

WINTER WHEAT, WHEAT PASTURE, AND WHEAT  
STOCKER CATTLE PRODUCTION PRACTICES  
USED BY OKLAHOMA GROWERS

By

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## PREFACE

Winter wheat (*Triticum aestivum* L.) may be grown for either forage-only, or grain-only, or for both winter forage and grain. The production of winter wheat, and livestock grazing on wheat pasture, constitutes a major component of the Southern Plains agricultural economy. This study was conducted to determine the proportion of Oklahoma wheat grown for each of the three purposes and to determine if wheat production practices differ across intended use. A questionnaire was developed for the purpose of determining wheat production, wheat pasture, and livestock production practices on wheat pasture used by Oklahoma farmers.

This thesis is composed of three papers. The first paper identifies the proportion of Oklahoma wheat grown for each of the three purposes and determines if wheat production practices differ across intended use. The objective of the second paper is to determine practices used by producers, and to identify instances in which the practices employed deviate substantially from research-based recommendations. The objective of the third paper is to determine producer practices for the aspects of the questionnaire that were not addressed in the previous two papers. It should be noted that the results of the survey were influenced by the drought for the 1995-96 growing season. Producers looking for high forage yield for grazing were disappointed by dry soils.

The Palmer Drought Severity Index (PDSI) is a meteorological index used to assess the severity of dry or wet spells of weather. Monthly PDSI values are generated by the U.S. Weather Bureau for each crop reporting district. PDSI values 0 to -.5 =

normal; -0.5 to -1.0 = incipient drought; -1.0 to -2.0 = mild drought; -2.0 to -3.0 = moderate drought; -3.0 to -4.0 = severe drought. Similar adjectives are attached to positive values of wet spells. August and September of 1995 were abnormally wet in the major wheat producing regions of Oklahoma (North Central Oklahoma PDSI = 4.87 in August and 4.47 in September). This abnormally wet weather was followed by abnormally dry weather and by February of 1996 the North Central Oklahoma PDSI had declined to -1.56 indicating a mild drought. (Source: <ftp://ftp.ncdc.noaa.gov/pub/data/cirs/>)

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## TABLE OF CONTENTS

Paper	Page
<b>I. DIFFERENCES IN WHEAT PRODUCTION PRACTICES ACROSS INTENDED USE.....</b>	<b>1</b>
<b>INTRODUCTION .....</b>	<b>3</b>
Problem Statement	
Importance of the Problem	
Objectives of the Study	
<b>PROCEDURE.....</b>	<b>5</b>
Source of Data	
Region Specification	
<b>RESULTS .....</b>	<b>5</b>
Response Summary	
<b>DISCUSSION.....</b>	<b>10</b>
Summary and Conclusions	
<b>REFERENCES .....</b>	<b>12</b>
<b>II. WHEAT PASTURE AND WHEAT-STOCKER CATTLE PRODUCTION PRACTICES USED IN THE SOUTHERN PLAINS .....</b>	<b>23</b>
<b>INTRODUCTION .....</b>	<b>25</b>
Problem Statement	
Importance of the Problem	
Objectives of the Study	
<b>PROCEDURE.....</b>	<b>27</b>
Source of Data	

Region Specification	
RESULTS .....	27
Summary of Responses	
DISCUSSION .....	35
Summary and Conclusions	
REFERENCES .....	37
<b>III. PRODUCTION PRACTICES USED BY WHEAT AND WHEAT-STOCKER PRODUCERS IN OKLAHOMA.....</b>	<b>61</b>
INTRODUCTION .....	63
Problem Statement	
Importance of the Problem	
Objectives of the Study	
PROCEDURE.....	63
Source of Data	
Region Specification	
RESULTS .....	64
Summary of Responses	
CONCLUSION.....	67
Summary and Conclusions	
REFERENCES .....	69
APPENDIX 1. Oklahoma Wheat Producing Regions .....	79
APPENDIX 2. Number of Producers Who Responded to Questions and Table That Summarizes the Data .....	81
APPENDIX 3. Number of Producers Who Responded to Question 13 and Table That Summarizes the Data .....	83
APPENDIX 4. Survey Questionnaire .....	85
APPENDIX 5. Institutional Review Board Approval Form.....	91

II. 7.	Type of supplementary feed used on wheat pasture as reported by more than one producer	47
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II. 8.	Percent of wheat pasture used for grazing by more than one producer	48
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**LIST OF TABLES**

Table		<b>Page</b>
		49

I. 1.	Number of responses, number of acres included in survey, and size of survey relative to total acreage.....	14
I. 2.	Percent of wheat planted for intended use of grain-only, forage-only, and forage and grain by region in Oklahoma, 1995-96 .....	15
I. 3.	Percent of wheat used for grain-only, forage-only, and forage and grain by region in Oklahoma, 1995-96 .....	16
I. 4.	Percent of respondents who indicated that a crop such as rye or ryegrass was planted with wheat on some acres and percent of total wheat acres that included a mixture.....	17
I. 5.	Actual average nitrogen applied across intended use by region in Oklahoma, 1995-96 (lb/acre).....	18
I. 6.	Average seeding rate across intended use by region (lb/acre) .....	19
I. 7.	Target planting date across intended use by region .....	20
I. 8.	Actual 1995 planting date across intended use by region.....	21
I. 9.	The percent of wheat producers in each region who indicated that they intended to grow wheat for one or more use (%).....	22
II. 1.	Fall/Winter wheat pasture use by livestock type, 1995-96 (%) .....	41
II. 2.	Fall/Winter grazing cattle weights, rates of gain, and stocking rate .....	42
II. 3.	Type of stocker cattle receiving programs (%).....	43
II. 4.	Stocker cattle receiving program days and cost.....	44
II. 5.	Stocker cattle feeding program during receiving (%).....	45
II. 6.	Factors that producers use to determine when to begin grazing wheat (%).....	46



- II. 7. Type of supplement fed to stocker cattle on wheat pasture as reported by those who fed a supplement (%) .....
- II. 8. Type of supplement fed to cows and replacement heifers on wheat pasture .....
- II. 9. Producers who reported the use of Bovatec<sup>®</sup>, poloxalene, and Rumensin and reasons for use by region (% of respondents who reported stocker steers on wheat) .....
- II. 10. Primary reasons producers gave for feeding a supplement to stocker cattle on wheat pasture (%) .....
- II. 11. Primary reasons producers gave for feeding a supplement to cows and replacement heifers on wheat pasture (%) .....
- II. 12. Factors that producers use to determine when to terminate grazing .....
- II. 13. Spring 1996 grazing termination date used by producers who plan to harvest grain.....
- II. 14. Graze-out period cattle weights, rates of gain, and stocking rate of cattle during graze-out period.....
- II. 15. When the percentages of wheat acres to be grazed out were determined.....
- II. 16. Factors that influenced the number of graze-out acres (%) .....
- II. 17. Lease arrangements for wheat pasture grazing (%) .....
- II. 18. Tenant and landlord responsibilities under lease arrangements for wheat pasture grazing (%).....
- II. 19. Wheat pasture rental price for fall/winter grazing .....
- II. 20. Wheat pasture rental price for graze-out acreage.....
- III. 1. Total farming operation acres owned and leased.....
- III. 2. Survey respondents who indicated membership in OWGA, OGSP and OCA (%) .....
- III. 3. Wheat commodity program chosen by region (%) .....
- III. 4. Characteristics of wheat used to determine variety chosen (%) .....

III. 5.	Sources of information used to determine which variety of wheat to plant (%)....	74
III. 6.	Estimated number of stocker steers on Oklahoma wheat pasture fall/winter 1995-96.....	75
III. 7.	Estimated number of stocker heifers on Oklahoma wheat pasture fall/winter 1995-96.....	76
III. 8.	Definition of "early jointing" responses across intended use by region (%) .....	77
III. 9.	Survey respondents classified by intended use of wheat who indicated membership in OWGA, OGSP, and OCA (%).....	78

DIFFERENCES IN WHEAT PRODUCTION PRACTICES  
ACROSS INTENDED USE

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ABSTRACT

Winter wheat (*Triticum aestivum L.*) may be grown for either forage-only, or grain-only, or for both winter forage and grain. No differentiation in use has been made in data collected and reported by the National Agricultural Statistics Service. This study was conducted to determine the proportion of Oklahoma wheat grown for each of the three purposes and to determine if wheat production practices differ across intended use. A survey questionnaire was developed and mailed to 4,801 Oklahoma wheat producers who were selected randomly from the Oklahoma Agricultural Statistics Service database. For the 1995-96 growing season, 9% of the wheat planted in Oklahoma was intended for forage-only, 25% for grain-only, and 66% for forage and grain. One-third of the crop intended to be used only for forage was seeded in combination with one or more crops such as rye (*Secale cereale L.*) or ryegrass (*Lolium multiflorum Lam.*). Significantly more nitrogen was applied to acres intended for forage-only production. The seeding rate was significantly greater for wheat intended for forage-only than for wheat intended for grain-only. Significantly different target planting dates of September 10, September 17, and September 27 were reported for forage-only, forage and grain, and grain-only, respectively. The survey findings confirm that Oklahoma farmers manage wheat differently depending upon intended use. The alternatives regarding use should be considered when designing experiment station studies and when extending results of those studies to producers.

## DIFFERENCES IN WHEAT PRODUCTION PRACTICES feeding wheat ACROSS INTENDED USE crop use

Winter wheat may be grown either as a forage-only crop, or as a grain-only crop, or as a dual-purpose winter forage and grain crop (Christiansen, et al., 1989; Fitzgerald et al., 1995; Redmon et al., 1995; Saberi, 1993; Washko, 1947). However, in the United States no differentiation in use has been made in data collected and reported by the United States Department of Agriculture (USDA). USDA provides annual estimates of the acres planted to wheat and the acres harvested for wheat grain. However, they do not report the proportion of wheat acres used for each of the three purposes (grain-only; forage-only; forage and grain). They also do not report the total number of acres that are winter grazed, and they do not provide estimates of the number and class of animals stocked on wheat pasture. The USDA provides annual estimates of the cost to produce wheat grain. However, they do not differentiate between wheat grain produced in a grain-only system and wheat grain produced in a forage and grain system.

The production of winter wheat, and livestock grazing on wheat pasture, constitutes a large share of the Southern Plains agricultural economy. In 1994-95 (average of two years), cattle and wheat accounted for 62% of Oklahoma's cash receipts from farm marketings (Oklahoma Department of Agriculture, 1995). Krenzer et al. (1992) estimate that in most years 35 to 55% of the wheat planted in the State is used for both forage and grain. More precise estimates of the quantity of land seeded to wheat in the State that was also grazed by livestock during the fall and winter are not available.

An informal survey of Oklahoma state extension personnel, farmers, and others

was conducted in 1973-74 by Harwell et al. (1976) to obtain information regarding wheat grazing practices. Walker et al. (1988) conducted a formal but nonrandom survey of 48 selected producers in the summer of 1987. These surveys provided some information regarding wheat-grazing practices used by the selected group of farmers. However, the 1973-74 and 1987 surveys were not random and did not provide information regarding the proportion of wheat used for each of the three purposes. Since the data were not drawn from a representative sample of wheat producers, the information obtained could not be used to conduct hypothesis tests regarding differences in production practices across intended use.

Some wheat production practices are similar for the three production classifications. For example, the same machinery complement may be used for tillage, seeding, and grain harvesting. However, some economically important production and management practices may differ depending upon the intended use of the crop. At a given location, wheat intended for forage-only should be seeded earlier in the fall than wheat intended for grain-only (Winter and Musick, 1993). A higher seeding rate is recommended for a forage-only relative to a grain-only crop (Krenzer, 1995). Some work has been conducted to evaluate differences in performance of varieties across use (Carver et al., 1991; Fitzgerald et al., 1995). Thus, the most economical variety, planting date, fertility program, weed control system, and seeding rate may differ depending upon intended use (Krenzer et al., 1992). The objective of the research reported in this paper is to determine the proportion of Oklahoma wheat grown for each of the three purposes and to determine if wheat production practices differ across intended use.

