

*Production  
Characteristics of  
Oklahoma Forages:*

# Small Grains

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# *Production Characteristics of Oklahoma Forages:* **Small Grains**

By Wayne W. Huffine, Nelson J. Adams, Chester L. Dewald,  
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Oklahomans have long recognized the value of cereal crops for winter pasture (3, 6, 10, 16), but no general agreement prevails as to which crop is the more productive and important for grazing. Wheat has been declared the most important small grain pasture crop in Oklahoma (3, 6, 10), partially as a result of its large acreage in the state each year. Wheat is seldom planted solely for pasture but usually is grazed some during the year.

In general, barley has been considered the most productive of the cereals in the fall, while annual ryegrass and winter oats are believed to excel in forage production in the spring.

Ryegrass has been reported as a better winter forage producer than small grains (9, 12, 15). In other studies, the cereal crop rye ranked first in winter forage yields when compared with other small grains (7, 9, 12). Each of these reports could be essentially correct, depending upon which season of the year was most favorable for growth. Frequently, lack of soil moisture prevents early planting and normal growth and therefore grazing is delayed until late winter and early spring. Fall production is sometimes curtailed by insect infestations.

Adams (1) noted growth differences and reported that variations occurred not only in the period of production of the different small grains but also be-

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The research reported herein was done under Oklahoma Agricultural Experiment Station Project 785. Also being prepared (by W. C. Elder) is a report concerning the production and management of small grain pastures under both dryland and irrigated conditions.

tween varieties within each crop. Staten (13, 14) reported that cattle preferred fertilized winter barley to other small grain pasture crops.

This publication reports results of a study designed to evaluate small grain crops for forage production and nutrient content. Major emphasis was placed on determining seasonal forage production and probable feeding value of small grain forage.

## Materials and Methods

Preliminary evaluation of 22 small grain varieties for forage production was begun in the fall of 1954 under dryland conditions on the Oklahoma Agricultural Experiment Station Farm located near Perkins, Oklahoma. Three rates of seeding were used for each crop in this study: oats and barley 2, 4, and 6 bushels per acre; wheat and rye 1, 2, and 3 bushels per acre. The soil is classified as a Norge, fine sandy loam. Lime was applied in the summer of 1954 at the rate of two tons per acre and 250 pounds of 0-20-0 applied per acre prior to planting on October 23 and 24. Elbon rye was planted on November 8 as the only exception. Design of this experiment, as all others reported in this study, was a randomized block with four replications.

Each plot in 1954 consisted of 5 rows, 7 inches apart and 20 feet long. When the forage reached an arbitrary grazing height of about 4 to 6 inches, the inside 3 rows of each plot were harvested with a reel-type lawn mower adjusted on a hard surface for a 1½ inch height of clip. Each of the three rates of seeding was treated as a separate study for statistical analyses as they were arranged in different blocks.

Following the 1954-55 season, the field plots were changed to the Agronomy Research Farm at Stillwater where trials continued through the 1958-59 season. The soil was loamy Port. Seven of the most promising small grain varieties and common (annual) ryegrass were tested 4 years under irrigation. The cereals were planted each year in the first two weeks of September in plots 20 feet long and replicated 4 times. In the 1955-56 and 1956-57 seasons, the plots consisted of 5 rows, 7 inches apart, with the 3 inside rows harvested. From 1957 through 1959, each plot contained 3 rows, 12 inches apart and the entire plot was harvested. The samples were placed in a cloth bag and dried in a forced air oven at about 140°F.

All protein analyses were made according to Official Methods of A.O.A.C. (2). The data is presented on a moisture free basis.

Of all varieties initially in the test only seven small grains and the common (annual) ryegrass were tested four years under irrigation.

Each year, prior to planting the small grains, the soil was fertilized with 16-20-0 fertilizer at the rate of 250 pounds per acre. Additional nitrogen was added as needed during the growing season. Generally, two applications of ammonium nitrate were made, each at the rate of 100 pounds per acre, one in the latter part of October and the other in early March.

A sickle-type mower was used to harvest the plots the first two years of this study at Stillwater, and a rotary type the last two years. In both cases the small grains were clipped at a height of approximately 2 inches above the soil surface.

Leafhoppers, in early October of 1956, inflicted severe damage to all rye and barley varieties seemingly in this order of preference with no apparent effect on oats, wheat or ryegrass.

## **Results and Discussion**

### **Forage Production**

The period of forage production (fall, winter or spring) for any variety or kind of small grain is in all probability just as important or even more so than the total forage yield. In this study no single crop or variety was consistently high in forage production throughout the growing season.

Variations in growing conditions from 1954 to 1959, particularly in the fall and the spring, appeared to influence the forage yields of small grain each year as much as the crop and the variety. Temperature variation in these periods, from one year to the next, possibly exerted the greatest influence.

The fall of 1954 was part of a record drouth year, and as a consequence no cereal crop was of satisfactory height for grazing (4 to 6 inches) until the latter part of February, and then only Elbon rye had sufficient growth for clipping (Table 1). Oats, which are generally considered a good spring forage producer in Oklahoma, yielded the greatest amount of forage for the year (Tables 1 and 2). The late planting date and lack of moisture during the fall and winter months contributed to the poorer showing of the other crops.

The high forage yields obtained in the spring of 1955 as shown in Table 1 compared to a 3-year average for the same period as shown in Table 12 can be explained in part by the fact a number of the varieties were in head at the time of clipping. This resulted from the rapid rate of growth during this period

and the inability to clip all varieties at the time they reached the arbitrary grazing height.

The forage produced per cutting by each variety and the yearly total from 1955 to 1959 is shown by years in Tables 4, 6, 8, and 10 with a multiple range test of these data (by cuttings), computed by the method described by Duncan (4), presented in Tables 5, 7, 9, and 11 respectively.

The average seasonal and yearly production of forage by these small grains from 1955 to 1958 is shown in Table 12. An analysis of these data by seasons show varietal differences in forage production in the fall (Table 13). The varieties which yielded the most forage in the fall months of 1955 to 1958 were Rogers and Tenkow barley, Arkwin oats, Concho wheat and common (annual) ryegrass. It would appear from this data that an increased rate of seeding, probably 2 or 3 times the usual amount, will increase forage for fall grazing. In addition, those varieties of small grains classified in general as having an intermediate or prostrate habit of growth (Table 13) may require an increased seeding rate, perhaps 2 or 3 times the normal amount, to yield as much forage for fall grazing as those varieties which in general have an upright habit of growth.

Seven varieties of small grains and common (annual) ryegrass were tested four years under irrigated conditions. The average seasonal and yearly production of these forages from 1955 to 1959 is shown in Table 14. An analysis of these data from the fall period of these four years (Table 15) indicated no varietal differences existed in forage production in the fall. This contradicts the results shown in Table 13 but this difference can be explained by the fact that all varieties of small grains, except one, were seeded at a low rate which does not appear adequate for maximum fall production.

Forage production in the winter months (December through February) appears to be associated more with variety than with the crop as shown in Tables 16 and 17. Elbon rye consistently produced more forage in the winter period than any other variety tested.

The production of forage in the spring (March through May) was good from all varieties of small grains and ryegrass (Tables 12 and 14) when compared to the yields in the fall and winter periods. Elbon and Tetraploid rye and Tenkow barley were significantly lower in yield than all other varieties in the spring period (Tables 18 and 19). There were no significant differences in the forage yields obtained from common (annual) ryegrass, Balbo rye, Rogers barley and all wheat and oat varieties for the period of this study. Variations in production for this period from year to year perhaps is a varietal response to the weather, particularly temperature.

## Chemical Analysis of Forage

Proximate analyses of small grain forage in the 1954-55 season show the calcium and phosphorus content to be high (Table 3). In all cases, the forages equal or exceed the level of 0.12 to 0.15 percent phosphorus and 0.2 to 0.3 percent calcium which are generally considered the minimum amounts in rations for beef cattle. Crude protein per acre, calculated on an ash-free-basis, was figured to be equivalent to 900 to 1,500 pounds of 41 percent cottonseed meal.

The crude protein content of small grains may be best evaluated by comparing the analytical data with the known requirements of beef cattle. The recommended quantities of digestible protein needed in a ration for different classes, ages and weights of beef cattle are presented in a report prepared by Guilbert et al. (8) for the Committee on Animal Nutrition of the National Research Council. They recommend 7.5 percent digestible protein in the ration for normal growth of 400 pound heifers and steers; 5.7 percent for 600 pound animals; 4.7 percent for 800 pound animals; and 4.3 percent for 1,000 pound animals of this class.

The digestible protein content of young cereal crops, as included in this study, usually averages about three-fourth of its crude protein content (11). Beef animal requirements for digestible protein, when converted into crude protein for comparison with the analytical data reported in this study, total 10.0, 7.5, 6.3, and 5.7 percent crude protein respectively for the different weights of cattle. It may be readily ascertained from the data of Tables 20, 21, 22 and 23 that the protein level of all cereal crop varieties was always more than sufficient to meet the recommended amount proposed by the committee. Although the crude protein content was consistently adequate, there was a gradual decline in percent crude protein from fall to spring.

After this study was well in progress it was found that a considerable amount of silica was adhering to the plant tissues during the harvesting process. Silica was determined on samples selected at random and was found to represent from 15 to 30 percent of the total sample. When the percent crude protein was expressed on a silica free basis values would frequently exceed 30 percent and occasionally exceed 35 percent (17).

A conversion of the seasonal average crude protein content of these forage crop yields into pounds of crude protein produced per acre for each of the years 1955 to 1958 is shown in Tables 24, 25, and 26. Based on a three-year average (1955-1958) as shown in Table 27 the crude protein production per acre annually would be near the quantity contained in 1,200 to 2,000 pounds of 41 percent cottonseed meal.

