



Current Report

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Protein Content of Winter Wheat Varieties in Oklahoma — 2017–2018

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General Information

Protein is just one of many attributes that determine end-use quality and marketability of winter wheat. In fact, some millers and bakers would argue that functionality of wheat protein is more important than the quantity of protein. While varietal differences commonly exist, variability in protein content among environments is generally much larger than variability in protein content among varieties. Factors such as N fertility and drought stress, for example, can sharply impact final wheat protein content.

To reflect these management and environmental impacts on wheat protein content, data are reported by variety and location in Table 1. In Table 2, we report the wheat protein content by variety as a deviation from location mean, as this allows for easier comparison among varieties across locations. Doublestop CL Plus, for example, is a variety which showed a positive deviation from the location mean in 92 percent of this year's trials, indicating it has a tendency for above-average wheat protein content. Iba, on the other hand, showed a negative deviation from the location mean in 91 percent of the trials, indicating a tendency for lower than average wheat protein content. However, protein quantity should not be used as a barometer for protein quality (i.e., dough strength and functionality). There are a few exceptions to this, with Doublestop CL Plus being one example of relatively high protein content and protein quality.

Adequate N fertility as recommended by a recent soil test or sensor-based nitrogen management program can help ensure that varieties such as Iba produce wheat or flour protein within the acceptable range for end-use customers. Iba is also a prime example of how protein data can sometimes be misused, as the functionality of the protein in Iba is above average, which can offset lower absolute protein content. More information on end-use quality is available in Current Report 2165 Wheat and Flour Quality for Varieties Tested in OSU Variety Performance Tests.

Procedures

Approximately 600-gram subsamples of wheat grain were collected from the OSU Wheat Variety Performance Test plots at harvest. These plots were well-fertilized and managed

according to OSU Cooperative Extension recommendations. Additional information on test locations and management practices is available in Current Report 2143 2017-2018 Oklahoma Small Grains Variety Performance Tests on the web at www.wheat.okstate.edu. Samples were stored in plastic containers for approximately one month following harvest. Samples were nondestructively analyzed for protein content on a 12 percent moisture basis using a Diode Array Near Infrared instrument (NIR) (model DA 7200, Perten Instruments, Sweden).

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Table 1. Wheat protein content (12% moisture basis) of varieties and experimental lines tested in the 2017-2018 Oklahoma Wheat Variety Performance Tests.

