Supplementary information

Figure S1A and B. Maximum-likelihood phylogenetic tree of swine and human influenza A viruses isolated in North America between 2002-2019 and downsampled to retain 98% sequence identity. Tips are coloured by country of origin of swine strains (S1A) and host species the strain was isolated from (S1B).

Figure S1A

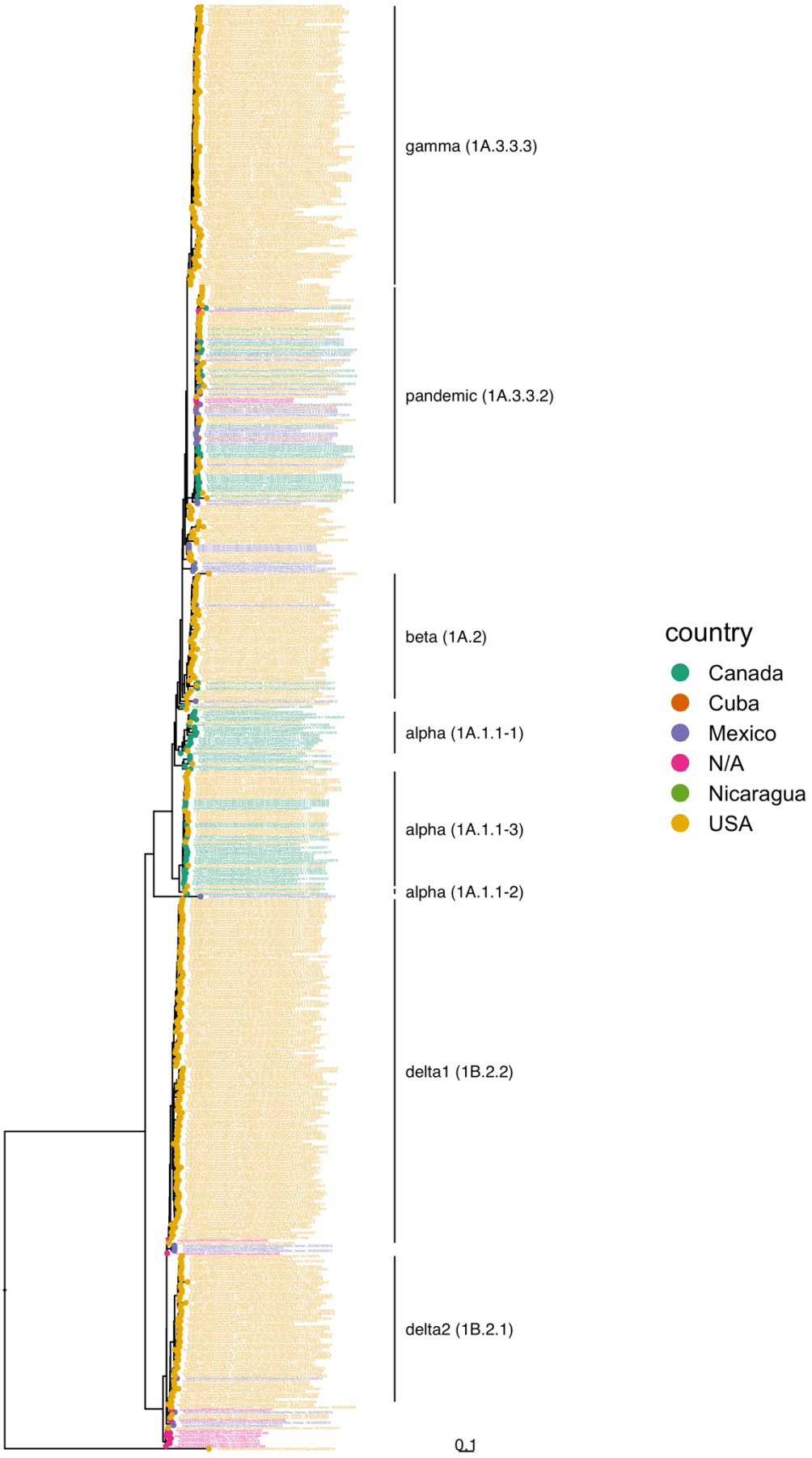


Figure S1B

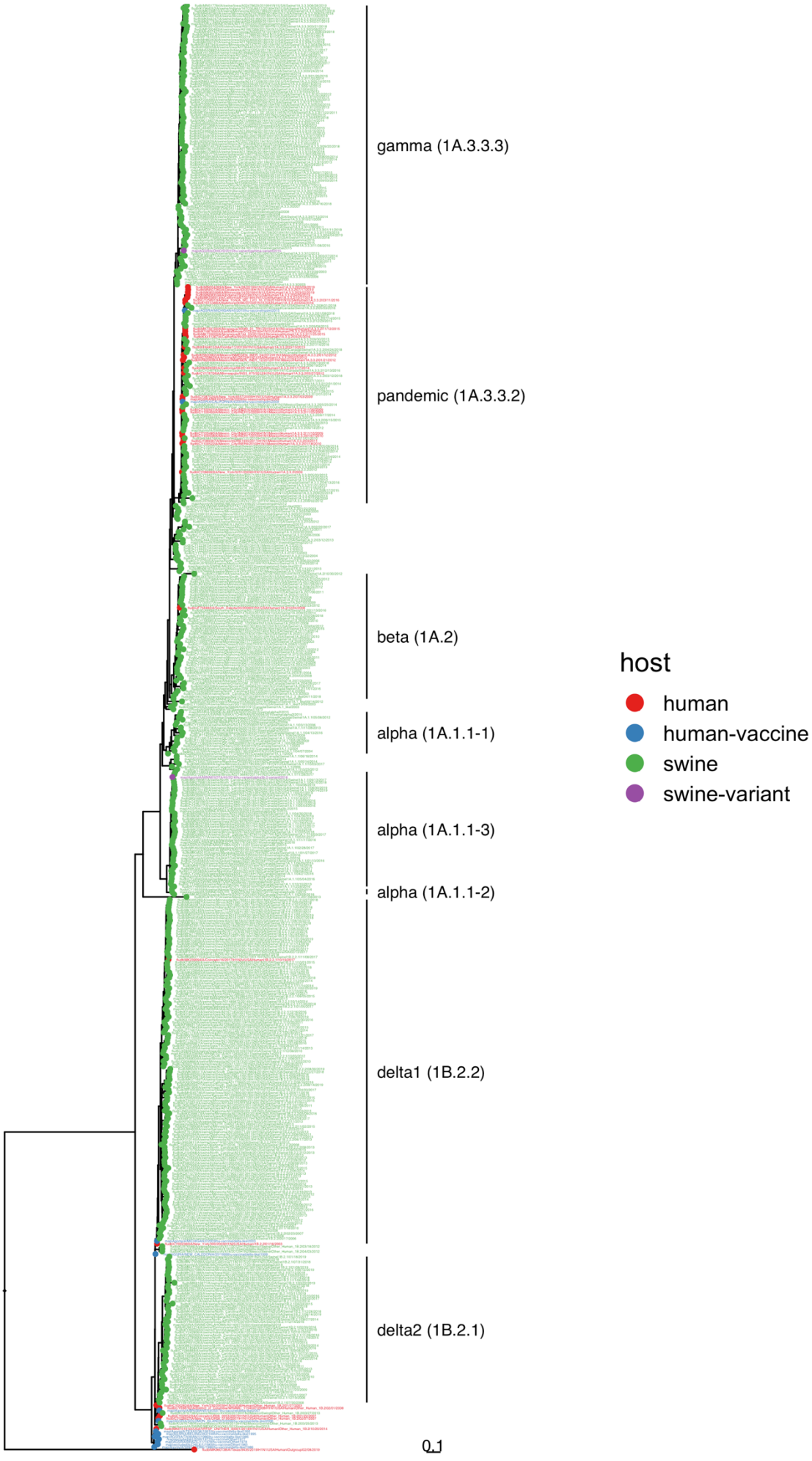

gamma (1A.3.3.3)
pandemic (1A.3.3.2)
beta (1A.2)
alpha (1A.1.1-1)
alpha (1A.1.1-3)
alpha (1A.1.1-2)
delta1 (1B.2.2)
delta2 (1B.2.1)
host
human
human-vaccine
swine
swine-variant
0.1

Figure S2. A scatterplot of genetic (amino acid) versus antigenic distance between viruses within the 1A and 1B lineages with a linear model regression line fitted to the data.