# Summary

Forage yields of all the small grains tested were higher in the spring (March through May) than any other season. None of the varieties was consistently high in forage production throughout the fall, winter, and spring growing periods. Variations in growing conditions, mainly temperature, in the fall and spring, apparently influenced forage yields as much as the crop or variety.

Of all varieties tested during the three-year period 1955 to 1958, best forage yields in the fall months were obtained from irrigated Rogers and Tenkow barley, Arkwin oats, Concho wheat and common (annual) ryegrass. The varieties of small grains classified in general as having an intermediate or prostrate habit of growth seemed to require an increased rate of seeding to yield as much forage for fall grazing as those varieties classified as having an upright habit of growth.

Forage production in the winter months (December through February) appeared to be more of a characteristic of the variety than of the crop. Elbon rye consistently produced more forage in the winter period than any other small grain variety tested.

Elbon and Tetraploid rye and Tenkow barley were significantly lower in yield in the spring period than other varieties when averaged for the three years 1955 to 1958.

The protein level of all cereal crop varieties produced from 1954 to 1958 was always more than sufficient to meet the recommended protein allowance for normal growth of different classes, ages and weights of beef cattle set forth by the Committee on Animal Nutrition of the National Research Council. Based on an average of the three years, 1955 to 1958, the crude protein production per acre annually from small grain forage would be near the quantity contained in 1,200 to 2,000 pounds of 41 percent cottonseed meal. There was a gradual decline in percent crude protein in all small grains from the fall to the spring period.

The calcium and phosphorus content of small grains harvested in 1954-55 season equalled or exceeded the amounts generally considered adequate in the rations of beef cattle.



# Literature Cited

1. Adams, Nelson J. A Forage Yield Study of Twenty-Two Small Grain Varieties at Three Seeding Rates. Master Thesis Oklahoma State University Library. 1957.
2. Assoc. Off. Agr. Chem. Official Methods of Analysis. 7th edition. 1950.
3. Chaffin, Wesley, and Graumann, Hugo. Small Grains for Winter Pasture in Oklahoma. Okla. Ext. Pub. 89. 1943.
4. Duncan, D. B. Multiple Range and Multiple F Tests. *Biometrics* 11:1-42. 1955.
5. Finnell, H. H. Grazing of Winter Wheat. Oklahoma Panhandle Exp. Sta. Bul. 4. 1929.
6. Hubbard, V. C., and Harper, Horace J. Effect of Clipping Small Grain on Composition and Yield of Forage and Grain. *Agron. Jour.* 41:85-92. 1949.
7. Guilbert, H. R., Gerlaugh, P. and Madsen, L. L. Recommended Nutrient Allowances for Beef Cattle. No. 4 National Research Council Publ. 1950.
8. Jones, M. D., Smith, H. S., Muncrief, Ernest and Staten, Hi W. Forage Production of Small Grains and Ryegrass. Okla. Agr. Exp. Sta. Mimeo. Cir. No. M-114. 1944.
9. McMillen, W. H., and Langham, W. Grazing Winter Wheat with Special Reference to the Mineral Blood Picture. *Jour. Animal Science* 1:14-21. 1942.
10. Morrison, Frank B. Feeds and Feeding. 22nd Ed. Morrison Publishing Co., Ithaca, N. Y., 1956.
11. Muncrief, Ernest H. The Relative Pasture Value of Winter Small Grains and Ryegrass. Master Thesis Oklahoma State University Library. 1945.
12. Staten, Hi W. Palatability Test of Winter Pasture Crops. Okla. Agri. Exp. Sta. Mimeo. Cir. M-115. 1944.
13. \_\_\_\_\_, Palatability Trials of Winter Pasture Crops and Effect of Phosphate Fertilizers on Palatability. Okla. Agri. Exp. Sta. Tech Bul. T-35. 1949.
14. \_\_\_\_\_, and Elder, W. C. Forage Production of Winter Small Grain Varieties and Annual Ryegrass, Okla. Agri. Exp. Sta. Mimeo. Cir. M-161. 1946.
15. \_\_\_\_\_, and Heller, V. G., Winter Pasture. Okla. Agri. Exp. Sta. Bul. No. B-333. 1949.
16. Waller, George R., Jr. Unpublished Data. Okla. Agri. Exp. Sta. 1959.

TABLE 1. Small Grains Forage Production on Dryland in 1954-55 at the Agronomy Research Farm, Perkins, Oklahoma

Total Yield Rank	Variety	Seeding Rate bu/A	Total	Yield-Pounds of Oven Dry Forage Per Acre							
				Harvest Period and Cutting Number							
				1	2	3	4	5	6	7	8
				Feb.15-28	Mar.1-15	Mar.16-31	Apr.1-15	Apr.16-30	May 1-15	May 16-31	June 1-15
1	Wintok oats	2	4032	--	--	1506	--	1289	770	--	467
2	Cimarron "	"	3958	--	--	1701	--	1311	638	--	308
3	Mustang "	"	3853	--	--	1363	--	1204	805	--	481
4	Traveler "	"	3793	--	--	1240	--	1218	835	--	500
5	Forkedeer"	"	3690	--	--	1308	--	1121	901	--	360
6	C.I.6988 "	"	3627	--	--	1470	--	959	775	--	423
	(Cimarron x Traveler)										
7	Forkedeer"	6	3608	--	--	1624	--	1132	--	852	--
8	Balbo rye	1	3578	--	1154	638	998	368	420	--	--
9	DeSoto oats	2	3483	--	--	1237	--	789	811	--	646
10	Balbo rye	2	3468	--	1413	599	912	544	--	--	--
11	Arkwin oats	2	3439	--	--	1267	--	1031	756	--	385
12	Traveler oats	4	3426	--	--	1198	--	1382	--	846	--
13	Cimarron "	6	3397	--	--	1715	--	1108	--	574	--
14	Dubois "	2	3394	--	--	1190	--	1286	668	--	250
15	Forkedeer "	4	3378	--	--	1171	--	1393	--	814	--
16	Wintok "	4	3375	--	--	1094	--	1503	--	778	--
17	Tetraploid rye	3	3334	--	--	1635	945	588	--	166	--
18	Traveler oats	6	3306	--	--	1440	--	1157	--	709	--
19	Arlington "	2	3245	--	--	904	--	890	912	--	539
20	Cimarron "	4	3215	--	--	1264	--	1415	--	536	--
21	Wintok "	6	3207	--	--	1319	--	1226	--	662	--
22	Balbo rye	3	3202	--	1369	555	822	456	--	--	--
23	Tetraploid rye	2	3190	--	--	1349	1022	563	--	256	--
24	Arkwin oats	6	3185	--	--	1426	--	1163	--	596	--
25	Tetraploid rye	1	3183	--	--	1141	998	--	569	--	--
26	Arkwin oats	4	3117	--	--	1108	--	1272	--	737	--

TABLE 1. (continued)

		Yield-Pounds of Oven Dry Forage Per Acre Harvest Period and Cutting Number									
Total Yield		Seeding Rate		1	2	3	4	5	6	7	8
Rank	Variety	bu/A	Total	Feb.15-28	Mar.1-15	Mar.16-31	Apr.1-15	Apr.16-30	May 1-15	May 16-31	June 1-15
27	Triumph wheat	3	2866	- -	- -	1113	1275	- -	478	- -	- -
28	Tenkow barley	4	2756	- -	- -	1099	1226	- -	431	- -	- -
29	Elbon rye	2	2749	1053	676	393	- -	627	- -	- -	- -
30	Harbine barley	6	2728	- -	- -	1044	1261	- -	423	- -	- -
31	Clarkan wheat	1	2720	- -	- -	838	1014	632	- -	236	- -
32	Ryegrass, annual lbs.	30	2702	- -	- -	481	- -	934	- -	671	616
33	Harbine barley	4	2688	- -	- -	929	1267	- -	492	- -	- -
34	Ryegrass, annual lbs.	20	2676	- -	- -	- -	- -	1742	- -	643	291
35	Tenkow barley	2	2774	- -	1097	- -	1008	382	- -	187	- -
36	Clarkan wheat	3	2668	- -	- -	860	1154	- -	654	- -	- -
37	Concho "	3	2666	- -	- -	904	1193	- -	569	- -	- -
38	Harbine barley	2	2606	- -	962	- -	1226	418	- -	- -	- -
39	Tenkow "	6	2605	- -	- -	970	1231	- -	404	- -	- -
40	Clarkan wheat	2	2600	- -	- -	874	1220	506	- -	- -	- -
41	Colonial "2" barley	2	2550	- -	1011	- -	956	393	- -	190	- -
42	Elbon rye	1	2542	890	690	346	- -	616	- -	- -	- -
43	Ponca wheat	1	2512	- -	- -	857	1075	580	- -	- -	- -
44	Concho "	1	2486	- -	- -	893	959	634	- -	- -	- -
45	Concho "	2	2481	- -	- -	857	1165	459	- -	- -	- -
46	Triumph "	2	2435	- -	- -	852	1215	368	- -	- -	- -
47	Comanche"	1	2405	- -	- -	811	992	602	- -	- -	- -
48	B-400 barley	2	2402	- -	937	- -	1042	423	- -	- -	- -
49	Triumph wheat	1	2309	- -	- -	811	896	602	- -	- -	- -

TABLE 2. Multiple range test of the total oven-dry forage production of 22 small grain varieties seeded at the rate of 1 bushel of wheat and rye and 2 bushels of oats and barley per acre on dryland in 1954-55 at the Agronomy Research Farm, Perkins, Oklahoma.

Varieties	Total Yield Lbs./Acre	Multiple Range 5% *
Wintok oats	4032	
Cimarron oats	3958	
Mustang oats	3853	
Traveler oats	3793	
Forkedeer oats	3690	
C.I. 6988 (cxt)**oats	3627	
Balbo rye	3578	
De Soto oats	3483	
Arkwin oats	3439	
Dubois oats	3394	
Arlington oats	3245	
Tetraploid rye	3183	
Clarkan wheat	2720	
Tenkow barley	2674	
Harbine barley	2606	
Colonial "2" barley	2550	
Elbon rye	2542	
Ponca wheat	2512	
Concho wheat	2486	
Comanche wheat	2405	
B-400 barley	2402	
Triumph wheat	2309	

\* Any two yields underscored by the same line are not significantly different.