## PROCEDURE

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A questionnaire was developed for the purpose of determining wheat production practices used by Oklahoma farmers (Appendix 4). A preliminary survey form was developed, tested, and revised. The final edit of the questionnaire was conducted in cooperation with agricultural statisticians of the Oklahoma Agricultural Statistics Service (OASS). For purposes of the mail survey, the state was divided into six regions (Appendix 1). Five of these regions correspond with five Oklahoma Crop Reporting Districts--Panhandle, West Central, Southwest, North Central, and Central. The sixth region included the four remaining Crop Reporting Districts--South Central, Northeast, East Central, and Southeast.

A sample of 4,801 Oklahoma producers was randomly drawn from the OASS database. Approximately 800 producers were selected from each of the six regions. Surveys were mailed in March of 1996. A reminder postcard was mailed one week after the survey. A total of 971 usable surveys were returned--20% of the total mailed. More than 150 responses were received from each of the five major wheat producing regions. Analysis of variance and multiple mean comparison procedures were used to determine if production practices differed across intended use and across region (SAS, 1988).

## RESULTS

Table 1 includes the number of returned surveys, respondents' wheat acres, total Oklahoma wheat acres, and the percent of the total wheat acres included in the survey, by

region. A total of seven million Oklahoma acres were planted to wheat in the fall of 1995 for the 1996 wheat crop. The 971 survey respondents farmed 6% of these acres.

Table 2 includes a summary of responses to the following question: "How many of your 1995-96 wheat acres were planted for each purpose: grain only (never intended to graze the wheat); full-season grazing (planned to graze from November through May with no grain harvest intended); grain plus forage (planned to graze in the fall and winter and harvest the grain). For the state, 25% of the acres were intended for grain-only production, 9% for forage-only, and 66% for forage and grain. In the north-central region 37% was intended for grain-only production. In the south central and east, 41% was intended for forage-only production. In the west central region, 84% was intended for dual purpose use. However, only 26% was intended for dual purpose use in the south central and east.

Producers were also asked how the acres were actually used for the 1995-96 season. These results are summarized in Table 3. Producers reported that they had intended to use 66% of the acres for forage and grain but only used 41% for that purpose. No question on the survey instrument was designed to determine why actual acreage differed from intentions. However, for most of the state, a drought extended through much of the 1995-96 growing season. In some locations limited rainfall reduced fall and winter forage production to less than historical averages.

Farmers reported that they had intended to use 25% for grain-only. They actually used 50% for grain-only. Both the intended use and actual use reported for forage-only was 9%. Thus, the data show that farmers did not harvest for grain on 9% of the acres (630,000 acres) seeded to wheat. They planned to harvest 91% for grain and planned to



graze 60% of the wheat intended for grain harvest. However, only 45% of the wheat harvested for grain was grazed.

Ten percent indicated that they planted a crop such as rye or ryegrass with wheat on some of their wheat acres (Table 4). A seed combination was used on 3% of the total acres. In other words, about a third of the land seeded to produce forage-only was not exclusively seeded to wheat. About 16% of the "wheat" acres planted in the south central and east region included some crop in combination with wheat. This confirms that some land seeded to wheat and reported as wheat in the agricultural statistics was never intended to be harvested as a grain crop.

Table 5 includes a summary of the actual average nitrogen applied per acre across intended use by region and for the state. Statistical analysis was conducted to determine if nitrogen application differed across intended use and across region. An average of 78 lb/acre of actual nitrogen was applied to acres intended for forage-only production. This quantity was greater ( $P \leq 0.05$ ) than that reported for grain-only (66 lb/acre) and forage and grain production (70 lb/acre). The amount applied to acres intended for both forage and grain and grain-only is not statistically different in any region and not different at the state level.

The greatest reported level of nitrogen use is for forage-only production in the south central and east region (99 lb/acre). This is the region of highest rainfall and thus the region of greatest expected benefits from the use of nitrogen. It is also the region in which 41% was intended for forage-only use. The least amount of nitrogen use (39 lb/acre) is reported for the forage-only acres in the Panhandle--the most arid region.

Table 6 includes a summary of seeding rates used across intended use by region.

In all regions the seeding rate is greater ( $P \leq 0.05$ ) for wheat intended for forage-only than for wheat intended for grain-only. In the north central, central, and south central and east regions, the seeding rate is greater ( $P \leq 0.05$ ) for wheat intended for forage and grain than for wheat intended for grain-only. The greatest reported average seeding rate is for the relatively high rainfall south central and east region for each intended use.

Alternatively, the lowest average seeding rate is reported for the relatively low rainfall Panhandle region.

The state average reported forage-only seeding rate of 90 lb/acre is greater ( $P \leq 0.05$ ) than the state average reported seeding rate of 79 lb/acre for the forage and grain acres. And, the reported rate for forage and grain is greater than that reported for the grain-only acres (72 lb/acre).

Respondents were asked to report their target and actual 1995-96 wheat planting dates. Results for the target date are reported in Table 7. Significantly different ( $P \leq 0.05$ ) state average target planting dates of September 10, September 17, and September 27 were reported for forage-only, forage and grain, and grain-only, respectively. In each region the target planting date is significantly later for grain-only than for forage-only. In all regions but the southwest, the target planting date is significantly later for forage and grain than for forage-only. These data suggest that, on the average, farmers plant wheat intended for forage-only first, followed by that intended for both forage and grain. Wheat intended for grain-only production is planted last. This would enable farmers who plant some wheat for each purpose to use their tillage and planting machinery over a relatively long period of time. The average difference between the mean planting dates for forage-only and grain-only is 17 days.

Weather patterns often preclude producers from conducting field operations, including planting, when they would prefer to do so. Actual planting dates for the 1995-96 crop are reported in Table 8. The state average actual planting date for the forage-only crop of September 23 was earlier ( $P \leq 0.05$ ) than that for the forage and grain crop--October 1. The average planting date for the grain-only crop was October 7. The average difference between the actual mean planting dates for the forage-only and grain-only crop of 14 days was similar to the average mean difference reported for the targeted planting dates.

Diversification in livestock and crop production is often prescribed as a means to manage risk and pest problems, and more effectively manage and use unique land, capital, and labor resources. Diversification for income risk management is most effective when the crop and livestock production portfolio includes activities with negatively correlated net returns. Negative correlation occurs if in years when the returns from one of the activities is relatively low, the returns from an alternative activity are relatively high. In this case producing a combination of the activities could reduce the variability in net returns over time. Oklahoma farmers could diversify by producing some wheat for forage-only, some wheat for forage and grain, and some wheat for grain-only. However, historical farm level data are not available to determine the expected consequences of a diversified portfolio (combination of the three uses) on farm income and variability of income.

Table 9 includes a summary of the percent of producers in each region and for the state, classified as to purpose for growing wheat. More than 73% of those responding indicated that they had intended to grow wheat on their farm for only one use. Almost

45% indicated that all the wheat on their farm was intended to be used as a dual purpose forage and grain crop. In the current context dual purpose is defined as a "single" use. However, producers may view dual-purpose use as a diversification strategy. Seventeen percent indicated that they only grew wheat to produce grain, and twelve percent responded that they only grew wheat to produce forage.

Only 27% indicated that they grew wheat for more than one of the three uses. Most of these respondents (13% of the total) indicated that they planted some wheat for grain-only and some for forage and grain. Four percent indicated that they planted some for each of the three uses.

## DISCUSSION

The vast majority of Oklahoma's cropland is seeded to winter wheat. Wheat may be used to produce either grain, forage, or to produce both forage and grain. However, historically no differentiation in use has been made in data collected and reported by the USDA. The objective of the research reported in this paper was to determine the proportion of Oklahoma wheat grown for each of the three purposes and to determine if wheat production practices differ across intended use.

A comprehensive survey of Oklahoma farmers was conducted. The survey data confirm that Oklahoma producers plant some wheat to be used as a forage-only crop, some to be used as a grain-only crop, and some as a dual purpose forage and grain crop. For the 1995-96 growing season, 9% was intended for forage-only, 25% for grain-only, and 66% for forage and grain. One-third of the crop intended to be used only for forage

was seeded in combination with one or more crops such as rye or ryegrass.

Producers use different seeding rates, planting dates, and nitrogen levels depending upon the intended use. In many respects wheat for grain-only is managed differently from wheat for forage-only. While the same machinery may be used to prepare the seedbed and seed the crop, the seeding rate, fertility program, and planting date may be different. Other production practices, not covered in the survey, such as weed and pest control may also differ depending on the intended use. If considered as separate crops, wheat for forage-only would be the third largest crop in the state in terms of acres, following wheat for grain-only, and wheat for forage and grain. The USDA could provide a more comprehensive and useful picture of crop production in the Southern Plains by collecting and reporting wheat production data differentiated by use.

Since producers manage wheat differently depending upon intended use, it may be appropriate for experiment station studies to be differentiated across intended use. Historically, wheat variety selection programs, have been conducted to serve the wheat for grain-only crop. By this measure, two of the three most important crops in the state have not had a variety selection program.

It was also determined that only 27% of Oklahoma producers diversify by producing some wheat for forage-only, some wheat for forage and grain, and some wheat for grain-only. This suggests a need for data acquisition and analysis necessary to determine risk efficient combinations of the three wheat uses.

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Table 1. Number of responses, number of acres included in survey, and size of survey relative to total acreage.

Region	Responses	1996 Wheat Acres of Respondents	Total 1996 Oklahoma Wheat Acres	Percent of Total Acres Included in Survey
Panhandle	179	78,105	1,070,000	7
West Central	172	75,536	1,090,000	7
Southwest	153	69,493	1,400,000	5
North Central	169	95,871	2,150,000	4
Central	175	50,719	823,000	6
South Central & East	123	22,129	467,000	5
Total	971	391,853	7,000,000	6



Table 2. Percent of wheat planted for intended use of grain-only, forage-only, and forage and grain by region in Oklahoma, 1995-96.

Region	Grain-only	Forage-only	Forage and Grain
Panhandle	33	4	63
West Central	10	5	84
Southwest	16	16	68
North Central	37	5	58
Central	19	10	70
South Central & East	33	41	26
State	25	9	66

Table 3. Percent of wheat used for grain-only, forage-only, and forage and grain by region in Oklahoma, 1995-96.

Region	Grain-only	Forage-only	Forage and Grain
Panhandle	61	4	35
West Central	44	9	47
Southwest	38	15	47
North Central	59	3	37
Central	46	10	44
South Central & East	39	37	23
State	50	9	41

Table 4. Percent of respondents who indicated that a crop such as rye or ryegrass was planted with wheat on some acres and percent of total wheat acres that included a mixture.

Region	Did you plant any other crop with the wheat, such as rye or ryegrass? Yes	Wheat acres that included a combination
Panhandle	3.4	0.9
West Central	8.2	2.8
Southwest	4.7	0.5
North Central	7.3	2.7
Central	14.3	4.5
South Central & East	26.3	15.9
State	9.9	2.9

Table 5. Actual average nitrogen applied across intended use by region in Oklahoma, 1995-96 (lb/acre).

Region	Grain-only	Forage-only	Forage and Grain
Panhandle	55 <sup>a</sup>	39 <sup>a</sup>	55 <sup>a</sup>
West Central	62 <sup>a</sup>	61 <sup>a</sup>	74 <sup>a</sup>
Southwest	80 <sup>a</sup>	75 <sup>a</sup>	74 <sup>a</sup>
North Central	59 <sup>b</sup>	77 <sup>a</sup>	68 <sup>ab</sup>
Central	66 <sup>b</sup>	83 <sup>a</sup>	75 <sup>ab</sup>
South Central & East	87 <sup>a</sup>	99 <sup>a</sup>	78 <sup>a</sup>
State	66 <sup>b</sup>	78 <sup>a</sup>	70 <sup>b</sup>

Means with a common lettered superscript within region (row) are not different at  $P \leq 0.05$ .

Table 6. Average seeding rate across intended use by region (lb/acre).

