

TITLE: 2016 Montana Statewide Barley Performance Trials

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OBJECTIVES: Evaluate the agronomic performance of barley cultivars and experimental breeding lines under the diverse environments represented across Montana by MSU and six MAES Agricultural Research Centers. Such evaluations will facilitate the release of improved feed- and malt-type barley cultivars for production by Montana producers, and assist producers in determining which commercially available barley cultivars are most likely to be best adapted for their production area.

RESULTS: The 2016 Montana Statewide Barley Performance Trials were grown at seven dryland locations, and three irrigated locations. The dryland trials were Bozeman, Conrad, Havre, Huntley, Kalispell, Moccasin, and Sidney. The irrigated trials included Bozeman, Conrad, and Huntley. Each trial consisted of 49 commercial cultivars and breeding lines arranged in a triple lattice design. Each location collected information regarding spring barley grain yield, test weight, harvest moisture, grain protein content, plump kernel fraction, mature plant height and heading date. Maturity date was estimated for all entries at both Bozeman trials and at the dryland trial near Conrad. Lodging was estimated for all entries grown under irrigation at Conrad. Table 1 summarizes all data averaged across all nine test locations in the state during 2016. Table 2 summarizes all data averaged for the six dryland locations. Table 3 is a summary of all data averaged for the three irrigated locations. Tables 4 through 10 summarize individual traits (grain yield, test weight, grain protein, plump kernel content, mature plant height, and heading date) by all test locations. Agronomic traits summarized for each location can be found in Tables 11 through 17 for dryland sites, and Tables 18 through 20 for irrigated production.

Averaged across all test environments, the highest yielding entry was 'LCS Genie' averaging slightly more than 106 bushels per acre (bu/a) (Tables 1 and 4). Other top yielding commercial cultivars included 'LCS Overture', 'LCS Vespa', 'LCS Odyssey', 'Champion', 'Westminster', 'ABI Growler' and 'ABI Balster', averaging 106 to 99 bu/a. The highest yielding breeding lines were 'ME08032-156', '08ARS12-79', 'MT124243', 'MT124016', '08ARS116-91', and

'MT090182, yielding from 102 to 99 bu/a. The top yielding spring barley entry under dryland conditions in 2016 was Champion with a statewide dryland average of 97 bu/a (Tables 2 and 4). Twelve other commercial cultivars produced dryland yields statistically equivalent to those of Champion, averaging between 96 and 89 bu/ac across the seven dryland sites. Another 13 breeding lines also produced dryland yields between 95 and 89 bu/a. Under irrigation, the commercial cultivar LCS Overture produced the highest yields, averaging 134 bu/a (Tables 3 and 4). Only the commercial cultivars, LCS Genie, LCS Vespa and LCS Odyssey, averaging 128, 130, and 132 bu/a, respectively, and the experimental lines ME08032-156 and MT124243, both averaging 122 bu/a, produced yields that were statistically equal to the yield of LCS Overture under irrigation.

Crop quality measured as grain test weight and percent plump kernels was excellent for all entries in 2016. Almost all entries possessed test weight values heavier than 50 pounds per bushel (lb/bu) at all test sites in 2016 (Table 5). A relatively small number of entries grown under dryland conditions at Huntley did produce test weight less than 50 lb/bu, but each of those entries still possessed test weight values greater than 48 lb/bu, exceeding the grade test weight requirement for all subclasses of US No. 1 barley. The state wide average for percent plump kernel fraction of the harvested grain in 2016 was 95 percent (%), greatly exceeding the 70 % minimum plump kernel content required by most malt barley contracts (Table 8). Across all location, grain protein content varied from 10.8 % for MT124243 to 12.6 % for ME08053-050, but differences in grain protein content appeared more strongly influenced by test location than the entries themselves (Table 7). Grain protein varied from 9.5 % under dryland conditions at Kalispell to 15.0 % under dryland conditions at Huntley. Grain protein content among the entries appeared more consistent between the three irrigated sites in 2016.

FUNDING SUMMARY:

Expenditure information will be provided by OSP upon request.

FUTURE PLANS:

These trials will continue in 2017. The Montana Statewide Barley Performance Trials are not a funded component of the Department of Research Center's umbrella project, however, much of this work is conducted by DRC personnel working in collaboration with the MSU Barley Breeding Project. This information is presented here for the convenience of the MWBC and the growers who generate MWBC check-off dollars.

Table 1. Agronomic performance of spring barley entries tested at ten locations in Montana, 2016.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump	Plant	Heading Date	
	Yield	Weight	Moisture	Protein	Kernels	Height	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- inches -		
ABI Balster	99.2*	52.3	10.8	11.6	94.3	25.3	172.2	Jun 21
Champion	101.2*	54.6	11.0	11.8	94.4	26.2	170.6	Jun 19
CDC Copeland	96.5	53.6	10.8	11.8	95.3	26.4	173.3	Jun 22
LCS Genie	106.2**	53.7	11.0	11.1	94.3	22.6	174.7	Jun 23
ABI Growler	99.3*	52.4	10.8	11.4	94.3	24.8	172.0	Jun 21
Harrington	94.0	53.7	10.9	12.1	94.6	26.3	171.8	Jun 20
Haxby	93.0	54.8	10.8	12.3	94.7	26.1	169.9	Jun 18
Hockett	96.8	54.0	10.8	11.9	95.4	26.1	170.8	Jun 19
AC Metcalfe	90.4	53.8	10.8	12.3	93.9	27.1	170.5	Jun 19
LCS Odessey	105.6*	52.8	11.2	11.3	95.9	22.9	174.7	Jun 23
LCS Overture	106.1*	53.1	10.9	11.1	93.9	23.5	175.3	Jun 24
AAC Synergy	95.0	52.7	10.8	11.5	95.8	26.6	171.4	Jun 20
LCS Vespa	106.0*	53.3	10.9	11.5	94.9	22.2	174.7	Jun 23
Westminster	101.2*	53.5	10.9	11.6	96.2	24.5	173.7	Jun 22
08ARS012-79	95.3	53.6	10.9	11.6	94.6	26.1	170.6	Jun 19
08ARS028-20	102.3*	53.0	10.9	11.3	92.5	24.6	173.6	Jun 22
08ARS116-91	99.4*	53.1	11.0	11.8	93.2	24.9	169.5	Jun 18
10WA-117.17	96.0	53.3	10.7	11.6	92.5	25.5	172.3	Jun 21
10WA-117.24	82.7	52.1	10.8	12.1	93.9	27.4	171.6	Jun 20
11WA-107.43	98.2	54.3	11.2	11.8	93.9	25.4	170.1	Jun 19
ME08032-156	102.7*	53.2	10.8	11.8	93.3	22.7	171.8	Jun 20
ME08053-050	91.9	53.2	10.8	12.6	95.6	25.2	170.7	Jun 19
08MT-15	94.8	53.6	10.8	12.0	95.4	23.3	173.3	Jun 22
08MT-19	96.6	54.1	10.8	11.8	94.8	26.9	171.7	Jun 20
08MT-63	95.5	53.6	10.9	11.6	91.7	27.1	171.4	Jun 20
08MT-95	91.0	53.6	10.8	12.1	90.2	28.6	171.0	Jun 20
MT090182	99.4*	53.8	11.1	10.8	94.3	27.3	172.4	Jun 21
MT090190	94.4	53.7	11.0	10.8	94.9	26.6	172.4	Jun 21
MT090193	94.3	53.5	11.0	11.0	95.7	27.4	173.1	Jun 22
MT100120	95.5	54.0	11.3	10.8	95.6	27.4	172.5	Jun 21
MT100126	93.0	54.0	11.4	10.9	94.8	26.9	173.9	Jun 22
MT124016	100.7*	53.3	10.8	11.2	93.4	25.4	171.9	Jun 20
MT124069	94.2	53.0	11.0	11.2	95.0	26.3	173.9	Jun 22
MT124073	95.4	53.8	10.8	11.4	94.6	28.1	172.5	Jun 21
MT124112	90.3	53.2	11.0	11.2	95.5	25.8	168.9	Jun 17
MT124118	92.2	54.5	10.9	11.9	95.2	26.8	170.2	Jun 19
MT124243	101.1*	53.4	11.0	10.8	93.7	27.2	172.1	Jun 21
MT124411	82.2	53.8	11.2	12.3	95.2	27.4	169.6	Jun 18
MT124454	92.6	54.7	10.8	12.2	95.9	27.1	170.3	Jun 19
MT124457	91.8	54.7	10.8	12.1	95.5	27.2	170.2	Jun 19
MT124555	95.8	54.4	11.0	11.5	95.9	26.0	171.8	Jun 20
MT124582	92.2	54.1	10.9	12.2	94.8	26.9	169.6	Jun 18
MT124645	87.9	53.4	10.7	11.6	94.9	26.0	171.2	Jun 20
MT124663	82.1	53.4	11.3	11.8	96.3	26.1	169.4	Jun 18
MT124673	79.0	53.4	11.2	11.6	94.6	24.6	170.3	Jun 19
MT124688	99.0	54.2	11.0	11.0	94.5	27.1	171.3	Jun 20
MT124716	89.8	53.9	10.7	12.3	93.3	25.4	171.6	Jun 20
MT124728	95.0	53.6	10.8	12.3	93.2	25.4	171.2	Jun 20
Average	95.4	53.6	10.9	11.6	94.5	25.8	171.8	Jun 20
Prob>F	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
PLSD (p=0.05)	7.0	0.6	0.3	0.4	2.4	1.1	1.1	
CV%	13.5	2.0	4.7	6.8	4.3	8.0	1.1	
Locations	10	10	10	10	10	10	10	

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 percent dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Table 2. Agronomic performance of spring barley entries tested at seven dryland locations in Montana, 2016.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump	Plant	Heading Date	
	Yield	Weight	Moisture	Protein	Kernels	Height	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- inches -		
ABI Balster	92.9*	52.3	11.2	12.0	93.4	25.5	173.4	Jun 22
Champion	96.7**	54.7	11.4	12.3	94.2	26.3	171.7	Jun 20
CDC Copeland	88.8*	53.4	11.1	12.2	94.7	25.9	174.1	Jun 23
LCS Genie	96.1*	53.7	11.5	11.5	93.6	22.7	175.8	Jun 24
ABI Growler	91.2*	52.5	11.2	11.8	93.8	24.3	173.2	Jun 22
Harrington	88.2	53.6	11.2	12.7	94.0	26.2	173.0	Jun 22
Haxby	88.5*	54.8	11.2	12.7	94.3	26.0	171.0	Jun 20
Hockett	93.0*	54.0	11.3	12.2	95.6	26.4	172.0	Jun 21
AC Metcalfe	84.6	53.6	11.1	12.9	93.6	26.8	171.7	Jun 20
LCS Odessey	94.6*	53.0	11.7	11.8	96.1	23.2	175.6	Jun 24
LCS Overture	93.5*	53.3	11.3	11.6	92.9	23.6	176.4	Jun 25
AAC Synergy	90.9*	52.9	11.2	11.9	95.4	26.4	172.5	Jun 21
LCS Vespa	96.1*	53.4	11.3	12.0	94.7	22.4	175.7	Jun 24
Westminster	92.8*	53.5	11.4	12.3	95.6	24.6	174.6	Jun 23
08ARS012-79	88.7*	53.5	11.4	12.1	95.0	26.2	171.8	Jun 20
08ARS028-20	94.5*	52.9	11.4	11.8	91.5	24.8	175.0	Jun 24
08ARS116-91	92.4*	53.0	11.3	12.4	93.2	24.7	170.8	Jun 19
10WA-117.17	91.4*	53.1	11.1	12.0	91.7	25.2	173.6	Jun 22
10WA-117.24	80.0	52.2	11.2	12.5	92.9	27.0	172.6	Jun 21
11WA-107.43	91.6*	54.3	11.7	12.1	93.2	25.6	171.3	Jun 20
ME08032-156	94.4*	53.1	11.3	12.2	91.8	23.1	172.8	Jun 21
ME08053-050	84.0	53.2	11.3	12.9	95.7	25.3	172.0	Jun 21
08MT-15	87.3	53.3	11.2	12.6	94.7	23.2	174.1	Jun 23
08MT-19	88.3	54.0	11.2	12.3	93.8	26.9	172.6	Jun 21
08MT-63	88.6*	53.6	11.3	12.0	91.1	27.0	172.5	Jun 21
08MT-95	85.4	53.7	11.3	12.4	93.7	28.4	172.1	Jun 21
MT090182	93.6*	53.9	11.6	11.2	93.8	27.2	173.7	Jun 22
MT090190	85.2	53.6	11.5	11.2	94.2	26.2	173.6	Jun 22
MT090193	87.9	53.6	11.5	11.5	95.4	27.1	174.3	Jun 23
MT100120	88.7*	54.1	11.8	11.2	95.1	27.2	173.5	Jun 22
MT100126	84.0	54.1	12.0	11.4	94.1	26.6	174.9	Jun 23
MT124016	93.0*	53.2	11.3	11.8	93.1	25.5	173.2	Jun 22
MT124069	87.8	53.0	11.4	11.6	94.3	26.2	174.8	Jun 23
MT124073	90.5*	54.0	11.3	11.7	94.3	27.7	173.4	Jun 22
MT124112	83.3	53.2	11.5	11.7	95.3	26.0	170.2	Jun 19
MT124118	84.6	54.4	11.3	12.2	95.2	26.9	171.3	Jun 20
MT124243	92.5*	53.5	11.5	11.2	92.9	26.9	173.3	Jun 22
MT124411	76.7	53.8	11.7	12.9	95.2	27.1	170.4	Jun 19
MT124454	85.6	54.6	11.2	12.6	95.6	27.3	171.4	Jun 20
MT124457	83.7	54.6	11.2	12.3	95.3	27.2	171.4	Jun 20
MT124555	88.2	54.5	11.5	11.9	95.5	26.1	172.9	Jun 21
MT124582	86.8	54.1	11.4	12.6	94.8	27.3	170.8	Jun 19
MT124645	81.1	53.3	11.1	12.1	94.4	25.7	172.2	Jun 21
MT124663	76.2	53.5	11.9	12.2	95.7	26.2	170.5	Jun 19
MT124673	71.2	53.3	11.8	12.0	94.1	24.5	171.9	Jun 20
MT124688	90.6*	54.1	11.5	11.5	94.2	27.0	172.6	Jun 21
MT124716	81.7	53.9	11.2	12.8	92.2	25.4	172.8	Jun 21
MT124728	87.9	53.6	11.2	12.7	92.6	25.4	172.3	Jun 21
Average	88.3	53.6	11.4	12.1	94.2	25.8	172.9	Jun 21
Prob>F	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
PLSD (p=0.05)	8.2	0.8	0.4	0.6	2.5	1.4	1.2	
CV%	14.4	2.3	5.0	6.9	3.8	8.3	1.1	
Locations	7	7	7	7	7	7	7	

