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ORCHARDGRASS AND FESCUE PASTURES FOR PRODUCING YEARLING SLAUGHTER STEERS

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Summary and Conclusions

ORCHARDGRASS and fescue, alone and in combination with ladino clover and at two rates of nitrogen fertilization, were compared for 4 years, 1956-1959, for producing yearling slaughter cattle. The following statements can be made:

1. Orchardgrass-clover pastures, with and without nitrogen, produced significantly higher daily gains during the summer grazing season than straight orchardgrass or fescue with nitrogen, and fescue-clover with and without nitrogen. Also, cattle that grazed orchardgrass-clover pastures graded higher at the end of the grazing season.

2. Clover content of the fescue-clover pastures declined from about 40% of the total forage the first year (1956) to 1% the fourth year (1959). For orchardgrass-clover pastures, clover declined from 40-50% in 1956 to 20-25% in 1959. The decline was about the same regardless of nitrogen fertilization of the pastures. Clover seemed to be important in increasing steer gains. Orchardgrass-clover pastures produced higher daily gains and higher grading cattle all year round than the straight fescue, fescue-clover, or straight orchardgrass pastures, all of which produced similar daily gains.

3. Fescue pastures produced significantly higher daily gains ($P < .05$) during the winter than orchardgrass pastures regardless of clover content or nitrogen fertilization. Fescue pastures carried more head per acre both summer and winter.

4. Adding 450 pounds of ammonium nitrate annually to straight fescue and orchardgrass and 225 pounds annually to fescue-clover and orchardgrass-clover pastures was unprofitable. Nitrogen fertilization of grass-clover pastures did not increase average daily steer gains.

5. Following the grazing period, cattle had to be fed concentrates for about 100 days to get them to Good slaughter grade. This feeding period was profitable every year.

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Orchardgrass and Fescue Pastures for Producing Yearling Slaughter Steers

by

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THE PRODUCTION of yearling slaughter steers has become one important phase of an extensive beef cattle industry that is undergoing rapid growth in Tennessee and the South in general. High costs of concentrates and the excellent forage-producing capabilities of this area dictate that much of the development of these yearling cattle should be done with home-grown roughages in the form of pasture, silage, or hay. Much of the land in this area is better suited to pasture than to other types of roughage production, and, therefore, pastures are of considerable importance. Also, the relatively long growing season contributes to the utilization of pastures in a year-around beef production program.

Rising farm costs make the maximum efficiency in pasture production and utilization a necessity. Research is needed to provide more information on seeding methods, fertilization practices, grazing management, seasons of grazing, most productive pasture species, and other factors that can increase pasture efficiency.

In Tennessee, orchardgrass, tall fescue, and ladino clover are among the more common pasture species being used by farmers. Although these forages have been used in the state for some years, more information is needed on their relative value and management practices for the maximum potential to be realized from them.

This study was conducted at the Main Experiment Station, Knoxville. Its purpose was to gain information on the comparative value of orchardgrass and fescue, alone and in combination with ladino clover, for producing yearling slaughter steers. Also, nitrogen was added to both straight grass pastures and grass-clover mixtures to see if this practice could be justified in terms of increased beef production, and if the nitrogen would affect the species composition of the pastures.

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Experimental Procedure

This investigation was conducted over a 4-year period from 1956 through 1959. A 36-acre tract of land at the University of Tennessee's Blount Farm was divided into 12 three-acre plots for this study. There were six pasture treatments with two replications (A&B) as follows:

<i>Pasture and lot numbers</i>	<i>Pasture and fertilizer treatments</i>
1 A&B	Orchardgrass, with nitrogen
2 A&B	Orchardgrass and ladino clover, with nitrogen
3 A&B	Orchardgrass and ladino clover, no nitrogen
4 A&B	Fescue, with nitrogen
5 A&B	Fescue and ladino clover, with nitrogen
6 A&B	Fescue and ladino clover, no nitrogen

SOILS. The predominant soils in each pasture were Cumberland loam and clay loam on slopes from 4% to 12%. Each treatment except No. 2 orchardgrass-ladino clover with nitrogen contained a small amount of Huntington silt loam. All treatments except No. 1 orchardgrass with nitrogen contained a small acreage of Cumberland clay loam that was either severely eroded or on a 12% to 20% slope (Table 1).