Region	Grain-only	Forage-only	Forage and Grain
Panhandle	48 <sup>b</sup> †	59 <sup>a</sup>	54 <sup>ab</sup>
West Central	78 <sup>b</sup>	86 <sup>a</sup>	83 <sup>ab</sup>
Southwest	81 <sup>b</sup>	88 <sup>a</sup>	84 <sup>ab</sup>
North Central	69 <sup>b</sup>	79 <sup>a</sup>	76 <sup>a</sup>
Central	85 <sup>b</sup>	94 <sup>a</sup>	90 <sup>a</sup>
South Central & East	96 <sup>b</sup>	110 <sup>a</sup>	107 <sup>a</sup>
State	72 <sup>c</sup>	90 <sup>a</sup>	79 <sup>b</sup>

Means with a common lettered superscript within region (row) are not different at  $P \leq 0.05$ .

Table 7. Target planting date across intended use by region.

Region	Grain Only	Forage Only	Forage and Grain
Panhandle	9/16 <sup>a†</sup>	9/03 <sup>c</sup>	9/11 <sup>b</sup>
West Central	9/24 <sup>a</sup>	9/09 <sup>c</sup>	9/17 <sup>b</sup>
Southwest	10/02 <sup>a</sup>	9/18 <sup>b</sup>	9/22 <sup>b</sup>
North Central	9/29 <sup>a</sup>	9/10 <sup>c</sup>	9/17 <sup>b</sup>
Central	9/30 <sup>a</sup>	9/11 <sup>c</sup>	9/16 <sup>b</sup>
South Central & East	10/06 <sup>a</sup>	9/07 <sup>c</sup>	9/17 <sup>b</sup>
State	9/27 <sup>a</sup>	9/10 <sup>c</sup>	9/17 <sup>b</sup>

<sup>†</sup> Means with the same single letter within region (row) are not different at  $P \leq 0.05$ .

Table 8. Actual 1995 planting date across intended use by region.

Region	Grain Only	Forage Only	Forage and Grain
Panhandle	9/28 <sup>a</sup> †	9/20 <sup>a</sup>	9/24 <sup>a</sup>
West Central	10/05 <sup>a</sup>	9/26 <sup>b</sup>	10/04 <sup>a</sup>
Southwest	10/16 <sup>a</sup>	9/29 <sup>c</sup>	10/08 <sup>b</sup>
North Central	10/05 <sup>a</sup>	9/22 <sup>c</sup>	9/28 <sup>b</sup>
Central	10/10 <sup>a</sup>	9/23 <sup>c</sup>	10/01 <sup>b</sup>
South Central & East	10/14 <sup>a</sup>	9/17 <sup>c</sup>	9/28 <sup>b</sup>
State	10/7 <sup>a</sup>	9/23 <sup>c</sup>	10/1 <sup>b</sup>

† Means with the same single letter within region (row) and means with the same double letter within method (column) are not different at  $P \leq 0.05$ .

Table 9. The percent of wheat producers in each region who indicated that they intended to grow wheat for one or for more than one use (%).

Region	Gm-only	For-only	For & gm	Gm-only For-only	Gm-only For & gm	For-only For & gm	Gm-only For-only For & gm
Panhandle	30	4	46	1	11	5	2
West Central	12	8	50	2	13	11	4
Southwest	10	7	50	3	12	10	8
North Central	20	2	48	1	19	5	5
Central	11	16	46	1	12	11	3
South Central & East	16	47	17	2	7	11	1
State	17	12	44	2	13	9	4

Row totals may not sum to 100 due to rounding errors.



PAPER II

WHEAT PASTURE AND WHEAT-STOCKER CATTLE  
PRODUCTION PRACTICES USED IN THE SOUTHERN PLAINS

WHEAT PASTURE AND WHEAT-STOCKER CATTLE  
PRODUCTION PRACTICES USED IN THE SOUTHERN PLAINS

ABSTRACT

The production of winter wheat, and livestock grazing on wheat pasture, constitutes a major component of the Southern Plains agricultural economy. Winter wheat grazing is important to the agricultural economies of Kansas, New Mexico, Oklahoma, and Texas. However, little effort has been devoted to determine comprehensive strategies to optimize returns to a farm family's resources devoted to the production of winter wheat and livestock grazing on wheat pasture. The objective of the research reported in this paper was to determine practices used by producers, and to identify instances in which the practices employed deviate substantially from research-based recommendations. A questionnaire was developed for the purpose of determining wheat production, wheat pasture, and livestock production practices on wheat pasture used by Oklahoma farmers. The results of the study will provide information regarding production practices and provide guidance for research and extension workers to focus efforts on those economically important practices that deviate substantially from recommendations. It was determined that livestock grazed 50% of the Oklahoma wheat acres. Steers and heifers were stocked on two-thirds of the pastured wheat acres. The survey identified several production practices that deviate substantially from research-based recommendations. The lack of conformance between research-based recommendations regarding both grazing initiation and grazing termination for wheat intended for grain harvest suggest an opportunity for extension education.

## WHEAT PASTURE AND WHEAT-STOCKER CATTLE PRODUCTION PRACTICES USED IN THE SOUTHERN PLAINS

The production of winter wheat, and livestock grazing on wheat pasture, constitutes a major component of the Southern Plains agricultural economy (Christiansen, et al., 1989; Fitzgerald et al., 1995; Redmon et al., 1995; Saberi, 1993; Washko, 1947). Winter wheat grazing is important to the agricultural economies of Kansas (Shroyer et al., 1993), New Mexico (Ralphs et al., 1997), Oklahoma (Redmon et al., 1995), and Texas (Pinchak et al., 1996). Many light weight calves are shipped to the Southern Plains from the Southeast, Midwest, and West to graze winter pastures (Brorsen et al., 1994). After wintering on wheat pasture, these calves are fed to slaughter weight in feedlots in the Southern Plains. The USDA (United States Department of Agriculture) does not provide estimates on the number of wheat acres grazed and the number of animals stocked on wheat pasture. Hence, precise estimates of the quantity of land seeded to wheat in the Southern Plains that is also grazed by livestock during the fall and winter are not available. However, Krenzer et al. (1992) estimate that in most years 35 to 55% of the wheat planted in Oklahoma is used for both forage and grain. Pinchak et al. (1996) estimate that 30 to 80% of the wheat acres in the Southern Great Plains are grazed and that 10 to 20% are used exclusively for forage and grazed out.

Production of wheat for both forage and grain, and grazing of wheat, is a complicated process involving the interaction of livestock production with wheat grain production. A number of research projects have been conducted that address management practices for specific components of the overall production system.

Historically, wheat variety development efforts in the region have concentrated on grain production (Carver et al., 1991; Winter and Thompson, 1990). Work has also been conducted to evaluate grazing initiation and termination (Krenzer, 1995; Winter and Thompson, 1990). Stocker cattle research has focused on bloat (Andersen et al., 1987; Bartley et al., 1975; Horn and Frost, 1982), supplementation (Andrae et al., 1995; Coulibaly et al., 1996; Horn et al., 1995) and efforts to develop self-limiting supplements containing an ionophore (Paisley and Horn, 1996; Paisley et al., 1997). However, little effort has been devoted to determine comprehensive strategies to optimize returns to a farm family's resources devoted to the production of winter wheat and livestock grazing on wheat pasture.

An informal survey of extension workers, farmers and others, was conducted in 1973-74 by Harwell et al. (1976) to obtain information regarding wheat-grazing practices in the Southern Plains. A formal, but nonrandom, survey of 48 selected producers was conducted in the summer of 1987 by Walker et al. (1988). These surveys provided some information regarding wheat-grazing practices used by the selected group of farmers. However, the 1973-74 and 1987 surveys could not be used to make inferences regarding production practices of the industry.

Hence, little more than anecdotal information is available regarding actual production practices. The objectives of the research reported in this paper are to determine practices used by producers. The results of the study will provide information regarding production practices and provide guidance for research and extension workers to focus efforts on those economically important practices that deviate substantially from recommendations.

## PROCEDURE

A questionnaire was developed for the purpose of determining wheat production, wheat pasture, and livestock production on wheat practices used by Oklahoma farmers (Appendix 4). A preliminary survey form was developed, tested, and revised. The final edit of the questionnaire was conducted in cooperation with agricultural statisticians of the Oklahoma Agricultural Statistics Service (OASS). For purposes of the mail survey, the state was divided into six regions (Appendix 1). Five of these regions correspond with five Oklahoma Crop Reporting Districts--Panhandle, West Central, Southwest, North Central, and Central. The sixth region included the four remaining Crop Reporting Districts--South Central, Northeast, East Central, and Southeast.

A sample of 4,801 Oklahoma producers was randomly drawn from the OASS database. Approximately 800 producers were selected from each of the six regions. Surveys were mailed in March of 1996. A reminder postcard was mailed one week after the survey. A total of 971 usable surveys were returned--20% of the total mailed. More than 150 responses were received from each of the five major wheat producing regions. Data were entered into a database. SAS (1988) was used to sort the data into regions and to calculate means.

## RESULTS

It was determined that in the 1995-96 growing season livestock grazed 50% of the Oklahoma wheat acres. Steers and heifers were stocked on two-thirds of the pastured wheat acres. Cows and replacement heifers were placed on 26% of the acres grazed. The

remaining acreage was grazed by sheep (1%), dairy cattle (2%), horses (3%), and other livestock (1%) (Table 1). The highest percentage of wheat grazed by stocker cattle for the 1995-96 growing season was 76% in the North Central region. In the West Central and South Central and East regions, 62% of the acres grazed were grazed by stocker cattle. Cows and replacement heifers grazed more than one-third of the wheat acres grazed in the West Central region but only 20% in the North Central region.

### *Fall and Winter Grazing Practices*

Table 2 includes the average beginning weight of steers and heifers when placed on wheat in the fall. The state average was 466 lb for steers and 459 lb for stocker heifers. The beginning weight for steers ranged from 445 lb in the Southwest region to 483 lb in the North Central and Central regions. Beginning weight for heifers ranged from 442 lb in the West Central region to 485 lb in the North Central region. The table also includes the average reported steer and heifer rate of gain. The reported state average rate of gain was 1.9 lb/d for steers and 1.8 lb/d for heifers. The rate of gain for steers was a consistent 1.9 lb/d across all regions except the Panhandle region that reported 1.8 lb/d. Rate of gain for heifers varied across regions from 1.6 lb/d in the Panhandle to 2.0 lb/d in the North Central region.

Stocking rate depends upon forage availability and climate conditions. The stocking rate varied widely across regions of the state, perhaps due to differences in climate. The reported average statewide stocking rate was 2.7 acres per steer and 2.6 acres per heifer. The South Central and East region receives significantly more rainfall than the Panhandle region. In a typical year, more wheat forage is produced per acre in

the South Central and East region than in the Panhandle. With more forage available, producers can stock the wheat more heavily. The results from the survey show that the South Central and East region had an average stocking rate of 1.5 acres per steer and heifer (0.67 head per acre). The Panhandle region had a stocking rate of 3.3 acres per steer (0.30 head per acre) and 3.5 acres per heifer (0.29 head per acre).

Producers were asked if they used a receiving or conditioning program for their cattle prior to placement on wheat. The list of potential responses included using their own receiving program, using a commercial program, purchasing cattle pre-conditioned, or to use no program. Only 40% used a receiving program, 35% used their own feeding program and 5% used a commercial receiving diet (Table 3). Commercial programs were most abundant in the North Central region. No program was used by 56% of those surveyed while 4% purchased their cattle pre-conditioned. Statewide, producers' personal conditioning program averaged 24 days at a cost of \$22 /head. Commercial programs averaged 24 days at a cost of \$23 /head (Table 4). In the North Central region, where 14% of the respondents reported using a commercial program, the average cost was \$25 for 23 days.

Table 5 includes a summary of feeding programs used during receiving for those producers who reported a personal program. The most widely used program included grass hay plus a high-energy supplement. This program was used by 22% of the producers across the state. Grass hay plus a high-protein supplement was fed by 21% of the producers statewide. The third most popular feeding program was grass hay alone, used by 12% of the producers. Grass hay was the primary feed for receiving programs. It was used by 55% of the producers statewide and by 61% of the North Central producers.

Grazing initiation is an important production decision. Producers were asked how they determine when to begin grazing wheat. The following choices were provided: calendar date, top growth of the wheat, root system development, climate conditions, recommendations of others, and grazing program provisions. Table 6 includes a summary of responses to the question. Top growth of the wheat was the most frequently cited, receiving 37% of the producer responses. Root system development was the second most frequently cited factor, receiving 35% of the producer responses. Fifteen percent indicated that grazing initiation was determined by calendar date.

