



Current Report

EXTENSION

Oklahoma Cooperative Extension Fact Sheets are also available on our website at:
extension.okstate.edu

Protein Concentration of Winter Wheat Varieties in Oklahoma — 2019–2020

Amanda de Oliveira Silva
Small Grains Extension Specialist

Robert Calhoun
Senior Agriculturalist

Brett Carver
Wheat Breeder

Tina Jonhson
Senior Research Specialist

Luiz Otavio Pradella
Visiting Research Scholar

Leighton Dill
Undergraduate Student

General Information

Protein is just one of many attributes that determines 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 exist, variability in protein among environments is generally much larger than variability among varieties. Factors such as nitrogen (N) fertilization and drought stress, for example, can sharply impact final wheat protein concentration.

To reflect these management and environmental impacts on wheat protein concentration, data are reported by variety and location in Table 1. In Table 2, the wheat protein concentration is reported by variety as a deviation from the location mean. This allows for easier comparison of wheat protein among varieties across locations. Doublestop CL Plus and Green Hammer, for example, showed positive deviation from the location mean in about 95% of this year's trials, indicating a tendency for above-average wheat protein concentration. Iba, on the other hand, showed a negative deviation from location mean in 85% of the trials, indicating a tendency for lower-than-average wheat protein concentration. Adequate and timely nitrogen fertility as recommended by a recent soil test or sensor-based nitrogen management program can help ensure varieties with lower than average protein produce wheat or flour protein within the acceptable range for the end users.

However, protein quantity should not be used as a barometer for protein quality (i.e., dough strength and functionality). Although, there are few exceptions to this, with Doublestop CL Plus being one example. 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 concentration. More information on end-use quality is available in Current Report 2165 Wheat and Flour Quality for Varieties Tested in the 2016 OSU Variety Performance Tests.

Procedures

Approximately 600-gram subsamples of wheat grain were collected at harvest from four field replicates of all entries for each

OSU Wheat Variety Performance Test. Each test was properly fertilized and managed according to OSU Extension recommendations. Additional information on test locations and management practices is available in Current Report 2143 2019-2020 Oklahoma Small Grains Variety Performance Tests online at www.wheat.okstate.edu. Samples were analyzed nondestructively immediately after harvest for wheat protein concentration on a 12% moisture basis, using a Diode Array Near Infrared (NIR) moisture and protein determinator (model DA 7200, Perten Instruments, Sweden).

Funding provided by:

Oklahoma Wheat Commission
Oklahoma Wheat Research Foundation
Oklahoma Cooperative Extension Service
Oklahoma Agricultural Experiment Station
Entry fees from participating seed companies

We sincerely thank our variety trial cooperators for donation of land, time and resources. Variety trial cooperators include:

Afton – Greg Leonard
Altus – OSU Southwest Research and Extension Center
Alva – Jerad Bradt & Wes Mallory
Apache – Bryan Vail
Balko – Teryl Rorabaugh
Buffalo – NRCS
Cherokee – Kenneth Failes
Chickasha – OSU South Central Research Station
El Reno – Jerry Lingo
Goodwell – Oklahoma Panhandle Research and Extension Center
Homestead – Brook Strader
Hooker – Ernest & Dan Herald
Keyes – J.B. Stewart
Kildare – Don Schieber
Kingfisher – Tary Helt
Lahoma – OSU North Central Research Station
Lamont – Don & Roger Kirby
Thomas – Brownie Brown
Walters – Jimmy Kinder

Table 1. Wheat protein concentration (12% moisture basis) of varieties and experimental lines tested in the 2019-2020 Oklahoma Wheat Variety Performance Tests.

