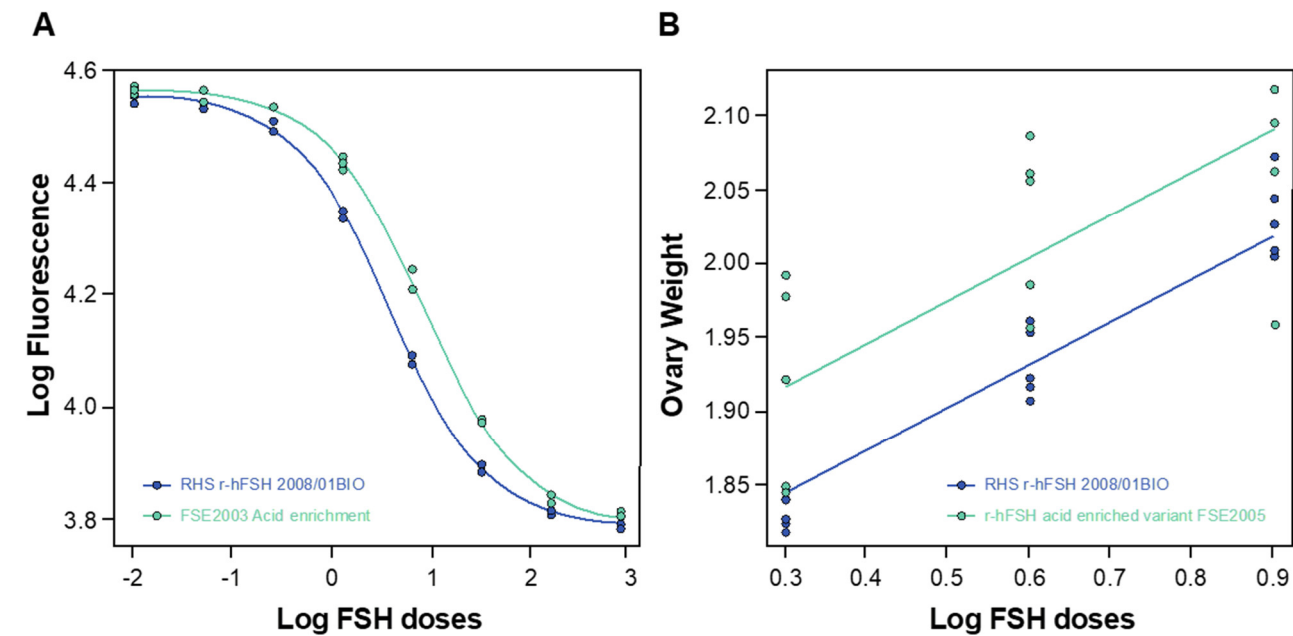
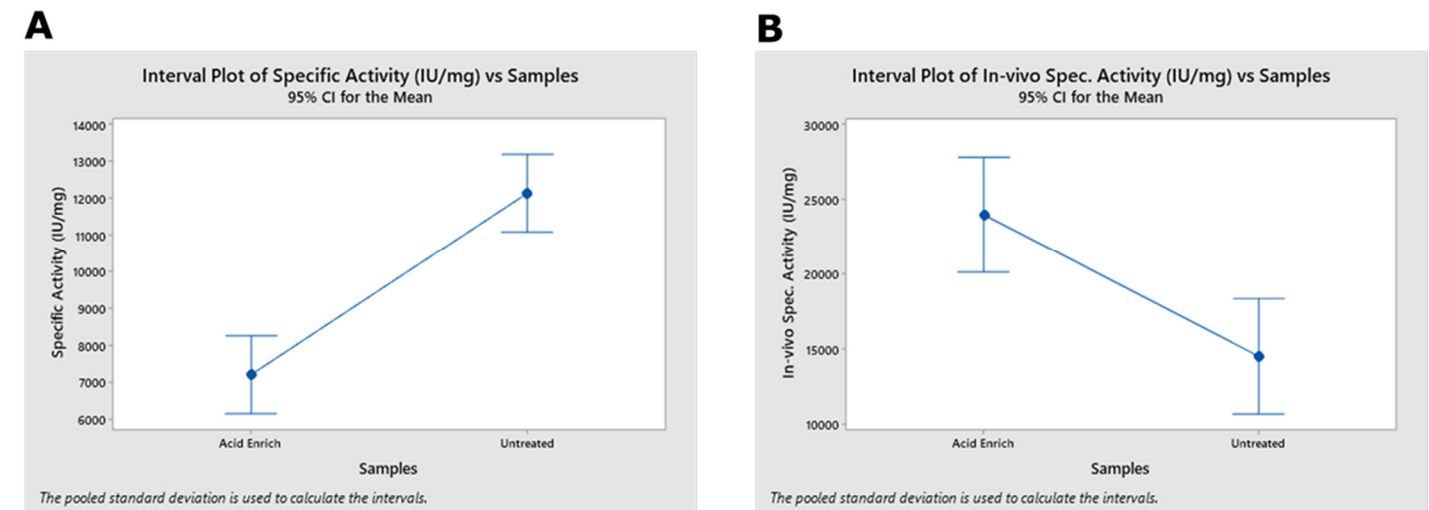


Supplementary Materials

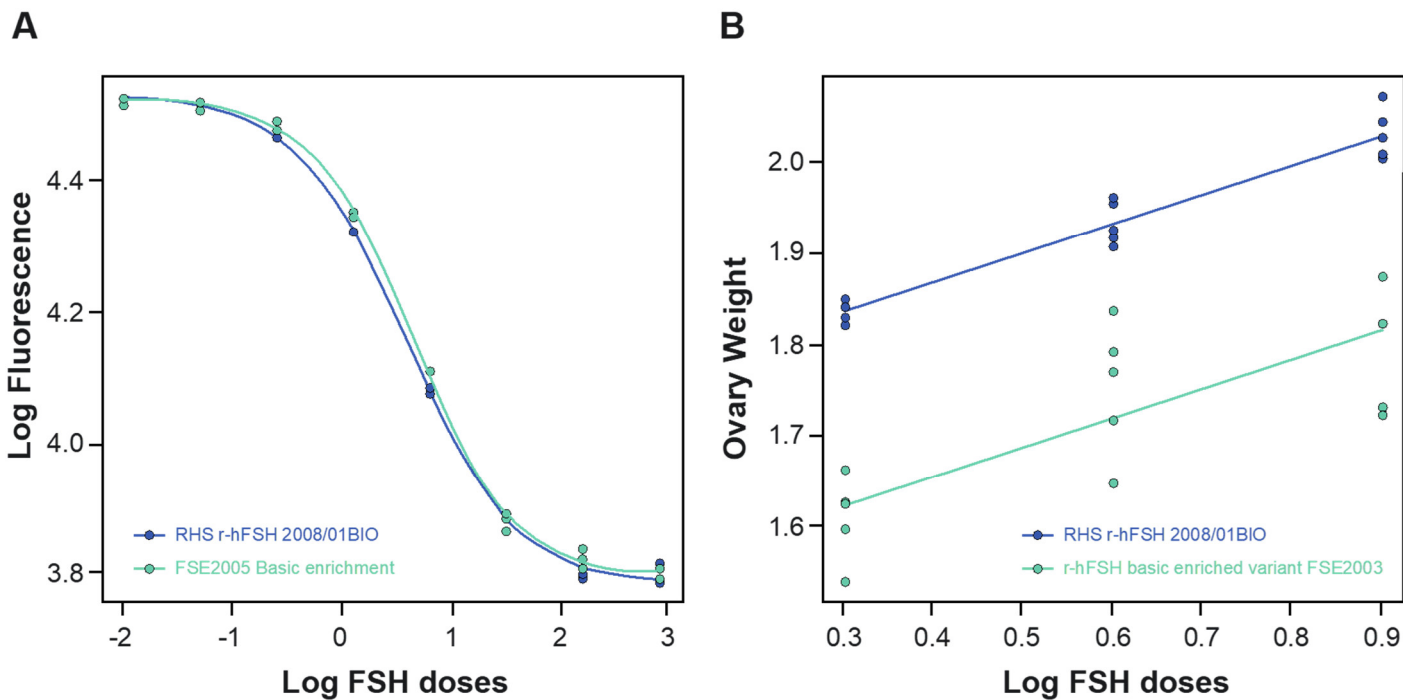
Supplementary Figure S1: Example dose-response curves for acid enriched variants versus RHS analyzed using A) *in-vitro* and B) *in-vivo* bioassay.



