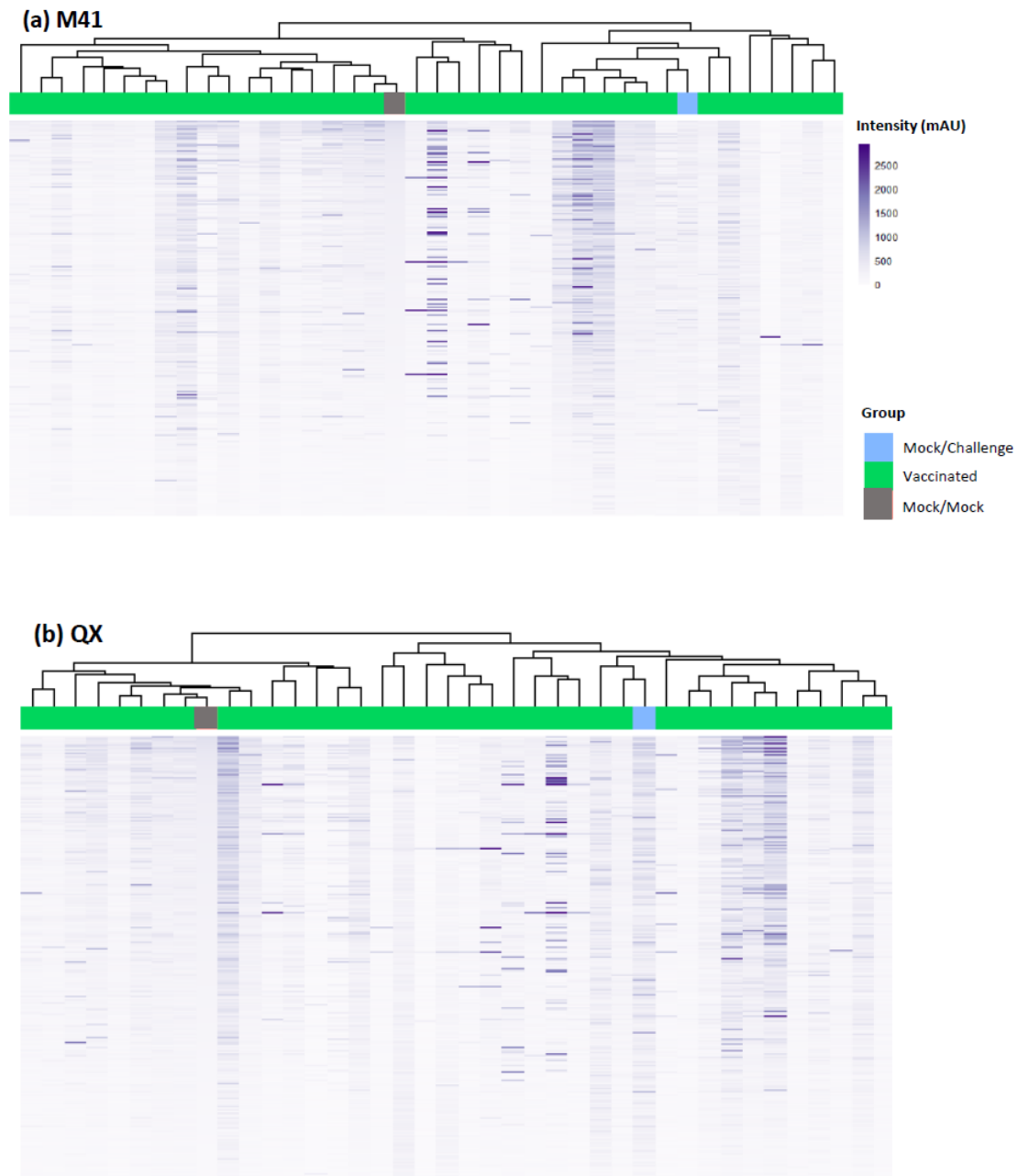
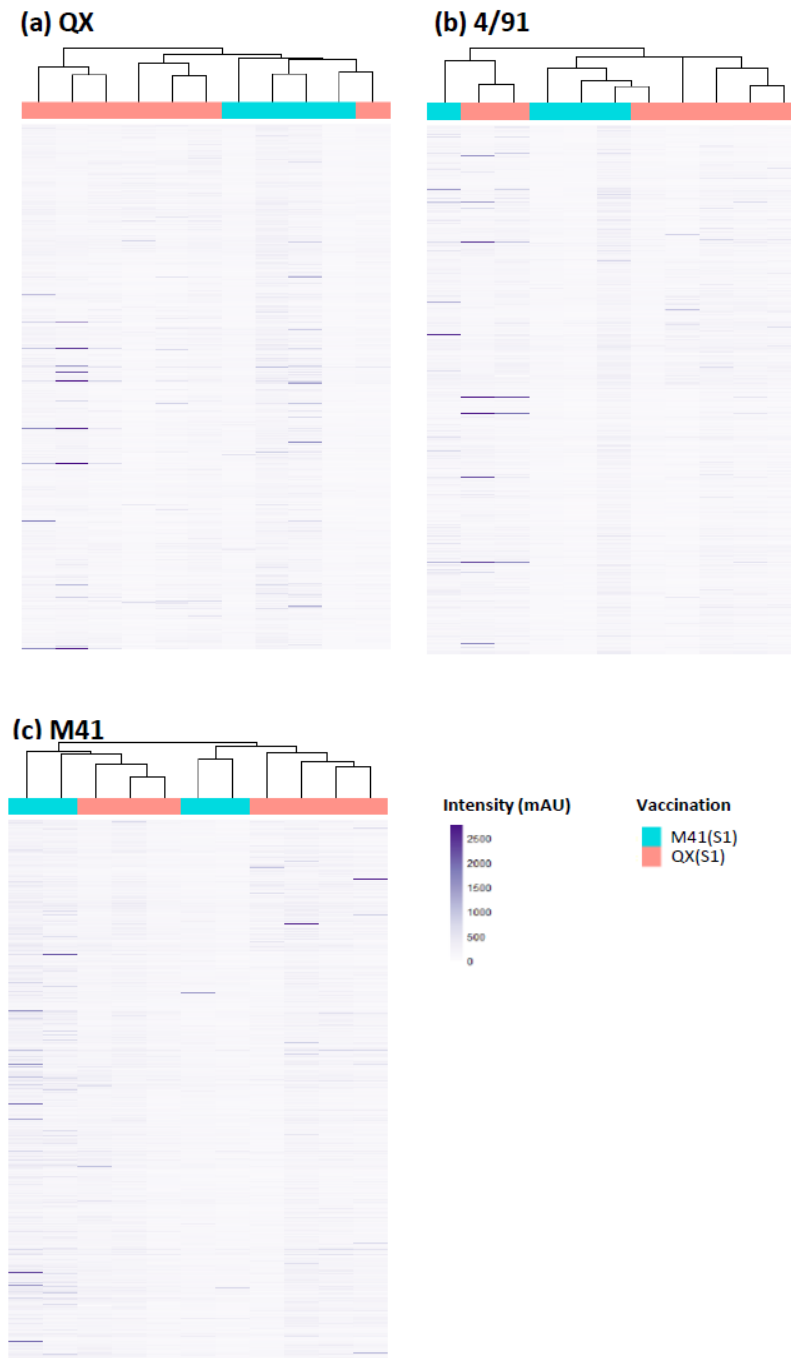


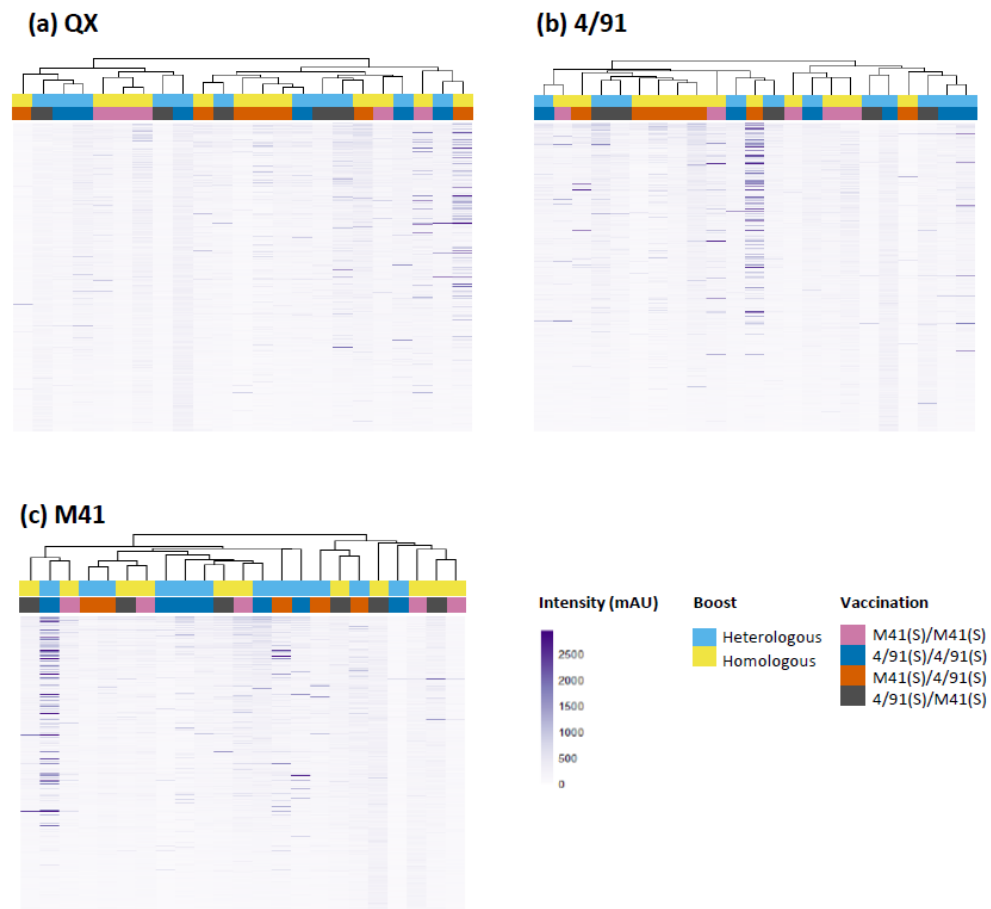
**Supplementary Figure S1.** Alignment of IBV S1 sequences from M41-CK, 4/91 and QX serotypes. The S1 subunits from M41-CK (GenBank: MK728875.1), 4/91 (UK) (GenBank: JN192154.1) and QX (L1148) (GenBank: KY933090.1) were aligned using ClustalW and the S1-NTD and S1-CTD, highlighted by boxes in blue and green respectively. The positions of the S1-NTD and S1-CTD areas determined by Shang et al 2018 (<https://doi.org/10.1371/journal.ppat.1007009>).



**Supplementary Figure S2.** Heat maps showing recognition of peptide sequences by pools of Mock/Mock, Mock/QX alongside individual sera from rIBV vaccinated homologous/vaccinated challenged chickens (collected at 14dpc).



**Supplementary Figure S3.** Heat maps showing recognition of peptide sequences by individual mapped sera from homologous vaccinated/challenged chickens (at 14 dpc) by binding to IBV S1 arrays, QX, 4/91 and M41.



**Supplementary Figure S4.** Heat maps showing recognition of peptide sequences by individual mapped sera from heterologous vaccinated/challenged chickens (at 14 dpc) by binding to IBV S1 arrays, QX, 4/91 and M41.