| Licensee | Variety | %wheat protein concentration | | | | | | | |
|--------------------------|--------------------|------------------------------|-------------|-------------|-------------|-------------|-------------|--------------------|-------------|
| | | Afton | Altus | Balko | Buffalo | Cherokee | El Reno | Goodwell Irrigated | Homestead |
| AGSECO | AG Icon | - | 14.3 | 11.2 | 12.3 | 10.2 | 10.7 | 15.8 | 11.5 |
| AgriMAXX | AM Cartwright | - | - | - | - | - | - | 15.9 | - |
| AgriMAXX | AM Eastwood | 11.3 | - | 10.9 | - | 9.7 | - | 15.8 | 10.8 |
| AgriPro | Ap EverRock | - | 13.5 | - | - | - | - | - | - |
| OGI | Baker's Ann | 12.0 | 14.9 | 10.7 | 12.7 | 10.3 | 10.9 | 15.9 | 11.9 |
| OGI | Bentley | 11.4 | 13.7 | 9.7 | 11.2 | 10.3 | 10.0 | 15.7 | 10.7 |
| AgriPro | Bob Dole | 11.4 | 14.8 | 10.3 | 11.9 | 10.4 | 10.3 | 15.8 | 11.0 |
| PlainsGold | Canvas | - | 11.5 | 10.3 | 12.1 | 9.9 | - | 14.6 | 10.9 |
| CROPLAN | CP7010 | - | 11.4 | - | - | - | - | 14.4 | - |
| CROPLAN | CP7869 | 11.4 | 11.6 | - | - | - | - | 14.8 | - |
| CROPLAN | CP7909 | - | 12.9 | - | - | - | - | 15.8 | - |
| PlainsGold | Crescent AX | - | 14.2 | 9.9 | 12.0 | 10.1 | - | 15.4 | 11.8 |
| OGI | Doublestop CL Plus | 11.9 | 11.2 | 11.1 | 13.3 | 11.1 | 11.1 | 16.3 | 12.2 |
| OGI | Duster | 11.2 | 13.8 | 10.0 | - | 10.2 | 10.3 | 15.6 | 11.4 |
| KWA | Everest | 13.0 | - | - | - | - | - | - | - |
| OGI | Gallagher | 11.1 | 12.7 | 9.7 | 12.3 | 9.9 | 10.4 | 16.4 | 10.7 |
| OGI | Green Hammer | 11.5 | 15.1 | - | 13.4 | 11.2 | 12.0 | - | 13.0 |
| PlainsGold | Guardian | - | 11.7 | - | - | - | - | 14.9 | 11.1 |
| OGI | Iba | - | 12.3 | 10.2 | 11.3 | 10.3 | - | 14.1 | 10.3 |
| KWA | KS Dallas | - | 13.3 | - | - | - | - | 15.3 | - |
| KWA | KS Silverado | - | 13.2 | - | - | - | - | 15.5 | - |
| KWA | KS Western Star | - | 12.1 | - | - | - | - | 14.2 | - |
| PlainsGold | Langin | - | 14.1 | 9.5 | 11.7 | 9.6 | - | 15.0 | 10.9 |
| LCS | LCS Chrome | 11.6 | 13.3 | 11.0 | 13.0 | 11.5 | 10.9 | 15.7 | 12.2 |
| LCS | LCS Photon AX | - | 14.9 | - | - | - | - | 15.9 | - |
| OGI | Lonerider | - | - | 10.6 | - | - | - | 16.3 | - |
| Dyna-Gro | Long Branch | - | - | 10.1 | - | - | - | 15.0 | - |
| OGI | OK Corral | 11.5 | 11.2 | 9.5 | 11.9 | 10.0 | 9.8 | 16.1 | 10.5 |
| OGI | Ruby Lee | 11.3 | 14.7 | - | - | 10.4 | 10.7 | - | 10.9 |
| OGI | Showdown | 10.9 | 12.2 | 9.8 | 11.8 | 9.8 | 10.4 | 15.1 | 10.4 |
| OGI | Skydance | 12.5 | 14.2 | - | - | - | 10.7 | - | - |
| OGI | Smith's Gold | 11.1 | 12.8 | 9.8 | 12.5 | 10.4 | 10.9 | 15.8 | 11.8 |
| OGI | Spirit Rider | - | - | 10.6 | - | 10.2 | - | 16.6 | 11.1 |
| AgriPro | SY Achieve CL2 | 11.2 | 14.3 | - | - | - | - | 17.4 | - |
| AgriPro | SY Benefit | 12.0 | 14.4 | - | - | - | - | 16.1 | - |
| AgriPro | SY Rugged | - | 13.6 | 9.7 | 11.2 | 10.2 | 10.7 | 14.4 | 10.9 |
| AgriPro | SY Wolverine | - | - | 9.9 | - | - | - | 14.9 | - |
| AGSECO | TAM 114 | - | 12.8 | 11.0 | 12.5 | 9.9 | - | 15.8 | - |
| WestBred | WB4269 | 11.7 | 14.7 | 10.9 | 11.1 | 9.9 | 10.1 | 15.3 | 11.4 |
| WestBred | WB4401 | - | 13.8 | - | - | - | - | - | - |
| WestBred | WB4515 | 12.0 | 11.9 | - | - | - | - | 17.2 | - |
| WestBred | WB4595 | - | 10.7 | - | - | 9.6 | - | 14.8 | 10.0 |
| WestBred | WB4699 | - | 10.5 | 9.7 | 11.6 | 9.4 | - | 14.2 | 10. |
| WestBred | WB4792 | 10.7 | 11.6 | 8.8 | 11.2 | 10.3 | - | 14.1 | 10.5 |
| KWA | Zenda | 10.5 | 14.3 | - | 12.1 | 10.7 | 9.9 | 15.2 | 11.5 |
| OSU Experimentals | | | | | | | | | |
| | OCW04S717T-6W | - | 14.0 | - | - | 10.2 | 11.1 | - | 12.3 |
| | OK12912C-138407-2 | - | 13.4 | - | 12.9 | 10.3 | 10.5 | - | 11.7 |
| | OK15MASBx7ARS 8-1 | 12.3 | 12.4 | 9.7 | - | 10.1 | 9.5 | 15.9 | 11.0 |
| | OK16107117 | - | - | 9.0 | - | 10.0 | - | 15.3 | - |
| | OK16729W | 10.8 | 13.7 | 9.8 | 11.3 | 10.7 | 10.1 | 14.7 | 11.0 |
| | OK168512 | - | - | 10.0 | 12.1 | 10.1 | - | 15.3 | - |
| | OK16D101089 | - | 13.5 | - | 12.4 | 10.6 | 10.1 | - | 11.5 |
| | OK188608 | - | 12.8 | - | - | - | 10.4 | - | - |
| Mean | | 11.5 | 13.1 | 10.1 | 12.1 | 10.2 | 10.5 | 15.5 | 11.2 |
| LSD (0.05) | | 0.9 | 1.4 | 1.1 | 0.5 | 1.2 | 0.5 | 0.6 | 1.3 |