Cumberland soils are deep and well drained. They are on upland positions and are developed in old stream deposits. The severely eroded areas are droughty. On gentle slopes the clay subsoil of Cumberland soil occurs at about 24 inches. On the more sloping and eroded areas the clay is nearer the surface. The Huntington soil is a deep, well-drained soil having medium texture. It is along drains or in sink holes.

FERTILIZATION. Nitrogen was applied in the form of am-

Table 1. Kinds of soils and percentage in each treatment

Soil	Treatment					
	1	2	3	4	5	6
Cumberland loam and clay loam, 4% to 12% slopes, eroded	97	97	74	80	73	86
Cumberland clay loam, 12% to 20% slopes, eroded	0	3	15	8	0	0
Cumberland clay loam, 4% to 12% slopes, severely eroded	0	0	8	0	20	7
Huntington silt loam	3	0	3	12	7	7

monium nitrate (33% N) three times yearly: March, June, and September. Treatments 1 and 4 received 150 pounds of ammonium nitrate per acre, and treatments 2 and 5 received 75 pounds of ammonium nitrate per acre each application. All treatments received triple-superphosphate in the fall of 1957 (75-100 lb. per acre, as indicated by soil test).

PASTURE EVALUATION. Each pasture was scored and evaluated at 2-week intervals during the entire grazing season. Consideration was given to height and estimated percentage of the various species, stage of growth, condition, color, carrying capacity, and thickness of sod. An overall grade reflecting the above considerations was assigned to each pasture. It was felt that this information would give a good picture of the pasture at any time during the grazing season, and would possibly help to explain any differences which might occur.

SOURCE OF ANIMALS. The experimental animals were obtained from the Station beef cattle herds and feeder calf sales in East Tennessee. Care was taken to select beef steer calves similar in age, weight, type, and condition. Four steers per pasture treatment were used, two for each replicate. These steers were designated as "test steers" and remained on pastures during the entire test period. Both the Hereford and Angus breeds were represented. The steers were weighed on 2 consecutive days and were graded at the beginning and end of the pasture test period.

Each pasture plot was provided with fresh water and sheds with mineral boxes and hay racks. Salt and dicalcium phosphate were available at all times and medium-quality mixed hay was fed, *ad libitum*, during the most severe winter months. The test steers were to remain on the pastures from approximately November 1 to August 30. The period from November 1 until the pastures would support the steers without hay—usually about March 30—was designated as the winter period, and the remainder of the grazing season as the summer period. However, the first two winter periods were somewhat shorter due primarily to difficulties in obtaining animals.

The forage in excess of that utilized by the test steers was removed through the use of the "put and take system"; extra steers were put on or taken off the pastures as needed to maintain desirable grazing levels. The changes in animal numbers, if needed, were made at the beginning of each 2-week period. Grazing days per acre are the total of the days the "test" and "extra" steers were on the pastures. The calculated beef gain per acre is the

daily gain of the test steers multiplied by the total grazing days, since it was assumed for the purpose of this evaluation that the extra steers gained comparably to the test steers. The totals for grazing days and beef gain per acre are cumulative totals of these values for each 28-day period. All pastures were clipped to approximately 6 inches once each summer to remove seed heads and weeds.

At the end of the summer grazing period the cattle were removed from pasture for a short dry-lot concentrate feeding period. The cattle were finished on a ration of ground corn, cottonseed meal, hay and/or silage, salt, and dicalcium phosphate. When the steers were finished sufficiently, they were sold to a local packing company.

Data were analyzed by analysis of variance and differences between all possible comparisons were tested for significance by the use of Duncan's Multiple Range Test.

Results and Discussion

Complete data for the average of 4 years, 1956 through 1959, are summarized by winter, summer, and combined winter and summer grazing periods, and by the dry-lot finishing period.

WINTER GRAZING PERIOD. During the fall and winter the steers on the fescue pasture treatments gained significantly faster than those on comparable orchardgrass treatments; daily gain for the fescue steers averaged about 0.38 pound per head higher than for orchardgrass steers (Table 2). Carrying capacity and estimated beef gain per acre were also significantly higher for the fescue treatments. It should be noted here that grazing days per acre represent the days the cattle were on the pastures, whether grazing was available or not. No adjustment was made for hay fed during periods when satisfactory grazing was not available. Hay consumption averaged about 465 pounds for all lots, and differences between lots were not significant.