Figure S2

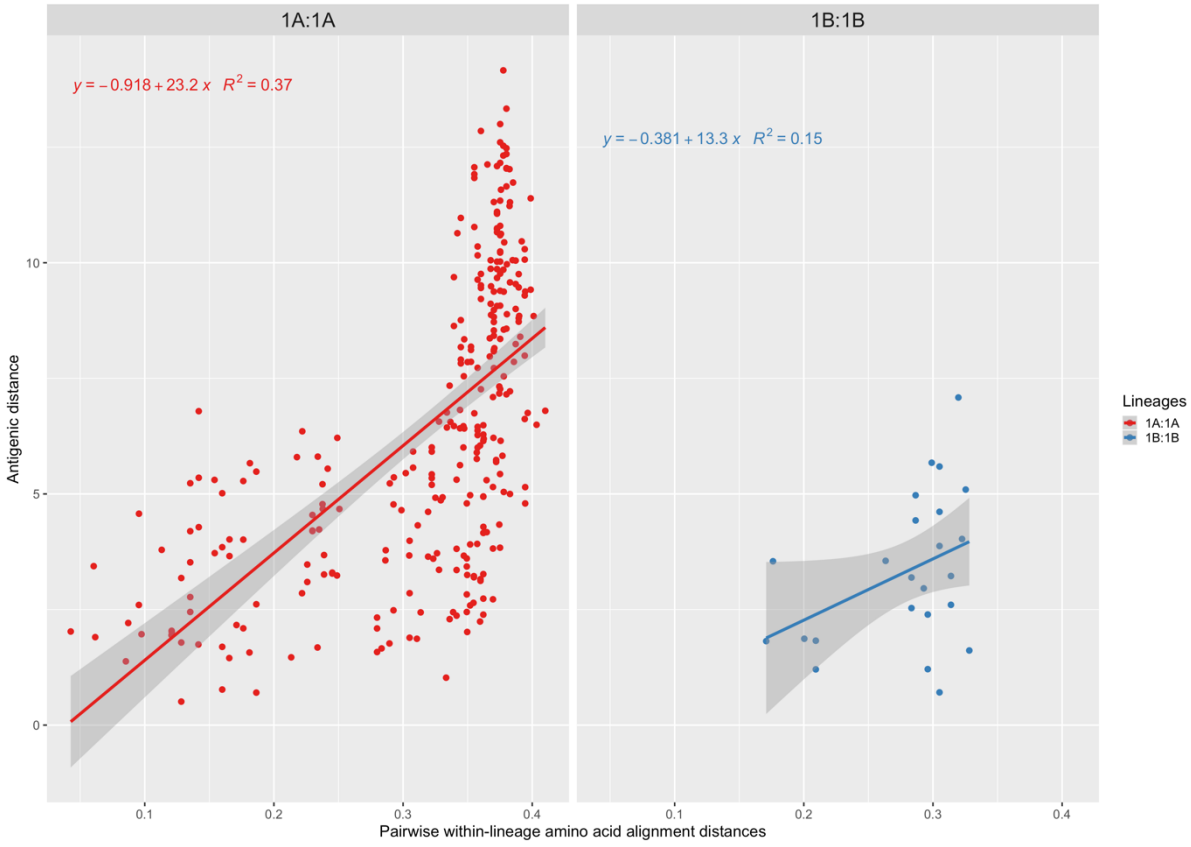
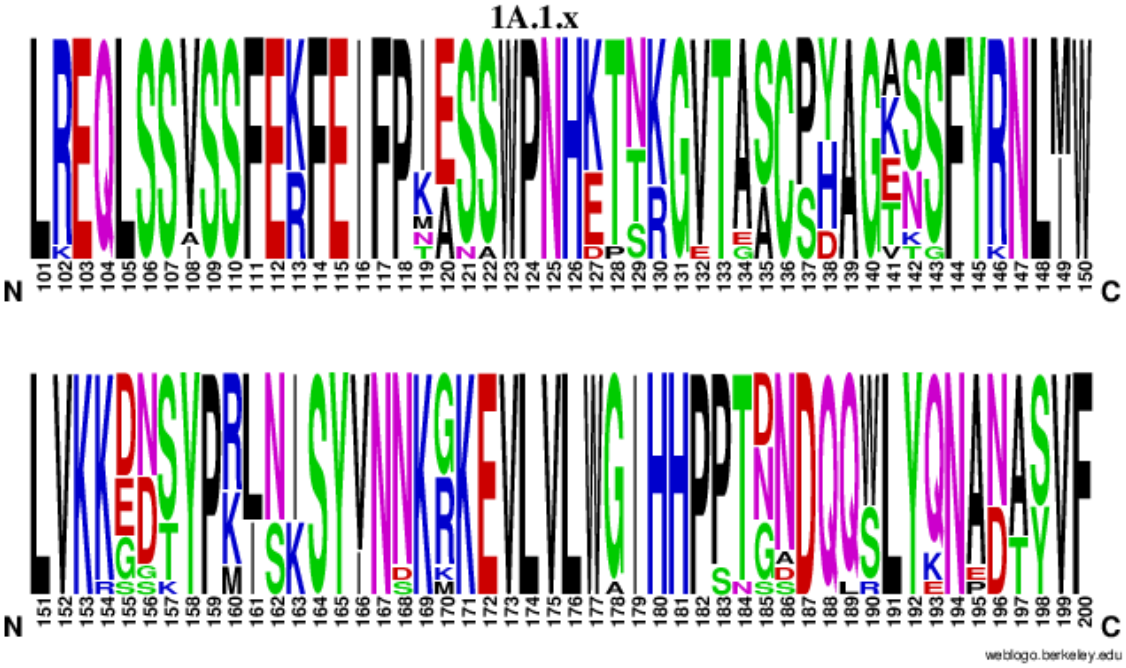
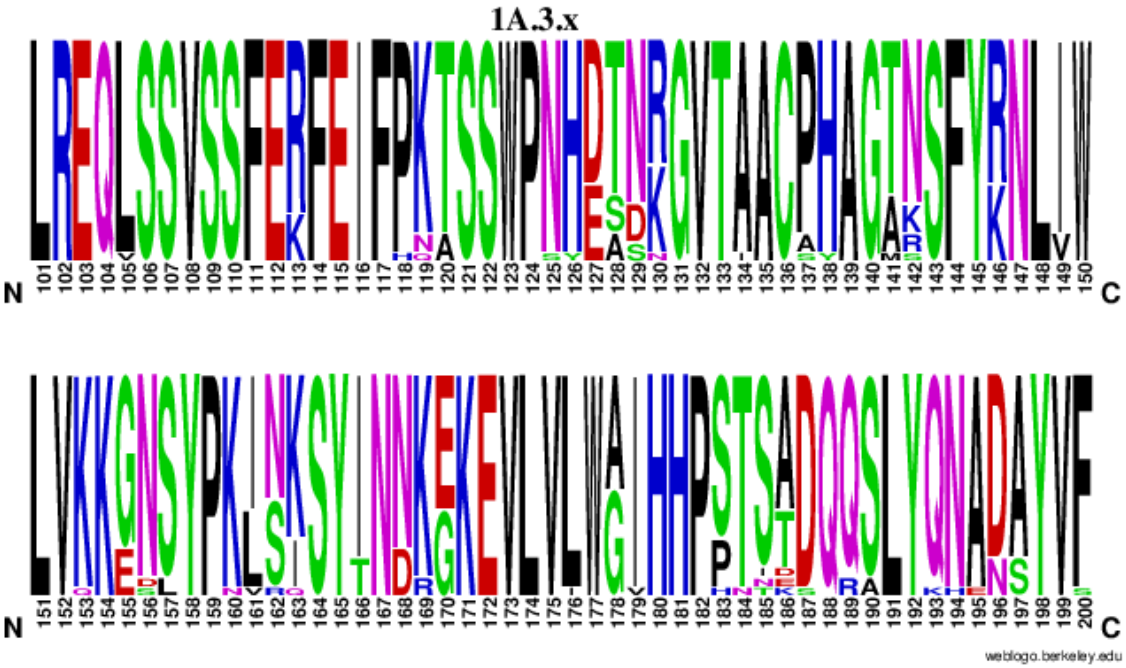


Figure S3 (A-D). Web-logo of the amino acid alignment (101-200) of each sub-lineage of North American swine influenza A virus: A (1A.1.x), B (1A.3.x), C (1B.2.1) and D (1B.2.2.1). Logo shows variation at each amino acid residue in a region of the protein in which largely determines antigenicity (recognised by host antibodies). (Crooks et al. 2004)