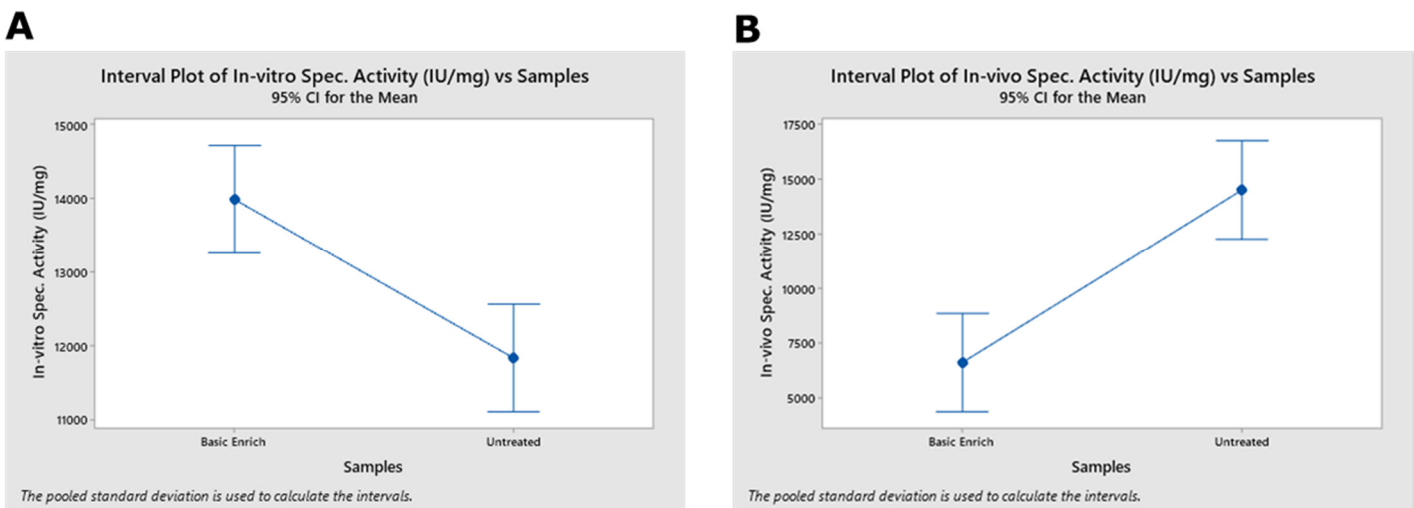
Supplementary Figure S2: ANOVA test for significance between untreated and acid enriched samples A) *in-vitro* and B) *in-vivo* assay specific activity.