Daily gains were considerably higher the first 2 years when the test was started later in the winter. This was true to a greater extent in the orchardgrass than in the fescue treatments. Possibly this was because considerable fall growth was left on the pastures the first two winters, and this was enough to support relatively good gains until spring growth began. However, during the last two winters, the fall growth was consumed before spring growth began, making it necessary for the steers to rely on fair-quality hay to meet most of their nutritive needs.

Table 2. Summary of winter grazing period
Four-year average, 1956-1959

	Lot No. and treatment					
	1AB O+N	2AB O+L+N	3AB O+L	4AB F+N	5AB F+L+N	6AB F+L
No. of test steers per year	4	4	4	4	4	4
Av. wt. and gain per head, lb.						
Initial wt.	535	526	538	532	535	524
Final wt.	575	582	586	624	615	610
Total gain	40	57	48	92	80	86
Daily gain (test steers)	0.56 ^b	0.77 ^b	0.64 ^b	1.09 ^a	0.97 ^a	1.04 ^a
Av. hay consumed per head, lb.	475	483	479	448	453	446
Productivity of pastures						
Grazing days per acre	74 ^b	76 ^b	67 ^b	106 ^a	105 ^a	102 ^a
Est. beef gain per acre, including hay	27 ^b	45 ^b	36 ^b	95 ^a	79 ^a	89 ^a
Carrying capacity, acres per steer (including hay)	1.45	1.39	1.41	0.99	1.00	1.02

^{a, b} Means with the same superscript do not differ significantly ($P > .05$).

Results for the individual years are presented in Appendix 1. The last two winter periods are nearer what would be expected in a pasture wintering program. The short winter periods during the first 2 years represent only a portion of a normal winter.

There always appeared to be adequate forage available on the fescue treatments even during the most severe part of the winter. However, this forage apparently was tough and unpalatable, as the cattle showed very little interest in eating it. In contrast, the orchardgrass was grazed down as short as possible, and by the end of the winter the sod was in very poor condition due to the combination of close grazing and trampling. The severe winter treatment imposed on the orchardgrass probably played a large part in the subsequent encroachment of weeds on these treatments.

SUMMER GRAZING PERIOD. Steers grazing the orchardgrass-clover treatments, with and without nitrogen, gained significantly faster than those on comparable fescue treatments (Table 3). However, grazing days per acre were significantly higher for the fescue-clover with nitrogen than for the comparable orchardgrass treatment, so the estimated beef gain per acre was similar for these treatments. The fescue-clover treatment (No. 6) produced significantly less beef per acre than did the other treatments. On this treatment there were certain periods during the summer when, although there was ample grass available for extra steers, the steers made negative daily gains. After the decline of the clover in this treatment, the nutritive value and palatability of the fescue may have been so low that the steers did not receive adequate nutrition to support good gains.

WINTER AND SUMMER PERIODS COMBINED. When the results for the two grazing periods were averaged, some advantages for the fescue treatments in the winter and for the orchardgrass-clover treatments in the summer were evened out (Table 4). Even so, the daily gains of steers on the orchardgrass-clover treatments (2 & 3) were still significantly higher than those of steers on any of the other treatments. Differences between other treatments (1, 4, 5, & 6) for daily gain were not significant. The fescue treatments produced about 40% of their total yearly beef yield in the winter and 60% in the summer, while the orchardgrass treatments produced about 80% of their beef yield in the summer and only 20% in the winter (Fig. 1).