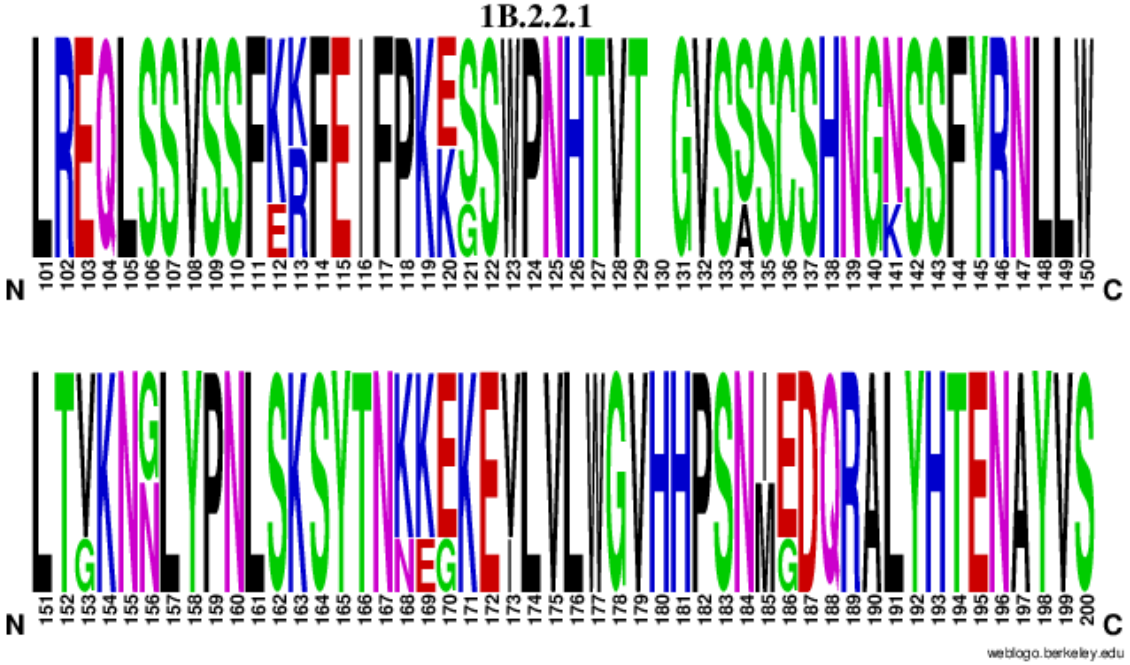
A



B



C


1B.2.2.1
N
C
webblogo.berkeley.edu

D

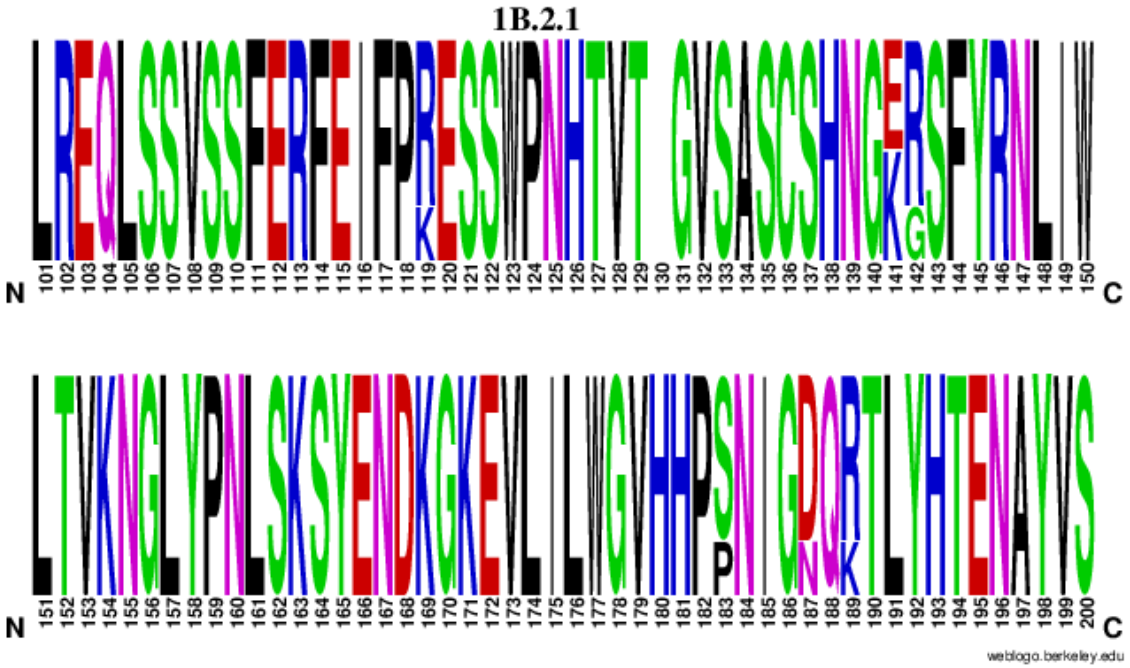

1B.2.1
N
C
webblogo.berkeley.edu

Figure S4 (A-B). Combined post-exposure and post-vaccination titres of human sera against representative swine strains, stratified by (A) low – to – high responders to MI15 (A/Michigan/45/2015) vaccine strain, (B) low – to – high responders to MI15 and period of birth (1945-76, 1977-88, 1989-96). Violin box plots show the median of aggregated HI titres against H1N1 strains with 5th and 95th percentile and standard deviation. Each dot represents the GMT: geometric mean titre, log2 (HI titre /10) of human sera on the y-axis against each strain (shown on x-axis). Cohorts are combined as results are similar for individual cohorts).

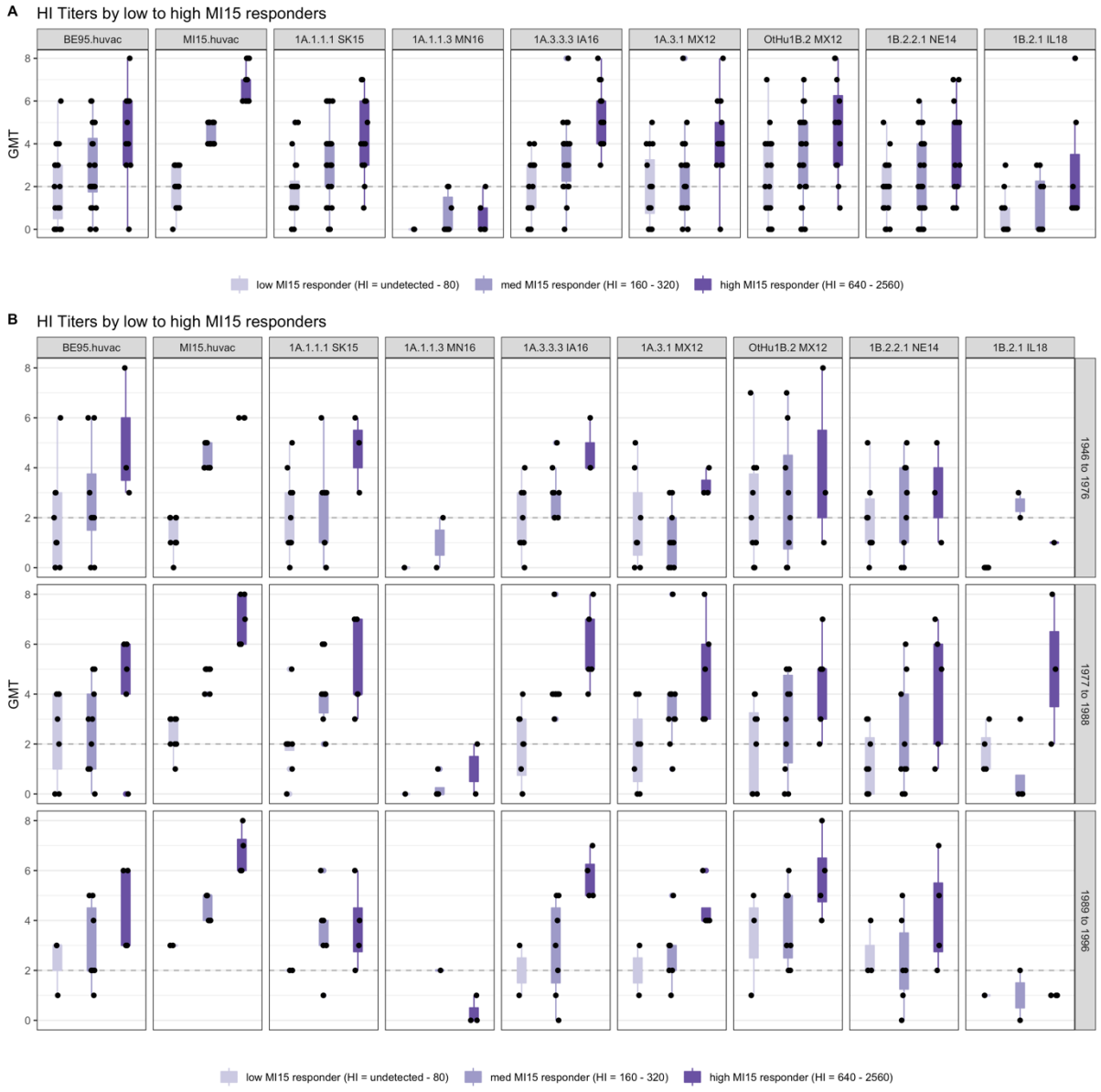


Figure S5. Spearman's correlation between HI titers against North American H1 swine strains and human seasonal H1 vaccine strains of post-exposure convalescent and post-vaccination human sera cohorts (combined as results similar to individual cohorts).

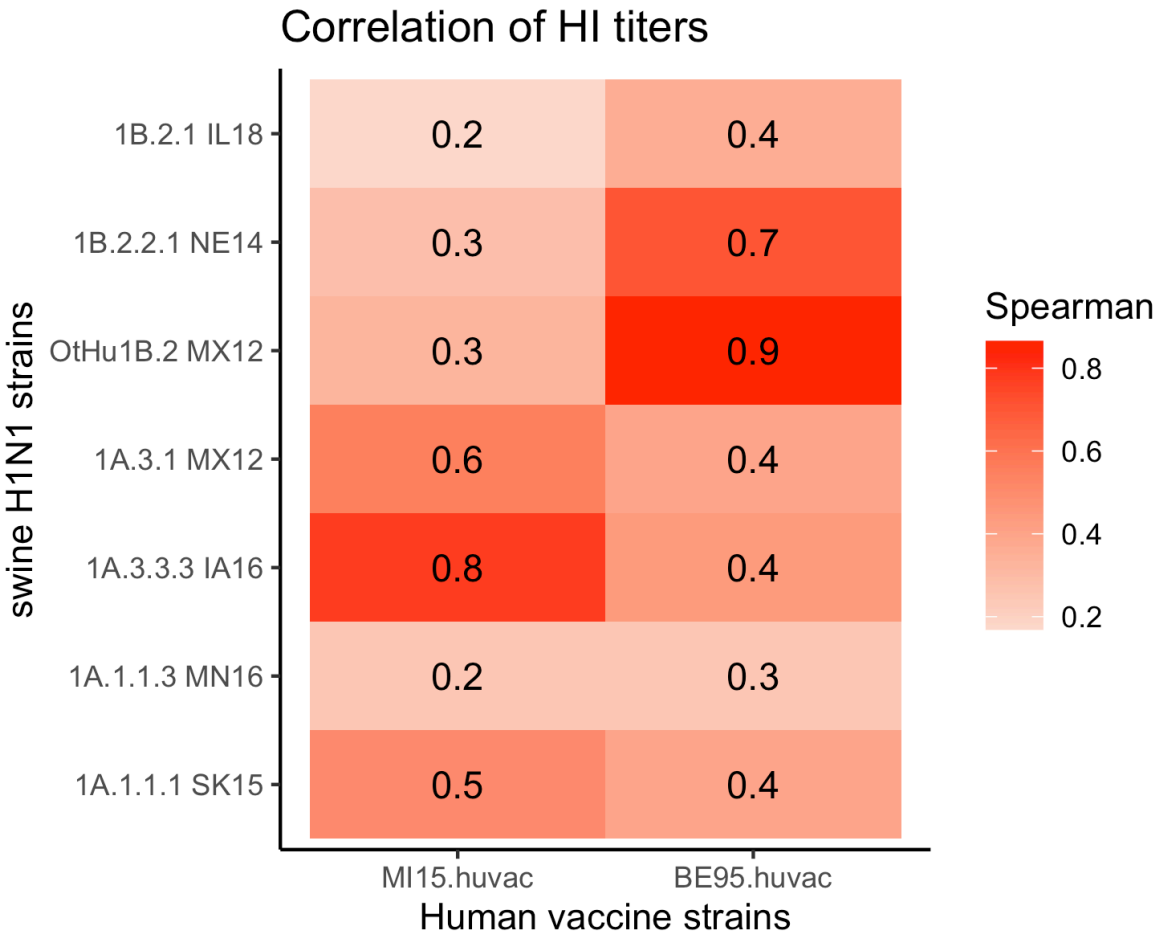


Table S1. A list of swine and human influenza A viruses and sera raised against them that have been used in this study.