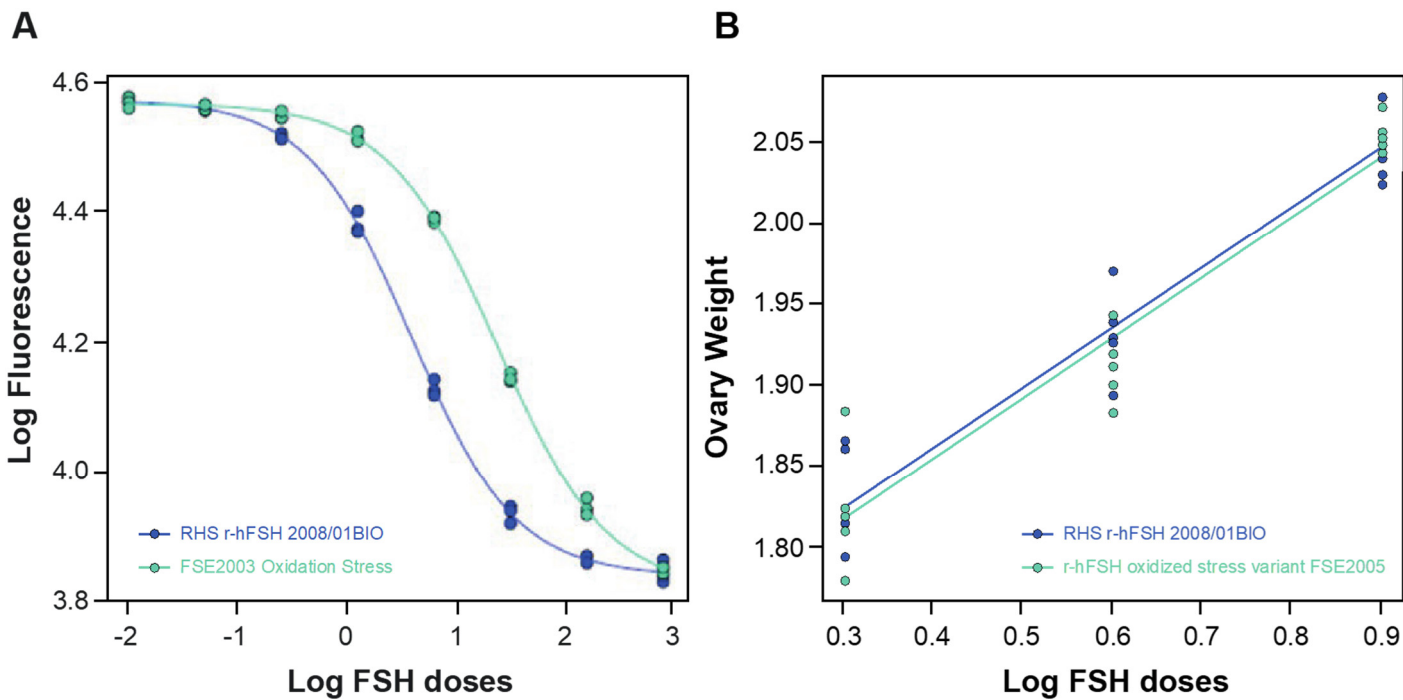
Supplementary Figure S3: Example dose-response curves for basic enriched variants versus RHS analyzed using **A)** *in-vitro* and **B)** *in-vivo* bioassay.



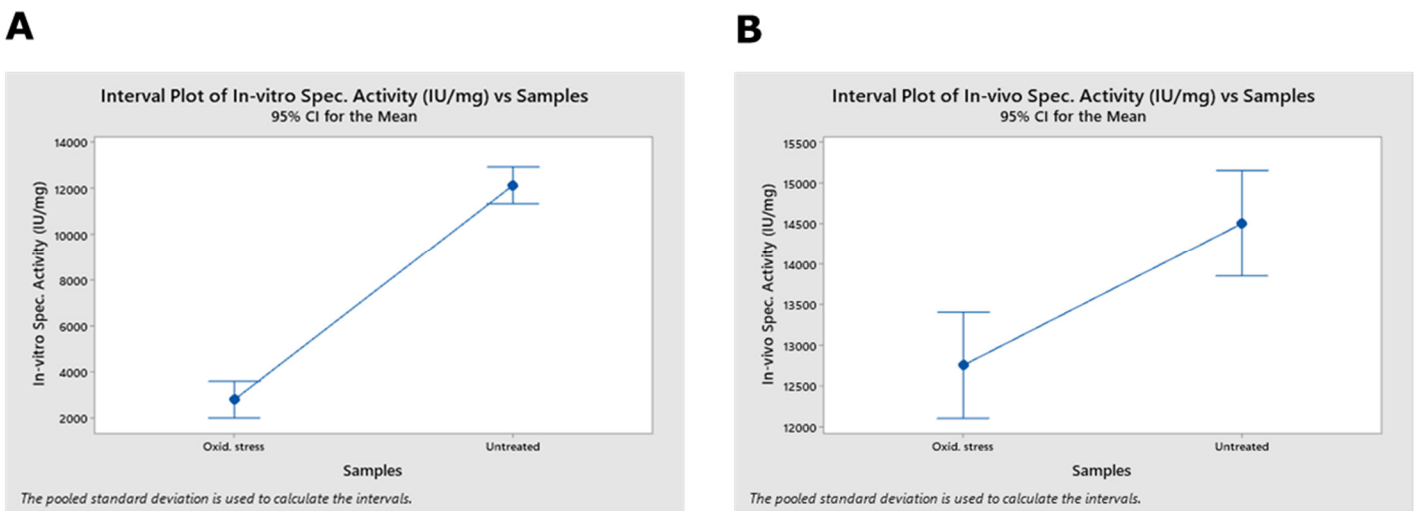
Supplementary Figure S4: ANOVA test for significance between untreated and basic enriched samples **A)** *in-vitro* and **B)** *in-vivo* assay specific activity.