Licensee	Variety	Apache								Chickasha		Irrigated	
		Afton	Altus	Alva	Apache	Fungicide	Balko	Buffalo	Cherokee	Chickasha	IWM	Goodwell	Homestead
		----- %wheat protein -----											
AGSECO	AG Gallant	-	-	-	-	-	-	-	-	12.2	11.9	14.5	-
AGSECO	AG Icon	-	14.1	-	15.3	15.4	-	-	-	14.1	13.8	14.8	-
AgriMAXX	AM Eastwood	-	14.8	-	-	-	-	-	-	12.9	12.9	14.7	-
OGI	Bentley	11.8	13.1	14.5	14.2	15.0	13.9	13.1	14.5	12.6	12.7	14.3	17.4
AgriPro	Bob Dole	-	13.7	13.9	-	-	-	-	12.8	13.3	13.2	14.4	15.5
CROPLAN	CP78-26	-	14.4	-	-	-	-	-	-	14.4	14.4	15.1	-
OGI	Doublestop CL Plus	13.5	14.7	15.8	16.2	16.5	16.2	15.4	13.1	14.4	14.6	16.4	17.1
OGI	Duster	12.0	13.5	13.8	13.8	14.2	14.6	-	14.5	12.8	13.0	14.0	15.0
KWA	Everest	12.5	-	-	-	-	-	-	-	-	-	-	-
OGI	Gallagher	-	14.4	15.9	14.1	14.3	14.3	14.0	14.0	13.0	12.9	14.1	16.6
OGI	Iba	-	12.7	15.0	13.0	13.5	13.5	12.7	13.7	12.1	12.2	13.4	14.5
KWA	Joe	10.9	13.3	13.3	13.2	13.5	13.3	12.2	13.3	12.5	12.4	13.4	14.3
PlainsGold	Langin	-	13.4	15.5	-	-	14.7	13.4	12.9	12.3	12.6	13.8	-
KWA	Larry	-	13.6	14.5	-	-	14.0	13.1	12.7	12.3	12.8	14.3	15.6
LCS	LCS Avenger	-	14.7	-	-	-	-	-	-	13.6	13.8	13.4	-
LCS	LCS Chrome	13.3	14.7	15.1	15.1	15.3	15.1	14.1	13.4	14.4	14.6	15.1	17.5
LCS	LCS Mint	11.8	14.7	14.0	13.6	14.5	13.9	-	14.5	12.5	12.9	13.9	16.1
LCS	LCS Pistol	12.9	14.1	15.2	14.1	14.3	14.6	-	14.1	13.4	13.3	14.0	17.2
OGI	Lonerider	13.2	13.6	14.9	14.6	14.7	14.1	12.7	13.6	13.1	12.3	13.5	16.0
Dyna-Gro	Long Branch	-	14.1	14.9	13.6	14.0	13.7	-	14.3	13.7	13.8	13.3	-
OGI	NF 101	-	13.9	-	14.2	14.4	-	-	-	13.3	13.0	14.6	-
KWA	Oakley CL	-	13.4	14.7	-	-	14.7	13.6	14.1	13.6	14.2	15.0	-
OGI	Ruby Lee	12.2	14.5	-	15.3	15.8	15.5	-	14.3	12.8	13.0	15.4	16.4
OGI	Smith's Gold	11.9	13.6	15.1	14.4	14.4	14.6	13.2	14.8	13.6	12.9	14.0	15.4
OGI	Spirit Rider	-	14.5	14.3	-	-	-	-	-	13.4	13.7	15.0	15.7
OGI	Stardust	12.1	14.3	-	-	-	-	-	-	13.9	13.5	15.4	17.0
AgriPro	SY Achieve CL2	-	14.2	16.4	-	-	-	-	13.1	13.9	13.9	15.4	15.6
AgriPro	SY Benefit	11.8	14.0	-	13.9	14.2	-	-	-	12.1	12.2	14.1	15.4
AgriPro	SY Flint	11.7	13.9	-	14.1	14.8	-	-	-	12.6	12.7	14.3	15.2
AgriPro	SY Grit	-	14.7	16.3	15.3	15.6	15.3	14.2	14.1	12.8	13.5	15.1	15.6
AgriPro	SY Monument	11.8	-	13.8	-	-	14.0	-	14.0	-	-	13.7	15.4
AgriPro	SY Rugged	-	13.4	15.0	14.1	13.7	13.8	12.1	13.1	12.8	12.9	13.6	-
LCS	T158	11.7	13.2	15.5	13.9	14.3	14.0	-	14.8	12.5	12.6	13.8	16.5
Watley	TAM 112	-	13.9	16.0	-	-	14.9	-	13.8	12.7	13.1	15.1	-
AGSECO	TAM 114	-	14.8	14.7	-	-	14.1	13.8	13.6	12.7	12.8	13.7	-
Watley	TAM 204	12.6	14.5	17.1	15.3	14.9	15.2	-	14.5	13.8	13.8	14.7	17.7
WestBred	WB4269	11.9	12.8	-	-	-	-	-	-	12.6	11.5	13.1	-
WestBred	WB4303	13.8	14.3	17.0	15.8	16.2	15.6	-	14.5	14.3	13.6	15.1	16.4
WestBred	WB4458	12.9	14.4	16.3	15.6	16.1	15.7	-	13.7	13.5	13.3	15.6	16.9
WestBred	WB4515	12.8	13.8	-	-	-	-	-	-	13.9	14.4	16.0	16.3
WestBred	WB4721	-	14.3	14.1	14.9	15.0	15.3	14.1	13.1	13.2	13.5	14.6	15.7
WestBred	WB-Grainfield	11.9	13.7	15.6	13.8	14.0	14.3	-	14.2	13.0	12.2	13.9	16.8
WestBred	Winterhawk	-	13.0	15.1	-	-	14.3	13.2	13.9	11.8	12.6	13.9	-
KWA	Zenda	11.5	13.8	-	-	-	-	-	-	13.2	12.9	14.1	15.2
OSU Experimentals													
	OCW03S580S-8F	12.0	-	-	-	-	-	-	-	-	-	-	-
	OCW04S717T-6W	12.9	16.0	-	15.0	15.3	-	-	14.3	14.1	14.3	-	18.6
	OCW05S616T-2	12.1	-	16.5	14.4	14.6	14.2	13.0	13.7	13.0	12.4	13.8	15.0
	OK12206-2	12.5	14.9	17.6	15.0	15.4	14.9	13.3	13.4	13.8	13.8	14.6	16.0
	OK12716	-	14.5	16.7	14.5	14.9	14.4	13.1	13.0	13.4	13.4	14.7	16.7
	OK12D22004-016	12.3	-	-	-	-	14.9	-	-	12.8	12.0	14.1	-
	OK13209	-	15.3	-	16.4	17.1	-	-	-	13.9	14.8	-	16.2
	OK13621	-	14.2	17.3	-	-	14.8	13.5	12.9	13.1	13.4	14.6	-
	OK14319	12.2	-	-	-	-	-	-	-	-	-	-	-
	OK14438	11.4	-	-	-	-	-	-	-	-	-	-	-
	OK14P212	-	13.4	15.8	-	-	14.8	12.8	13.7	-	-	14.1	14.0
	OK168513	-	-	15.0	-	-	14.4	13.4	-	-	-	14.3	-
	Mean	12.3	14.1	15.3	14.6	14.9	14.6	13.4	13.8	13.2	13.2	14.4	16.1
	LSD (0.05)	0.7	1.0	1.6	0.6	0.5	0.4	0.5	NS	0.7	0.4	0.5	1.5

