4.0	5.1
C.V.: ( S / MEAN)*100		9.4	9.4	3.9	0.9	-	5.2	44.9
P-VALUE (Entries)		0.0057	0.0057	0.0002	<.0001	-	<.0001	0.0297

**Bold** Indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

\*\* Indicates highest yielding cultivar within a column.

\* Indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Sawfly rating is reported as percentage of cut stems.

**Table 15. 2012 Winter Cereal Forages (Exp. WCF1): Bozeman G1 Field**

Entry #	Cultivar/ Line	Pedigree	Grain yield lb/a RCB	Test weight lb/bu RCB	Heading date Julian RCB	Plant height in RCB	3ft <sup>2</sup> forage sample (harv = June 13,20)		Protein % bulk
							Dry wt		
1	+ MTF1231	Yellowstone(L)*2/98X168E1	4128	54.0	173.3	38.5	4.158	260	15.1
2	+ MTF1232	Yellowstone/MT0684	3937	59.6	174.3	47.1	5.506	344	15.1
3	+ MTF1229	Yellowstone*2/98X168E1	<b>4849**</b>	57.3	172.3	38.2	4.462	279	13.9
4	+ MTF1230	Yellowstone*2/98X168E1	<b>4771*</b>	57.2	172.7	36.4	4.280	268	14.4
5	<b>Trical 102</b>	Triticale	2885	48.3	170.0	59.3	4.323	270	14.5
6	<b>Willow Creek</b>	wheat	3081	<b>60.7**</b>	178.7	46.3	4.510	282	17.0
7	<b>Newturk</b>	wheat (changed from original)	3085	54.1	169.0	68.4	4.584	287	14.7
8	9 10AdvWcf 9	Triticale	3700	52.6	167.3	67.2	4.051	253	14.5
9	+ 10PreWCF68		<b>4595*</b>	53.3	168.0	66.1	5.112	320	13.4
10	+ 10PreWCF78		4218	53.4	167.3	66.8	4.995	312	13.7
11	+ 110 WCF 57	Triticale	<b>4722*</b>	50.5	168.7	53.9	4.675	292	13.5
12	111 WCF 57	Triticale	3500	51.0	167.7	63.0	4.851	303	14.6
13	F289	(06x272cB Yllwstrn/Mt0684	<b>4367*</b>	55.8	175.0	37.7	4.307	269	14.1
14	+ P0062		3618	53.7	168.3	66.3	4.984	312	14.9
15	+ 10PreWCF81		3855	52.9	167.0	66.5	5.005	313	14.0
16	+ 10PreWCF60		3749	49.6	167.0	63.9	4.520	283	14.4
<b>Average</b>			<b>3941</b>	<b>54.0</b>	<b>170.4</b>	<b>55.3</b>	<b>4.645</b>	<b>290</b>	<b>14.5</b>
<b>LSD (0.05)</b>			<b>547</b>	<b>0.9</b>	<b>1.0</b>	<b>2.5</b>	<b>ns</b>	<b>ns</b>	
<b>C.V. (%)</b>			<b>8.3</b>	<b>1.0</b>	<b>0.3</b>	<b>2.7</b>		<b>13.0</b>	
<b>P-value (Varieties)</b>			<b>&lt;.0001</b>	<b>&lt;.0001</b>	<b>&lt;.0001</b>	<b>&lt;.0001</b>		<b>0.2568</b>	

planted: 10/1/2011

harvested: 8/10/2012

Crop Year Rainfall (Sept 2011 - Aug 2012): xx.xx in (55 year Avg = 16.xx in)

Table 16 2011 Winter cereal forage cultivar development trial on **crop-fallow** near Moccasin.  
**Exp 11223807** Central Agricultural Research Center. Moccasin, Montana.

Entry	ID code	Head Date	Plant Height	Forage Yield	Plot Yield ave. Rank	Grain Yield
		Julian	cm	t/a	#	lbs/a
12 10Advwcf1	11WCF 10	180	133	4.144	10	1564
20 10AdvWCF20	11WCF 14	181	125	3.997	18	2147
<b>Trical 102</b>	<b>11WCF 01</b>	<b>182</b>	<b>116</b>	<b>3.958</b>	<b>18</b>	<b>1809</b>
F289	11WCF 03	184	75	3.905	21	2362
<b>111 WCF 57</b>	<b>11WCF 09</b>	<b>181</b>	<b>121</b>	<b>3.795</b>	<b>17</b>	<b>1831</b>
9 10AdvWcf 9	11WCF 12	182	136	3.706	15	1888
108 WCF 28	11WCF 13	182	125	3.639	18	2011
106 WCF 57	11WCF 08	183	123	3.608	24	1849
120 WCF 57	11WCF 11	180	121	3.215	26	1574
<b>Newturk</b>	<b>11WCF 07</b>	<b>181</b>	<b>104</b>	<b>3.137</b>	<b>37</b>	<b>2134</b>
<b>Willow Creek</b>	<b>11WCF 02</b>	<b>192</b>	<b>108</b>	<b>3.105</b>	<b>26</b>	<b>1536</b>
19 WCFBz2207	11WCF 16	180	113	3.056	25	2168
Elduraldo	11WCF 06	183	87	3.011	30	1961
43 WCFBz2207	11WCF 15	179	103	2.805	34	2069
WCFKP61	11WCF 04	183	121	2.784	33	1660
08TRS398	11WCF 05	181	85	2.766	40	2151
Means		182.1	112.3	3.414	24.5	1920
P-value		0	0	0.20	0.35	0.07
CV1		1.183	5.62	20.39	55.86	16.43
LSD(0.05)		3.591	10.52	ns	22.82	526.1