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 percent dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Table 3. Agronomic performance of spring barley entries tested at three irrigated dryland locations in Montana, 2016.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump	Plant	Heading Date	
	Yield	Weight	Moisture	Protein	Kernels	Height	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- inches -		
ABI Balster	114.2	52.4	10.0	10.6	96.1	25.0	168.2	Jun 17
Champion	110.6	54.2	9.9	10.7	94.7	26.0	166.8	Jun 15
CDC Copeland	113.8	54.0	9.9	10.9	96.5	27.5	170.3	Jun 19
LCS Genie	127.5*	53.7	10.0	9.9	95.6	22.4	170.8	Jun 19
ABI Growler	120.5	52.3	10.0	10.5	95.3	25.8	167.5	Jun 16
Harrington	107.4	53.9	10.0	10.7	95.7	26.4	167.5	Jun 16
Haxby	102.1	54.9	10.0	11.3	95.9	26.1	166.3	Jun 15
Hockett	104.2	54.0	9.8	11.1	94.9	25.4	166.8	Jun 15
AC Metcalfe	103.9	54.1	9.9	11.1	94.7	27.8	166.2	Jun 15
LCS Odyssey	131.6*	52.5	9.9	10.0	95.5	22.1	171.5	Jun 20
LCS Overture	133.7**	52.7	9.8	9.9	95.8	23.0	171.3	Jun 20
AAC Synergy	106.1	52.4	9.7	10.5	96.9	27.0	167.5	Jun 16
LCS Vespa	130.0*	53.3	10.1	10.2	95.5	21.9	171.0	Jun 20
Westminster	120.6	53.5	9.9	10.2	97.6	24.2	170.7	Jun 19
08ARS012-79	110.5	53.7	9.9	10.5	94.1	26.0	166.2	Jun 15
08ARS028-20	119.9	53.3	9.9	10.1	94.8	24.2	168.8	Jun 17
08ARS116-91	115.3	53.2	10.1	10.6	93.6	25.2	164.8	Jun 13
10WA-117.17	106.6	53.5	9.8	10.7	94.1	26.3	167.8	Jun 16
10WA-117.24	89.8	52.1	9.9	11.3	95.8	28.3	168.0	Jun 17
11WA-107.43	114.1	54.2	10.0	10.9	95.2	25.1	166.2	Jun 15
ME08032-156	122.4*	53.5	9.8	10.7	96.8	21.7	168.0	Jun 17
ME08053-050	112.8	53.3	9.7	11.8	95.6	25.0	166.3	Jun 15
08MT-15	113.7	54.1	9.9	10.8	96.9	23.4	170.5	Jun 19
08MT-19	116.4	54.5	9.9	10.7	96.9	27.0	168.5	Jun 17
08MT-63	111.8	53.6	10.0	10.7	92.9	27.3	167.5	Jun 16
08MT-95	103.0	53.3	9.8	11.3	83.1	29.2	167.2	Jun 16
MT090182	110.3	53.7	10.0	9.9	95.2	27.5	168.0	Jun 17
MT090190	116.2	53.9	10.0	9.8	96.4	27.4	168.2	Jun 17
MT090193	108.5	53.2	9.8	9.9	96.6	28.1	169.0	Jun 18
MT100120	112.9	53.8	10.0	9.9	96.7	27.7	168.8	Jun 17
MT100126	113.7	53.9	10.0	9.9	95.9	27.7	170.7	Jun 19
MT124016	117.9	53.4	9.8	10.0	94.2	25.3	167.3	Jun 16
MT124069	108.6	53.0	9.9	10.2	96.4	26.5	170.7	Jun 19
MT124073	108.0	53.5	9.7	10.6	95.6	28.8	169.3	Jun 18
MT124112	107.6	53.0	9.9	10.2	96.1	25.4	164.3	Jun 13
MT124118	109.7	54.7	9.9	11.1	95.4	26.6	166.2	Jun 15
MT124243	121.9*	53.2	10.1	9.7	95.4	27.8	167.7	Jun 16
MT124411	94.0	53.7	9.8	11.0	95.1	27.9	166.8	Jun 15
MT124454	106.6	54.7	9.9	11.3	96.7	26.9	166.2	Jun 15
MT124457	110.5	55.0	9.8	11.5	95.7	27.1	165.8	Jun 14
MT124555	115.3	54.3	9.9	10.5	96.8	25.8	167.8	Jun 16
MT124582	105.2	54.1	9.9	11.1	95.0	26.1	165.5	Jun 14
MT124645	103.9	53.4	9.9	10.4	96.1	26.7	167.7	Jun 16
MT124663	97.4	53.3	9.9	10.9	97.4	26.0	165.3	Jun 14
MT124673	97.8	53.7	9.8	10.7	95.6	24.8	164.5	Jun 13
MT124688	119.4	54.3	9.9	9.9	95.4	27.2	167.0	Jun 16
MT124716	110.1	53.8	9.7	11.0	95.5	25.4	167.5	Jun 16
MT124728	110.8	53.7	9.9	11.5	94.3	25.5	167.5	Jun 16
Average	112.0	53.6	9.9	10.6	95.4	25.9	167.8	Jun 16
Prob>F	<0.001	<0.001	0.636	<0.001	0.257	<0.001	<0.001	
PLSD (p=0.05)	12.1	0.8	-	0.7	-	1.9	2.2	
CV%	11.3	1.4	3.3	7.0	5.6	7.4	1.1	
Locations	3	3	3	3	3	3	2	

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 percent dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Table 4. Summary of grain yield^{1/} for spring barley entries tested at ten locations in Montana, 2016. Entries sorted by declining statewide average yield.

Cultivar/Line	Dryland Locations								Irrigated Locations				Statewide
	Bozeman	Conrad	Havre	Huntley	Kalispell	Moccasin	Sidney	Average	Bozeman	Conrad	Huntley	Average	Average
	----- bushels/acre -----												
LCS Genie	88.2	110.6*	86.9	100.5	105.3	73.8*	106.0*	96.1*	130.6*	132.0	122.3*	127.5*	106.2**
LCS Overture	82.2	108.1*	85.3	102.4	116.4	54.0	105.2*	93.5*	129.9*	145.0**	128.3**	133.7**	106.1*
LCS Vespa	89.2	110.7*	95.9*	102.0	102.5	69.3	93.4	96.1*	138.1*	139.9*	111.4	130.0*	106.0*
LCS Odyssey	95.6	118.0**	90.3*	116.4**	95.4	70.4	107.9*	94.6*	141.0**	132.5*	120.5*	131.6*	105.6*
ME08032-156	77.9	114.9*	93.3*	105.8	101.3	64.3	102.3*	94.4*	129.2*	127.9	109.5	122.4*	102.7*
08ARS028-20	95.6	106.4*	79.6	104.9	108.0	68.4	93.3	94.5*	127.0*	115.9	117.2*	119.9	102.3*
Champion	99.9	102.5*	94.9*	97.3	84.9	81.8**	109.0**	96.7**	138.2*	99.8	95.3	110.6	101.2*
Westminster	91.4	107.3*	90.2*	94.9	89.8	63.7	108.1*	92.8*	135.6*	124.9	101.9	120.6	101.2*
MT124243	85.2	103.3*	78.1	99.9	94.4	71.3	105.6*	92.5*	129.9*	122.4	112.4	121.9*	101.1*
MT124016	87.7	100.8*	91.8*	98.1	99.7	65.3	104.7*	93.0*	130.6*	122.5	101.2	117.9	100.7*
08ARS116-91	91.3	114.4*	83.6	93.0	101.9	64.9	94.2	92.4*	130.1*	115.8	100.2	115.3	99.4*
MT090182	93.2	96.4	85.7	90.3	110.7	74.2*	99.2*	93.6*	126.3*	110.6	97.5	110.3	99.4*
ABI Growler	82.4	117.0*	81.7	103.7	98.6	66.9	84.5	91.2*	116.9	124.5	117.6*	120.5	99.3*
ABI Balster	90.4	108.0*	88.2	99.5	100.4	62.7	99.0*	92.9*	117.4	120.3	105.0	114.2	99.2*
MT124688	80.6	106.2*	87.3	89.1	107.1	62.7	100.7*	90.6*	128.9*	125.3	103.0	119.4	99.0
11WA-107.43	88.8	100.7*	87.2	95.0	89.9	75.1*	105.2*	91.6*	135.1*	107.5	98.8	114.1	98.2
Hockett	93.5	108.2*	97.0**	71.6	106.3	68.8	104.3*	93.0*	118.9	120.5	74.7	104.2	96.8
08MT-19	88.0	98.7	88.1	82.7	90.9	64.3	101.1*	88.3	133.5*	119.0	96.8	116.4	96.6
CDC Copeland	89.6	104.5*	82.0	98.2	101.5	71.9	104.4*	88.8*	124.9*	117.2	100.1	113.8	96.5
10WA-117.17	81.5	104.9*	92.4*	89.2	96.3	74.0*	100.2*	91.4*	119.5	111.4	89.3	106.6	96.0
MT124555	79.9	104.4*	66.0	84.7	104.6	69.4	100.5*	88.2	120.9	120.4	102.2	115.3	95.8
08MT-63	96.2	97.9	80.1	94.4	78.9	74.4*	94.6	88.6*	120.6	113.1	101.5	111.8	95.5
MT100120	92.4	104.0*	79.0	90.3	98.6	59.2	93.0	88.7*	116.6	121.4	98.6	112.9	95.5
MT124073	93.9	95.7	77.7	92.4	113.4	63.3	98.4*	90.5*	120.2	108.3	94.2	108.0	95.4
08ARS012-79	86.9	105.3*	89.0*	79.9	90.5	65.0	100.5*	88.7*	128.8*	113.3	89.3	110.5	95.3
AAC Synergy	91.6	106.4*	86.9	85.2	94.3	70.8	98.6*	90.9*	119.5	114.2	82.7	106.1	95.0
MT124728	84.8	108.7*	84.1	84.3	90.2	65.1	96.7	87.9	127.9*	119.3	86.3	110.8	95.0
08MT-15	89.5	95.9	88.7*	101.5	65.0	74.5*	95.9	87.3	125.6*	113.6	100.6	113.7	94.8
MT090190	79.4	98.3	78.4	84.1	93.5	61.9	100.6*	85.2	129.9*	120.2	98.3	116.2	94.4
MT090193	92.4	100.4*	74.5	92.7	87.2	66.5	102.7*	87.9	111.5	116.9	98.0	108.5	94.3
MT124069	92.4	87.7	76.2	93.2	93.7	68.8	96.1	87.8	119.1	110.4	97.0	108.6	94.2
Harrington	86.4	99.1	85.6	86.9	103.5	64.8	92.0	88.2	119.4	110.0	92.5	107.4	94.0

Table 4 Con't.

Cultivar/Line	Dryland Locations							Irrigated Locations				Statewide		
	Bozeman	Conrad	Havre	Huntley	Kalispell	Moccasin	Sidney	Average	Bozeman	Conrad	Huntley	Average	Average	
	----- bushels/acre -----													
Haxby	85.6	107.6*	80.8	74.4	101.4	64.6	104.0*	88.5*	122.5	107.6	77.6	102.1	93.0	
MT100126	84.1	100.9*	57.4	89.5	94.9	59.5	102.7*	84.0	123.7	118.8	98.9	113.7	93.0	
MT124454	89.5	100.2*	77.6	77.8	91.2	63.2	96.1	85.6	125.4*	110.2	87.1	106.6	92.6	
MT124118	74.0	90.7	81.7	75.5	101.4	64.0	102.1*	84.6	124.4	115.4	89.7	109.7	92.2	
MT124582	88.6	97.6	79.7	73.8	96.2	65.4	105.7*	86.8	125.5*	108.8	81.0	105.2	92.2	
ME08053-050	85.5	94.3	87.4	71.0	86.2	66.0	98.4*	84.0	124.3	121.0	90.1	112.8	91.9	
MT124457	90.2	99.1	78.9	74.0	78.4	63.2	101.1*	83.7	130.3*	114.9	86.3	110.5	91.8	
08MT-95	86.1	97.3	83.8	85.9	78.9	64.5	97.3	85.4	131.0*	93.6	85.6	103.0	91.0	
AC Metcalfe	80.0	97.3	76.1	79.8	102.5	63.0	89.1	84.6	118.5	107.1	86.1	103.9	90.4	
MT124112	91.4	79.2	86.1	71.8	90.9	62.3	97.3*	83.3	134.0*	110.9	77.1	107.6	90.3	
MT124716	79.0	97.0	70.8	83.1	87.5	59.9	90.9	81.7	122.5	114.7	91.6	110.1	89.8	
MT124645	79.7	95.9	75.0	86.6	82.9	59.9	86.0	81.1	115.9	104.5	90.9	103.9	87.9	
10WA-117.24	88.1	91.7	84.1	66.0	83.8	62.2	85.6	80.0	115.0	90.3	63.3	89.8	82.7	
MT124411	89.9	80.7	64.5	77.7	92.7	53.8	79.2	76.7	97.1	98.0	87.8	94.0	82.2	
MT124663	90.9	74.7	67.4	70.8	88.2	53.5	86.2	76.2	118.2	104.8	67.3	97.4	82.1	
MT124673	81.5	76.5	59.1	73.3	66.0	50.5	88.6	71.2	111.3	106.9	74.6	97.8	79.0	
Average	87.5	100.8	82.0	88.6	94.6	65.6	98.0	88.3	124.6	115.6	95.9	112.0	95.4	
Prob>F	0.233	<0.001	<0.001	<0.05	0.265	<0.001	<0.001	<0.001	0.004	<0.001	<0.05	<0.001	<0.001	
PLSD (p=0.05)	-	18.0	8.4	7.8	-	9.8	12.0	8.2	16.1	12.8	11.7	12.1	7.0	
CV%	10.0	10.3	6.3	5.4	17.4	9.5	6.9	14.4	7.9	6.6	7.5	11.3	13.5	
Locations								7					3	10

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

** denotes highest yielding entry within a column.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level within a column.

Table 5. Summary of grain test weight for spring barley entries tested at ten locations in Montana, 2016. Entries sorted by declining statewide average test weight.

Cultivar/Line	Dryland Locations								Irrigated Locations				Statewide Average
	Bozeman	Conrad	Havre	Huntley	Kalispell	Moccasin	Sidney	Average	Bozeman	Conrad	Huntley	Average	
	----- pounds/bushels -----												
Haxby	56.8	55.0	52.2	53.5	55.3	55.2	55.4	54.8	57.4	52.7	54.5	54.9	54.8
MT124454	56.9	54.4	53.4	52.0	55.0	55.4	55.2	54.6	57.0	54.3	52.9	54.7	54.7
MT124457	56.9	54.1	53.3	52.8	54.7	55.2	55.2	54.6	56.9	54.8	53.2	55.0	54.7
Champion	56.5	54.3	53.4	52.8	55.0	56.1	54.9	54.7	56.5	52.6	53.5	54.2	54.6
MT124118	56.2	53.7	51.7	51.5	55.1	57.4	55.5	54.4	56.8	54.2	53.0	54.7	54.5
MT124555	56.2	54.2	53.7	53.0	54.5	55.5	54.6	54.5	56.2	53.3	53.4	54.3	54.4
11WA-107.43	56.4	53.8	54.0	52.4	54.6	55.4	53.9	54.3	56.7	53.0	52.9	54.2	54.3
MT124688	55.8	53.7	52.1	52.2	54.7	55.1	55.2	54.1	56.7	53.3	52.9	54.3	54.2
08MT-19	55.5	54.4	52.0	51.3	54.6	55.3	54.6	54.0	56.6	54.0	52.9	54.5	54.1
MT124582	55.6	54.0	52.1	51.3	54.3	56.6	55.1	54.1	56.1	53.4	52.8	54.1	54.1
Hockett	56.3	54.2	52.7	52.0	54.3	55.0	53.4	54.0	56.2	53.5	52.4	54.0	54.0
MT100120	56.2	53.9	53.0	51.8	53.7	55.8	54.1	54.1	55.5	53.2	52.8	53.8	54.0
MT100126	55.8	54.5	53.0	51.2	53.7	55.6	54.7	54.1	55.9	53.5	52.3	53.9	54.0
MT124716	55.6	53.8	53.7	51.2	55.2	55.7	52.5	53.9	56.3	53.2	51.8	53.8	53.9
AC Metcalfe	55.2	53.1	52.1	51.9	53.9	55.4	53.5	53.6	56.0	53.1	53.1	54.1	53.8
MT090182	55.9	53.1	52.9	51.4	54.1	55.9	54.0	53.9	55.6	52.9	52.5	53.7	53.8
MT124073	55.6	53.3	53.7	51.8	54.7	55.1	53.4	54.0	55.8	52.7	52.0	53.5	53.8
MT124411	55.8	52.8	52.7	51.4	54.1	54.4	54.7	53.8	56.2	52.7	52.3	53.7	53.8
LCS Genie	55.6	53.4	52.6	52.3	53.6	55.9	52.8	53.7	55.1	53.8	52.1	53.7	53.7
Harrington	55.5	53.7	52.6	51.2	54.8	54.5	52.9	53.6	56.2	52.9	52.8	53.9	53.7
MT090190	55.7	53.1	52.0	51.6	53.8	54.9	54.1	53.6	55.5	53.5	52.6	53.9	53.7
CDC Copeland	54.8	53.6	52.6	51.7	54.4	53.0	53.1	53.4	56.0	52.7	53.2	54.0	53.6
08ARS012-79	55.6	52.9	52.1	51.1	54.0	55.8	53.4	53.5	56.0	52.7	52.4	53.7	53.6
08MT-15	55.4	53.0	52.2	52.7	54.3	52.8	52.2	53.3	55.7	52.9	53.7	54.1	53.6
08MT-63	55.2	53.8	52.8	52.0	53.5	54.9	53.2	53.6	55.3	52.6	52.7	53.6	53.6
08MT-95	53.8	53.0	53.4	51.7	54.2	55.1	54.8	53.7	55.4	52.3	52.3	53.3	53.6
MT124728	55.2	53.5	52.5	51.2	54.7	54.9	53.0	53.6	55.8	53.1	52.2	53.7	53.6
Westminster	55.7	53.3	53.0	51.6	53.9	52.9	53.4	53.5	56.3	53.0	51.2	53.5	53.5
MT090193	55.8	53.0	52.6	51.4	52.6	56.2	53.8	53.6	55.0	52.9	51.7	53.2	53.5
MT124243	54.9	52.3	52.8	51.4	53.3	56.8	53.5	53.5	55.5	52.2	52.2	53.2	53.4
MT124645	54.8	53.3	52.6	51.8	53.3	54.7	53.2	53.3	55.4	52.7	52.2	53.4	53.4
MT124663	56.2	52.1	52.7	49.9	52.7	57.8	53.5	53.5	55.9	52.3	51.8	53.3	53.4

Table 5 Con't.

