



Current Report

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

Protein Content of Winter Wheat Varieties in Oklahoma—2014

Jeff Edwards
Small Grains Extension Specialist

Rick Kochenower
Panhandle Area Agronomist

Robert Calhoun
Senior Agriculturalist

Matt Knori
Research Technician

Brett Carver
Wheat Breeder

Romulo Lollato
Graduate Assistant

Giovana Cruppe
Graduate Assistant

General Information

Protein is just one of many attributes which 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, differences in varietal protein among environments are generally much larger than differences among varieties. Factors such as nitrogen fertility and drought stress, for example, can sharply impact final protein content of the grain.

To reflect these environmental impacts on wheat grain protein content, data are reported by variety and location in Table 1. The 18.5% average wheat grain protein for the Thomas location is a good example of how fertility and environment can impact protein content (Table 1). Soil tests at the time of sowing revealed 141 lb/acre of residual nitrogen available, which should be enough to produce a 70 bu/acre wheat crop. Due to extreme drought, however, average grain yield at Thomas was 13 bu/acre. Under these circumstances, wheat plants were able to pull large amounts of nitrogen from the soil and move this nitrogen to the developing grain. Grain size was reduced and grains were shriveled due to drought, thus resulting in abnormally high wheat protein. A similar situation was reported for Altus in 2013.

In Table 2 we reported the wheat grain protein content as a deviation from location mean for each variety, as this provides easier comparison of wheat grain protein among varieties across locations. Billings, for example, is a variety with solidly positive deviation from location means, indicating it has a tendency for above-average grain protein content. Iba, on the other hand, has negative deviations from location

means, indicating a tendency for lower than average grain protein content. Adequate nitrogen fertility as recommended by a recent soil test or sensor-based nitrogen management program can help ensure that varieties such as Iba produce grain 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 grain protein content.

Procedures

Approximately 600g 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 *2014 Oklahoma Small Grains Variety Performance Tests* on the web at www.wheat.okstate.edu. Samples were stored in plastic containers for approximately three months following harvest. Samples were nondestructively analyzed for protein content using a Diode Array Near Infrared instrument (NIR) (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

Table 1. Wheat protein content of varieties and experimental lines tested in the 2014 Oklahoma Wheat Variety Performance Tests.