Viruses tested agianst swine sera	virus clade	virus subtype	HA reference
A/swine/Alberta/SD0125/2015	1A.1.1	H1N1	MF768555
A/swine/Saskatchewan/SD0094/2015*	1A.1.1	H1N1	MF768483
A/swine/Alberta/SD0014/2013	1A.1.1	H1N1	CY195078
A/swine/Alberta/SD0154/2016	1A.1.1	H1N1	MF768523
A/swine/Manitoba/D0333/2014	1A.1.1	H1N2	CY195575
A/swine/Manitoba/D0392/2015	1A.1.1	H1N2	MF768531
A/swine/Saskatchewan/SD0102/2015	1A.1.1	H1N2	MF768539
A/swine/Manitoba/SD0114/2015	1A.1.1	H1N2	MF768507
A/swine/Alberta/SD0191/2016	1A.1.1	H1N2	MF768475
A/swine/Saskatchewan/SD0200/2016	1A.1.1	H1N2	MF768547
A/swine/Manitoba/D0348/2014	1A.1.1	H1N2	CY195295
A/Minnesota/45/2016	1A.1.1	H1N2	EPI760602
A/swine/Minnesota/A01781045/2016*	1A.1.1	H1N2	KX928680
A/swine/Mexico/AVX23/2012*	1A.2-3-like	H1N1	KU976649
A/swine/Illinois/A01493472/2014	1A.3.3.2	H1N1	KJ701784
A/California/04/2009	1A.3.3.2	H1N1	GQ280797
A/Mexico/4108/2009	1A.3.3.2	H1N1	GQ223112
A/Michigan/45/2015*	1A.3.3.2	H1N1	KU933493
A/swine/Mexico/AVX31/2012	1A.3.3.2	H1N1	KU976950
A/swine/Mexico/AVX44/2012	1A.3.3.2	H1N1	KU976796
A/swine/North Carolina/A02076926/2015	1A.3.3.3	H1N1	KT429540
A/swine/North Carolina/A01841602/2015	1A.3.3.3	H1N1	KR088267
A/swine/Ohio/A01847657/2015	1A.3.3.3	H1N1	KR780630
A/Ohio/09/2015	1A.3.3.3	H1N1	EPI587643
A/swine/Minnesota/A01567490/2014	1A.3.3.3	H1N1	KP662638
A/swine/North Carolina/A01797415/2015	1A.3.3.3	H1N1	KU357008
A/swine/Iowa/A01731653/2016*	1A.3.3.3	H1N1	KU877398
A/swine/North Carolina/A01730369/2016	1A.3.3.3	H1N1	KU695684
A/swine/Oklahoma/A01409770/2014	1B.2.1	H1N2	KJ437589
A/swine/Illinois/A02139356/2018*	1B.2.1	H1N2	MG917068
A/swine/Michigan/A01104117/2018	1B.2.1	H1N2	MH758776
A/swine/Minnesota/A01134353/2011	1B.2.2.1	H1N2	JQ906881
A/swine/Nebraska/A01492366/2014*	1B.2.2.1	H1N2	KJ549771
A/swine/Illinois/A01644323/2018	1B.2.2.1	H1N2	MG825101
A/Brazil/11/1978	Other-Human	H1N1	CY020293
A/New Caledonia/20/1999	Other-Human-1B.2	H1N1	EU103824
A/swine/Mexico/AVX18/2012*	Other-Human-1B.2	H1N2	KU976609
A/swine/Mexico/AVX61/2013	Other-Human-1B.2	H1N2	KU976596
A/Solomon Islands/3/2006	Other-Human-1B.2	H1N1	EU124135
A/Singapore/6/1986	Other-Human-1B.2	H1N1	CY020477
A/Taiwan/1/1986	Other-Human-1B.2	H1N1	X17224
A/Texas/36/1991	Other-Human-1B.2	H1N1	AJ457908
A/Beijing/262/1995*	Other-Human-1B.2	H1N1	AJ457900
A/Michigan/2/2003	Other-Human-1B.2	H1N2	CY016324
A/Brisbane/59/2007	Other-Human-1B.2	H1N1	KF009550

*viruses tested against human sera

Swine sera raised against virus	virus clade	virus subtype	HA reference
A/swine/Iowa/1973	1A.1.1	H1N1	EU139826
A/swine/Alberta/SD0125/2015	1A.1.1	H1N1	MF768555
A/swine/Alberta/SD0014/2013	1A.1.1	H1N1	CY195078
A/swine/Alberta/SD0154/2016	1A.1.1	H1N1	MF768523
A/swine/Manitoba/D0333/2014	1A.1.1	H1N2	CY195575
A/swine/Minnesota/02053/2008	1A.1.1	H1N1	HM461762
A/swine/Manitoba/D0392/2015	1A.1.1	H1N2	MF768531
A/swine/Saskatchewan/SD0102/2015	1A.1.1	H1N2	MF768539
A/swine/Manitoba/SD0114/2015	1A.1.1	H1N2	MF768507
A/swine/Saskatchewan/SD0142/2016	1A.1.1	H1N2	MK462362
A/swine/Minnesota/A01781045/2016	1A.1.1	H1N2	KX928680
A/swine/Minnesota/37866/1999	1A.2-3-like	H1N1	EU139827
A/swine/South Dakota/A01349306/2013	1A.3.2	H1N1	KC844200
A/swine/Minnesota/1192/2001	1A.3.3-like	H1N2	EU139828
A/Mexico/4108/2009	1A.3.3.2	H1N1	GQ223112
A/swine/Illinois/A01493472/2014	1A.3.3.2	H1N1	KJ701784
A/California/04/2009	1A.3.3.2	H1N1	GQ280797
A/Michigan/45/2015	1A.3.3.2	H1N1	KU933493
A/swine/Minnesota/00194/2003	1A.3.3.3	H1N2	EU139830
A/swine/Kansas/00246/2004	1A.3.3.3	H1N2	CY081680
A/swine/OH/511445/2007	1A.3.3.3	H1N1	EU604689
A/swine/Missouri/02060/2008	1A.3.3.3	H1N1	CY082655
A/swine/North Carolina/02023/2008	1A.3.3.3	H1N1	HM461818
A/swine/Ohio/02026/2008	1A.3.3.3	H1N1	CY082631
A/Ohio/09/2015	1A.3.3.3	H1N1	EPI587643
A/swine/Iowa/A01731653/2016	1A.3.3.3	H1N1	KU877398
A/swine/Illinois/00685/2005	1B.2.1	H1	CY081899
A/swine/Oklahoma/A01409770/2014	1B.2.1	H1N2	KJ437589
A/swine/Minnesota/A01134353/2011	1B.2.2.1	H1N2	JQ906881
A/swine/Nebraska/A01492366/2014	1B.2.2.1	H1N2	KJ549771
A/Brazil/11/1978	Other-Human	H1N1	CY020293
A/Taiwan/1/1986	Other-Human-1B.2	H1N1	X17224
A/Beijing/262/1995	Other-Human-1B.2	H1N1	AJ457900
A/New Caledonia/20/1999	Other-Human-1B.2	H1N1	EU103824
A/Solomon Islands/3/2006	Other-Human-1B.2	H1N1	EU124135

Table S2. Hemagglutination inhibition titres against homologous and heterologous strains extracted from the antigenic map.

