Reassortment with dominant chicken H9N2 influenza virus contributed to the fifth H7N9 virus human epidemic

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Running Title: Role of H9N2 AIV in the fifth H7N9 human wave

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ABSTRACT

H9N2 Avian influenza virus (AIV) is regarded as a principal donor of viral genes through reassortment to co-circulating influenza viruses that can result in zoonotic reassortants. Whether H9N2 virus can maintain sustained evolutionary impact on such reassortants is unclear. Since 2013, avian H7N9 virus had caused five sequential human epidemics in China; the fifth wave in 2016-2017 was by far the largest but the mechanistic explanation behind the scale of infection is not clear. Here, we found that, just prior to the fifth H7N9 virus epidemic, H9N2 viruses had phylogenetically mutated into new sub-clades, changed antigenicity and increased its prevalence in chickens vaccinated with existing H9N2 vaccines. In turn, the new H9N2 virus sub-clades of PB2 and PA genes, housing mammalian adaptive mutations, were reassorted into co-circulating H7N9 virus to create a novel dominant H7N9 virus genotype that was responsible for the fifth H7N9 virus epidemic. H9N2-derived PB2 and PA genes in H7N9 virus conferred enhanced polymerase activity in human cells at 33°C and 37°C, and increased viral replication in the upper and lower respiratory tracts of infected mice which could account for the sharp increase in human cases of H7N9 virus infection in the 2016-2017 epidemic. The role of H9N2 virus in the continual mutation of H7N9 virus highlights the public health significance of H9N2 virus in the generation of variant reassortants of increasing zoonotic potential.

IMPORTANCE

Avian H9N2 influenza virus, although primarily restricted to chicken populations, is a major threat to human public health by acting as a donor of variant viral genes through reassortment to co-circulating influenza viruses. We established that the high prevalence of evolving H9N2 virus in vaccinated flocks played a key role, as donor of new sub-clade PB2 and PA genes in the generation of a dominant H7N9 virus genotype (G72) with enhanced infectivity in humans during the 2016-2017 N7N9 virus epidemic. Our findings emphasize that the ongoing evolution of prevalent H9N2 virus in chickens is an important source, via reassortment, of mammalian adaptive genes for other influenza virus subtypes. Thus, close monitoring of prevalence and variants of H9N2 virus in chicken flocks is necessary in the detection of zoonotic mutations.

KEYWORDS

Avian influenza virus, H9N2, H7N9, PB2, PA, genetic evolution, reassortment, zoonosis

Since the first human outbreak in 2013 of avian H7N9 influenza virus, there had been a total of five waves of the virus in China (1, 2). The fifth wave of 2016-2017 was by far the largest epidemic to date where the number of human cases (n = 758) was almost the same as the sum of all previous four outbreaks (2). In the fifth wave, affected regions had expanded from eastern and southern China to the central and western provinces (2). Highly pathogenic avian influenza (HPAI) H7N9 viruses were first identified in this epidemic to cause clinical infections in both chickens and humans (3-5); however most human cases continued to be from low pathogenicity avian influenza (LPAI) H7N9 viruses (6). Although human-to-human H7N9 virus transmission has not been conclusively documented, the risk still exists (5, 7).

H9N2 AIV has been in circulation in chickens in China for over twenty years (8, 9). To reduce the impact of H9N2 virus infection, flocks have been vaccinated since 1998 with commercial inactivated vaccines (10-12); however, the virus continues to circulate in vaccinated chickens (10, 11, 13). We previously showed that a particular genotype (G57) of H9N2 virus was responsible for outbreaks in chicken flocks across the country between 2010 and 2013, and that through reassortment it provided six internal genes to generate the novel H7N9 virus of 2013 (8). Subsequently, the H7N9 virus crossed the human barrier to cause the first epidemic wave (14). Co-circulation of H9N2 and H7N9 viruses in chickens has continued to perpetuate H7N9 virus evolution resulting in increased viral diversity in subsequent waves of infection (14-19). Several studies have described molecular characteristics of the evolving H7N9 virus of the fifth wave (4-6, 20). However, it remains unclear whether H9N2

influenza viruses can maintain sustained evolutionary impact on the largest H7N9 epidemic in humans so far.

Here, we found that the evolution of H9N2 virus in chickens has continued to impact on H7N9 virus genetic changes and contributes to the largest epidemic, of human infection in the fifth wave. Through systematic analysis of the evolution of H9N2 influenza viruses in chickens in China in the period of 2014-2017, we discovered that H9N2 viruses isolated since 2015 have undergone significant genetic and antigenic changes, with corresponding increased prevalence in vaccinated chicken flocks. The evolving H9N2 virus reassorted its PB2 and PA genes containing mammalian adaptive mutations with co-circulating H7N9 virus, thus creating a novel dominant H7N9 genotype that led to the fifth H7N9 virus epidemic. These findings highlight the ongoing public health threat posed by avian H9N2 viruses in generating novel or variant reassortants of H7N9 virus with epidemic/pandemic potential.

RESULTS

New sub-clades of H9N2 AIVs in surface and internal genes emerged before the fifth wave of H7N9 virus infection in humans.

To ascertain a possible role of H9N2 virus in the fifth H7N9 virus epidemic (2016-2017), we examined the evolutionary changes of chicken H9N2 viruses before and during the human H7N9 virus outbreak. Genome of 143 chicken-derived H9N2 viruses from chicken flocks and live bird markets collected between 2014-2017 in China was sequenced for phylogenetic analysis of all eight gene segments, supplemented by publicly available H9N2 sequences from the 2010-2017 period.

105 We found that H9N2 virus strains from the 2014 to 2017 period were all of the
106 previously identified G57-like clades (Fig. 1A, 1B and S1) (8), but had formed
107 relatively independent branches (identified as sub-clades) in the eight segments. In the
108 HA phylogenetic tree, a new sub-clade 9.1 was evident in the G57-like clade 9; most
109 of the 2014-2017 strains formed this 9.1 sub-clade. In the phylogenetic tree of PB2,
110 PB1 or PA, most isolates from 2014 onwards were different from the earlier isolates,
111 and formed relatively independent sub-clades (PB2-6.2, PB1-3.2 and PA-3.1).

112 According to their sub-clades, viruses analyzed could be categorized into
113 multiple sub-genotypes (G57-S1 to -S162) (Table S1). Notably, this diversity was
114 reduced over time. Viruses from 2016-2017 had the lowest diversity with two major
115 dominant sub-genotypes (Fig. 1C) which had the same evolved genes of PB2, PB1
116 and PA, indicating that H9N2 viruses with such gene constellation were prevalent in
117 chickens during this period.

118 **Rising isolation rates of H9N2 virus in vaccinated chickens preceded and**
119 **overlapped with the fifth human outbreak of H7N9 virus infection.**

120 As most H9N2 viruses isolated between 2014-2017 belonged to a new HA sub-clade,
121 the associated HA gene changes would amount to viral antigenic drift (21-24). To
122 determine the extent of antigenic drift, hemagglutinin inhibition (HI) assays, using 7
123 selected sera, were performed on 23 representative H9N2 viruses from the 2010-2017
124 period (Fig. 2 and Table S2). Three of the seven sera were previously identified as
125 specific for viral antigenic group F (8) and the remaining four were derived from the
126 viruses of 2015-2017. H9N2 isolates from 2010 to 2013 belonged to antigenic group

F as previously found (8). However, some strains in 2014 showed distinct antigenic changes. By 2015-2017, significant antigenic drift was commonly found; most isolates had HI titers that were 4 to 32 times lower than those of the F group viruses. Thus, these new variants were classed as a novel antigenic group G. Out of the 23 representative H9N2 viruses tested, 5 from HA clade 9 belonged to antigen group F; the remaining 18 viruses were from HA sub-clade 9.1 of which 15 belonged to antigenic group G (Fig. 2 and Table S2).

To determine if antigenic drift of the H9N2 virus was connected to rising prevalence of H9N2 virus infection in chicken flocks, we retrospectively examined the isolation rates of H9N2 virus in vaccinated chickens across 21 provinces in China, from January 2014 to December 2017 (Table S3). Out of a total of 1455 flocks, 465 were positive for H9N2 virus infection, with a virus isolation rate of 31.96% (Table S3). Mean H9N2 isolation rates varied annually. Compared with our previous isolation rate (47.08%) in 2013 (8), isolation rate declined in 2014 (41.13%), followed by further reduction in 2015 (25.20%). However, in the 2016-2017 period, isolation rates began to rise again and reached 31.15% in 2017. Notably, the rising H9N2 virus prevalence in chickens over the 2016-2017 period preceded and overlapped with the fifth H7N9 virus epidemic (Fig. 3), which suggests that these recent H9N2 viruses could have been sources of genetic transmission via reassortment to H7N9 viruses.