Source	Variety	%wheat protein (12% moisture basis)						
		Afton	Chickasha	Chickasha IWM	Goodwell Irrigated	Homestead	Hooker	Kingfisher
WestBred	Armour	-	15.7	16.6	14.7	-	-	-
OGI	Billings	12.9	17.6	17.1	15.3	14.6	16.5	12.3
PlainsGold	Brawl CL Plus	-	16.3	17.0	14.8	14.4	16.5	12.9
PlainsGold	Byrd	-	14.9	16.3	15.1	14.4	16.3	10.1
OGI	Centerfield	-	16.9	16.8	15.8	-	-	-
Syngenta	CJ	12.7	16.0	16.6	14.8	-	-	-
OSU	Deliver	-	15.2	15.2	14.8	-	-	11.6
Syngenta	Doans	13.7	16.6	16.7	15.4	13.8	16.3	11.9
OGI	Doublestop CL Plus	14.2	17.6	17.4	15.8	15.6	16.5	12.3
OGI	Duster	11.9	15.2	16.3	14.9	14.2	16.1	10.2
OSU	Endurance	12.6	15.3	15.8	13.7	13.6	15.1	10.3
KWA	Everest	12.8	15.2	16.1	15.0	14.7	15.8	11.4
OGI	Gallagher	12.3	16.5	16.8	15.2	14.0	16.8	10.8
OGI	Garrison	13.8	16.9	17.6	15.2	15.4	16.1	11.5
Syngenta	Greer	13.4	17.0	17.1	14.9	14.8	16.3	11.2
OGI	Iba	12.1	15.0	16.3	13.8	13.5	15.4	10.9
Syngenta	Jackpot	13.0	16.0	17.0	15.3	13.8	16.0	11.4
LCS	LCH11-109	-	16.8	16.8	14.2	-	-	-
LCS	LCH11-1117	-	15.7	16.0	14.5	-	-	-
LCS	LCS Mint	13.0	15.6	16.9	14.5	13.6	15.9	10.9
LCS	LCS Pistol	13.3	16.3	16.5	14.4	-	-	-
LCS	LCS Wizard	-	15.5	16.9	14.5	14.7	16.3	12.3
USDA	Mace	-	-	-	14.9	-	16.9	-
OGI	OK Bullet	-	17.2	17.2	15.6	-	-	-
OGI	OK Rising	-	17.4	17.5	15.5	-	-	-
OGI	Pete	-	15.0	15.4	14.3	-	-	-
OGI	Ruby Lee	13.0	16.9	16.7	15.8	14.3	16.3	12.0
Syngenta	SY Llano	-	15.8	16.3	15.1	-	-	-
Syngenta	SY Southwind	12.2	16.3	17.2	-	-	-	-
LCS	T153	-	15.4	16.0	14.7	-	-	-
LCS	T154	-	15.9	16.1	14.6	13.1	-	-
LCS	T158	11.5	16.1	16.5	14.1	13.0	15.7	10.8
Watley	TAM 112	-	15.4	16.8	15.1	-	16.6	-
AGSECO	TAM 113	-	15.3	15.6	15.2	-	15.9	-
WestBred	WB-Cedar	13.0	15.8	15.9	14.9	12.9	-	11.2
WestBred	WB-Grainfield	12.8	17.3	17.8	14.5	13.8	15.6	11.2
WestBred	WB-Redhawk	-	16.5	17.3	15.2	-	-	-
WestBred	WB4458	14.2	18.0	18.4	15.6	14.7	16.5	13.3
WestBred	Winterhawk	-	15.6	16.8	14.7	-	15.8	11.9
OSU Experimentals								
	OK08707W-19C13	-	-	-	15.6	-	-	-
	OK09125	-	15.4	17.0	15.6	14.1	16.2	11.4
	OK09520	-	15.2	15.5	14.4	13.4	-	11.6
	OK10126	13.2	18.1	18.6	15.4	-	-	-
	OK10728W	-	-	-	15.2	14.3	-	-
	OK10805W	-	16.8	16.7	15.3	14.7	-	-
	OK11754WF	12.7	-	-	-	14.5	-	-
Mean		12.9	16.2	16.7	15.0	14.2	16.1	11.5
LSD _(0.05)		0.7	0.9	1.2	0.9	0.5	0.9	1.3

NS = differences among varieties were nonsignificant

Table 1. Wheat protein content of varieties and experimental lines tested in the 2014 Oklahoma Wheat Variety Performance Tests (cont'd).