Cultivar/Line	Dryland Locations								Irrigated Locations				Statewide
	Bozeman	Conrad	Havre	Huntley	Kalispell	Moccasin	Sidney	Average	Bozeman	Conrad	Huntley	Average	Average
	----- pounds/bushels -----												
MT124673	56.2	53.3	53.0	48.9	52.8	54.5	54.3	53.3	55.5	53.0	52.5	53.7	53.4
LCS Vespa	55.2	52.8	52.9	52.0	52.4	55.8	52.6	53.4	55.0	52.8	52.1	53.3	53.3
10WA-117.17	54.9	53.1	53.3	50.8	54.0	53.5	52.4	53.1	55.9	52.3	52.1	53.5	53.3
MT124016	54.5	53.6	53.7	51.7	53.7	52.4	52.4	53.2	55.4	52.8	52.1	53.4	53.3
ME08032-156	55.1	52.9	53.3	51.9	53.0	54.2	51.6	53.1	56.0	52.5	52.1	53.5	53.2
ME08053-050	55.1	53.3	53.1	50.3	53.6	53.7	53.4	53.2	55.0	53.2	51.5	53.3	53.2
MT124112	55.5	52.4	52.1	50.9	52.7	55.3	53.6	53.2	55.4	52.5	51.3	53.0	53.2
LCS Overture	55.6	52.1	52.4	51.9	52.1	56.6	52.8	53.3	54.9	52.1	51.1	52.7	53.1
08ARS116-91	54.9	53.1	52.3	52.2	53.5	52.7	52.4	53.0	55.0	52.5	52.3	53.2	53.1
08ARS028-20	54.5	52.6	53.0	50.1	54.1	53.9	52.0	52.9	55.2	52.2	52.3	53.3	53.0
MT124069	55.0	52.9	52.7	51.1	53.0	53.8	52.3	53.0	55.1	52.5	51.5	53.0	53.0
LCS Odyssey	54.8	52.2	52.4	51.1	52.0	56.1	52.2	53.0	54.7	52.2	50.7	52.5	52.8
AAC Synergy	54.9	51.9	53.4	51.5	52.2	54.0	52.3	52.9	54.7	50.9	51.6	52.4	52.7
ABI Growler	53.8	52.3	52.9	49.9	52.7	53.6	52.5	52.5	54.6	51.6	50.6	52.3	52.4
ABI Balster	54.7	51.3	51.8	50.8	52.5	53.5	51.5	52.3	54.9	51.8	50.6	52.4	52.3
10WA-117.24	53.8	52.4	52.6	48.7	52.3	55.1	50.4	52.2	54.2	51.8	50.4	52.1	52.1
Average	55.5	53.3	52.8	51.5	53.8	55.0	53.4	53.6	55.7	52.8	52.3	53.6	53.6
Prob>F	<0.001	<0.001	0.972	<0.05	<0.001	0.594	<0.001	<0.001	<0.001	<0.001	<0.05	<0.001	<0.001
PLSD (p=0.05)	1.3	1.1	-	1.1	1.1	-	1.0	0.8	0.8	0.7	0.8	0.8	0.6
CV%	1.4	1.3	2.2	1.3	1.2	1.8	1.0	2.3	1.8	0.8	0.9	1.4	2.0
Locations								7				3	10

Table 7. Summary of grain protein content^{1/} for spring barley entries tested at ten locations in Montana, 2016. Entries sorted by declining statewide average grain protein content.

Cultivar/Line	Dryland Locations								Irrigated Locations				Statewide Average
	Bozeman	Conrad	Havre	Huntley	Kalispell	Moccasin ^{2/}	Sidney	Average	Bozeman	Conrad	Huntley	Average	
	----- % -----												
ME08053-050	14.2	10.4	13.8	16.9	10.4	12.3	12.2	12.9	11.8	10.9	12.5	11.8	12.6
Haxby	13.1	11.4	14.1	15.8	10.2	12.2	11.8	12.7	11.2	11.1	11.7	11.3	12.3
AC Metcalfe	14.0	10.0	13.8	16.7	10.1	13.5	12.2	12.9	11.8	9.9	11.4	11.1	12.3
MT124411	13.6	11.4	14.1	15.7	10.6	13.2	12.0	12.9	11.8	10.5	10.9	11.0	12.3
MT124716	14.3	11.2	14.1	15.0	10.6	13.5	11.9	12.8	11.5	10.4	11.3	11.0	12.3
MT124728	14.5	11.0	13.4	15.4	10.6	13.2	11.1	12.7	12.7	10.5	11.2	11.5	12.3
MT124454	13.7	10.7	13.7	16.0	9.5	12.8	12.1	12.6	10.9	11.2	11.6	11.3	12.2
MT124582	13.2	10.2	14.0	16.4	9.8	12.2	12.4	12.6	10.8	10.3	12.3	11.1	12.2
Harrington	13.9	9.3	14.7	16.0	10.1	12.6	12.0	12.7	10.5	10.2	11.2	10.7	12.1
10WA-117.24	13.2	9.4	13.7	17.4	9.8	11.8	11.8	12.5	11.3	10.3	12.2	11.3	12.1
08MT-95	14.3	9.8	13.1	15.7	9.7	12.2	12.4	12.4	11.5	11.3	11.1	11.3	12.1
MT124457	13.5	10.8	13.4	15.5	9.7	11.9	11.6	12.3	11.5	10.8	12.3	11.5	12.1
08MT-15	13.7	9.3	13.7	15.9	11.2	12.3	12.1	12.6	11.5	9.5	11.5	10.8	12.0
Hockett	13.1	10.3	13.9	15.9	9.7	12.3	10.5	12.2	11.7	10.3	11.5	11.1	11.9
MT124118	13.1	10.2	12.6	15.9	9.8	11.7	11.9	12.2	10.7	10.4	11.9	11.1	11.9
Champion	13.2	10.6	13.5	15.3	9.8	11.7	11.8	12.3	11.7	9.4	10.8	10.7	11.8
CDC Copeland	13.7	10.1	12.8	15.2	9.4	12.3	11.8	12.2	11.3	10.3	11.0	10.9	11.8
08ARS116-91	13.6	9.9	14.1	15.1	9.7	12.3	12.0	12.4	11.2	10.5	10.2	10.6	11.8
11WA-107.43	12.7	10.3	13.5	15.0	9.9	11.9	11.3	12.1	10.9	10.1	11.8	10.9	11.8
ME08032-156	13.8	9.4	13.6	14.8	9.0	12.6	11.7	12.2	11.0	9.6	11.4	10.7	11.8
08MT-19	14.3	10.4	13.2	15.9	9.1	12.2	11.1	12.3	11.0	10.6	10.7	10.7	11.8
MT124663	12.7	10.3	14.4	14.5	10.0	12.4	11.8	12.2	10.9	10.5	11.2	10.9	11.8
ABI Balster	13.0	9.4	14.2	14.7	9.2	11.8	11.5	12.0	11.0	10.1	10.7	10.6	11.6
Westminster	13.9	9.2	13.4	15.8	9.3	12.1	12.2	12.3	10.7	9.3	10.7	10.2	11.6
08ARS012-79	13.0	9.3	14.8	14.9	9.3	11.9	11.5	12.1	10.8	10.0	10.7	10.5	11.6
10WA-117.17	13.1	9.5	13.6	15.2	9.3	12.2	11.2	12.0	10.9	10.2	11.3	10.7	11.6
08MT-63	13.2	10.1	12.9	15.3	8.9	12.5	11.3	12.0	11.3	9.9	11.2	10.7	11.6
MT124645	12.7	9.8	13.1	14.9	9.9	11.7	11.6	12.1	11.2	9.6	10.5	10.4	11.6
MT124673	12.1	9.9	13.7	14.5	10.5	12.2	11.3	12.0	10.7	10.3	11.2	10.7	11.6
AAC Synergy	12.6	9.5	13.3	15.7	9.1	11.7	11.4	11.9	11.0	9.6	11.0	10.5	11.5
LCS Vespa	13.5	9.4	13.5	15.5	9.1	12.5	11.0	12.0	10.2	9.6	10.7	10.2	11.5
MT124555	13.0	10.0	13.4	15.0	8.9	11.7	10.7	11.9	11.3	9.8	10.4	10.5	11.5

Table 7 Con't.

Cultivar/Line	Dryland Locations								Irrigated Locations				Statewide		
	Bozeman	Conrad	Havre	Huntley	Kalispell	Moccasin ^{2/}	Sidney	Average	Bozeman	Conrad	Huntley	Average	Average		
	-----%-----														
ABI Growler	13.3	9.2	13.4	13.8	9.2	12.3	12.0	11.8	10.9	10.1	10.3	10.5	11.4		
MT124073	11.9	10.5	13.1	14.0	9.6	12.0	10.7	11.7	11.3	9.7	10.7	10.6	11.4		
LCS Odyssey	13.2	8.4	14.7	14.0	9.2	12.0	10.8	11.8	10.8	9.4	9.8	10.0	11.3		
08ARS028-20	12.9	9.4	13.2	15.1	8.8	11.9	11.0	11.8	10.2	9.4	10.6	10.1	11.3		
MT124016	12.9	9.4	13.5	14.5	9.3	11.6	11.1	11.8	9.8	9.3	10.5	10.0	11.2		
MT124069	13.1	9.3	13.6	14.3	9.1	12.2	10.4	11.6	11.3	9.0	10.2	10.2	11.2		
MT124112	12.2	10.0	13.5	13.7	9.9	11.4	11.1	11.7	10.1	9.6	10.8	10.2	11.2		
LCS Genie	13.1	9.0	13.3	14.1	9.0	11.0	10.8	11.5	10.2	9.4	10.1	9.9	11.1		
LCS Overture	13.6	8.7	12.8	14.0	8.9	12.0	11.3	11.6	10.8	9.1	10.1	9.9	11.1		
MT090193	10.9	9.7	14.3	14.0	8.8	11.3	10.8	11.5	10.1	9.2	10.2	9.9	11.0		
MT124688	11.8	9.6	12.8	14.6	9.6	11.3	11.0	11.5	10.0	9.3	10.5	9.9	11.0		
MT100126	12.5	9.2	13.5	13.4	8.5	11.3	11.0	11.4	10.5	9.2	9.9	9.9	10.9		
MT090182	11.9	9.0	13.2	13.8	8.8	11.3	10.4	11.2	10.4	9.0	10.3	9.9	10.8		
MT090190	12.4	9.2	12.8	13.5	8.7	11.2	11.0	11.2	10.3	9.3	9.9	9.8	10.8		
MT100120	11.8	9.3	13.8	13.0	8.8	11.3	10.7	11.2	10.3	9.2	10.2	9.9	10.8		
MT124243	11.6	9.2	14.0	13.6	8.8	10.5	10.7	11.2	9.9	8.9	10.3	9.7	10.8		
Average	13.1	9.8	13.6	15.0	9.5	12.0	11.4	12.1	11.0	9.9	10.9	10.6	11.6		
Prob>F	<0.001	<0.001	0.024	<0.05	<0.001	-	<0.001	<0.001	0.068	<0.001	<0.05	<0.001	<0.001		
PLSD (p=0.05)	1.3	0.9	1.1	0.7	0.7	-	1.1	0.6	-	0.9	0.9	0.7	0.4		
CV%	6.0	5.2	4.9	3.0	4.4	-	5.5	6.9	8.1	5.2	5.2	7.0	6.8		
Locations									7					3	10

1/ Grain protein values adjusted to a 100 percent dry matter content.

2/ Unreplicated data measured for percent grain protein content at Moccasin in 2016.

Table 8. Summary of grain plump kernel fraction content for spring barley entries tested at ten locations in Montana, 2016. Entries sorted by declining statewide average plump kernel fraction content.

Cultivar/Line	Dryland Locations							Irrigated Locations				Statewide Average	
	Bozeman	Conrad	Havre	Huntley	Kalispell ^{1/}	Moccasin ^{1/}	Sidney	Average	Bozeman	Conrad	Huntley		Average
	----- % -----												
MT124663	97.4	99.3	96.4	91.6	98.8	97.8	91.5	95.7	98.4	98.8	94.9	97.4	96.3
Westminster	92.4	98.2	94.8	95.0	98.9	93.2	95.8	95.6	98.2	98.5	96.0	97.6	96.2
LCS Odyssey	97.1	98.6	97.7	95.8	98.5	93.6	92.2	96.1	94.7	97.9	94.1	95.5	95.9
MT124454	94.9	98.9	94.9	93.1	97.9	94.7	94.2	95.6	97.7	98.1	94.1	96.7	95.9
MT124555	96.9	99.0	90.3	93.5	99.2	96.7	95.1	95.5	98.7	98.5	93.9	96.8	95.9
AAC Synergy	91.9	98.9	93.4	94.9	98.8	96.5	95.3	95.4	95.9	98.9	96.6	96.9	95.8
MT090193	97.5	98.7	89.6	93.2	97.8	93.7	96.2	95.4	97.7	98.2	93.9	96.6	95.7
ME08053-050	92.5	98.7	96.1	94.2	99.0	93.0	96.4	95.7	92.7	98.3	95.8	95.6	95.6
MT100120	95.7	99.0	89.8	94.2	98.4	94.8	94.5	95.1	97.5	98.5	94.1	96.7	95.6
MT124112	92.9	98.8	95.4	93.1	98.3	94.8	94.4	95.3	97.0	98.3	93.2	96.1	95.5
MT124457	94.7	98.9	94.3	92.7	97.7	95.0	94.7	95.3	94.8	98.2	93.7	95.7	95.5
Hockett	93.9	99.1	95.6	91.4	98.1	96.0	96.2	95.6	93.7	98.4	92.6	94.9	95.4
08MT-15	92.8	98.4	91.1	93.0	98.6	97.1	94.9	94.7	96.3	98.3	96.0	96.9	95.4
CDC Copeland	92.6	98.3	91.4	94.7	98.4	93.1	94.7	94.7	96.0	98.0	95.6	96.5	95.3
MT124118	89.9	98.1	95.1	91.4	98.7	95.7	97.4	95.2	95.2	98.4	92.7	95.4	95.2
MT124411	94.7	98.5	92.1	93.6	97.0	96.3	95.7	95.2	97.4	96.8	91.0	95.1	95.2
MT124069	92.6	98.1	90.6	93.2	96.7	94.1	94.8	94.3	96.6	98.5	94.3	96.4	95.0
LCS Vespa	88.7	98.8	95.3	90.4	98.2	93.0	97.2	94.7	94.5	97.5	94.4	95.5	94.9
MT090190	92.2	98.9	88.5	90.4	97.6	96.8	96.5	94.2	97.2	98.0	93.9	96.4	94.9
MT124645	90.9	98.7	92.4	93.9	98.3	91.9	94.3	94.4	96.7	98.3	93.3	96.1	94.9
08MT-19	83.2	99.2	93.9	90.2	98.4	95.1	97.7	93.8	97.8	98.4	94.5	96.9	94.8
MT100126	93.1	98.8	87.1	93.6	97.2	95.7	95.5	94.1	96.0	97.8	93.8	95.9	94.8
MT124582	90.2	98.9	92.6	93.4	97.4	95.3	96.6	94.8	94.7	96.3	93.7	95.0	94.8
Haxby	92.7	98.6	90.4	91.3	98.9	87.8	97.9	94.3	95.5	98.1	94.1	95.9	94.7
Harrington	91.5	98.4	92.2	93.8	98.1	89.9	94.1	94.0	95.9	96.8	94.6	95.7	94.6
08ARS012-79	91.6	98.3	93.8	93.2	97.1	94.6	96.4	95.0	93.9	96.5	92.5	94.1	94.6
MT124073	94.5	98.5	90.4	90.5	98.5	92.1	95.6	94.3	96.5	98.4	92.7	95.6	94.6
MT124673	94.8	98.7	87.7	93.0	97.4	92.1	95.5	94.1	96.9	97.8	92.0	95.6	94.6
MT124688	93.8	97.6	89.4	93.4	97.9	90.2	95.7	94.2	96.9	97.4	92.6	95.4	94.5
Champion	90.4	98.3	91.3	92.2	97.5	92.4	97.3	94.2	95.5	96.8	91.7	94.7	94.4
ABI Balster	87.8	98.6	92.1	91.5	97.9	93.0	93.9	93.4	97.2	98.2	92.8	96.1	94.3
LCS Genie	93.1	97.9	95.6	87.2	98.7	92.0	92.8	93.6	95.9	97.9	92.9	95.6	94.3

Table 8 Con't.