Dominant H7N9 genotype (G72) identified in the fifth wave of human infection comprised PB2 and PA genes from chicken H9N2 virus.

Using chicken H7N9 virus sequences generated in this study, along with all available

149 public H7N9 sequences from human and chickens, we constructed phylogenetic trees
150 of the six internal segments to examine genotype evolution (Fig. S2) as previously
151 described (6, 18). We found that the internal genes of H7N9 virus formed diversified
152 clades as reported (5, 6, 20, 25). Based on the genomic diversity of internal genes, the
153 five waves of H7N9 virus could be classed into 78 genotypes (Table S1); each with 10%
154 or more of the total number of strains in each epidemic was regarded as a major
155 genotype (Fig. 4A). Genotype diversity showed sharp increase from the first to the
156 second wave, and was followed by successive reduction, with the lowest diversity
157 found during the fourth and fifth waves (Fig. 4A). H7N9 genotype 13 (G13) was the
158 most dominant genotype in the third wave of human infection (Fig. 4A). In this third
159 wave, G72 genotype was first detected in January 2015 (Fig. 4B and Table S1); its
160 isolation rate subsequently rose going into the fourth and fifth waves to replace the
161 dominance of G13 (Fig. 4A) in frequency and geographical distribution (Fig. S3). The
162 number of G72 viruses isolated from human (n = 15) in the fourth wave rose sharply
163 (n = 287) into the fifth wave (Fig. 4B). It is worth noting that the number of G72 virus
164 from humans showed abrupt increase after November 2016 (Fig. 4B), and preceded a
165 year earlier by increase prevalence of avian H9N2 virus with newly evolved genes in
166 chicken flocks (Fig. 3).

167 We compared the genetic makeup of G72 and G13 genotypes, and found distinct
168 PB2 and PA gene combinations (Fig. 4C and Table S1), where the two genes in G72,
169 distinct from G13, could contribute to the prevalence of G72 in the fifth wave. As
170 changes in PB2 and PA segments were found both in recent H9N2 and the dominant

(G72) H7N9 viruses, these genes could have been donated from co-circulating H9N2 to H7N9 viruses. We constructed PB2 and PA phylogenetic trees using all available H9N2 sequences from 2010-2017 and H7N9 strain sequences from 2013-2017 which clearly showed that the PB2 and PA genes of the H7N9 G72 strains, but not the H7N9 G13 strains, were derived from H9N2 viruses (Fig. 5A, 5B and S4). The PB2 and PA genes of the G72 genotype were from the H9N2 PB2-6.2 sub-clade and PA-3.1 sub-clade, respectively.

To confirm the delivery of PB2-6.2 and PA-3.1 from H9N2 virus to the G72 genotype of H7N9, we compared the temporal prevalence of PB2 and PA genes in both subtypes. As shown in Fig. 5C, PB2-6.2 and PA-3.1 genes first appeared in the 2011 H9N2 virus strains, while those from G72 H7N9 virus were first found in 2015. Increasing prevalence of PB2-6.2 and PA-3.1 in H9N2 viruses preceded a similar rise in their prevalence in H7N9 viruses. Thus, H9N2 viruses were likely to be responsible for the provision of PB2 and PA genes to the H7N9 viruses to form the G72 genotype. Furthermore, comparisons of PB2 and PA amino acid sequences, revealed the delivery of the possible 12 critical mammalian adaptive residues from H9N2 virus to the H7N9 virus, including PB2-588V (26), PA-70V (27), PA-100V (28), and PA-343S (29, 30) (Fig. 5D and Table S4). Thus, the earliest PB2 and PA reassortment between H9N2 and H7N9 viruses had likely taken place on or before 2015 that led to the generation of the predominant G72 genotype responsible for the fifth H7N9 virus outbreak in humans.

H9N2-derived PB2 and PA genes raised polymerase activity in the dominant G72

genotype H7N9 virus in human cells.

Adaptation of viral polymerase is necessary for efficient virus replication in new host species (31). To determine the effect of the H9N2 PB2 and PA gene substitutions in H7N9 viral polymerase function, viral mini-genome polymerase assays were performed in human 293T cells at 33ºC and 37ºC respectively. We used the PB2, PB1, PA and NP genes from a LPAI H7N9 G13-like virus as the backbone of the polymerase complex, and generated a series of recombinant polymerase complexes by replacing G13-like PB2 and PA genes with PB2-6.2 and PA-3.1 genes derived from different H9N2 virus and G72 H7N9 viruses (Fig. 6 and Table S5). PB2-6.2 and PA-3.1 genes from the test H9N2 and G72 H7N9 viruses carry 16 specific amino acid residues reported to confer mammalian adaptive functions (Table S6). Viral mini-genome polymerase assays showed that replacement with PB2-6.2 and PA-3.1 genes of H9N2 or G72 H7N9 virus significantly enhanced the polymerase activity of the LPAI H7N9 polymerase complex at both 33ºC and 37ºC by 4.4 - 11.2 fold ($P < 0.001$) (Fig. 6A). Thus, the recent H9N2-derived PB2 and PA genes conferred increased polymerase activity in H7N9 viruses, possibly making the G72 genotype better able for mammalian replication. The new sub-clade of PB2 and PA genes also increased viral polymerase activity of H7N9 viruses in chicken DF-1 cells at 37ºC and 39ºC, respectively, by 1.4- to 2.7-fold increase ($P < 0.05$), with the exception of genes from one G72 H7N9 virus (Fig. 6B).

H9N2-derived PB2 and PA genes increased infectivity of G72 genotype H7N9 virus in mice.

To further assess the contribution of the H9N2-derived PB2-6.2 and PA-3.1 genes to the pathogenicity and replication of H7N9 virus in mammals (Fig. 7), we used LPAI G13 H7N9 virus as a backbone control virus (rG13) (Table S5 and Fig. S5) to generate three reassortants (rG13: PB2/PA-H9N2, rG13: PB2/PA-H7N9-1 and rG13: PB2/PA-H7N9-2). These reassortants had PB2-6.2 and PA-3.1 genes from H9N2 and G72 H7N9 viruses (Table S5). The resulting MID_{50} values of rG13, rG13: PB2/PA-H9N2, rG13: PB2/PA-H7N9-1 and rG13: PB2/PA-H7N9-2 were 4.5, 3.5, 3.5 and 1.5 $\log_{10}TCID_{50}$, respectively, demonstrating that PB2-6.2 and PA-3.1 genes conferred increased infectivity by between 10- and 1000-fold (Table S7).

Next, the four viruses were inoculated into mice to determine their pathogenicity and viral load in respiratory tract. Each mouse was intranasally inoculated with indicated virus at a dose of 10^6 $TCID_{50}$. Nasal turbinate and lung samples of five mice per group were collected for viral titration at 3 and 5 dpi. rG13 infected mice showed no obvious weight loss; the other three reassortants caused a range of weight loss, with maximum loss of 15.4% to 22.86% (Fig. 7A). All mice infected with the rG13 virus recovered; those infected with the other three reassortants showed 1-3 deaths from each group although they were not statistically different from the rG13 group (Fig. 7A). For viral loads in the nasal turbinate and lung, the three reassortants produced significantly higher viral titers than those of rG13 virus at 3 and 5 dpi ($P < 0.05$) (Fig. 7B). Among the three reassortants, rG13: PB2/PA-H7N9-2 virus produced the highest titers in the turbinate (> 100-fold) and lung (> 200-fold) relative to rG13 virus. Histopathology findings of virus infection in mice were consistent with clinical

response. Lungs from rG13 virus infection showed mild bronchitis (Fig. 7C), while the 3 reassortant viruses caused extensive and severe peribronchiolitis and bronchopneumonia; interstitial pneumonia was detected (Fig. 7C). Viral-antigen-positive cells in the lung were also more abundant with the 3 reassortant viruses (Fig. 7C). In summary, recent substitutions of H9N2-derived PB2 and PA genes with those in H7N9 virus conferred increased infectivity in mice.

DISCUSSION

We demonstrated here that continually evolving H9N2 virus had not only resulted in its increased prevalence in vaccinated chickens but also led to the transfer of its PB2 and PA gene variants to co-circulating H7N9 virus that in turn caused the largest H7N9 virus epidemic to date between 2016-2017. Our findings highlight chicken H9N2 virus as a key donor in virus reassortment and thus an ongoing threat to public health.

