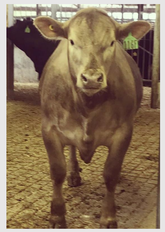

Effects of feeding methionine during late gestation on progeny performance, feed efficiency, and carcass quality for feedlot steers in an industry applied setting

K. Acton[1], I. B. Mandell[1], L. Huber[1], M. A. Steele[1], and K. M. Wood[1]

[1]*Department of Animal Biosciences, University of Guelph, Guelph, ON, Canada*

PSIX-5

BACKGROUND

- **Fetal programming** is the theory that environmental factors during pregnancy can influence the developing fetus, which affects postnatal growth and development of progeny. [1] Maternal nutrition can enhance beef calf health, growth, and carcass characteristics[2]
- **Methionine** is a limiting amino acid in beef cattle, during pregnancy cows have increased requirements to support the developing fetus[3]
- Few studies have considered the effects of maternal methionine supplementation on progeny performance in the feedlot
- To evaluate if controlled developmental programming is effective on farm, more highly applied research is needed to confirm control fetal programming experiments

HYPOTHESIS

It was hypothesized that offspring from cows supplemented with methionine during pregnancy in an industry applied setting would have improved growth performance and carcass quality.

OBJECTIVE

- Assess how maternal methionine supplementation in an applied setting impacts steer progeny growth and feed efficiency in the feedlot, and carcass characteristics

MATERNAL METHODOLOGY

- 67 Angus cross cows randomly assigned to dietary treatments where cows received once daily in a bunk, 0.75 kg/cow/d of pellet that supplied 10 g/d of rumen-protected methionine (**MET**; Smartamine); or a similar pellet without additional methionine (**No MET**).
- Cows were fed over the last eight weeks of gestation, and had ad libitum access to hay from a round bale feeder and water.
- After parturition, calves were raised as a group until weaning
- After weaning, 34 (control n=16; methionine n=18) steer progeny transported to the feedlot facility to complete the trial

STEER PROGENY METHODOLOGY

- Steers were randomly assigned to a pen and fed corn-silage based grower for 29 days and high moisture corn-based finisher ration for 125 days until slaughter. Feed intake was recorded using the Insentec feed system.
- Body weight measured every 14 days, and blood samples were collected 3 days before slaughter. Residual feed intake was calculated according to Koch et al. (1963).
- Steers were slaughtered at the University of Guelph meat lab. Carcasses graded by certified grader, then an 8th to 12th rib dissection was conducted to assess lean, fat, and bone yield, and steaks were used for meat quality analysis
- Data were analyzed with PROC GLIMMIX in SAS (SAS Institute Inc. Cary, NC). Steer data analyzed as a randomized complete block design; with steer as the experimental unit, pen as the random effect, and maternal methionine supplementation as fixed effect. Age at weaning was used as a covariate for body weights. Results declared significant at $P \leq 0.05$.

RESULTS

Table 1: Impact of maternal supplementation of 10 g/d rumen-protected methionine during late-gestation on steer progeny growth performance

	No MET	MET	SEM	*P*-value
Weaning weight, kg	285 [b]	314 [a]	14.2	0.004
Initial body weight, kg	317 [b]	353 [a]	14.7	0.003
End of grower body weight, kg	374 [b]	407 [a]	15.6	0.016
End of transition body weight, kg	403 [b]	437 [a]	16.5	0.017
Slaughter body weight, kg	627	674	20.7	0.104
Hot carcass weight (HCW), kg	348	377	11.6	0.061
Days on feed, d	163	158	6	0.130
Average daily gain (ADG), kg/d	1.97	2.11	0.090	0.166
Dry matter intake (DMI), kg/d	11.8 [b]	12.6 [a]	0.42	0.044
Feed to gain ratio	6.20	5.99	0.165	0.357
Residual feed intake (RFI)[5]	0.046	- 0.041	0.1114	0.573

RESULTS

- Steer progeny from MET cows had consistently heavier body weight from the time of weaning and throughout the experimental period ($P \leq 0.017$; Table 1)
- Average daily gain was similar, however MET progeny had higher dry matter intake ($P = 0.044$; Table 1), though feed conversion ratio and residual feed intake did not differ ($P \geq 0.36$)
- Maternal supplementation had no effect on circulating blood metabolites (BHBA, cholesterol, glucose, insulin, NEFA, total protein, urea) ($P \geq 0.22$; data not shown)
- Liver, pancreas or kidney weights (actual and relative to body weight and HCW) did not differ with maternal methionine supplementation ($P \geq 0.06$; data not shown)
- Similarly, maternal dietary treatment did not impact carcass characteristics including grade fat, rib eye area, and lean yield, or meat quality assessment of steak pH, colour saturation, and colour descriptor ($P \geq 0.38$; data not shown) for steer progeny

CONCLUSIONS

The results of this experiment suggest that in an industry applied setting, supplementation of rumen-protected methionine during late-gestation increased dry matter intake and body weight at weaning and throughout the finishing period without impacting carcass quality of steer progeny in the feedlot.

REFERENCES

1. Taylor et al., 2016. Prof. Anim. Sci. 32:389–399.
2. Funston et al., 2010. J. Anim. Sci. 88:E205–E215.
3. Bach et al., 2000. J. Anim. Sci. 78:742–749.
4. NRC 2016. Nutrient requirements of beef cattle. National Academy Press, Washington, DC
5. Koch et al., 1963. J. Anim. Sci. 22(2):486-494.

Kortney Acton

acton@uoguelph.ca

University of Guelph
Department of Animal Biosciences
NSERC CRSNG
Beef Farmers of Ontario
Agriculture and Agri-Food Canada
Agriculture et Agroalimentaire Canada