Note: shaded values are not statistically different from the greatest value within a column (i.e., location).

Table 1. Wheat protein concentration (12% moisture basis) of varieties and experimental lines tested in the 2019-2020 Oklahoma Wheat Variety Performance Tests. (cont'd)

| Licensee | Variety | %wheat protein concentration | | | | | | | |
|--------------------------|--------------------|------------------------------|-------------|-------------|-------------|-------------|------------------|-------------|------------|
| | | Hooker | Keyes | Kildare | Kingfisher | Lahoma | Lahoma Fungicide | Lamont | Walters |
| AGSECO | AG Icon | 14.4 | 12.2 | 10.6 | 16.3 | 13.5 | 13.2 | 12.6 | - |
| AgriMAXX | AM Cartwright | - | - | - | - | 12.4 | 12.7 | - | - |
| AgriMAXX | AM Eastwood | 15.2 | 13.5 | 9.9 | 16.7 | 12.8 | 13.0 | 12.5 | - |
| AgriPro | Ap EverRock | - | - | - | - | 13.5 | 13.8 | - | - |
| OGI | Baker's Ann | 15.4 | 13.4 | 10.1 | 17.0 | 13.5 | 14.0 | 12.7 | 11.4 |
| OGI | Bentley | 14.9 | 12.2 | 9.4 | 16.6 | 12.7 | 12.8 | 12.0 | 9.8 |
| AgriPro | Bob Dole | 14.7 | 12.9 | 9.8 | 16.4 | 13.0 | 12.8 | 12.4 | 9.5 |
| PlainsGold | Canvas | 14.3 | 11.4 | - | - | 12.6 | 12.7 | - | - |
| CROPLAN | CP7010 | - | - | - | - | 12.2 | 11.9 | - | - |
| CROPLAN | CP7869 | - | - | - | - | 13.1 | 13.1 | - | - |
| CROPLAN | CP7909 | - | - | - | - | 12.9 | 13.0 | - | - |
| PlainsGold | Crescent AX | 14.5 | 12.1 | - | - | 12.4 | 12.4 | - | - |
| OGI | Doublestop CL Plus | 15.4 | 13.9 | 11.3 | 16.9 | 13.7 | 14.1 | 13.6 | 10.0 |
| OGI | Duster | 14.5 | 12.6 | - | 16.0 | 12.9 | 13.0 | 12.3 | 9.3 |
| KWA | Everest | - | - | - | - | - | - | - | - |
| OGI | Gallagher | 13.9 | 13.2 | 9.6 | 16.4 | 12.8 | 13.3 | 12.0 | 9.8 |
| OGI | Green Hammer | - | - | 11.5 | 17.3 | 14.0 | 14.6 | 13.9 | 10.3 |
| PlainsGold | Guardian | - | - | - | - | 12.8 | 13.0 | - | - |
| OGI | Iba | 13.4 | 12.4 | 9.2 | - | 12.2 | 12.4 | 11.0 | 9.5 |
| KWA | KS Dallas | - | - | - | - | 13.3 | 13.4 | - | - |
| KWA | KS Silverado | - | - | - | - | 13.2 | 12.9 | - | - |
| KWA | KS Western Star | - | - | - | - | 12.8 | 12.9 | - | - |
| PlainsGold | Langin | 13.9 | 11.4 | - | - | 12.6 | 12.7 | - | - |
| LCS | LCS Chrome | 14.8 | 12.7 | 11.2 | 16.6 | 15.1 | 14.0 | 12.7 | 9.4 |
