Published February 1, 2019

2017 Reciprocal Meat Conference – Environment, Production Systems

Meat and Muscle Biology™

Influence of Growth Promoting Technologies on Animal Performance, Production Economics, Environmental Impacts and Carcass Characteristics of Beef

M. J. Webb[1*], D. L. Pendell[2], A. A. Harty[1], R. R. Salverson[1], C. A. Rotz[3], K. R. Underwood[1], K. C. Olson[1], and A. D. Blair[1]

[1]Animal Science, South Dakota State University, Brookings, SD, USA; [2]Department of Agricultural Economics, Kansas State University, Manhattan, KS, USA; [3]Agricultural Research Service, United States Department of Agriculture, University Park, PA, USA

Keywords: beef, feedlot performance, growth promotant, life cycle assessment, technology

Meat and Muscle Biology 1(3):23–24 **doi:10.221751/rmc2017.022**

Objectives

Objectives of this study were to 1) evaluate growth performance and carcass characteristics, and 2) determine environmental and economic impacts of cattle raised with different levels of growth promoting technology.

Materials and Methods

Angus × Simmental crossbred steer calves ($n = 120$) of a single source were stratified by dam age, birth date, birth weight, and randomly assigned to 4 treatments with increasing levels of growth promoting technology: 1) no technology (NA; no antibiotics or growth promotants); 2) non-hormone treated (NHTC; NA plus therapeutic antibiotics, tylosin and monensin during finishing); 3) implant (IMPL; NHTC plus 3 implants [suckling, initial finishing, and mid-finishing]); and 4) β-agonist (IMBA; IMPL plus ractopamine-HCl for 31 d before harvest). At weaning, steers were transported to a backgrounding lot and blocked by initial feedyard body weight to 3 pen replicates per treatment resulting in a randomized complete block design. Following backgrounding, steers were finished in a GrowSafe feeding system and individual performance data (ADG, DMI, and G:F) were recorded. At harvest, hot carcass weight (HCW) and standard carcass measures were used to obtain USDA Yield Grade (YG) and Quality Grade (QG). To evaluate environmental impact of each treatment, input parameters recorded from 3 production stages (cow-calf, backgrounding, and finishing) were represented in a Life Cycle Assessment using the USDA-ARS, Integrated Farm System Model to determine greenhouse gas emissions, energy use, water use, and reactive nitrogen loss. Production costs and carcass values were used to determine economic impacts of each treatment.

Results

Steers in the IMPL and IMBA treatment had heavier ($P < 0.01$) final calculated body weight and HCW than NA and NHTC. Steers in IMPL and IMBA had greater ($P < 0.01$) DMI than NA, which was greater ($P < 0.01$) than NHTC. Steers in the IMPL treatment had the greatest overall ADG, followed by IMBA, and NA and NHTC had the lowest ADG (2.11, 1.79, 1.54 and 1.45 kg/d respectively; $P < 0.01$). Gain to feed was greatest ($P < 0.01$) for IMPL while IMBA, NHTC, and NA were similar ($P > 0.05$). There were no differences among treatments for YG. Treatments with less technology (NA and NHTC) had greater ($P < 0.01$) marbling scores than IMPL and IMBA however, there was no difference ($P > 0.05$) in the distribution of carcasses in each QG category. Compared to NA, IMPL reduced carbon footprint (CO_2e/kg HCW) by 8%, energy use (MJ/kg HCW) by 6%, water use (kg H_2O/kg HCW) by 4%, and reactive nitrogen loss (g N/kg HCW) by 8%. Compared to NA, IMBA reduced carbon footprint by 1%, energy use by 3%, and reactive nitrogen loss by 2%. The NA and NHTC treatments were similar in environmental outputs and resource utilization. Total cost of gain ($/kg) was greater ($P < 0.01$) for NA and NHTC than IMPL and IMBA. When branded carcass premiums were applied, NA and IMPL had a higher value than NHTC and IMBA ($P < 0.01$). Net return was greatest ($P < 0.\ 01$) for NA. Steers in the IMPL had a greater ($P < 0.01$) net return than NHTC, which was greater ($P < 0.01$) than IMBA.

 www.meatandmusclebiology.com

Conclusion

Treatments utilizing growth promotant implants with and without β-agonist produced heavier and more environmentally sustainable carcasses. Economic data suggests carcass premiums associated with NA and NHTC may offer producers greater profitability.