In recent years, the H9N2 virus has undergone rapid mutational changes, leading to repeated outbreaks in vaccinated chicken flocks. In 1998, H9N2 virus caused the first epizootic in chickens along the eastern coast of China (11). Despite an existing nationwide poultry vaccination program, during 2010-2013, it caused a second large-scale outbreak in chickens across most provinces in China (8). Subsequently, updated vaccines were able to reduce virus prevalence in 2014-2015, according to our findings. However, a year later, between 2016 and 2017, the prevalence of H9N2 virus in vaccinated flocks had again risen. Although this increase was not as high as the 2010-2013 outbreak in chickens, it produced new H9N2 sub-clades of zoonotic

significance.

The formation of the H7N9 virus G72 genotype, responsible for the fifth epidemic wave, was the result of newly acquired sub-clade PB2 and PA gene segments from co-circulating H9N2 virus. Previous studies have also analyzed the internal genes of the dominant H7N9 virus genotype virus of the fifth wave (4-6, 20); most identified H7N9 PB2 and PA genes were from the co-circulating H9N2 virus, but the functional and genetic details of these genes are hitherto unclear. Here, we found that the PB2 and PA genes of 2016-2017 H7N9 virus were different from those isolated in 2013. The PB2 and PA genes from the dominant H9N2 virus sub-clades had undergone further mutations to carry more mammalian adaptive variations. Experimentally, we demonstrated that the PB2 and PA genes donated by H9N2 virus significantly enhanced the polymerase activity of the recipient H7N9 virus in human cells at 37ºC and 33ºC. The latter temperature could favor G72 H7N9 virus replication along the nasal passage thus promoting initial upper respiratory tract infection in humans. Challenge study in mice confirmed that the 2016-2017 H7N9 virus with the recently acquired H9N2-originating PB2 and PA genes produced significantly higher viral titers in nasal turbinates and lungs at 3 and 5 dpi. Notably, the H9N2 virus-derived PB2 and PA genes carried a number of known mammalian adaptive residues of PB2-588V, PA-70V, PA-100V, and PA-343S in PB2 and PA (26-28). We previously reported additional mammalian adapted amino acid residues, such as PA-356R and PB2-292V, in recent chicken H9N2 isolates (32-34). Thus, H9N2 virus is highly adept at producing mammalian adaptive mutations in its natural chicken host

281 and contributes to viral transmissibility to humans.

282 There are at least three major factors behind the largest H7N9 virus epidemic to
283 date (2, 35). Firstly, over the four previous waves, the H7N9 virus had steadily spread
284 through chickens from the original center of infection (the Yangtze River Delta) to
285 across China (2, 25, 35). With growing co-circulation of H7N9 and H9N2 viruses in
286 most of China, it is not surprising that reassortment events took place. Secondly, the
287 2016-2017 H7N9 virus was more infectious. We found that the new sub-clade of PB2
288 and PA genes increased viral polymerase activity of H7N9 viruses in chicken cells,
289 which would facilitate viral spread among chicken populations. Moreover, the H7N9
290 viruses were found to replicate better than its predecessor in the upper and lower
291 respiratory tract of mice, which suggests more effective transmission of G72 H7N9
292 virus from chickens to humans. Thirdly, other gene segments, in addition to PB2 and
293 PA genes, with mammalian mutations could have contributed to increased human
294 infection of H7N9 virus (2, 6).

295 The clinical severity of human cases in the fifth H7N9 virus wave was not
296 significantly different from previous waves (36). Our mouse challenge results also
297 found no significant difference in survival rates between G13 and its reassortants with
298 H9N2-derived PB2 and PA genes. Thus, the evolved PB2 and PA genes of H9N2 virus
299 could have conferred higher infectivity of H7N9 virus in humans without significantly
300 enhancing its pathogenicity. In addition to H7N9 virus, H5N6 and other viruses with
301 H9N2-original genes are also widely prevalent in poultry populations in China (37).
302 Impact of H9N2 virus on these reassortants also should be paid more attention.

In summary, the dominant G72 genotype H7N9 virus, responsible for the largest 2016-2017 H7N9 virus epidemic to date, had arisen from reassortment of new sub-clade PB2 and PA genes from continually evolving H9N2 virus. Presently, H9N2 virus is the most dominant AIV in China and shows little seasonality of transmission in chicken populations (7, 8). Although the number of H7N9 virus isolates in chickens has recently declined (4), H9N2 virus with mammalian adaptive mutations remains widespread amongst chickens. Therefore, it is necessary to continue to gather epidemiological data of H9N2 virus and its reassortants in chickens throughout the country to chart their evolutionary progress, and better predict zoonotic transmission to humans.

MATERIALS AND METHODS

Ethics statement.

All animal research was approved by the Beijing Association for Science and Technology and performed in compliance with the Beijing Laboratory Animal Welfare and Ethics guidelines, as issued by the Beijing Administration Committee of Laboratory Animals, and in accordance with the China Agricultural University (CAU) Institutional Animal Care and Use Committee guidelines (SKLAB-B-2010-003).

Virus isolation, identification and genomic sequencing.

In our retrospective survey for the period of January 2014 to December 2017, samples (chicken carcasses and lung samples) from 1455 chicken flocks located across 21 provinces in China (Anhui, Beijing, Guangxi, Guansu, Fujuan, Hebei, Heilongjiang,

Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Neimenggu, Ningxia, Shanxi, Shaanxi, Shandong, Sichuan, Yunnan and Zhejiang) were received by our laboratory for diagnosis (Table S1). Samples were from H9N2 virus-vaccinated chicken flocks that showed respiratory signs and/or a 5–20% drop in egg production. During 2014-2017, H9N2 virus vaccines used in chickens in China were mostly derived from strains belonging to the antigen group F (38). Virus isolation using 10-day-old SPF embryonated chicken eggs and virus identification by hemagglutination inhibition (HI) assay were carried out as previously described (8). Typically, several chickens or lung samples from each flock were sent to the laboratory each time. If H9N2 virus was isolated from one or more samples, the flock was considered H9N2 virus-positive. Virus isolation rate was determined by dividing the number of H9N2-positive flocks by the total number of flocks. Oro-pharyngeal and cloacal swabs from healthy chickens of live poultry markets were also taken in four provinces (Beijing, Gansu, Hebei and Shandong) for virus isolation. H9N2 viruses (n = 143) isolated from 2014 through 2017, and H7N9 viruses (n = 17) isolated from 2013 through 2017 were sequenced as previously described (8). All isolated H7N9 viruses were LPAI viruses.

Human cases of H7N9 virus infection in China.

The number of confirmed human cases of H7N9 virus infection cited in this study were derived from the World Health Organization (www.who.int/influenza/human_animal_interface/avian_influenza/archive/en/) and National Health Commission of the People's Republic of China (www.nhc.gov.cn).

Sequence collection and alignment.

All previously published sequences of H9N2 chicken influenza A virus isolated in China (2010-2017) and related sequences were obtained from the Global Initiative on Sharing Avian Influenza Data (www.gisaid.org) and the Influenza Virus Resource at the National Center for Biotechnology Information (NCBI) (www.ncbi.nlm.nih.gov/genomes/FLU) (Table S8 and S9). All sequences of H7N9 virus published before September 2017 were acquired from the above databases. H9N2 and H7N9 virus sequences, combined with sequences generated in this study (Table S9), were used for further analysis. All duplicated submissions were removed by identifying sets of isolates with identical viral names and sequences in submitted segments. The resulting sequences of each gene segment were aligned using MUSCLE v3.7 (39) via CIPRES Science Gateway (40), manually adjusted to correct frame shift errors, and subsequently translated. Downstream phylogenetic analyses were performed on regions of the alignments containing few gaps across sequences. These regions consist of the following intervals (nucleotide numbers are from the start of the untranslated region): PB2, 28-2,307; PB1, 25-2,298; PA, 25-2,175; HA, 34-1,716; NP, 46-1,542; NA, 20-1,420; MP, 26-1,007; and NS, 27-864.

Phylogenetic analysis and clade classification.