| LCS | LCS Photon AX | - | - | - | - | 13.4 | 13.6 | - | - |
| OGI | Lonerider | 15.9 | 13.0 | - | - | - | - | - | - |
| Dyna-Gro | Long Branch | 14.2 | 11.2 | - | - | - | - | - | - |
| OGI | OK Corral | 15.2 | 12.4 | 10.0 | 17.2 | 13.3 | 13.5 | 12.5 | 10.3 |
| OGI | Ruby Lee | - | - | - | 16.8 | 13.8 | 14.3 | 12.9 | 10.4 |
| OGI | Showdown | 15.2 | 11.8 | 9.6 | 16.6 | 12.6 | 13.3 | 11.4 | 9.1 |
| OGI | Skydance | - | - | - | 16.4 | - | - | - | 10.6 |
| OGI | Smith's Gold | 14.3 | 12.8 | 10.2 | 16.5 | 13.4 | 13.3 | 12.4 | 9.5 |
| OGI | Spirit Rider | 15.8 | 13.1 | 10.0 | - | 13.5 | 13.7 | 12.8 | - |
| AgriPro | SY Achieve CL2 | - | - | 10.2 | - | 13.6 | 14.2 | 12.6 | - |
| AgriPro | SY Benefit | - | - | - | 16.3 | 12.1 | 12.5 | 11.5 | - |
| AgriPro | SY Rugged | 14.8 | 11.9 | 9.7 | 16.3 | 12.5 | 12.5 | 11.6 | 9.7 |
| AgriPro | SY Wolverine | 13.8 | 11.9 | - | - | - | - | - | - |
| AGSECO | TAM 114 | 15.0 | 13.1 | - | - | 13.0 | 13.2 | - | - |
| WestBred | WB4269 | 14.5 | 13.1 | 10.0 | 15.5 | 12.1 | 12.0 | 11.6 | 9.1 |
| WestBred | WB4401 | - | - | - | - | 12.0 | 12.4 | - | - |
| WestBred | WB4515 | - | - | - | - | 13.9 | 14.5 | - | - |
| WestBred | WB4595 | - | - | - | 16.3 | 11.9 | 11.8 | 11.4 | - |
| WestBred | WB4699 | 13.8 | 11.9 | 9.0 | - | 11.9 | 11.9 | 11.1 | - |
| WestBred | WB4792 | 13.5 | 11.0 | 9.4 | 16.5 | 11.7 | 11.7 | 11.3 | 8.8 |
| KWA | Zenda | - | - | 10.3 | 16.4 | 13.1 | 13.2 | 12.2 | 10.2 |
| OSU Experimentals | | | | | | | | | |
| | OCW04S717T-6W | - | - | 10.8 | 16.9 | 13.9 | 13.7 | 13.1 | 10.1 |
| | OK12912C-138407-2 | - | - | 10.5 | 16.6 | 13.7 | 13.9 | 13.1 | 9.6 |
| | OK15MASBx7ARS 8-1 | 14.5 | 13.0 | 9.6 | 16.3 | 12.3 | 12.6 | 12.0 | 10.2 |
| | OK16107117 | 15.1 | 12.8 | - | - | - | - | - | - |
| | OK16729W | 14.8 | 11.9 | 9.7 | 15.6 | 12.2 | 9.6 | 12.2 | 9.3 |
| | OK168512 | 14.7 | 12.5 | - | - | - | - | - | - |
| | OK16D101089 | - | - | 10.9 | 15.9 | 13.4 | 13.4 | 12.7 | 9.8 |
| | OK188608 | - | - | - | 16.5 | - | - | - | 10.3 |
| | Mean | 14.6 | 12.5 | 10.1 | 16.5 | 13.0 | 13.0 | 12.3 | 9.8 |
| | LSD (0.05) | 0.8 | 0.7 | 0.9 | 0.7 | 0.8 | 1.3 | 0.6 | 0.7 |

Note: shaded values are not statistically different from the greatest value within a column (i.e., location).