Source	Variety	%wheat protein (12% moisture basis)						
		Lahoma	Lahoma Fungicide	Marshall Dual Purpose	Marshall Grain Only	McLoud	Thomas	Walters
WestBred	Armour	14.0	14.0	-	-	-	-	-
OGI	Billings	14.5	14.7	18.4	16.6	16.5	19.0	-
PlainsGold	Brawl CL Plus	14.5	14.3	15.4	14.7	16.3	18.3	12.5
PlainsGold	Byrd	12.8	13.6	14.7	14.4	16.1	18.1	12.3
OGI	Centerfield	14.9	14.4	-	-	-	-	-
Syngenta	CJ	13.6	13.7	-	-	-	-	-
OSU	Deliver	13.7	14.4	-	-	15.2	17.6	-
Syngenta	Doans	13.9	13.6	16.8	15.1	16.5	18.3	12.5
OGI	Doublestop CL Plus	13.6	13.4	15.8	15.4	17.2	19.6	12.5
OGI	Duster	14.3	14.6	15.1	14.0	15.9	18.3	11.4
OSU	Endurance	13.6	14.1	14.7	14.1	15.6	17.8	11.7
KWA	Everest	14.5	14.1	16.7	15.8	16.1	18.8	11.4
OGI	Gallagher	14.2	14.4	15.4	15.7	16.4	18.2	12.1
OGI	Garrison	14.7	14.8	15.8	15.9	15.3	18.3	13.7
Syngenta	Greer	14.0	14.1	15.2	15.4	17.5	20.5	11.6
OGI	Iba	13.5	13.6	14.4	13.9	15.1	17.9	11.8
Syngenta	Jackpot	14.1	13.9	15.9	14.5	16.3	18.8	12.4
LCS	LCH11-109	13.8	14.4	-	-	-	-	-
LCS	LCH11-1117	12.4	13.2	-	-	-	-	-
LCS	LCS Mint	13.3	13.4	14.9	15.2	15.6	18.3	11.7
LCS	LCS Pistol	13.9	14.9	-	-	-	-	-
LCS	LCS Wizard	14.0	15.0	16.1	16.0	15.6	19.3	12.9
USDA	Mace	-	-	-	-	-	-	-
OGI	OK Bullet	15.3	15.0	-	-	-	-	-
OGI	OK Rising	14.5	14.9	-	-	-	-	-
OGI	Pete	13.1	13.0	-	-	-	-	-
OGI	Ruby Lee	14.7	14.2	15.7	15.8	15.8	18.3	11.4
Syngenta	SY Llano	12.5	13.0	-	-	-	-	-
Syngenta	SY Southwind	13.4	13.9	-	-	-	-	-
LCS	T153	13.2	13.4	-	-	-	-	-
LCS	T154	13.6	13.8	15.0	14.3	-	-	-
LCS	T158	12.8	12.8	14.9	13.9	15.7	18.4	11.4
Watley	TAM 112	14.4	14.9	-	-	-	-	12.1
AGSECO	TAM 113	12.5	13.1	-	-	-	-	11.0
WestBred	WB-Cedar	12.9	13.3	16.5	14.9	15.6	18.2	-
WestBred	WB-Grainfield	13.5	14.2	15.5	14.3	16.8	19.3	12.8
WestBred	WB-Redhawk	13.3	14.1	-	-	-	-	-
WestBred	WB4458	14.3	14.4	16.3	16.1	16.7	19.0	12.8
WestBred	Winterhawk	12.2	12.8	-	-	15.6	18.0	12.1
OSU Experimentals								
	OK08707W-19C13	-	-	-	-	-	-	-
	OK09125	13.4	13.9	15.5	14.6	-	18.7	12.9
	OK09520	12.6	13.3	15.6	13.6	-	18.1	-
	OK10126	14.3	14.5	-	-	17.9	-	-
	OK10728W	13.7	13.9	15.0	14.8	-	-	-
	OK10805W	13.5	14.3	-	-	-	-	12.7
	OK11754WF	14.0	13.9	-	-	-	-	-
Mean		13.7	14.0	15.6	15.0	16.1	18.5	12.2
LSD (0.05)		1.2	1.0	1.4	0.8	0.7	0.9	1.7

NS = differences among varieties were nonsignificant

Table 2. Wheat protein content relative to the location mean (expressed as a deviation) for varieties tested in the 2014 Oklahoma Wheat Variety Performance Tests.