The fescue treatments produced 65 more grazing days per acre than were produced on the orchardgrass treatment during the winter and summer periods. Also, the fescue-clover with nitrogen (treatment 5) produced significantly more grazing days

Table 3. Summary of summer grazing period
Four-year average, 1956-1959

	Lot No. and treatment					
	1AB O+N	2AB O+L+N	3AB O+L	4AB F+N	5AB F+L+N	6AB F+L
No. of steers per year	4	4	4	4	4	4
Av. wt and gain per head, lb.						
Initial wt.	575	582	586	624	615	610
Final wt.	748	784	806	761	766	731
Total gain	173	202	220	137	151	126
Daily gain (test steers)	1.14 ^b	1.33 ^a	1.46 ^a	0.90 ^{bc}	0.99 ^{bc}	0.83 ^c
Productivity of pastures						
Grazing days per acre	164 ^{bc}	168 ^{bc}	147 ^c	198 ^a	205 ^a	184 ^{ab}
Est. beef gain per acre	207 ^a	232 ^a	229 ^a	205 ^a	215 ^a	150 ^b
Carrying capacity, acres per steer	0.93	0.90	1.04	0.76	0.75	0.82

^{a, b, c} Means with the same superscript letter do not differ significantly ($P > .05$).

Table 4. Combined summary of winter and summer periods
Average of 4 years, 1956-1959

	Lot No. and treatment					
	1AB O+N	2AB O+L+N	3AB O+L	4AB F+N	5AB F+L+N	6AB F+L
No. of steers per year	4	4	4	4	4	4
Av. wt. and gain per head, lb.						
Initial wt.	535	526	538	532	535	524
Final wt.	748	784	806	761	766	731
Total gain	213	258	268	229	231	207
Daily gain (test steers)	0.85 ^{bc}	1.06 ^a	1.08 ^a	0.93 ^{ab}	0.93 ^{ab}	0.85 ^{bc}
Av. animal grades ^d						
Initial feeder	11.6	11.6	12.1	11.7	12.0	11.7
Final slaughter	6.9 ^{ab}	7.3 ^{ab}	7.8 ^a	6.5 ^{bc}	7.1 ^{ab}	6.5 ^{bc}
Productivity of pastures						
Grazing days per acre	238 ^b	244 ^b	223 ^b	305 ^a	310 ^a	286 ^c
Est. beef gain per acre	221 ^a	276 ^a	265 ^a	300 ^a	294 ^a	238 ^a
Carrying capacity, acres per steer	1.09	1.05	1.14	0.87	0.83	0.89

^{a, b, c} Means with same superscript do not differ significantly ($P > .05$).

^d 7.0 = Standard; 10.0 = av. Good; 12.0 = low Choice.

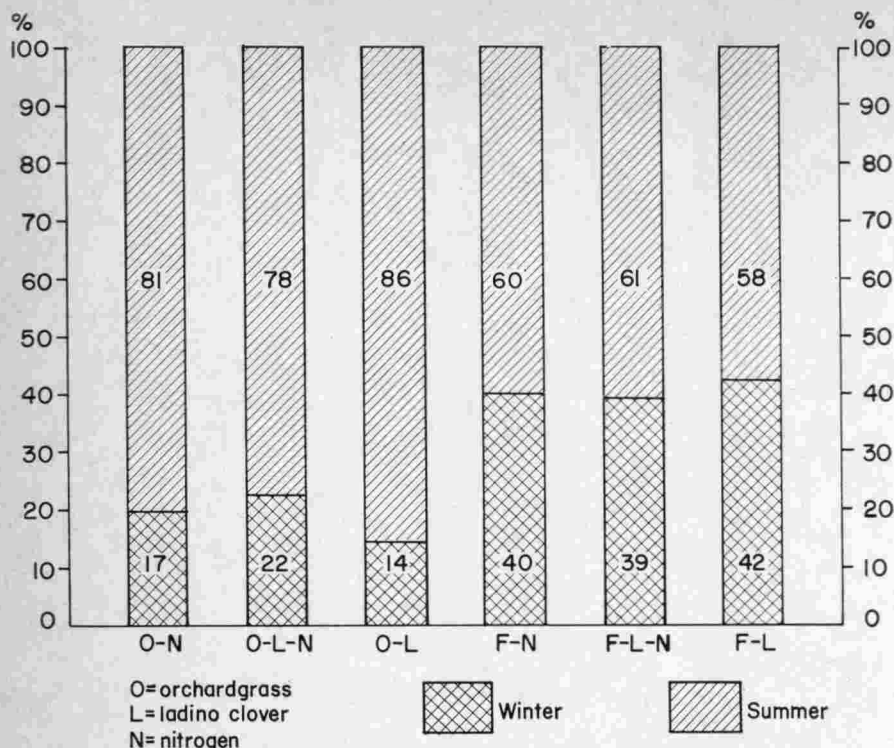


Figure 1. Relative proportions of average yearly total gains produced during winter and summer.

than the fescue-clover (treatment 6)—310 vs. 286 days. However the straight grass treatments (1 & 4) receiving 150 pounds of N per acre produced no more grazing days than the comparable grass-clover treatments (2 & 5) receiving 75 pounds of N per acre.