Table 2. Wheat protein concentration relative to the location mean (expressed as a deviation) for varieties and experimental lines in the 2019-2020 Oklahoma Wheat Variety Performance Tests.

| | | <i>Afton</i> | <i>Altus</i> | <i>Balko</i> | <i>Buffalo</i> | <i>Cherokee</i> | <i>El Reno</i> | <i>Goodwell Irrigated</i> | <i>Homestead</i> |
|--------------------------|--------------------|--|--------------|--------------|----------------|-----------------|----------------|---------------------------|------------------|
| Licensee | Variety | ----- % wheat protein relative to location mean----- | | | | | | | |
| AGSECO | AG Icon | - | 1.2 | 1.1 | 0.3 | 0.0 | 0.2 | 0.3 | 0.3 |
| AgriMAXX | AM Cartwright | - | - | - | - | - | - | 0.4 | - |
| AgriMAXX | AM Eastwood | -0.2 | - | 0.8 | - | -0.5 | - | 0.3 | -0.4 |
| AgriPro | Ap EverRock | - | 0.4 | - | - | - | - | - | - |
| OGI | Baker's Ann | 0.5 | 1.8 | 0.6 | 0.6 | 0.1 | 0.4 | 0.4 | 0.7 |
| OGI | Bentley | -0.1 | 0.6 | -0.4 | -0.8 | 0.1 | -0.5 | 0.2 | -0.5 |
| AgriPro | Bob Dole | -0.1 | 1.7 | 0.2 | -0.2 | 0.1 | -0.2 | 0.3 | -0.2 |
| PlainsGold | Canvas | - | -1.6 | 0.2 | 0.1 | -0.3 | - | -0.9 | -0.3 |
| CROPLAN | CP7010 | - | -1.7 | - | - | - | - | -1.1 | - |
| CROPLAN | CP7869 | -0.1 | -1.5 | - | - | - | - | -0.8 | - |
| CROPLAN | CP7909 | - | -0.2 | - | - | - | - | 0.3 | - |
| PlainsGold | Crescent AX | - | 1.1 | -0.2 | -0.1 | -0.1 | - | -0.2 | 0.6 |
| OGI | Doublestop CL Plus | 0.4 | -1.9 | 1.0 | 1.2 | 0.9 | 0.6 | 0.8 | 1.0 |
| OGI | Duster | -0.3 | 0.7 | -0.1 | - | 0.0 | -0.2 | 0.1 | 0.2 |
| KWA | Everest | 1.5 | - | - | - | - | - | - | - |
| OGI | Gallagher | -0.4 | -0.4 | -0.4 | 0.2 | -0.3 | -0.1 | 0.9 | -0.5 |
| OGI | Green Hammer | 0.0 | 2.0 | - | 1.3 | 0.9 | 1.5 | - | 1.8 |
| PlainsGold | Guardian | - | -1.4 | - | - | - | - | -0.6 | -0.1 |
| OGI | Iba | - | -0.8 | 0.1 | -0.7 | 0.1 | - | -1.4 | -0.9 |
| KWA | KS Dallas | - | 0.2 | - | - | - | - | -0.3 | - |
| KWA | KS Silverado | - | 0.1 | - | - | - | - | -0.1 | - |
| KWA | KS Western Star | - | -1.1 | - | - | - | - | -1.3 | - |
| PlainsGold | Langin | - | 1.0 | -0.6 | -0.3 | -0.7 | - | -0.5 | -0.3 |