Notes: Shaded values are not statistically different from the highest value within a column (i.e., location). NS = not significant.

Table 1. Wheat protein content (12% moisture basis) of varieties and experimental lines tested in the 2017-2018 Oklahoma Wheat Variety Performance Tests. (cont'd).

Licensee	Variety	%wheat protein											
		Hooker	Keyes	Kildare	Kingfisher	Lahoma	Lahoma Fungicide	Lamont	Marshall Dual-Purpose	Marshall Grain-Only	Union Thomas	Union City	Walters
AGSECO	AG Gallant	-	-	-	-	13.1	13.4	-	-	-	-	-	-
AGSECO	AG Icon	-	-	-	-	14.6	14.2	-	16.5	16.0	-	-	-
AgriMAXX	AM Eastwood	-	-	-	-	14.2	14.5	-	-	-	-	-	-
OGI	Bentley	14.5	14.2	12.5	13.1	13.0	13.0	15.8	16.6	14.4	15.0	11.4	11.0
AgriPro	Bob Dole	-	-	13.1	-	13.0	12.8	15.7	14.9	15.2	-	-	-
CROPLAN	CP78-26	-	-	-	-	14.3	14.3	-	-	-	-	-	-
OGI	Doublestop CL Plus	14.7	16.2	13.7	14.3	14.4	14.7	16.4	16.2	16.1	16.5	12.3	13.4
OGI	Duster	14.3	14.5	12.5	13.3	13.0	13.2	15.7	15.6	15.5	15.6	11.2	11.3
KWA	Everest	-	-	-	-	-	-	-	-	-	-	-	-
OGI	Gallagher	14.7	14.7	13.3	13.6	13.4	13.5	16.1	16.7	15.4	15.3	12.6	11.3
OGI	Iba	14.6	13.9	11.7	12.8	12.6	12.7	13.9	16.3	14.3	14.0	10.3	11.0
KWA	Joe	14.4	13.4	11.7	13.8	12.6	11.6	15.6	15.9	14.7	13.3	-	11.0
PlainsGold	Langin	14.3	14.2	-	-	12.8	12.7	-	-	-	-	-	-
KWA	Larry	14.8	15.0	-	13.9	13.0	12.7	15.6	-	-	14.9	-	-
LCS	LCS Avenger	-	-	-	-	13.4	13.5	-	-	-	-	-	-
LCS	LCS Chrome	14.4	15.2	13.9	13.3	14.7	14.3	16.6	17.4	17.6	16.4	12.4	13.1
LCS	LCS Mint	14.5	14.0	12.8	12.0	12.9	13.0	15.2	-	-	14.0	11.4	11.0
LCS	LCS Pistol	14.4	13.9	-	12.5	13.6	12.8	15.9	-	-	15.5	11.0	11.6
OGI	Lonerider	14.2	13.7	-	13.7	13.6	13.9	16.3	-	-	15.6	11.7	11.3
Dyna-Gro	Long Branch	14.0	13.4	-	-	13.6	12.8	-	15.6	15.4	14.7	-	11.9
OGI	NF 101	-	-	-	-	13.2	13.1	-	-	-	-	12.9	11.6
KWA	Oakley CL	14.5	14.6	-	-	12.7	12.8	-	-	-	-	-	-
OGI	Ruby Lee	15.3	15.9	13.2	15.1	13.8	14.3	15.8	17.0	15.5	16.3	11.6	11.5
OGI	Smith's Gold	14.3	14.4	13.1	13.6	12.9	12.7	16.2	15.9	15.4	15.1	12.1	11.3
OGI	Spirit Rider	-	-	13.7	-	13.6	13.2	17.0	-	-	-	-	-
OGI	Stardust	-	-	13.7	-	13.4	13.2	16.5	16.2	15.7	-	-	-
