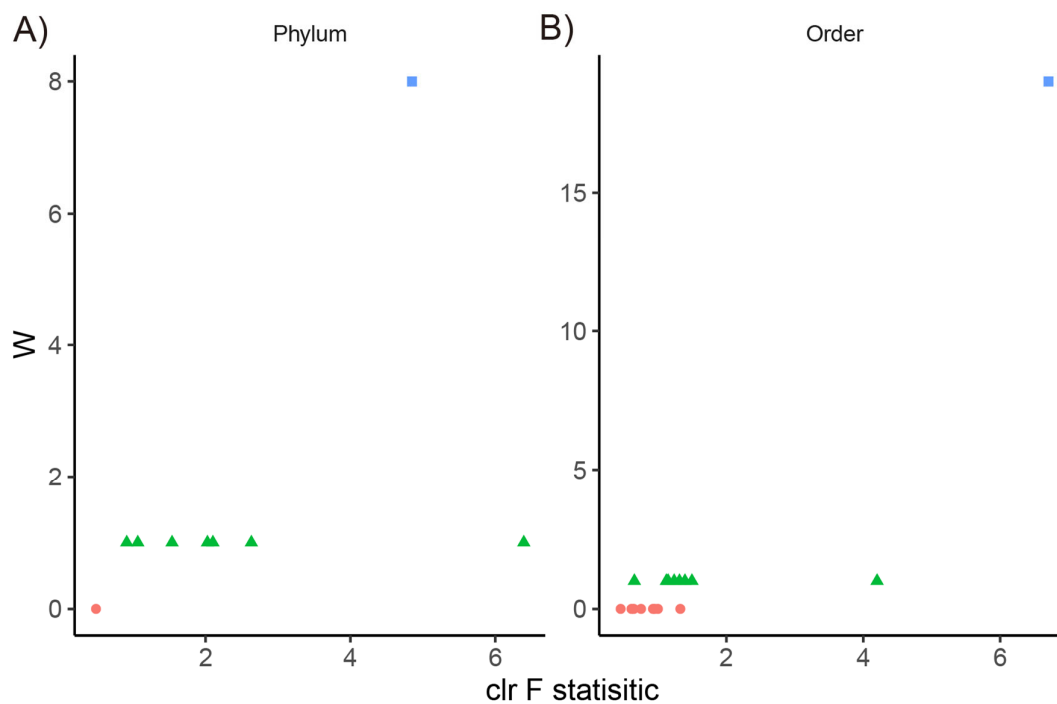
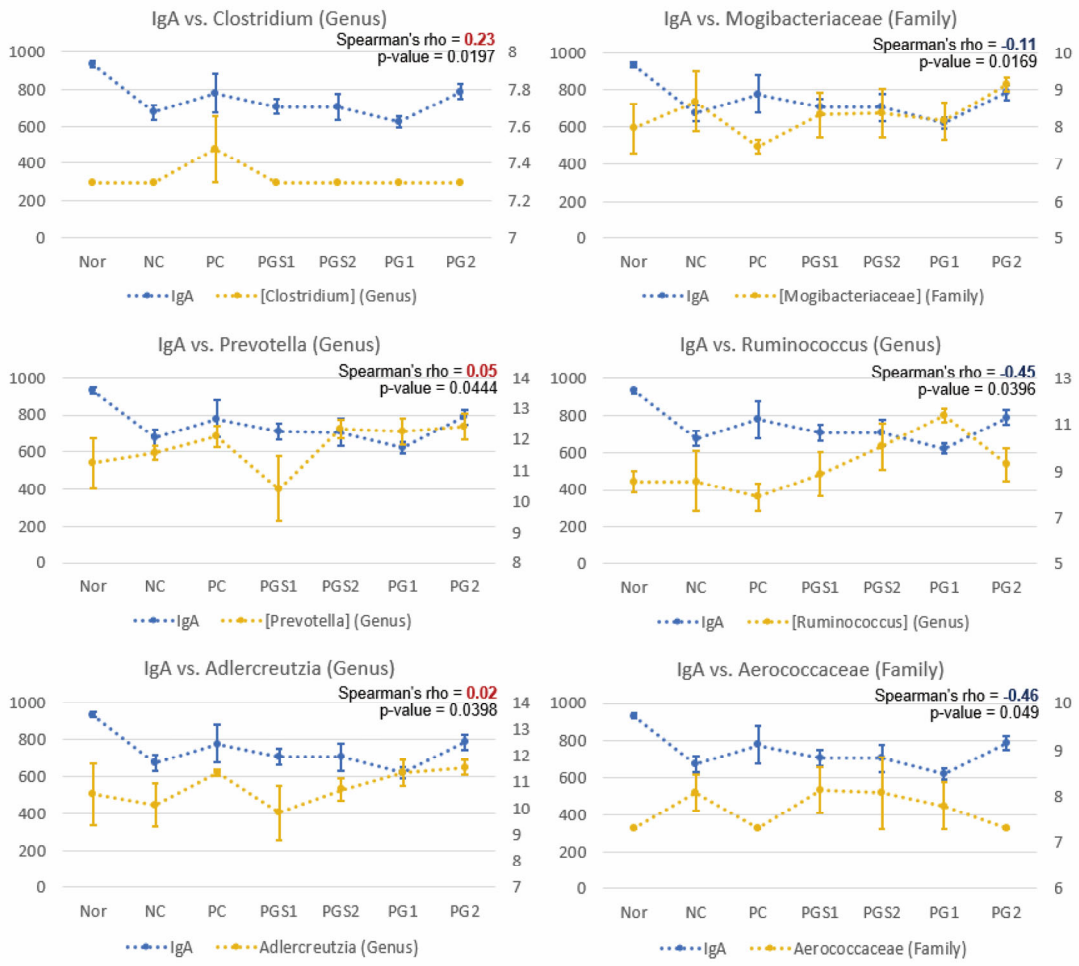


**Figure S1. Observed OTUs and Shannon index in seven groups.** The x-axis represents seven groups and the y-axis presents the alpha diversity measurements: observed OTUs and Shannon index.