| LCS | LCS Chrome | 0.1 | 0.2 | 0.9 | 0.9 | 1.3 | 0.4 | 0.2 | 1.0 |
| LCS | LCS Photon AX | - | 1.8 | - | - | - | - | 0.4 | - |
| OGI | Lonerider | - | - | 0.5 | - | - | - | 0.8 | - |
| Dyna-Gro | Long Branch | - | - | 0.0 | - | - | - | -0.5 | - |
| OGI | OK Corral | 0.0 | -1.9 | -0.6 | -0.2 | -0.2 | -0.7 | 0.6 | -0.7 |
| OGI | Ruby Lee | -0.2 | 1.6 | - | - | 0.1 | 0.2 | - | -0.3 |
| OGI | Showdown | -0.6 | -0.9 | -0.3 | -0.2 | -0.4 | -0.1 | -0.4 | -0.8 |
| OGI | Skydance | 1.0 | 1.1 | - | - | - | -0.2 | - | - |
| OGI | Smith's Gold | -0.4 | -0.3 | -0.3 | 0.4 | 0.2 | 0.4 | 0.3 | 0.6 |
| OGI | Spirit Rider | - | - | 0.5 | - | 0.0 | - | 1.1 | -0.1 |
| AgriPro | SY Achieve CL2 | -0.3 | 1.2 | - | - | - | - | 1.9 | - |
| AgriPro | SY Benefit | 0.4 | 1.3 | - | - | - | - | 0.6 | - |
| AgriPro | SY Rugged | - | 0.5 | -0.4 | -0.9 | 0.0 | 0.2 | -1.1 | -0.3 |
| AgriPro | SY Wolverine | - | - | -0.2 | - | - | - | -0.6 | - |
| AGSECO | TAM 114 | - | -0.4 | 0.9 | 0.4 | -0.3 | - | 0.3 | - |
| WestBred | WB4269 | 0.2 | 1.6 | 0.8 | -1.0 | -0.3 | -0.4 | -0.2 | 0.2 |
| WestBred | WB4401 | - | 0.7 | - | - | - | - | - | - |
| WestBred | WB4515 | 0.5 | -1.2 | - | - | - | - | 1.7 | - |
| WestBred | WB4595 | - | -2.4 | - | - | -0.6 | - | -0.7 | -1.2 |
| WestBred | WB4699 | - | -2.6 | -0.4 | -0.5 | -0.8 | - | -1.3 | -0.9 |
| WestBred | WB4792 | -0.8 | -1.6 | -1.3 | -0.9 | 0.0 | - | -1.4 | -0.7 |
| KWA | Zenda | -1.0 | 1.2 | - | 0.1 | 0.5 | -0.6 | -0.3 | 0.3 |
| OSU Experimentals | | | | | | | | | |
| | OCW04S717T-6W | - | 0.9 | - | - | 0.0 | 0.6 | - | 1.1 |
| | OK12912C-138407-2 | - | 0.3 | - | 0.9 | 0.1 | 0.0 | - | 0.5 |
| | OK15MASBx7ARS 8-1 | 0.8 | -0.7 | -0.4 | - | -0.1 | -1.0 | 0.4 | -0.2 |
| | OK16107117 | - | - | -1.1 | - | -0.2 | - | -0.3 | - |
| | OK16729W | -0.7 | 0.6 | -0.3 | -0.8 | 0.5 | -0.4 | -0.8 | -0.2 |
| | OK168512 | - | - | -0.1 | 0.1 | -0.1 | - | -0.2 | - |
| | OK16D101089 | - | 0.4 | - | 0.3 | 0.4 | -0.4 | - | 0.3 |
| | OK188608 | - | -0.3 | - | - | - | -0.1 | - | - |
| Location mean | | 11.5 | 13.1 | 10.1 | 12.1 | 10.2 | 10.5 | 15.5 | 11.2 |
| LSD (0.05) | | 0.9 | 1.4 | 1.1 | 0.5 | 1.2 | 0.5 | 0.6 | 1.3 |

