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A COMPARISON OF TALL FESCUE AND ORCHARDGRASS FOR GRAZING IN SOUTHERN INDIANA, 1958 SEASON

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The first year these pastures of the Southern Indiana Forage Farm were grazed, alfalfa was included in combination with fescue and orchardgrass. (Refer to ID-27.) During the winter of 1957-58, most of the alfalfa was eliminated from the pastures as a result of severe winter heaving. With this exception, the experiment has been conducted during the 1958 grazing season according to plan. The primary objectives of the experiment have been changed slightly to correspond with the botanical changes which have occurred in the original seedings.

#### Objectives of Experiment

The experiment was conducted during the 1958 grazing season to obtain the following information:

- 1. To compare the production of fescue and orchardgrass in terms of carrying capacity, average daily gain of growing beef steers and heifers and the amount of beef produced per acre.
- 2. To compare orchardgrass and fescue as a firm footing (sod) during wet periods in the spring and fall.
- 3. To determine the effect of interplanting cereals in fescue and orchard-grass sods with a "grassland drill".
  - (a) Compare the seasonal yield of the pasture, that is, extending the grazing season later in the fall and earlier in the spring.
  - (b) Compare the production of the permanent sod of orchardgrass and tall fescue.
- 4. To determine the forage yield increase due to nitrogen fertilizer on the interplanted cereal and the permanent sod crop.

#### The Experimental Pastures

The experimental pastures, page 44, consist of 24 plots each about two acres. Twelve pastures consist of almost a pure stand of Alta fescue. Twelve pastures are in a sod of commercial orchardgrass. Six of the twelve pastures of each species were "sod seeded" on September 17, 18, 19 and 20, 1957 with five pecks of dual wheat per acre. All pastures, those sod-seeded as well as those that were not sod seeded, received an application of 200 pounds of 5-20-20 fertilizer/A. at the time the dual wheat was sod-seeded.

The six pastures in each of the four groups described above were treated with three different levels of nitrogen. The three nitrogen levels were 0, 75 and 150 pounds of actual nitrogen/A. One-half of the designated amount was applied at the time the dual wheat was "sod seeded" and the remaining increment was applied from April 16 to April 21, 1958.

During the grazing season each pasture was managed independently of the other pastures. All pastures were rotationally grazed.

#### The Experimental Animals

Yearling Hereford steers and heifers, raised on the Forage Farm from birth, were used as experimental animals. The average age of these cattle at time of allotment was 14 months. They had been wintered on wheat silage and sorghum silage which was supplemented with two pounds of Purdue Cattle Supplement A per calf daily. The steers averaged 619 pounds and the heifers 597 pounds when they were placed on the experimental pastures on April 29, 1958.

Twenty-four steers and 24 heifers were designated as "tester" animals. One "tester" steer and one "tester" heifer was allotted to each of the 24 pastures. These "tester" animals were used to measure the average daily gains of steers and heifers on each of the twelve treatments. The "testers" remained on their respective pastures throughout the grazing season. Additional yearlings were added to the pastures during flush growth periods as "put-and-take" animals and were removed when there was only enough forage for the tester animals. During the 1958 grazing season it was also necessary to use several cows with their calves as "put-and-take" animals to utilize the extra forage which was produced during the last weeks of May and first 10 days of June. All of the animals in the pasture were taken into account in computing the animal days per acre.

Beginning October 16, 1958 a new crop of calves was used to graze the pastures until November 24, 1958. The same allotment technique described above was used for this period. These calves were about eight months old. The tester steers averaged 471 pounds and the heifers averaged 437 pounds on October 16, 1958.

All animals were weighed every 28 days. A mineral mixture of two parts steamed bonemeal and one part cobalt-iodized salt as well as cobalt-iodized salt by itself were fed free choice. Pond water, under pressure, was piped to each of the 24 pastures. Back rubbers, saturated with one part of 25% DDT emulsion and eight parts diesel fuel, were used for fly control in each pasture.

### Results and Discussion - 1958 Season

The 1958 growing season was favorable for the growth of grass with lower than normal temperatures in mid-summer and greater than normal rainfall.

Botanical Composition of the Pastures: The 24 pastures involved in this experiment were originally seeded in 1956. The original seedings consisted of (a) Buffalo alfalfa (9.4 los.) and orchardgrass (12 lbs.) and (b) Buffalo alfalfa (9.4 lbs.) and tall fescue (12.9 lbs.). During the 1957 growing season excellent stands of both alfalfa and grass prevailed over most of the experimental area. During the winter of 1957-58 the alfalfa was severely damaged by heaving and most of the alfalfa plants were eliminated, thus leaving essentially pure stands of the two grasses. Table 1 presents the percent of alfalfa and grasses in each treatment in early May for 1957 and 1958. The botanical composition of the pasture indicate that:

- In 1957 the percentage of alfalfa was much greater in the fescue pastures than in the orchardgrass.
- 2. Nitrogen reduced the alfalfa in the mixtures and the reduction was greater in orchardgrass than in fescue pastures.
- 3. The winter of 1957-58 almost eliminated the alfalfa in the pasture mixtures and neither orchardgrass nor fescue were effective in reducing the loss from heaving.
- 4. Although the percentages of alfalfa are low in all pastures, the greater percentages are found in pastures which receive no nitrogen application.