Table 7 includes a summary of responses to a question regarding the type of supplement fed to stocker steers and heifers while on wheat pasture. The survey results indicated that producers used a variety of supplementation strategies. A mineral supplement was fed by 57 %. Hay was fed by 55% and wheat straw was fed as a supplement by 22% of the producers.

Table 8 includes a summary of responses regarding supplementation strategies for cows and replacement heifers. Of the survey respondents, 65% reported that they used hay to supplement wheat pasture. A mineral supplement was used by 39% of the producers. A protein supplement was used by 25%. Tables 7 and 8 show in detail the supplements used by region and the average for the state for stocker cattle and cows and replacement heifers, respectively.

Rumensin<sup>®</sup> (monensin) and Bovatec<sup>®</sup> (lasalocid) are ionophores that may be fed to improve rate of gain of stocker cattle. In a recent study, Paisley and Horn (1998) reported that monensin is more efficacious than lasalocid in decreasing both the incidence and severity of bloat in cattle grazing wheat pasture. Bloat can be a problem on wheat



pasture especially during periods of rapid wheat growth. Bloat Guard® (poloxalene) is a product approved for the prevention of bloat in cattle. The responses show that 39% of the producers used at least one of the three products. Table 9 details the use of these products by producers across region.

The information shown in Table 10 shows that the primary reasons for feeding a supplement to wheat pasture stockers are to provide additional roughage (30%) and nutrients (36%) and to improve average daily gain (23%). Producers also indicated that roughage (46%) and nutrients (30%) are the two primary reasons for feeding a supplement to cows and replacement heifers (Table 11).

Producers were asked to indicate the most important factors that determine when to terminate grazing wheat. The producers were provided a list of choices including calendar date, jointing of ungrazed wheat, jointing of grazed wheat, recommendations of others, and something other than the choices provided. Almost half (47%) indicated that calendar date was the factor that determined grazing termination. Jointing of ungrazed wheat received 12% of the responses while jointing of grazed wheat received 17%. Something other than the choices provided, received 23% of the producer responses (Table 12). The state average grazing termination date on fields intended for grain harvest was March 3. This ranged from February 27 in the Southwest to March 10 in the Panhandle (Table 13).

Producers were asked: "How many years out of 10 does fall/winter grazing negatively affect wheat yields?". The results for the state averaged 5. This suggests that producers believe that fall/winter grazing of wheat will reduce wheat grain yields in five

of ten years. Alternatively, grazing is not expected to reduce grain yield in half of the years.

### *Spring Grazing (Graze-out) Practices*

Table 14 includes information regarding wheat grazing during the graze-out period. The average beginning weight was 545 lb for steers and 523 lb for heifers. The reported average rate of gain was 2.2 lb/d for steers and 2.1 lb/d for heifers. The stocking rate for steers averaged 1.5 acres per steer (0.67 steers per acre) and ranged from 2.5 acres per steer (0.40 steers per acre) in the Panhandle region to 1.2 acres per steer (0.63 steers per acre) in the South Central and East region. The stocking rate for heifers also averaged 1.5 acres per heifer (0.67 heifers per acre) and ranged from 2.1 acres per heifer (0.48 heifers per acre) in the Panhandle region to 1 acre per heifer (1 heifer per acre) in the Central region. The stocking rate for cows with fall calves averaged 2.5 acres per cow (0.40 cows per acre), cows with spring calves, 1.9 acres per cow (0.53 cows per acre), and cows only, 1.6 acres per cow (0.625 cows per acre).

Producers were asked to respond to the following question: "At what point in the season did you determine the percentage of your total acres that would be grazed out?" The following alternative responses were provided: prior to planting; at planting; during the fall/winter grazing season; when livestock were removed from fall/winter pasture; other. Table 15 includes a summary of the regional and overall response to the question. Statewide, 41% of the producers indicated that they determined the percentage of acres to be grazed out prior to planting. This ranged from 28% in the Southwest to 65% in the

South Central and East. During the fall/winter-grazing season, 25% of the producers determine the percentage of graze-out acres.

Producers were asked to rank the top three factors that influenced their decisions regarding the number of acres to graze out. Eight potential factors were listed including: cattle prices; wheat price; lack of moisture; government programs; hail or high winds; available capital to purchase cattle; income from pasture leasing; other. Results are summarized in Table 16. Cattle price was listed by 74% as either the first, second, or third most important factor. Wheat price was cited by 70% as either the first, second, or third most important factor that determines the number of graze-out acres. Lack of moisture was the third most frequently cited factor with 57% of the producers listing it as the first, second, or third most important factor.

Half of the respondents from the Panhandle indicated that lack of moisture was either the first or second most important factor. But, in the South Central and East only 24% indicated that lack of moisture was either first or second most important factor. In the West Central region, 66% of the producers indicated that wheat price was either the first or second most important factor. However, only 40% of the producers in the Panhandle region indicated that wheat price was either the first or second most important factor that determines the number of graze-out acres.

Producers have the choice of stocking wheat pasture with cattle that they own or leasing the pasture to someone else. When entering into a lease arrangement, there are several decisions to be made. The lease contract can be oral or written. It also can be annual or multi-year. The financial arrangement of the lease can be based on rate of gain, fixed rate per acre, profit sharing or a combination of these.

Of those producers who indicated that they participated in a fall/winter wheat pasture grazing lease, 60% were tenants and 40% were landlords. In the Central region, 71% of the producers reporting were landlords whereas, in the West Central region, only 46% were landlords. Statewide, 82% of the lease arrangements were oral contracts and 18% were written contracts. The South Central and East region reported the highest percentage of written contracts at 28%. Producers reported that 81% of the lease contracts were annual and 19% were multi-year (Table 17). The West Central region reported the highest annual lease rate (89%).

The tenant and landlord have certain responsibilities under the lease arrangement. These responsibilities vary dramatically across individual contracts. However, the average response for the state indicates that the tenant was primarily responsible for checking livestock, salt and minerals, fencing labor, supplemental feeding, and supplemental pasture. The landlord was primarily responsible for fencing materials, fertilizer cost, and water. In general, the landlord primarily supplied resources that would stay with the land, whereas the tenant supplied resources that primarily benefited the cattle. The results are summarized in Table 18.

The average wheat pasture rental price for fall/winter grazing for the 1995-96 growing season was determined to be \$0.31/lb of gain (Table 19). The price ranged from \$0.29/lb of gain in the Central region to \$0.34/lb of gain in the North Central region. The rental price for graze-out acreage also averaged \$0.31/lb of gain. The only regions deviating from \$0.31/lb of gain were the Panhandle and North Central regions, each having an average of \$0.32/lb of gain (Table 20).

## DISCUSSION

The survey identified several production practices that deviate substantially from research-based recommendations. For example, it is recommended that animals should not be stocked on wheat until the coronal root system has developed (Redmon et al., 1995; Krenzer, 1995; Shroyer et al., 1993). However, only 35% indicated that they used root system development to determine when to initiate grazing.

Producers who purchase cattle to place on wheat pasture are faced with a high-risk period while the cattle get acclimated to their new environment. The receiving period is one of the most stressful times during an animal's life (Lalman, 1997). It is recommended that producers use a receiving program for stockers. The cattle purchased for placement on the wheat pasture are exposed to a high stress period while getting acclimated to their new environment. However, 60% of the producers did not use a receiving program. Since each producer's resources differ, there is no single nutritional program recommended for the receiving period. A general recommendation suggests receiving diets be designed to maximize intake and provide greater concentrations of required nutrients.

It is recommended that a wheat pasture lease agreement be in writing, preferably drafted by an attorney (Tilley, 1988). Survey results indicate that only 18% of the producers have written contracts.

Cattle grazing wheat pastures are at risk for bloat (Bartley et al., 1975). It is recommended that the cattle be given a bloat preventative while grazing wheat pastures. However, the results show that only 39% of the producers use one of the products listed in the survey.

Grazing termination on wheat intended for grain harvest is a decision with important economic consequences. Grazing too late in the spring will reduce wheat yield. Removing livestock earlier than necessary will result in less overall weight gain. Redmon et al. (1996) concluded that grazing should be terminated when ungrazed wheat of the same variety and planting date begins the earliest stage of jointing. The earliest stage of jointing occurs when the hollow stem begins to elongate. If grazing occurs after this period, grain yields may be reduced more than one bushel per day. Almost half (47%) of the producers responded that they used calendar date to determine when to remove livestock from wheat intended for grain harvest. Only 12% indicated that they used jointing of ungrazed wheat to determine when to remove livestock. The lack of conformance between research based recommendations regarding both grazing initiation and grazing termination for wheat intended for grain harvest suggest an opportunity for extension education.

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Table 1. Fall/Winter wheat pasture use by livestock type, 1995-96 (%).

Region	Stocker Cattle	Cows and Replacement Heifers	Sheep	Dairy Cattle	Horses	Other
Panhandle	68	22	0	3	6	1
West Central	62	34	0	0	2	2
Southwest	69	27	0	0	3	1
North Central	76	20	1	3	0	1
Central	63	25	3	1	6	2
South Central & East	62	30	0	7	2	0
State	67	26	1	2	3	1

Row totals may not sum to 100 due to rounding errors.

Table 2. Fall/Winter grazing cattle weights, rates of gain, and stocking rate.

	Beginning Weight Steers (lbs)	Beginning Weight Heifers (lbs)	Rate of Gain Steers (lbs/day)	Rate of Gain Heifers (lbs/day)	Stocking Rate Steers (acres/hd)	Stocking Rate Heifers (acres/hd)	Stocking Rate Cows with Fall Calves (acres/hd)	Stocking Rate Cows with Spring Calves (acres/hd)	Stocking Rate Cows Only (acres/hd)
Panhandle	459	452	1.8	1.6	3.3	3.5	4.0	3.0	2.0
West Central	459	442	1.9	1.7	3.0	3.1	4.2	4.3	4.3
Southwest	445	448	1.9	1.7	3.0	2.8	4.6	4.0	5.0
North Central	483	485	1.9	2.0	2.6	3.1	2.6	3.9	2.1
Central	483	465	1.9	1.7	2.5	1.8	2.6	3.1	2.8
South Central & East	461	458	1.9	1.7	1.5	1.5	2.9	3.0	0.7
State	466	459	1.9	1.8	2.7	2.6	3.6	3.7	3.1

Table 3. Receiving strategies reported by stocker producers (%).

Region	Own Program	Commercial Receiving	Pre-conditioned Cattle	No Program
Panhandle	46	0	3	51
West Central	40	4	4	53
Southwest	32	3	7	58
North Central	35	14	2	49
Central	31	6	5	59
South Central & East State	28	4	4	65
	35	5	4	56

Table 4. Stocker cattle receiving program days and cost.

	Personal Program		Commercial Program	
	Days	Cost (\$/Hd)	Days	Cost (\$/Hd)
Panhandle	24.7	22.04	*	
West Central	21.1	23.29	16.3	23.45
Southwest	24.4	24.03	30.0	25.50
North Central	24.3	21.82	23.1	25.18
Central	24.8	21.18	22.4	14.67
South Central & East	25.8	15.46	33.0	26.55
State	24.0	21.85	23.6	23.07

\*No respondents in the panhandle region reported the use of a commercial program.

Table 5. Stocker cattle feeding program during receiving (%).

Region	Grass Hay Alone	Silage	Alfalfa Hay Alone	Silage Plus Supplement	Grass Hay plus High-Protein Supplement	Mixed Ration Self-fed	Grass Hay plus High-Energy Supplement	Mixed Ration Hand-fed	Alfalfa plus High-Energy Supplement	Other
Panhandle	6	0	3	0	16	0	22	16	0	6
West Central	7	0	7	0	24	7	20	9	2	17
Southwest	5	0	0	0	13	3	26	8	8	18
North Central	10	0	4	0	22	6	29	6	6	6
Central	25	0	9	0	25	7	18	13	7	2
South Central & East	14	0	0	0	22	3	19	19	0	8
State	12	0	4	0	21	5	22	11	4	9

Row totals may not sum to 100 due to rounding errors.

Table 6. Factors that producers use to determine when to begin grazing wheat (%).