AgriPro	SY Achieve CL2	-	-	14.2	14.7	14.2	14.0	16.3	16.5	15.3	16.9	-	-
AgriPro	SY Benefit	-	-	12.2	14.3	12.4	12.5	15.6	-	-	15.9	10.8	10.5
AgriPro	SY Flint	-	-	-	14.5	13.0	12.8	14.9	-	-	15.6	11.2	11.4
AgriPro	SY Grit	14.7	14.8	-	15.4	13.6	13.9	16.7	15.8	15.9	15.5	13.4	11.2
AgriPro	SY Monument	14.7	14.5	12.7	12.7	12.7	12.3	15.6	-	-	14.4	-	-
AgriPro	SY Rugged	14.1	14.0	-	13.4	13.1	12.4	-	14.8	14.8	15.2	11.9	11.4
LCS	T158	13.9	13.3	-	13.2	12.6	12.6	15.1	14.8	14.7	15.3	11.0	10.8
Watley	TAM 112	14.6	14.8	-	-	13.9	13.9	-	-	-	-	-	-
AGSECO	TAM 114	14.5	14.8	-	-	12.4	12.3	-	-	-	-	-	-
Watley	TAM 204	15.5	15.8	14.1	14.7	14.1	14.3	17.1	15.8	15.6	17.2	12.7	-
WestBred	WB4269	-	-	12.1	-	12.8	12.6	13.9	15.6	14.0	-	-	-
WestBred	WB4303	15.3	15.9	14.5	15.0	13.5	14.1	17.4	17.5	16.1	16.4	13.5	12.6
WestBred	WB4458	14.6	15.7	13.7	16.4	13.7	13.8	17.8	-	-	16.9	12.9	11.8
WestBred	WB4515	-	-	-	13.6	12.8	13.7	16.7	17.1	16.1	15.0	11.0	-
WestBred	WB4721	14.5	14.9	-	-	13.1	13.5	-	16.0	15.7	15.5	12.0	11.7
WestBred	WB-Grainfield	14.2	13.5	12.5	13.0	13.7	13.6	16.5	-	-	16.3	11.1	11.6
WestBred	Winterhawk	15.0	14.5	-	-	12.7	12.6	-	-	-	-	-	-
KWA	Zenda	-	-	13.4	-	13.1	13.1	15.7	-	-	-	-	-
OSU Experimentals													
	OCW03S580S-8F	-	-	-	-	-	-	-	-	-	-	-	-
	OCW04S717T-6W	-	-	-	15.9	14.1	14.4	17.6	17.9	16.4	-	-	-
	OCW05S616T-2	14.5	13.8	13.0	14.5	13.1	13.0	16.2	16.2	15.5	15.2	12.5	12.1
	OK12206-2	14.1	-	-	13.8	13.9	13.6	-	15.9	16.1	16.3	12.8	-
	OK12716	14.5	14.6	13.3	13.3	13.1	13.3	16.5	15.7	16.6	15.4	10.4	11.4
	OK12D22004-016	-	-	13.6	14.0	13.0	12.9	16.4	-	-	15.9	-	-
	OK13209	-	-	-	15.9	13.3	13.7	17.2	-	-	16.5	13.3	13.6
	OK13621	14.4	-	-	16.1	13.9	13.6	16.2	-	-	-	-	-
	OK14319	-	-	-	14.5	13.5	13.6	-	16.1	15.7	-	11.7	-
	OK14438	-	-	-	-	-	-	-	-	-	-	-	-
	OK14P212	14.7	14.4	-	-	-	-	-	14.9	15.1	15.6	11.0	-
	OK168513	14.7	14.3	-	-	-	-	-	-	-	-	-	-
	Mean	14.5	14.5	13.1	14.1	13.3	13.3	16.1	16.1	15.5	15.6	11.9	11.6
	LSD (0.05)	NS	0.5	0.5	0.8	1.3	1.1	0.8	NS	0.8	1.3	0.8	0.6

Notes: Shaded values are not statistically different from the highest value within a column (i.e., location). NS = not significant.