Table 17 2011 Winter cereal forage cultivar development trial on recrop near Moccasin.  
**Exp 11223870** Central Agricultural Research Center. Moccasin, Montana.

Entry	ID code	Head Date	Plant Height	Dry Matter	Forage Yield	Grain Yield
		Julian	cm	%	t/a	lbs/a
20 10AdvWCF20	11WCF 14	182	115	51	1.98	
F289	11WCF 03	185	75	49	1.937	
9 10AdvWcf 9	11WCF 12	181	130	52	1.753	
Newturk	11WCF 07	184	92	51	1.735	
Trical 102	11WCF 01	183	118	46	1.616	
WCFKP61	11WCF 04	182	117	47	1.606	
12 10Advwcf1	11WCF 10	183	121	48	1.412	
111 WCF 57	11WCF 09	183	111	50	1.342	
106 WCF 57	11WCF 08	184	113	44	1.334	
08TRS398	11WCF 05	185	75	51	1.275	
Elduraldo	11WCF 06	183	76	50	1.241	
Willow Creek	11WCF 02	191	102	45	1.186	
108 WCF 28	11WCF 13	182	111	46	1.157	
19 WCFBz2207	11WCF 16	183	111	48	1.135	
120 WCF 57	11WCF 11	182	119	49	1.049	
43 WCFBz2207	11WCF 15	184	96	45	0.79	
Means		183.5	105	48.2	1.409	
P-value		0	0	0.3058	0.1144	
CV1		0.8946	7.077	7.838	31.89	
LSD(0.05)		2.737	12.4	0.6297	ns	

Table 18 2011 Winter cereal forage cultivar development trial near Lewistown.  
Exp. 112238BU Central agricultural Research Center. Moccasin, Montana.

Entry	ID code	Stand	Plant Height	Dry Matter	Forage Yield
		1 to 10	cm	%	t/a
9 10AdvWcf 9	11WCF 12	7	130	51	3.009
<b>Trical 102</b>	<b>11WCF 01</b>	<b>6</b>	<b>117</b>	<b>45</b>	<b>2.576</b>
20 10AdvWCF20	11WCF 14	8	117	45	2.550
12 10Advwcf1	11WCF 10	7	130	41	2.418
WCFKP61	11WCF 04	6	120	43	2.142
19 WCFBz2207	11WCF 16	7	107	38	2.111
<b>111 WCF 57</b>	<b>11WCF 09</b>	<b>7</b>	<b>123</b>	<b>42</b>	<b>2.110</b>
108 WCF 28	11WCF 13	7	122	41	2.005
F289	11WCF 03	8	73	47	1.941
43 WCFBz2207	11WCF 15	7	102	42	1.849
08TRS398	11WCF 05	6	77	45	1.584
<b>Willow Creek</b>	<b>11WCF 02</b>	<b>8</b>	<b>91</b>	<b>37</b>	<b>1.420</b>
106 WCF 57	11WCF 08	7	120	36	1.380
120 WCF 57	11WCF 11	5	125	47	1.353
<b>Newturk</b>	<b>11WCF 07</b>	<b>6</b>	<b>93</b>	<b>48</b>	<b>1.346</b>
Elduraldo	11WCF 06	7	76	48	1.337
Means		6.833	107.8	43.5	1.946
P-value		0.05	0.00		0.06
CV1		14.5	7.5		33.0
LSD(0.05)		1.6	13.4		ns



Table 18 2011 Winter cereal forage cultivar development trial near Lewistown.  
Exp. 112238BU Central agricultural Research Center. Moccasin, Montana.