Region	Calendar Date	Top Growth	Climate Conditions	Root System	Recommendations	Other
Panhandle	13	29	7	46	1	4
West Central	15	32	8	43	0	3
Southwest	14	40	9	33	0	4
North Central	12	30	12	42	1	4
Central	16	41	11	30	0	2
South Central and East	20	50	7	18	0	6
State	15	37	9	35	0	3

Row totals may not sum to 100 due to rounding errors.



Table 7. Type of supplement fed to stocker cattle on wheat pasture as reported by those who fed a supplement (%).

Region	None	Hay	Protein	Mineral	Wheat Straw	High Fiber Energy	High Starch Energy	Other
Panhandle	6	56	13	59	22	9	6	19
West Central	2	54	13	52	33	2	9	15
Southwest	0	58	18	53	24	3	5	13
North Central	0	53	14	69	29	6	14	10
Central	7	55	16	59	18	5	4	7
South Central & East	8	56	14	44	3	11	3	8
State	4	55	15	57	22	6	7	12

Table 8. Type of supplement fed to cows and replacement heifers on wheat pasture (%).

Region	None	Hay	Protein	Mineral	Wheat Straw	High Fiber Energy	High Starch Energy	Other
Panhandle	0	56	33	56	44	0	0	0
West Central	18	55	32	32	5	5	0	9
Southwest	8	68	32	32	24	4	0	4
North Central	0	69	15	54	31	0	0	23
Central	4	71	21	42	17	0	0	0
South Central & East	14	71	14	36	7	0	9	14
State	8	65	25	39	19	2	0	7

Table 9. Producers who reported the use of Bovatec<sup>®</sup>, poloxalene, and Rumensin<sup>®</sup> and reasons for use by region (% of respondents who reported having stocker steers on wheat).

	Panhandle	West Central	Southwest	North Central	Central	South Central & East	State
Bovatec <sup>®</sup>	31	9	21	24	34	8	22
for gain	80	50	50	75	79	67	71
for bloat	50	50	50	83	53	33	57
Poloxalene	9	7	8	8	14	8	9
full season	33	33	0	25	0	0	13
high risk	67	67	100	100	75	100	87
Rumensin <sup>®</sup>	9	4	5	4	16	14	9
for gain	67	100	100	0	78	80	77
for bloat	100	100	0	100	100	40	82
Total	50	20	34	37	64	31	39

For example, 31% of the producers in the Panhandle who responded to the survey used Bovatec<sup>®</sup>. Of that 31%, 80% of the producers indicated that they used Bovatec<sup>®</sup> to enhance gain and 50% used Bovatec<sup>®</sup> for bloat prevention. Totals over 100% are due to producers selecting both uses for the supplements in question 19 of the survey.

Table 10. Primary reasons producers gave for feeding a supplement to stocker cattle on wheat pasture (%).

	Nutrients	Energy	Roughage	ADG	Stocking Density	Other
Panhandle	33	12	27	21	27	6
West Central	46	7	33	15	15	11
Southwest	26	21	29	21	18	13
North Central	39	4	27	24	22	4
Central	45	5	29	36	21	4
South Central & East	19	8	33	17	19	11
State	36	9	30	23	21	8

Table 11. Primary reasons producers gave for feeding a supplement to cows and replacement heifers on wheat pasture (%).

	Nutrients	Energy	Roughage	ADG	Stocking Density	Other
Panhandle	44	0	56	11	0	11
West Central	41	9	32	5	0	9
Southwest	36	12	52	12	8	8
North Central	31	8	46	15	23	31
Central	17	8	50	0	4	4
South Central & East	14	14	43	0	21	7
State	30	9	46	7	8	10

Table 12. Factors that producers use to determine when to terminate grazing (%).

Region	Calendar Date	Jointing Ungrazed Wheat	Jointing Grazed Wheat	Recommendations of Others	Other
Panhandle	36	17	14	0	33
West Central	46	14	18	1	21
Southwest	48	11	18	0	23
North Central	50	11	15	2	22
Central	53	13	18	1	14
South Central & East	40	7	18	0	34
State	47	12	17	1	23

Table 13. Spring 1996 grazing termination date used by producers who planned to harvest grain.

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Region	Date
Panhandle	March 10
West Central	March 5
Southwest	February 27
North Central	March 1
Central	March 4
South Central & East	March 7
State	March 3

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Table 14. Graze-out period cattle weights, rates of gain, and stocking rate operation during graze-out period.

Region	Beginning Weight Steers (lbs)	Beginning Weight Heifers (lbs)	Rate of Gain Steers (lbs/day)	Rate of Gain Heifers (lbs/day)	Stocking Rate Steers (ac/hd)	Stocking Rate Heifers (ac/hd)	Stocking Rate Cows with Fall Calves (ac/hd)	Stocking Rate Cows with Spring Calves (ac/hd)	Stocking Rate Cows Only (ac/hd)
Panhandle	478	486	1.8	1.8	2.5	2.1	*	1.8	*
West Central	560	580	2.5	3.0	1.6	1.9	1.8	1.6	2.0
Southwest	530	513	2.1	2.0	1.5	1.5	4.3	1.6	3.0
North Central	586	566	2.1	2.0	1.3	1.1	2.0	1.4	0.9
Central	573	515	2.3	2.1	1.6	1.0	1.1	2.2	*
South Central & East	508	497	2.0	2.0	1.2	1.4	2.0	3.2	0.5
State	545	523	2.2	2.1	1.5	1.5	2.5	1.9	1.6

\* Indicates no responses.



Table 15. When the percentages of wheat acres to be grazed-out were determined (%).

	Prior to Planting	At Planting	During Grazing Season	At End of Winter Grazing	Other
Panhandle	46	11	21	4	18
West Central	40	4	21	17	19
Southwest	28	4	38	14	16
North Central	33	3	31	19	14
Central	33	10	29	21	7
South Central & East	65	10	12	12	2
State	41	7	25	15	12

Table 16. Factors that influenced the number of graze-out acres (%).

	Panhandle			West Central			Southwest			North Central			Central			South Central & East			State		
	#1's	#2's	#3's	#1's	#2's	#3's	#1's	#2's	#3's	#1's	#2's	#3's	#1's	#2's	#3's	#1's	#2's	#3's	#1's	#2's	#3's
Cattle Prices	19	26	15	26	23	26	19	37	26	26	29	7	30	32	14	29	34	21	25	31	18
Wheat Prices	14	26	15	26	40	13	28	27	16	15	39	21	28	34	14	21	26	5	23	33	14
Lack of Moisture	28	22	20	24	10	23	19	14	29	18	13	17	15	12	24	10	14	42	19	13	25
Other	11	0	0	11	4	6	15	0	3	26	8	10	11	4	0	27	6	5	17	4	4
Gov't Programs	14	13	10	4	6	26	9	10	16	8	5	28	9	8	22	6	6	11	8	8	20
Income from Pasture Leasing	8	0	10	7	6	3	9	4	10	8	5	10	2	0	5	6	6	0	6	4	7
Capital Availability	3	9	15	0	2	3	0	0	0	0	0	0	4	8	19	0	9	16	1	4	8
Hail or High Winds	3	4	15	2	8	0	2	8	0	0	0	7	0	2	3	0	0	0	1	4	4

Table 17. Lease arrangements for wheat pasture grazing (%).

Region	Tenant	Landlord	Oral Contract	Written Contract	Annual Lease	Multi-year Lease	Related to Other Party
Panhandle	69	31	83	17	76	24	36
West Central	46	54	84	16	89	11	26
Southwest	57	43	83	17	75	25	24
North Central	53	47	84	16	81	19	45
Central	71	29	84	16	84	16	39
South Central & East	70	30	72	28	75	25	19
State	60	40	82	18	81	19	32

Table 18. Tenant and landlord responsibilities under lease arrangements for wheat pasture grazing (%).

	Panhandle			West Central			Southwest			North Central			Central			South Central & East			State		
	T	L	B	T	L	B	T	L	B	T	L	B	T	L	B	T	L	B	T	L	B
Checking Livestock	79	11	11	80	10	10	64	7	29	83	13	4	82	6	12	65	26	9	76	11	13
Salt & Minerals	86	14	0	78	11	11	74	15	11	78	22	0	90	3	6	73	23	5	80	14	6
Fencing Materials	46	50	4	37	55	8	38	55	7	64	36	0	35	56	9	26	70	4	40	54	6
Fencing Labor	59	30	11	44	36	19	48	41	11	71	24	5	61	27	12	55	41	5	55	33	11
Fertilizer Cost	25	57	18	18	49	33	24	59	17	36	45	18	32	35	32	42	46	13	28	48	23
Supplemental Feeding	81	15	4	77	11	11	76	20	4	91	9	0	90	7	3	64	36	0	80	16	4
Supplemental Pasture	68	26	5	63	19	19	54	38	8	88	12	0	62	31	8	53	42	5	64	28	8
Water	46	43	11	38	47	15	50	46	4	59	36	5	33	50	17	36	59	5	43	47	10
Other	100	0	0	67	0	33	50	50	0	100	0	0	67	0	33	0	0	0	73	9	18

T represents the tenants' (livestock owner) responsibility; L represents the landlords' responsibility; B represents both parties' responsibility. Totals may not sum to 100 due to rounding errors.

Table 19. Wheat pasture rental price for fall/winter grazing.

Region	Obs.	\$/acre/year	Obs.	\$/cwt/month	Obs.	\$/lb of gain	Obs.	\$/head/month
Panhandle	3	10	18	2.27	5	0.31	1	8.00
West Central	4	27	21	2.43	10	0.32	0	.
Southwest	2	35	7	2.32	16	0.31	4	5.56
North Central	1	6	12	2.77	5	0.34	1	3.00
Central	5	30	11	2.59	8	0.29	3	5.17
South Central & East	8	38	1	2.25	11	0.31	1	6.00
State	23	29	70	2.46	55	0.31	10	5.48

Obs. is the number of observations.

Table 20. Wheat pasture rental price for 1996 graze-out acreage.

Region	Obs.	\$/acre	Obs.	\$/cwt/month	Obs.	\$/lb of gain	Obs.	\$/head/month
Panhandle	5	26	4	2.31	7	0.32	1	15.00
West Central	7	74	7	2.50	7	0.31	*	*
Southwest	5	69	2	2.25	13	0.31	*	*
North Central	3	41	3	3.00	3	0.32	2	6.75
Central	4	50	4	2.50	7	0.31	*	*
South Central & East	7	33	1	2.25	8	0.31	1	9.00
State	31	50	21	2.50	45	0.31	4	9.38

Obs. is the number of observations.

\* Indicates no responses.

PAPER III

PRODUCTION PRACTICES USED BY WHEAT AND WHEAT-STOCKER  
PRODUCERS IN OKLAHOMA

PRODUCTION PRACTICES USED BY WHEAT AND WHEAT-STOCKER  
PRODUCERS IN OKLAHOMA

ABSTRACT

Wheat, in the Southern Plains, is grown for both forage and grain. Winter wheat production represents a large portion of the Oklahoma agricultural economy. Three distinct types of wheat producers exist in Oklahoma, those that produce grain only, full season grazing, and forage plus grain. A survey was conducted to determine wheat production practices used by Oklahoma producers, and the data were sorted by intended use. The objective of this paper is to report the findings of the research questionnaire not included in Paper I and Paper II. It was determined that of the land included in the total farming operation, 45% was owned by the producers and 55% was leased by the producers. Grain yield was chosen, by 72% of the producers, to be the first, second, or third most important characteristic in determining which variety of wheat to plant. It was determined that 82% of the producers who completed the survey chose "past performance on my farm" as the first, second, or third most important source of information when determining which variety of wheat to plant. It was determined that 76% of the producers who completed the survey did not correctly identify the jointing stage of wheat. This suggests that either the question was not understood or that opportunities exist for extension education programs. Through extension we need to emphasize teaching about wheat growth and development. Additional research will be necessary to clarify this finding.



