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Nutritive value of forages as affected by soil and climatic differences

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

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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).