IQ-TREE was used to construct maximum likelihood phylogenies for each segment (41). Generalized time reversible substitution model with gamma distribution (GTR+G) was used, and branch supports were assessed through the single branch test SH-aLRT (42) with 1,000 replicated tests. Clades with SH-aLRT support (%) equal to or more than 90 in the tree were selected as clusters. Clades were then manually

merged, if necessary, based on the branch length (> 0.01) and reported classification (6, 8). In identified clades, clusters that formed relatively independent branches (SH-aLRT support > 90 and the branch length > 0.001) were identified as sub-clades. Each clade/sub-clade was assigned a unique clade/sub-clade identification number. Figures were generated using iTOL (43).

Genotypic analysis.

Isolates were genotyped/sub-genotyped if sequences and clade/sub-clade assignments were available for all eight segments of H9N2 viruses (8) or for all six internal segments of H7N9 viruses (6, 18, 20). Virus sub-genotypes were analyzed in chicken H9N2 viruses isolated in China from 2010-2017. Virus genotypes were analyzed in H7N9 viruses isolated from human and other hosts in China during wave 1 to wave 5. Genotype/sub-genotype IDs were assigned according to the isolation time of the initial founder isolate.

Antigenic analysis.

HI assays, performed as previously described (44), were used to antigenically characterize H9N2 viruses isolated in China in this study. HI titer was expressed as the reciprocal of the highest serum dilution in which hemagglutination was inhibited. For analysis of antigenic variation, the HI data were log2 transformed and the transformed data were downscaled to three-dimensional space by Multidimensional scaling (MDS) (45) with an explained variance of 96.78%. Antigenic clustering of virulent strains was performed using K-means clustering (46).

Plasmids and cells.

Protein expression plasmids, pcDNA-PB2, pcDNA-PB1, pcDNA-PA and pcDNA-NP, were generated by subcloning the corresponding coding segment into the pcDNA3.1 vector. Human embryonic kidney (293T) cells, human lung adenocarcinoma epithelial (A549) cell and chicken embryo fibroblasts (DF-1) cells were maintained in Dulbecco's modified Eagle's medium (DMEM; Gibco) supplemented with 10% fetal bovine serum (FBS; Gibco), 100U/ml of penicillin, and 100 μg/mL of streptomycin at 37°C in a 5% CO_2 atmosphere.

Polymerase activity assay.

A dual-luciferase reporter assay system (Promega, Madison, WI, USA) was used to compare the polymerase activities of different viral RNP complexes (32). PB2, PB1, PA and NP gene segments of indicated viruses were separately cloned into the pCDNA3.1 expression plasmid. PB2, PB1, PA and NP plasmids (125 ng each plasmid) along with the pLuci luciferase reporter plasmid (10 ng) and the renilla internal control plasmid (2.5 ng) were used to transfect 293T cells or DF-1 cells. 293T cell cultures were incubated at 33°C or 37°C; DF-1 cell cultures were incubated at 37°C or 39°C. Cell lysates were analyzed 24 hours post-transfection for firefly and renilla luciferase activities using GloMax 96 microplate luminometer (Promega). The PB2, PB1, PA and NP genes from a LPAI G13 genotype H7N9 virus (A/chicken/Shandong/M0303-10/2017) were used as reference viral RNP complex in polymerase activity assays. Series of recombinant viral RNP complexes were generated by replacing reference complex with specific PB2 and PA genes from

H9N2 and G72 genotype H7N9 viruses, whose PB2 and PA genes were from PB2-6.2 and PA-3.1 sub-clade respectively. The H9N2 viruses used were A/chicken/Shandong/217/2017 and A/chicken/Hebei/M1211-20/2016, and the G72 genotype H7N9 viruses used were A/chicken/Shandong/F0513-60/2017 and A/chicken/Beijing/F0606-1/2017. Further details of virus and segment information are shown in Table S5.

Generation of reassortant viruses by reverse genetics.

A recombinant reference vG13 genotype (rG13) virus was generated by reverse genetics (47). All six internal gene segments were amplified by reverse transcription-PCR (RT-PCR) from the LPAI G13 genotype H7N9 virus (A/chicken/Shandong/M0303-10/2017) and two surface genes were from the LPAI G13 virus (A/chicken/Jiangsu/BD145/2014). Each gene was individually cloned into a dual-promoter plasmid, pHW2000. Based on the rG13 virus, three additional reassortants (rG13: PB2/PA-H9N2, rG13: PB2/PA-H7N9-1 and rG13: PB2/PA-H7N9-2) were generated by substituting the PB2 and PA genes (from PB2-6.2 and PA-3.1 sub-clades) of H9N2 and G72 H7N9 viruses. Rescued viruses were generated in 293T cells as previously described (47). Further details of segment and viral information of these reassortants are shown in Table S5.

Mouse challenge study.

Fifteen mice (6-week-old female BALB/c mice; Vital River Laboratory, Beijing, China) per group were anesthetized with tiletamine-zolazepam (Zoletil; VirbacSA, Carros, France) (20mg/g) and each mouse was inoculated intranasally with 10^6

433 $TCID_{50}$ of the indicated test virus diluted to 50 μL with PBS. Five mice from each
434 group were monitored daily for 14 days, and mice that lost > 25% of their original
435 body weight were humanely euthanized. Five mice from each group were euthanized
436 at 3 and 5 days post-infection (dpi) for the determination of virus titers and
437 histopathology. Nasal turbinates and lungs were collected and homogenized in 1 mL
438 of cold PBS. Virus titers were determined by $TCID_{50}$ assays. A portion of lung from
439 each euthanized mouse at 3 dpi was fixed in 10% phosphate-buffered formalin for
440 histopathological examination which was performed as described previously (48).
441 MID_{50} was determined according to previous study (49).

442 **Statistical analysis.**

443 Experimental groups were statistically compared by ANOVA. $P < 0.05$ was
444 considered to indicate a statistically significant difference.

445 **Data availability.**

446 The sequences generated in this study have been deposited in the GenBank database,
447 and accession numbers are listed in Table S9.

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Figure legends

FIG 1 Phylogenetic analysis of H9N2 influenza viruses isolated from chickens. (A) HA phylogenetic tree of H9N2 influenza viruses from 2010 to 2017 denoted by different colors. Viruses labeled with a red dot were selected for HI assay. (B) PB2 phylogenetic tree of H9N2 influenza viruses. (C) Abundance of the sub-genotypes of H9N2 influenza virus during period from 2014 to 2017. The upper graph depicts percentage of strains of the five most dominant sub-genotypes in each year; lower graph depicts the total number of sub-genotypes in each year from 2014 to 2017. Total number of H9N2 viruses in each year are 72, 101, 29, and 41.

FIG 2 Antigenic cartography representation of the HI data generated by a panel of chicken antisera. Map was drawn by performing Multidimensional scaling (MDS) with downscaling of the HI data to three-dimensional space after log2 transformation, using K-means clustering. Circles and triangles represent the locations of strains classified as F- and G-antigen groups, respectively. Different colors represent different years of isolation. Virus names are indicated by using their abbreviations, and details of the HI data are shown in Table S2.