## PRODUCTION PRACTICES USED BY WHEAT AND WHEAT-STOCKER PRODUCERS IN OKLAHOMA

Wheat, in the Southern Plains, is grown for both forage and grain. Beef cattle and wheat are Oklahoma's two principal agricultural products. Combined they account for 60% of the total value of Oklahoma's multi-billion dollar agricultural sector (Oklahoma Agricultural Statistics, 1995). As a result of a combination of factors, including soils and climate, winter wheat may be seeded in September, grazed by livestock during the fall and winter, and harvested for grain in June. Grazing stocker cattle on wheat pasture is a valuable production enterprise available to Oklahoma producers. The purpose of this paper is to present the findings of the questionnaire not reported in papers I and II.

### PROCEDURE

A survey was created for the purpose of determining the wheat production practices used by Oklahoma farmers (Appendix 4). The survey was conducted in cooperation with agricultural statisticians of the Oklahoma Agricultural Statistics Service (OASS). The state was divided into six regions (Appendix 1). Five of these regions correspond with five Oklahoma Crop Reporting Districts--Panhandle, West Central, Southwest, North Central, and Central. The sixth region included the four remaining Crop Reporting Districts--South Central, Northeast, East Central, and Southeast.

The sample of 4,801 Oklahoma producers was randomly drawn from the OASS data base. Roughly 800 producers were chosen from each of the six regions. The surveys were mailed in March 1996. A reminder postcard was sent about a week after the

survey. A total of 971 usable surveys were returned--20% of the total mailed. More than 150 responses were received from each of the five major wheat producing regions. The number of producer responses for each question and the corresponding table that summarizes the data are shown in Appendices 2 and 3.

## RESULTS

It was determined that of land included in the total farming operation, 45% was owned by the producers and 55% was leased by producers (Table 1). The land owned by the producers ranged from 59% in the South Central and East region to 39% in the Panhandle. Producers were asked if they were members of the Oklahoma Wheat Growers Association (OWGA), Oklahoma Grain and Stocker Producers (OGSP), or the Oklahoma Cattlemen's Association (OCA). Producers who completed the survey indicated their membership in these organizations statewide as being OWGA (15%), OGSP (1%), OCA (22%), OWGA and OGSP (0%), OWGA and OCA (10%), OGSP and OCA (0%), OWGA, OGSP, and OCA (1%), and none (51%) (Table 2).

Producers were asked which commodity program option was used for the 1995-96 crop year. Producers were given the following choices: regular option, 0-85, 0-92, no participation, or other. Results indicate that 69% of the producers chose the regular option and 19% did not participate (Table 3).

Producers were asked to rank the top three characteristics in order of importance when determining the varieties they plant. Results show 72% of the producers indicated that grain yield was either the first, second, or third most important characteristic determining what varieties to plant. Forage yield was the next most popular characteristic

with 52% of the producers reporting it as either the first, second, or third most important characteristic (Table 4). In the southwest region 78% of the producers indicated that grain yield was either the first or second most important characteristic. But, in the south central and east region only 46% indicated grain yield to be the first or second most important characteristic compared to forage yield (62%).

Producers were asked to rank the sources of information in order of importance when selecting which variety of wheat to plant. The following choices were provided: area test plot results, results of neighboring fields, seed availability, past performance on my farm, research publications, area extension service, seed company information, and other. Producers (82%) indicated past performance to be either the first, second, or third most important source of information when determining the varieties to plant. Neighboring fields (58%) was the second most popular source of information. Area test plot results (47%), seed availability (46%), and research publications (38%) were also important sources of information (Table 5).

Early jointing or the first sign of jointing in wheat is an important stage in wheat growth. In the survey the producers were asked which answer best describes their understanding of what the term "early jointing" means in reference to wheat production. The following choices were provided: joint or node above soil, developing head at or above soil, hollow stem above roots, or not familiar with the term. Krenzer (1997) defines the earliest stage of jointing to occur when hollow stem can be identified above the roots. The results from this question indicate that a large portion (76%) of the producers are not able to correctly identify the jointing stage of wheat (Table 8).

The USDA does not provide estimates of the number and class of animals grazed on wheat pasture. Using the results from the survey and statistics from the Oklahoma Department of Agriculture, an estimate of the number of stocker steers and stocker heifers was derived. Statewide there were over 518,000 stocker steers (Table 6) and 350,000 stocker heifers (Table 7) on Oklahoma wheat pasture. The North Central region had the highest number of steers with 135,615, while the Panhandle region recorded the fewest steers with 61,963. The Southwest region (83,700) reported the most heifers compared with the Panhandle (42,922). These numbers may have been influenced by the dry weather that persisted throughout the growing season. The lack of moisture may have influenced forage yield and affected the grazing practices used by producers.

Three distinct types of wheat producers exist in Oklahoma: those that produce grain only, full season grazing, and forage plus grain. To determine if any differences in production practices exist between the three groups, the data from the survey were sorted by intended use. One of the questions that was analyzed in this manner is about “early jointing”. Table 8 summarizes the producer responses across intended use. Of the full-season grazing producers, 23% were able to correctly define the jointing stage compared with 24% for producers utilizing both forage and grain. The majority of grain-only producers (85%) were unable to correctly define the jointing stage of wheat.

Question 4 of the survey asked the producers if they were members of any or all of the following: Oklahoma Wheat Growers Association, Oklahoma Grain and Stocker Producers, or the Oklahoma Cattlemen's Association. The majority of the producers who completed the survey reported that they were not members of any of these associations. The results are summarized in Table 9. Most respondents who reported membership in

the Oklahoma Wheat Growers Association indicated that wheat was primarily produced on their farms for grain-only. Thirty-five percent of respondents who indicated production of wheat for full season forage indicated membership in the Oklahoma Cattlemen's Association. Also, 16% of those reporting dual purpose wheat production indicated membership in the Oklahoma Cattlemen's Association. Producers placing animals on their wheat are more likely to be members of a cattle association whereas producers only harvesting grain are more likely members of wheat associations.

## CONCLUSION

When determining which variety of wheat to plant, producers indicated that grain yield was the most important characteristic. Another important characteristic to producers that determines variety chosen is forage production. Producers indicated that past performance on their farm was the most important source of information when determining which variety of wheat to plant. Results from neighboring fields are also important to producers when choosing variety of wheat. Seed availability is another determining factor which producers found important. We can conclude that producers tend to plant the varieties with high grain yield and forage production that are readily available and they believe have performed well for them or their neighbors in the recent past. Producers rank grain and forage yield as the highest performance characteristics.

More than half (55%) of the land farmed by survey respondents was leased. More than half (51%) of the survey respondents were not members of either the Oklahoma Wheat Growers Association or the Oklahoma Cattlemen's Association or the Oklahoma Grain and Stocker Producers. In the 1995-96 season more than 860,000 stockers grazed

fall/winter wheat pasture in Oklahoma, of which 60% were steers. More than a fifth (21%) of producers who grew dual-purpose wheat reported that they were not familiar with the term "early jointing".

An additional survey of producers could be conducted to confirm the results of this study. Where substantial differences in production practices differ, research, including economic analysis will be necessary to determine economic consequences and if the differences matter. For proper management of the unique wheat pasture resources, it will be essential to continue research programs to develop appropriate management strategies and extension education programs to extend the research information.

## REFERENCES

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Table 1. Total farming operation acres owned and leased.

Region	Total Acres	Percent Owned	Percent Leased
Panhandle	310,000	39	61
West Central	206,000	49	51
Southwest	168,798	46	54
North Central	176,919	40	60
Central	134,389	46	54
South Central & East	121,998	59	41
State	1,118,104	45	55



Table 2. Survey respondents who indicated membership in OWGA, OGSP, and OCA (%).

Region	OWGA <sup>a</sup>	OGSP <sup>a</sup>	OCA <sup>a</sup>	OWGA & OGSP	OWGA & OCA	OGSP & OCA	OWGA & OGSP & OCA	None
Panhandle	13	0	15	0	7	1	0	65
West Central	15	1	19	0	10	0	0	55
Southwest	12	0	14	0	8	0	0	65
North Central	18	1	11	1	5	0	1	63
Central	11	1	21	1	11	1	1	54
South Central & East	7	0	27	0	2	1	0	64
State	13	1	18	0	8	0	0	61
Wheat Acres Planted <sup>b</sup>	15	1	22	0	10	0	1	51

<sup>a</sup> OWGA refers to the Oklahoma Wheat Growers Association.  
 OGSP refers to the association of Oklahoma Grain and Stocker Producers.  
 OCA refers to the Oklahoma Cattlemen's Association.

<sup>b</sup> Proportion of wheat acres reported by survey respondents classified by reported membership. For example, 15% of the total wheat acres reported were farmed by respondents who indicated membership in OWGA.

Table 3. Wheat commodity program chosen by region (%).

	Regular Option	0-85	0-92	No Participation	Other
Panhandle	67	8	14	8	3
West Central	64	5	10	12	9
Southwest	64	8	5	15	8
North Central	77	3	6	8	6
Central	53	4	8	28	6
South Central & East	29	5	13	48	5
State	61	5	9	19	6

Table 4. Characteristics of wheat used to determine variety chosen (%).

	Panhandle			West Central			Southwest			North Central			Central			South Central & East			State		
	#1	#2	#3	#1	#2	#3	#1	#2	#3	#1	#2	#3	#1	#2	#3	#1	#2	#3	#1	#2	#3
Grain Yield	39	20	8	60	6	6	58	20	3	53	17	5	43	21	7	28	18	3	47	19	6
Forage Yield	13	16	5	17	30	14	20	27	10	15	17	7	31	24	5	46	16	5	22	22	8
Past Success	6	6	10	6	5	14	6	7	22	6	7	10	5	9	13	7	9	21	6	7	14
Test Weight	4	10	13	6	12	14	5	9	16	9	17	11	4	11	15	3	11	7	5	12	13
Drought	16	15	13	2	6	5	2	10	6	2	5	7	1	5	6	1	6	4	5	8	7
Winter Hardy	4	8	14	2	5	5	1	5	6	1	5	7	4	7	11	6	9	13	3	6	9
Disease	3	3	7	1	4	9	2	6	5	5	5	11	3	6	9	2	7	8	3	5	8
Other	2	0	1	1	1	1	2	0	1	2	0	1	1	0	0	4	1	3	2	0	1
Height	4	5	4	1	5	3	1	2	4	0	3	8	1	4	4	1	5	7	1	4	5
Insect	3	3	4	1	4	4	1	2	3	1	3	5	1	4	6	1	7	7	1	4	5
pH Tolerance	1	0	1	2	1	8	0	2	1	1	3	11	2	1	6	2	1	4	1	1	6
Lodging	1	1	2	1	2	3	0	2	3	1	2	3	3	1	6	0	2	3	1	2	3
Coleoptile	1	3	5	1	2	4	1	1	3	1	4	5	0	1	2	0	2	5	1	2	4
Shattering	1	2	3	0	1	2	0	2	3	1	2	3	1	1	0	0	1	1	1	2	2
Late Frost	1	2	2	1	1	3	0	0	3	0	3	3	0	1	3	1	3	1	1	2	3
Maturity	1	3	4	0	2	3	0	5	8	1	5	1	1	2	6	0	2	7	0	3	4
Pedigree	1	0	3	0	1	3	0	1	2	1	1	2	0	0	2	0	2	3	0	1	2

Table 5. Sources of information used to determine which variety of wheat to plant (%).

	Panhandle	West Central	Southwest	North Central	Central	South Central & East	State
	#1 #2 #3	#1 #2 #3	#1 #2 #3	#1 #2 #3	#1 #2 #3	#1 #2 #3	#1 #2 #3
Past Performance	65 17 10	43 23 16	57 22 8	40 25 18	48 24 8	49 16 6	50 21 11
Test Plot	14 8 8	18 14 10	10 17 12	25 15 8	20 11 11	12 7 19	17 15 15
Neighboring Fields	8 37 21	14 28 20	16 32 14	15 27 17	11 25 24	7 20 26	12 28 18
Seed Avail.	5 16 26	7 14 23	8 9 32	6 13 19	9 18 25	16 23 18	8 15 23
Research Pub.	4 13 16	11 13 14	7 12 24	8 10 23	8 9 22	9 11 18	8 11 19
Extension Service	2 3 14	5 5 9	3 4 4	3 6 8	1 7 7	3 12 6	3 6 8
Seed Company Info.	1 6 4	2 2 8	1 4 5	2 3 6	2 5 4	3 9 8	2 4 6
Other	1 0 0	0 0 1	0 1 1	1 0 2	1 0 0	1 1 1	1 0 1

Table 6. Estimated number of stocker steers on Oklahoma wheat pasture fall/winter 1995-96.