Table 2. Wheat protein content relative to the location mean (expressed as a deviation) for varieties and experimental lines in the 2017-2018 Oklahoma Wheat Variety Performance Tests.

Licensee	Variety	% wheat protein relative to location mean-----											
		Afton	Altus	Alva	Apache	Apache Fungicide	Balko	Buffalo	Cherokee	Chickasha	Chickasha IWM	Irrigated Goodwell	Homestead
AGSECO	AG Gallant	-	-	-	-	-	-	-	-	-1.0	-1.2	0.1	-
AGSECO	AG Icon	-	0.0	-	0.7	0.5	-	-	-	0.9	0.6	0.4	-
AgriMAXX	AM Eastwood	-	0.7	-	-	-	-	-	-	-0.3	-0.3	0.3	-
OGI	Bentley	-0.4	-1.0	-0.9	-0.3	0.1	-0.7	-0.3	0.8	-0.5	-0.5	-0.1	1.3
AgriPro	Bob Dole	-	-0.4	-1.5	-	-	-	-	-1.0	0.1	0.0	0.0	-0.5
CROPLAN	CP78-26	-	0.3	-	-	-	-	-	-	1.2	1.2	0.7	-
OGI	Doublestop CL Plus	1.2	0.7	0.5	1.6	1.7	1.6	2.1	-0.6	1.2	1.4	2.0	1.0
OGI	Duster	-0.3	-0.6	-1.6	-0.8	-0.6	0.1	-	0.7	-0.4	-0.2	-0.4	-1.1
KWA	Everest	0.2	-	-	-	-	-	-	-	-	-	-	-
OGI	Gallagher	-	0.4	0.5	-0.5	-0.6	-0.3	0.6	0.2	-0.1	-0.2	-0.2	0.6
OGI	Iba	-	-1.3	-0.3	-1.6	-1.4	-1.1	-0.6	-0.1	-1.0	-1.0	-1.0	-1.5
KWA	Joe	-1.4	-0.8	-2.0	-1.3	-1.4	-1.2	-1.2	-0.5	-0.7	-0.8	-1.0	-1.8
PlainsGold	Langin	-	-0.6	0.2	-	-	0.1	0.1	-0.9	-0.9	-0.6	-0.6	-
KWA	Larry	-	-0.4	-0.8	-	-	-0.5	-0.2	-1.1	-0.9	-0.4	-0.1	-0.5
LCS	LCS Avenger	-	0.6	-	-	-	-	-	-	0.4	0.7	-1.0	-
LCS	LCS Chrome	1.1	0.7	-0.2	0.6	0.4	0.6	0.7	-0.4	1.2	1.4	0.7	1.4
LCS	LCS Mint	-0.4	0.6	-1.3	-1.0	-0.4	-0.6	-	0.7	-0.6	-0.3	-0.5	0.1
LCS	LCS Pistol	0.6	0.0	-0.2	-0.5	-0.6	0.0	-	0.3	0.2	0.1	-0.4	1.1
OGI	Lonerider	0.9	-0.5	-0.4	0.0	-0.2	-0.5	-0.7	-0.2	-0.1	-0.9	-0.9	-0.1
Dyna-Gro	Long Branch	-	0.1	-0.5	-1.0	-0.8	-0.9	-	0.6	0.6	0.6	-1.1	-
OGI	NF 101	-	-0.2	-	-0.3	-0.5	-	-	-	0.1	-0.2	0.2	-
KWA	Oakley CL	-	-0.6	-0.7	-	-	0.1	0.2	0.3	0.4	1.0	0.6	-
OGI	Ruby Lee	-0.1	0.5	-	0.7	1.0	1.0	-	0.5	-0.4	-0.2	1.0	0.3
OGI	Smith's Gold	-0.4	-0.5	-0.2	-0.2	-0.5	0.0	-0.2	1.0	0.4	-0.3	-0.4	-0.7
OGI	Spirit Rider	-	0.4	-1.0	-	-	-	-	-	0.2	0.5	0.6	-0.4
OGI	Stardust	-0.1	0.2	-	-	-	-	-	-	0.7	0.4	1.0	1.0
AgriPro	SY Achieve CL2	-	0.2	1.1	-	-	-	-	-0.7	0.7	0.7	1.0	-0.5
