

1970

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F.G. Clary

B.E. Brent

D. Richardson

See next page for additional authors

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Recommended Citation

Clary, F.G.; Brent, B.E.; Richardson, D.; Erhart, A.B.; Banbury, Evans E.; and Boren, Fred W. (1970) "Nutritive value of forages as affected by soil and climatic differences," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 1. <https://doi.org/10.4148/2378-5977.2876>

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Nutritive value of forages as affected by soil and climatic differences

Abstract

Effects of environment on the performance of beef steers in Kansas have been studied since 1962. The experiments, in three phases, have included seven feedlot trials and one digestion trial.

Keywords

Cattlemen's Day, 1970; Report of progress (Kansas State University. Agricultural Experiment Station); 536; Beef; Nutritive value; Soil; Climate

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Authors

F.G. Clary, B.E. Brent, D. Richardson, A.B. Erhart, Evans E. Banbury, and Fred W. Boren

Nutritive Value of Forages as Affected by
Soil and Climatic Differences (Project 430)
Seven-year Summary

F.G. Clary, B.E. Brent, D. Richardson, A.B. Erhart,
E.E. Banbury, F.W. Boren

Effects of environment on the performance of beef steers in Kansas have been studied since 1962. The experiments, in three phases, have included seven feedlot trials and one digestion trial.

Phase 1

Four feedlot trials comparing wintering, finishing, and overall performance of steers fed at Colby, Garden City, Manhattan and Southeastern Kansas (Mound Valley) Experiment Stations were reported in the 51st, 52nd, 53rd, and 54th Live-Stock Feeder's Day Reports. Wintering gains at Mound Valley were significantly ($P < .05$) greater than those at Colby. During the finishing period, cattle at Garden City outgained ($P < .05$) those at Manhattan and Mound Valley. Total gains, (wintering plus finishing) were greater at Garden City ($P < .05$) than at Manhattan and Mound Valley.

Phase 2

In the first phase of the study, ration ingredients were produced at each station but all cattle were from a common source. In the second phase, all feed was grown and processed at the Garden City Experiment Station, so observed differences should result from factors associated with location alone, not from feed. The 55th and 56th Livestock Feeder's Day Reports carried the results. When the feedlot data for both trials were combined, wintering gains were highest at Colby and lowest at Mound Valley. Highest finishing gains were at Manhattan, lowest at Colby. The differences approached statistical significance. Wintering plus finishing differences among locations were not significant.

Phase 3

Recent experiments compared the feeding value of a single variety of sorghum grain produced in the area of each station, randomly assigned and self-fed. Sorghum silage was produced at Manhattan. The rations were made isonitrogenous with a urea premix (table 1). Feedlot and carcass data are shown in table 2. Because of animal variability, neither total gains nor carcass traits differed significantly.

The apparent digestibility of the four rations was determined in a digestion trial using eight crossbred western lambs. Results of the digestion trial are shown in table 3. Since lambs received only the concentrate portion of the ration, digestion coefficients are quite high. The digestibility of ether extract and crude fiber was significantly ($P < .05$) higher for Colby grains than for Mound Valley grains. Other coefficients were similar.

Table 1. Composition of Premix Used at Indicated Experiment Stations

Origin of grain	Colby	Garden City	Manhattan	Mound Valley
Ground sorghum grain, lbs.*	64.0 lb.	78.0 lb.	78.0 lb.	72.0
Urea (45% N)*	20.0	6.0	6.0	12.0
Ground limestone, lbs.	15.0	15.0	15.0	15.0
Vitamin A (10,000 IU, gm.	150.0	150.0	150.0	150.0
Aurofac-10, gm.	380.0	380.0	380.0	380.0

* Varied to make all rations isonitrogenous; premix at 100 lbs./ton of grain.

Table 2. Feedlot Results from Phase 3 Trials
 Dec. 21, 1968, to April 24, 1969--126 Days

Origin of grain	Colby	Garden City	Manhattan	Mound Valley
Steers per lot	10	10	10	10
Av. initial wt., lb.	793	777	787	775
Av. final wt., lb.	1082	1060	1059	1038
Av. total gain, lb.	289	283	272	263
Av. daily gain, lb.	2.30	2.24	2.16	2.08
Feed per lb. gain				
Sorghum silage	3.3	3.3	3.3	3.3
sorghum grain	14.5	16.5	17.0	16.3
Av. hot carcass wt., lb.	647	638	627.	618
Dressing %, based on Feedlot wt.	59.8	60.5	59.4	59.7
Fat thickness, 12th rib, in.	.4	.4	.4	.4
Rib eye area, sq. in.	11.26	11.50	11.49	11.06
Av. yield grade	2.7	2.7	2.6	2.5
Av. carcass grade				
Av. choice	-	1	-	-
Low choice	3	3	1	1
High good	7	6	8	8
Av. good	-	-	1	1
Low good	-	-	-	-

Table 3. Digestion Coefficients (means) for Sorghum Grains Used (all-concentrate diet)

Origin of grain	Colby	Garden City	Manhattan	Mound Valley
Dry matter	95.01	92.97	93.09	92.31
Gross energy	94.43	92.15	91.84	91.25
Crude protein	88.29	84.32	84.00	85.18
Ether extract*	89.37 ^a	84.72 ^{ab}	86.25 ^{ab}	80.95 ^b
Crude fiber*	82.95 ^a	69.94 ^{ab}	71.20 ^{ab}	62.32 ^b
Nitrogen free extract	97.59	96.44	96.60	96.04
Total digestible nutrients	97.27	94.83	96.06	94.78

*Means with unlike superscripts differ significantly (P<.05).