	Swine serum IDs	EXP428-P592	EXP428-P560	EXP428-P569	EXP428-P578	EXP428-P581	EXP467-P821	EXP569-P859	EXP569-P860	EXP480-P868	EXP480-P869	EXP480-P864	EXP480-P865	EXP480-P866	EXP480-P867	EXP569B-P927	EXP569B-P928	EXP496M-P960	EXP496M-P962	EXP496M-963	EXP496M-966	EXP604-P50	EXP604-P51	EXP592B-P3
Antigen names	Passage/Serum names	A/SWINE/MINNESOTA/1192/2001	A/SWINE/MINNESOTA/00194/2003	A/SWINE/MINNESOTA/00194/2003	A/SWINE/KANSAS/00246/2004	A/SWINE/KANSAS/00246/2004	A/SWINE/OHIO/511445/2007	A/SWINE/OHIO/511445/2007	A/SWINE/OHIO/511445/2007	A/SWINE/MISSOURI/02060/2008	A/SWINE/MISSOURI/02060/2008	A/SWINE/NORTH_CAROLINA/02023/2008	A/SWINE/NORTH_CAROLINA/02023/2008	A/SWINE/OHIO/02026/2008	A/SWINE/OHIO/02026/2008	A/SWINE/SOUTH_DAKOTA/A01349306/2013	A/SWINE/SOUTH_DAKOTA/A01349306/2013	A/CALIFORNIA/4/2009	A/CALIFORNIA/4/2009	A/MEXICO/4108/2009	A/MEXICO/4108/2009	A/OHIO/9/2015	A/OHIO/9/2015	A/SWINE/ILLINOIS/A01493472/2014
A/SWINE/NORTH_CAROLINA/A02076926/2015	MDCK2	80	<10	40	80	80	80	80	40	80	80	<10	40	<10	320	40	20	640	640	160	80	20	80	20
A/SWINE/NORTH_CAROLINA/A01841602/2015	MDCK2	<10	<10	<10	10	40	40	10	40	80	40	<10	20	<10	160	20	<10	80	80	80	20	20	40	10
A/SWINE/OHIO/A01847657/2015	MDCK2	<10	<10	<10	<10	40	20	<10	20	20	20	<10	10	<10	160	40	<10	80	80	40	20	20	40	<10
A/OHIO/9/2015	MDCK2	20	<10	<10	20	40	40	<40	*	160	80	<10	10	<10	160	57	<20	127	160	80	80	127	160	10
A/SWINE/ILLINOIS/A01493472/2014	MDCK2	320	320	320	320	160	80	160	80	80	160	40	80	10	40	320	80	2560	5120	2560	2560	<10	<10	160
A/SWINE/MINNESOTA/A01567490/2014	MDCK2	160	320	160	1280	320	1280	640	160	640	640	160	320	80	640	160	80	1280	1280	320	320	20	40	<10
A/CALIFORNIA/4/2009	MDCK4	160	160	160	80	160	80	101	*	20	80	40	40	10	40	226	113	3225	5120	2560	2560	<10	<10	80
A/MEXICO/4108/2009	MDCK3	160	320	160	160	160	160	160	80	160	320	40	80	20	80	640	80	5120	5120	2560	1280	10	<10	80
A/BRAZIL/11/1978	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	<10	<10	<10	<10	*	*	<10	<10	*
A/NEW_CALEDONIA/20/1999	E2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	80	20	<20	<40	*	*	<20	<10	*
A/MICHIGAN/45/2015	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	80	40	*	*	*	*	<10	<10	*
A/SWINE/NORTH_CAROLINA/A01797415/2015	MDCK3	*	*	*	*	*	*	640	640	*	*	*	*	*	*	160	40	640	640	*	*	40	40	*
A/SWINE/IOWA/A01731653/2016	MDCK3	*	*	*	*	*	*	80	80	*	*	*	*	*	*	80	20	160	320	*	*	<10	10	*
A/SWINE/MEXICO/AVX31/2012	MDCK2	*	*	*	*	*	*	160	160	*	*	*	*	*	*	640	320	2560	2560	*	*	20	10	*
A/SWINE/MEXICO/AVX23/2012	MDCK2	*	*	*	*	*	*	160	160	*	*	*	*	*	*	40	10	320	640	*	*	<10	<10	*
A/SWINE/MEXICO/AVX44/2012	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	640	80	80	160	*	*	<10	<10	*
A/SWINE/MEXICO/AVX18/2012	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	<10	<10	<10	<10	*	*	20	<10	*
A/SWINE/MEXICO/AVX61/2013	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	10	10	<10	<10	*	*	10	10	*
A/SOLOMON_ISLANDS/3/2006	E2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	<10	<10	*	*	<10	<10	*
A/SWINE/ALBERTA/SD0125/2015	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	160	320	*	*	*	*	*
A/SWINE/SASKATCHEWAN/SD0094/2015	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	160	160	*	*	*	*	*
A/SWINE/ALBERTA/SD0014/2013	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	80	160	*	*	*	*	*
A/SWINE/ALBERTA/SD0154/2016	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	320	320	*	*	*	*	*
A/SWINE/MANITOBA/D0333/2014	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	40	80	*	*	*	*	*
A/SWINE/MANITOBA/D0392/2014	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<10	<10	*	*	*	*	*
A/SWINE/SASKATCHEWAN/SD0102/2015	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<10	<10	*	*	*	*	*
A/SWINE/MANITOBA/SD0114/2015	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<10	<10	*	*	*	*	*
A/SWINE/ALBERTA/SD0191/2016	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<10	<10	*	*	*	*	*
A/SWINE/SASKATCHEWAN/SD0200/2016	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<10	<10	*	*	*	*	*
A/SWINE/MANITOBA/D0348/2014	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<10	<10	*	*	*	*	*
A/MINNESOTA/45/2016	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<10	<10	*	*	*	*	*
A/SWINE/MINNESOTA/A01781045/2016	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SINGAPORE/1986	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	<10	10	*	*	10	10	*
A/TAIWAN/1/1986	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	<10	20	*	*	<10	<10	*
A/TEXAS/36/1991	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	10	40	*	*	<10	<10	*
A/BEIJING/262/1995	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	<10	<10	*	*	<10	<10	*
A/MICHIGAN/2/2003	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	<10	<10	*	*	<10	<10	*
A/BRISBANE/59/2007	MDCK3	*	*	*	*	*	*	10	20	*	*	*	*	*	*	*	*	<10	<10	*	*	10	10	*
A/SWINE/NORTH_CAROLINA/A01730369/2016	MDCK3	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	160	320	*	*	<10	<10	*
A/SOLOMON_ISLANDS/3/2006	E2/M1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/MINNESOTA/A01134353/2011	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/NEBRASKA/A01492366/2014	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/ILLINOIS/A01644323/2018	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/OKLAHOMA/A01409770/2014	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/ILLINOIS/A02139356/2018	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/MICHIGAN/A01104117/2018	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

	Swine serum IDs	EXP604-P18	EXP604-P19	EXP604-P38	EXP604-P39	EXP604-P16	EXP604-P17	EXP527-P460	EXP527-P462	EXP527-P468	EXP527-P471	FLU17-P706	FLU17-P707	FLU14-P703	FLU14-P705	EXP428-P593	EXP428-P595	EXP428-P532	EXP428-P588	FLU7-P501	FLU7-P502	EXP535-P171	EXP535-P172
Antigen names	Passage/Serum names	A/BRAZIL/11/1978	A/BRAZIL/11/1978	A/TAIWAN/1/1986	A/TAIWAN/1/1986	A/BEIJING/262/1995	A/BEIJING/262/1995	A/NEW_CALEDONIA/20/1999	A/NEW_CALEDONIA/20/1999	A/SOLOMON_ISLANDS/3/2006	A/SOLOMON_ISLANDS/3/2006	A/CALIFORNIA/4/2009	A/CALIFORNIA/4/2009	A/MICHIGAN/45/2015	A/MICHIGAN/45/2015	A/SWINE/IOWA/1973	A/SWINE/IOWA/1973	A/SWINE/MINNESOTA/37866/1999	A/SWINE/MINNESOTA/37866/1999	A/SWINE/IOWA/A01731653/2016	A/SWINE/IOWA/A01731653/2016	A/SWINE/ILLINOIS/00685/2005	A/SWINE/ILLINOIS/00685/2005
A/SWINE/NORTH_CAROLINA/A02076926/2015	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/NORTH_CAROLINA/A01841602/2015	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/OHIO/A01847657/2015	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/OHIO/9/2015	MDCK2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	160	160	<10	10	80	160	80	226	<10	<10	<10	<10
A/SWINE/ILLINOIS/A01493472/2014	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/MINNESOTA/A01567490/2014	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/CALIFORNIA/4/2009	MDCK4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2560	640	160	160	20	80	80	320	<10	<10	<10	<10
A/MEXICO/4108/2009	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/BRAZIL/11/1978	MDCK2	202	320	24	17	<40	<40	<10	<10	<10	<10	*	*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
A/NEW_CALEDONIA/20/1999	E2	<10	<10	<20	<10	20	28	127	127	25	101	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	101	160
A/MICHIGAN/45/2015	MDCK3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	320	80	160	160	*	*	40	160	<10	<10	*	*
A/SWINE/NORTH_CAROLINA/A01797415/2015	MDCK3	<10	<10	10	20	10	<10	<10	<10	10	40	80	40	20	10	40	160	320	640	320	640	10	20
A/SWINE/IOWA/A01731653/2016	MDCK3	<10	<10	<10	10	<10	<10	<10	<10	<10	<10	80	20	40	40	20	80	160	320	1280	640	<10	<10
A/SWINE/MEXICO/AVX31/2012	MDCK2	10	10	<10	<10	<10	<10	<10	<10	<10	<10	1280	320	160	160	20	40	320	320	40	20	<10	<10
A/SWINE/MEXICO/AVX23/2012	MDCK2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	160	160	160	40	20	10	320	640	80	40	<10	<10
A/SWINE/MEXICO/AVX44/2012	MDCK2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	160	80	40	20	40	40	10	40	<10	<10	<10	<10
A/SWINE/MEXICO/AVX18/2012	MDCK2	10	<10	20	10	80	80	320	320	80	320	10	<10	<10	<10	<10	10	<10	<10	<10	<10	320	320
A/SWINE/MEXICO/AVX61/2013	MDCK2	10	10	10	10	10	10	20	20	10	20	20	10	10	10	10	<10	<10	<10	20	20	10	10
A/SOLOMON_ISLANDS/3/2006	E2	<10	<10	*	<20	14	80	<40	*	453	640	*	*	<10	<10	*	*	<10	<10	*	*	113	80
A/SWINE/ALBERTA/SD0125/2015	MDCK2	*	*	<10	<10	<10	*	<10	<10	<10	<10	*	*	320	80	*	*	*	*	*	*	<10	<10
A/SWINE/SASKATCHEWAN/SD0094/2015	MDCK2	*	*	<10	10	10	*	<10	<10	<10	10	*	*	160	80	*	*	*	*	*	*	<10	<10
A/SWINE/ALBERTA/SD0014/2013	MDCK2	*	*	<10	<10	<10	*	<10	<10	<10	<10	*	*	40	20	*	*	*	*	*	*	<10	<10
A/SWINE/ALBERTA/SD0154/2016	MDCK2	*	*	<10	<10	<10	*	<10	<10	<10	<10	*	*	160	160	*	*	*	*	*	*	<10	<10
A/SWINE/MANITOBA/D0333/2014	MDCK2	*	*	<10	<10	<10	*	<10	<10	<10	<10	*	*	<10	10	*	*	*	*	*	*	<10	<10
A/SWINE/MANITOBA/D0392/2014	MDCK2	*	*	<10	<10	<10	*	<10	<10	<10	<10	*	*	<10	<10	*	*	*	*	*	*	<10	<10
A/SWINE/SASKATCHEWAN/SD0102/2015	MDCK2	*	*	<10	<10	<10	*	<10	<10	<10	<10	*	*	<10	<10	*	*	*	*	*	*	<10	<10
A/SWINE/MANITOBA/SD0114/2015	MDCK2	*	*	<10	<10	<10	*	<10	<10	<10	<10	*	*	<10	<10	*	*	*	*	*	*	<10	<10
A/SWINE/ALBERTA/SD0191/2016	MDCK2	*	*	<10	<10	<10	*	<10	<10	<10	<10	*	*	<10	<10	*	*	*	*	*	*	20	80
A/SWINE/SASKATCHEWAN/SD0200/2016	MDCK2	*	*	10	<10	<10	*	20	40	<10	<10	*	*	<10	<10	*	*	*	*	*	*	160	320
A/SWINE/MANITOBA/D0348/2014	MDCK2	*	*	10	10	10	*	80	160	<10	<10	*	*	<10	<10	*	*	*	*	*	*	<10	<10
A/MINNESOTA/45/2016	MDCK3	*	*	<10	<10	<10	*	<10	<10	<10	<10	*	*	<10	<10	*	*	*	*	*	*	<10	<10
A/SWINE/MINNESOTA/A01781045/2016	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SINGAPORE/1986	MDCK2	10	10	40	40	10	<10	10	20	20	40	*	*	*	*	*	*	<10	20	*	*	160	80
A/TAIWAN/1/1986	MDCK2	40	10	320	320	<10	<10	<10	<10	<10	<10	*	*	*	*	*	*	<10	<10	*	*	<10	10
A/TEXAS/36/1991	MDCK2	10	10	320	320	20	20	<10	<10	10	10	*	*	*	*	*	*	<10	<10	*	*	<10	20
A/BEIJING/262/1995	MDCK2	<10	<10	10	10	160	160	80	80	10	20	*	*	*	*	*	*	<10	<10	*	*	80	80
A/MICHIGAN/2/2003	MDCK2	*	*	20	20	28	40	80	80	40	80	*	*	*	*	*	*	<10	<10	*	*	160	226
A/BRISBANE/59/2007	MDCK3	<10	<10	<10	<10	<10	<10	<10	<10	80	80	*	*	*	*	*	*	<10	<10	*	*	<10	<10
A/SWINE/NORTH_CAROLINA/A01730369/2016	MDCK3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	*	*	*	*	*	*	20	<10	*	*	80	160
A/SOLOMON_ISLANDS/3/2006	E2/M1	20	10	40	20	10	40	*	*	320	320	*	*	*	*	*	*	*	*	*	*	40	40
A/SWINE/MINNESOTA/A01134353/2011	MDCK3	10	<10	<10	<10	<10	<10	*	*	<10	<10	*	*	*	*	*	*	*	*	*	*	10	10
A/SWINE/NEBRASKA/A01492366/2014	MDCK3	40	40	40	20	20	40	*	*	<10	20	*	*	*	*	*	*	*	*	*	*	160	80
A/SWINE/ILLINOIS/A01644323/2018	MDCK3	20	10	10	10	10	10	*	*	<10	10	*	*	*	*	*	*	*	*	*	*	40	10
A/SWINE/OKLAHOMA/A01409770/2014	MDCK3	20	20	10	10	20	<10	*	*	10	10	*	*	*	*	*	*	*	*	*	*	20	10
A/SWINE/ILLINOIS/A02139356/2018	MDCK3	<10	<10	<10	<10	<10	<10	*	*	<10	<10	*	*	*	*	*	*	*	*	*	*	10	<10
A/SWINE/MICHIGAN/A01104117/2018	MDCK2	10	10	20	20	20	10	*	*	20	20	*	*	*	*	*	*	*	*	*	*	80	80

