INFLUENCE OF DIET, PRODUCTION TRAITS, BLOOD HORMONES AND METABOLITES, AND MITOCHONDRIAL COMPLEX PROTEIN CONCENTRATIONS ON RESIDUAL FEED INTAKE IN BEEF CATTLE

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ABSTRACT

Residual feed intake (RFI) is the difference between measured feed intake and predicted feed intake of an animal. Intake prediction is computed from a regression of intake on gain and metabolic body weight. Residual feed intake is used as a measure of metabolic efficiency. As RFI increases, feed intake (FI) and feed conversion ratio (FCR) increase with no change in postweaning growth and body weight in steers. Identification and selection for lower RFI cattle would improve herd feed efficiency without influencing growth. Steer residual feed intake measured in the growing phase, is related to residual feed intake during the finishing phase. Animals with low residual feed intake in the growing phase had lower residual feed intake and improved feed efficiency in the finishing phase. Serum concentrations of glucose and mitochondrial function are related to metabolic efficiency and may differ between residual feed intake phenotypes. Serum concentrations of glucose at weaning were greater ($P < 0.05$) in low (efficient) compared to high (inefficient) RFI steers. Mitochondrial complex protein concentrations I:II and I:III ratios were greater ($P < 0.05$) in low extreme versus high extreme RFI steers. Diets varied in rumen undegradable protein content were used to determine impact of intestinal amino acid supply on growth performance. Increasing rumen bypass amino acids in no roughage diets during the growing phase tended ($P < 0.15$) to influence ADG and FCR in

the growing phase such that as rumen bypass amino acid level increased growth and feed efficiency improved in the growing phase. Steers fed post ruminal absorbable amino acid levels below that required for growth in growing phase tended ($P < 0.15$) to have improved feed efficiency in the finishing phase. Also, during the growing phase as bypass amino acids increased subcutaneous and intramuscular fat deposition decreased in steers during the finishing phase. Feeding a level of bypass amino acids below optimum for growth to steers during the growing phase decreased ($P < 0.05$) *longissimus dorsi* muscle area in steers during the finishing phase.