Table 2. Wheat protein concentration relative to the location mean (expressed as a deviation) for varieties and experimental lines in the 2019-2020 Oklahoma Wheat Variety Performance Tests (cont'd).

| Licensee | Variety | Lahoma | | | | | | | |
|--|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|
| | | Hooker | Keyes | Kildare | Kingfisher | Lahoma | Fungicide | Lamont | Walters |
| ----- % wheat protein relative to location mean----- | | | | | | | | | |
| AGSECO | AG Icon | -0.2 | -0.3 | 0.5 | -0.2 | 0.6 | 0.2 | 0.3 | - |
| AgriMAXX | AM Cartwright | - | - | - | - | -0.5 | -0.4 | - | - |
| AgriMAXX | AM Eastwood | 0.6 | 1.0 | -0.2 | 0.2 | -0.2 | 0.0 | 0.2 | - |
| AgriPro | Ap EverRock | - | - | - | - | 0.5 | 0.8 | - | - |
| OGI | Baker's Ann | 0.8 | 0.9 | 0.0 | 0.5 | 0.5 | 1.0 | 0.4 | 1.6 |
| OGI | Bentley | 0.3 | -0.3 | -0.7 | 0.1 | -0.3 | -0.2 | -0.3 | 0.0 |
| AgriPro | Bob Dole | 0.1 | 0.4 | -0.3 | -0.1 | 0.0 | -0.2 | 0.1 | -0.3 |
| PlainsGold | Canvas | -0.3 | -1.1 | - | - | -0.3 | -0.3 | - | - |
| CROPLAN | CP7010 | - | - | - | - | -0.8 | -1.1 | - | - |
| CROPLAN | CP7869 | - | - | - | - | 0.2 | 0.1 | - | - |
| CROPLAN | CP7909 | - | - | - | - | 0.0 | 0.0 | - | - |
| PlainsGold | Crescent AX | -0.1 | -0.4 | - | - | -0.5 | -0.6 | - | - |
| OGI | Doublestop CL Plus | 0.8 | 1.4 | 1.2 | 0.4 | 0.7 | 1.0 | 1.3 | 0.2 |
| OGI | Duster | -0.1 | 0.1 | - | -0.5 | 0.0 | 0.0 | 0.0 | -0.6 |
| KWA | Everest | - | - | - | - | - | - | - | - |
| OGI | Gallagher | -0.7 | 0.7 | -0.5 | -0.1 | -0.1 | 0.2 | -0.3 | 0.0 |
| OGI | Green Hammer | - | - | 1.4 | 0.8 | 1.0 | 1.5 | 1.6 | 0.5 |
| PlainsGold | Guardian | - | - | - | - | -0.1 | 0.0 | - | - |
| OGI | Iba | -1.2 | -0.1 | -0.9 | - | -0.7 | -0.6 | -1.3 | -0.4 |
| KWA | KS Dallas | - | - | - | - | 0.3 | 0.3 | - | - |
| KWA | KS Silverado | - | - | - | - | 0.2 | -0.2 | - | - |
| KWA | KS Western Star | - | - | - | - | -0.1 | -0.2 | - | - |
| PlainsGold | Langin | -0.7 | -1.1 | - | - | -0.4 | -0.3 | - | - |
| LCS | LCS Chrome | 0.2 | 0.2 | 1.1 | 0.1 | 2.2 | 0.9 | 0.4 | -0.4 |
| LCS | LCS Photon AX | - | - | - | - | 0.5 | 0.6 | - | - |
| OGI | Lonerider | 1.3 | 0.5 | - | - | - | - | - | - |
| Dyna-Gro | Long Branch | -0.4 | -1.3 | - | - | - | - | - | - |
| OGI | OK Corral | 0.6 | -0.1 | -0.1 | 0.7 | 0.4 | 0.5 | 0.2 | 0.5 |
| OGI | Ruby Lee | - | - | - | 0.3 | 0.8 | 1.3 | 0.6 | 0.6 |
| OGI | Showdown | 0.6 | -0.7 | -0.5 | 0.1 | -0.3 | 0.3 | -0.9 | -0.7 |
| OGI | Skydance | - | - | - | -0.1 | - | - | - | 0.8 |
| OGI | Smith's Gold | -0.3 | 0.3 | 0.1 | 0.0 | 0.4 | 0.3 | 0.1 | -0.3 |
| OGI | Spirit Rider | 1.2 | 0.6 | -0.1 | - | 0.6 | 0.7 | 0.5 | - |
| AgriPro | SY Achieve CL2 | - | - | 0.1 | 0.6 | 0.7 | 1.2 | 0.4 | - |
| AgriPro | SY Benefit | - | - | - | -0.2 | -0.9 | -0.6 | -0.8 | - |
| AgriPro | SY Rugged | 0.2 | -0.6 | -0.4 | -0.2 | -0.4 | -0.5 | -0.7 | -0.1 |
| AgriPro | SY Wolverine | -0.8 | -0.6 | - | - | - | - | - | - |
| AGSECO | TAM 114 | 0.4 | 0.6 | - | - | 0.1 | 0.2 | - | - |
| WestBred | WB4269 | -0.1 | 0.6 | -0.1 | -1.0 | -0.8 | -1.0 | -0.7 | -0.7 |
| WestBred | WB4401 | - | - | - | - | -0.9 | -0.7 | - | - |
| WestBred | WB4515 | - | - | - | - | 0.9 | 1.4 | - | - |
| WestBred | WB4595 | - | - | - | -0.2 | -1.0 | -1.3 | -0.9 | - |
| WestBred | WB4699 | -0.8 | -0.6 | -1.1 | - | -1.1 | -1.1 | -1.2 | - |
| WestBred | WB4792 | -1.1 | -1.5 | -0.7 | 0.0 | -1.3 | -1.3 | -1.0 | -1.0 |
| KWA | Zenda | - | - | 0.2 | -0.1 | 0.1 | 0.2 | -0.1 | 0.4 |
| OSU Experimentals | | | | | | | | | |
| | OCW04S717T-6W | - | - | 0.7 | 0.4 | 1.0 | 0.7 | 0.8 | 0.3 |
| | OK12912C-138407-2 | - | - | 0.4 | 0.1 | 0.7 | 0.8 | 0.8 | -0.3 |
| | OK15MASBx7ARS 8-1 | -0.1 | 0.5 | -0.5 | -0.2 | -0.6 | -0.4 | -0.2 | 0.4 |
| | OK16107117 | 0.5 | 0.3 | - | - | - | - | - | - |
| | OK16729W | 0.2 | -0.6 | -0.4 | -0.9 | -0.7 | -3.4 | -0.1 | -0.5 |
| | OK168512 | 0.1 | 0.0 | - | - | - | - | - | - |
| | OK16D101089 | - | - | 0.8 | -0.6 | 0.5 | 0.4 | 0.4 | 0.0 |
| | OK188608 | - | - | - | 0.0 | - | - | - | 0.5 |
| Location mean | | 14.6 | 12.5 | 10.1 | 16.5 | 13.0 | 13.0 | 12.3 | 9.8 |
| LSD (0.05) | | 0.8 | 0.7 | 0.9 | 0.7 | 0.8 | 1.3 | 0.6 | 0.7 |