	Swine serum IDs	SD-P3	SD-P4	SD-P10	SD-P11	SD-P12	SD-P15	EXP480-P874	EXP480-P875	SD-P7	SD-P8	SD-P1	SD-P2	SD-P5	SD-P6	SD-P17	SD-P18	FLU9-P583	FLU9-P585	EXPXXX-P175	EXPXXX-P176	EXPXXX-P291	EXPXXX-P292	EXPXXX-P1	EXPXXX-P2
Antigen names	Passage/Serum names	A/SWINE/ALBERTA/SD0125/2015	A/SWINE/ALBERTA/SD0125/2015	A/SWINE/ALBERTA/SD0014/2013	A/SWINE/ALBERTA/SD0154/2016	A/SWINE/ALBERTA/SD0154/2016	A/SWINE/MANITOBA/D0333/2014	A/SWINE/MINNESOTA/02053/2008	A/SWINE/MINNESOTA/02053/2008	A/SWINE/MANITOBA/D0392/2014	A/SWINE/MANITOBA/D0392/2014	A/SWINE/SASKATCHEWAN/SD0102/2015	A/SWINE/SASKATCHEWAN/SD0102/2015	A/SWINE/MANITOBA/SD0114/2015	A/SWINE/MANITOBA/SD0114/2015	A/SWINE/SASKATCHEWAN/SD0142/2016	A/SWINE/SASKATCHEWAN/SD0142/2016	A/SWINE/MINNESOTA/A01781045/2016	A/SWINE/MINNESOTA/A01781045/2016	A/SWINE/MINNESOTA/A01134353/2011	A/SWINE/MINNESOTA/A01134353/2011	A/SWINE/NEBRASKA/A01492366/2014	A/SWINE/NEBRASKA/A01492366/2014	A/SWINE/OKLAHOMA/A01409770/2014	A/SWINE/OKLAHOMA/A01409770/2014
A/SWINE/NORTH_CAROLINA/A02076926/2015	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/NORTH_CAROLINA/A01841602/2015	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/OHIO/A01847657/2015	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/OHIO/9/2015	MDCK2	*	*	*	*	*	*	10	<10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/ILLINOIS/A01493472/2014	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/MINNESOTA/A01567490/2014	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/CALIFORNIA/4/2009	MDCK4	*	*	*	*	*	*	10	<10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/MEXICO/4108/2009	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/BRAZIL/11/1978	MDCK2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	*	*	<10	<10	<10	<10	20	20
A/NEW_CALEDONIA/20/1999	E2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	*	*	*	*	*	*	*	*
A/MICHIGAN/45/2015	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/NORTH_CAROLINA/A01797415/2015	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/IOWA/A01731653/2016	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/MEXICO/AVX31/2012	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/MEXICO/AVX23/2012	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/MEXICO/AVX44/2012	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/MEXICO/AVX18/2012	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/MEXICO/AVX61/2013	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SOLOMON_ISLANDS/3/2006	E2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	*	*	*	*	*	*	*	*
A/SWINE/ALBERTA/SD0125/2015	MDCK2	640	160	10	80	160	<10	40	80	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	*	*	*	*	*	*
A/SWINE/SASKATCHEWAN/SD0094/2015	MDCK2	80	20	20	40	160	<10	160	160	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	*	*	*	*	*	*
A/SWINE/ALBERTA/SD0014/2013	MDCK2	40	10	320	20	80	<10	20	40	<10	<10	<10	<10	<10	<10	<10	10	<10	<10	*	*	*	*	*	*
A/SWINE/ALBERTA/SD0154/2016	MDCK2	80	20	10	160	640	<10	40	40	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	*	*	*	*	*	*
A/SWINE/MANITOBA/D0333/2014	MDCK2	<10	<10	<10	<10	<10	80	<10	<10	<10	10	<10	<10	<10	<10	20	<10	<10	<10	*	*	*	*	*	*
A/SWINE/MANITOBA/D0392/2014	MDCK2	<10	<10	<10	<10	<10	<10	<10	<10	80	40	<10	<10	<10	<10	20	<10	<10	10	*	*	*	*	*	*
A/SWINE/SASKATCHEWAN/SD0102/2015	MDCK2	<10	<10	<10	<10	<10	<10	<10	<10	160	80	320	320	40	20	320	160	20	80	*	*	*	*	*	*
A/SWINE/MANITOBA/SD0114/2015	MDCK2	<10	<10	<10	<10	<10	10	<10	<10	320	160	160	160	640	160	80	320	40	80	*	*	*	*	*	*
A/SWINE/ALBERTA/SD0191/2016	MDCK2	<10	<10	<10	<10	<10	20	<10	<10	320	640	640	640	80	40	320	320	40	160	*	*	*	*	*	*
A/SWINE/SASKATCHEWAN/SD0200/2016	MDCK2	<10	<10	<10	<10	<10	10	<10	<10	640	640	320	640	80	160	1280	640	40	160	*	*	*	*	*	*
A/SWINE/MANITOBA/D0348/2014	MDCK2	<10	<10	<10	<10	<10	10	<10	<10	320	320	320	320	160	80	640	160	80	160	*	*	*	*	*	*
A/MINNESOTA/45/2016	MDCK3	<10	<10	<10	<10	<10	<10	<10	<10	40	40	40	40	10	10	40	10	80	160	*	*	*	*	*	*
A/SWINE/MINNESOTA/A01781045/2016	MDCK2	<10	<10	<10	<10	<10	<10	<10	<10	40	40	20	20	40	20	10	40	160	320	*	*	*	*	*	*
A/SINGAPORE/1986	MDCK2	*	*	*	*	*	*	10	10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/TAIWAN/1/1986	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/TEXAS/36/1991	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/BEIJING/262/1995	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/MICHIGAN/2/2003	MDCK2	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	*	*	40	40	80	160	20	10
A/BRISBANE/59/2007	MDCK3	*	*	*	*	*	*	<10	<10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SWINE/NORTH_CAROLINA/A01730369/2016	MDCK3	*	*	*	*	*	*	160	80	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
A/SOLOMON_ISLANDS/3/2006	E2/M1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	20	40	<10	<10	<10	<10
A/SWINE/MINNESOTA/A01134353/2011	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1280	640	40	40	<10	<10
A/SWINE/NEBRASKA/A01492366/2014	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	40	80	320	160	40	10
A/SWINE/ILLINOIS/A01644323/2018	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1280	320	320	160	20	<10
A/SWINE/OKLAHOMA/A01409770/2014	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	10	10	40	40	80	80
A/SWINE/ILLINOIS/A02139356/2018	MDCK3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	<10	<10	10	20	20	20
A/SWINE/MICHIGAN/A01104117/2018	MDCK2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	20	20	40	80	80	80

Table S3. Risk ranking scoring system used to prioritize representative swine H3N2 strains for the assessment of human immunity for pandemic potential.

