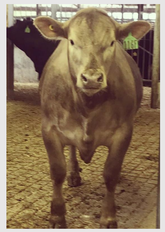
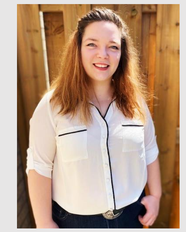


Maternal protein and/or rumen-protected methionine supplementation effects on progeny performance, feed efficiency, and carcass quality for feedlot steers

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-4



BACKGROUND

- How environmental stimuli impacts a developing fetus during pregnancy is referred to as **fetal programming** and has been shown to influence growth potential, carcass yield and carcass quality of beef steer progeny[1,2]
- Supplementation of **protein** during late gestation can be beneficial as it improves cow performance after parturition and improves carcass characteristics of steer progeny[1]
- **Methionine** supplementation improves cow performance[3],impacts on steer progeny performance is unknown

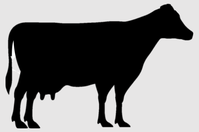
HYPOTHESIS

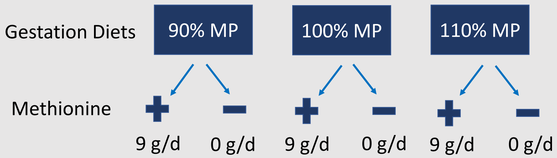
It was hypothesized that offspring from cows supplemented with protein and methionine during the last eight weeks of gestation would have improved growth performance in the feedlot and enhanced carcass characteristics.

OBJECTIVE

- Evaluate how maternal supplementation of protein and rumen-protected methionine during late gestation impacts steer progeny performance and carcass quality

MATERNAL METHODOLOGY





- 138 Angus cross cows blocked by calving date and randomly assigned to one of three protein treatments (feeding to meet 90%, 100%, or 110% metabolizable protein (MP) requirements[4])
- Half of each group top-dressed a straw and haylage TRM with pellets supplying 9 g/d of rumen-protected methionine (**MET**; Smartamine). Diets were isocaloric through the addition of palm fat and fed for the last 8 weeks of gestation

STEER PROGENY METHODOLOGY

- After weaning, 56 (90% MET n=12; 90% no MET n=14; 100% MET n=9; 100% no MET n=7; 110% MET n=9; 110% no MET n=5) steer progeny were transported to the feedlot for the trial and randomly assigned to a pen
- Steers were fed a corn-silage based grower diet for 29 days, followed by a corn based finisher for 125 days[4] with feed intake monitored using Insentec feeders.
- Every 14 days body weight was recorded, three days before slaughter serum and plasma samples were collected to measure circulating blood metabolites (glucose, NEFA, BHBA, urea, total cholesterol, Insulin)
- After carcasses were graded by certified grader, the 8th to 12th rib was removed to assess lean, fat, and bone yield percentages; meat quality was analyzed using steaks
- Data were analyzed with PROC GLIMMIX in SAS (SAS Institute Inc. Cary, NC). Steer data analyzed as a completely randomized design with a 3 x 2 factorial arrangement; with steer as the experimental unit, pen as the random effect, and maternal plane of nutrition as fixed effects. Age at weaning was used as a covariate for body weights. Results declared significant at $P \leq 0.05$.

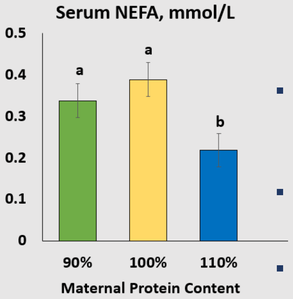


Figure 1: Serum NEFA levels of steer progeny before slaughter from cows fed below, at, or above MP requirements during late-gestation

RESULTS

- Steer progeny from 90% MP cows were consistently heavier throughout the trial ($P \leq 0.07$; Table 1); and had higher grade fat and lower lean yield ($P \leq 0.039$; Table 1). However feed intake, ADG and RFI did not differ ($P \geq 0.70$)
- Steer progeny from 90% MP and 100% MP cows had higher serum NEFA levels ($P = 0.003$; Figure 1) before slaughter
- Steers from cows supplemented with methionine had lower rib weight (MET: 4.37 kg, - MET: 4.57 kg; $P = 0.020$)
- Maternal nutrition had no effect on liver, kidney and pancreas weights, other circulating blood metabolites, carcass characteristics including rib eye area, quality grade, and marbling score, and meat pH, and colour reflectance ($P \geq 0.06$; data not shown)

Table 1: Impact of maternal metabolizable protein content during late-gestation on steer progeny growth performance and carcass quality

	90%	100%	110%	SEM	*P*-value
Performance					
Weaning weight, kg	260 [a]	251 [ab]	245 [b]	12.4	0.024
Initial body weight, kg	329	316	312	13.5	0.045
End of grower body weight, kg	377	365	359	14.3	0.066
End of transition body weight, kg	403	388	384	15.5	0.055
Slaughter body weight, kg	640	634	631	11.2	0.605
Dry matter intake (DMI), kg/d	11.1	11.3	11.2	0.28	0.757
Average daily gain (ADG), kg/d	1.87	1.90	1.93	0.061	0.757
Feed to gain ratio	5.96	5.93	5.82	0.169	0.796
Residual feed intake (RFI)[5]	- 0.065	0.092	-0.128	0.2054	0.699
Carcass Quality					
Hot carcass weight (HCW), kg	349	348	345	5.0	0.810
Grade fat, mm	15.5 [a]	14.7 [ab]	11.8 [b]	1.12	0.038
Lean Yield	49.5	49.4	50.56	0.630	0.039

CONCLUSIONS

The results of this experiment suggest that feeding cows below their protein requirements during late-gestation increased body weight gain and improved some carcass characteristics of steer progeny.

While rumen-protected methionine supplementation had minimal impact on steer progeny.

REFERENCES

1. Stalker et al., 2014. J. Anim. Sci. 84:2582-2589.
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