AgriPro	SY Benefit	-0.5	-0.1	-	-0.6	-0.7	-	-	-	-1.1	-0.9	-0.3	-0.6
AgriPro	SY Flint	-0.6	-0.2	-	-0.5	-0.1	-	-	-	-0.5	-0.5	-0.1	-0.8
AgriPro	SY Grit	-	0.7	0.9	0.7	0.8	0.8	0.9	0.3	-0.3	0.3	0.7	-0.4
AgriPro	SY Monument	-0.5	-	-1.5	-	-	-0.6	-	0.3	-	-	-0.7	-0.6
AgriPro	SY Rugged	-	-0.7	-0.3	-0.5	-1.2	-0.8	-1.3	-0.6	-0.4	-	-0.3	-0.8
LCS	T158	-0.6	-0.9	0.2	-0.7	-0.6	-0.6	-	1.0	-0.6	-0.6	-0.6	0.4
Watley	TAM 112	-	-0.2	0.6	-	-	0.3	-	0.0	-	-0.5	-0.1	0.7
AGSECO	TAM 114	-	0.8	-0.6	-	-	-0.5	0.4	-0.2	-0.5	-0.4	-0.7	-
Watley	TAM 204	0.3	0.4	1.8	0.8	0.1	0.7	-	0.7	0.6	0.6	0.3	1.7
WestBred	WB4269	-0.4	-1.3	-	-	-	-	-	-	-0.5	-1.7	-1.3	-
WestBred	WB4303	1.6	0.2	1.6	1.3	1.3	1.0	-	0.7	1.1	0.4	0.7	0.3
WestBred	WB4458	0.7	0.4	0.9	1.0	1.2	1.2	-	0.0	0.3	0.1	1.2	0.8
WestBred	WB4515	0.5	-0.3	-	-	-	-	-	-	0.7	1.3	1.6	0.2
WestBred	WB4721	-	0.2	-1.2	0.4	0.2	0.8	0.8	-0.7	0.0	0.3	0.2	-0.4
WestBred	WB-Grainfield	-0.3	-0.4	0.2	-0.8	-0.9	-0.3	-	0.5	-0.1	-0.9	-0.5	0.7
WestBred	Winterhawk	-	-1.0	-0.2	-	-	-0.2	-0.2	0.1	-1.3	-0.6	-0.5	-
KWA	Zenda	-0.8	-0.3	-	-	-	-	-	-	0.0	-0.3	-0.2	-0.8
OSU Experimentals													
	OCW03S580S-8F	-0.2	-	-	-	-	-	-	-	-	-	-	-
	OCW04S717T-6W	0.6	1.9	-	0.5	0.4	-	-	0.5	0.9	1.1	-	2.6
	OCW05S616T-2	-0.2	-	1.1	-0.2	-0.3	-0.4	-0.4	-0.1	-0.2	-0.8	-0.6	-1.1
	OK12206-2	0.2	0.9	2.2	0.4	0.5	0.4	-0.1	-0.4	0.6	0.6	0.2	-0.1
	OK12716	-	0.4	1.3	0.0	0.0	-0.2	-0.2	-0.8	0.2	0.3	0.3	0.6
	OK12D22004-016	0.1	-	-	-	-	0.3	-	-	-0.4	-1.2	-0.3	-
	OK13209	-	1.3	-	1.8	2.3	-	-	-	0.7	1.6	-	0.2
	OK13621	-	0.2	2.0	-	-	0.2	0.1	-0.9	-0.1	0.2	0.2	-
	OK14319	0.0	-	-	-	-	-	-	-	-	-	-	-
	OK14438	-0.9	-	-	-	-	-	-	-	-	-	-	-
	OK14P212	-	-0.6	0.4	-	-	0.2	-0.6	0.0	-	-	-0.2	-2.1
	OK168513	-	-	-0.3	-	-	-0.1	0.0	-	-	-	-0.1	-
	Mean	12.3	14.1	15.3	14.6	14.9	14.6	13.4	13.8	13.2	13.2	14.4	16.1
	LSD (0.05)	0.7	1.0	1.6	0.6	0.5	0.4	0.5	NS	0.7	0.4	0.5	1.5

Table 2. Wheat protein content relative to the location mean (expressed as a deviation) for varieties and experimental lines in the 2017-2018 Oklahoma Wheat Variety Performance Tests. (cont'd).