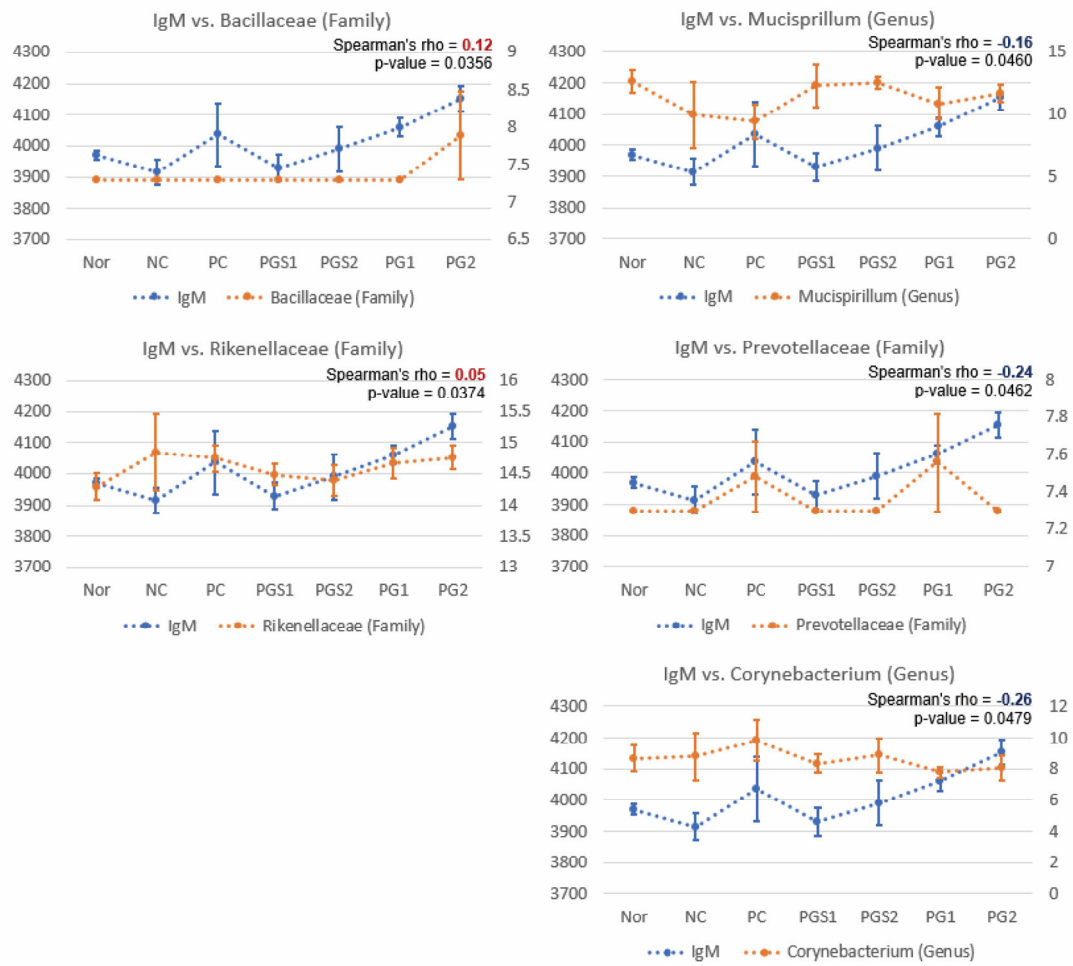


**Figure S2. Differentially abundant microbial taxa identified by q2-ANCOM.** ANCOM volcano plot of differential abundance at the group level, where the x-axis represents F-statistics and y-axis represents the W-statistics. A) At the phylum level, the square represents *Verrucomicrobia*, the triangle represents *Bacteria*, *Actinobacteria*, *Bacteroidetes*, *Firmicutes*, *Fusobacteria*, *Proteobacteria*, and *Tenericutes*, circle represents *Deferribacteres*. B) At the order level, the square represents *Verrucomicrobiales*, the triangle represents *Bacteroidales*, *Bacillales*, *Gemellales*, *Lactobacillales*, *Clostridiales*, *Fusobacteriales*, *Pseudomonadales*, and RF39, circle represents *Actinomycetales*, *Coriobacteriales*, *Deferribacterales*, *Turicibacterales*, *Erysipelotrichales*, *Burkholderiales*, *Desulfovibrionales*, and *Anaeroplasmatales*.

A)



B)



**Figure S3. Correlation between IgA and IgM level and relative abundance of microorganisms.** Total of six and five significant genera were correlated with IgA and IgM, respectively (A, B). The x-axis is the group, and the left y-axis is the phenotype values (blue) and right y-axis is the relative abundance values (IgA: yellow; IgM: orange). The Spearman's coefficient and p-value are placed on the right top corner.