Table 1. Percentage of Alfalfa, grasses and Cereal on Experimental Pastures in May 1957 and 1958.

	Orchardgrass									
	I	bs. Nitr With Ce				Lbs. Nitr Without				
1957	0	75	150	Avg.	0	75	150	Avg.		
Alfalfa Grasses	65.0 35.0	37.5 62.5	22.5 77.5	41.7 58.3	40.5 60.0	36.5 63.5	27.5 72.5	34.8 65 <b>.3</b>		
1958										
Alfalfa Grasses Cereals	2.8 74.0 23.2	1.2 61.4 37.4	0.5 83.0 16.5	1.5 72.8 25.7	1.8 98.2 	95.2	2.0 98.0 	2.9 97.1		
	Tall Fescue									
	I	bs. Nitr With Ce			Ibs. Nitrogen/A. Without Cereal					
1957	0	75	150	Avg.	0	75	150	Avg.		
Alfalfa Grasses	85.0 15.0	60.0 40.0	57.5 42.5	67.5 32.5	82.5 17.5	70.0 30.0	45.0 55.0	65.8 34.2		
1958										
Alfalfa Grasses Cereals	2.8 75.9 21.3	0.4 72.0 27.6	0.4 71.6 28.0	1.2 73.2 25.6	6.0 94.0	2.8 97.2	0.4 99.6 	3.1 96.9 		

Chemical Composition of the Pastures in Early May: Pasture samples were taken for chemical analysis at the time the botanical composition of the pastures was determined in early May, 1958. Table 2 gives the chemical composition of the two perennial grasses and the cereal which was "sod seeded" and grew in association with the permanent grasses. The conclusions which may be drawn for the 1958 season are as follows:

- 1. Sod seeding of the cereal reduced the protein content of the orchardgrass and fescue between 2 and 3 percent.
- 2. The first 75 pound increment of nitrogen increased the protein content of the fescue and orchardgrass between 5 and 6 percent while the second 75 pound increment (total of 150 pounds) increased the protein from 2 to 4 percent.
- 3. The protein content of the cereal was increased from 15 percent to 20 percent by 75 lbs. of N and to 25 percent by 150 lbs. of N.
- 4. An increase in protein content resulted in a decrease in crude fiber and nitrogen-free extract in the perennial grasses.
- 5. The protein content of the forages in early spring exceeds the animal's requirement when pasture is the sole ration.

Table 2. Chemical Composition of Forages from Grazing Trial, Samples Taken May 5 and 6, 1958.

#### Crude Protein

			crogen/A.		Lbs. Nitrogen/A. Fesque				
The second of the second of the figure second of the secon	0	75	150	Avg.	0	75	150	Avg.	
With cereal Without cereal Cereal	16.9 20.4 15.1	23.6 28.6 20.1	30.2 31.1 25.2	23.6 26.7 20.1	20.3 21.6 15.7	24.3 26.3 20.4	25.8 28.6 26.2	23.5 25.5 20.8	
			Crude F	ibre					
With cereal Without cereal Cereal	23.0 17.7 21.6	20.5 18.7 23.7	19.4 21.5 19.1	21.0 19.3 21.5	23.4 21.8 19.0	22.6 20.0 20.8	19.5 18.5 19.2	21.8 20.1 19.7	
	Nitrogen Free Extract								
With cereal Without cereal Cereal	40.6 43.7 43.1	35.2 33.2 37.1	31.3 27.0 35.6	35.7 34.6 38.6	40.1 38.9 42.9	34.9 34.4 45.6	37.2 34.4 33.9	37.4 35.9 40.8	

Animal Performance on Pasture: The results for 1958 are presented in three periods as indicated in Table 3. All of the pastures were rotationally grazed from April 29 to September 15, at which time the cattle were removed from the pastures that were to be "sod seeded" so that a new seeding of dual wheat could be made for the 1958-1959 season. Grazing was continued on the pastures that were not "sod seeded" until October 1. On October 16 grazing was resumed on all pastures, using calves from the herd as grazing animals, and was terminated for the year on November 24.

