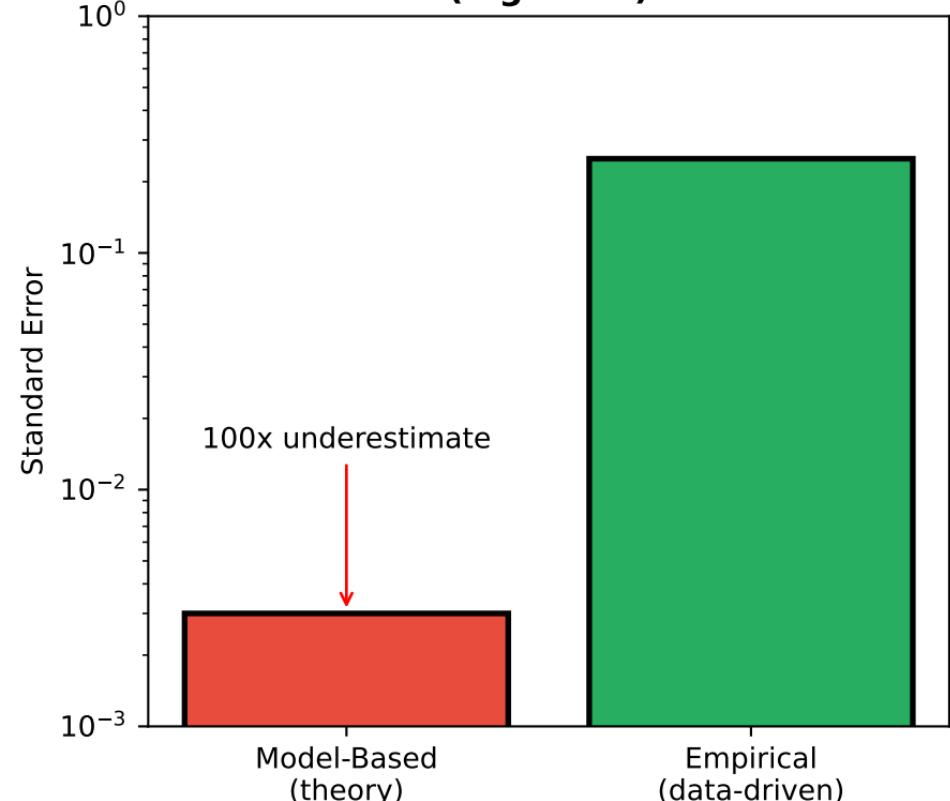
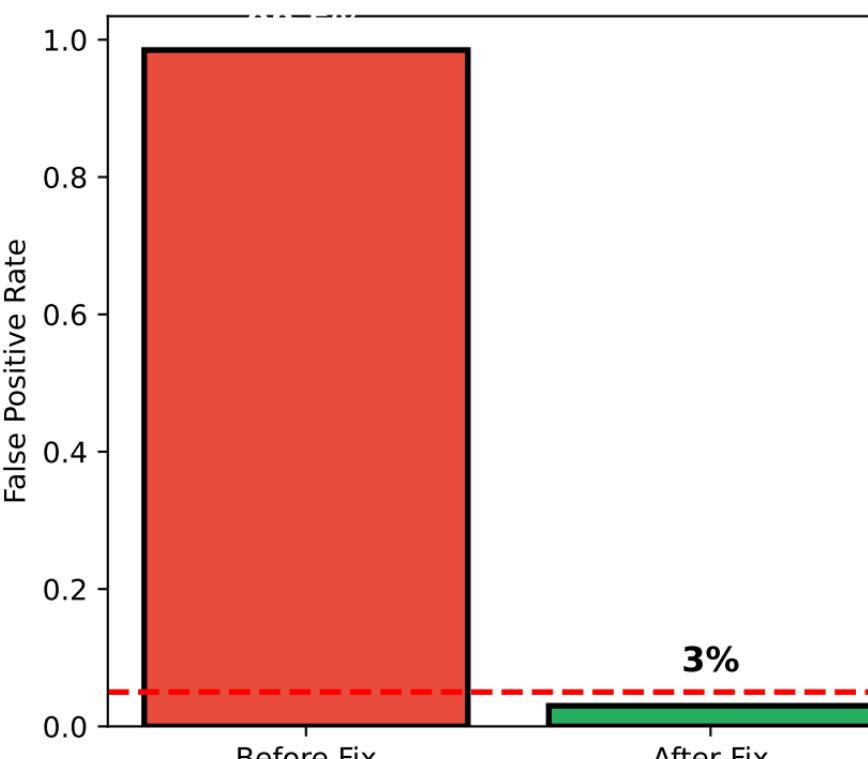


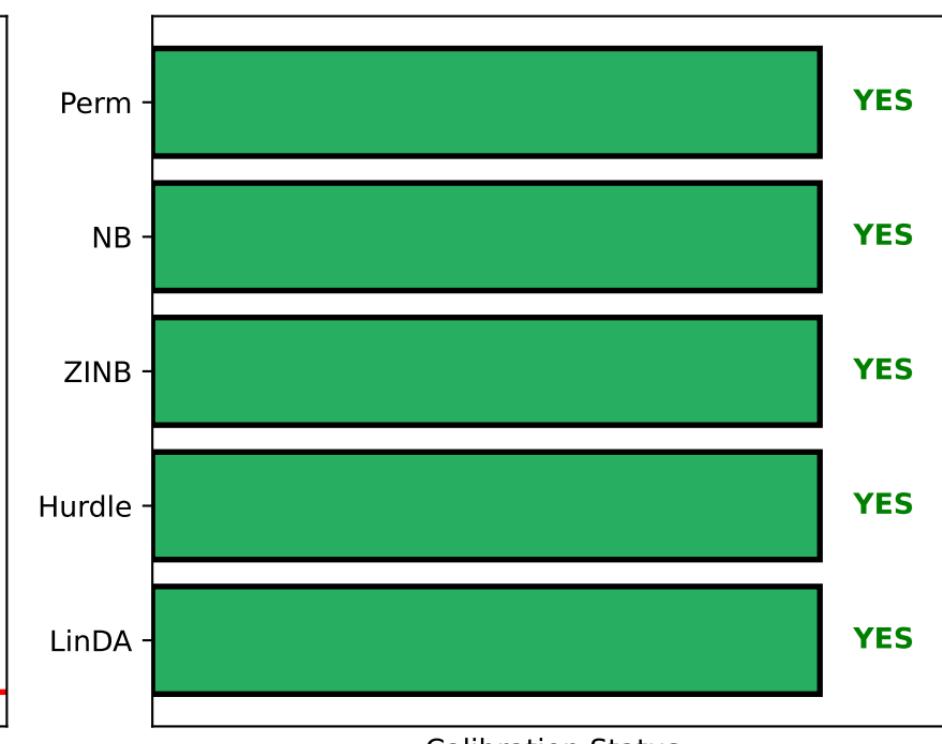
### A. SE Estimation (log scale)



### B. FPR Calibration



### C. Current Methods



Key Finding: Theoretical variance formulas severely underestimate uncertainty for microbiome data (100x). Solution: Use empirical variance estimation.  
All current methods are properly calibrated with  $\text{FPR} < 5\%$ .