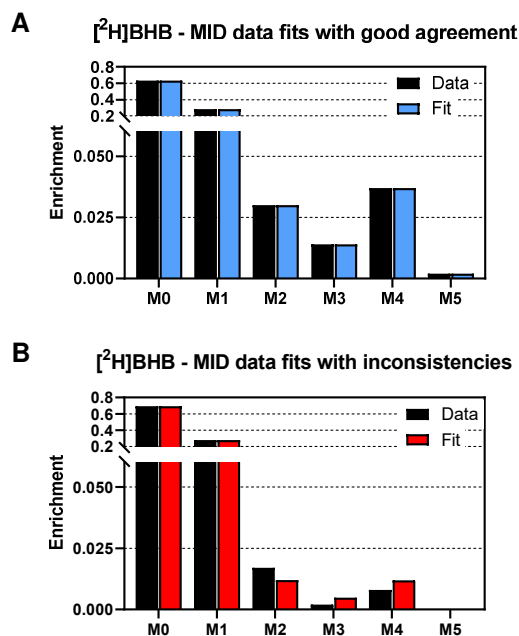
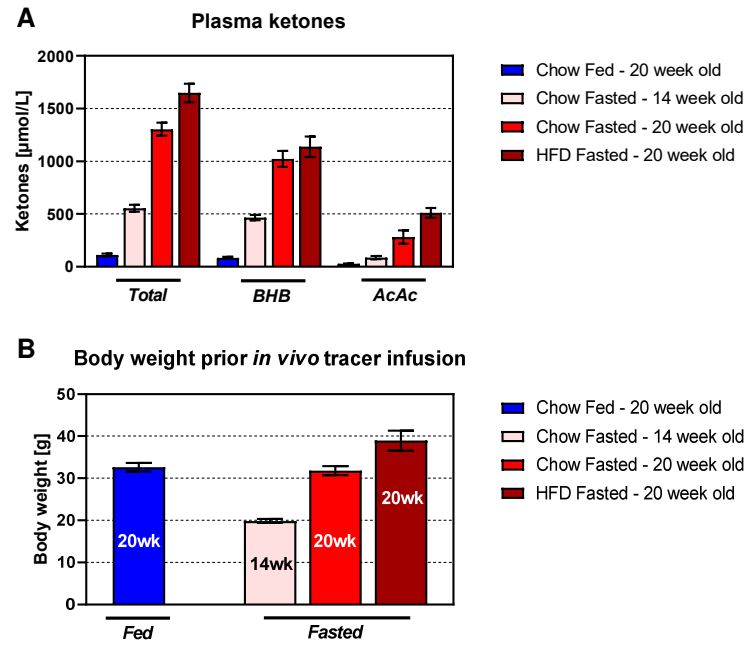


**Figure S1.** Real time reaction monitoring of EtAcAc hydrolysis to AcAc using  $^1\text{H}$  NMR. (A-D) Zoomed spectral regions showing signal evolution during real-time reaction monitoring. (E) Integrated  $^1\text{H}$  NMR resonances of unknown transitional resonance and Acetone over time; (F) relationship between EtAcAc signal detected using  $^1\text{H}$  NMR and AcAc concentration quantified using enzymatic assay; (G)  $^1\text{H}$  NMR spectrum of ketone tracer infusate sample after 72-hour storage at room temperature. Both AcAc and BHB resonances are clearly detectable, indicating sufficient stability of AcAc tracer for *in vivo* tracer infusion experiments.



**Figure S2.** Comparison of measured and simulated  $[^2\text{H}]\text{BHB}$  MID. (A) Simulated MID in good agreement with measured values. (B) Simulated MID in disagreement with measurements due to very low enrichment values.



**Figure S3.** Characteristics of mice used in experiments. (A) Plasma ketones quantified in subset of samples. (B) Body weight prior to *in vivo* tracer infusions.