Licensee	Variety	----- % wheat protein relative to location mean-----											
		Hooker	Keyes	Kildare	Kingfisher	Lahoma	Fungicide	Lamont	Dual-Purpose	Marshall	Marshall	Thomas	Union City
AGSECO	AG Gallant	-	-	-	-	-	-	-	-	-1.0	-1.2	0.1	-
AGSECO	AG Icon	-	0.0	-	0.7	0.5	-	-	-	0.9	0.6	0.4	-
AgriMAXX	AM Eastwood	-	0.7	-	-	-	-	-	-	-0.3	-0.3	0.3	-
OGI	Bentley	-0.4	-1.0	-0.9	-0.3	0.1	-0.7	-0.3	0.8	-0.5	-0.5	-0.1	1.3
AgriPro	Bob Dole	-	-0.4	-1.5	-	-	-	-	-1.0	0.1	0.0	0.0	-0.5
CROPLAN	CP78-26	-	0.3	-	-	-	-	-	-	1.2	1.2	0.7	-
OGI	Doublestop CL Plus	1.2	0.7	0.5	1.6	1.7	1.6	2.1	-0.6	1.2	1.4	2.0	1.0
OGI	Duster	-0.3	-0.6	-1.6	-0.8	-0.6	0.1	-	0.7	-0.4	-0.2	-0.4	-1.1
KWA	Everest	0.2	-	-	-	-	-	-	-	-	-	-	-
OGI	Gallagher	-	0.4	0.5	-0.5	-0.6	-0.3	0.6	0.2	-0.1	-0.2	-0.2	0.6
OGI	Iba	-	-1.3	-0.3	-1.6	-1.4	-1.1	-0.6	-0.1	-1.0	-1.0	-1.0	-1.5
KWA	Joe	-1.4	-0.8	-2.0	-1.3	-1.4	-1.2	-1.2	-0.5	-0.7	-0.8	-1.0	-1.8
PlainsGold	Langin	-	-0.6	0.2	-	-	0.1	0.1	-0.9	-0.9	-0.6	-0.6	-
KWA	Larry	-	-0.4	-0.8	-	-	-0.5	-0.2	-1.1	-0.9	-0.4	-0.1	-0.5
LCS	LCS Avenger	-	0.6	-	-	-	-	-	-	0.4	0.7	-1.0	-
LCS	LCS Chrome	1.1	0.7	-0.2	0.6	0.4	0.6	0.7	-0.4	1.2	1.4	0.7	1.4
LCS	LCS Mint	-0.4	0.6	-1.3	-1.0	-0.4	-0.6	-	0.7	-0.6	-0.3	-0.5	0.1
LCS	LCS Pistol	0.6	0.0	-0.2	-0.5	-0.6	0.0	-	0.3	0.2	0.1	-0.4	1.1
OGI	Lonerider	0.9	-0.5	-0.4	0.0	-0.2	-0.5	-0.7	-0.2	-0.1	-0.9	-0.9	-0.1
Dyna-Gro	Long Branch	-	0.1	-0.5	-1.0	-0.8	-0.9	-	0.6	0.6	0.6	-1.1	-
OGI	NF 101	-	-0.2	-	-0.3	-0.5	-	-	-	0.1	-0.2	0.2	-
KWA	Oakley CL	-	-0.6	-0.7	-	-	0.1	0.2	0.3	0.4	1.0	0.6	-
OGI	Ruby Lee	-0.1	0.5	-	0.7	1.0	1.0	-	0.5	-0.4	-0.2	1.0	0.3
OGI	Smith's Gold	-0.4	-0.5	-0.2	-0.2	-0.5	0.0	-0.2	1.0	0.4	-0.3	-0.4	-0.7
OGI	Spirit Rider	-	0.4	-1.0	-	-	-	-	-	0.	0.5	0.6	-0.4
OGI	Stardust	-0.1	0.2	-	-	-	-	-	-	0.7	0.4	1.0	1.0
AgriPro	SY Achieve CL2	-	0.2	1.1	-	-	-	-	-0.7	0.7	0.7	1.0	-0.5
AgriPro	SY Benefit	-0.5	-0.1	-	-0.6	-0.7	-	-	-	-1.1	-0.9	-0.3	-0.6
AgriPro	SY Flint	-0.6	-0.2	-	-0.5	-0.1	-	-	-	-0.5	-0.5	-0.1	-0.8