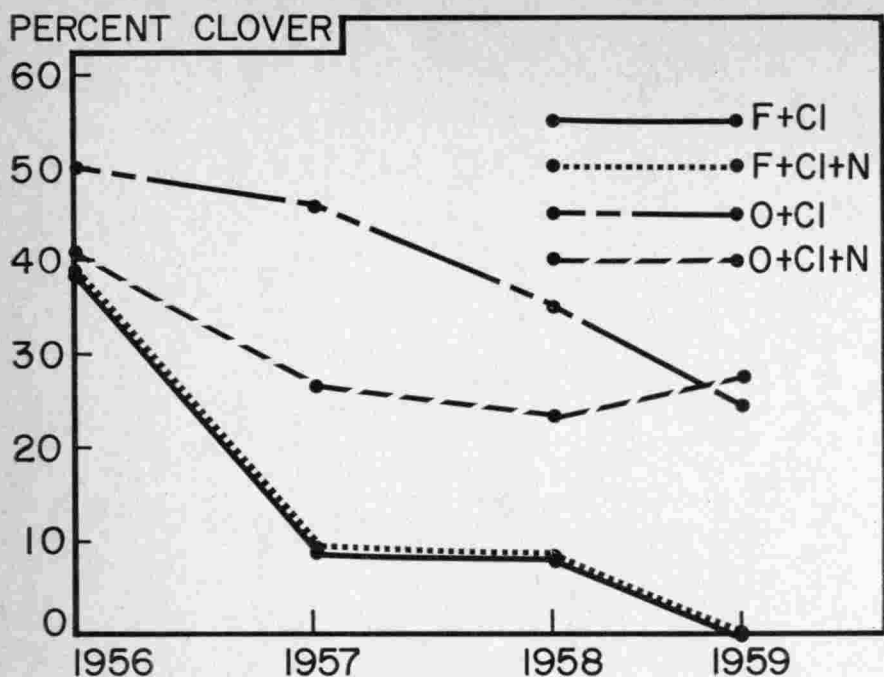
On a slaughter basis, at the end of the grazing season, the steers grazing the orchardgrass clover, or treatment 3, graded high-standard, and the steers grazing fescue and fescue-clover treatments (4 & 6) graded low-standard.

FINANCIAL RESULTS. The steers that had grazed the orchardgrass-ladino clover, treatment 3, were the only ones to show a positive return above pasture and hay costs, based on initial feeder value and slaughter value at the end of the pasture season (Table 5). The treatments receiving the highest rates of nitrogen fertilization showed the lowest returns. Dollar returns ranged from \$10.58 per head for steers grazing treatment 3 to —\$27.64 for steers grazing treatment 1. Returns would have been slightly higher had they been calculated on the final feeder value.

Table 5. Financial statement for pasture phase
Four-year average, 1956-1959

	Lot No. and treatment					
	1AB O+N	2AB O+L+N	3AB O+L	4AB F+N	5AB F+L+N	6AB F+L
	Dollars					
Animal values per cwt.						
Initial feeder value	23.88	23.88	23.88	23.88	23.88	23.88
Slaughter value, end of pasture season	18.66	18.84	19.38	18.34	18.72	18.59
Costs per head						
Pasture ^a	34.71	24.24	12.36	27.62	19.30	9.93
Hay on pasture	4.75	4.83	4.79	4.48	4.53	4.46
Total	39.46	29.07	17.15	32.10	23.83	14.39
Returns above costs						
Per steer	—27.64	—6.97	10.58	—19.57	—8.19	—3.63
Per acre	—25.43	—6.62	9.32	—22.51	—9.91	—4.07

^a Includes initial establishment cost (equally divided over 5 years), nitrogen fertilizer, and maintenance.



