

RUMINORETICULAR FILL AND TURNOVER AND TOTAL FECAL OUTPUT IN PREGNANT AND LACTATING COWS FED SUPPLEMENTAL FEEDS ON RANGELAND

J. E. Huston

Texas Agricultural Experiment Station
A&M University, San Angelo, 76901, USA

Introduction

Beef cattle grazing on rangelands are typically fed concentrates to supply nutrients such as phosphorus and protein that are inherently low in dormant range vegetation. The energy contribution from these supplements can be additive or substitutive depending on the forage on offer and the energy content of the concentrate (Huston et al., 1988). A study was conducted to determine the effect of various supplemental feeds on ruminoreticular fill and digesta turnover and total fecal output in cattle grazing dormant range vegetation.

Materials and Methods

Thirty-four adult cows, Hereford X Brangus, were assigned randomly to five experimental groups for applying treatments during two experimental periods (table 1).

Feeds were formulated by blending sorghum grain, cottonseed meal, molasses and mono-dicalcium phosphate in the appropriate proportions. Feeding was on an individual cow basis according to body weight and was accomplished by use of Calan feeding gates that were accessible to the

free-grazing cows.

Measurements were accomplished by applying the pulse dose of the marker ytterbium (Yb) according to Ellis et al. (1984) during pregnancy (period 1) and lactation (period 2) in a winter dormancy season. Fill, turnover and fecal output were estimated using the single compartmental model.

Results

Cattle in the lactating phase had a greater fill, turnover rate and fecal output compared with pregnant cows (table 2). Supplemental phosphorus had no statistically detectable effect on any parameter for either pregnant or lactating cows. However, there was a trend (N.S.) for cows fed supplemental phosphorus to have a lower fill and faster turnover rate. Supplements containing protein and two levels of energy appeared to increase fill in the pregnant ($p < .10$) and lactating ($p < .15$) cows. The higher energy supplement had a greater positive influence on fill compared with the lower energy supplement ($p < .15$). The supplements had no statistically detectable effects on fecal output from forage, therefore, were additive not substitutive.

Discussion

Supplemental feed affects cattle grazing rangeland by both contributing directly to nutrient needs and influencing forage intake. At low forage quality, supplemental feed stimulates forage intake and at high forage quality forage consumption is reduced by feeding concentrates (Huston et al., 1988). Although these data show the expected increase in intake associated with onset of lactation, only small effects of supplemental feeding are apparent, mainly on increasing fill. It is suggested that the major role of supplemental feed for cattle grazing forages that are neither extremely

TABLE 1. FEED AMOUNTS AND NUTRIENTS SUPPLIED TO FOUR GROUPS OF CATTLE ON RANGELAND

| Group | Amount/kg ^{.75} /d | | | |
|-------|-----------------------------|-------|--------|-----------|
| | Feed (g) | P (g) | CP (g) | DE (Kcal) |
| 1 | 0 | 0 | 0 | 0 |
| 2 | 3 | 0.1 | < 1 | < 10 |
| 3 | 13 | 0.1 | 3 | 41 |
| 4 | 18 | 0.1 | 3 | 61 |

TABLE 2. GASTROINTESTINAL DYNAMICS IN COWS FED DIFFERENT LEVELS OF SUPPLEMENTAL FEEDS ON RANGELAND⁶

| Period | Group | No. Cows | Fill ^b kg | TR ^c %/h | FO ^d g/MW | For FO ^e g/MW |
|-------------|-------|----------|-------------------------|------------------------|-------------------------|-----------------------------|
| 1 | 1 | 5 | 3.32 | .040 | 31.8 | 31.8 |
| | 2 | 5 | 2.91 | .048 | 31.1 | 30.2 |
| | 3 | 3 | 3.55 | .041 | 34.0 | 30.7 |
| | 4 | 5 | 4.04 | .044 | 38.5 | 34.5 |
| Period Mean | | | 3.46 | .043 | 33.8 | 31.8 |
| 2 | 1 | 3 | 3.89 | .051 | 45.4 | 45.4 |
| | 2 | 5 | 3.68 | .056 | 46.4 | 43.5 |
| | 3 | 5 | 3.96 | .053 | 47.6 | 44.4 |
| | 4 | 3 | 4.80 | .050 | 53.7 | 49.7 |
| Period Mean | | | 4.08 | .053 | 48.3 | 45.8 |

^aStatistical inferences:

| Comparison | Fill | TR | FO | For FO |
|-----------------|---------|---------|---------|---------|
| Period 1 vs 2 | p < .05 | p < .01 | p < .01 | p < .01 |
| Period 1 | | | | |
| 1 vs 2, 3 and 4 | N.S. | N.S. | N.S. | N.S. |
| 2 vs 3 and 4 | p < .10 | p < .20 | N.S. | N.S. |
| 3 vs 4 | N.S. | N.S. | N.S. | N.S. |
| Period 2 | | | | |
| 1 vs 2, 3 and 4 | N.S. | N.S. | N.S. | N.S. |
| 2 vs 3 and 4 | p < .15 | N.S. | N.S. | N.S. |
| 3 vs 4 | p < .15 | N.S. | N.S. | N.S. |

^bWhole-tract digesta dry matter that is subsequently excreted.

^cTurnover rate, percent of fill per hour.

^dTotal fecal output per twenty-four hours.

^eFecal output from forage per twenty-four hours.

low nor high in required nutrients is the supply of nutrients to meet requirements. These data suggest that the supplemental feeds were neither stimulatory nor substitutive but additive.

(Key Words: Fill, Turnover, Supplemental Feeding)

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