Cultivar/Line	Dryland Locations								Irrigated Locations				Statewide
	Bozeman	Conrad	Havre	Huntley	Kalispell ^{1/}	Moccasin ^{1/}	Sidney	Average	Bozeman	Conrad	Huntley	Average	Average
	----- % -----												
ABI Growler	92.6	98.6	89.6	93.8	97.7	90.0	93.5	93.8	95.5	97.4	92.9	95.3	94.3
MT090182	93.6	98.2	87.1	91.4	97.1	93.1	96.9	93.8	95.3	97.5	92.6	95.2	94.3
AC Metcalfe	89.4	98.1	91.6	91.1	97.3	93.9	95.3	93.6	93.4	97.4	94.1	94.7	93.9
LCS Overture	94.9	97.3	95.6	93.5	96.9	96.1	79.2	92.9	95.7	98.3	93.3	95.8	93.9
10WA-117.24	90.6	98.5	92.3	89.2	97.7	88.9	92.3	92.9	96.2	97.5	93.6	95.8	93.9
11WA-107.43	88.1	98.6	89.4	90.6	98.6	95.4	94.8	93.2	95.3	97.9	92.1	95.2	93.9
MT124243	91.9	98.5	83.2	92.7	98.2	93.6	94.9	92.9	95.4	97.5	93.4	95.4	93.7
MT124016	90.7	98.0	91.7	92.5	99.1	83.5	93.9	93.1	93.1	97.8	91.5	94.2	93.4
ME08032-156	88.5	98.5	92.6	88.7	99.3	78.5	91.9	91.8	97.8	97.7	94.9	96.8	93.3
MT124716	84.8	98.7	88.6	88.1	98.3	91.4	95.7	92.2	97.1	98.3	90.9	95.5	93.3
08ARS116-91	92.7	98.5	91.4	92.7	96.2	76.9	95.8	93.2	93.6	95.7	91.3	93.6	93.2
MT124728	85.3	98.5	91.6	88.4	98.2	91.1	96.6	92.6	93.5	98.0	91.5	94.3	93.2
08ARS028-20	91.1	98.1	87.0	90.9	97.3	78.2	93.8	91.5	91.9	97.3	95.1	94.8	92.5
10WA-117.17	81.6	98.5	91.0	91.2	97.4	84.3	95.6	91.7	94.2	96.5	91.3	94.1	92.5
08MT-63	87.0	97.8	86.2	88.0	91.7	94.0	94.1	91.1	93.0	96.2	89.0	92.9	91.7
08MT-95	86.8	98.5	93.8	90.1	97.7	95.5	96.2	93.7	59.0	98.7	91.7	83.1	90.2
Average	91.7	98.5	91.8	92.1	97.9	92.4	94.8	94.2	95.0	97.8	93.4	95.4	94.5
Prob>F	0.503	0.003	<0.001	<0.05	-	-	<0.001	<0.001	<0.001	<0.001	<0.05	0.257	<0.001
PLSD (p=0.05)	-	0.8	1.9	3.5	-	-	3.4	2.5	7.9	1.3	2.2	-	2.4
CV%	6.8	0.5	1.2	2.3	-	-	2.1	3.8	5.1	0.8	1.5	5.6	4.3
Locations								7				3	10

1/ Unreplicated data measured for percent plump kernel content at Kalispell and Moccasin in 2016.

Table 9. Summary of plant height for spring barley entries tested at ten locations in Montana, 2016. Entries sorted by declining statewide average plant height.

Cultivar/Line	Dryland Locations								Irrigated Locations				Statewide
	Bozeman	Conrad	Havre	Huntley	Kalispell	Moccasin	Sidney	Average	Bozeman	Conrad	Huntley	Average	Average
	----- inches -----												
08MT-95	26.2	25.4	30.1	42.8	34.3	25.4	30.1	28.4	32.6	32.9	41.8	29.2	28.6
MT124073	26.6	27.3	27.4	39.6	36.9	25.0	28.1	27.7	33.2	34.2	39.9	28.8	28.1
10WA-117.24	27.3	24.0	27.7	41.3	30.7	25.4	26.7	27.0	31.4	35.7	39.5	28.3	27.4
MT090193	26.3	26.4	27.7	37.7	33.3	25.0	29.8	27.1	31.9	34.5	38.9	28.1	27.4
MT100120	26.0	27.3	27.6	39.5	33.3	23.7	30.1	27.2	30.4	33.9	39.5	27.7	27.4
MT124411	24.3	24.0	27.8	39.6	32.8	25.3	30.6	27.1	33.0	30.5	39.0	27.9	27.4
MT090182	26.1	27.1	27.5	37.2	34.6	24.6	29.8	27.2	30.6	33.7	38.7	27.5	27.3
MT124243	25.3	25.6	27.2	39.8	32.7	24.1	29.0	26.9	31.3	32.5	39.4	27.8	27.2
MT124457	25.6	25.2	26.5	39.8	33.6	25.8	28.8	27.2	29.7	32.6	38.8	27.1	27.2
AC Metcalfe	26.6	24.5	28.9	39.6	33.5	24.1	26.0	26.8	29.8	33.1	40.6	27.8	27.1
08MT-63	25.6	27.2	28.2	38.8	31.5	25.5	28.1	27.0	29.6	30.7	40.3	27.3	27.1
MT124454	25.5	28.0	27.0	39.8	34.4	24.8	27.7	27.3	29.9	30.7	38.6	26.9	27.1
MT124688	24.7	25.8	27.9	39.6	33.9	23.8	28.8	27.0	29.9	33.0	38.7	27.2	27.1
08MT-19	25.3	25.8	29.0	39.9	31.0	24.9	27.5	26.9	29.9	32.0	38.6	27.0	26.9
MT100126	25.3	26.9	27.4	37.3	32.3	23.6	29.8	26.6	31.3	35.4	37.9	27.7	26.9
MT124582	25.6	24.8	26.9	40.1	32.7	25.3	30.2	27.3	29.1	31.0	37.3	26.1	26.9
MT124118	24.6	23.8	27.0	40.1	34.8	24.8	27.9	26.9	29.5	31.6	37.6	26.6	26.8
AAC Synergy	25.1	24.5	28.1	38.3	32.2	24.5	27.4	26.4	29.8	31.4	38.9	27.0	26.6
MT090190	23.8	26.5	25.8	37.1	31.1	24.6	29.8	26.2	30.3	34.5	38.1	27.4	26.6
CDC Copeland	24.1	24.5	25.8	37.1	33.5	23.5	28.4	25.9	31.6	34.0	37.4	27.5	26.4
Harrington	24.3	23.6	27.0	38.3	35.7	24.2	25.9	26.2	29.4	30.9	37.3	26.4	26.3
MT124069	24.3	24.4	26.3	37.4	33.1	25.0	27.8	26.2	29.1	33.1	37.3	26.5	26.3
Champion	24.7	26.2	27.6	38.6	29.1	23.6	30.4	26.3	28.6	30.9	37.1	26.0	26.2
Haxby	24.4	27.3	26.7	41.3	31.1	23.9	24.8	26.0	28.3	31.8	37.6	26.1	26.1
Hockett	26.1	24.7	27.8	38.7	33.3	24.2	24.8	26.4	27.8	29.8	36.8	25.4	26.1
08ARS012-79	23.8	26.6	26.3	38.9	30.6	24.1	29.5	26.2	29.5	29.7	36.7	26.0	26.1
MT124663	25.3	24.6	27.8	38.1	30.4	23.2	28.4	26.2	29.9	30.1	36.2	26.0	26.1
MT124555	23.8	24.3	27.0	37.1	31.9	25.1	28.5	26.1	27.9	30.7	37.4	25.8	26.0
MT124645	24.1	25.9	26.3	37.6	31.5	23.9	26.9	25.7	30.0	32.9	36.9	26.7	26.0
MT124112	24.8	24.0	26.6	38.6	30.7	23.4	27.1	26.0	28.1	30.5	36.2	25.4	25.8
10WA-117.17	22.8	23.1	24.9	38.6	30.1	24.4	25.9	25.2	28.0	32.5	38.3	26.3	25.5
11WA-107.43	23.3	24.7	27.6	37.7	31.1	22.6	26.9	25.6	27.2	29.9	36.2	25.1	25.4

Table 9 Con't.

Cultivar/Line	Dryland Locations								Irrigated Locations				Statewide
	Bozeman	Conrad	Havre	Huntley	Kalispell	Moccasin	Sidney	Average	Bozeman	Conrad	Huntley	Average	Average
	----- inches -----												
MT124016	24.5	23.8	26.8	38.3	30.6	21.5	28.2	25.5	27.1	29.9	36.9	25.3	25.4
MT124716	23.2	24.6	26.9	36.8	32.5	23.3	24.9	25.4	27.6	30.7	36.5	25.4	25.4
MT124728	22.5	25.0	27.9	37.8	31.4	23.4	24.8	25.4	28.5	29.6	36.4	25.5	25.4
ABI Balster	23.2	23.3	26.2	36.7	32.0	23.1	27.4	25.5	27.8	29.7	35.6	25.0	25.3
ME08053-050	23.3	23.5	24.7	40.2	29.8	23.3	26.9	25.3	26.3	29.3	37.1	25.0	25.2
08ARS116-91	22.9	24.4	25.4	37.5	30.8	23.2	24.4	24.7	28.4	29.0	35.7	25.2	24.9
ABI Growler	22.6	25.0	26.4	34.6	29.5	22.7	24.3	24.3	28.8	32.7	35.9	25.8	24.8
08ARS028-20	22.0	23.1	25.1	36.0	33.1	21.2	27.3	24.8	26.8	27.8	35.0	24.2	24.6
MT124673	22.9	24.7	25.5	37.5	25.6	21.2	27.9	24.5	28.2	28.9	34.7	24.8	24.6
Westminster	23.6	23.6	26.6	35.3	26.6	23.2	27.7	24.6	28.2	28.7	33.3	24.2	24.5
LCS Overture	22.6	23.0	24.5	31.6	27.8	21.2	28.5	23.6	26.5	27.6	31.9	23.0	23.5
08MT-15	22.6	21.7	23.8	33.2	25.9	21.7	26.1	23.2	27.3	26.4	32.5	23.4	23.3
LCS Odyssey	22.4	23.1	25.4	31.5	26.8	21.8	25.9	23.2	25.9	24.6	30.7	22.1	22.9
ME08032-156	22.5	21.5	24.0	32.9	28.7	21.6	25.1	23.1	23.8	26.2	31.0	21.7	22.7
LCS Genie	21.6	23.8	23.2	31.5	26.6	20.8	25.8	22.7	25.1	25.5	31.9	22.4	22.6
LCS Vespa	20.5	23.2	23.9	31.8	25.6	22.1	24.2	22.4	25.9	25.6	29.7	21.9	22.2
Average	24.2	24.7	26.6	37.6	31.2	23.6	27.5	25.8	28.9	30.7	36.7	25.9	25.8
Prob>F	<0.001	0.006	<0.001	<0.05	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	<0.001	<0.001
PLSD (p=0.05)	1.3	3.3	2.1	2.0	5.2	1.9	3.5	1.4	2.4	2.5	1.9	1.9	1.1
CV%	4.1	7.8	5.0	3.3	10.0	4.8	7.4	8.3	4.9	4.7	3.1	7.4	8.0
Locations								7				3	10

Table 10. Summary of heading date for spring barley entries tested at eight locations in Montana, 2016. Entries sorted by statewide average heading date.

Cultivar/Line	Dryland Locations								Irrigated Locations			Statewide Average	
	Bozeman	Conrad	Havre	Huntley	Kalispell	Moccasin	Sidney	Average	Bozeman	Huntley	Average	Julian	Calendar
	----- julian day -----												
MT124112	175.7	169.6	177.9	156.7	173.0	174.2	165.0	170.2	174.7	154.0	164.3	168.9	Jun 17
MT124663	176.0	170.7	178.5	157.0	173.0	174.2	165.0	170.5	175.0	155.7	165.3	169.4	Jun 18
08ARS116-91	177.0	173.7	177.0	155.7	172.0	174.7	165.3	170.8	175.0	154.7	164.8	169.5	Jun 18
MT124411	176.0	170.3	176.7	157.3	172.7	173.9	166.0	170.4	177.0	156.7	166.8	169.6	Jun 18
MT124582	176.0	171.3	178.9	156.7	172.7	174.6	165.3	170.8	175.0	156.0	165.5	169.6	Jun 18
Haxby	175.3	172.9	178.2	156.7	173.7	174.5	165.3	171.0	175.7	157.0	166.3	169.9	Jun 18
11WA-107.43	176.0	171.8	179.9	157.0	175.0	174.4	165.0	171.3	175.3	157.0	166.2	170.1	Jun 19
MT124118	176.7	171.8	177.2	157.0	176.7	174.5	165.0	171.3	175.7	156.7	166.2	170.2	Jun 19
MT124457	176.7	173.4	179.1	156.7	174.3	174.6	165.3	171.4	175.3	156.3	165.8	170.2	Jun 19
MT124454	177.3	172.1	178.4	156.7	174.3	174.3	167.0	171.4	175.7	156.7	166.2	170.3	Jun 19
MT124673	177.0	172.1	179.1	156.7	178.0	174.6	166.0	171.9	175.3	153.7	164.5	170.3	Jun 19
AC Metcalfe	176.0	172.6	179.1	156.3	177.7	174.8	165.3	171.7	175.7	156.7	166.2	170.5	Jun 19
Champion	176.7	172.4	179.0	156.7	178.0	173.9	165.3	171.7	176.7	157.0	166.8	170.6	Jun 19
08ARS012-79	177.0	172.7	178.1	156.7	177.7	174.8	165.3	171.8	176.0	156.3	166.2	170.6	Jun 19
ME08053-050	177.3	172.1	179.4	157.0	177.3	175.1	165.7	172.0	175.7	157.0	166.3	170.7	Jun 19
Hockett	177.3	171.1	179.1	157.0	178.0	174.9	166.3	172.0	176.7	157.0	166.8	170.8	Jun 19
08MT-95	176.0	174.2	178.9	157.0	178.0	175.1	165.0	172.1	178.0	156.3	167.2	171.0	Jun 20
MT124645	178.0	172.5	179.8	157.7	176.7	174.2	166.3	172.2	178.3	157.0	167.7	171.2	Jun 20
MT124728	178.0	172.7	179.3	157.0	178.0	174.8	166.0	172.3	178.0	157.0	167.5	171.2	Jun 20
MT124688	177.7	173.7	180.7	157.0	177.0	175.0	166.3	172.6	175.7	158.3	167.0	171.3	Jun 20
AAC Synergy	176.7	172.8	180.9	157.7	177.3	175.4	167.0	172.5	176.7	158.3	167.5	171.4	Jun 20
08MT-63	178.7	171.2	180.9	157.0	178.3	175.0	165.7	172.5	178.0	157.0	167.5	171.4	Jun 20
10WA-117.24	178.0	172.6	181.9	157.7	177.7	175.5	165.0	172.6	179.0	157.0	168.0	171.6	Jun 20
MT124716	179.0	173.6	180.0	157.7	177.3	175.3	166.3	172.8	178.0	157.0	167.5	171.6	Jun 20
08MT-19	178.0	175.3	179.1	158.3	176.3	175.7	165.7	172.6	179.3	157.7	168.5	171.7	Jun 20
Harrington	177.3	174.1	180.7	158.3	178.7	175.3	167.0	173.0	178.0	157.0	167.5	171.8	Jun 20
ME08032-156	177.7	175.8	179.6	158.3	178.0	175.1	165.0	172.8	177.7	158.3	168.0	171.8	Jun 20
MT124555	177.3	174.7	181.6	159.7	176.3	175.1	165.3	172.9	177.3	158.3	167.8	171.8	Jun 20
MT124016	179.7	172.9	180.4	157.0	179.0	175.4	168.0	173.2	178.7	156.0	167.3	171.9	Jun 20
ABI Growler	177.0	174.0	181.2	158.3	179.0	175.2	168.0	173.2	178.0	157.0	167.5	172.0	Jun 21
MT124243	178.3	174.6	181.4	157.7	179.0	175.3	167.3	173.3	178.3	157.0	167.7	172.1	Jun 21
ABI Balster	178.7	174.8	180.9	160.0	177.7	175.7	166.3	173.4	179.3	157.0	168.2	172.2	Jun 21

Table 10 Con't.