AgriPro	SY Grit	-	0.7	0.9	0.7	0.8	0.8	0.9	0.3	-0.3	0.3	0.7	-0.4
AgriPro	SY Monument	-0.5	-	-1.5	-	-	-0.6	-	0.3	-	-	-0.7	-0.6
AgriPro	SY Rugged	-	-0.7	-0.3	-0.5	-1.2	-0.8	-1.3	-0.6	-0.4	-0.3	-0.8	-
LCS	T158	-0.6	-0.9	0.2	-0.7	-0.6	-0.6	-	1.0	-0.6	-0.6	-0.6	0.4
Watley	TAM 112	-	-0.2	0.6	-	-	0.3	-	0.0	-0.5	-0.1	0.7	-
AGSECO	TAM 114	-	0.8	-0.6	-	-	-0.5	0.4	-0.2	-0.5	-0.4	-0.7	-
Watley	TAM 204	0.3	0.4	1.8	0.8	0.1	0.7	-	0.7	0.6	0.6	0.3	1.7
WestBred	WB4269	-0.4	-1.3	-	-	-	-	-	-	-0.5	-1.7	-1.3	-
WestBred	WB4303	1.6	0.2	1.6	1.3	1.3	1.0	-	0.7	1.1	0.4	0.7	0.3
WestBred	WB4458	0.7	0.4	0.9	1.0	1.2	1.2	-	0.0	0.3	0.1	1.2	0.8
WestBred	WB4515	0.5	-0.3	-	-	-	-	-	-	0.7	1.3	1.6	0.2
WestBred	WB4721	-	0.2	-1.2	0.4	0.2	0.8	0.8	-0.7	0.0	0.3	0.2	-0.4
WestBred	WB-Grainfield	-0.3	-0.4	0.2	-0.8	-0.9	-0.3	-	0.5	-0.1	-0.9	-0.5	0.7
WestBred	Winterhawk	-	-1.0	-0.2	-	-	-0.2	-0.2	0.1	-1.3	-0.6	-0.5	-
KWA	Zenda	-0.8	-0.3	-	-	-	-	-	-	0.0	-0.3	-0.2	-0.8
OSU Experimentals													
	OCW03S580S-8F	-0.2	-	-	-	-	-	-	-	-	-	-	-
	OCW04S717T-6W	0.6	1.9	-	0.5	0.4	-	-	0.5	0.9	1.1	-	2.6
	OCW05S616T-2	-0.2	-	1.1	-0.2	-0.3	-0.4	-0.4	-0.1	-0.2	-0.8	-0.6	-1.1
	OK12206-2	0.2	0.9	2.2	0.4	0.5	0.4	-0.1	-0.4	0.6	0.6	0.2	-0.1
	OK12716	-	0.4	1.3	0.0	0.0	-0.2	-0.2	-0.8	0.2	0.3	0.3	0.6
	OK12D22004-016	0.1	-	-	-	-	0.3	-	-	-0.4	-1.2	-0.3	-
	OK13209	-	1.3	-	1.8	2.3	-	-	-	0.7	1.6	-	0.2
	OK13621	-	0.2	2.0	-	-	0.2	0.1	-0.9	-0.1	0.2	0.2	-
	OK14319	0.0	-	-	-	-	-	-	-	-	-	-	-
	OK14438	-0.9	-	-	-	-	-	-	-	-	-	-	-
	OK14P212	-	-0.6	0.4	-	-	0.2	-0.6	0.0	-	-	-0.2	-2.1
	OK168513	-	-	-0.3	-	-	-0.1	0.0	-	-	-	-0.1	-
	Mean	12.3	14.1	15.3	14.6	14.9	14.6	13.4	13.8	13.2	13.2	14.4	16.1
	LSD (0.05)	0.7	1.0	1.6	0.6	0.5	0.4	0.5	NS	0.7	0.4	0.5	1.5

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Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

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- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
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