Table 4 contains the following important findings for the 140-day period beginning April 29 and ending September 15, 1958:

- 1. The average daily gain of yearling steers and heifers appeared to increase with increased nitrogen applications on orchardgrass, but this relationship was reversed for fescue.
- 2. The application of nitrogen at the 75-pound rate increased the carrying capacity on the average by 44 animals days/A., and 68 animal days for the 150-lbs. rate.
- 3. The tall fescue gave a 33% greater carrying capacity than the orchard-grass; however, the lower daily gains made by the cattle on fescue resulted in about the same amount of beef/A. for the two species.
- 4. "Sod seeding" of dual wheat in orchardgrass reduced the average daily gains of the cattle for the season and produced less beef/A. "Sod seeding" in fescue had little, if any effect on the production of the pasture.
- 5. When 150 pounds of nitrogen/A. was applied to orchardgrass, nearly 90 pounds more beef was produced/A., while on fescue, only a 50-pound increase was obtained.

Table 3. Fescue Compared With Orchardgrass as Pasture for Yearling Beef Steers and Heifers. (April 29 to November 24, 1958.)

-	Orchardgrass								
			itrogen/ h Cereal	Lbs. Nitrogen/A. Without Cereal					
Period - 1958	0	75	150	Avg.	0	75	) 150	Avg.	
April 29 to Sept. 15 Average daily gain Animal days per acre Beef per acre	1.00 241 241	1.09 261 284	1.25 289 358	1.11 264 294	1.32 206 270	1.39 216 301	1.38 238 328	1.36 220 299	
Sept. 16 to Oct. 1 Average Animal days per acre Beef per acre		<u>-</u> -	- -		1.64 14 24	1.18 15 18	.86 14 12	1.23 14 18	
Oct. 16 to Nov. 24 Average daily gain Animal days per acre Beef per acre	1.54 27 42	1.52 41 62	•56 54 30	1,21 41 45	1.26 38 48	1.83 49 90	1.47 57 84	1.52 48 74	
April 29 to Nov. 24 Average daily gain Animal days per acre Beef per acre	1.06 268 283	1.14 302 346	1.13 343 388	1.11 305 339	1.32 258 342	1.46 280 409	1.37 309 424	1.39 282 391	
	Tall Fescue								
			itrogen/ n Cereal	Lbs. Nitrogen/A. Without Cereal					
Period - 1958	0	75	150	Avg.	0	75	150	Avg.	
April 29 to Sept. 15 Average daily gain Animal days per acre Beef per acre	1.03 275 280	•92 328 290	•88 381 335	•94 328 306	1.13 253 284	•84 346 289	•98 338 328	.98 312 306	
Sept. 16 to Oct. 1  Average daily gain  Animal days per acre  Beef per acre		- - -	- - -		.48 20 9	02 22 0	•88 23 20	.31 21 10	
Oct. 16 to Nov. 24  Average daily gain  Animal days per acre  Beef per acre	•77 62 48	1.71 68 116	1.79 80 143	1.42 70 102	1.50 50 75	1.74 68 118	1.67 70 117	1.64 63 103	
April 29 to Nov. 24 Average daily gain Animal days per acre Beef per acre	•97 337 328	1.02 396 406	1.04 461 478	1.02 398 408	1.14 322 368	•93 436 407	1.08 431 465	1.06 396 419	

Table 4. Orchardgrass vs. Fescue - with and without Nitrogen. (April 29 to September 16, 1958.)

	Lbs. Nitrogen/A. Orchardgrass					Grand			
	0	75	150	Avg.	0	75	150	Avg.	$\sum \overline{\mathbf{x}}$
Daily gain  \[ \bar{x} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1.16	1.24	1.32	1.24	1.08 1.12	.88 1.06	.93	.96	1.10
Animal days  \[ \bar{x} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	224	238	263	242	264 244	337	360 312	320	281
Beef/Acre x N x M x Nitrogen x Mixtures	256	292	343	297	282 269	290 291	332 338	301	299

Table 3 presents the following conclusions concerned with the amount of beef produced per acre for the entire grazing season, a period of 194 days from April 29 to November 24, 1958, excluding October 2 to 15.

1. The orchardgrass pastures (pooled data for all three levels of N), which were "sod seeded" with dual wheat, produced an average of 339 pounds of beef per acre, whereas, the orchardgrass that was not "sod seeded" produced an average of 391 pounds of beef to the acre.

2. The fescue pastures (pooled data for all three levels of N) that were "sod seeded" with dual wheat produced an average of 408 pounds of beef per acre and the fescue pastures not "sod seeded" averaged 419 pounds of beef per acre.

3. One hundred fifty pounds of nitrogen applied to "sod seeded" orchard-grass produced 105 pounds more beef per acre than the O-Nitrogen treatment.

4. When orchardgrass that was not "sod seeded" received 150 pounds of nitrogen it produced 82 pounds more beef per acre than its companion pastures that had no nitrogen applied.

5. "Sod seeded" tall fescue, treated with 150 pounds of nitrogen, produced 150 pounds more beef per acre than the fescue pastures without nitrogen.

6. Ninety-seven pounds more beef per acre was produced when 150 pounds of nitrogen was applied to the tall fescue pastures not sod seeded.