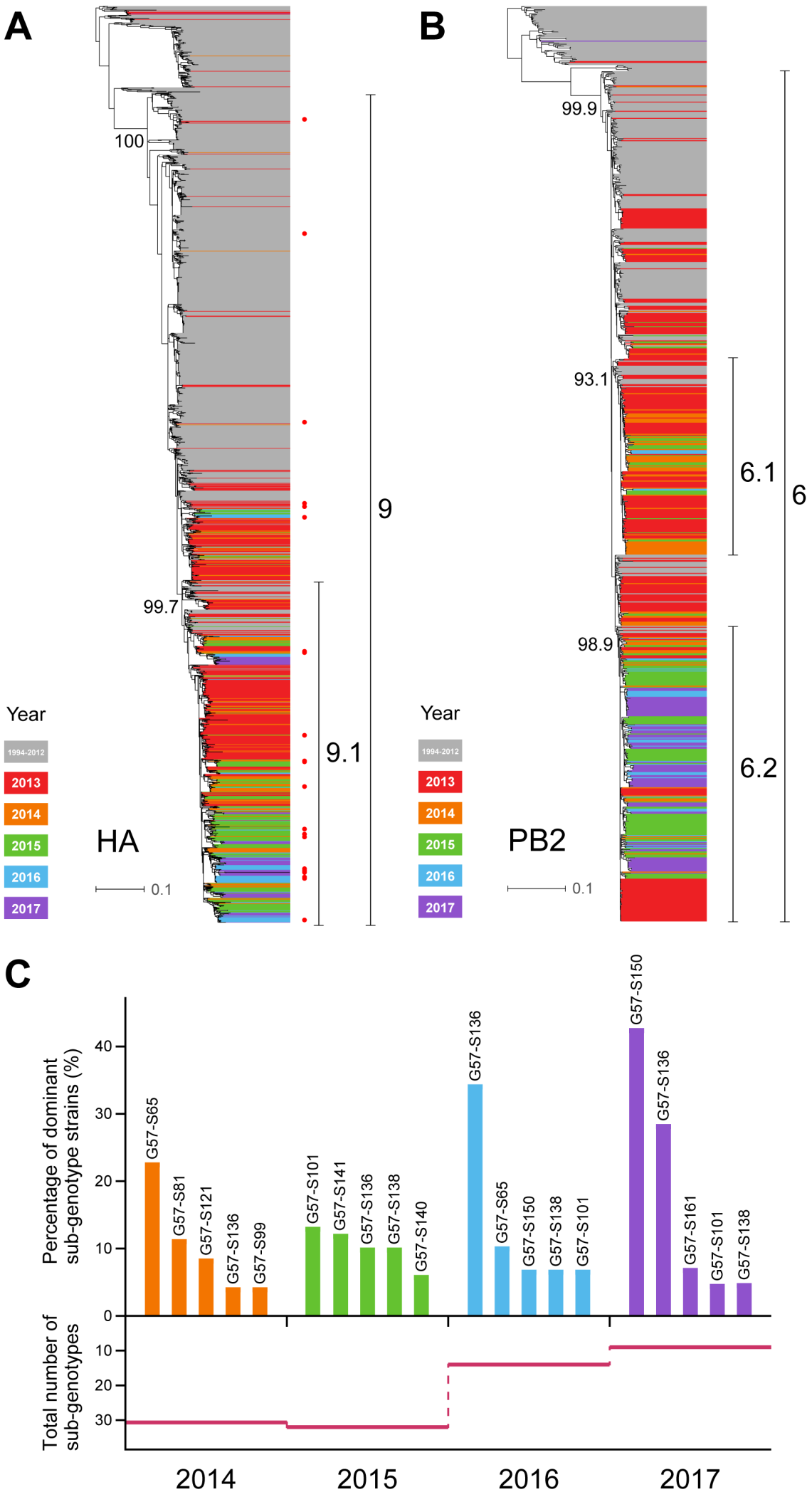
FIG 3 Isolation rate (%) of H9N2 influenza viruses in chicken flocks reporting illness, and the number of human H7N9 cases in the five epidemic waves. Red horizontal line (with connecting dots) indicates mean annual isolation rates and gray horizontal dashed lines indicate 95% CI. 2013 H9N2 isolation rate data obtained during the first epidemic wave are from our previous study (8). The total number of human cases from wave 1 to wave 5 was 135, 320, 226, 119 and 758, respectively.

675 **FIG 4** Genetic evolution of H7N9 influenza viruses from epidemic wave 1 through to
676 wave 5. (A) Abundance of different genotypes of H7N9 influenza virus. The upper
677 graph shows the prevalence rate of the five most abundant genotypes and the lower
678 graph illustrates the total number of genotypes in each wave. (B) Number of G13 and
679 G72 H7N9 strains in each month during 2013-2017 in human. The first isolation of
680 G72 H7N9 virus was in January 2015 during the third wave. The total number of G72
681 viruses isolated from humans in the third, fourth and fifth waves were 3, 15 and 286
682 respectively. (C) Genomic constitution of G13 and G72 H7N9 viruses. Virus particles
683 are represented by ovals. The eight gene segments are horizontal bars (from the top:
684 PB2, PB1, PA, HA, NP, NA, MP, and NS). Scarlet bars represent the internal
685 segments in G72 genotype that are different from G13 H7N9 viruses.
686 **FIG 5** Genetic relatedness of H7N9 and H9N2 influenza viruses in PB2 and PA genes.
687 (A) PB2 phylogenetic tree of H7N9 and H9N2 influenza viruses. On the right side of
688 tree, PB2 genes of G13 H7N9, G72 H7N9, and 6.2 sub-clade of H9N2 viruses are
689 denoted by different colored bars. (B) PA phylogenetic tree of H7N9 and H9N2
690 influenza viruses. On the right side of tree, PA genes of G13 H7N9, G72 H7N9, and
691 3.1 sub-clade of H9N2 viruses are denoted by different colored bars. (C) Prevalence
692 of PB2-6.2 and PA-3.1 in H7N9 and H9N2 viruses over time. (D) Prevalence of
693 critical amino acid residues coded in PB2 and PA genes of indicated H7N9 and H9N2
694 viruses. Red indicates high prevalence (up to 100%) substitutions, and blue indicates
695 no mutation or no virus isolated in the given year.
696 **FIG 6** Contribution of H9N2-derived PB2 and PA genes to polymerase activity in

H7N9 virus. Viral polymerase activities in 293T cells (A) were determined by minigenome replication assays at 33°C and 37°C, and those in DF-1 cells (B) were determined at 37°C and 39°C (expressed as mean percent ± standard deviation with the activity of the corresponding wild-type G13 H7N9 virus being set at 100%, from three independent experiments). Test RNP complexes were variants of a G13 H7N9 virus with indicated substitutions of PB2 and PA genes. rG13: PB2/PA-H9N2 refers to RNP complex with the PB2 and PA genes from a H9N2 virus; rG13: PB2/PA-G72-1 and rG13: PB2/PA-G72-2 refer to RNP complexes with the PB2 and PA genes from different G72 H7N9 viruses. All substituted genes were from H9N2-derived PB2-6.2 and PA-3.1 sub-clades. Detailed segment and viral information of these reassortants is shown in Table S5. Statistical significance was based on one-way ANOVA (ns, not significant; *, $P < 0.05$; **, $P < 0.01$; ***, $P < 0.001$).

FIG 7 Contribution of PB2 and PA genes of H9N2 virus origin to infectivity of H7N9 virus in mice. (A) Weight loss and percentage survival of mice (n = 5) inoculated with 10^6 $TCID_{50}$ of each virus. Mice that lost > 25% of their baseline weight were euthanized. (B) Virus production from nasal turbinates and lungs. Five mice from each group were euthanized at 3 and 5 dpi to determine viral titers of nasal turbinate and lung tissues. Statistical significance was based on one-way ANOVA (*, $P < 0.05$; **, $P < 0.01$; ***, $P < 0.001$). (C) Representative histopathological changes in lung sections at 3 dpi; H&E-stained (left panels) and immuno-detection of influenza viral NP antigen (right panels). Mice infected with rG13: PB2/PA-H9N2, rG13: PB2/PA-H7N9-1 and rG13: PB2/PA-H7N9-2 viruses were presented with more