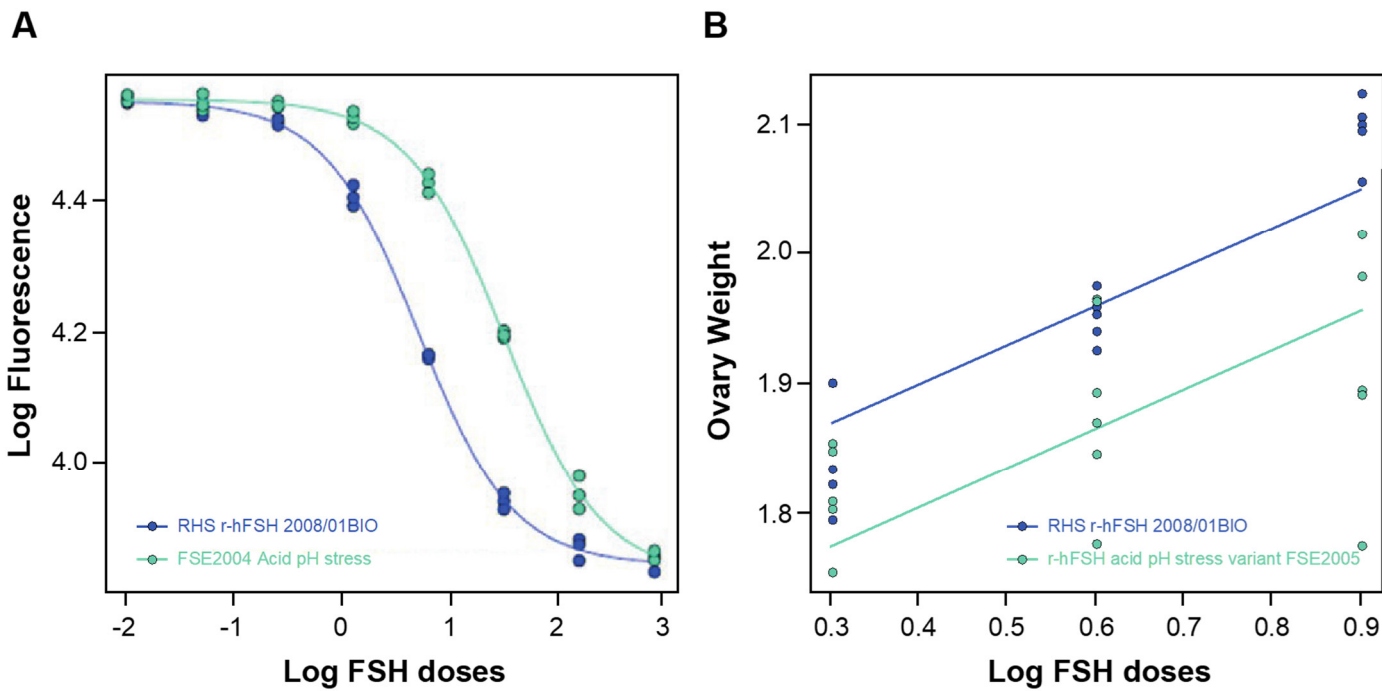
Supplementary Figure S5: Example dose-response curves for oxidized variants versus RHS analyzed using **A) *in-vitro*** and **B) *in-vivo*** bioassay.



