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Rumen Protected Long Chain Fatty Acid Supplementation Effects on Beef Carcass Traits and Composition

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Objectives

Marbling is one of the most important indicators of beef quality. Greater amounts of intramuscular fat are associated with increased palatability. Previous research has shown the activation of peroxisome proliferator activated receptor γ (PPARγ) is related to marbling development in growing beef cattle, and long chain fatty acids are known activators of PPARγ. The objective of this study was to determine if supplementation of long chain fatty acids, which are known activators of PPARγ, will increase marbling development of beef cattle.

Materials and Methods

Angus steer calves ($n = 99$) were backgrounded for 77 d with a target weight gain of 1.2 kg/d and received a Synovex-S implant during this period. Upon completion of backgrounding, the steers were divided into 12 pens with 8 to 9 head/pen. Steers received a transition diet for 21 d prior to being fed a high concentrate diet containing high moisture ear corn, corn silage, dry rolled corn, soybean meal, and a liquid supplement containing monensin. Megalac -R was fed to 6 pens at 2% of the diet dry matter (LCFA). Control pens (CON; $n = 6$) received an additional 2% of diet dry matter as dry rolled corn. The final finishing diet NE_g for LCFA and CON treatments was 63.70 and 60.50 Mcal/cwt, respectively. At d 28 of the finishing phase, cattle received a Revalor-S implant. Steers were weighed every 28 d. Growth performance data including ADG and G:F were calculated monthly and averaged across the feeding period for cumulative data. After a 147-d finishing phase, steers were transported to a commercial abattoir for slaughter. After a 24-hour chilling period, standard carcass data were obtained by trained personnel. A subset of carcasses ($n = 24$, 2 per pen) were selected for carcass composition analysis using 9–10–11 rib dissections and analyzed using equations from Hankens and Howe (1946). Live and carcass data were analyzed using Proc GLM of SAS (SAS Inst. Inc., Cary, NC) and rib composition data were analyzed using PROC Mixed of SAS. Both used pen as the experimental unit. Significance was determined at a P-value ≤ 0.05 and a trend at a P-value < 0.10.

Results

Final live weights tended ($P = 0.06$) to be greater for LCFA than CON cattle (596 ± 1.51 vs. 586 ± 2.86 kg). There was a tendency for cumulative ADG to be increased (1.60 ± 0.01 vs. 1.54 ± 0.02 kg; $P = 0.08$) while cumulative G:F was decreased (0.07 ± 0.02 vs. 0.08 ± 0.02 kg; $P = 0.04$) for LCFA cattle. Hot carcass weight, REA, Backfat, %KPH, Marbling Score, Quality Grade, and Yield Grade did not differ ($P > 0.05$) between treatments. Composition of the 9–10–11 rib sections revealed no differences in ash ($P = 0.25$), moisture ($P = 0.16$), or fat ($P = 0.12$). Protein was greater (15.3 ± 0.22 vs. $14.6 \pm 0.09\%$; $P = 0.01$) for CON cattle. Predicted percent carcass fat was increased for LCFA cattle (25.5 ± 0.39 vs. $23.9 \pm .060\%$; $P < 0.05$). In contrast, predicted percent carcass protein (13.8 ± 0.13 vs. $13.6 \pm 0.05\%$; $P = 0.07$) and bone (14.6 ± 0.21 vs. $13.8 \pm 0.33\%$; $P = 0.06$) tended to be greater for CON cattle.

Conclusion

Long chain fatty acid supplementation during the finishing phase did not increase marbling scores of the steers in this study, but predicted total body fat was increased. Supplementation of LCFA at earlier growth stages or for longer durations are of interest for future work to determine if marbling scores can be increased.