Participating Seed Companies

AgriMAXX Wheat Company

Matt Wehmeyer
7167 Highbanks Road
Mascoutah, IL 62258
Phone: (855) 629-9432
Email: matt@agrimaxxwheat.com
www.agrimaxxwheat.com
Variety: AM Cartwright, AM Eastwood

AgriPro

Greg McCormack
8750 NW 66th St.
Silver Lake, KS 66539
Phone: (620) 532-6283
Email: greg.mccormack@syngenta.com
www.agriprowheat.com
Varieties: AP EverRock, Bob Dole, SY Achieve CL2, SY Benefit, SY Rugged, SY Wolverine

AGSECO, Inc.

Steve Ahring
P.O. Box 7
Girard, KS 66743
Phone: (620) 724-6223
Email: steve@delangeseed.com www.agseco.com
Varieties: AG Icon, TAM 114

CROPLAN by Winfield United

Cameron Aker
500 North 1st street
Vincent, IA 50594
Garrison, ND 58540
Phone: (515) 356-4524
Email: claker@landolakes.com
www.croplan.com
Variety: CP7010, CP7869, CP7909

Dyna-Gro Seed

Shawn Carter
3492 Long Prairie Road Suite 200
Flower Mound, TX 75022
Phone: (318) 282-9804
Email: shawn.carter@nutrien.com
www.dynagroseed.com
Variety: Long Branch

Kansas Wheat Alliance (KWA)

Daryl Strouts
1990 Kimball Ave. Suite 200
Manhattan, KS 66502
Phone: (785) 320-4080
Email: kwa@kansas.net www.ksweatalliance.org
Varieties: KS Dallas, KS Silverado, KS Western Star, Zenda

Limagrain Cereal Seeds (LCS)

Nathan Miller
6414 N Sheridan street
Wichita, KS 67204
Phone: (316) 755-2042
Email: nathan.miller@limagrain.com www.limagraincereal-seeds.com
Varieties: LCS Chrome, LCS Photon AX, T173

Oklahoma Genetics Inc. (OGI)

Mark Hodges
201 South Range Road
Stillwater, OK 74074
Phone: (405) 744-4347
Email: hodgesm1@cox.net www.okgenetics.com
Varieties: Baker's Ann, Bentley, Doublestop CL Plus, Duster, Gallagher, Green Hammer, Iba, Lonerider, OK Corral, Ruby Lee, Showdown, Skydance, Smith's Gold, Spirit Rider

PlainsGold

(Colorado Wheat Research Foundation)
Brad Erker/Tyler Benninghoven
4026 S. Timberline Road Suite 100
Fort Collins, CO 80525
Phone: (970) 449-6994
Email: tbenninghoven@coloradowheat.org
www.plainsgold.com
Variety: Canvas, Crescent AX, Guardian, Langin

WestBred

John Fenderson
1616 E. Glencoe Road
Stillwater, OK 74075
Phone: (620) 243-4263
Email: john.fenderson@bayer.com
www.westbred.com
Varieties: WB4269, WB4401, WB4515, WB4595, WB4699, WB4792

The Oklahoma Cooperative Extension Service

Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

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.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- 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.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

Oklahoma State University, as an equal opportunity employer, complies with all applicable federal and state laws regarding non-discrimination and affirmative action. Oklahoma State University is committed to a policy of equal opportunity for all individuals and does not discriminate based on race, religion, age, sex, color, national origin, marital status, sexual orientation, gender identity/ expression, disability, or veteran status with regard to employment, educational programs and activities, and/or admissions. For more information, visit <https://eeo.okstate.edu>.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President for Agricultural Programs and has been prepared and distributed at a cost of 20 cents per copy. Revised 08/2020 GH.