**Supplementary file 1. The comparison of humoral immune response in pigs whose bronchoalveolar lavage fluid (BALF) samples are available for direct sequencing or plaque purification between treatment groups.**

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| **Category** | **Sample sizea** | **Variableb** | **Group comparison** | **P valuec** |
| Direct sequencing (H1N1) | 19 | H1-specific hemagglutinin inhibition titer | PRIME BOOST – SINGLE LAIV | 0.0003 |
| PRIME BOOST – NO VAC | 0.0006 |
| SINGLE LAIV – NO VAC | 1.0000 |
| Direct sequencing (H3N2) | 21 | H3-specific hemagglutinin inhibition titer | PRIME BOOST – SINGLE LAIV | 0.0009 |
| PRIME BOOST – NO VAC | 0.0026 |
| SINGLE LAIV – NO VAC | 1.0000 |
| Plaque assay | 13 | H1-specific hemagglutinin inhibition titer | PRIME BOOST – SINGLE LAIV | 0.0214 |
| PRIME BOOST – NO VAC | 0.0427 |
| SINGLE LAIV – NO VAC | 1.0000 |
| H3-specific hemagglutinin inhibition titer | PRIME BOOST – SINGLE LAIV | 0.0066 |
| PRIME BOOST – NO VAC | 0.0132 |
| SINGLE LAIV – NO VAC | 1.0000 |

a The columns of Sample size represent the number of BALF samples that successfully yielded the H1N1 genomes, H3N2 genomes, and IAV plaques, respectively, by direct sequencing or plaque assay.

b The hemagglutinin inhibition assay was performed on blood samples from selected treatment pigs collected prior to contact with challenged pigs.

c The means of hemagglutinin inhibition titers between treatment groups were compared by Kruskal-Wallis rank sum test. The Dunn’s test was utilized for the pairwise comparisons, the p values were adjusted using the Benjamini-Hochberg method.