\*\*C.I. 6988 (Cimarron x Traveler) oats.

TABLE 3. Pounds of crude protein produced per acre on an ash-free basis and the average proximate analyses (in percent) of small grain varieties produced in the spring of 1955 on dryland at the Agronomy Research Farm, Perkins, Oklahoma

Variety	Seeding Rate bu/A	Average Composition - Percent				Pounds Crude Protein/A Ash-Free Basis
		Protein	Calcium	Phosphorus	Ash	
B-400 barley	2	21.10	.55	.66	25.42	378
Colonial "2" barley	2	22.15	.45	.92	22.52	438
Harbine* barley	2	23.45	.51	.34	20.88	484
" "	4	21.38	.51	.34	20.88	455
" "	6	16.72	.51	.34	20.88	361
Tenkow* "	2	19.94	.49	.24	23.53	423
" "	4	20.23	.49	.24	23.53	426
" "	6	19.06	.49	.24	23.53	398
Arkwin* oats	2	19.64	.45	.38	24.55	510
" "	4	17.65	.45	.38	24.55	415
" "	6	18.38	.45	.38	24.55	442
Arlington oats	2	20.61	.41	.35	21.03	528
Cimarron* oats	2	20.42	.33	.34	13.78	697
" "	4	18.67	.33	.34	13.78	518
" "	6	19.23	.33	.34	13.78	563
C.I. 6988 oats (Cimarron x Traveler)	2	18.53	.41	.32	24.34	508
De Soto oats	2	19.44	.48	.67	24.69	510
Dubois oats	2	19.68	.48	.35	16.34	559
Forkedeer* oats	2	19.34	.40	.42	16.74	597
" "	4	17.19	.40	.42	16.74	484
" "	6	16.55	.40	.42	16.74	497
Mustang oats	2	22.32	.41	.53	18.78	698
Traveler* oats	2	21.06	.40	.35	18.03	665
" "	4	21.08	.40	.35	18.03	592
" "	6	19.48	.40	.35	18.03	528
Wintok* oats	2	19.24	.34	.41	17.17	643
" "	4	18.63	.34	.41	17.17	521
" "	6	18.64	.34	.41	17.17	495
Balbo rye	1	25.09	--	--	-----	898**
" "	2	23.20	--	--	-----	805**
" "	3	22.55	--	--	-----	722**
Elbon*** rye	1	25.16	--	--	-----	640**
" "	2	25.67	--	--	-----	706**
Tetraploid* rye	1	25.43	.38	.35	23.50	619
" "	2	20.48	.38	.35	23.50	500
" "	3	18.23	.38	.35	23.50	465
Clarkan* wheat	1	21.68	.38	.37	21.37	464
" "	2	21.38	.38	.37	21.37	437
" "	3	20.21	.38	.37	21.37	424
Comanche wheat	1	22.60	.42	.59	19.15	439
Concho* wheat	1	22.22	.37	.34	20.40	440
" "	2	22.82	.37	.34	20.40	451
" "	3	19.83	.37	.34	20.40	421
Ponca wheat	1	22.26	.44	.43	26.94	408
Triumph* wheat	1	22.76	.39	.23	23.04	404
" "	2	21.49	.39	.23	23.04	403
" "	3	20.84	.39	.23	23.04	460
Annual ryegrass	20#	17.99	--	--	-----	481**
" "	30#	22.86	--	--	-----	618**

\* Average percent calcium, phosphorus and ash was computed by combining the determinations of each component from all seeding rates.

\*\* Yield of crude protein per acre was not calculated on ash-free basis.

\*\*\* One cutting of all Elbon rye plots, made in February, is included in this table of spring production.

TABLE 4. Small Grain Forage Production in 1955-56 on Irrigated Land at the Agronomy Research Farm. Stillwater, Oklahoma

No.*	Variety	Seeding Rate bu/A	Total	Yield-Pounds of Oven Dry Forage Per Acre											
				Harvest Date and Cutting Number											
				1	2	3	4	5	6	7	8	9	10	11	12
				Oct.11	Oct.27	Nov.11	Dec.20	Feb.17	March 2	March 16	March 27	April 6	April 21	May 4	May 30
(1)	Common ryegrass **	5347	265	154	---	---	---	527	----	657	1136	1049	1061	498	
(2)	Wintok oats	2	4601	78	---	---	373	---	----	915	971	722	840	702	
(3)	Wintok oats	4	4430	250	---	174	134	---	----	803	971	940	844	314	
(4)	Traveler oats	2	4417	227	---	---	231	---	----	750	915	697	888	709	
(5)	Traveler oats	4	4336	418	99	---	---	---	----	906	962	772	816	363	
(6)	Forkedeer oats	4	4326	175	---	162	---	---	----	816	859	865	981	468	
(7)	Ponca wheat	1	4136	279	---	---	327	---	----	989	567	529	576	869	---
(8)	Clarkan wheat	2	4136	316	---	---	253	---	199	----	1136	747	682	803	---
(9)	Forkedeer oats	2	4061	41	---	---	289	---	----	688	766	809	756	712	
(10)	Concho wheat	1	4037	163	---	---	274	---	----	1230	682	458	529	701	---
(11)	Arkwin oats	2	3949	289	153	33	---	---	----	619	651	859	978	367	
(12)	Concho wheat	2	3844	311	49	---	---	---	----	1149	695	439	554	647	---
(13)	Clarkan wheat	1	3628	158	---	---	143	---	----	728	610	638	604	747	---
(14)	Tenkow barley	4	3439	505	251	---	---	---	----	619	433	604	595	432	---
(15)	Rogers barley	2	3268	268	198	---	---	---	321	283	399	744	501	554	---
(16)	Balbo rye	2	3236	395	106	---	---	---	----	800	449	424	654	408	---
(17)	Rogers barley	4	2870	445	248	---	277	---	517	----	523	234	308	318	---
(18)	Balbo rye	1	2859	204	---	183	---	---	----	685	520	386	508	373	---
(19)	Tetraploid rye	1	2632	171	---	144	392	---	----	352	324	330	536	383	---
(20)	Tenkow barley	2	2545	239	168	---	271	---	644	205	305	227	218	268	---
(21)	Elbon rye	2	2514	225	111	61	206	296	442	----	548	87	---	538	---
(22)	Tetraploid rye	2	2421	131	---	182	---	---	----	492	361	352	520	383	---
(23)	Elbon rye	1	1885	105	71	---	308	299	280	122	156	97	---	447	---

\*Number refers to variety and corresponds to those used in the multiple range table, Table 5.

\*\*Common annual ryegrass was seeded at the rate of 20 pounds per acre.

TABLE 5. Multiple Range Table (5% level of probability)\*\* of Small Grain Forage Production in 1955-56 Analyzed by Cutting Dates.

Cutting Date

1.	(14)*	(17)	(5)	(16)	(8)	(12)	(11)	(7)	(15)	(1)	(3)	(20)	(4)	(21)	(18)	(6)	(19)	(10)	(13)	(22)	(23)	(2)	(9)
2.	(14)	(17)	(15)	(20)	(1)	(11)	(21)	(16)	(5)	(23)	(12)	(2)	(3)	(4)	(6)	(7)	(8)	(9)	(10)	(13)	(18)	(19)	(22)
3.	(18)	(22)	(3)	(6)	(19)	(21)	(11)	(1)	(2)	(4)	(5)	(7)	(8)	(9)	(10)	(12)	(13)	(14)	(15)	(16)	(17)	(20)	(23)
4.	(19)	(2)	(7)	(23)	(9)	(17)	(10)	(20)	(8)	(4)	(21)	(13)	(3)	(1)	(6)	(11)	(12)	(14)	(15)	(16)	(17)	(18)	(22)
5.	(23)	(21)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(22)
6.	(20)	(1)	(17)	(21)	(15)	(23)	(8)	(2)	(3)	(4)	(5)	(6)	(7)	(9)	(10)	(11)	(12)	(13)	(14)	(16)	(18)	(19)	(22)
7.	(10)	(12)	(7)	(16)	(13)	(18)	(14)	(22)	(19)	(15)	(20)	(23)	(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(11)	(17)	(21)
8.	(8)	(2)	(5)	(6)	(3)	(4)	(12)	(9)	(10)	(1)	(11)	(13)	(7)	(21)	(17)	(18)	(16)	(14)	(15)	(22)	(19)	(20)	(23)

TABLE 5. Multiple Range Table (5% level of probability)\*\* of Small Grain Forage Production in 1955-56 Analyzed by Cutting Dates. (Cont'd)

<u>Cutting Date</u>																							
9.	(1)	(2)	(3)	(5)	(4)	(6)	(9)	(8)	(15)	(11)	(13)	(14)	(7)	(10)	(12)	(16)	(18)	(22)	(19)	(17)	(20)	(23)	(21)
10.	(1)	(3)	(6)	(11)	(9)	(5)	(2)	(4)	(8)	(16)	(13)	(14)	(7)	(12)	(19)	(10)	(22)	(18)	(15)	(17)	(20)	(21)	(23)
11.	(1)	(6)	(11)	(4)	(7)	(3)	(2)	(5)	(8)	(9)	(13)	(10)	(12)	(15)	(21)	(23)	(14)	(16)	(22)	(19)	(18)	(17)	(20)
12.	(9)	(4)	(2)	(1)	(6)	(11)	(5)	(3)	(7)	(8)	(10)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)

\* Numbers in parenthesis refers to varieties and correspond to those used in Table 4.