Cultivar/Line	Dryland Locations							Irrigated Locations			Statewide Average		
	Bozeman	Conrad	Havre	Huntley	Kalispell	Moccasin	Sidney	Average	Bozeman	Huntley	Average	Julian	Calendar
	----- julian day -----												
10WA-117.17	179.3	174.9	181.7	157.7	177.7	175.9	168.0	173.6	178.7	157.0	167.8	172.3	Jun 21
MT090182	178.7	174.7	181.2	159.0	178.3	175.7	168.0	173.7	179.0	157.0	168.0	172.4	Jun 21
MT090190	179.0	173.9	182.0	159.7	177.7	175.7	167.0	173.6	179.3	157.0	168.2	172.4	Jun 21
MT100120	179.0	174.8	181.7	158.3	177.7	176.3	167.0	173.5	179.3	158.3	168.8	172.5	Jun 21
MT124073	179.7	173.8	182.8	157.7	179.0	174.3	166.7	173.4	180.3	158.3	169.3	172.5	Jun 21
MT090193	180.3	174.4	182.7	159.0	180.3	175.7	167.3	174.3	179.7	158.3	169.0	173.1	Jun 22
CDC Copeland	180.0	176.9	182.1	158.3	178.3	175.9	167.3	174.1	179.7	161.0	170.3	173.3	Jun 22
08MT-15	179.7	176.3	182.6	159.0	179.3	176.2	166.0	174.1	180.0	161.0	170.5	173.3	Jun 22
08ARS028-20	183.0	175.7	182.4	160.7	178.7	176.1	168.3	175.0	180.7	157.0	168.8	173.6	Jun 22
Westminster	180.3	174.6	182.7	162.0	180.0	176.6	165.7	174.6	180.3	161.0	170.7	173.7	Jun 22
MT100126	180.3	175.3	184.1	158.3	180.3	176.6	169.3	174.9	180.3	161.0	170.7	173.9	Jun 22
MT124069	180.0	176.3	182.6	163.0	178.3	175.6	168.0	174.8	180.3	161.0	170.7	173.9	Jun 22
LCS Genie	180.7	175.9	182.8	164.7	183.3	176.3	167.0	175.8	182.0	159.7	170.8	174.7	Jun 23
LCS Odyssey	179.3	177.9	183.1	164.0	181.7	175.7	167.3	175.6	182.0	161.0	171.5	174.7	Jun 23
LCS Vespa	181.3	177.7	180.8	166.0	180.7	176.1	167.0	175.7	181.0	161.0	171.0	174.7	Jun 23
LCS Overture	182.7	175.2	183.1	165.0	182.7	177.0	169.0	176.4	181.7	161.0	171.3	175.3	Jun 24
Average	178.2	173.8	180.4	158.5	177.6	175.2	166.4	172.9	178.0	157.7	167.8	171.8	Jun 20
Prob>F	<0.001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.05	<0.001	<0.001	
PLSD ($p=0.05$)	1.4	2.3	1.6	2.3	2.5	1.0	1.4	1.2	1.4	1.8	2.2	1.1	
CV%	0.5	0.8	0.5	0.9	0.9	0.3	0.5	1.1	0.5	0.7	1.1	1.1	
Locations								7				3	10

Table 11. Agronomic performance of spring barley entries grown under dryland conditions near Bozeman Montana in 2016. MSU Plant Science and Pathology Department.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump	Plant	Heading Date		Maturity Date	
	Yield	Weight	Moisture	Protein	Kernels	Height	Julian	Calendar	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- inches -				
ABI Balster	90.4	54.7	9.8	13.0	87.8	23.2	178.7	Jun 27	204.8	Jul 23
Champion	99.9	56.5	10.0	13.2	90.4	24.7	176.7	Jun 25	208.1	Jul 27
CDC Copeland	89.6	54.8	9.9	13.7	92.6	24.1	180.0	Jun 29	207.1	Jul 26
LCS Genie	88.2	55.6	10.0	13.1	93.1	21.6	180.7	Jun 29	208.2	Jul 27
ABI Growler	82.4	53.8	9.9	13.3	92.6	22.6	177.0	Jun 26	207.0	Jul 26
Harrington	86.4	55.5	9.8	13.9	91.5	24.3	177.3	Jun 26	205.0	Jul 24
Haxby	85.6	56.8	10.0	13.1	92.7	24.4	175.3	Jun 24	202.8	Jul 21
Hockett	93.5	56.3	9.8	13.1	93.9	26.1	177.3	Jun 26	204.4	Jul 23
AC Metcalfe	80.0	55.2	10.0	14.0	89.4	26.6	176.0	Jun 25	202.6	Jul 21
LCS Odyssey	95.6	54.8	10.0	13.2	97.1	22.4	179.3	Jun 28	208.0	Jul 27
LCS Overture	82.2	55.6	10.0	13.6	94.9	22.6	182.7	Jul 1	209.2	Jul 28
AAC Synergy	91.6	54.9	9.9	12.6	91.9	25.1	176.7	Jun 25	204.1	Jul 23
LCS Vespa	89.2	55.2	10.2	13.5	88.7	20.5	181.3	Jun 30	208.9	Jul 27
Westminster	91.4	55.7	9.9	13.9	92.4	23.6	180.3	Jun 29	206.8	Jul 25
08ARS012-79	86.9	55.6	9.9	13.0	91.6	23.8	177.0	Jun 26	205.1	Jul 24
08ARS028-20	95.6	54.5	10.1	12.9	91.1	22.0	183.0	Jul 2	206.1	Jul 25
08ARS116-91	91.3	54.9	10.1	13.6	92.7	22.9	177.0	Jun 26	205.6	Jul 24
10WA-117.17	81.5	54.9	9.8	13.1	81.6	22.8	179.3	Jun 28	205.6	Jul 24
10WA-117.24	88.1	53.8	9.9	13.2	90.6	27.3	178.0	Jun 27	207.1	Jul 26
11WA-107.43	88.8	56.4	10.1	12.7	88.1	23.3	176.0	Jun 25	206.0	Jul 25
ME08032-156	77.9	55.1	9.8	13.8	88.5	22.5	177.7	Jun 26	204.6	Jul 23
ME08053-050	85.5	55.1	10.0	14.2	92.5	23.3	177.3	Jun 26	204.8	Jul 23
08MT-15	89.5	55.4	9.9	13.7	92.8	22.6	179.7	Jun 28	206.2	Jul 25
08MT-19	88.0	55.5	9.7	14.3	83.2	25.3	178.0	Jun 27	206.5	Jul 25
08MT-63	96.2	55.2	9.9	13.2	87.0	25.6	178.7	Jun 27	203.9	Jul 22
08MT-95	86.1	53.8	9.9	14.3	86.8	26.2	176.0	Jun 25	200.9	Jul 19
MT090182	93.2	55.9	10.2	11.9	93.6	26.1	178.7	Jun 27	210.1	Jul 29
MT090190	79.4	55.7	10.1	12.4	92.2	23.8	179.0	Jun 28	208.9	Jul 27
MT090193	92.4	55.8	10.2	10.9	97.5	26.3	180.3	Jun 29	211.5	Jul 30
MT100120	92.4	56.2	10.2	11.8	95.7	26.0	179.0	Jun 28	209.8	Jul 28
MT100126	84.1	55.8	10.0	12.5	93.1	25.3	180.3	Jun 29	209.8	Jul 28
MT124016	87.7	54.5	9.9	12.9	90.7	24.5	179.7	Jun 28	205.6	Jul 24
MT124069	92.4	55.0	9.8	13.1	92.6	24.3	180.0	Jun 29	207.9	Jul 26
MT124073	93.9	55.6	9.9	11.9	94.5	26.6	179.7	Jun 28	209.3	Jul 28
MT124112	91.4	55.5	10.1	12.2	92.9	24.8	175.7	Jun 24	206.0	Jul 25
MT124118	74.0	56.2	9.9	13.1	89.9	24.6	176.7	Jun 25	204.6	Jul 23
MT124243	85.2	54.9	10.0	11.6	91.9	25.3	178.3	Jun 27	207.7	Jul 26
MT124411	89.9	55.8	10.2	13.6	94.7	24.3	176.0	Jun 25	207.3	Jul 26
MT124454	89.5	56.9	9.9	13.7	94.9	25.5	177.3	Jun 26	205.5	Jul 24
MT124457	90.2	56.9	9.9	13.5	94.7	25.6	176.7	Jun 25	205.0	Jul 24
MT124555	79.9	56.2	10.0	13.0	96.9	23.8	177.3	Jun 26	208.2	Jul 27
MT124582	88.6	55.6	10.0	13.2	90.2	25.6	176.0	Jun 25	203.8	Jul 22
MT124645	79.7	54.8	9.8	12.7	90.9	24.1	178.0	Jun 27	207.4	Jul 26
MT124663	90.9	56.2	10.1	12.7	97.4	25.3	176.0	Jun 25	208.6	Jul 27
MT124673	81.5	56.2	10.0	12.1	94.8	22.9	177.0	Jun 26	210.3	Jul 29
MT124688	80.6	55.8	10.2	11.8	93.8	24.7	177.7	Jun 26	208.3	Jul 27
MT124716	79.0	55.6	9.9	14.3	84.8	23.2	179.0	Jun 28	204.9	Jul 23
MT124728	84.8	55.2	9.8	14.5	85.3	22.5	178.0	Jun 27	204.3	Jul 23
Average	87.5	55.5	10.0	13.1	91.7	24.2	178.2	Jun 27	206.6	Jul 25
Prob>F	0.233	<0.001	0.028	<0.001	0.503	<0.001	<0.001		<0.001	
PLSD (p=0.05)	-	1.3	0.3	1.3	-	1.3	1.4		3.5	
CV%	10.0	1.4	1.8	6.0	6.8	4.1	0.5		1.0	
Lattice RE% ^{3/}	99.6	106.2	91.9	100.0	99.4	99.1	101.0		117.4	

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 percent dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

Table 12. Agronomic performance of spring barley entries grown under dryland conditions near Conrad, Montana in 2016.
MSU Western Triangle Agricultural Research Center.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump	Thin	Plant	Heading Date	
	Yield	Weight	Moisture	Protein	Kernels	Kernels	Height	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- % -	- inches -		
ABI Balster	108.0*	51.3	11.0	9.4	98.6	0.3	23.3	174.8	Jun 23
Champion	102.5*	54.3	11.9	10.6	98.3	0.4	26.2	172.4	Jun 21
CDC Copeland	104.5*	53.6	11.3	10.1	98.3	0.6	24.5	176.9	Jun 25
LCS Genie	110.6*	53.4	11.2	9.0	97.9	0.6	23.8	175.9	Jun 24
ABI Growler	117.0*	52.3	11.1	9.2	98.6	0.3	25.0	174.0	Jun 23
Harrington	99.1	53.7	11.3	9.3	98.4	0.4	23.6	174.1	Jun 23
Haxby	107.6*	55.0	11.2	11.4	98.6	0.3	27.3	172.9	Jun 21
Hockett	108.2*	54.2	11.4	10.3	99.1	0.2	24.7	171.1	Jun 20
AC Metcalfe	97.3	53.1	10.7	10.0	98.1	0.6	24.5	172.6	Jun 21
LCS Odyssey	118.0**	52.2	11.7	8.4	98.6	0.5	23.1	177.9	Jun 26
LCS Overture	108.1*	52.1	11.2	8.7	97.3	0.8	23.0	175.2	Jun 24
AAC Synergy	106.4*	51.9	11.4	9.5	98.9	0.3	24.5	172.8	Jun 21
LCS Vespa	110.7*	52.8	11.7	9.4	98.8	0.3	23.2	177.7	Jun 26
Westminster	107.3*	53.3	11.3	9.2	98.2	0.6	23.6	174.6	Jun 23
08ARS012-79	105.3*	52.9	11.1	9.3	98.3	0.5	26.6	172.7	Jun 21
08ARS028-20	106.4*	52.6	11.5	9.4	98.1	0.3	23.1	175.7	Jun 24
08ARS116-91	114.4*	53.1	11.4	9.9	98.5	0.4	24.4	173.7	Jun 22
10WA-117.17	104.9*	53.1	11.1	9.5	98.5	0.5	23.1	174.9	Jun 23
10WA-117.24	91.7	52.4	11.0	9.4	98.5	0.4	24.0	172.6	Jun 21
11WA-107.43	100.7*	53.8	11.4	10.3	98.6	0.4	24.7	171.8	Jun 20
ME08032-156	114.9*	52.9	11.2	9.4	98.5	0.4	21.5	175.8	Jun 24
ME08053-050	94.3	53.3	11.1	10.4	98.7	0.5	23.5	172.1	Jun 21
08MT-15	95.9	53.0	11.1	9.3	98.4	0.5	21.7	176.3	Jun 25
08MT-19	98.7	54.4	11.1	10.4	99.2	0.3	25.8	175.3	Jun 24
08MT-63	97.9	53.8	11.3	10.1	97.8	0.5	27.2	171.2	Jun 20
08MT-95	97.3	53.0	11.1	9.8	98.5	0.4	25.4	174.2	Jun 23
MT090182	96.4	53.1	11.4	9.0	98.2	0.4	27.1	174.7	Jun 23
MT090190	98.3	53.1	11.0	9.2	98.9	0.3	26.5	173.9	Jun 22
MT090193	100.4*	53.0	11.4	9.7	98.7	0.3	26.4	174.4	Jun 23
MT100120	104.0*	53.9	11.2	9.3	99.0	0.3	27.3	174.8	Jun 23
MT100126	100.9*	54.5	11.3	9.2	98.8	0.3	26.9	175.3	Jun 24
MT124016	100.8*	53.6	11.4	9.4	98.0	0.5	23.8	172.9	Jun 21
MT124069	87.7	52.9	10.9	9.3	98.1	0.5	24.4	176.3	Jun 25
MT124073	95.7	53.3	11.3	10.5	98.5	0.3	27.3	173.8	Jun 22
MT124112	79.2	52.4	11.0	10.0	98.8	0.4	24.0	169.6	Jun 18
MT124118	90.7	53.7	10.8	10.2	98.1	0.5	23.8	171.8	Jun 20
MT124243	103.3*	52.3	11.4	9.2	98.5	0.5	25.6	174.6	Jun 23
MT124411	80.7	52.8	11.2	11.4	98.5	0.5	24.0	170.3	Jun 19
MT124454	100.2*	54.4	10.8	10.7	98.9	0.4	28.0	172.1	Jun 21
MT124457	99.1	54.1	10.7	10.8	98.9	0.4	25.2	173.4	Jun 22
MT124555	104.4*	54.2	11.4	10.0	99.0	0.4	24.3	174.7	Jun 23
MT124582	97.6	54.0	11.1	10.2	98.9	0.2	24.8	171.3	Jun 20
MT124645	95.9	53.3	11.2	9.8	98.7	0.4	25.9	172.5	Jun 21
MT124663	74.7	52.1	11.3	10.3	99.3	0.3	24.6	170.7	Jun 19
MT124673	76.5	53.3	11.3	9.9	98.7	0.5	24.7	172.1	Jun 21
MT124688	106.2*	53.7	11.2	9.6	97.6	0.7	25.8	173.7	Jun 22
MT124716	97.0	53.8	11.3	11.2	98.7	0.4	24.6	173.6	Jun 22
MT124728	108.7*	53.5	11.1	11.0	98.5	0.5	25.0	172.7	Jun 21
Average	100.8	53.3	11.2	9.8	98.5	0.4	24.7	173.8	Jun 22
Prob>F	<0.001	<0.001	0.091	<0.001	0.003	0.014	0.006	<0.001	
PLSD (p=0.05)	18.0	1.1	-	0.9	0.8	0.3	3.3	2.3	
CV%	10.3	1.3	2.7	5.2	0.5	40.5	7.8	0.8	
Lattice RE% ^{3/}	114.7	100.0	110.0	128.4	107.8	100.1	109.5	121.8	

