ESSENTIAL OIL EFFECTS ON RUMEN FERMENTATION, ANIMAL PERFORMANCE, AND MEAT QUALITY OF BEEF STEERS

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ABSTRACT

Essential oils are naturally occurring, secondary metabolites that can be distilled or extracted from most plants and possess antimicrobial properties. Next Enhance® (**NE**, Novus International Inc.) is comprised of garlic (diallyl disulfide) and cinnamon (cinnamaldehyde) extracts; both have demonstrated the ability to modify fermentation. A series of experiments was conducted to determine how feeding NE affects fermentation, nutrient digestibility, feedlot performance, carcass traits, meat quality, and consumer sensory characteristics of LM steaks from beef steers. In the first experiment, feedlot steers fed 150 $mg \cdot hd^{-1} \cdot d^{-1}$ targeted NE inclusion had the greatest ADG and G:F early in the feeding period. Overall DMI, ADG, and G:F were not affected by NE inclusion. All NE levels improved dressing percent, 12th rib backfat, LM area, and calculated USDA yield grade. Steers fed 150 $mg \cdot hd^{-1} \cdot d^{-1}$ NE yielded carcasses worth nearly $30 more than control steers. LM steaks were obtained from five head/treatment and used to evaluate meat quality and consumer sensory characteristics. NE inclusion at 150 – 300 $mg \cdot hd^{-1} \cdot d^{-1}$ improved beef steer carcass traits and total carcass value while achieving feedlot performance, meat quality, and consumer acceptance not different from non-supplemented steers. A continuous culture fermentation experiment and a cannulated steer study were conducted to see if observed animal performance and carcass improvements could be explained by NE effects on ruminal fermentation or site and extent of nutrient digestion. *In vitro*, NE inclusion at 15 – 120 $mg \cdot kg^{-1}$ DM numerically increased nutrient digestibility, microbial N flow, and microbial efficiency. Total VFA, acetate, ammonia, and peptide production were not affected by NE inclusion *in vitro*. In cannulated steers, NE inclusion at 15 – 30 $mg \cdot kg^{-1}$ increased N degradation and decreased NDF digestibility in the rumen, while all NE levels increased microbial N production. Increased protein degradation and microbial N flow during lean tissue growth could contribute to the increased calf performance early in the feeding trial. If consistent results can be achieved, NE could be an alternative to ionophores.