\*\* Any two varieties (ranked by mean yield highest to lowest from left to right) underscored by the same line are not significantly different in mean yield at the 5% level of probability.



TABLE 6. Small Grain Forage Production In 1956-57 On Irrigated Land at  
The Agronomy Research Farm, Stillwater, Oklahoma.

No.*	Variety	Seeding Rate bu/A	Total	Yield-Pounds of Oven Dry Forage Per Acre						
				Harvest Date and Cutting Number						
				1	2	3	4	5	6	7
				Oct. 9	Oct. 29	Dec. 5	March 12	March 30	April 24	May 10
(1)	Concho wheat	1	3541	508	565	130	467	677	1077	117
(2)	Rogers barley	2	3126	466	311	77	- -	881	1285	106
(3)	Wintok oats	4	3033	346	459	101	- -	468	1460	199
(4)	Ponca wheat	1	2946	490	410	105	340	453	1027	121
(5)	Concho wheat	2	2939	637	552	80	192	461	918	99
(6)	Rogers barley	4	2798	630	298	54	- -	523	1192	101
(7)	Balbo rye	2	2787	459	- -	- -	238	522	1516	52
(8)	Wintok oats	2	2680	241	325	78	162	287	1345	242
(9)	Forkeddeer oats	4	2669	338	372	75	- -	517	1102	265
(10)	Arkwin oats	2	2614	451	552	121	- -	355	890	245
(11)	Traveler oats	2	2543	238	281	88	- -	551	1149	236
(12)	Traveler oats	4	2541	335	410	129	- -	394	1046	227
(13)	Tetraploid rye	2	2525	398	- -	- -	- -	560	1482	85
(14)	Common ryegrass	**	2516	212	444	236	266	222	890	246
(15)	Tenkow barley	4	2451	817	309	81	- -	365	784	95
(16)	Tenkow barley	2	2410	638	406	81	250	197	775	63
(17)	Elbon rye	2	2386	518	- -	- -	739	365	638	126
(18)	Forkeddeer oats	2	2283	201	289	90	- -	318	1096	289
(19)	Balbo rye	1	2119	223	- -	- -	443	435	878	140
(20)	Elbon rye	1	2099	403	- -	- -	514	400	722	60
(21)	Composite 222 rye	2	1835	473	- -	- -	143	337	766	116
(22)	Tetraploid rye	1	1793	199	- -	- -	- -	302	1226	66
(23)	Composite 222 rye	1	1585	264	- -	- -	103	265	850	103

\* Number refers to variety and correspond to those used in the multiple range table, Table 7.

\*\* Common (annual) ryegrass was seeded at the rate of 20 pounds per acre.

TABLE 7. Multiple Range Table (5% level of probability)\*\* of Small Grain Forage Production in 1956-57 Analyzed by Cutting Dates.

Cutting  
Date

1.	(15)*	(16)	(5)	(6)	(17)	(1)	(4)	(21)	(2)	(7)	(10)	(20)	(13)	(3)	(9)	(21)	(23)	(8)	(11)	(19)	(14)	(18)	(22)
2.	(1)	(5)	(10)	(3)	(14)	(12)	(4)	(16)	(9)	(8)	(2)	(15)	(6)	(18)	(11)	(7)	(13)	(17)	(19)	(20)	(21)	(22)	(23)
3.	(14)	(1)	(12)	(10)	(4)	(3)	(18)	(11)	(16)	(15)	(5)	(8)	(2)	(9)	(6)	(7)	(13)	(17)	(19)	(20)	(21)	(22)	(23)
4.	(17)	(20)	(1)	(19)	(4)	(14)	(16)	(7)	(5)	(8)	(21)	(23)	(2)	(3)	(6)	(9)	(10)	(11)	(12)	(13)	(15)	(18)	(22)
5.	(2)	(1)	(13)	(11)	(6)	(7)	(9)	(3)	(5)	(4)	(19)	(20)	(12)	(17)	(15)	(10)	(21)	(18)	(22)	(8)	(23)	(14)	(16)
6.	(7)	(13)	(3)	(8)	(2)	(22)	(6)	(11)	(18)	(9)	(1)	(12)	(4)	(5)	(14)	(10)	(19)	(23)	(15)	(16)	(21)	(20)	(17)
7.	(18)	(9)	(14)	(10)	(8)	(11)	(12)	(3)	(19)	(17)	(4)	(1)	(21)	(2)	(6)	(23)	(5)	(15)	(13)	(22)	(16)	(20)	(7)

\* Numbers in parenthesis refers to varieties and correspond to those used in Table 6.

\*\* Any two varieties (ranked by mean yield highest to lowest from left to right) underscored by the same line are not significantly different in mean yield at the 5% level of probability.

TABLE 8. Small Grain Forage Production In 1957-58 On Irrigated Land At  
The Agronomy Research Farm. Stillwater, Oklahoma.

No.* Variety	Seeding Rate bu/A	Total	Yields-Pounds of Oven Dry Forage Per Acre							
			Harvest Date and Cutting Number							
			1 Oct. 17	2 Nov. 21	3 Feb. 24	4 March 22	5 April 4	6 April 22	7 May 5	8 May 25
(1) Common ryegrass	**	3978	393	294	156	209	362	1537	440	587
(2) Wintok oats	4	2966	438	236	119	173	350	1331	319	- -
(3) Wintok oats	2	2815	246	- -	232	215	415	1359	348	- -
(4) Rogers barley	2	2782	348	- -	292	317	490	1126	209	- -
(5) Tenkow barley	4	2775	486	301	326	269	316	867	210	- -
(6) Rogers barley	4	2761	430	243	240	243	433	959	213	- -
(7) Forkeddeer oats	4	2717	279	201	87	132	331	1301	386	- -
(8) Forkeddeer oats	2	2594	261	227	108	140	326	1084	448	- -
(9) Elbon rye	1	2578	377	311	309	267	296	737	281	- -
(10) Tenkow barley	2	2574	426	293	362	273	340	656	224	- -
(11) Concho wheat	2	2569	465	- -	174	286	449	1023	172	- -
(12) Ponca wheat	1	2568	367	- -	168	265	448	1075	245	- -
(13) Concho wheat	1	2558	299	- -	178	381	485	968	247	- -
(14) Traveler oats	4	2532	348	232	76	113	282	1184	297	- -
(15) Arkwin oats	2	2503	369	255	81	109	280	1100	309	- -
(16) Traveler oats	2	2467	283	- -	215	187	345	1109	328	- -
(17) Balbo rye	1	2377	304	- -	224	265	354	967	263	- -
(18) Balbo rye	2	2343	410	- -	205	255	383	882	208	- -
(19) Composite 222 rye	1	2342	233	- -	244	318	430	813	304	- -
(20) Tetraploid rye	2	2280	320	218	75	99	279	1100	189	- -
(21) Composite 222 rye	2	2275	377	279	188	254	352	610	215	- -
(22) Elbon rye	2	2227	405	270	259	254	258	582	199	- -
(23) Tetraploid rye	1	2203	229	- -	189	183	364	975	263	- -

\* Number refers to variety and corresponds to those used in the multiple range table, Table 9.

\*\* Common (annual) ryegrass was seeded at the rate of 20 pounds per acre.

TABLE 9 Multiple Range Table (5% level of probability)\*\* of Small Grain Forage Production in 1957-58 Analyzed by Cutting Dates.

Cutting Date	(5)*	(11)	(2)	(6)	(10)	(18)	(22)	(1)	(21)	(9)	(15)	(12)	(4)	(14)	(20)	(17)	(13)	(16)	(7)	(8)	(3)	(19)	(23)
1.	[Significance lines]																						
2.	(9)	(5)	(1)	(10)	(21)	(22)	(15)	(6)	(2)	(14)	(8)	(20)	(7)	(3)	(4)	(11)	(12)	(13)	(16)	(17)	(18)	(19)	(23)
3.	(10)	(5)	(9)	(4)	(22)	(19)	(6)	(3)	(17)	(16)	(18)	(23)	(21)	(13)	(11)	(12)	(1)	(2)	(8)	(7)	(15)	(14)	(20)
4.	(13)	(19)	(4)	(11)	(16)	(5)	(9)	(17)	(12)	(18)	(22)	(21)	(6)	(3)	(1)	(16)	(23)	(2)	(8)	(7)	(14)	(15)	(20)
5.	(4)	(13)	(11)	(12)	(6)	(19)	(3)	(18)	(23)	(1)	(17)	(21)	(2)	(16)	(10)	(7)	(8)	(5)	(9)	(14)	(15)	(20)	(22)
6.	(1)	(3)	(2)	(7)	(14)	(4)	(16)	(20)	(15)	(8)	(12)	(11)	(23)	(13)	(17)	(6)	(18)	(5)	(19)	(9)	(10)	(21)	(22)
7.	(8)	(1)	(7)	(3)	(16)	(2)	(15)	(19)	(14)	(9)	(17)	(23)	(13)	(12)	(10)	(21)	(6)	(5)	(4)	(18)	(22)	(20)	(11)

\* Numbers in parenthesis refers to varieties and correspond to those used in Table 8.

\*\* Any two varieties (ranked by mean yield highest to lowest from left to right) underscored by the same line are not significantly different in mean yield at the 5% level of probability.