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 percent dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Table 13. Agronomic performance of spring barley entries grown under dryland conditions near Havre, Montana in 2016. MSU Northern Agricultural Research Center.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump	Plant	Heading Date	
	Yield	Weight	Moisture	Protein	Kernels	Height	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- inches -		
ABI Balster	88.2	51.8	11.8	14.2	92.1	26.2	180.9	Jun 29
Champion	94.9*	53.4	11.7	13.5	91.3	27.6	179.0	Jun 28
CDC Copeland	82.0	52.6	11.5	12.8	91.4	25.8	182.1	Jul 1
LCS Genie	86.9	52.6	11.9	13.3	95.6	23.2	182.8	Jul 1
ABI Growler	81.7	52.9	11.7	13.4	89.6	26.4	181.2	Jun 30
Harrington	85.6	52.6	11.7	14.7	92.2	27.0	180.7	Jun 29
Haxby	80.8	52.2	11.5	14.1	90.4	26.7	178.2	Jun 27
Hockett	97.0**	52.7	12.0	13.9	95.6	27.8	179.1	Jun 28
AC Metcalfe	76.1	52.1	11.6	13.8	91.6	28.9	179.1	Jun 28
LCS Odyssey	90.3*	52.4	12.4	14.7	97.7	25.4	183.1	Jul 2
LCS Overture	85.3	52.4	11.8	12.8	95.6	24.5	183.1	Jul 2
AAC Synergy	86.9	53.4	11.6	13.3	93.4	28.1	180.9	Jun 29
LCS Vespa	95.9*	52.9	11.7	13.5	95.3	23.9	180.8	Jun 29
Westminster	90.2*	53.0	11.5	13.4	94.8	26.6	182.7	Jul 1
08ARS012-79	89.0*	52.1	11.6	14.8	93.8	26.3	178.1	Jun 27
08ARS028-20	79.6	53.0	11.7	13.2	87.0	25.1	182.4	Jul 1
08ARS116-91	83.6	52.3	11.9	14.1	91.4	25.4	177.0	Jun 26
10WA-117.17	92.4*	53.3	11.7	13.6	91.0	24.9	181.7	Jun 30
10WA-117.24	84.1	52.6	11.8	13.7	92.3	27.7	181.9	Jun 30
11WA-107.43	87.2	54.0	12.0	13.5	89.4	27.6	179.9	Jun 28
ME08032-156	93.3*	53.3	11.7	13.6	92.6	24.0	179.6	Jun 28
ME08053-050	87.4	53.1	12.0	13.8	96.1	24.7	179.4	Jun 28
08MT-15	88.7*	52.2	11.6	13.7	91.1	23.8	182.6	Jul 1
08MT-19	88.1	52.0	11.8	13.2	93.9	29.0	179.1	Jun 28
08MT-63	80.1	52.8	11.7	12.9	86.2	28.2	180.9	Jun 29
08MT-95	83.8	53.4	11.5	13.1	93.8	30.1	178.9	Jun 27
MT090182	85.7	52.9	12.4	13.2	87.1	27.5	181.2	Jun 30
MT090190	78.4	52.0	12.1	12.8	88.5	25.8	182.0	Jul 1
MT090193	74.5	52.6	12.5	14.3	89.6	27.7	182.7	Jul 1
MT100120	79.0	53.0	12.4	13.8	89.8	27.6	181.7	Jun 30
MT100126	57.4	53.0	12.5	13.5	87.1	27.4	184.1	Jul 3
MT124016	91.8*	53.7	11.8	13.5	91.7	26.8	180.4	Jun 29
MT124069	76.2	52.7	11.8	13.6	90.6	26.3	182.6	Jul 1
MT124073	77.7	53.7	12.2	13.1	90.4	27.4	182.8	Jul 1
MT124112	86.1	52.1	12.0	13.5	95.4	26.6	177.9	Jun 26
MT124118	81.7	51.7	11.8	12.6	95.1	27.0	177.2	Jun 26
MT124243	78.1	52.8	11.8	14.0	83.2	27.2	181.4	Jun 30
MT124411	64.5	52.7	12.4	14.1	92.1	27.8	176.7	Jun 25
MT124454	77.6	53.4	11.6	13.7	94.9	27.0	178.4	Jun 27
MT124457	78.9	53.3	11.8	13.4	94.3	26.5	179.1	Jun 28
MT124555	66.0	53.7	12.2	13.4	90.3	27.0	181.6	Jun 30
MT124582	79.7	52.1	11.7	14.0	92.6	26.9	178.9	Jun 27
MT124645	75.0	52.6	11.5	13.1	92.4	26.3	179.8	Jun 28
MT124663	67.4	52.7	12.6	14.4	96.4	27.8	178.5	Jun 27
MT124673	59.1	53.0	11.9	13.7	87.7	25.5	179.1	Jun 28
MT124688	87.3	52.1	12.1	12.8	89.4	27.9	180.7	Jun 29
MT124716	70.8	53.7	11.9	14.1	88.6	26.9	180.0	Jun 29
MT124728	84.1	52.5	11.5	13.4	91.6	27.9	179.3	Jun 28
Average	82.0	52.8	11.9	13.6	91.8	26.6	180.4	Jun 29
Prob>F	<0.001	0.972	<0.001	0.024	<0.001	<0.001	<0.001	
PLSD (0.05)	8.4	-	0.5	1.1	1.9	2.1	1.6	
CV%	6.3	2.2	2.2	4.9	1.2	5.0	0.5	
Lattice RE% ^{3/}	98.8	126.1	184.2	110.2	105.7	101.9	107.9	

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 percent dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Table 14. Agronomic performance of spring barley entries grown under dryland conditions near Huntley, Montana in 2016.
MSU Southern Agricultural Research Center.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump	Thin	Plant	Heading Date	
	Yield	Weight	Moisture	Protein	Kernels	Kernels	Height	Julian	Calendar
	- bu/a -	- lb/bu -	- %-	- %-	- %-	- %-	- inches -		
ABI Balster	99.5	50.8	12.2	14.7	91.5	3.0	36.7	160.0	Jun 9
Champion	97.3	52.8	13.2	15.3	92.2	2.9	38.6	156.7	Jun 5
CDC Copeland	98.2	51.7	12.2	15.2	94.7	2.0	37.1	158.3	Jun 7
LCS Genie	100.5	52.3	13.3	14.1	87.2	4.4	31.5	164.7	Jun 13
ABI Growler	103.7	49.9	12.1	13.8	93.8	2.3	34.6	158.3	Jun 7
Harrington	86.9	51.2	12.4	16.0	93.8	1.9	38.3	158.3	Jun 7
Haxby	74.4	53.5	11.9	15.8	91.3	3.5	41.3	156.7	Jun 5
Hockett	71.6	52.0	12.3	15.9	91.4	3.8	38.7	157.0	Jun 6
AC Metcalfe	79.8	51.9	12.1	16.7	91.1	3.4	39.6	156.3	Jun 5
LCS Odyssey	116.4**	51.1	14.3	14.0	95.8	1.6	31.5	164.0	Jun 13
LCS Overture	102.4	51.9	12.8	14.0	93.5	2.6	31.6	165.0	Jun 14
AAC Synergy	85.2	51.5	12.6	15.7	94.9	1.9	38.3	157.7	Jun 6
LCS Vespa	102.0	52.0	11.9	15.5	90.4	3.0	31.8	166.0	Jun 15
Westminster	94.9	51.6	12.9	15.8	95.0	1.7	35.3	162.0	Jun 11
08ARS012-79	79.9	51.1	13.5	14.9	93.2	2.6	38.9	156.7	Jun 5
08ARS028-20	104.9	50.1	12.7	15.1	90.9	3.2	36.0	160.7	Jun 9
08ARS116-91	93.0	52.2	11.9	15.1	92.7	2.5	37.5	155.7	Jun 4
10WA-117.17	89.2	50.8	12.6	15.2	91.2	3.0	38.6	157.7	Jun 6
10WA-117.24	66.0	48.7	12.1	17.4	89.2	4.3	41.3	157.7	Jun 6
11WA-107.43	95.0	52.4	13.6	15.0	90.6	4.1	37.7	157.0	Jun 6
ME08032-156	105.8	51.9	12.7	14.8	88.7	3.5	32.9	158.3	Jun 7
ME08053-050	71.0	50.3	12.6	16.9	94.2	2.5	40.2	157.0	Jun 6
08MT-15	101.5	52.7	12.1	15.9	93.0	2.0	33.2	159.0	Jun 8
08MT-19	82.7	51.3	12.1	15.9	90.2	3.9	39.9	158.3	Jun 7
08MT-63	94.4	52.0	12.4	15.3	88.0	4.7	38.8	157.0	Jun 6
08MT-95	85.9	51.7	12.8	15.7	90.1	4.5	42.8	157.0	Jun 6
MT090182	90.3	51.4	13.1	13.8	91.4	3.0	37.2	159.0	Jun 8
MT090190	84.1	51.6	13.3	13.5	90.4	3.7	37.1	159.7	Jun 8
MT090193	92.7	51.4	12.8	14.0	93.2	2.5	37.7	159.0	Jun 8
MT100120	90.3	51.8	14.9	13.0	94.2	2.1	39.5	158.3	Jun 7
MT100126	89.5	51.2	14.7	13.4	93.6	2.4	37.3	158.3	Jun 7
MT124016	98.1	51.7	12.4	14.5	92.5	2.6	38.3	157.0	Jun 6
MT124069	93.2	51.1	13.6	14.3	93.2	2.1	37.4	163.0	Jun 12
MT124073	92.4	51.8	12.5	14.0	90.5	2.8	39.6	157.7	Jun 6
MT124112	71.8	50.9	13.1	13.7	93.1	3.1	38.6	156.7	Jun 5
MT124118	75.5	51.5	12.8	15.9	91.4	3.6	40.1	157.0	Jun 6
MT124243	99.9	51.4	13.4	13.6	92.7	2.8	39.8	157.7	Jun 6
MT124411	77.7	51.4	13.7	15.7	93.6	2.4	39.6	157.3	Jun 6
MT124454	77.8	52.0	12.8	16.0	93.1	2.8	39.8	156.7	Jun 5
MT124457	74.0	52.8	12.2	15.5	92.7	2.7	39.8	156.7	Jun 5
MT124555	84.7	53.0	12.8	15.0	93.5	2.8	37.1	159.7	Jun 8
MT124582	73.8	51.3	13.4	16.4	93.4	3.0	40.1	156.7	Jun 5
MT124645	86.6	51.8	12.2	14.9	93.9	2.2	37.6	157.7	Jun 6
MT124663	70.8	49.9	14.9	14.5	91.6	3.7	38.1	157.0	Jun 6
MT124673	73.3	48.9	15.0	14.5	93.0	2.8	37.5	156.7	Jun 5
MT124688	89.1	52.2	13.2	14.6	93.4	2.6	39.6	157.0	Jun 6
MT124716	83.1	51.2	12.1	15.0	88.1	3.5	36.8	157.7	Jun 6
MT124728	84.3	51.2	12.2	15.4	88.4	3.7	37.8	157.0	Jun 6
Average	88.6	51.5	12.9	15.0	92.1	2.9	37.6	158.5	Jun 7
Prob>F	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PLSD (p=0.05)	7.8	1.1	1.4	0.7	3.5	1.5	2.0	2.3	2.3
CV%	5.4	1.3	6.6	3.0	2.3	32.6	3.3	0.9	0.9
Lattice RE% ^{3/}	99.0	91.0	101.0	100.0	100.0	97.0	98.0	93.0	93.0

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry within a column.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Table 15. Agronomic performance of spring barley entries grown under rainfed conditions near Kalispell, Montana in 2016. MSU Northwestern Agricultural Research Center.

Cultivar	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump ^{3/}	Plant	Heading Date	
	Yield	Weight	Moisture	Protein	Kernels	Height	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- inches -		
ABI Balster	100.4	52.5	11.0	9.2	97.9	32.0	177.7	Jun 26
Champion	84.9	55.0	11.0	9.8	97.5	29.1	178.0	Jun 27
CDC Copeland	101.5	54.4	10.9	9.4	98.4	33.5	178.3	Jun 27
LCS Genie	105.3	53.6	10.8	9.0	98.7	26.6	183.3	Jul 2
ABI Growler	98.6	52.7	11.1	9.2	97.7	29.5	179.0	Jun 28
Harrington	103.5	54.8	10.9	10.1	98.1	35.7	178.7	Jun 27
Haxby	101.4	55.3	11.1	10.2	98.9	31.1	173.7	Jun 22
Hockett	106.3	54.3	11.0	9.7	98.1	33.3	178.0	Jun 27
AC Metcalfe	102.5	53.9	11.2	10.1	97.3	33.5	177.7	Jun 26
LCS Odyssey	95.4	52.0	11.5	9.2	98.5	26.8	181.7	Jun 30
LCS Overture	116.4	52.1	10.7	8.9	96.9	27.8	182.7	Jul 1
AAC Synergy	94.3	52.2	11.1	9.1	98.8	32.2	177.3	Jun 26
LCS Vespa	102.5	52.4	11.2	9.1	98.2	25.6	180.7	Jun 29
Westminster	89.8	53.9	11.5	9.3	98.9	26.6	180.0	Jun 29
08ARS012-79	90.5	54.0	11.2	9.3	97.1	30.6	177.7	Jun 26
08ARS028-20	108.0	54.1	11.1	8.8	97.3	33.1	178.7	Jun 27
08ARS116-91	101.9	53.5	11.6	9.7	96.2	30.8	172.0	Jun 21
10WA-117.17	96.3	54.0	11.1	9.3	97.4	30.1	177.7	Jun 26
10WA-117.24	83.8	52.3	11.3	9.8	97.7	30.7	177.7	Jun 26
11WA-107.43	89.9	54.6	12.3	9.9	98.6	31.1	175.0	Jun 24
ME08032-156	101.3	53.0	11.0	9.0	99.3	28.7	178.0	Jun 27
ME08053-050	86.2	53.6	11.2	10.4	99.0	29.8	177.3	Jun 26
08MT-15	65.0	54.3	10.8	11.2	98.6	25.9	179.3	Jun 28
08MT-19	90.9	54.6	11.0	9.1	98.4	31.0	176.3	Jun 25
08MT-63	78.9	53.5	11.1	8.9	91.7	31.5	178.3	Jun 27
08MT-95	78.9	54.2	11.2	9.7	97.7	34.3	178.0	Jun 27
MT090182	110.7	54.1	10.7	8.8	97.1	34.6	178.3	Jun 27
MT090190	93.5	53.8	10.9	8.7	97.6	31.1	177.7	Jun 26
MT090193	87.2	52.6	11.0	8.8	97.8	33.3	180.3	Jun 29
MT100120	98.6	53.7	10.9	8.8	98.4	33.3	177.7	Jun 26
MT100126	94.9	53.7	11.6	8.5	97.2	32.3	180.3	Jun 29
MT124016	99.7	53.7	11.1	9.3	99.1	30.6	179.0	Jun 28
MT124069	93.7	53.0	11.1	9.1	96.7	33.1	178.3	Jun 27
MT124073	113.4	54.7	10.8	9.6	98.5	36.9	179.0	Jun 28
MT124112	90.9	52.7	11.5	9.9	98.3	30.7	173.0	Jun 22
MT124118	101.4	55.1	11.3	9.8	98.7	34.8	176.7	Jun 25
MT124243	94.4	53.3	11.1	8.8	98.2	32.7	179.0	Jun 28
MT124411	92.7	54.1	11.1	10.6	97.0	32.8	172.7	Jun 21
MT124454	91.2	55.0	10.9	9.5	97.9	34.4	174.3	Jun 23
MT124457	78.4	54.7	11.2	9.7	97.7	33.6	174.3	Jun 23
MT124555	104.6	54.5	11.1	8.9	99.2	31.9	176.3	Jun 25
MT124582	96.2	54.3	10.9	9.8	97.4	32.7	172.7	Jun 21
MT124645	82.9	53.3	10.8	9.9	98.3	31.5	176.7	Jun 25
MT124663	88.2	52.7	11.8	10.0	98.8	30.4	173.0	Jun 22
MT124673	66.0	52.8	11.8	10.5	97.4	25.6	178.0	Jun 27
MT124688	107.1	54.7	11.0	9.6	97.9	33.9	177.0	Jun 26
MT124716	87.5	55.2	10.8	10.6	98.3	32.5	177.3	Jun 26
MT124728	90.2	54.7	11.2	10.6	98.2	31.4	178.0	Jun 27
Average	94.6	53.8	11.1	9.5	97.9	31.2	177.6	Jun 26
Prob>F	0.265	<0.001	0.030	<0.001	-	0.001	<0.001	
PLSD (p=0.05)	-	1.1	0.7	0.7	-	5.2	2.5	
CV%	17.4	1.2	3.9	4.4	-	10.0	0.9	
Lattice RE% ^{4/}	107.2	106.2	93.0	128.8	-	102.2	96.7	

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 percent dry matter content.