F=Fescue
 Cl=Clover
 N= Nitrogen
 O= Orchardgrass

Figure 2. Estimated percent of clover in pastures during 4 years after seeding.

CATTLE CONDITION. The cattle that had grazed the fescue pastures possessed rough haircoats and a generally unthrifty appearance as opposed to the sleek haircoats and healthy appearance of the steers that had grazed the orchardgrass pastures. During the winter of 1958-59, one steer grazing one of the no-nitrogen fescue-clover plots began losing weight at a rapid rate and became stiff in his movements and very emaciated. It appeared that this steer was not going to recover, and so he was removed from the test. The symptoms were similar to those described in the literature for "fescue toxicity." Although a positive diagnosis could not be made, the station veterinarian believed that the steer was suffering from "fescue toxicity."

Botanical Composition of Pastures

GRASS-LEGUME BALANCE. The pastures underwent considerable change in the relative proportions of the various species

that made up the total forage available during the 4 years of the experiment. During this period the ladino clover practically disappeared from the fescue-clover treatments (5 & 6), going from about 40% of the total composition in 1956 to less than 1% in 1959 (Table 6). In fact, after the first 2 years the clover was so scarce in these pastures that it was of little consequence in the total forage supply. Clover in the orchardgrass-clover treatments declined less than in the fescue-clover treatments. Initially the orchardgrass-clover treatments (2 & 3) consisted of 40-50% clover and about 20-25% remained at the end of 4 years.

CLOVER IMPORTANT. Clover seems to be very important from the standpoint of daily gains of the cattle. The orchardgrass-clover treatments (2 & 3), regardless of nitrogen fertilization, produced significantly higher daily gains than the orchardgrass treatment (No. 1). Similarly, steer gains were considerably higher on the fescue-clover treatments (5 & 6) during the first 2 years, than in the last 2 years after the clover had disappeared. (Appendixes 1, 2, & 3). The clover declined at a similar rate regardless of the nitrogen fertilization of the pastures.

Table 6. Estimated composition of grass-clover treatments by years, percent

Treatment & year	Species			
	O. grass	Fescue	Clover	Weeds
2. O.grass-cl.				
1956	48	0	50	2
1957	50	0	46	4
1958	60	0	36	4
1959	55	0	25	20
3. O.grass-cl.+N				
1956	57	0	42	1
1957	71	0	27	2
1958	74	0	24	2
1959	59	0	28	13
5. Fescue-cl.				
1956	0	58	40	2
1957	0	89	10	1
1958	0	91	8	1
1959	0	98	1	1
6. Fescue-cl.+N				
1956	0	56	42	2
1957	0	90	9	1
1958	0	91	8	1
1959	0	98	1	1



Figure 3. A good balance of grass and clover in a pasture mixture.

WEEDS. The encroachment of weeds became a serious problem in the orchardgrass pastures. Weeds of various kinds were estimated to make up 12-20% of the total composition of these treatments after 4 years. Possibly the severe winter grazing imposed on these pastures was largely responsible for this condition. Weeds were not a problem in the fescue pastures. This grass formed a very dense sod and the cattle did not graze it extremely close as they did the orchardgrass. This trait is one definite advantage that the fescue appeared to have over the orchardgrass.

DRY-LOT FINISHING PERIOD. These cattle were not carrying sufficient finish to make desirable slaughter animals at the end of the grazing season. A dry-lot feeding period of about 100 days was required for the cattle to reach the Good slaughter grade.

There was no apparent relationship between the performance of the cattle on pasture and their subsequent performance on feed (Table 7). Daily gains ranged from 2.23 to 2.49 pounds per head for the different groups as an average over the 4 years. However, there was considerable yearly variation in the feedlot performance of the cattle. In 1959, as an average of all treatments, cattle gained 3.25 pounds per head daily, whereas in 1958 the overall average daily gain was only 1.98 pounds per head (Appendix 4).

Net returns for the feedlot period were very good, ranging from \$33.31 to \$42.29 per head. This resulted in a total net return above costs for the entire experiment of \$13.12 (treatment 1) to \$50.75 (treatment 3) per head (Table 7).

Many who produce steers on grass sell them before they are finished sufficiently for slaughter cattle. Full-feed of a similar ration could increase profits from this type of cattle operation. More and more cattle feeders are realizing the value of these yearling steers off pasture, and are anxious to buy them at good prices from farmers not interested in feeding.