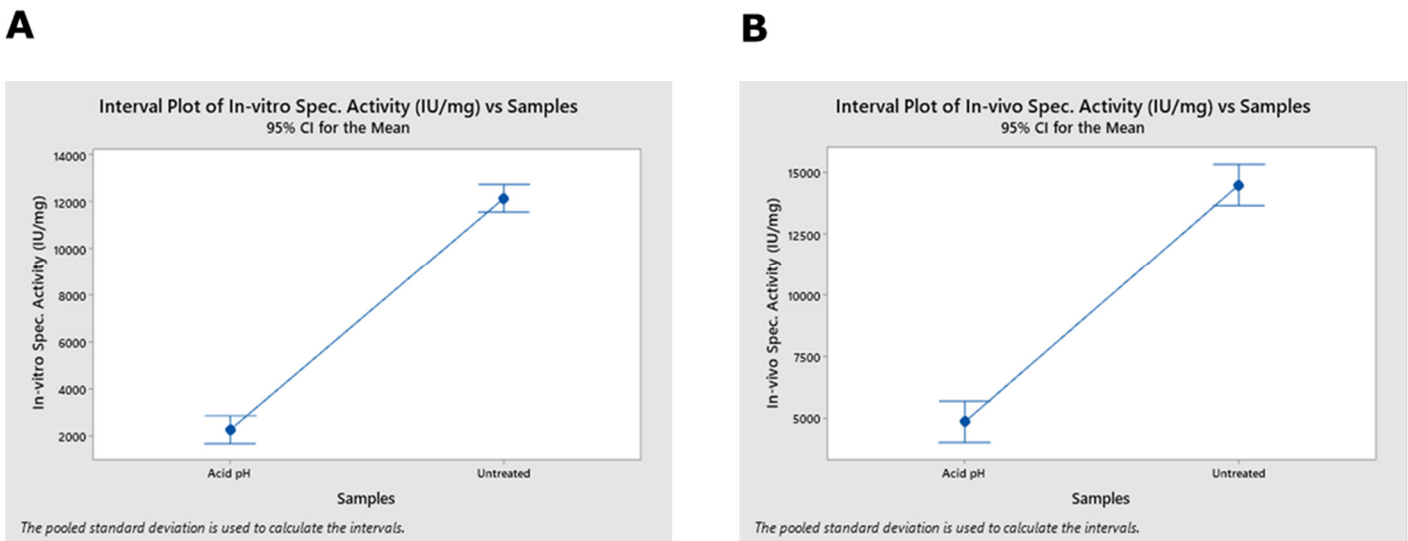
Supplementary Figure S6: ANOVA test for significance between untreated and oxidized samples **A) *in-vitro*** and **B) *in-vivo*** assay specific activity.