TABLE 10. Small Grain Forage Production In 1958-59 on Irrigated Land at  
The Agronomy Research Farm. Stillwater, Oklahoma

No.*	Variety	Seeding Rate Bu/A	Total	Yield-Pounds of Oven Dry Forage Per Acre							
				Harvest Date and Cutting Number							
				1	2	3	4	5	6	7	8
				Oct. 9	Oct. 22	Nov. 22	Feb. 16	Mar. 18	Mar. 23	Apr. 14	Apr. 30
1	Elbon rye	1	5209	670	703	926	715	1162	- -	686	347
2	Rogers barley	2	4350	610	985	904	- -	- -	889	737	225
3	Balbo rye	1	4107	525	609	884	307	- -	801	620	361
4	Common ryegrass	**	3939	127	810	927	- -	- -	637	931	507
5	Dayton barley	4	3815	760	773	832	- -	- -	546	621	283
6	" "	2	3475	445	708	846	- -	- -	537	602	337
7	Arkwin oats	4	3455	992	793	678	- -	- -	- -	545	447
8	Wintok oats	4	3442	625	839	624	- -	- -	- -	812	542
9	Bronco oats	4	3220	654	798	656	- -	- -	- -	575	537
10	Cimarron oats	4	3139	400	796	712	- -	- -	- -	744	487
11	Wintok oats	2	2893	214	838	525	- -	- -	- -	685	631
12	Arkwin oats	2	2771	655	719	518	- -	- -	- -	477	402
13	" " Sel.	2	2635	584	706	491	- -	- -	- -	497	357
14	C.I.12871 wheat	1	2558	218	540	634	- -	- -	289	488	389
15	Bronco oats	2	2377	216	652	483	- -	- -	- -	437	589
16	Concho wheat	1	2232	113	325	538	- -	- -	396	543	317
17	Ponca wheat	1	2219	225	401	573	- -	- -	266	489	265
18	Cimarron oats	2	2200	122	691	550	- -	- -	- -	443	394
19	Triumph wheat	1	2134	222	372	532	- -	- -	213	510	285

\* Number refers to variety and corresponds to those used in the multiple range, Table 11.

\*\* Common (annual) ryegrass was seeded at the rate of 20 pounds per acre.

TABLE 11 Multiple Range Table (5% level of probability)\*\* of Small Grain Forage Production in 1958-59 Analyzed by Cutting Dates.

Cutting  
Date

1.	<u>(7)*</u>	(5)	(1)	(12)	(9)	(8)	(2)	(13)	(3)	(6)	(10)	(17)	(19)	(15)	(11)	(14)	(4)	(18)	(16)
2.	<u>(2)</u>	<u>(8)</u>	<u>(11)</u>	<u>(4)</u>	<u>(9)</u>	<u>(10)</u>	<u>(7)</u>	<u>(5)</u>	(12)	(6)	(13)	(1)	(18)	(15)	<u>(3)</u>	<u>(14)</u>	(17)	(19)	(16)
3.	<u>(4)</u>	<u>(1)</u>	<u>(2)</u>	<u>(3)</u>	<u>(6)</u>	<u>(5)</u>	<u>(10)</u>	<u>(7)</u>	<u>(9)</u>	<u>(14)</u>	<u>(8)</u>	<u>(17)</u>	<u>(18)</u>	<u>(16)</u>	<u>(19)</u>	<u>(11)</u>	<u>(12)</u>	<u>(13)</u>	<u>(15)</u>
4.	<u>(1)</u>	<u>(3)</u>	(2)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
5.	<u>(1)</u>	<u>(2)</u>	<u>(3)</u>	<u>(4)</u>	<u>(5)</u>	<u>(6)</u>	<u>(7)</u>	<u>(8)</u>	<u>(9)</u>	<u>(10)</u>	<u>(11)</u>	<u>(12)</u>	<u>(13)</u>	<u>(14)</u>	<u>(15)</u>	<u>(16)</u>	<u>(17)</u>	<u>(18)</u>	<u>(19)</u>
6.	<u>(2)</u>	<u>(3)</u>	<u>(4)</u>	<u>(5)</u>	<u>(6)</u>	<u>(16)</u>	<u>(14)</u>	<u>(17)</u>	<u>(19)</u>	(1)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(18)
7.	<u>(4)</u>	<u>(8)</u>	<u>(10)</u>	<u>(2)</u>	<u>(1)</u>	<u>(11)</u>	<u>(5)</u>	<u>(3)</u>	<u>(6)</u>	<u>(9)</u>	<u>(7)</u>	<u>(16)</u>	<u>(19)</u>	<u>(13)</u>	<u>(17)</u>	<u>(14)</u>	<u>(12)</u>	<u>(18)</u>	<u>(15)</u>
8.	<u>(11)</u>	<u>(15)</u>	<u>(8)</u>	<u>(9)</u>	<u>(4)</u>	<u>(10)</u>	<u>(7)</u>	<u>(12)</u>	<u>(18)</u>	<u>(14)</u>	<u>(3)</u>	<u>(13)</u>	<u>(1)</u>	<u>(6)</u>	<u>(16)</u>	<u>(19)</u>	<u>(5)</u>	<u>(17)</u>	<u>(2)</u>

\* Numbers in parenthesis refers to varieties and correspond to those used in Table 10.

\*\* Any two varieties (ranked by mean yield highest to lowest from left to right) underscored by the same line are not significantly different in mean yield at the 5% level of probability.

TABLE 12. Three-Year Average Seasonal and Total Production as Oven-dry Forage of 12 Small Grain Varieties and Common Domestic Ryegrass (Fall 1955 through Spring 1959)

Variety	Seeding	Fall	Winter	Spring	Total
	Rate	Sept.-Nov.	Dec.-Feb.	March-May	
	bu./A	Lbs./A	Lbs./A	Lbs./A	Lbs./A
Common ryegrass	**	567	131	3229	3947
Wintok oats	2	297	228	2841	3366
Wintok oats	4	634	118	2724	3476
Traveler oats	2	343	178	2621	3142
Traveler oats	4	614	68	2454	3136
Forkedeer oats	2	340	162	2477	2979
Forkedeer oats	4	509	54	2674	3237
Arkwin oats	2	701	67	2254	3022
Concho wheat	1	512	194	2673	3379
Concho wheat	2	671	85	2361	3116
Ponca wheat	1	515	200	2501	3216
Rogers barley	2	530	123	2405	3058
Rogers barley	4	765	190	1855	2810
Tenkow barley	2	723	238	1548	2809
Tenkow barley	4	890	136	1863	2889
Balbo rye	1	305	75	2072	2452
Balbo rye	2	457	68	2264	2789
Elbon rye	1	422	305	1460	2187
Elbon rye	2	530	254	1592	2376
Tetraploid rye	1	248	194	1768	2210
Tetraploid rye	2	416	25	1967	2408

\*\* Common ryegrass was seeded at the rate of 20 pounds per acre.

TABLE 13. Fall Production (September through November) of Oven-Dry Forage Per Acre for Each of Three Years and Multiple Range Test (5% level of probability) of Eleven Small Grains and Common (annual) Ryegrass.

No.	Habit of Growth/1	Variety	Seeding Rate bu/A	Fall Production				Multiple Range (5% Level*)
				Oven-Dry Forage 1955-56	Oven-Dry Forage 1956-57	Pounds per acre 1957-58	Mean	
1	I	Tenkow barley	4	756	1126	787	890	
2	P	Rogers barley	4	693	928	673	765	
3	I	Tenkow barley	2	407	1044	719	723	
4	U	Arkwin oats	2	475	1003	624	701	
5	I	Concho wheat	2	360	1189	465	671	
6	P	Wintok oats	4	424	805	674	634	
7	I	Traveler oats	4	517	745	580	614	
8		Common ryegrass **		419	656	687	587	
9	P	Rogers barley	2	466	777	348	530	
10	U	Elbon rye	2	397	518	675	530	
11	I	Ponca wheat	1	279	900	367	515	
12	I	Concho wheat	1	163	1073	299	512	
13	P	Forkedeer oats	4	337	710	480	509	
14	P	Balbo rye	2	501	459	410	457	
15	U	Elbon rye	1	176	403	688	422	
16	P	Tetraploid rye	2	313	398	538	416	
17	I	Traveler oats	2	227	519	283	343	
18	P	Forkedeer oats	2	41	490	488	340	
19	P	Balbo rye	1	387	223	304	305	
20	P	Wintok oats	2	78	566	246	297	
21	P	Tetraploid rye	1	315	199	229	248	

\* Any two means underscored by the same line are not significantly different.

\*\* Common (annual) ryegrass was seeded at the rate of 20 pounds per acre.

/1 Habit of growth refers to vegetative characteristics of stem and leaf position in relation to the soil surface:

U = upright

I = intermediate

P = prostrate

TABLE 14. Four-Year Average Seasonal and Total Production as Oven-dry Forage of 8 Small Grain Varieties and Annual Ryegrass. (Fall 1955 through Spring 1959).

Variety	Seeding Rate (bu/A)	Production - 4 Year Average			Total Lbs./A
		Fall	Winter	Spring	
		Sept.-Nov. Lbs./A	Dec.-Feb. Lbs./A	March-May Lbs./A	
Common ryegrass	**	907	98	2941	3946
Wintok oats	2	617	171	2460	3248
Wintok oats	4	998	89	2382	3469
Arkwin oats	2	999	51	1910	2960
Concho wheat	1	628	146	2319	3093
Ponca wheat	1	686	150	2131	2967
Rogers barley	2	1023	92	2267	3382
Balbo rye	1	733	133	2000	2866
Elbon rye	1	892	408	1644	2944

\*\* Common ryegrass was seeded at the rate of 20 pounds per acre.



**TABLE 15. Fall Production (September through November) of Oven-Dry Forage Per Acre for Eight Small Grains and Common (annual) Ryegrass.**

No.	Variety	Seeding Rate bu/A	Fall Production Oven-Dry Forage - - Pounds per acre				Mean
			1955-56	1956-57	1957-58	1958-59	
1	Rogers barley	2	466	777	348	2499	1023
2	Arkwin oats	2	475	1003	624	1892	999
3	Wintok oats	4	424	805	674	2088	998
4	Common ryegrass	**	419	656	687	1864	907
5	Elbon rye	1	176	403	688	2299	892
6	Balbo rye	1	387	223	304	2018	733
7	Ponca wheat	1	279	900	367	1199	686
8	Concho wheat	1	163	1073	299	976	628
9	Wintok oats	2	78	566	246	1577	617

\* No significant differences could be shown in the means at the 5% level of probability in an analysis of Variance.