Source	Variety	%wheat protein (12% moisture basis)						
		Afton	Chickasha	Chickasha IWM	Goodwell Irrigated	Homestead	Hooker	Kingfisher
WestBred	Armour	-	-0.5	-0.1	-0.3	-	-	-
OGI	Billings	0.0	1.4	0.4	0.4	0.5	0.3	0.8
PlainsGold	Brawl CL Plus	-	0.1	0.3	-0.2	0.3	0.4	1.5
PlainsGold	Byrd	-	-1.2	-0.4	0.1	0.2	0.2	-1.4
OGI	Centerfield	-	0.7	0.1	0.8	-	-	-
Syngenta	CJ	-0.3	-0.1	-0.1	-0.2	-	-	-
OSU	Deliver	-	-1.0	-1.5	-0.1	-	-	0.1
Syngenta	Doans	0.8	0.4	0.1	0.4	-0.3	0.2	0.5
OGI	Doublestop CL Plus	1.3	1.4	0.7	0.9	1.4	0.4	0.8
OGI	Duster	-1.1	-1.0	-0.4	-0.1	0.0	0.0	-1.3
OSU	Endurance	-0.3	-0.8	-0.9	-1.3	-0.6	-1.1	-1.1
KWA	Everest	-0.1	-0.9	-0.5	0.0	0.5	-0.4	-0.1
OGI	Gallagher	-0.6	0.3	0.1	0.3	-0.1	0.6	-0.7
OGI	Garrison	0.8	0.7	1.0	0.3	1.3	0.0	0.0
Syngenta	Greer	0.5	0.8	0.4	0.0	0.7	0.2	-0.3
OGI	Iba	-0.8	-1.2	-0.3	-1.1	-0.7	-0.7	-0.6
Syngenta	Jackpot	0.1	-0.2	0.3	0.3	-0.4	-0.2	-0.1
LCS	LCH11-109	-	0.6	0.1	-0.8	-	-	-
LCS	LCH11-1117	-	-0.4	-0.7	-0.5	-	-	-
LCS	LCS Mint	0.1	-0.5	0.2	-0.4	-0.5	-0.2	-0.6
LCS	LCS Pistol	0.4	0.1	-0.2	-0.5	-	-	-
LCS	LCS Wizard	-	-0.7	0.2	-0.5	0.5	0.1	0.8
USDA	Mace	-	-	-	-0.1	-	0.7	-
OGI	OK Bullet	-	1.1	0.5	0.6	-	-	-
OGI	OK Rising	-	1.2	0.8	0.5	-	-	-
OGI	Pete	-	-1.2	-1.3	-0.6	-	-	-
OGI	Ruby Lee	0.0	0.8	0.0	0.8	0.2	0.1	0.6
Syngenta	SY Llano	-	-0.3	-0.4	0.1	-	-	-
Syngenta	SY Southwind	-0.7	0.1	0.5	-	-	-	-
LCS	T153	-	-0.7	-0.7	-0.2	-	-	-
LCS	T154	-	-0.3	-0.6	-0.3	-1.0	-	-
LCS	T158	-1.4	-0.1	-0.2	-0.9	-1.2	-0.5	-0.6
Watley	TAM 112	-	-0.8	0.1	0.2	-	0.5	-
AGSECO	TAM 113	-	-0.8	-1.0	0.3	-	-0.2	-
WestBred	WB-Cedar	0.1	-0.4	-0.8	0.0	-1.2	-	-0.2
WestBred	WB-Grainfield	-0.1	1.1	1.1	-0.5	-0.4	-0.5	-0.3
WestBred	WB-Redhawk	-	0.3	0.6	0.3	-	-	-
WestBred	WB4458	1.3	1.8	1.7	0.6	0.5	0.3	1.8
WestBred	Winterhawk	-	-0.5	0.1	-0.3	-	-0.3	0.5
OSU Experimentals								
	OK08707W-19C13	-	-	-	0.6	-	-	-
	OK09125	-	-0.7	0.3	0.6	0.0	0.1	-0.1
	OK09520	-	-1.0	-1.2	-0.6	-0.7	-	0.2
	OK10126	0.3	2.0	1.9	0.4	-	-	-
	OK10728W	-	-	-	0.2	0.2	-	-
	OK10805W	-	0.6	0.1	0.3	0.5	-	-
	OK11754WF	-0.2	-	-	-	0.4	-	-
Location mean		12.9	16.2	16.7	15.0	14.2	16.1	11.5
LSD _(0.05)		0.7	0.9	1.2	0.9	0.5	0.9	1.3

Note: Actual protein for any variety can be calculated by adding the reported deviation to the appropriate location mean.

Table 2. Wheat protein content relative to the location mean (expressed as a deviation) for varieties tested in the 2014 Oklahoma Wheat Variety Performance Tests (cont'd).