3/ Unreplicated data measured for percent grain protein and plump kernel content.

4/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Table 16. Agronomic performance of spring barley entries grown under dryland conditions near Moccasin, Montana in 2016. MSU Central Agricultural Research Center.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump ^{3/}	Plant ^{3/}	Heading Date		Maturity Date	
	Yield	Weight	Moisture	Protein	Kernels	Height	Julian	Calendar	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- inches -				
ABI Balster	62.7	53.5	11.2	11.8	93.0	23.1	175.7	Jun 24	207.1	Jul 26
Champion	81.8**	56.1	10.9	11.7	92.4	23.6	173.9	Jun 22	207.7	Jul 26
CDC Copeland	71.9	53.0	11.1	12.3	93.1	23.5	175.9	Jun 24	207.0	Jul 26
LCS Genie	73.8*	55.9	11.4	11.0	92.0	20.8	176.3	Jun 25	209.0	Jul 28
ABI Growler	66.9	53.6	11.1	12.3	90.0	22.7	175.2	Jun 24	207.2	Jul 26
Harrington	64.8	54.5	11.4	12.6	89.9	24.2	175.3	Jun 24	206.9	Jul 25
Haxby	64.6	55.2	11.1	12.2	87.8	23.9	174.5	Jun 23	206.0	Jul 25
Hockett	68.8	55.0	11.3	12.3	96.0	24.2	174.9	Jun 23	207.2	Jul 26
AC Metcalfe	63.0	55.4	11.0	13.5	93.9	24.1	174.8	Jun 23	207.6	Jul 26
LCS Odyssey	70.4	56.1	10.9	12.0	93.6	21.8	175.7	Jun 24	209.6	Jul 28
LCS Overture	54.0	56.6	11.2	12.0	96.1	21.2	177.0	Jun 26	210.2	Jul 29
AAC Synergy	70.8	54.0	10.8	11.7	96.5	24.5	175.4	Jun 24	208.0	Jul 27
LCS Vespa	69.3	55.8	10.9	12.5	93.0	22.1	176.1	Jun 25	208.6	Jul 27
Westminster	63.7	52.9	11.2	12.1	93.2	23.2	176.6	Jun 25	208.0	Jul 27
08ARS012-79	65.0	55.8	11.1	11.9	94.6	24.1	174.8	Jun 23	208.3	Jul 27
08ARS028-20	68.4	53.9	11.3	11.9	78.2	21.2	176.1	Jun 25	208.3	Jul 27
08ARS116-91	64.9	52.7	11.1	12.3	76.9	23.2	174.7	Jun 23	207.5	Jul 26
10WA-117.17	74.0*	53.5	10.8	12.2	84.3	24.4	175.9	Jun 24	207.0	Jul 26
10WA-117.24	62.2	55.1	10.6	11.8	88.9	25.4	175.5	Jun 24	206.8	Jul 25
11WA-107.43	75.1*	55.4	11.2	11.9	95.4	22.6	174.4	Jun 23	208.3	Jul 27
ME08032-156	64.3	54.2	10.9	12.6	78.5	21.6	175.1	Jun 24	206.7	Jul 25
ME08053-050	66.0	53.7	10.9	12.3	93.0	23.3	175.1	Jun 24	207.7	Jul 26
08MT-15	74.5*	52.8	11.1	12.3	97.1	21.7	176.2	Jun 25	208.6	Jul 27
08MT-19	64.3	55.3	11.1	12.2	95.1	24.9	175.7	Jun 24	208.0	Jul 27
08MT-63	74.4*	54.9	11.2	12.5	94.0	25.5	175.0	Jun 24	208.0	Jul 27
08MT-95	64.5	55.1	11.0	12.2	95.5	25.4	175.1	Jun 24	208.0	Jul 27
MT090182	74.2*	55.9	11.4	11.3	93.1	24.6	175.7	Jun 24	209.6	Jul 28
MT090190	61.9	54.9	11.3	11.2	96.8	24.6	175.7	Jun 24	209.7	Jul 28
MT090193	66.5	56.2	11.3	11.3	93.7	25.0	175.7	Jun 24	209.5	Jul 28
MT100120	59.2	55.8	11.3	11.3	94.8	23.7	176.3	Jun 25	209.9	Jul 28

Table 16 Con't.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump ^{3/}	Plant ^{3/}	Heading Date		Maturity Date	
	Yield	Weight	Moisture	Protein	Kernels	Height	Julian	Calendar	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- inches -				
MT100126	59.5	55.6	11.6	11.3	95.7	23.6	176.6	Jun 25	210.3	Jul 29
MT124016	65.3	52.4	11.1	11.6	83.5	21.5	175.4	Jun 24	207.6	Jul 26
MT124069	68.8	53.8	11.3	12.2	94.1	25.0	175.6	Jun 24	208.4	Jul 27
MT124073	63.3	55.1	11.0	12.0	92.1	25.0	174.3	Jun 23	208.0	Jul 27
MT124112	62.3	55.3	11.2	11.4	94.8	23.4	174.2	Jun 23	208.8	Jul 27
MT124118	64.0	57.4	11.1	11.7	95.7	24.8	174.5	Jun 23	209.0	Jul 28
MT124243	71.3	56.8	11.3	10.5	93.6	24.1	175.3	Jun 24	209.5	Jul 28
MT124411	53.8	54.4	11.3	13.2	96.3	25.3	173.9	Jun 22	209.7	Jul 28
MT124454	63.2	55.4	11.1	12.8	94.7	24.8	174.3	Jun 23	208.4	Jul 27
MT124457	63.2	55.2	11.1	11.9	95.0	25.8	174.6	Jun 23	207.5	Jul 26
MT124555	69.4	55.5	11.4	11.7	96.7	25.1	175.1	Jun 24	208.0	Jul 27
MT124582	65.4	56.6	11.1	12.2	95.3	25.3	174.6	Jun 23	207.8	Jul 26
MT124645	59.9	54.7	11.0	11.7	91.9	23.9	174.2	Jun 23	207.8	Jul 26
MT124663	53.5	57.8	11.1	12.4	97.8	23.2	174.2	Jun 23	209.4	Jul 28
MT124673	50.5	54.5	11.0	12.2	92.1	21.2	174.6	Jun 23	209.4	Jul 28
MT124688	62.7	55.1	11.4	11.3	90.2	23.8	175.0	Jun 24	209.4	Jul 28
MT124716	59.9	55.7	10.7	13.5	91.4	23.3	175.3	Jun 24	207.4	Jul 26
MT124728	65.1	54.9	11.2	13.2	91.1	23.4	174.8	Jun 23	208.2	Jul 27
Average	65.6	55.0	11.1	12.0	92.4	23.6	175.2	Jun 24	208.3	Jul 27
Prob>F	<0.001	0.594	0.482	-	-	<0.001	<0.001		<0.001	
PLSD (p=0.05)	9.8	-	-	-	-	1.9	1.0		1.6	
CV%	9.5	1.8	9.0	-	-	4.8	0.3		0.4	
Lattice RE% ^{4/}	120.8	118.6	158.3	-	-	137.0	123.6		160.1	

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 percent dry matter content.

3/ Unreplicated data measured for percent grain protein and plump kernel content.

4/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Table 17. Agronomic performance of spring barley entries grown under dryland conditions near Sidney, Montana in 2016. MSU Eastern Agricultural Research Center.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump	Plant	Heading Date	
	Yield	Weight	Moisture	Protein	Kernels	Height	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- inches -		
ABI Balster	99.0*	51.5	11.3	11.5	93.9	27.4	166.3	Jun 15
Champion	109.0**	54.9	11.6	11.8	97.3	30.4	165.3	Jun 14
CDC Copeland	104.4*	53.1	11.4	11.8	94.7	28.4	167.3	Jun 16
LCS Genie	106.0*	52.8	11.6	10.8	92.8	25.8	167.0	Jun 16
ABI Growler	84.5	52.5	11.4	12.0	93.5	24.3	168.0	Jun 17
Harrington	92.0	52.9	11.2	12.0	94.1	25.9	167.0	Jun 16
Haxby	104.0*	55.4	11.6	11.8	97.9	24.8	165.3	Jun 14
Hockett	104.3*	53.4	11.2	10.5	96.2	24.8	166.3	Jun 15
AC Metcalfe	89.1	53.5	11.3	12.2	95.3	26.0	165.3	Jun 14
LCS Odessey	107.9*	52.2	11.3	10.8	92.2	25.9	167.3	Jun 16
LCS Overture	105.2*	52.8	11.4	11.3	79.2	28.5	169.0	Jun 18
AAC Synergy	98.6*	52.3	11.4	11.4	95.3	27.4	167.0	Jun 16
LCS Vespa	93.4	52.6	11.5	11.0	97.2	24.2	167.0	Jun 16
Westminster	108.1*	53.4	11.3	12.2	95.8	27.7	165.7	Jun 14
08ARS012-79	100.5*	53.4	11.4	11.5	96.4	29.5	165.3	Jun 14
08ARS028-20	93.3	52.0	11.5	11.0	93.8	27.3	168.3	Jun 17
08ARS116-91	94.2	52.4	11.4	12.0	95.8	24.4	165.3	Jun 14
10WA-117.17	100.2*	52.4	11.3	11.2	95.6	25.9	168.0	Jun 17
10WA-117.24	85.6	50.4	11.6	11.8	92.3	26.7	165.0	Jun 14
11WA-107.43	105.2*	53.9	11.4	11.3	94.8	26.9	165.0	Jun 14
ME08032-156	102.3*	51.6	11.5	11.7	91.9	25.1	165.0	Jun 14
ME08053-050	98.4*	53.4	11.3	12.2	96.4	26.9	165.7	Jun 14
08MT-15	95.9	52.2	11.4	12.1	94.9	26.1	166.0	Jun 15
08MT-19	101.1*	54.6	12.0	11.1	97.7	27.5	165.7	Jun 14
08MT-63	94.6	53.2	11.3	11.3	94.1	28.1	165.7	Jun 14
08MT-95	97.3	54.8	11.4	12.4	96.2	30.1	165.0	Jun 14
MT090182	99.2*	54.0	11.4	10.4	96.9	29.8	168.0	Jun 17
MT090190	100.6*	54.1	11.6	11.0	96.5	29.8	167.0	Jun 16
MT090193	102.7*	53.8	11.4	10.8	96.2	29.8	167.3	Jun 16
MT100120	93.0	54.1	11.4	10.7	94.5	30.1	167.0	Jun 16
MT100126	102.7*	54.7	11.7	11.0	95.5	29.8	169.3	Jun 18
MT124016	104.7*	52.4	11.4	11.1	93.9	28.2	168.0	Jun 17
MT124069	96.1	52.3	11.5	10.4	94.8	27.8	168.0	Jun 17
MT124073	98.4*	53.4	11.5	10.7	95.6	28.1	166.7	Jun 15
MT124112	97.3*	53.6	11.6	11.1	94.4	27.1	165.0	Jun 14
MT124118	102.1*	55.5	11.2	11.9	97.4	27.9	165.0	Jun 14
MT124243	105.6*	53.5	11.6	10.7	94.9	29.0	167.3	Jun 16
MT124411	79.2	54.7	11.5	12.0	95.7	30.6	166.0	Jun 15
MT124454	96.1	55.2	11.4	12.1	94.2	27.7	167.0	Jun 16
MT124457	101.1*	55.2	11.7	11.6	94.7	28.8	165.3	Jun 14
MT124555	100.5*	54.6	11.6	10.7	95.1	28.5	165.3	Jun 14
MT124582	105.7*	55.1	11.4	12.4	96.6	30.2	165.3	Jun 14
MT124645	86.0	53.2	11.2	11.6	94.3	26.9	166.3	Jun 15
MT124663	86.2	53.5	11.3	11.8	91.5	28.4	165.0	Jun 14
MT124673	88.6	54.3	11.3	11.3	95.5	27.9	166.0	Jun 15
MT124688	100.7*	55.2	11.4	11.0	95.7	28.8	166.3	Jun 15
MT124716	90.9	52.5	11.5	11.9	95.7	24.9	166.3	Jun 15
MT124728	96.7	53.0	11.4	11.1	96.6	24.8	166.0	Jun 15
Average	98.0	53.4	11.4	11.4	94.8	166.4	166.4	
Prob>F	<0.001	<0.001	0.060	<0.001	<0.001	<0.001	<0.001	
PLSD (p=0.05)	12.0	1.0	-	1.1	3.4	3.5	1.4	
CV%	6.9	1.0	1.7	5.5	2.1	1.2	0.5	
Lattice RE% ^{3/}	203.9	142.4	129.5	151.9	105.8	115.2	100.8	