\*\* Common (annual) ryegrass was seeded at the rate of 20 pounds per acre.

**TABLE 16. Winter Production (December through February) of Oven-Dry Forage Per Acre for Each of Three Years and Multiple Range Test (5% level of probability) of Eleven Small Grains and Common (annual) Ryegrass.**

No.	Variety	Seeding Rate bu/A	Winter Production Oven-Dry Forage - - Pounds per acre				Multiple Range (5% level*)
			1955-56	1956-57	1957-58	Mean	
1.	Elbon rye	1	607	(397)**	309	438	   
2.	Elbon rye	2	502	(319)	259	360	
3.	Tenkow barley	2	271	81	362	238	
4.	Wintok oats	2	373	78	232	231	
5.	Ponca wheat	1	327	105	168	197	
6.	Tetraploid rye	1	392	0	189	194	
7.	Concho wheat	1	274	130	178	194	
8.	Rogers barley	4	277	54	240	190	
9.	Traveler oats	2	231	88	215	178	
10.	Forkedeer oats	2	289	90	108	162	
11.	Tenkow barley	4	0	81	326	136	
12.	Common ryegrass	**	0	236	156	131	
13.	Rogers barley	2	0	77	292	123	
14.	Wintok oats	4	134	101	119	118	
15.	Balbo rye	1	0	(51)	224	92	
16.	Concho wheat	2	0	80	174	85	
17.	Balbo rye	2	0	(41)	205	82	
18.	Traveler oats	4	0	129	76	68	
19.	Arkwin oats	2	0	121	81	67	
20.	Forkedeer oats	4	0	75	87	54	
21.	Tetraploid rye	2	0	0	75	25	

\* Any two means underscored by the same line are not significantly different.

\*\* Common (annual) ryegrass was seeded at the rate of 20 pounds per acre.

\*\*\* Numbers in parentheses were calculated as missing plots. Insects killed these varieties.

TABLE 17. Winter Production (December through February) of Oven-Dry Forage per Acre for Each of Four Years and Multiple Range Test (5% level of probability) of Eight Small Grains and Common (annual) Ryegrass.

No.	Variety	Seeding Rate bu/A	Winter Production Oven-Dry Forage - - Pounds per acre				Mean	Multiple Range 5% level*
			1955-56	1956-57	1957-58	1958-59		
1.	Elbon rye	1	607	(508)**	309	715	539	
2.	Wintok oats	2	373	78	232	0	171	
3.	Balbo rye	1	0	(141)	224	307	168	
4.	Ponca wheat	1	327	105	168	0	150	
5.	Concho wheat	1	274	130	178	0	146	
6.	Common ryegrass	**	0	236	156	0	98	
7.	Rogers barley	2	0	77	292	0	92	
8.	Wintok oats	4	134	101	119	0	89	
9.	Arkwin oats	2	0	121	81	0	51	

\* Any two means underscored by the same line are not significantly different.

\*\* Common (annual) ryegrass was seeded at the rate of 20 pounds per acre.

\*\*\* Numbers in parentheses were calculated as missing plots. Insects killed these varieties.

TABLE 18. Spring Production (March through May) of Oven-Dry Forage Per Acre for Each of Three Years and Multiple Range Test (5% level of probability) of Eleven Small Grains and Common (annual) Ryegrass.

No.	Variety	Seeding Rate bu/A	Spring Production Oven-Dry Forage - - Pounds per acre				Mean	Multiple Range (5% level*)
			1955-56	1956-57	1957-58	Mean		
1.	Common ryegrass	**	4928	1624	3135	3229		
2.	Wintok oats	2	4150	2036	2337	2841		
3.	Wintok oats	4	3872	2127	2173	2724		
4.	Forkedeer oats	4	3989	1884	2150	2674		
5.	Concho wheat	1	3600	2338	2081	2673		
6.	Traveler oats	2	3959	1936	1969	2621		
7.	Ponca wheat	1	3530	1941	2033	2501		
8.	Forkedeer oats	2	3731	1703	1998	2477		
9.	Traveler oats	4	3819	1667	1876	2454		
10.	Rogers barley	2	2802	2272	2142	2405		
11.	Concho wheat	2	3484	1670	1930	2361		
12.	Balbo rye	2	2735	2328	1728	2254		
13.	Arkwin oats	2	3474	1490	1798	2294		
14.	Balbo rye	1	2472	1896	1849	2072		
15.	Tetraploid rye	2	2108	2127	1667	1967		
16.	Tenkow barley	4	2683	1244	1662	1863		
17.	Rogers barley	4	1900	1816	1848	1855		
18.	Tetraploid rye	1	1925	1594	1785	1785		
19.	Elbon rye	2	1615	1868	1293	1592		
20.	Tenkow barley	2	1867	1285	1493	1548		
21.	Elbon rye	1	1102	1696	1581	1460		

\* Any two means underscored by the same line are not significantly different.

\*\* Common (annual) ryegrass was seeded at the rate of 20 pounds per acre.

TABLE 19. Spring Production (March through May) of Oven-Dry Forage Per Acre for Each of Four Years and Multiple Range Test (5% level of probability) of Eleven Small Grains and Common (annual) ryegrass.

No.	Variety	Seeding Rate bu/A	Spring Production Oven-Dry Forage - - Pounds per acre				Mean	Multiple Range (5% level*)
			1955-56	1956-57	1957-58	1958-59		
1.	Common ryegrass	**	4928	1624	3135	2075	2941	
2.	Wintok oats	2	4150	2036	2337	1316	2460	
3.	Wintok oats	4	3872	2127	2173	1354	2382	
4.	Concho wheat	1	3600	2338	2081	1256	2319	
5.	Rogers barley	2	2802	2272	2142	1851	2267	
6.	Ponca wheat	1	3530	1941	2033	1020	2131	
7.	Balbo rye	1	2472	1896	1849	1782	2000	
8.	Arkwin oats	2	3474	1490	1798	879	1910	
9.	Elbon rye	1	1102	1696	1581	2195	1644	

\* Any two means underscored by the same line are not significantly different.

\*\* Common (annual) ryegrass was seeded at the rate of 20 pounds per acre.

TABLE 20. Crude Protein Content (in percent) of Small Grain Varieties  
Harvested at Various Periods in 1954-55.

Total Forage Yield Rank	Variety	Seeding Rate bu/A	Percent Crude Protein at Various Harvest Periods							
			Feb.15-28	Mar.1-15	Mar.16-31	Apr.1-15	Apr.16-30	May 1-15	May 16-31	June 1-15
1	Wintok oats	2	--	--	25.19	--	17.75	17.19	--	16.81
2	Cimarron "	2	--	--	24.06	--	24.75	14.59	--	18.28
3	Mustang "	2	--	--	26.87	--	22.50	16.06	--	23.84
4	Traveler "	2	--	--	24.88	--	25.25	16.88	--	17.22
5	Forkedeer oats	2	--	--	26.69	--	15.63	15.09	--	19.94
6	C.I.6988(cxt)oats	2	--	--	20.75	--	18.75	16.44	--	18.19
7	Forkedeer "	6	--	--	25.38	--	10.85	--	13.41	--
8	Balbo rye	1	--	29.72	29.30	24.88	24.88	16.65	--	--
9	DeSoto oats	2	--	--	24.31	--	18.19	16.06	--	19.19
10	Balbo rye	2	--	27.05	22.63	21.56	21.56	--	--	--
11	Arkwin oats	2	--	--	21.25	--	21.06	17.81	--	18.44
12	Traveler oats	4	--	--	24.88	--	23.25	--	15.12	--
13	Cimarron "	6	--	--	24.06	--	18.88	--	14.75	--
14	Dubois "	2	--	--	25.21	--	20.81	15.49	--	17.22
15	Forkedeer "	4	--	--	26.69	--	12.06	--	12.81	--
16	Wintok "	4	--	--	25.19	--	17.19	--	13.50	--
17	Tetraploid rye	3	--	--	17.59	20.31	19.94	--	15.09	--
18	Traveler oats	6	--	--	24.88	--	19.69	--	13.87	--
19	Arlington "	2	--	--	25.63	--	22.25	16.41	--	18.13
20	Cimarron "	4	--	--	24.06	--	17.94	--	14.00	--
21	Wintok "	6	--	--	25.19	--	17.09	--	13.63	--
22	Balbo rye	3	--	--	28.58	19.53	19.53	--	--	--
23	Tetraploid rye	2	--	--	17.44	21.19	22.38	--	20.90	--
24	Arkwin oats	6	--	--	21.25	--	18.19	--	15.69	--
25	Tetraploid rye	1	--	--	28.89	22.19	25.22	19.68	--	--
26	Arkwin oats	4	--	--	21.25	--	18.19	--	14.13	--
27	Triumph wheat	3	--	--	24.72	20.80	--	17.00	--	--
28	Tenkow barley	4	--	--	21.41	19.19	--	20.09	--	--
29	Elbon rye	2	25.53	27.63	28.53	--	21.00	--	--	--
30	Harbine barley	6	--	--	21.09	10.85	--	18.22	--	--

TABLE 20. (continued)

Rank	Total Forage Yield	Variety	Seeding Rate bu/A	Percent Crude Protein at Various Harvest Periods							
				Feb.15-28	Mar.1-15	Mar.16-31	Apr.1-15	Apr.16-30	May 1-15	May 16-31	June 1-15
31		Clarkan wheat	1	--	--	--	22.09	23.00	--	19.94	--
32		Ryegrass, annual	30 lbs.	--	--	28.90	--	23.40	--	--	16.28
33		Harbine barley	4	--	--	24.28	18.69	--	21.16	--	--
34		Ryegrass, annual	20 lbs.	--	--	--	--	16.00	--	21.97	16.00
35		Tenkow barley	2	--	21.41	--	19.50	22.31	--	16.53	--
36		Clarkan wheat	3	--	--	23.50	18.94	--	18.19	--	--
37		Concho wheat	3	--	--	23.25	19.06	--	17.19	--	--
38		Harbine barley	2	--	24.28	--	27.56	18.50	--	--	--
39		Tenkow "	6	--	--	19.56	19.69	--	17.94	--	--
40		Clarkan wheat	2	--	--	24.50	23.16	16.47	--	--	--
41		Colonial 2 barley	2	--	--	--	27.44	21.78	--	17.22	--
42		Elbon rye	1	25.69	21.13	28.66	--	--	--	--	--
43		Ponca wheat	1	--	--	21.88	22.75	22.16	--	--	--
44		Concho "	1	--	--	24.93	20.72	21.00	--	--	--
45		Concho "	2	--	--	25.66	21.48	21.31	--	--	--
46		Triumph "	2	--	--	25.03	19.53	19.91	--	--	--
47		Comanche "	1	--	--	25.18	21.44	21.18	--	--	--
48		B-400 barley	2	--	--	--	21.39	20.81	--	--	--
49		Triumph wheat	1	--	--	26.46	21.81	20.00	--	--	--

Table 21.--Crude Protein Content (in percent) of Small Grain Varieties  
Harvested at Various Periods in 1955-56.