Entry	ID code	Stand	Plant Height	Dry Matter	Forage Yield
		1 to 10	cm	%	t/a
9 10AdvWcf 9	11WCF 12	7	130	51	3.009
<b>Trical 102</b>	<b>11WCF 01</b>	<b>6</b>	<b>117</b>	<b>45</b>	<b>2.576</b>
20 10AdvWCF20	11WCF 14	8	117	45	2.550
12 10Advwcf1	11WCF 10	7	130	41	2.418
WCFKP61	11WCF 04	6	120	43	2.142
19 WCFBz2207	11WCF 16	7	107	38	2.111
<b>111 WCF 57</b>	<b>11WCF 09</b>	<b>7</b>	<b>123</b>	<b>42</b>	<b>2.110</b>
108 WCF 28	11WCF 13	7	122	41	2.005
F289	11WCF 03	8	73	47	1.941
43 WCFBz2207	11WCF 15	7	102	42	1.849
08TRS398	11WCF 05	6	77	45	1.584
<b>Willow Creek</b>	<b>11WCF 02</b>	<b>8</b>	<b>91</b>	<b>37</b>	<b>1.420</b>
106 WCF 57	11WCF 08	7	120	36	1.380
120 WCF 57	11WCF 11	5	125	47	1.353
<b>Newturk</b>	<b>11WCF 07</b>	<b>6</b>	<b>93</b>	<b>48</b>	<b>1.346</b>
Elduraldo	11WCF 06	7	76	48	1.337
Means		6.833	107.8	43.5	1.946
P-value		0.05	0.00		0.06
CV1		14.5	7.5		33.0
LSD(0.05)		1.6	13.4		ns

**TABLE 19. WINTER CEREAL FORAGE - forage components. Winter Cereal Forage Evaluation Grown Under No-Till Dryland Fallow Conditions. Northern Agricultural Research (Exp# 11-FR02-FR)**

Species	CULTIVAR or SELECTION	2011	2011	FORAGE MOISTURE %	1/ HEADING DATE		PLANT HT inches	SAWFLY % Cut
		FORAGE DRY YIELD Lb/Ac	DRY YIELD Ton/Ac		Julian	Calendar		
Winter Wheat F289		8358.8	4.18**	67.8	178.7	28-Jun	36.6	10.0
Triticale	Trical 102	7874.8	3.94*	69.0	174.0	23-Jun	50.3	13.3
Triticale	9 10AdvWcf9	7584.0	3.79*	71.7	171.7	21-Jun	58.0	11.7
Triticale	108 WCF 28	7525.8	3.76*	70.3	171.7	21-Jun	54.4	11.7
Triticale	111 WCF 57	7459.9	3.73*	68.8	173.7	23-Jun	49.7	11.7
Winter Wheat 08TRS398		7390.5	3.70*	67.4	176.3	25-Jun	38.6	11.7
Winter Wheat Willow Creek		7393.8	3.70*	54.6	182.0	1-Jul	44.9	40.0
Triticale	106 WCF 57	7072.0	3.54*	67.8	175.0	24-Jun	55.9	10.0
Triticale	WCFKP61	6717.8	3.36	73.9	174.3	23-Jun	49.1	8.3
Triticale	19 WCFBz2207	6679.3	3.34	73.3	173.0	22-Jun	44.8	8.3
Triticale	12 10Advwcf12	6293.9	3.15	70.7	174.3	23-Jun	57.3	10.0
Triticale	120 WCF 57	6027.1	3.01	69.2	171.7	21-Jun	57.3	10.0
Triticale	20 10AdvWCF20	5920.2	2.96	68.1	173.3	22-Jun	53.4	11.7
Winter Wheat Newturk		5659.0	2.83	68.1	174.0	23-Jun	42.2	36.7
Triticale	43 WCFBz2207	5534.5	2.77	68.4	174.3	23-Jun	42.6	8.3
Winter Wheat Elduraldo		5186.6	2.59	70.8	174.0	23-Jun	36.5	20.0
EXPERIMENTAL MEANS		6792.4	3.4	68.7	174.5	23-Jun	48.2	14.6
LSD (0.05)		1472.6	0.7	4.5	2.6	-	6.5	6.3
C.V.: ( S / MEAN)*100		13.0	13.0	4.0	0.9	-	8.1	26.1
P-VALUE (Entries)		0.0023	0.0023	<0.0001	<0.0001	-	<0.0001	<0.0001

1/ No. of Days from January 1 (174 = June 23).

\*\* Indicates highest yielding cultivar within a column.

\* Indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level. ns denotes no significant difference between cultivars within a column at the 0.05 probability level.

Sawfly rating is reported as percentage of cut stems.

