

# Interactions between the stage of maturity of *Eragrostis tef* hay and supplemental energy source on forage utilization in beef heifers

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## Introduction

- The changes in the nutritive value of teff (*Eragrostis tef* cv. Moxie) grass with advancing maturity could necessitate supplementation to enhance animal performance.
- Compared to beet pulp (BP), the use of corn grain as an energy supplement could result in acidosis and compromise digestive function.
- Thus, the objective was to evaluate the interaction between the stage of maturity of *Eragrostis tef* (teff) grass and supplemental energy source on ruminal fermentation characteristics, apparent total tract nutrient digestibility, and nitrogen (N) utilization.

## Material and Methods

- 6 ruminally-fistulated beef heifers were used in a 3 × 3 split-plot design (21 d periods).
- The whole plot factor was stage of maturity of teff hay (early- [EH] or late-heading [LH]), and the subplot factor was supplemental energy source (no supplement [Control], beet pulp pellet [BP]) or rolled corn grain [CG]) (Table 1) fed at 0.5% of body weight.
- Indwelling pH loggers were used to measure ruminal pH (d 15 to 21) and ruminal fluid was collected from d 19 to 21 to determine fermentation characteristics, as were feces and urine to measure nutrient excretion and digestibility.

**Table 1.** Dietary and ingredient composition of experimental diets

Item	EH hay	LH hay	BP	CG
Chemical composition				
DM, %	89.1	84.7	91.8	86.5
NDF, % of DM	62.6	61.3	45.3	9.60
CP, % of DM	14.7	11.9	6.90	8.60

## Results

**Table 2.** Nutrient intake and apparent total tract digestion, ruminal fermentation characteristics, and nitrogen utilization for beef heifers fed either early heading (EH) or late heading (LH) teff hay and provided with no supplement (control), supplemental beet pulp (BP), or supplemental corn grain (CG).

Item	Harvest maturity			Energy supplement				P-value		
	EH	LH	SEM	Control	BP	CG	SEM	HM	SP	HM × SP
DMI, kg/d	12.2	11.3	0.37	9.8 <sup>a</sup>	12.6 <sup>b</sup>	12.8 <sup>b</sup>	0.45	0.09	<0.01	0.89
Ruminal SCFA, mmol/L	80.1	75.7	2.15	77.3	77.9	78.4	2.42	0.22	0.94	0.75
Ruminal pH										
Duration ≤ 6.2	319	295	96.2	146	239	537	106.2	0.87	0.07	0.41
Area pH ≤ 6.2	57.2	89.3	27.2	23.1	50.0	147.0	33.32	0.44	0.08	0.18
Apparent total tract digestibility										
DM, % of intake	55.2 <sup>x</sup>	43.1 <sup>y</sup>	3.00	42.6	52.8	52.1	3.67	<0.01	0.10	0.84
NDF, % of intake	60.2 <sup>x</sup>	48.8 <sup>y</sup>	2.50	54.6	56.5	52.4	3.06	<0.01	0.60	0.90
Measures of nitrogen utilization										
N intake, g/d	249 <sup>x</sup>	212 <sup>y</sup>	7.5	211 <sup>a</sup>	232 <sup>ab</sup>	249 <sup>b</sup>	9.2	<0.01	0.048	0.90
Rumen NH <sub>3</sub> -N, mg/dL	10.0	8.0	0.82	9.21	9.67	8.16	1.000	0.096	0.56	0.87
Microbial N, g/d	117 <sup>x</sup>	53.1 <sup>y</sup>	10.9	86.7	77.2	91.6	13.3	<0.01	0.76	0.29
Urine N excretion, % of N intake	71.8	71.7	7.94	86.0	71.7	57.6	10.7	0.99	0.18	0.51
Urine urea-N, % of total urine N	66.7	62.1	1.91	64.6	64.2	64.5	2.34	0.13	0.99	0.93
Fecal N excretion, % of N intake	41.3 <sup>x</sup>	55.8 <sup>y</sup>	3.29	48.0	46.6	51.0	4.03	0.01	0.77	0.94
Apparent N retention, g/d	-31.9	-50.5	20.3	-67.2	-38.9	-17.3	24.8	0.54	0.42	0.67

## Summary

- Feeding teff hay harvested at the EH than LH stage of maturity increased DM and N intake, apparent total tract DM and NDF digestibility, and microbial N supply, whereas feeding corn and BP as energy supplements increased DM and N intake, and apparent total tract DM digestibility.
- Although there was no supplement effect on N utilization, feeding supplemental corn grain compared to CON and beet pulp resulted in a tendency for a greater duration and area pH < 6.2, but this did not compromise apparent total tract fiber digestion.