Variety	Seeding Rate bu/A	Percent Crude Protein by Cutting Dates											
		Oct.11	Oct.27	Nov.11	Dec.20	Feb.17	March 2	March 16	March 27	April 6	April 21	May 4	May 30
Common ryegrass	**	26.72	27.72	--	--	--	23.58	--	18.84	30.49	25.70	21.00	26.00
Wintok oats	2	34.20	--	--	26.96	--	--	--	21.31	21.68	28.34	14.75	15.31
Wintok oats	4	33.31	--	33.34	25.15	--	--	--	17.43	28.43	27.48	25.25	15.38
Traveler oats	2	29.11	--	--	24.02	--	--	--	20.90	21.31	28.00	24.25	16.13
Traveler oats	4	31.94	32.78	--	--	--	--	--	18.99	27.21	27.89	25.19	14.31
Forkeddeer oats	4	28.94	--	31.41	--	--	--	--	19.87	28.06	26.79	23.69	14.00
Ponca wheat	1	29.31	--	--	25.18	--	--	25.46	23.59	26.84	31.63	26.69	--
Clarkan wheat	2	30.82	--	--	24.12	--	23.00	--	19.62	26.90	28.51	26.69	--
Forkeddeer oats	2	32.34	--	--	26.34	--	--	--	21.37	23.91	27.34	25.81	14.13
Concho wheat	1	29.50	--	--	28.09	--	--	23.93	24.18	28.99	31.13	27.94	--
Arkwin oats	2	28.83	30.20	30.41	--	--	--	--	21.06	27.09	27.97	25.75	16.69
Concho wheat	2	29.33	33.41	--	--	--	--	22.77	22.65	27.74	30.29	27.06	--
Clarkan wheat	1	27.21	--	--	23.93	--	--	21.24	24.09	26.96	30.94	27.19	--
Tenkow barley	4	29.00	35.16	--	--	--	--	23.17	19.43	27.45	29.17	26.56	--
Rogers barley	2	33.75	36.34	--	--	--	23.40	25.17	23.34	30.06	29.73	28.31	--
Balbo rye	2	29.34	31.09	--	--	--	--	23.93	23.90	30.00	29.95	26.56	--
Rogers barley	4	32.91	34.66	--	25.71	--	20.12	--	17.68	28.09	31.73	29.25	--
Balbo rye	1	28.40	--	30.72	--	--	--	22.15	23.56	27.97	31.37	27.63	--
Tetraploid rye	1	30.14	--	32.03	27.37	--	--	19.74	22.59	30.71	31.36	30.44	--
Tenkow barley	2	31.72	35.54	--	25.74	--	21.80	19.74	23.56	27.50	30.98	27.88	--
Elbon rye	2	28.13	32.22	30.59	28.93	23.62	23.63	--	20.33	25.31	--	22.69	--
Tetraploid rye	2	30.66	--	31.34	--	--	--	22.65	23.49	30.33	32.26	30.94	--
Elbon rye	1	31.19	34.28	--	26.74	23.94	23.64	20.85	25.77	24.67	--	23.75	--

\*\* Common ryegrass was seeded at the rate of 20 pounds per acre.

Table 22.—Crude Protein Content (in percent) of Small Grain Varieties  
Harvested at Various Periods in 1956-57.

Variety	Seeding Rate bu/A	Percent Crude Protein By Cutting Dates						
		Oct. 9	Oct. 29	Dec. 5	March 12	March 30	April 24	May 10
Concho wheat	1	28.69	28.37	25.94	23.00	24.44	16.50	16.00
Rogers barley	2	25.87	21.87	26.31	- -	23.16	15.69	15.38
Wintok oats	4	32.19	29.69	24.94	- -	20.25	20.38	14.56
Ponca wheat	1	28.50	31.50	25.56	22.81	24.88	16.31	15.50
Concho wheat	2	30.13	26.37	24.63	18.75	23.16	14.06	17.31
Rogers barley	4	29.81	24.00	26.63	- -	20.31	13.38	13.13
Balbo rye	2	28.00	- -	- -	27.31	30.56	17.94	13.94
Wintok oats	2	29.00	28.44	27.50	25.19	25.69	15.75	13.75
Forkeddeer oats	4	34.87	29.75	26.63	- -	22.81	14.44	13.69
Arkwin oats	2	22.81	30.31	22.56	- -	21.13	14.81	14.69
Traveler oats	2	34.50	27.81	25.00	- -	24.19	16.88	13.94
Traveler oats	4	32.19	31.19	25.50	- -	22.81	13.94	15.13
Tetraploid rye	2	24.50	- -	- -	- -	29.06	18.25	11.88
Common ryegrass	**	27.19	25.13	21.94	20.75	22.25	14.50	13.81
Tenkow barley	4	24.87	25.19	- -	- -	19.56	14.94	14.69
Tenkow barley	2	26.13	23.25	20.75	21.56	25.50	16.63	17.63
Elbon rye	2	25.56	- -	- -	21.69	27.88	20.69	14.44
Forkeddeer oats	2	35.81	27.37	25.81	- -	22.63	14.81	13.50
Balbo rye	1	26.63	- -	- -	25.50	29.31	21.00	15.31
Elbon rye	1	27.13	- -	- -	22.44	28.50	21.44	17.38
Composite 222 rye	2	28.63	- -	- -	24.19	23.31	15.69	16.13
Tetraploid rye	1	29.56	- -	- -	- -	28.69	13.69	22.38
Composite 222 rye	1	27.31	- -	- -	24.44	26.88	18.44	15.31

\*\* Common ryegrass was seeded at the rate of 20 pounds per acre.

Table 23.--Crude Protein Content (in percent) of Small Grain Varieties  
Harvested at Various Periods in 1957-58.

Variety	Seeding Rate bu./A	<u>Percent Crude Protein by Cutting Dates</u>							
		Oct. 17	Nov. 21	Feb. 24	Mar. 22	Apr. 4	Apr. 22	May 5	May 25
Common ryegrass	**	17.31	31.49	19.87	17.31	26.44	20.81	20.38	14.94
Wintok oats	4	20.94	21.12	21.02	17.94	24.94	20.69	17.56	- -
Wintok oats	2	21.38	- -	18.96	18.31	24.81	18.06	16.44	- -
Rogers barley	2	18.06	- -	20.35	17.63	23.16	20.31	20.19	- -
Tenkow barley	4	20.38	20.33	22.29	17.94	23.44	20.31	18.44	- -
Rogers barley	4	17.06	20.42	22.33	17.94	23.81	21.75	18.25	- -
Forkeddeer oats	4	20.06	21.12	20.83	16.81	24.94	20.19	17.25	- -
Forkeddeer oats	2	20.56	21.11	19.99	16.69	22.94	18.50	18.13	- -
Elbon rye	1	21.31	22.20	21.89	17.56	20.69	24.06	20.50	- -
Tenkow barley	2	17.38	23.00	20.09	14.88	17.25	23.00	19.75	- -
Concho wheat	2	16.88	- -	20.78	20.19	25.31	22.44	19.31	- -
Ponca wheat	1	19.63	- -	21.48	20.69	23.44	19.19	19.69	- -
Concho wheat	1	20.69	- -	21.74	20.06	23.56	19.69	18.88	- -
Traveler oats	4	20.31	22.12	19.88	17.19	24.88	18.88	18.81	- -
Arkwin oats	2	14.31	22.42	19.37	15.69	23.75	19.31	18.44	- -
Traveler oats	2	18.06	- -	18.76	17.88	24.56	18.94	18.75	- -
Balbo rye	1	21.25	- -	20.56	19.69	24.06	23.16	18.69	- -
Balbo rye	2	14.13	- -	20.83	18.94	25.56	23.31	20.19	- -
Composite 222 rye	1	18.56	- -	20.78	19.94	22.69	22.56	19.31	- -
Tetraploid rye	2	16.75	14.69	19.05	16.81	26.94	22.06	18.56	- -
Composite 222 rye	2	20.00	22.35	22.05	19.38	23.00	23.88	18.00	- -
Elbon rye	2	17.25	21.15	22.28	16.06	22.44	25.94	18.31	- -
Tetraploid rye	1	14.44	- -	17.71	17.81	24.19	22.13	18.88	- -

\*\* Common ryegrass was seeded at the rate of 20 pounds per acre.



TABLE 24. Seasonal yield of oven-dry forage, the average crude protein content (in percent) and pounds of crude protein produced per acre by irrigated small grains in 1955-56.