Table 7. Dry-lot feeding period, average 1956-1959

	Pasture number and treatment					
	1AB O+N	2AB O+L+N	3AB O+L	4AB F+N	5AB F+L+N	6AB F+L
Average wt. and gain per head, lb.:						
Initial wt.	748	784	806	761	766	731
Final wt.	1006	1026	1059	1020	998	964
Total gain	258	242	253	259	232	233
Daily gain ^a	2.48	2.33	2.43	2.49	2.23	2.24
Av. daily ration						
Concentrates	17.9	17.8	17.9	18.0	18.0	16.7
Hay	6.6	6.7	6.6	6.6	6.7	6.6
Av. feed per cwt. gain, lb.						
Concentrates	722	764	737	723	807	729
Hay	266	288	272	265	300	288
Total	988	1052	1009	988	1107	1017
Av. animal grades:						
Initial slaughter	Std.	Std.+	H.Std.	L.Std.+	Std.	L.Std.
Final slaughter	G.	G.	G.	G.	G.	L.G.
U.S.D.A. carcass	G.	G.	H.G.	G.	G.	L.G.
Financial returns (dollars)						
Initial value per cwt.	18.66	18.84	19.38	18.34	18.72	18.59
Final value per cwt.	23.53	23.43	23.84	23.38	23.38	22.98
Feed cost per head	56.37	55.81	56.10	56.62	56.62	52.19
Returns per head above costs	40.76	36.87	40.17	42.29	33.31	33.45
Return per head for combined pasture and feedlot period	13.12	29.90	50.75	22.72	25.12	29.82

^a Differences in daily gain were not significant ($P < .05$).

Appendix 1. Summary of individual winter periods

	Days in period	Average daily gain	Lb. hay per head
Treatment 1 (Orchardgrass + N)			
1956	56	1.21	0
1957	84	0.93	413
1958	141	0.08	432
1959	141	0.01	1052
Treatment 2 (Orchardgrass-Clover + N)			
1956	56	1.68	0
1957	84	1.14	389
1958	141	0.13	452
1959	141	0.14	1092
Treatment 3 (Orchardgrass-Clover)			
1956	56	1.37	0
1957	84	1.01	407
1958	141	0.18	482
1959	141	0.02	1029
Treatment 4 (Fescue + N)			
1956	56	1.75	0
1957	84	1.71	401
1958	141	0.30	487
1959	141	0.58	905
Treatment 5 (Fescue-Clover + N)			
1956	56	1.70	0
1957	84	1.44	412
1958	141	0.21	445
1959	141	0.52	954
Treatment 6 (Fescue-Clover)			
1956	56	1.80	0
1957	84	1.62	402
1958	141	0.32	463
1959	141	0.44	918

Appendix 2. Summary of individual summer periods

	Days in period	Average daily gain	Average final weight	Final ^a condition grade	Grazing days per acre
Treatment 1	(Orchardgrass + N)				
1956	156	1.07	854	10.0	147
1957	154	1.10	706	4.7	187
1958	156	1.11	739	6.4	180
1959	140	1.30	692	6.5	142
Treatment 2	(Orchardgrass-Clover + N)				
1956	156	1.44	938	10.5	165
1957	154	1.21	740	5.5	172
1958	156	1.09	712	5.8	197
1959	140	1.60	746	7.2	137
Treatment 3	(Orchardgrass-Clover)				
1956	156	1.33	911	10.5	161
1957	154	1.41	755	7.0	176
1958	156	1.43	802	6.3	148
1959	140	1.67	757	7.2	102
Treatment 4	(Fescue + N)				
1956	156	1.03	875	10.0	176
1957	154	1.01	749	6.0	212
1958	156	0.69	698	4.9	202
1959	140	0.89	721	5.1	204
Treatment 5	(Fescue-Clover + N)				
1956	156	1.18	898	10.0	189
1957	154	0.88	706	5.7	230
1958	156	1.03	748	6.4	203
1959	140	0.88	710	6.4	197
Treatment 6	(Fescue-Clover)				
1956	156	1.15	893	10.5	164
1957	154	0.82	715	5.0	224
1958	156	0.72	679	5.0	181
1959	140	0.62	638	5.4	168

* 5.0 = high Utility; 7.0 = high Standard; 11.0 = high Good.