Region	Total 1996 Oklahoma Wheat Acres	Percent used for Forage <sup>a</sup>	Wheat Acres Used for Forage	Percent used by Stocker Steers	Wheat Acres Stocked with Stocker Steers	Stocking Rate Steers/Acre	Calculated Number of Steers
Panhandle	1,070,000	39	417,300	49	204,477	0.30	61,963
West Central	1,090,000	56	610,400	40	244,160	0.33	81,387
Southwest	1,400,000	62	868,000	39	338,520	0.33	112,840
North Central	2,150,000	41	881,500	40	352,600	0.38	135,615
Central	823,000	54	444,420	40	177,768	0.4	71,107
South Central & East	467,000	61	284,870	34	96,855	0.67	64,571
State	7,000,000	50	3,500,000	40	1,400,000	0.37	518,519

<sup>a</sup>Includes both forage and grain and forage only.

Table 7. Estimated number of stocker heifers on Oklahoma wheat pasture fall/winter 1995-96.

Region	Total 1996 Oklahoma Wheat Acres	Percent used for Forage <sup>a</sup>	Wheat Acres Used for Forage	Percent used by Stocker Heifers	Wheat Acres Stocked with Stocker Heifers	Stocking Rate Heifers/Acre	Calculated Number of Heifers
Panhandle	1,070,000	39	417,300	36	150,228	0.29	42,922
West Central	1,090,000	56	610,400	22	134,288	0.32	43,319
Southwest	1,400,000	62	868,000	27	234,360	0.36	83,700
North Central	2,150,000	41	881,500	28	246,820	0.32	79,619
Central	823,000	54	444,420	22	97,772	0.56	54,318
South Central & East	467,000	61	284,870	32	91,158	0.67	60,772
State	7,000,000	50	3,500,000	26	910,000	0.38	350,000

<sup>a</sup> Includes both forage and grain and forage only.

Table 8. Definition of "early jointing" responses across intended use by region (%).

Region	Joint or Node Above Soil	Developing Head Above Soil	Hollow Stem Above Roots	Not Familiar
<b>GRAIN ONLY</b>				
Panhandle	35	25	21	19
West Central	16	21	11	53
Southwest	50	8	8	33
North Central	30	19	11	41
Central	38	13	13	38
South Central & East	47	20	13	20
State	34	20	15	31
<b>FULL SEASON GRAZING</b>				
Panhandle	60	40	0	0
West Central	30	30	0	40
Southwest	20	20	30	30
North Central	0	50	50	0
Central	12	4	38	46
South Central & East	18	18	20	44
State	19	17	23	40
<b>FORAGE PLUS GRAIN</b>				
Panhandle	35	21	31	13
West Central	36	18	23	23
Southwest	29	27	21	23
North Central	34	22	19	26
Central	28	22	31	19
South Central & East	33	28	11	28
State	32	22	24	21

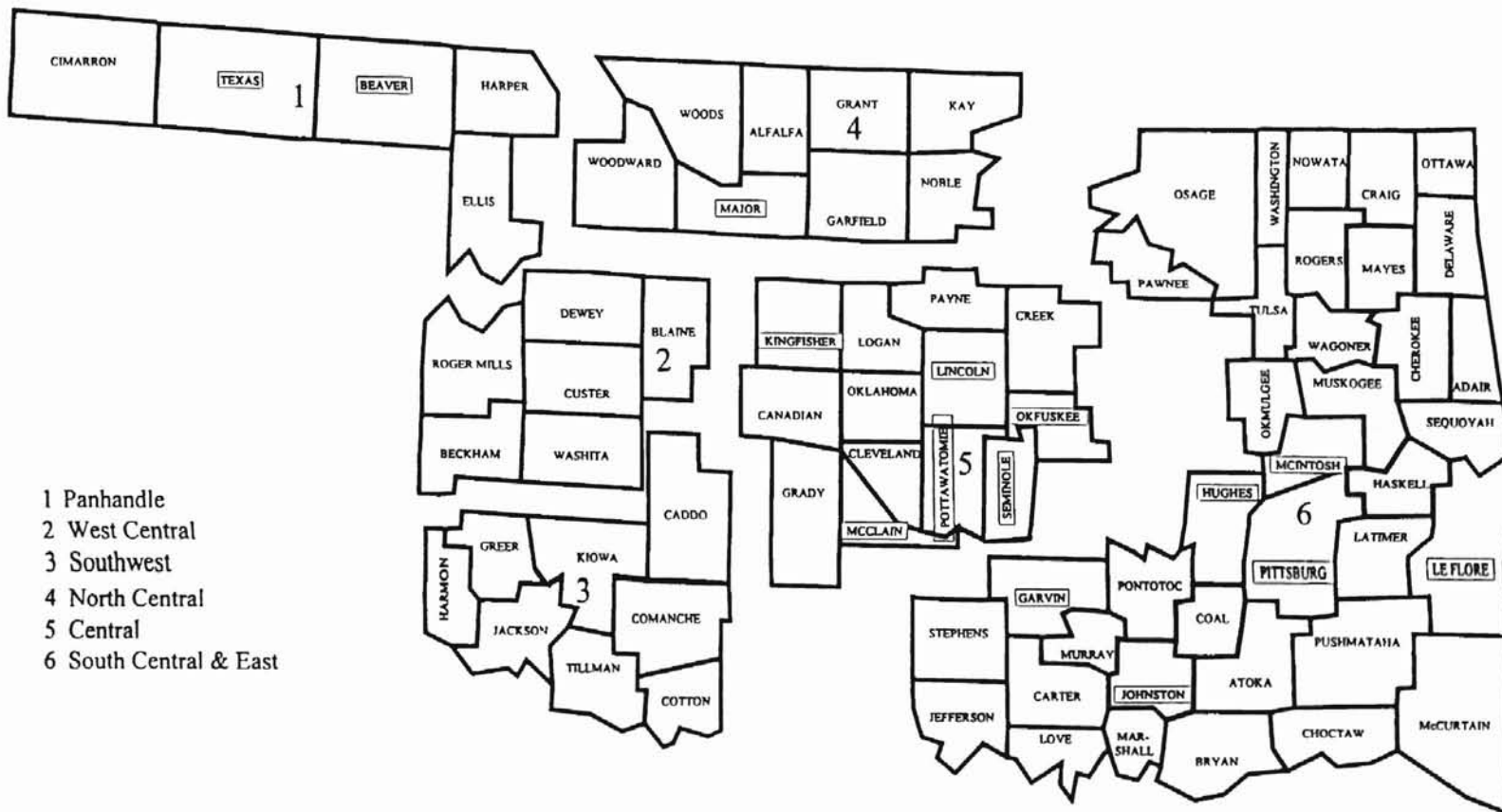
Table 9. Survey respondents classified by intended use of wheat who indicated membership in OWGA, OGSP, and OCA (%).

Region	OWGA*	OGSP*	OCA*	OWGA & OGSP	OWGA & OCA	OGSP & OCA	OWGA & OGSP & OCA	None
<b>GRAIN ONLY</b>								
Panhandle	20	0	4	0	6	0	0	71
West Central	35	0	0	0	5	0	0	60
Southwest	21	0	0	0	0	0	0	79
North Central	23	0	6	0	6	0	0	65
Central	22	0	11	0	11	0	0	56
South Central & East	25	0	13	0	0	0	0	63
State	23	0	5	0	5	0	0	66
<b>FULL SEASON GRAZING</b>								
Panhandle	0	0	71	0	0	0	0	29
West Central	0	0	71	0	0	0	0	29
Southwest	10	0	30	0	10	0	0	50
North Central	0	33	0	0	0	0	0	67
Central	4	0	42	0	0	0	0	54
South Central & East	2	0	31	0	2	2	0	63
State	3	1	35	0	1	1	0	58
<b>FORAGE PLUS GRAIN</b>								
Panhandle	12	0	17	0	8	1	0	62
West Central	13	1	23	0	17	0	0	46
Southwest	10	0	14	0	10	0	0	67
North Central	17	1	11	1	4	0	0	65
Central	9	1	14	1	14	0	1	59
South Central & East	11	0	28	0	6	0	0	56
State	12	1	16	0	10	0	0	60

\* Oklahoma Wheat Growers Association, Oklahoma Grain and Stocker Producers, Oklahoma Cattlemen's Association.



## APPENDIX 1



- 1 Panhandle
- 2 West Central
- 3 Southwest
- 4 North Central
- 5 Central
- 6 South Central & East

Appendix 1. Oklahoma Wheat Producing Regions

Source: Regions 1 through 5 correspond with agricultural statistics districts as defined by the Oklahoma Agricultural Statistics Service. Region 6 includes four districts: South Central, Northeast, East Central, and Southeast.

## APPENDIX 2

Appendix 2. Number of producers who responded to questions and table that summarizes the data.

Question	Panhandle	West Central	Southwest	North Central	Central	South Central & East	Paper	Table
2	179	172	153	169	175	123	III	1
3	179	172	153	169	175	123	III	1
4	178	172	153	169	175	123	III	2
5	174	168	149	163	160	103	I	1
6	179	170	150	165	168	118	I	4
7	159	162	143	163	165	110	III	3
8	179	171	150	167	173	114	III	4
9	167	168	145	169	168	106	III	5
10	168	165	147	157	162	107	III	8
11	96	96	90	101	103	61	I	2
12	82	84	75	93	95	59	I	3
14 <sup>a</sup>	65	139	130	99	141	89	II	1
15	70	169	142	117	171	117	II	2
16	37	80	74	57	88	54	II	3,4
17	37	74	83	62	99	58	II	5
18	84	167	142	130	175	101	II	6
19 <sup>b</sup> (cows)	9	22	25	13	24	14	II	8
19 (stockers)	32	46	38	49	56	36	II	7
20 (cows)	9	22	25	13	24	14	II	11
20 (stockers)	33	46	38	49	56	36	II	10
21	58	110	97	88	120	67	II	12
22	43	87	84	72	86	36	II	13
24 <sup>c</sup>	23	61	58	38	53	70	II	14
25	28	48	50	36	58	52	II	15
26	36	48	51	39	53	48	II	16
27a	26	39	30	19	31	20	II	17
27b	24	37	23	19	31	18	II	17
27c	21	27	20	16	19	16	II	17
27d	22	35	21	22	28	16	II	17
28	27	35	19	19	27	21	II	19
29	28	40	29	24	34	24	II	18
31	17	21	20	11	15	17	II	20

<sup>a</sup> Question 13 is summarized in Appendix 3.

<sup>b</sup> Does not include responses regarding Rumensin<sup>®</sup>, Bovatec<sup>®</sup>, or poloxalene.

<sup>c</sup> Question 23 was not summarized due to database errors.

## APPENDIX 3

Appendix 3. Producer responses for question 13 and table that summarize the data.

	Panhandle	West Central	Southwest	North Central	Central	South Central & East	Paper	Table
Grain Only								
Q13a	93	70	60	80	68	33	I	6
Q13b	92	69	64	74	64	34	I	7,8
Q13d	47	45	44	67	44	28	I	5
Forage Only								
Q13a	26	36	39	22	50	53	I	6
Q13b	24	36	36	21	47	50	I	7,8
Q13d	11	23	29	12	35	35	I	5
Forage & Grain								
Q13a	92	107	102	107	96	31	I	6
Q13b	88	103	100	97	95	30	I	7,8
Q13d	55	67	75	80	65	22	I	5

## APPENDIX 4

## APPENDIX 4

Dear Producer:

The 1995-96 growing season has not been favorable for wheat pasture production throughout most of Oklahoma. Information requested in this survey will be used by Oklahoma State University and Oklahoma Agricultural Statistics Service to document the consequences of the weather problems and to support wheat production and wheat pasture grazing research programs. Please complete the questionnaire to the best of your ability and return in the enclosed envelope. Information provided will be confidential. Thank you for your assistance.