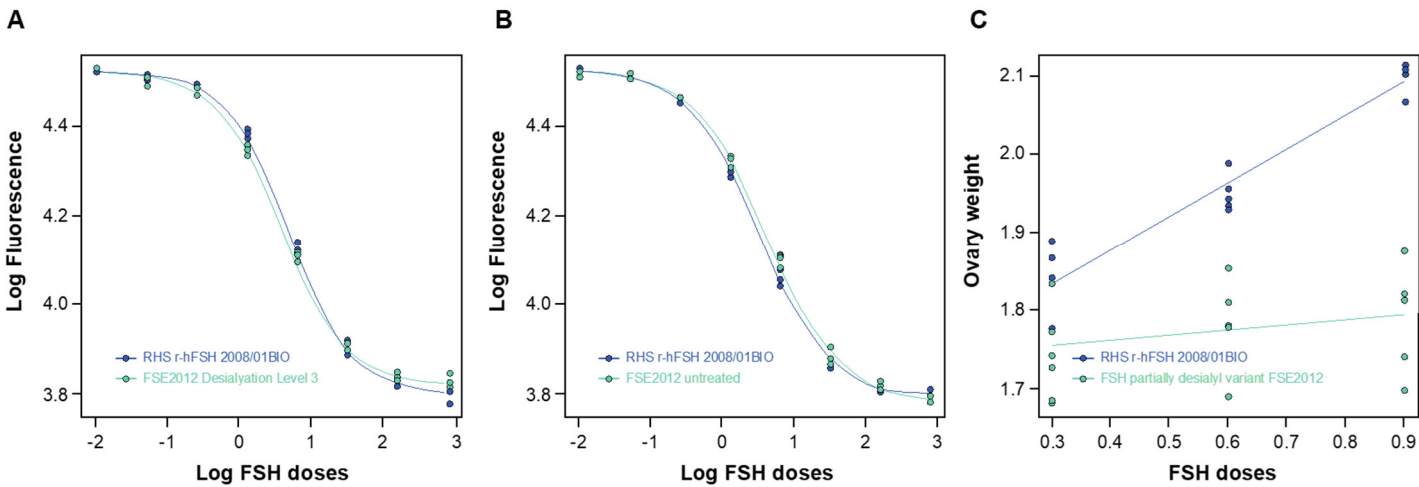
Supplementary Figure S7: Example dose-response curves for acid pH stressed variants versus RHS analyzed using **A)** *in-vitro* and **B)** *in-vivo* bioassay.



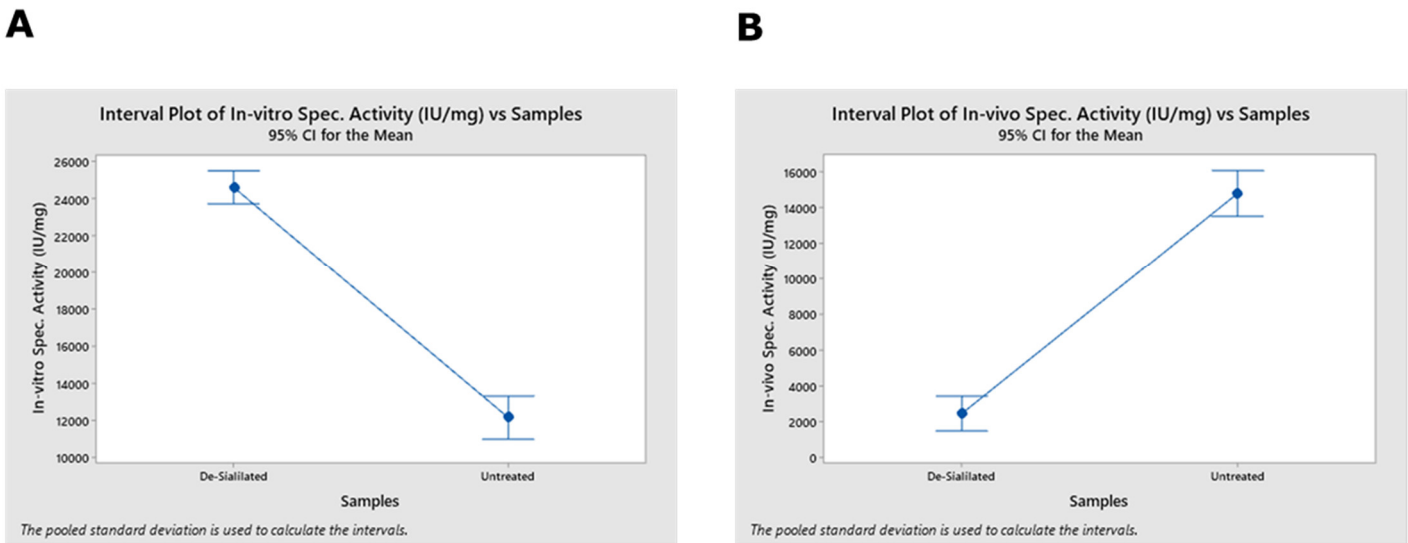
Supplementary Figure S8: ANOVA test for significance between untreated and acid pH stressed samples **A)** *in-vitro* and **B)** *in-vivo* assay specific activity.