Appendix 3. Summary of combined winter and summer, individual years

	Days in Period	Av. initial wt.	Av. final wt.	Av. daily gain	Final value per cwt.	Grazing ^a days per acre
Treatment 1 (Orchardgrass + N)						
1956	212	619	854	1.10	18.50	184
1957	238	458	706	1.04	14.50	245
1958	297	555	739	0.62	18.50	286
1959	281	508	692	0.65	23.13	236
Treatment 2 (Orchardgrass-Clover + N)						
1956	212	619	938	1.50	19.37	202
1957	238	458	740	1.19	14.62	240
1958	297	524	712	0.63	18.62	303
1959	281	501	746	0.90	22.75	231
Treatment 3 (Orchardgrass-Clover)						
1956	212	626	911	1.37	18.50	198
1957	238	452	755	1.27	17.00	234
1958	297	554	802	0.84	19.00	264
1959	281	521	757	0.84	23.00	196
Treatment 4 (Fescue + N)						
1956	212	616	875	1.22	17.75	227
1957	238	450	749	1.26	16.00	310
1958	297	549	698	0.50	17.62	370
1959	281	514	721	0.74	22.00	312
Treatment 5 (Fescue-Clover + N)						
1956	212	619	898	1.31	18.62	240
1957	238	450	706	1.08	15.62	330
1958	297	558	748	0.64	18.38	368
1959	281	513	710	0.70	22.25	301
Treatment 6 (Fescue-Clover)						
1956	212	613	893	1.32	19.50	213
1957	238	452	715	1.10	14.87	324
1958	297	522	679	0.53	18.00	338
1959	281	489	638	0.52	22.00	269

^a Included period during winter when hay was being fed.

Appendix 4. Summary of individual dry-lot periods

	Days on feed	Average final weight	Average daily gain	Final ^a condition grade	Final ^a carcass grade	Feed cost per cwt. gain	Final value per cwt.
Treatment 1 (Orchardgrass + N)							
1956	84	1060	2.45	10.0	11.5	\$21.29	\$21.75
1957	122	980	2.25	9.6	9.2	23.75	22.50
1958	123	1014	2.24	10.3	11.5	23.78	25.38
1959	86	969	3.22	9.2	8.5	18.29	24.50
Treatment 2 (Orchardgrass-Clover + N)							
1956	84	1136	2.36	10.5	11.5	\$23.59	\$21.75
1957	122	1026	2.35	10.8	9.7	22.54	23.00
1958	123	931	1.77	9.2	10.0	27.88	24.50
1959	86	1013	3.10	9.8	8.8	19.23	24.50
Treatment 3 (Orchardgrass-Clover)							
1956	84	1121	2.51	10.5	12.0	\$21.74	\$21.75
1957	122	1043	2.36	11.6	11.0	22.60	24.00
1958	123	1044	1.97	10.1	10.7	25.83	25.13
1959	86	1027	3.14	9.6	8.8	18.95	24.50
Treatment 4 (Fescue + N)							
1956	84	1058	2.18	10.0	11.5	\$25.52	\$21.75
1957	122	1031	2.31	11.0	10.0	23.23	23.00
1958	123	956	2.10	9.4	9.2	24.55	24.25
1959	86	1034	3.64	8.6	8.5	16.27	24.50
Treatment 5 (Fescue-Clover + N)							
1956	84	1071	2.05	10.0	12.0	\$27.04	\$21.75
1957	122	965	2.12	10.5	8.5	23.96	22.00
1958	123	967	1.78	10.5	11.0	30.30	25.25
1959	86	990	3.25	9.2	8.2	18.38	24.50
Treatment 6 (Fescue-Clover)							
1956	84	1116	2.65	10.5	12.0	\$20.98	\$21.75
1957	122	924	1.71	9.1	8.5	27.12	22.00
1958	123	905	2.02	8.6	8.0	21.98	23.67
1959	86	909	3.15	8.6	8.5	18.73	24.50

^a 9.0 = low Good; 10.0 = av. Good; 11.0 = high Good; 12.0 = low Choice.

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