719 severe histopathology and greater abundance of viral antigen-positive cells in the lung
720 fields.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G57-S138
G57-S140
G57-S136
G57-S65
G57-S150
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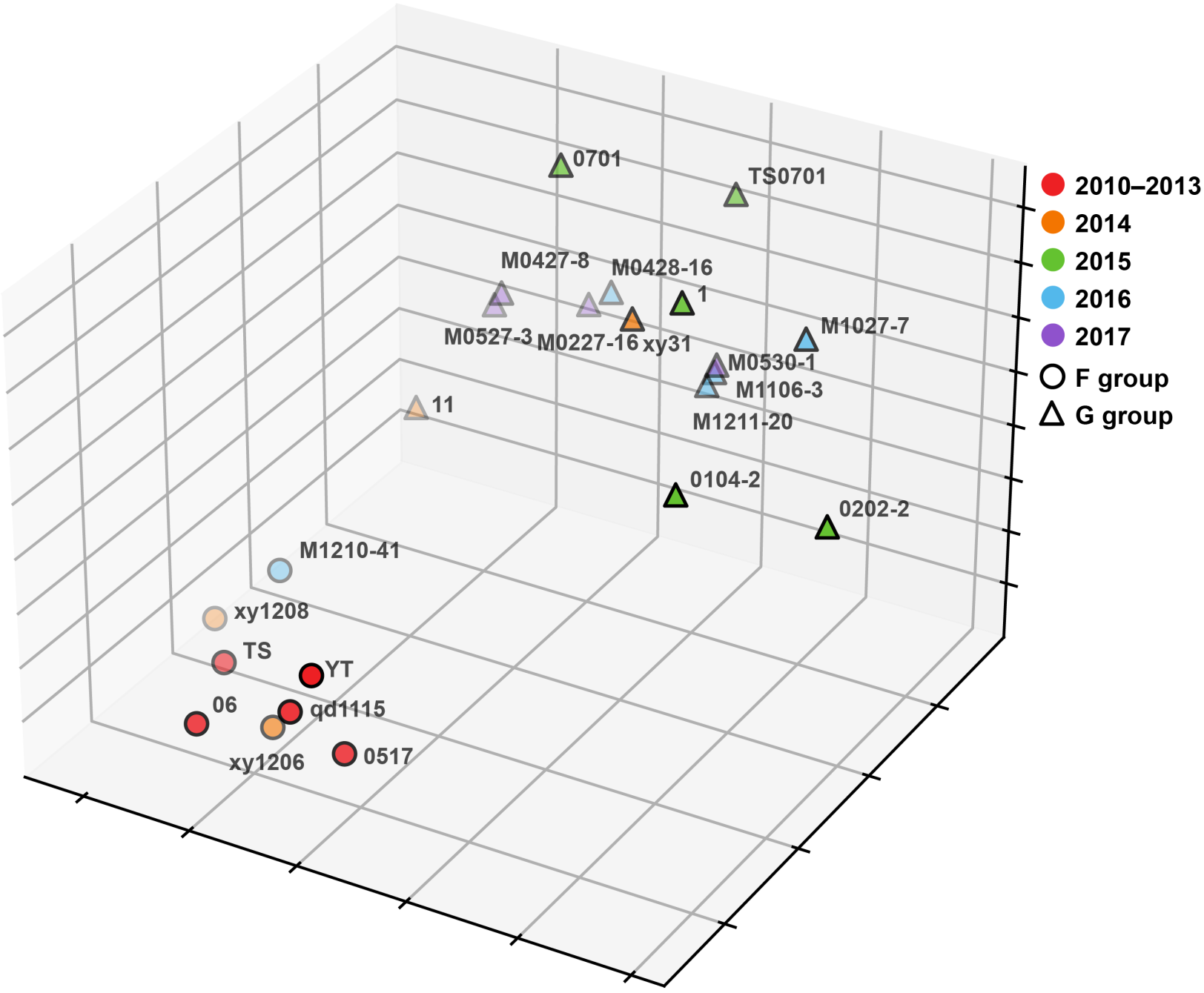