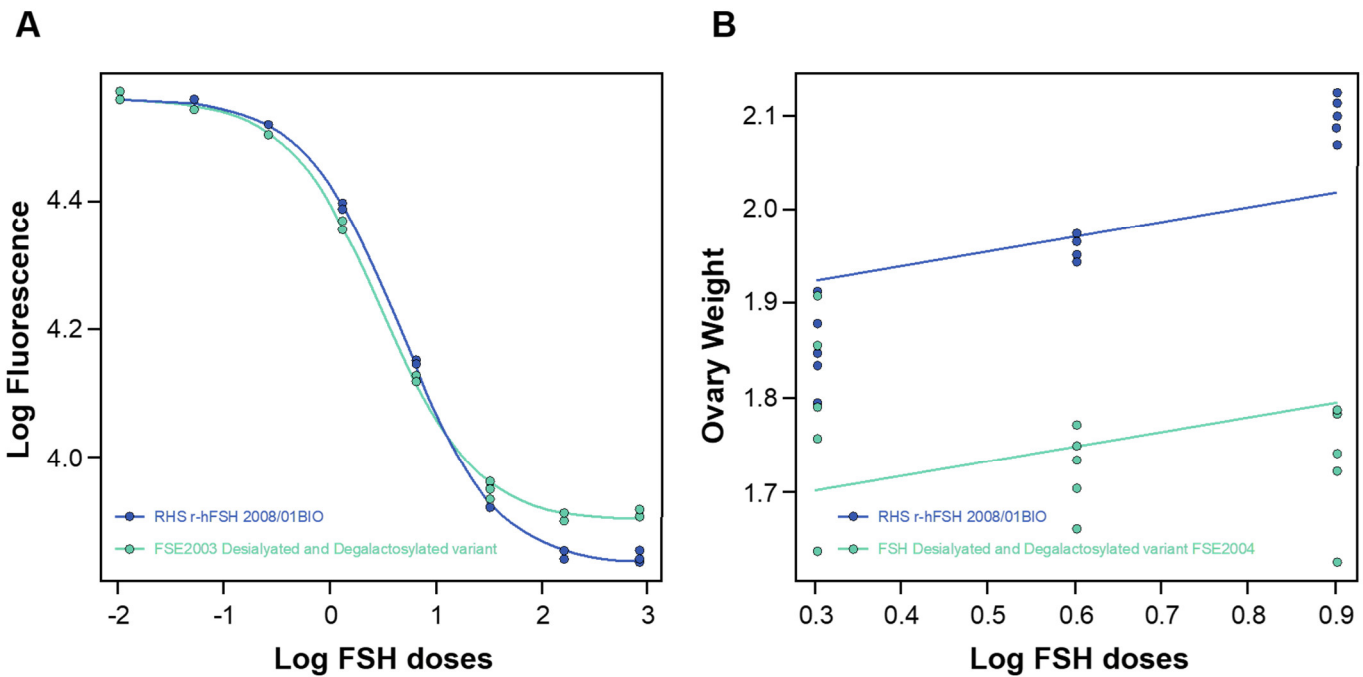
Supplementary Figure S9: Example dose-response curves for 100% desialylated FSE2012 **A)** totally desialylated and **B)** untreated FSE2012 versus RHS analyzed using the *in-vitro* bioassay and **C)** 100% desialylated FSE2012 versus RHS analyzed using the *in-vivo* bioassay.



Supplementary Figure S10: ANOVA test for significance between untreated and totally desialylated samples **A)** *in-vitro* and **B)** *in-vivo* assay specific activity.



Supplementary Figure S11: ANOVA test for significance between untreated and desialylated and degalactosylated samples A) *in-vitro* and B) *in-vivo* assay specific activity.



Supplementary Figure S12: Example dose-response curves for desialylated and degalactosylated variants versus RHS analyzed using A) *in-vitro* and B) *in-vivo* bioassay.

