Substantial differences between organ and muscle specific tracer incorporation rates in a lactating dairy cow

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We aimed to produce a new batch of intrinsically L-[1-^{13}C]phenylalanine labeled milk and beef for subsequent use in human nutrition research. The collection of the various organ tissues after slaughter allowed for us to gain insight into the dynamics of tissue protein turnover *in vivo* in a lactating dairy cow. One lactating dairy cow received a constant infusion of L-[1-^{13}C]phenylalanine (450 µmol/min) for 96 h. Plasma and milk were collected prior to, during, and after the stable isotope infusion. Twenty-four hours after cessation of the infusion the cow was slaughtered. The meat and samples of the various organ tissues (liver, heart, lung, udder, kidney, rumen, small intestine, and colon) were collected and stored. Approximately 210 kg of intrinsically labeled beef (bone and fat free) with an average L-[1-^{13}C]phenylalanine enrichment of 1.8±0.1 mole percent excess (MPE) was obtained. The various organ tissues differed substantially in L-[1-^{13}C]phenylalanine enrichments in the tissue protein bound pool, the highest enrichment levels were achieved in the kidney (11.7 MPE) and the lowest enrichment levels in the skeletal muscle tissue protein of the cow (between 1.5-2.4 MPE). Our data demonstrates that there are relatively small differences in L-[1-^{13}C]phenylalanine enrichments between the various meat cuts, but substantial higher enrichment values are observed in the various organ tissues. We conclude that protein turnover rates of various organs are much higher when compared to skeletal muscle protein turnover rates in large lactating ruminants.