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Animal Production Science

Supplementary Material

Grazing beef cows identified as efficient using a nutrition model partition more energy to lactation

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Supplemental Data

Evaluation of a nutrition model to identify biologically efficient beef cows in a grazing production system

Table S1 Summary statistics of original performance and efficiency traits of cows and calves (N = 63) in Production Cycle 2

Trait[A]	Original data Mean	SD	Adjusted data Mean	SD
Cow LW, kg	492.6	53.0	499.1	49.0
Cow BCS1	4.79	0.61	5.00	--
Cow BCS2	5.22	0.68	5.22	0.68
Cow BCS3	5.12	0.99	5.12	0.99
Calving interval, d	369.3	21.5	369.3	21.5
Milk yield, kg/d[B]	3.86	1.32	3.86	1.32
Calf BW, kg	33.8	5.1	35.2	5.0
Calf WW, kg	240	39.8	261.6	33.8
Wean age, d	244.3	29.7	250	--
PKM, kg/d	5.02	1.03	5.56	1.02
MER, Mcal	7456	612	7514	558
EEI, Mcal/kg	31.96	6.71	29.14	3.98
WR, kg/kg	0.490	0.081	0.528	0.079

[A] LW = live body weight at pregnancy check; BCS1= body condition score at pregnancy check in June; BCS2 = body condition score at calving in the fall; BCS3 = body condition score in March; BW = birth weight; WW = weaning weight; PKM = model-predicted peak milk yield; MER = metabolizable energy required by the cow; EEI = energy efficiency index; WR = ratio of calf WW to cow LW.

[B] Observed energy-corrected milk yield measured on 30 randomly selected cows by weigh-suckle-weigh technique at 58, 87, and 136 (± 21) days in milk

Table S2 Pearson correlation coefficients of observed milk yield measured in Production Cycle 2 (N = 30)with performance and efficiency traits for cows in Production Cycle 1 and 2

Trait[A]	Cycle 1	Cycle 2
Original Data		
Cow LW	0.04	0.18
Calf WW	0.14	0.22
PKM	0.25	0.25
MER	0.09	0.24
EEI	-0.12	-0.11
WR	0.12	0.09
Adjusted Data		
Cow LW	-0.03	0.04
Calf WW	0.37*	0.36*
PKM	0.37*	0.34
MER	0.08	0.29
EEI	-0.35*	-0.22
WR	0.31	0.29

[A] LW = live body weight at pregnancy determination; WW = weaning weight; PKM = model predicted peak milk; MER = metabolizable energy required by the cow; EEI = energy efficiency index; WR = ratio of calf WW to cow LW.

* Correlations are different from zero at $P<0.05$.

Table S3 Pearson correlation coefficients for original performance and efficiency traits for cows betweenProduction Cycle 1 and 2

Trait[A]	Correlation
Cow LW	0.91*
Calf WW	0.43*
PKM	0.32*
MER	0.73*
EEI	0.42*
WR	0.48*

[A] LW = live body weight at pregnancy determination; WW = weaning weight; PKM = model predicted peak milk; MER = metabolizable energy required by the cow; EEI = energy efficiency index; WR = ratio of calf WW to cow LW.

* Correlations are different from zero at $P<0.05$.

Table S4 Apparent nutrient digestibility in Brangus crossbred cows classified as low or high EEI fed *ad-libitum* during the late lactation metabolism experiment in Production Cycle 2

Trait[A]	Low EEI	High EEI	SEM	*P*-value
No. of cows	8	8	--	--
Metabolic BW, kg of $BW^{0.75}$	88.4	97.1	2.9	0.05
DMI, kg/d	11.24	11.20	0.81	0.97
Fecal output, kg DM/d	6.28	6.02	0.41	0.66
	Apparent digestibility (%)			
DM	43.91	46.06	0.83	0.03
OM	44.53	47.12	0.88	0.01
CP	50.87	52.19	1.28	0.44
EE	46.09	45.74	2.00	0.90
aNDF	46.24	47.60	1.92	0.21
ADF	33.03	35.37	2.15	0.33

[A] DMI = dry matter intake; DM = dry matter; OM = organic matter; CP = crude protein; EE = ether extract; aNDF = neutral detergent fiber with amylase; ADF = acid detergent fiber.

Table S5 Apparent nutrient digestibility in Brangus crossbred cows classified as low or high energy efficiency index(EEI) fed *ad-libitum* during the late gestation metabolism experiment following Production Cycle 2

Trait[A]	Low EEI	High EEI	SEM	*P*-value
No. of cows	8	8		
Metabolic BW, kg of BW $^{0.75}$	97.8	104.9	2.4	0.06
DMI, kg/d	10.83	10.77	0.89	0.96
Fecal output, kg DM/d	4.31	4.26	0.37	0.92
	Apparent digestibility (%)			
DM	60.25	60.54	0.32	0.54
OM	60.75	61.13	0.30	0.40
CP	61.80	61.68	0.50	0.83
EE	76.91	76.09	0.94	0.55
aNDF	60.54	61.04	0.45	0.40
ADF	61.75	62.27	0.90	0.44

[A] DMI = dry matter intake; DM =dry matter; OM = organic matter; CP = crude protein; EE = ether extract; aNDF = neutral detergent fiber with amylase; ADF = acid detergent fiber.

DISCUSSION OF DIGESTIBILITY DATA

Cows identified as low EEI (more efficient) had lesser apparent DM and OM digestibility than cows identified as high EEI (less efficient), likely due to the overall low digestibility of the hay used during the late lactation metabolism experiment (Table S4). The greater DMI per unit of BW for low than high EEI cows likely also contributed (2.85 vs. 2.51 % BW, respectively). In contrast to the late lactation experiment, cows identified as low EEI had similar apparent DM and OM digestibility during the late gestation metabolism experiment as cows identified as high EEI (Table S5), even though cows with low EEI consumed 2.40% of BW compared with 2.17% of BW for cows with high EEI. The overall greater digestibility of the hay used in the late gestation metabolism experiment is likely the reason for the lack of differences between cows with low and high EEI. Thus, the overall digestibility of the forage consumed may influence whether cows can maintain their efficiency ranking.