strain	global_lineage	blast_USA 2yr	blast_global 10yr	revblast_USA 2yr	revblast_global 10yr	**Sequence Factor**	A/BRAZIL/11/1978	A/SINGAPORE/1986	A/TAIWAN/1/1986	A/TEXAS/36/1991	A/BEIJING/262/1995	A/NEW_CALEDONIA/20/1999	A/MICHIGAN/2/2003	A/SOLOMON_ISLANDS/3/200	A/BRISBANE/59/2007	A/CALIFORNIA/4/2009	A/MICHIGAN/45/2015	all_vaccine	stdev	>3	**Antigenc Factor**	**Summed Factor**
A/SWINE/SASKATCHEWAN/SD0094/2015	**1A.1.1-1**	**0.00**	**0.18**	**0.00**	**23.67**	**40.40**	**5.77**	**3.65**	**5.82**	**5.62**	**6.40**	**5.69**	**5.09**	**6.15**	**7.81**	**3.54**	**2.56**	**5.28**	**1.49**	**10**	**14.48**	**54.89**
A/SWINE/ALBERTA/SD0154/2016	1A.1.1-1	0.00	0.06	0.00	0.06	0.20	6.96	4.91	6.62	6.41	7.56	6.25	6.27	6.69	7.79	2.12	1.85	5.77	2.01	9	15.04	15.25
A/SWINE/ALBERTA/SD0125/2015	1A.1.1-1	0.00	0.06	0.00	9.45	16.11	6.03	5.29	6.05	6.09	7.99	7.37	6.77	7.34	8.65	3.12	1.75	6.04	2.05	10	16.16	32.27
A/SWINE/ALBERTA/SD0014/2013	1A.1.1-1	0.00	0.06	0.00	0.06	0.20	6.91	5.54	8.09	8.08	8.23	7.83	6.93	8.79	10.56	4.35	2.47	7.07	2.24	10	16.71	16.92
A/SWINE/MANITOBA/D0333/2014	1A.1.1-3	0.00	0.06	0.00	0.18	0.41	9.33	5.22	9.49	8.96	6.89	5.00	5.72	7.43	8.87	5.87	5.92	7.15	1.74	11	16.21	16.62
A/SWINE/SASKATCHEWAN/SD0200/2016	1A.1.1-3-del	0.00	0.12	0.00	0.18	0.51	6.17	3.33	7.13	6.75	2.97	5.34	2.77	6.42	9.32	9.62	8.65	6.22	2.44	9	16.33	16.84
A/SWINE/MANITOBA/D0348/2014	1A.1.1-3-del	0.00	0.24	0.22	1.65	3.50	5.82	3.38	6.90	6.56	2.96	5.64	2.86	6.49	9.45	9.80	8.75	6.24	2.47	9	16.40	19.90
A/SWINE/MANITOBA/SD0114/2015	1A.1.1-3-del	0.00	0.41	3.51	1.06	7.29	5.70	4.29	7.65	7.52	4.83	7.11	4.42	8.05	10.97	9.75	8.34	7.15	2.17	11	17.51	24.80
A/SWINE/ALBERTA/SD0191/2016	1A.1.1-3-del	0.00	0.12	0.15	0.41	1.10	6.35	3.90	7.61	7.28	3.62	6.01	3.46	7.11	10.02	10.00	8.92	6.75	2.38	11	18.13	19.24
A/SWINE/SASKATCHEWAN/SD0102/2015	1A.1.1-3-del	0.00	0.12	0.15	0.83	1.81	7.38	5.82	8.91	8.66	4.88	7.73	5.18	8.64	11.61	12.07	10.89	8.34	2.47	11	18.42	20.24
A/SWINE/MINNESOTA/A01781045/2016	**1A.1.1-3-del**	**0.00**	**0.18**	**2.71**	**1.36**	**6.31**	**3.25**	**4.13**	**5.14**	**5.21**	**4.10**	**7.39**	**4.19**	**7.01**	**10.02**	**10.30**	**8.90**	**6.33**	**2.53**	**11**	**18.59**	**24.91**
A/MINNESOTA/45/2016	1A.1.1-3-del	1.10	0.00	5.34	0.47	9.60	4.77	5.29	6.18	6.15	4.25	7.95	4.84	7.53	10.56	11.86	10.59	7.27	2.67	11	19.00	28.60
A/SWINE/MANITOBA/D0392/2015	1A.1.1-3-del	0.00	0.12	0.00	0.24	0.61	8.06	7.03	8.07	7.69	4.53	7.95	5.81	7.50	10.20	13.91	13.14	8.54	2.85	11	19.54	20.15
A/SWINE/MEXICO/AVX23/2012	**1A.3.1**	**0.00**	**0.24**	**2.71**	**7.14**	**16.21**	**7.35**	**6.23**	**6.25**	**6.15**	**8.64**	**7.34**	**7.51**	**6.93**	**7.42**	**2.79**	**3.20**	**6.35**	**1.81**	**10**	**15.43**	**31.64**
A/SWINE/MEXICO/AVX31/2012	1A.3.3.2	0.00	0.06	0.00	3.25	5.61	7.75	5.66	7.05	6.80	8.20	6.51	6.93	6.87	7.55	1.45	2.27	6.10	2.20	9	15.61	21.21
A/SWINE/MEXICO/AVX44/2012	1A.3.3.2	0.00	0.12	0.00	0.18	0.51	7.73	4.59	7.95	7.62	7.08	5.62	5.72	7.12	8.57	3.58	3.21	6.25	1.83	11	16.50	17.00
A/SWINE/ILLINOIS/A01493472/2014	1A.3.3.2	0.00	0.35	6.88	30.70	62.00	9.14	7.22	8.42	8.21	9.73	7.77	8.46	8.19	8.44	0.71	2.72	7.18	2.82	9	17.45	79.45
A/SWINE/NORTH_CAROLINA/A01797415/2015	1A.3.3.3	0.00	0.00	0.22	0.30	0.81	7.33	5.00	5.59	5.14	7.02	5.24	5.97	4.83	5.23	3.74	4.53	5.42	1.04	11	14.12	14.93
A/SWINE/IOWA/A01731653/2016	**1A.3.3.3**	**1.68**	**0.00**	**36.21**	**0.12**	**52.00**	**6.82**	**5.54**	**5.05**	**4.81**	**7.63**	**6.43**	**6.64**	**5.53**	**6.00**	**4.09**	**4.49**	**5.73**	**1.09**	**11**	**14.26**	**66.26**
A/SWINE/NORTH_CAROLINA/A01730369/2016	1A.3.3.3	0.00	0.00	0.00	0.00	0.00	6.19	2.77	6.53	6.18	5.33	4.69	3.98	5.95	7.96	4.86	4.08	5.32	1.44	10	14.32	14.32
A/SWINE/MINNESOTA/A01567490/2014	1A.3.3.3	0.07	0.00	2.56	1.53	6.19	8.40	6.39	6.98	6.66	8.63	6.65	7.49	6.53	6.55	2.51	3.88	6.42	1.79	10	15.38	21.56
A/OHIO/09/2015	1A.3.3.3	0.00	0.00	0.00	0.06	0.10	9.26	5.38	8.00	7.35	7.09	3.99	5.97	5.40	5.59	4.14	5.43	6.14	1.62	11	15.85	15.95
A/SWINE/NORTH_CAROLINA/A02076926/2015	1A.3.3.3	0.07	0.00	1.46	0.06	2.19	10.44	7.07	8.92	8.34	8.86	5.74	7.76	6.64	6.02	3.75	5.68	7.20	1.89	11	16.68	18.88
A/SWINE/NORTH_CAROLINA/A01841602/2015	1A.3.3.3	0.00	0.00	0.80	0.00	1.09	10.84	7.00	8.98	8.23	8.18	4.67	7.30	5.68	4.62	5.62	7.29	7.13	1.91	11	16.72	17.81
A/SWINE/OHIO/A01847657/2015	1A.3.3.3	0.00	0.00	0.00	0.06	0.10	10.82	6.62	9.30	8.53	7.74	4.09	6.83	5.80	5.31	5.80	7.28	7.10	1.93	11	16.78	16.88
A/SWINE/MICHIGAN/A01104117/2018	1B.2.1	1.83	0.00	5.41	0.00	9.90	4.32	2.01	4.75	4.38	1.94	4.91	1.71	4.91	7.91	8.84	7.90	4.87	2.48	8	15.44	25.34
A/SWINE/OKLAHOMA/A01409770/2014	1B.2.1	0.15	0.00	2.56	2.01	7.11	3.60	2.89	4.84	4.70	3.00	6.10	2.90	5.94	8.96	9.37	8.16	5.50	2.43	9	16.29	23.40
A/SWINE/ILLINOIS/A02139356/2018	**1B.2.1**	**0.37**	**0.00**	**8.34**	**0.00**	**11.91**	**4.84**	**4.51**	**6.47**	**6.37**	**3.85**	**7.29**	**4.15**	**7.36**	**10.43**	**11.02**	**9.72**	**6.91**	**2.55**	**11**	**18.65**	**30.55**
A/SWINE/ILLINOIS/A01644323/2018	1B.2.2.1	0.07	0.00	6.36	1.06	10.59	5.37	1.68	5.81	5.45	4.24	4.39	2.92	5.40	7.79	5.90	5.01	4.91	1.61	9	13.83	24.42
A/SWINE/NEBRASKA/A01492366/2014	**1B.2.2.1**	**0.07**	**0.00**	**8.71**	**0.65**	**13.10**	**4.42**	**0.53**	**4.62**	**4.20**	**2.73**	**4.20**	**1.61**	**4.51**	**7.29**	**7.24**	**6.38**	**4.34**	**2.15**	**8**	**14.44**	**27.54**
A/SWINE/MINNESOTA/A01134353/2011	1B.2.2.1	0.00	0.00	5.71	0.00	7.81	6.64	3.28	6.85	6.49	5.82	4.81	4.46	6.13	7.93	4.32	3.70	5.49	1.47	11	15.41	23.22
A/SWINE/MEXICO/AVX18/2012	**Other_Human_1B.2**	**0.00**	**0.12**	**0.00**	**12.63**	**21.60**	**6.87**	**2.65**	**5.71**	**4.88**	**1.96**	**1.89**	**1.60**	**2.65**	**5.29**	**8.23**	**8.15**	**4.53**	**2.52**	**6**	**13.56**	**35.16**
A/SWINE/MEXICO/AVX61/2013	Other_Human_1B.2	0.00	0.06	0.00	0.59	1.10	5.01	1.21	5.53	5.16	3.65	4.36	2.39	5.23	7.80	6.55	5.62	4.77	1.84	9	14.52	15.62