Source	Variety	%wheat protein (12% moisture basis)						
		Lahoma	Lahoma Fungicide	Marshall Dual Purpose	Marshall Grain Only	McLoud	Thomas	Walters
WestBred	Armour	0.3	0.0	-	-	-	-	-
OGI	Billings	0.8	0.8	2.8	1.6	0.4	0.4	-
PlainsGold	Brawl CL Plus	0.7	0.3	-0.3	-0.3	0.1	-0.3	0.4
PlainsGold	Byrd	-0.9	-0.4	-0.9	-0.6	0.0	-0.5	0.2
OGI	Centerfield	1.2	0.4	-	-	-	-	-
Syngenta	CJ	-0.1	-0.3	-	-	-	-	-
OSU	Deliver	0.0	0.4	-	-	-1.0	-0.9	-
Syngenta	Doans	0.2	-0.4	1.1	0.1	0.3	-0.2	0.4
OGI	Doublestop CL Plus	-0.1	-0.5	0.1	0.5	1.0	1.1	0.4
OGI	Duster	0.6	0.6	-0.5	-0.9	-0.2	-0.2	-0.7
OSU	Endurance	-0.1	0.1	-0.9	-0.9	-0.6	-0.7	-0.5
KWA	Everest	0.8	0.1	1.1	0.8	-0.1	0.2	-0.8
OGI	Gallagher	0.5	0.4	-0.3	0.7	0.3	-0.3	-0.1
OGI	Garrison	0.9	0.8	0.2	0.9	-0.8	-0.2	1.5
Syngenta	Greer	0.3	0.1	-0.5	0.5	1.4	1.9	-0.5
OGI	Iba	-0.2	-0.4	-1.2	-1.1	-1.0	-0.7	-0.4
Syngenta	Jackpot	0.3	0.0	0.3	-0.4	0.2	0.3	0.2
LCS	LCH11-109	0.1	0.4	-	-	-	-	-
LCS	LCH11-1117	-1.3	-0.7	-	-	-	-	-
LCS	LCS Mint	-0.4	-0.6	-0.7	0.3	-0.5	-0.2	-0.5
LCS	LCS Pistol	0.2	0.9	-	-	-	-	-
LCS	LCS Wizard	0.3	1.1	0.4	1.0	-0.6	0.8	0.8
USDA	Mace	-	-	-	-	-	-	-
OGI	OK Bullet	1.6	1.1	-	-	-	-	-
OGI	OK Rising	0.8	0.9	-	-	-	-	-
OGI	Pete	-0.6	-1.0	-	-	-	-	-
OGI	Ruby Lee	1.0	0.2	0.0	0.8	-0.4	-0.2	-0.7
Syngenta	SY Llano	-1.2	-1.0	-	-	-	-	-
Syngenta	SY Southwind	-0.3	-0.1	-	-	-	-	-
LCS	T153	-0.5	-0.5	-	-	-	-	-
LCS	T154	-0.2	-0.2	-0.6	-0.6	-	-	-
LCS	T158	-0.9	-1.2	-0.8	-1.1	-0.4	-0.2	-0.7
Watley	TAM 112	0.7	0.9	-	-	-	-	-0.1
AGSECO	TAM 113	-1.3	-0.9	-	-	-	-	-1.2
WestBred	WB-Cedar	-0.8	-0.7	0.9	0.0	-0.6	-0.3	-
WestBred	WB-Grainfield	-0.2	0.2	-0.1	-0.6	0.6	0.7	0.6
WestBred	WB-Redhawk	-0.4	0.1	-	-	-	-	-
WestBred	WB4458	0.6	0.4	0.6	1.2	0.6	0.4	0.6
WestBred	Winterhawk	-1.5	-1.2	-	-	-0.6	-0.5	-0.1
OSU Experimentals								
	OK08707W-19C13	-	-	-	-	-	-	-
	OK09125	-0.4	-0.1	-0.1	-0.4	-	0.2	0.7
	OK09520	-1.1	-0.7	0.0	-1.4	-	-0.5	-
	OK10126	0.5	0.5	-	-	1.8	-	-
	OK10728W	0.0	0.0	-0.6	-0.1	-	-	-
	OK10805W	-0.2	0.3	-	-	-	-	0.5
	OK11754WF	0.3	0.0	-	-	-	-	-
Location mean		13.7	14.0	15.6	15.0	16.1	18.5	12.2
LSD (0.05)		1.2	1.0	1.4	0.8	0.7	0.9	1.7