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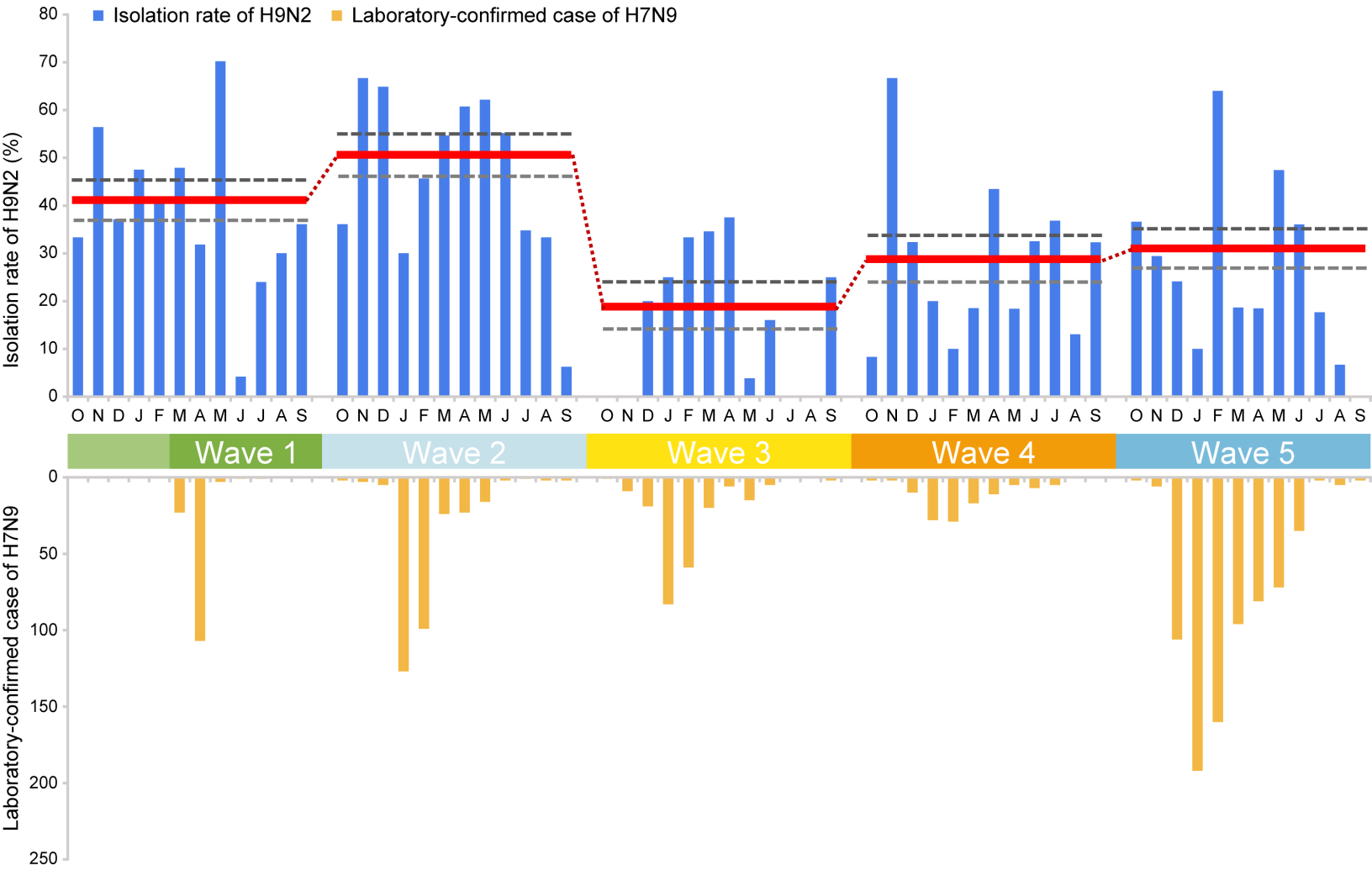
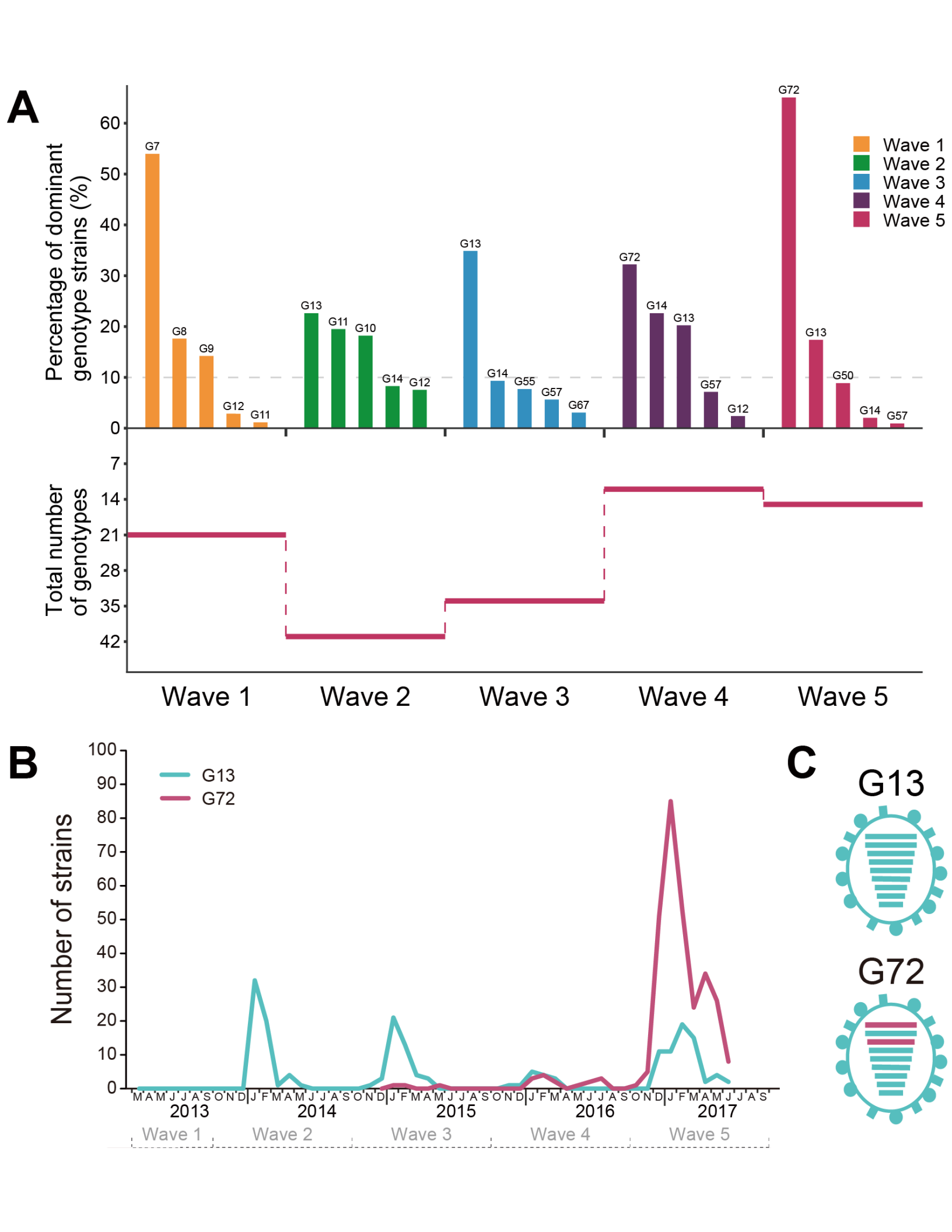
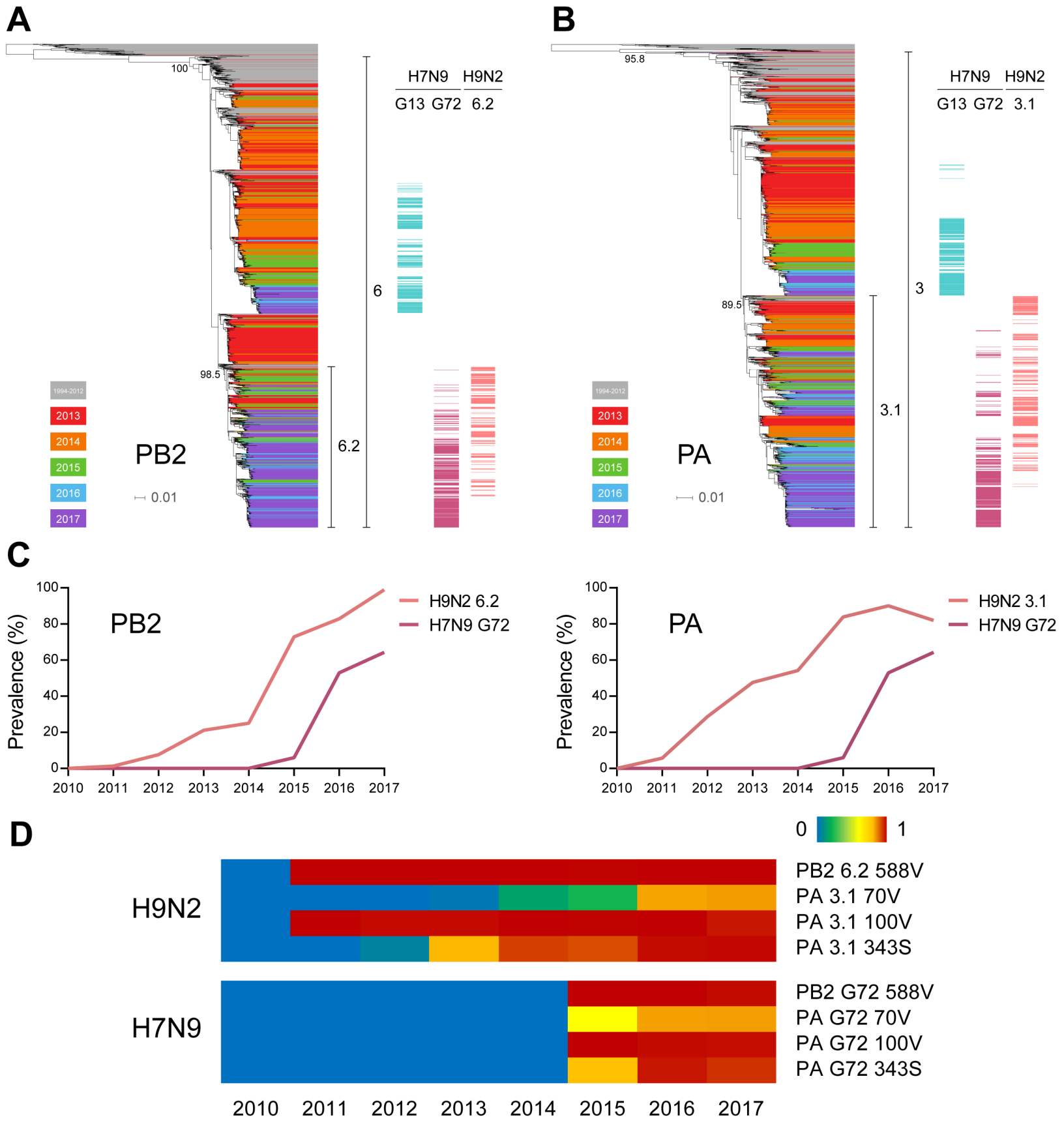
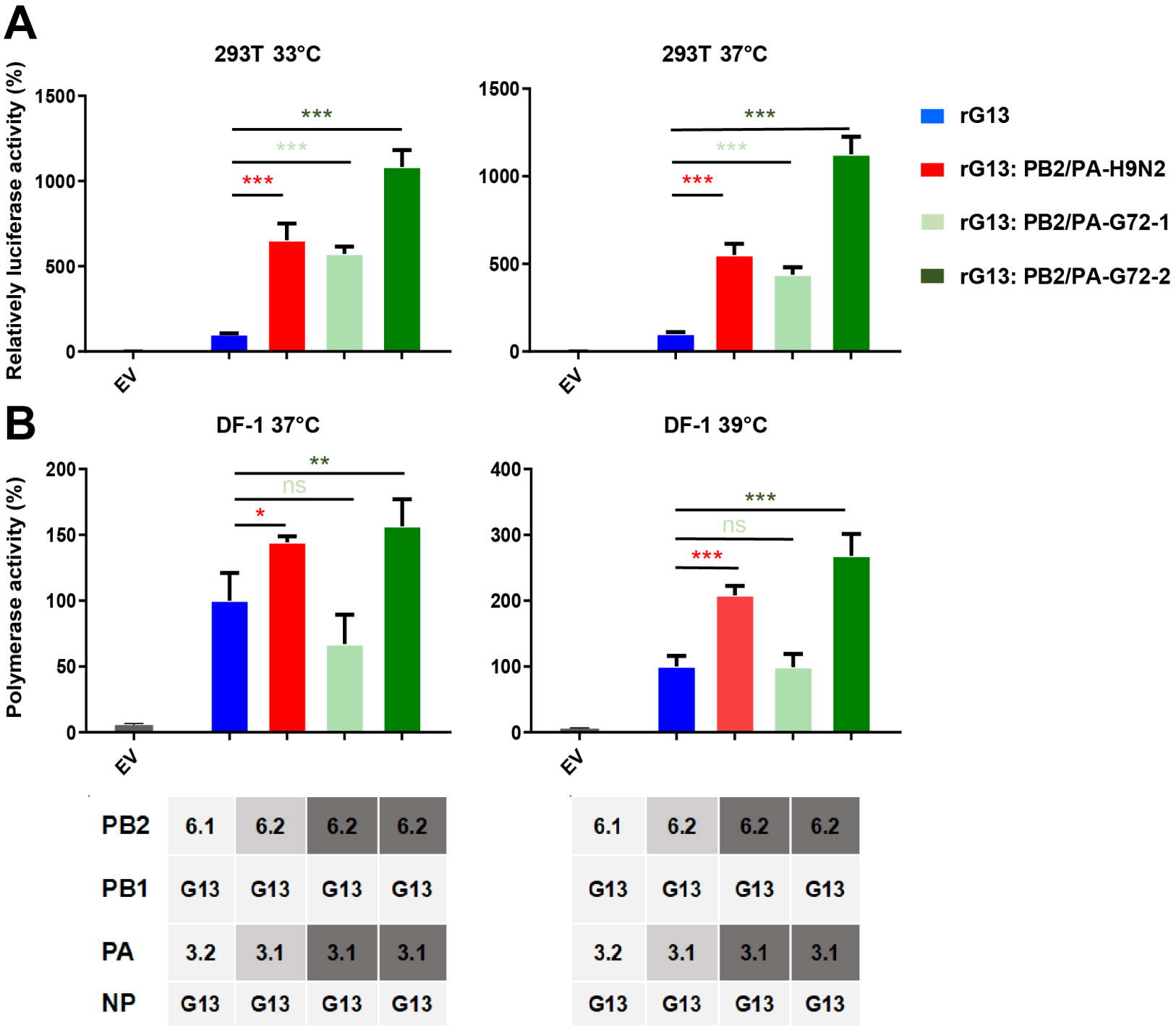
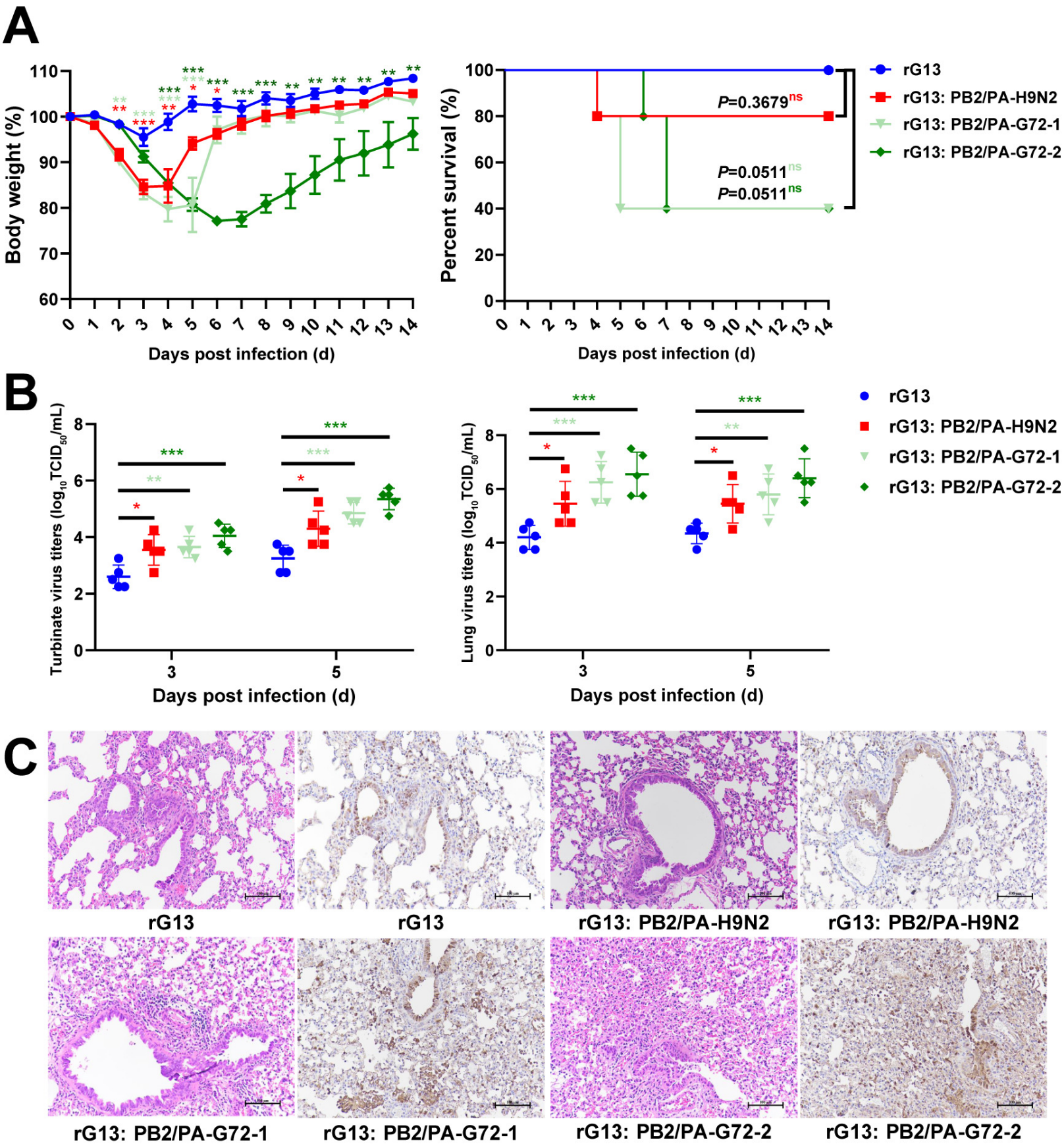
2015
2016
2017
F group
G group