Table S4. Hemagglutination inhibition titres of post-infection convalescent (post_exp) and post-vaccination (post_vac) human sera against representative North American swine H1strains.

study_id	cohort	hospital	age	yearofbirth	periodofbirth	gender	pre_vaccine_titre	post_vaccine_titre	fold_change	BE95.huvac	MI15.huvac	1A.1.1.1 SK15	1A.1.1.3 MN16	1A.3.3.3 IA16	1A.3.1 MX12	OtHu1B.2 MX12	1B.2.2.1 NE14	1B.2.1 IL18
01-11-A-0077	post_exp	JHHS	71	1946	1946 to 1976	n/a	n/a	n/a	n/a	10	320	80	5	80	20	10	20	5
02-17-Pro-0089	post_vac	JHHS	68	1949	1946 to 1976	Female	80	320	4	5	20	20	5	5	5	10	20	5
02-17-Pro-0027	post_vac	JHHS	66	1951	1946 to 1976	Male	320	640	2	40	160	10	5	40	40	5	160	40
01-21-A-0046	post_exp	CGMH	65	1952	1946 to 1976	n/a	n/a	n/a	n/a	10	40	20	5	20	40	10	80	10
02-17-Pro-0037	post_vac	JHHS	61	1956	1946 to 1976	Male	1280	2560	2	2560	640	640	5	160	80	2560	320	20
02-17-Pro-0111	post_vac	JHHS	59	1958	1946 to 1976	Female	2560	5120	2	5	160	20	5	40	10	10	10	5
02-17-Pro-0121	post_vac	JHHS	59	1958	1946 to 1976	Male	640	1280	2	640	40	20	10	20	10	1280	320	10
02-17-Pro-0124	post_vac	JHHS	58	1959	1946 to 1976	Female	10240	10240	1	10	160	80	40	40	20	40	160	80
02-17-Pro-0051	post_vac	JHHS	56	1961	1946 to 1976	Female	80	640	8	40	160	80	10	160	80	160	80	5
02-17-Pro-0012	post_vac	JHHS	53	1964	1946 to 1976	Female	640	1280	2	80	320	10	5	80	10	80	40	5
02-17-Pro-0016	post_vac	JHHS	51	1966	1946 to 1976	Male	320	640	2	80	640	80	5	640	80	80	80	5
02-17-Pro-0080	post_vac	JHHS	51	1966	1946 to 1976	Male	1280	1280	1	20	40	40	5	80	20	20	10	5
02-17-Pro-0100	post_vac	JHHS	49	1968	1946 to 1976	Male	40	320	8	10	10	80	5	80	160	80	20	5
02-17-Pro-0109	post_vac	JHHS	49	1968	1946 to 1976	Male	2560	2560	1	20	20	80	5	20	10	20	20	10
02-17-Pro-0103	post_vac	JHHS	48	1969	1946 to 1976	Male	1280	1280	1	10	40	320	5	160	320	20	40	10
02-17-Pro-0022	post_vac	JHHS	47	1970	1946 to 1976	Male	320	1280	4	40	160	20	5	40	10	20	10	5
01-21-A-0039	post_exp	CGMH	47	1970	1946 to 1976	n/a	n/a	n/a	n/a	640	320	640	5	320	80	640	80	5
02-17-Pro-0052	post_vac	JHHS	44	1973	1946 to 1976	Female	2560	5120	2	640	160	80	5	80	20	1280	320	5
02-17-Pro-0116	post_vac	JHHS	44	1973	1946 to 1976	Male	160	640	4	40	20	10	5	10	5	40	40	5
02-17-Pro-0004	post_vac	JHHS	42	1975	1946 to 1976	Female	5120	10240	2	160	640	320	5	160	160	20	20	5
02-17-Pro-0049	post_vac	JHHS	42	1975	1946 to 1976	Female	1280	2560	2	80	20	20	5	20	5	160	80	10
02-17-Pro-0104	post_vac	JHHS	41	1976	1946 to 1976	Female	80	160	2	80	20	160	5	40	20	160	40	5
02-17-Pro-0093	post_vac	JHHS	40	1977	1977 to 1988	Female	10240	10240	1	5	320	40	10	80	20	10	20	10
01-11-A-0065	post_exp	JHHS	40	1977	1977 to 1988	n/a	n/a	n/a	n/a	640	640	80	5	1280	640	80	1280	2560
02-17-Pro-0015	post_vac	JHHS	39	1978	1977 to 1988	Female	320	320	1	160	80	40	10	40	40	160	80	20
02-17-Pro-0114	post_vac	JHHS	39	1978	1977 to 1988	Male	160	320	2	80	160	160	20	160	160	80	10	5
01-11-A-0080	post_exp	JHHS	39	1978	1977 to 1988	n/a	n/a	n/a	n/a	160	80	40	5	80	160	160	80	80
02-17-Pro-0091	post_vac	JHHS	38	1979	1977 to 1988	Female	160	640	4	10	2560	160	5	320	80	40	40	5
02-17-Pro-0101	post_vac	JHHS	38	1979	1977 to 1988	Male	5120	10240	2	5	40	10	5	20	10	10	10	5
01-22-A-0070	post_exp	CGMH	38	1979	1977 to 1988	n/a	n/a	n/a	n/a	10	40	20	5	10	5	10	10	5
01-11-A-0116	post_exp	JHHS	36	1981	1977 to 1988	n/a	n/a	n/a	n/a	320	2560	1280	40	2560	2560	320	320	320
02-17-Pro-0070	post_vac	JHHS	34	1983	1977 to 1988	Female	2560	2560	1	10	320	640	5	160	160	10	5	5
02-17-Pro-0115	post_vac	JHHS	34	1983	1977 to 1988	Male	320	640	2	40	80	320	5	160	160	40	20	40
01-11-A-0121	post_exp	JHHS	34	1983	1977 to 1988	n/a	n/a	n/a	n/a	160	1280	1280	5	160	320	320	20	5
01-12-A-0053	post_exp	JHHS	34	1983	1977 to 1988	n/a	n/a	n/a	n/a	10	40	40	5	80	20	10	10	5
02-17-Pro-0013	post_vac	JHHS	33	1984	1977 to 1988	Female	640	640	1	20	320	40	5	160	40	160	40	10
01-12-A-0136	post_exp	JHHS	33	1984	1977 to 1988	n/a	n/a	n/a	n/a	80	160	160	10	160	80	160	20	5
01-21-A-0029	post_exp	CGMH	32	1985	1977 to 1988	n/a	n/a	n/a	n/a	160	320	160	5	160	160	320	160	5
02-17-Pro-0023	post_vac	JHHS	31	1986	1977 to 1988	Male	160	320	2	80	80	40	5	40	40	80	20	20
02-17-Pro-0069	post_vac	JHHS	31	1986	1977 to 1988	Female	1280	2560	2	20	320	160	5	160	160	20	10	5
02-17-Pro-0020	post_vac	JHHS	30	1987	1977 to 1988	Male	80	160	2	640	640	160	10	320	80	1280	640	40
01-21-A-0047	post_exp	CGMH	30	1987	1977 to 1988	n/a	n/a	n/a	n/a	320	320	160	10	160	80	320	320	10
02-17-Pro-0019	post_vac	JHHS	29	1988	1977 to 1988	Female	2560	2560	1	320	320	80	5	2560	2560	320	640	80
02-17-Pro-0083	post_vac	JHHS	29	1988	1977 to 1988	Female	2560	2560	1	40	320	640	5	160	80	40	20	5
01-21-A-0032	post_exp	CGMH	29	1988	1977 to 1988	n/a	n/a	n/a	n/a	160	20	40	5	10	10	80	40	5
01-22-A-0025	post_exp	CGMH	28	1989	1989 to 1996	n/a	n/a	n/a	n/a	40	160	80	5	20	40	40	10	5
02-17-Pro-0029	post_vac	JHHS	27	1990	1989 to 1996	Male	640	2560	4	80	80	40	5	20	20	320	40	5
01-11-A-0102	post_exp	JHHS	26	1991	1989 to 1996	n/a	n/a	n/a	n/a	320	320	640	40	320	320	320	320	40
02-17-Pro-0063	post_vac	JHHS	25	1992	1989 to 1996	Female	2560	5120	2	640	2560	160	10	1280	160	2560	1280	20
02-17-Pro-0095	post_vac	JHHS	25	1992	1989 to 1996	Male	320	1280	4	40	160	160	5	80	80	80	40	5
01-21-A-0077	post_exp	CGMH	25	1992	1989 to 1996	n/a	n/a	n/a	n/a	640	1280	640	5	320	640	640	320	20
01-11-A-0160	post_exp	JHHS	24	1993	1989 to 1996	n/a	n/a	n/a	n/a	80	5	5	5	5	5	160	160	5
02-17-Pro-0011	post_vac	JHHS	23	1994	1989 to 1996	Female	1280	2560	2	80	640	40	10	320	160	160	40	5
02-17-Pro-0043	post_vac	JHHS	23	1994	1989 to 1996	Male	10240	10240	1	40	320	5	5	10	5	40	5	5
02-17-Pro-0073	post_vac	JHHS	23	1994	1989 to 1996	Male	2560	2560	1	20	160	20	5	40	20	80	20	5
02-17-Pro-0096	post_vac	JHHS	23	1994	1989 to 1996	Female	10240	20480	2	20	80	40	5	80	80	20	40	20
02-17-Pro-0047	post_vac	JHHS	22	1995	1989 to 1996	Male	1280	1280	1	160	320	160	5	320	80	320	40	5
01-21-A-0083	post_exp	CGMH	22	1995	1989 to 1996	n/a	n/a	n/a	n/a	320	320	80	5	160	40	640	160	10
01-11-A-0026	post_exp	JHHS	21	1996	1989 to 1996	n/a	n/a	n/a	n/a	80	640	80	20	640	160	320	80	20
01-21-A-0060	post_exp	CGMH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5	640	20	5	80	10	5	20	5