Note: Actual protein for any variety can be calculated by adding the reported deviation to the appropriate location mean

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

Afton – Greg Leonard
Alva – Wes Mallory
Apache – Bryan Vail
Balko – Teryl Rorabaugh
Buffalo – NRCS
Cherokee – Kenneth Failes
Chickasha – South Central Research Station
Goodwell – Oklahoma Panhandle Research and Extension Center
Homestead – Brook Strader
Hooker – Dan and Earnest Herald
Keyes – J.B. Stewart
Kildare – Don Schieber
Kingfisher – Rodney Mueggenborg
Lahoma – North Central Research Station
Lamont – Kirby Farms
Marshall – Fuxa Farms
McLoud – Gerod McKinley
Thomas – Brownie Browne
Walters – Kinder Farms

List of participating seed companies

AGSECO, Inc.

Steve Ahring, P.O. Box 7, Girard, KS 66743
Phone: (620) 724-6223
Email: steve@delangeseed.com
www.agseco.com
Varieties: TAM 113

Kansas Wheat Alliance (KWA)

Daryl Strouts, 1990 Kimball Ave. Ste 200
Manhattan, KS 66502
Phone: (785) 320-4080
Email: kwa@kansas.net
www.kswheatalliance.org
Varieties: Everest

Limagrain Cereal Seeds (LCS)

Marla Barnett, 6414 N Sheridan, Wichita, KS 67204
Phone: (316) 253-6839
Email: marla.barnett@limagrain.com
www.limagraincerealseeds.com
Varieties: LCS Mint, LCS Wizard, T153, T154, T158, LCH11-109, LCH11-1117, LCH11-1130

Monsanto/WestBred

John Fenderson, 1616 E. Glencoe Rd., Stillwater, OK 74075
Phone: (620) 243-4263
Email: john.m.fenderson@monsanto.com
www.westbred.com
Varieties: Armour, Winterhawk, WB4458, WB-Cedar, WB-Grainfield, WB-Redhawk,

Oklahoma Genetics Inc. (OGI)

Mark Hodges, P.O. Box 2113, Stillwater, OK 74076
Phone: (405) 744-7741
www.okgenetics.com
Varieties: Billings, Centerfield, Doublestop CL Plus, Duster, Iba, Gallagher, Garrison, OK Bullet, OK Rising, Pete, Ruby Lee

Oklahoma Foundation Seed Services (OSU)

Jeff Wright, 2902 W. 6th Ave., Stillwater, OK 74074
Phone: (405) 744-7741
www.oklahomaseed.com
Varieties: Endurance, Deliver

PlainsGold

Darrell Hanavan, 4026 S. Timberline Rd. Ste. 100, Fort Collins, CO 80525
Phone: (970) 449-6994
Email: dhanavan@coloradowheat.org
Varieties: Byrd, Brawl CL Plus

Syngenta Seeds

Greg Gungoll, 1517 Osage Ave., Enid, OK 73703
Phone: (580) 540-4773
Email: greg.gungoll@syngenta.com
www.agriproheat.com
Varieties: CJ, Doans, Greer, Jackpot, SY Llano, SY Southwind

Watley Seed

Andy Watley, Box 51, Spearman, TX 79081
Phone: (806) 659-3838
Email: watleyseed@valornet.com
www.watleyseed.com
Varieties: TAM112

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, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, gender, age, religion, disability, or status as a veteran in any of its policies, practices, or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, the Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 20 cents per copy. Revised 1014 GH.