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 percent dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Table 18. Agronomic performance of spring barley entries grown under irrigated conditions near Bozeman Montana in 2016. MSU Plant Science and Pathology Department.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump	Plant	Heading Date		Maturity Date	
	Yield	Weight	Moisture	Protein	Kernels	Height	Julian	Calendar	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- inches -				
ABI Balster	117.4	54.9	10.7	11.0	97.2	27.8	179.3	Jun 28	209.9	Jul 28
Champion	138.2*	56.5	10.6	11.7	95.5	28.6	176.7	Jun 25	209.9	Jul 28
CDC Copeland	124.9*	56.0	10.5	11.3	96.0	31.6	179.7	Jun 28	211.4	Jul 30
LCS Genie	130.6*	55.1	10.6	10.2	95.9	25.1	182.0	Jul 1	212.4	Jul 31
ABI Growler	116.9	54.6	10.5	10.9	95.5	28.8	178.0	Jun 27	210.6	Jul 29
Harrington	119.4	56.2	10.3	10.5	95.9	29.4	178.0	Jun 27	209.3	Jul 28
Haxby	122.5	57.4	10.6	11.2	95.5	28.3	175.7	Jun 24	206.4	Jul 25
Hockett	118.9	56.2	10.5	11.7	93.7	27.8	176.7	Jun 25	208.0	Jul 27
AC Metcalfe	118.5	56.0	10.4	11.8	93.4	29.8	175.7	Jun 24	208.0	Jul 27
LCS Odyssey	141.0**	54.7	10.6	10.8	94.7	25.9	182.0	Jul 1	214.8	Aug 2
LCS Overture	129.9*	54.9	10.4	10.8	95.7	26.5	181.7	Jun 30	213.8	Aug 1
AAC Synergy	119.5	54.7	10.5	11.0	95.9	29.8	176.7	Jun 25	208.1	Jul 27
LCS Vespa	138.1*	55.0	10.9	10.2	94.5	25.9	181.0	Jun 30	211.2	Jul 30
Westminster	135.6*	56.3	10.6	10.7	98.2	28.2	180.3	Jun 29	212.7	Jul 31
08ARS012-79	128.8*	56.0	10.3	10.8	93.9	29.5	176.0	Jun 25	209.0	Jul 28
08ARS028-20	127.0*	55.2	10.6	10.2	91.9	26.8	180.7	Jun 29	210.2	Jul 29
08ARS116-91	130.1*	55.0	10.7	11.2	93.6	28.4	175.0	Jun 24	209.5	Jul 28
10WA-117.17	119.5	55.9	10.4	10.9	94.2	28.0	178.7	Jun 27	210.8	Jul 29
10WA-117.24	115.0	54.2	10.5	11.3	96.2	31.4	179.0	Jun 28	210.0	Jul 29
11WA-107.43	135.1*	56.7	10.7	10.9	95.3	27.2	175.3	Jun 24	210.4	Jul 29
ME08032-156	129.2*	56.0	10.4	11.0	97.8	23.8	177.7	Jun 26	210.6	Jul 29
ME08053-050	124.3	55.0	10.5	11.8	92.7	26.3	175.7	Jun 24	208.8	Jul 27
08MT-15	125.6*	55.7	10.4	11.5	96.3	27.3	180.0	Jun 29	210.3	Jul 29
08MT-19	133.5*	56.6	10.4	11.0	97.8	29.9	179.3	Jun 28	209.5	Jul 28
08MT-63	120.6	55.3	10.5	11.3	93.0	29.6	178.0	Jun 27	208.5	Jul 27
08MT-95	131.0*	55.4	10.4	11.5	59.0	32.6	178.0	Jun 27	208.5	Jul 27
MT090182	126.3*	55.6	10.5	10.4	95.3	30.6	179.0	Jun 28	214.1	Aug 2
MT090190	129.9*	55.5	10.4	10.3	97.2	30.3	179.3	Jun 28	213.9	Aug 1
MT090193	111.5	55.0	10.5	10.1	97.7	31.9	179.7	Jun 28	213.9	Aug 1
MT100120	116.6	55.5	10.5	10.3	97.5	30.4	179.3	Jun 28	214.0	Aug 2
MT100126	123.7	55.9	10.4	10.5	96.0	31.3	180.3	Jun 29	214.1	Aug 2
MT124016	130.6*	55.4	10.5	9.8	93.1	27.1	178.7	Jun 27	209.4	Jul 28
MT124069	119.1	55.1	10.5	11.3	96.6	29.1	180.3	Jun 29	211.2	Jul 30
MT124073	120.2	55.8	10.2	11.3	96.5	33.2	180.3	Jun 29	211.8	Jul 30
MT124112	134.0*	55.4	10.5	10.1	97.0	28.1	174.7	Jun 23	208.9	Jul 27
MT124118	124.4	56.8	10.4	10.7	95.2	29.5	175.7	Jun 24	207.8	Jul 26
MT124243	129.9*	55.5	10.7	9.9	95.4	31.3	178.3	Jun 27	212.0	Jul 31
MT124411	97.1	56.2	10.4	11.8	97.4	33.0	177.0	Jun 26	211.4	Jul 30
MT124454	125.4*	57.0	10.6	10.9	97.7	29.9	175.7	Jun 24	207.0	Jul 26
MT124457	130.3*	56.9	10.4	11.5	94.8	29.7	175.3	Jun 24	206.3	Jul 25
MT124555	120.9	56.2	10.5	11.3	98.7	27.9	177.3	Jun 26	211.4	Jul 30
MT124582	125.5*	56.1	10.4	10.8	94.7	29.1	175.0	Jun 24	208.4	Jul 27
MT124645	115.9	55.4	10.4	11.2	96.7	30.0	178.3	Jun 27	209.7	Jul 28
MT124663	118.2	55.9	10.6	10.9	98.4	29.9	175.0	Jun 24	213.4	Aug 1
MT124673	111.3	55.5	10.4	10.7	96.9	28.2	175.3	Jun 24	211.3	Jul 30
MT124688	128.9*	56.7	10.5	10.0	96.9	29.9	175.7	Jun 24	211.8	Jul 30
MT124716	122.5	56.3	10.4	11.5	97.1	27.6	178.0	Jun 27	208.6	Jul 27
MT124728	127.9*	55.8	10.5	12.7	93.5	28.5	178.0	Jun 27	208.9	Jul 27
Average	124.6	55.7	10.5	11.0	95.0	28.9	178.0	Jun 27	210.5	Jul 29
Prob>F	0.004	<0.001	0.584	0.068	<0.001	<0.001	<0.001		<0.001	
PLSD (p=0.05)	16.1	0.8	-	-	7.9	2.4	1.4		2.5	
CV%	7.9	1.8	2.0	8.1	5.1	4.9	0.5		0.7	
Lattice RE%	89.3	100.1	89.5	101.5	100.8	108.8	87.2		105.4	

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 percent dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Table 19. Agronomic performance of spring barley entries grown under irrigated conditions near Conrad, Montana in 2016. MSU Western Triangle Agricultural Research Center.

Cultivar/Line	Grain ^{1/} Yield	Test Weight	Grain Moisture	Grain ^{2/} Protein	Plump Kernels	Thin Kernels	Plant Height	Lodging
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- % -	- inches -	- % -
ABI Balster	120.3	51.8	10.1	10.1	98.2	0.4	29.7	19.8
Champion	99.8	52.6	9.8	9.4	96.8	0.9	30.9	62.3
CDC Copeland	117.2	52.7	9.9	10.3	98.0	0.9	34.0	38.2
LCS Genie	132.0	53.8	10.2	9.4	97.9	0.7	25.5	35.7
ABI Growler	124.5	51.6	10.2	10.1	97.4	1.0	32.7	30.1
Harrington	110.0	52.9	10.4	10.2	96.8	1.0	30.9	70.0
Haxby	107.6	52.7	10.1	11.1	98.1	0.6	31.8	43.9
Hockett	120.5	53.5	9.8	10.3	98.4	0.4	29.8	72.6
AC Metcalfe	107.1	53.1	10.1	9.9	97.4	0.9	33.1	33.4
LCS Odyssey	132.5*	52.2	9.9	9.4	97.9	0.8	24.6	21.4
LCS Overture	145.0**	52.1	10.2	9.1	98.3	0.5	27.6	23.0
AAC Synergy	114.2	50.9	9.4	9.6	98.9	0.4	31.4	26.7
LCS Vespa	139.9*	52.8	10.0	9.6	97.5	0.8	25.6	15.5
Westminster	124.9	53.0	9.9	9.3	98.5	0.3	28.7	29.3
08ARS012-79	113.3	52.7	10.2	10.0	96.5	1.3	29.7	36.0
08ARS028-20	115.9	52.2	9.8	9.4	97.3	0.7	27.8	22.8
08ARS116-91	115.8	52.5	10.2	10.5	95.7	1.2	29.0	28.9
10WA-117.17	111.4	52.3	9.8	10.2	96.5	1.2	32.5	74.8
10WA-117.24	90.3	51.8	10.4	10.3	97.5	0.6	35.7	60.1
11WA-107.43	107.5	53.0	9.9	10.1	97.9	0.5	29.9	24.2
ME08032-156	127.9	52.5	9.9	9.6	97.7	0.6	26.2	23.3
ME08053-050	121.0	53.2	9.4	10.9	98.3	0.5	29.3	13.9
08MT-15	113.6	52.9	10.2	9.5	98.3	0.6	26.4	23.0
08MT-19	119.0	54.0	9.8	10.6	98.4	0.4	32.0	30.5
08MT-63	113.1	52.6	10.1	9.9	96.2	1.5	30.7	37.1
08MT-95	93.6	52.3	9.7	11.3	98.7	0.4	32.9	33.5
MT090182	110.6	52.9	10.2	9.0	97.5	0.7	33.7	15.6
MT090190	120.2	53.5	10.3	9.3	98.0	0.5	34.5	16.5
MT090193	116.9	52.9	9.8	9.2	98.2	0.6	34.5	16.5
MT100120	121.4	53.2	10.2	9.2	98.5	0.4	33.9	8.3
MT100126	118.8	53.5	10.3	9.2	97.8	0.7	35.4	11.1
MT124016	122.5	52.8	9.4	9.3	97.8	0.9	29.9	40.1
MT124069	110.4	52.5	10.1	9.0	98.5	0.5	33.1	17.4
MT124073	108.3	52.7	9.8	9.7	98.4	0.5	34.2	24.5
MT124112	110.9	52.5	10.3	9.6	98.3	0.6	30.5	10.2
MT124118	115.4	54.2	10.0	10.4	98.4	0.6	31.6	29.5
MT124243	122.4	52.2	10.3	8.9	97.5	0.8	32.5	14.2
MT124411	98.0	52.7	9.8	10.5	96.8	0.9	30.5	12.5
MT124454	110.2	54.3	10.2	11.2	98.1	0.7	30.7	26.4
MT124457	114.9	54.8	10.1	10.8	98.2	0.5	32.6	27.2
MT124555	120.4	53.3	9.6	9.8	98.5	0.4	30.7	25.0
MT124582	108.8	53.4	10.1	10.3	96.3	1.3	31.0	35.4
MT124645	104.5	52.7	10.3	9.6	98.3	0.5	32.9	16.7
MT124663	104.8	52.3	9.9	10.5	98.8	0.3	30.1	7.4
MT124673	106.9	53.0	9.8	10.3	97.8	0.6	28.9	9.3
MT124688	125.3	53.3	10.2	9.3	97.4	0.9	33.0	26.3
MT124716	114.7	53.2	9.8	10.4	98.3	0.5	30.7	13.1
MT124728	119.3	53.1	10.2	10.5	98.0	0.7	29.6	15.1
Average	115.6	52.8	10.0	9.9	97.8	0.7	30.7	27.8
Prob>F	<0.001	<0.001	0.463	<0.001	<0.001	<0.001	<0.001	<0.001
PLSD (p=0.05)	12.8	0.7	-	0.9	1.3	0.5	2.5	4.1
CV%	6.6	0.8	4.3	5.2	0.8	44.6	4.7	21.7
Lattice RE% ^{3/}	104.7	103.0	100.3	135.5	105.3	106.2	125.0	129.3

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content

2/ Grain protein values adjusted to a 100 dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level

Table 20. Agronomic performance of spring barley entries grown under irrigated conditions near Huntley, Montana in 2016.
MSU Southern Agricultural Research Center.

Cultivar/Line	Grain ^{1/}	Test	Grain	Grain ^{2/}	Plump	Thin	Plant	Heading Date	
	Yield	Weight	Moisture	Protein	Kernels	Kernels	Height	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- % -	- % -	- inches -		
ABI Balster	105.0	50.6	9.2	10.7	92.8	2.3	35.6	157.0	Jun 6
Champion	95.3	53.5	9.3	10.8	91.7	2.2	37.1	157.0	Jun 6
CDC Copeland	100.1	53.2	9.2	11.0	95.6	1.7	37.4	161.0	Jun 10
LCS Genie	122.3*	52.1	9.1	10.1	92.9	2.5	31.9	159.7	Jun 8
ABI Growler	117.6*	50.6	9.1	10.3	92.9	2.3	35.9	157.0	Jun 6
Harrington	92.5	52.8	9.3	11.2	94.6	1.7	37.3	157.0	Jun 6
Haxby	77.6	54.5	9.3	11.7	94.1	1.5	37.6	157.0	Jun 6
Hockett	74.7	52.4	9.1	11.5	92.6	3.0	36.8	157.0	Jun 6
AC Metcalfe	86.1	53.1	9.2	11.4	94.1	1.7	40.6	156.7	Jun 5
LCS Odyssey	120.5*	50.7	9.1	9.8	94.1	1.9	30.7	161.0	Jun 10
LCS Overture	128.3**	51.1	8.9	10.1	93.3	2.3	31.9	161.0	Jun 10
AAC Synergy	82.7	51.6	9.2	11.0	96.6	1.3	38.9	158.3	Jun 7
LCS Vespa	111.4	52.1	9.5	10.7	94.4	1.9	29.7	161.0	Jun 10
Westminster	101.9	51.2	9.2	10.7	96.0	1.6	33.3	161.0	Jun 10
08ARS012-79	89.3	52.4	9.2	10.7	92.5	2.3	36.7	156.3	Jun 5
08ARS028-20	117.2*	52.3	9.3	10.6	95.1	1.5	35.0	157.0	Jun 6
08ARS116-91	100.2	52.3	9.4	10.2	91.3	2.6	35.7	154.7	Jun 3
10WA-117.17	89.3	52.1	9.2	11.3	91.3	2.8	38.3	157.0	Jun 6
10WA-117.24	63.3	50.4	9.0	12.2	93.6	2.3	39.5	157.0	Jun 6
11WA-107.43	98.8	52.9	9.5	11.8	92.1	2.7	36.2	157.0	Jun 6
ME08032-156	109.5	52.1	9.1	11.4	94.9	1.6	31.0	158.3	Jun 7
ME08053-050	90.1	51.5	9.1	12.5	95.8	1.5	37.1	157.0	Jun 6
08MT-15	100.6	53.7	9.3	11.5	96.0	1.1	32.5	161.0	Jun 10
08MT-19	96.8	52.9	9.4	10.7	94.5	1.9	38.6	157.7	Jun 6
08MT-63	101.5	52.7	9.4	11.2	89.0	3.8	40.3	157.0	Jun 6
08MT-95	85.6	52.3	9.2	11.1	91.7	3.1	41.8	156.3	Jun 5
MT090182	97.5	52.5	9.2	10.3	92.6	2.4	38.7	157.0	Jun 6
MT090190	98.3	52.6	9.3	9.9	93.9	2.1	38.1	157.0	Jun 6
MT090193	98.0	51.7	9.0	10.2	93.9	1.9	38.9	158.3	Jun 7
MT100120	98.6	52.8	9.2	10.2	94.1	1.9	39.5	158.3	Jun 7
MT100126	98.9	52.3	9.2	9.9	93.8	2.1	37.9	161.0	Jun 10
MT124016	101.2	52.1	9.5	10.5	91.5	2.6	36.9	156.0	Jun 5
MT124069	97.0	51.5	9.1	10.2	94.3	1.8	37.3	161.0	Jun 10
MT124073	94.2	52.0	9.1	10.7	92.7	2.4	39.9	158.3	Jun 7
MT124112	77.1	51.3	9.1	10.8	93.2	2.2	36.2	154.0	Jun 3
MT124118	89.7	53.0	9.4	11.9	92.7	2.4	37.6	156.7	Jun 5
MT124243	112.4	52.2	9.3	10.3	93.4	2.4	39.4	157.0	Jun 6
MT124411	87.8	52.3	9.2	10.9	91.0	3.3	39.0	156.7	Jun 5
MT124454	87.1	52.9	9.1	11.6	94.1	2.0	38.6	156.7	Jun 5
MT124457	86.3	53.2	9.0	12.3	93.7	2.2	38.8	156.3	Jun 5
MT124555	102.2	53.4	9.5	10.4	93.9	2.4	37.4	158.3	Jun 7
MT124582	81.0	52.8	9.3	12.3	93.7	2.0	37.3	156.0	Jun 5
MT124645	90.9	52.2	9.1	10.5	93.3	2.4	36.9	157.0	Jun 6
MT124663	67.3	51.8	9.3	11.2	94.9	1.8	36.2	155.7	Jun 4
MT124673	74.6	52.5	9.3	11.2	92.0	2.5	34.7	153.7	Jun 2
MT124688	103.0	52.9	8.9	10.5	92.6	2.7	38.7	158.3	Jun 7
MT124716	91.6	51.8	9.0	11.3	90.9	2.5	36.5	157.0	Jun 6
MT124728	86.3	52.2	9.2	11.2	91.5	2.6	36.4	157.0	Jun 6
Average	95.9	52.3	9.2	10.9	93.4	2.2	36.7	157.7	Jun 6
PLSD (p=0.05)	11.7	0.8	0.3	0.9	2.2	1.1	1.9	1.8	
CV%	7.5	0.9	1.9	5.2	1.5	29.6	3.1	0.7	
Lattice RE% ^{3/}	88.9	100.2	92.4	92.9	101.0	102.1	95.2	103.1	

1/ Grain yields are based on a 48 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Grain protein values adjusted to a 100 percent dry matter content.

3/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

** denotes highest yielding entry within a column.

* denotes entries yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.