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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 orchardgrass 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 lbs.) 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:

1. 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							
	Lbs. Nitrogen/A. With Cereal				Lbs. Nitrogen/A. Without Cereal			
	0	75	150	Avg.	0	75	150	Avg.
1957								
Alfalfa	65.0	37.5	22.5	41.7	40.5	36.5	27.5	34.8
Grasses	35.0	62.5	77.5	58.3	60.0	63.5	72.5	65.3
1958								
Alfalfa	2.8	1.2	0.5	1.5	1.8	4.8	2.0	2.9
Grasses	74.0	61.4	83.0	72.8	98.2	95.2	98.0	97.1
Cereals	23.2	37.4	16.5	25.7	----	----	----	----
	Tall Fescue							
	Lbs. Nitrogen/A. With Cereal				Lbs. Nitrogen/A. Without Cereal			
	0	75	150	Avg.	0	75	150	Avg.
1957								
Alfalfa	85.0	60.0	57.5	67.5	82.5	70.0	45.0	65.8
Grasses	15.0	40.0	42.5	32.5	17.5	30.0	55.0	34.2
1958								
Alfalfa	2.8	0.4	0.4	1.2	6.0	2.8	0.4	3.1
Grasses	75.9	72.0	71.6	73.2	94.0	97.2	99.6	96.9
Cereals	21.3	27.6	28.0	25.6	----	----	----	----

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

Period - 1958	Orchardgrass							
	Lbs. Nitrogen/A. With Cereal				Lbs. Nitrogen/A. Without Cereal			
	0	75	150	Avg.	0	75	150	Avg.
April 29 to Sept. 15								
Average daily gain	1.00	1.09	1.25	1.11	1.32	1.39	1.38	1.36
Animal days per acre	241	261	289	264	206	216	238	220
Beef per acre	241	284	358	294	270	301	328	299
Sept. 16 to Oct. 1								
Average	-	-	-	-	1.64	1.18	.86	1.23
Animal days per acre	-	-	-	-	14	15	14	14
Beef per acre	-	-	-	-	24	18	12	18
Oct. 16 to Nov. 24								
Average daily gain	1.54	1.52	.56	1.21	1.26	1.83	1.47	1.52
Animal days per acre	27	41	54	41	38	49	57	48
Beef per acre	42	62	30	45	48	90	84	74
April 29 to Nov. 24								
Average daily gain	1.06	1.14	1.13	1.11	1.32	1.46	1.37	1.39
Animal days per acre	268	302	343	305	258	280	309	282
Beef per acre	283	346	388	339	342	409	424	391
	Tall Fescue							
	Lbs. Nitrogen/A. With Cereal				Lbs. Nitrogen/A. Without Cereal			
	0	75	150	Avg.	0	75	150	Avg.
Period - 1958								
April 29 to Sept. 15								
Average daily gain	1.03	.92	.88	.94	1.13	.84	.98	.98
Animal days per acre	275	328	381	328	253	346	338	312
Beef per acre	280	290	335	306	284	289	328	306
Sept. 16 to Oct. 1								
Average daily gain	-	-	-	-	.48	-.02	.88	.31
Animal days per acre	-	-	-	-	20	22	23	21
Beef per acre	-	-	-	-	9	0	20	10
Oct. 16 to Nov. 24								
Average daily gain	.77	1.71	1.79	1.42	1.50	1.74	1.67	1.64
Animal days per acre	62	68	80	70	50	68	70	63
Beef per acre	48	116	143	102	75	118	117	103
April 29 to Nov. 24								
Average daily gain	.97	1.02	1.04	1.02	1.14	.93	1.08	1.06
Animal days per acre	337	396	461	398	322	436	431	396
Beef per acre	328	406	478	408	368	407	465	419

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

	Lbs. Nitrogen/A. Orchardgrass				Lbs. Nitrogen/A. Fescue				Grand x̄
	0	75	150	Avg.	0	75	150	Avg.	
Daily gain x̄ N x M	1.16	1.24	1.32		1.08	.88	.93		
x̄ Nitrogen					1.12	1.06	1.12		
x̄ Mixtures				1.24				.96	1.10
Animal days x̄ N x M	224	238	263		264	337	360		
x̄ Nitrogen					244	288	312		
x̄ Mixtures				242				320	281
Beef/Acre x̄ N x M	256	292	343		282	290	332		
x̄ Nitrogen					269	291	338		
x̄ Mixtures				297				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" orchardgrass produced 105 pounds more beef per acre than the 0-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.