F. M. Epplin  
Agricultural Economist

Barry L. Bloyd  
State Statistician

1. In what county or counties do you farm? \_\_\_\_\_
2. How many total acres are included in your farming operation? (cropland, pastureland, woodland, CRP, other land) \_\_\_\_\_ acres
3. Of these total acres how many do you:
 

<input type="checkbox"/> own? _____ acres <input type="checkbox"/> lease? _____ acres	4. Are you a member of? (Check all that apply.) <input type="checkbox"/> Oklahoma Wheat Growers Association <input type="checkbox"/> Oklahoma Grain and Stocker Producers <input type="checkbox"/> Oklahoma Cattlemen's Association
--	--
5. How many acres of wheat did you plant in the Fall of 1995? \_\_\_\_\_
6. Did you plant any other crop with the wheat, such as rye or ryegrass?  yes  no  
 If yes, what else did you plant with the wheat? \_\_\_\_\_  
 On how many of your wheat acres did you use this combination? \_\_\_\_\_
7. What wheat commodity program option did you exercise for the 1995-96 crop year?  
 regular option       0-85       0-92  
 did not participate in wheat commodity program       other \_\_\_\_\_
8. Rank the following **characteristics** in order of importance when determining the varieties you plant. (Rank the top three with 1 being most important)
 

__ forage yield	__ grain yield	__ aluminum or low pH tolerance
__ test weight	__ coleoptile length	__ winter hardiness
__ drought tolerance	__ late frost tolerance	__ insect resistance
__ height of plant	__ past success	__ disease resistance
__ maturity	__ pedigree (parentage)	__ shattering reputation
__ lodging	__ other (specify) _____	
9. Rank the following **sources of information** as to their importance when selecting which variety of wheat to plant. (Rank the top three with 1 being most important)
 

__ area test plot results	__ results of neighboring fields	__ seed availability
__ past performance on my farm	__ research publications	__ area extension service
__ seed company information	__ other (specify) _____	
10. Which of the following best describes your understanding of what the term "early jointing" means in reference to wheat production? (Check one.)
  - growth stage when I can feel a joint or node above the soil surface
  - growth stage where the developing head is at or above the soil surface
  - growth stage when hollow stem can first be identified above the roots
  - I am not familiar with what "early jointing" means



11. Based on the following definitions, how many of your 1995-96 wheat acres were planted for each purpose:

- \_\_\_\_\_ Acres **Grain Only.** Never intended to graze the wheat.  
 \_\_\_\_\_ Acres **Full-season Grazing.** Planned to graze from Nov through May with no grain harvest.  
 \_\_\_\_\_ Acres **Grain plus Forage.** Planned to graze in the fall and winter and harvest the grain.

12. How many acres of your 1995-96 wheat crop will actually be used for each purpose?

**Grain Only** \_\_\_\_\_ acres **Full-season Grazing** \_\_\_\_\_ acres **Grain plus Forage** \_\_\_\_\_ acres

13. This item deals with the variation of production practices according to intended use of the wheat acreage. Please complete the information for each of the uses identified in item 11. Only fill in the column(s) that applies to your operation.

	<u>Grain only</u>	<u>Full-season Grazing</u>	<u>Grain plus Forage</u>
a. seeding rate (lbs/acre)	_____	_____	_____
b. planting dates:			
- target date	_____	_____	_____
- actual date	_____	_____	_____
c. variety(s) planted	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
d. actual nitrogen (lbs/acre)	_____	_____	_____
or lbs/acre of			
anhydrous ammonia (82-0-0)	_____	_____	_____
ammonium nitrate (33-0-0)	_____	_____	_____
urea (46-0-0)	_____	_____	_____
liquid nitrogen (32-0-0)	_____	_____	_____
diammonium phosph (18-46-0)	_____	_____	_____
other _____	_____	_____	_____

*This section of the survey deals with aspects of your fall/winter grazing program. If you did not graze small grain in the 1995-96 season please skip to item 27.*

14. What species of livestock did you graze on 1995-96 wheat pasture? (check all that apply)

- stocker cattle                       cows and/or replacement heifers                       sheep  
 dairy cattle                               horses     other \_\_\_\_\_

15. Which of the following best describes your 1995-96 fall/winter operation?

	<u>Average Beginning Weight</u>	<u>Stocking Rate</u>	<u>Rate of Gain (lbs/day)</u>
<input type="checkbox"/> stocker steers	_____ lbs	_____ acres/steer	_____
<input type="checkbox"/> stocker heifers	_____ lbs	_____ acres/heifer	_____
<input type="checkbox"/> cows with fall calves		_____ acres/cow	
<input type="checkbox"/> cows with spring calves		_____ acres/cow	
<input type="checkbox"/> cows only		_____ acres/cow	
<input type="checkbox"/> other _____		_____ acres/animal	_____

16. Did you use a receiving program (either your own or a commercial one) for the stocker cattle that you purchased? (check one)
- yes, my own receiving program \_\_\_\_\_ days at \_\_\_\_\_ \$/head
- yes, a commercial receiving program \_\_\_\_\_ days at \_\_\_\_\_ \$/head
- no, I purchase my cattle pre-conditioned
- no, I don't use a receiving program
17. Which of the following best describes your feeding program during receiving?
- grass hay alone  silage
- alfalfa hay alone  silage plus supplement
- grass hay plus a high-protein supplement  a complete mixed ration that is a self-fed
- grass hay plus a high-energy supplement  a complete mixed ration that is hand-fed daily
- alfalfa hay plus high-energy supplement  other \_\_\_\_\_
18. How did you determine when to begin grazing your wheat pasture?
- calendar date beginning date \_\_\_\_\_
- visual assessment of top growth
- climate conditions
- after root system was "anchored"
- recommendation of others
- grazing provision for set-aside acres
- other \_\_\_\_\_
19. Which of the following best describes the type of supplement that you fed to livestock on wheat pasture? (Check all that apply.)
- none  hay
- protein supplement  mineral supplement
- wheat straw and/or other low-quality roughage
- high-fiber (i.e. wheat middling, soybean hull, etc.) energy supplement
- high-starch (grain-based) energy supplement
- Rumensin (monensin)  to increase gain  to decrease bloat
- Bovatec (lasalocid)  to increase gain  to decrease bloat
- poloxalene  during full season  during high bloat risk periods
- a mineral supplement Which mineral(s)? \_\_\_\_\_
- other \_\_\_\_\_
20. What is the primary reason that you fed a supplement to livestock on wheat pasture?
- to provide supplemental nutrients such as minerals  to provide additional energy
- to provide additional roughage  to maintain an ideal average daily gain
- to increase stocking density during the fall/winter grazing  other \_\_\_\_\_
21. How did you determine when to terminate fall/winter grazing?
- calendar date  jointing stage of ungrazed wheat
- jointing stage of grazed wheat  recommendation of someone else
- other \_\_\_\_\_
22. What calendar date did you remove the livestock from the wheat that you plan to harvest for grain? \_\_\_\_\_

23. How many years out of 10 does fall/winter grazing negatively affects wheat yields? \_\_\_\_ years

*This section of the survey deals with aspects of grazing during the graze-out period. If you are not grazing-out small grain in 1996 please skip to item 27.*

24. Which best describes your graze-out operation?

	<u>Average Beginning</u> <u>Graze-out Weight</u>	<u>Graze-out</u> <u>Stocking Rate</u>	<u>Graze-out</u> <u>Rate of Gain (lbs/day)</u>
<input type="checkbox"/> stocker steers	_____ lbs	_____ acres/steer	_____
<input type="checkbox"/> stocker heifers	_____ lbs	_____ acres/heifer	_____
<input type="checkbox"/> cows with fall calves		_____ acres/cow	
<input type="checkbox"/> cows with spring calves		_____ acres/cow	
<input type="checkbox"/> cows only		_____ acres/cow	
<input type="checkbox"/> other _____		_____ acres/animal	_____

25. At what point in the season did you determine the percentage of your total wheat acres that would be grazed out?

- prior to planting     during the fall/winter grazing season  
 at planting         when livestock were removed from fall/winter pasture  
 other \_\_\_\_\_

26. Rank the top three factors (with "1" being the highest) that influence your decision on how many, if any, acres you graze-out each year.

- |                       |   |
|-----------------------|---|
| __ cattle prices      | __ wheat prices                         |
| __ lack of moisture   | __ available capital to purchase cattle |
| __ hail or high winds | __ government programs                  |
| __ other _____        | __ income from pasture leasing          |

*The following items deal with lease arrangements for wheat pasture grazing. If you did not rent or lease wheat pasture then go to item 32. If you were involved in wheat pasture rental then please answer the following items concerning your most typical fall/winter grazing lease.*

27. For this agreement, (check one for each item)

- a. you are         tenant    landlord   How many acres are under this agreement? \_\_\_\_ acres  
 b. the lease is    oral     written   How many years have these acres been leased? \_\_\_\_ years  
 c. the lease is    annual    multi-year  
 d. are you a relative of the other party?    yes    no

28. The most recent rental price for fall/winter grazing was/is (Use the one blank with appropriate units)

- |                  |          |                  |          |
|------------------|----------|------------------|----------|
| a. \$/acre/year  | \$ _____ | b. \$/acre/month | \$ _____ |
| c. \$/cwt/month  | \$ _____ | d. \$/lb of gain | \$ _____ |
| e. \$/head/month | \$ _____ | f. other _____   | \$ _____ |

29. Under the price you gave in the previous item, who is responsible for the following services? (check all that apply)

	<u>Tenant</u>	<u>Landlord</u>	<u>Both</u>		<u>Tenant</u>	<u>Landlord</u>	<u>Both</u>
a. checking livestock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	b. salt and minerals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. fencing materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	d. fencing labor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. fertilizer cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	f. supplemental feeding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. supplemental pasture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	h. water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

30. If you have other lease agreements and arrangement(s), please specify the nature of your situation and the terms that apply. \_\_\_\_\_  
\_\_\_\_\_

31. The most recent rental price for graze-out acreage was/is (use the one blank with appropriate units)

a. \$/acre/year	\$ _____	b. \$/acre/month	\$ _____
c. \$/cwt/month	\$ _____	d. \$/lb of gain	\$ _____
e. \$/head/month	\$ _____	f. other _____	\$ _____

32. Thank you for your cooperation. In the space provided below, please provide your ideas concerning what research topics in the area of wheat production and wheat pasture grazing should be given highest priority.

## APPENDIX 5

OKLAHOMA STATE UNIVERSITY  
INSTITUTIONAL REVIEW BOARD  
HUMAN SUBJECTS REVIEW

Date: 07-31-95

IRB#: AG-96-013

Proposal Title: INCREASING PROFITABILITY OF THE WHEAT/STOCKER  
ENTERPRISE

Principal Investigator(s): Francis M. Epplin

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD  
AT NEXT MEETING.


APPROVAL STATUS PERIOD VALID FOR ONE CALENDAR YEAR AFTER WHICH A  
CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD  
APPROVAL.

ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR  
APPROVAL.

---

Comments, Modifications/Conditions for Approval or Reasons for Deferral or Disapproval  
are as follows:

Signature:

  
Chair of Institutional Review Board

Date: February 2, 1996

VITA

Randy Reginald True

Candidate for the Degree of

Master of Science

Thesis: WINTER WHEAT, WHEAT PASTURE, AND WHEAT STOCKER CATTLE  
PRODUCTION PRACTICES USED BY OKLAHOMA GROWERS

Major Field: Agricultural Economics

Biographical:

Personal Data: Born in Pryor, Oklahoma, On June 22, 1973, the son of John and Carol True.

Education: Graduated from Salina High School, Salina, Oklahoma in May 1991; received an Associate of Science degree in Agricultural Economics from Eastern Oklahoma State College, Wilburton, Oklahoma in May 1993; received Bachelor of Science degree in Agricultural Economics from Oklahoma State University, Stillwater, Oklahoma in May 1995. Completed the requirements for the Master of Science degree with a major in Agricultural Economics at Oklahoma State University in May, 2000.

Experience: Research Assistant in the Department of Agricultural Economics at Oklahoma State University, May - December 1995; Graduate Research Assistant in the Department of Agricultural Economics at Oklahoma State University, January 1996 - September 1998; Extension Associate with the Oklahoma Cooperative Extension Service, July 1999 to present.