Table 21 2010 WCF winter triticale four location yield summary.  
Exp.10223800

Entry	Code	CARC Fallow				CARC CC	Winifred	NARC
		Vigor	Plant Height		Yield	Yield	Yield	Yield
		14-May 0 to 5	22-Jun cm	9-Jul cm	9-Jul t/ac	28-Jun t/ac	12-Jul t/ac	Fallow t/a
Willow Creek	10WCF 01	3.0	84	126	4.882	2.363	6.112	3.84
Trical 102	10WCF 02	4.0	103	140	4.849	2.317	6.592	3.58
2006SFOB-48	10WCF 03	4.0	101	154	5.321	3.135	6.865	3.56
106 WCF 57	10WCF 06	4.0	96	159	5.167	2.048	5.877	3.53
108 WCF 28	10WCF 13	4.0	95	144	5.600	2.886	6.785	3.46
111 WCF 57	10WCF 09	3.3	103	149	5.465	3.115	6.932	3.41
WCFKP 61	10WCF 05	4.0	88	142	5.230	2.440	6.421	3.35
08TRS398	10WCF 08	3.3	79	107	5.077	1.830	6.612	3.35
Elduraldo	10WCF 07	3.7	81	107	4.352	2.090	5.621	3.14
Yellowstone	10WCF 04	3.0	62	94	4.587	1.638	4.683	3.07
Newturk	10WCF 12	3.0	83	133	5.008	2.180	5.824	3.03
08TRS389	10WCF 14	3.0	71	108	4.791	1.909	4.724	2.92
120 WCF 57	10WCF 11	3.0	97	157	5.482	2.402	6.853	2.88
110 WCF 57	10WCF 10	4.0	82	137	4.739	2.589	6.710	2.71
NX05M4180-6	10WCF 16	3.7	70	91	4.685	2.021	5.258	2.70
08TRS391	10WCF 15	3.0	82	122	3.981	2.105	5.539	2.55
Mean		3.5	86.1	129.4	4.951	2.317	6.088	3.19
P value		0.00	0.00	0.00	0.15	0.00	0.00	
CV1		7.7	7.3	5.4	12.3	16.0	5.6	14.12
LSD 0.05		0.4	10	12	1.012 ns	0.618	0.5715	0.75

Table 22	2010 Yield rank of 16 WCF at four locations				
Exp 10223800					
Entry	CARC Fal	CARC RC	Winifred	NARC	Ave
2006SFOB-48	4	1	2	3	2.5
111 WCF 57	3	2	1	6	3.0
108 WCF 28	1	3	4	5	3.3
120 WCF 57	2	6	3	13	6.0
WCFKP 61	5	5	8	7	6.3
Willow Creek	9	7	9	1	6.5
Trical 102	10	8	7	2	6.8
106 WCF 57	6	12	10	4	8.0
110 WCF 57	12	4	5	14	8.8
08TRS398	7	15	6	8	9.0
Newturk	8	9	11	11	9.8
Elduraldo	15	11	12	9	11.8
08TRS389	11	14	15	12	13.0
NX05M4180-6	13	13	14	15	13.8
08TRS391	16	10	13	16	13.8
Yellowstone	14	16	16	10	14.0

Table 23 2010 Winter cereal forage quality and nitrate content across four locations.  
 Exp.223870 Central and Northern Agricultural Research Center. Moccasin, Montana.

Entry	Reps	Nitrogen Protein		Crude			NO3N	2nd NO3N	
		Content	Content	ADF	Fiber	NDF			
		%	%	%	%	%	ppm	ppm	
Willow Creek	10WCF 01	8	1.59	10.0	35	33	57	261	220
Trical 102	10WCF 02	8	1.51	9.4	35	34	58	238	238
2006SFOB-48	10WCF 03	8	1.44	9.0	37	35	59	282	282
Yellowstone	10WCF 04	8	1.59	9.9	31	29	53	244	244
WCFKP 61	10WCF 05	8	1.41	8.8	37	34	59	210	210
106 WCF 57	10WCF 06	8	1.44	8.9	36	34	60	235	235
Elduraldo	10WCF 07	8	1.69	10.6	32	29	53	342	342
08TRS398	10WCF 08	8	1.66	10.5	33	31	56	388	388
111 WCF 57	10WCF 09	8	1.53	9.5	37	36	59	317	317
120 WCF 57	10WCF 11	8	1.53	9.6	36	34	57	331	331
Newturk	10WCF 12	8	1.59	9.9	35	32	57	304	304
108 WCF 28	10WCF 13	8	1.54	9.6	35	33	57	407	407
08TRS389	10WCF 14	7	1.61	10.0	34	32	57	190	188
Mean			1.547	9.653	34.79	32.79	57.11	288.4	285.1
P value			0.44	0.35	0.00	0.00	0.00	0.26	0.21
CV 1			15.3	15.5	4.1	4.2	2.7	58.0	59.0
LSD 0.05			0.2361	1.486	1.41	1.355	1.543	166.3	167.2
Count per mean			8	8	8	8	8	8	8