Variety	Seed Rate bu/A	Fall (Sept.-Nov.)			Winter (Dec.-Feb.)			Spring (Mar.-May)			Total Yield Crude Prot. Lbs./A
		Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs./A	Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs./A	Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs./A	
Common ryegrass	**	419	27.22	114	0	-----	---	4928	24.27	1196	1310
Wintok oats	2	78	34.20	27	373	26.96	101	4150	20.28	842	970
" "	4	424	33.33	141	134	25.15	34	3872	22.79	882	1057
Traveler oats	2	227	29.11	66	231	24.02	55	3959	22.12	876	997
" "	4	517	32.36	167	0	-----	0	3819	22.72	868	1035
Forkedeer oats	4	337	30.18	102	0	-----	0	3989	22.48	897	999
Ponca wheat	1	279	29.31	82	327	25.18	82	3530	26.84	947	1111
Clarkan wheat	2	316	30.82	97	253	24.12	61	3567	24.94	890	1048
Forkedeer oats	2	41	32.34	13	289	26.34	76	3731	22.51	840	929
Concho wheat	1	163	29.50	48	274	28.09	77	3600	27.23	980	1105
Arkwin oats	2	475	29.81	142	0	-----	0	3474	23.71	824	966
Concho wheat	2	360	31.37	113	0	-----	0	3484	26.10	909	1022
Clarkan wheat	1	158	27.21	43	143	23.93	34	3327	26.08	868	945
Tenkow barley	4	756	32.08	243	0	-----	0	2683	25.16	675	918
Rogers barley	2	466	35.05	163	0	-----	0	2802	26.67	747	910
Balbo rye	2	501	30.22	151	0	-----	0	2735	26.87	735	886
Rogers barley	4	693	33.79	234	277	25.71	71	1900	25.37	482	787
Balbo rye	1	387	29.56	114	0	-----	0	2472	26.54	656	770
Tetraploid rye	1	315	31.09	98	392	27.37	107	1925	26.97	519	724
Tenkow barley	2	407	33.63	137	271	25.74	70	1867	25.24	471	678
Elbon rye	2	397	30.31	120	502	26.28	132	1615	22.99	371	623
Tetraploid rye	2	313	31.00	97	0	-----	0	2108	27.93	589	686
Elbon rye	1	176	32.74	58	607	25.34	154	1102	23.74	262	474

\*\* Common ryegrass was seeded at the rate of 20 pounds per acre.

TABLE 25. Seasonal yield of oven-dry forage, the average crude protein content (in percent) and pounds of crude protein produced per acre by irrigated small grains in 1956-57.

Variety	Seed Rate bu/A	Fall (Sept.-Nov.)			Winter (Dec.-Feb.)			Spring (Mar.-May)			Total Yield Crude Prot. Lbs./A
		Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs/A	Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs/A	Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs/A	
Concho wheat	1	1073	28.53	306	130	25.94	34	2338	19.99	467	807
Rogers barley*	2	777	23.87	185	77	26.31	20	2272	18.08	411	616
Wintok oats	4	805	30.94	249	101	24.94	25	2127	18.40	391	665
Ponca wheat	1	900	30.00	270	105	25.56	27	1941	19.88	386	683
Concho wheat	2	1189	28.25	336	80	24.63	20	1670	18.32	310	666
Rogers barley*	4	928	26.91	250	54	26.63	14	1816	15.61	283	547
Balbo rye*	2	459	28.00	129	0	-----	0	2328	22.44	522	651
Wintok oats	2	566	28.72	163	78	27.50	21	2036	20.10	409	593
Forkedeer oats	4	710	32.31	229	75	26.63	20	1884	16.98	320	569
Arkwin "	2	1003	26.56	266	121	22.56	27	1490	16.88	252	545
Traveler "	2	519	31.16	162	88	25.00	22	1936	18.34	355	539
" "	4	745	31.69	236	129	25.50	33	1667	17.29	288	557
Tetraploid rye*	2	398	24.50	98	0	-----	0	2127	19.73	420	518
Common ryegrass **	**	656	26.16	172	236	21.94	52	1624	17.83	290	514
Tenkow barley*	4	1126	25.03	282	81	-----	--	1244	16.40	204	486
" " *	2	1044	24.69	258	81	20.75	17	1285	20.33	261	536
Elbon rye*	2	518	25.56	132	0	-----	0	1868	21.18	396	528
Forkedeer oats	2	490	31.59	155	90	25.81	23	1703	16.98	289	467
Balbo rye*	1	223	26.63	59	0	-----	0	1896	22.78	432	491
Elbon " *	1	403	27.13	109	0	-----	0	1696	22.44	381	490
Composite 222 rye*	2	473	28.63	135	0	-----	0	1362	19.83	270	405
Tetraploid " *	1	199	29.56	59	0	-----	0	1594	21.59	344	403
Composite 222 " *	1	264	27.31	72	0	-----	0	1321	21.27	281	353

\* All rye and barley varieties were severely injured by leafhoppers in October, 1956. All were replanted Nov. 8, 1956.  
 \*\* Common ryegrass was seeded at the rate of 20 pounds per acre.

TABLE 26. Seasonal yield of oven-dry forage, the average crude protein content (in percent) and pounds of crude protein produced per acre by irrigated small grains in 1957-58.

Variety	Seed Rate bu/A	Fall (Sept.-Nov.)			Winter (Dec.-Feb.)			Spring (Mar.-May)			Total Yield Crude Prot.- Lbs./A
		Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs/A	Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs/A	Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs/A	
Common ryegrass	**	687	24.40	168	156	19.87	31	3135	19.98	626	825
Wintok oats	4	674	21.03	142	119	21.02	25	2173	20.28	441	608
Wintok oats	2	246	21.38	53	232	18.96	44	2337	19.41	454	551
Rogers barley	2	348	18.06	63	292	20.35	59	2142	20.32	435	557
Tenkow barley	4	787	20.36	160	326	22.29	73	1662	20.03	333	566
Rogers barley	4	673	18.74	126	240	22.33	54	1848	20.44	378	558
Forkeddeer oats	4	480	20.59	99	87	20.83	18	2150	19.80	426	543
Forkeddeer oats	2	488	20.84	102	108	19.99	22	1998	19.07	381	505
Elbon rye	1	688	21.76	150	309	21.89	68	1581	20.70	327	545
Tenkow barley	2	719	20.19	145	362	20.09	73	1493	18.72	279	497
Concho wheat	2	465	16.88	78	174	20.78	36	1930	21.81	421	535
Ponca wheat	1	367	19.63	72	168	21.48	36	2033	20.75	422	530
Concho wheat	1	299	20.69	62	178	21.74	39	2081	20.55	428	529
Traveler oats	4	580	21.22	123	76	19.88	15	1876	19.94	374	512
Arkwin oats	2	624	18.37	115	81	19.37	16	1798	19.30	347	478
Traveler oats	2	283	18.06	51	215	18.76	40	1969	20.03	394	485
Balbo rye	1	304	21.25	65	224	20.56	46	1849	21.40	396	507
Balbo rye	2	410	14.13	58	205	20.83	43	1728	22.00	380	481
Composite 222 rye	1	233	18.56	43	244	20.78	51	1865	21.13	394	488
Tetraploid rye	2	538	15.72	85	75	19.05	14	1667	21.09	352	451
Composite 222 rye	2	656	21.18	139	188	22.05	41	1431	21.07	302	482
Elbon rye	2	675	19.20	130	259	22.28	58	1293	20.69	268	456
Tetraploid rye	1	229	14.44	33	189	17.71	33	1785	20.75	370	436

\*\* Common ryegrass was seeded at the rate of 20 pounds per acre.

TABLE 27. Three-year average seasonal yield of oven-dry forage, crude protein content (in percent) and pounds of crude protein produced per acre by irrigated small grains, 1955-58.

Variety	Seed Rate bu/A	Three Year Average									Total Yield Crude Prot. Lbs./A
		Fall (Sept.-Nov.)			Winter (Dec.-Feb.)			Spring (Mar.-May)			
		Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs./A	Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs./A	Oven-Dry Forage Lbs./A	Crude Protein Av. %	Lbs./A	
Rogers barley	2	530	25.66	136	123	23.33	29	2405	21.69	522	687
" "	4	765	26.48	203	190	24.89	47	1855	20.47	380	630
Tenkow barley	2	723	26.17	189	238	22.19	53	1548	21.43	332	574
" "	4	890	25.82	230	136	22.29	30	1863	20.53	382	642
Arkwin oats	2	701	24.91	175	67	20.97	14	2254	19.96	450	639
Forkedeer "	2	340	28.26	96	162	24.05	39	2477	19.52	484	619
" "	4	509	27.69	141	54	23.73	13	2674	19.75	528	682
Traveler "	2	343	26.11	90	178	22.59	40	2621	20.16	528	658
" "	4	614	28.42	174	68	22.69	15	2454	19.98	490	679
Wintok "	2	297	28.10	83	231	24.47	57	2841	19.93	566	706
" "	4	634	28.43	180	118	23.70	28	2724	20.49	558	766
Balbo rye	1	305	25.81	79	92	20.56	19	2072	23.57	488	586
" "	2	457	24.12	110	82	20.83	17	2264	23.77	538	665
Elbon "	1	422	27.21	115	438	23.62	103	1460	22.29	325	543
" "	2	530	25.02	133	360	24.28	87	1592	21.62	344	564
Tetraploid rye	1	248	25.03	62	194	22.54	44	1768	23.10	408	514
" "	2	416	23.74	99	25	19.05	5	1967	22.92	451	555
Concho wheat	1	512	26.24	134	194	25.26	49	2673	22.59	604	787
" "	2	671	25.50	171	85	22.71	19	2361	22.08	521	711
Ponca "	1	515	26.31	135	197	24.07	47	2501	22.49	562	744
Common ryegrass	**	587	25.93	152	131	20.91	27	3229	20.69	668	847

\*\* Common ryegrass was seeded at the rate of 20 pounds per acre.