Models were trained on 3 data sets with X mice with cage temperatures at thermoneutrality. Model features for the models include: X. For initial evaluation, time interval data was randomly separated into a training cohort and a testing cohort based on 70:30 ratio. Models were selected based on the performance on the training data only. A total of 12 methods were evaluated including generalized linear, generalized additive, boosted generalized linear, boosted generalized additive, linear support vector machines, polynomial support vector machines, radial support vector machines, multivariate adaptive regression splines, nonparametric spline fitting, random forest, k-nearest neighbor, and radial basis function network. Each model was also used to evaluate the use of total weight, lean body mass, fat mass and lean body mass with fat mass as feature inputs. The final ensemble approach uses the mean energy expenditure of X to estimate energy expenditure at thermoneutrality. Additional measured heat ouput from the Oxymax-CLAMS system is assigned as adaptive energy expenditure. Further partition of energy expenditure is determined using X.