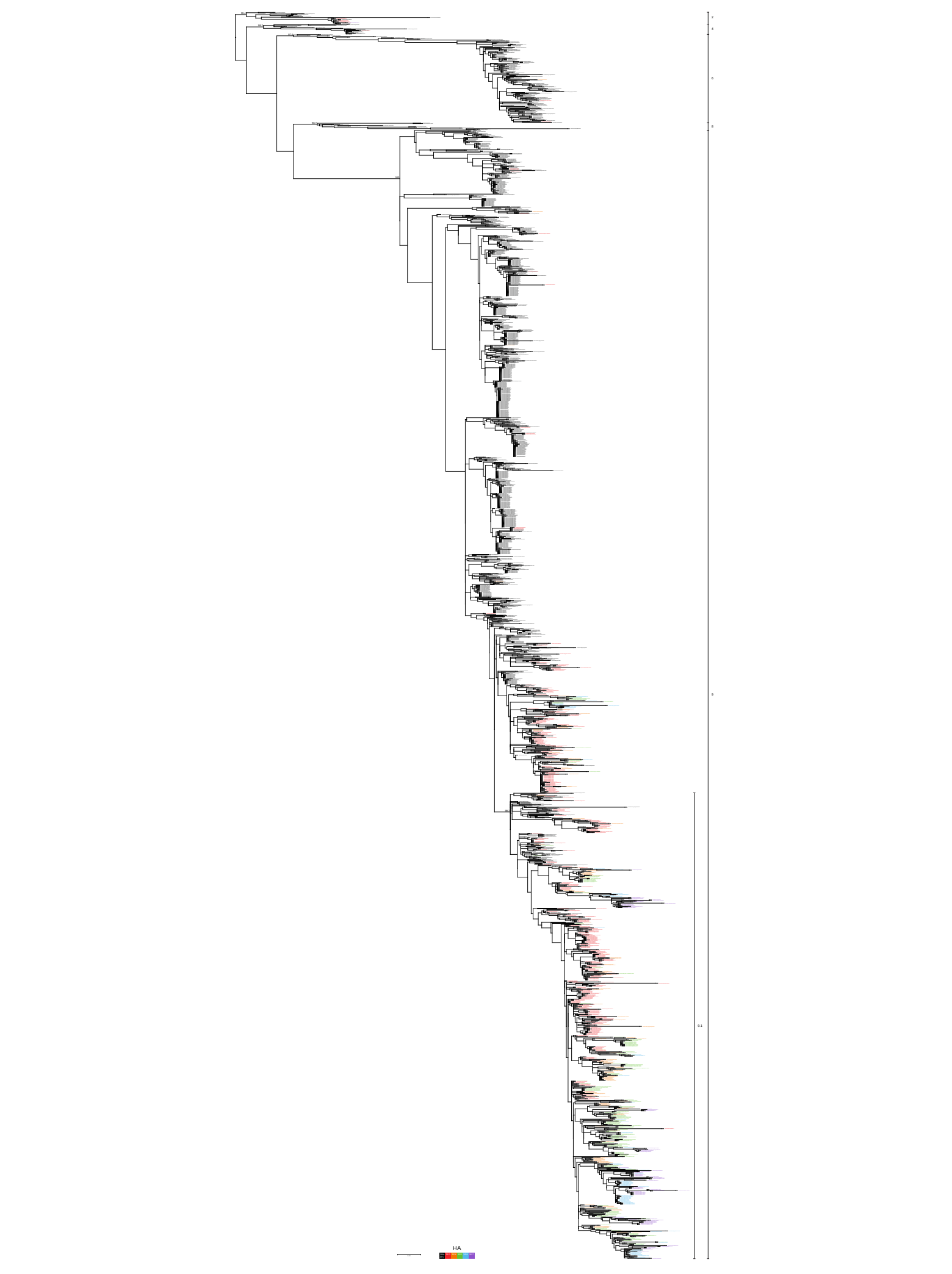

Isolation rate of H9N2
Laboratory-confirmed case of H7N9
Isolation rate of H9N2 (%)
Laboratory-confirmed case of H7N9
80
70
60
50
40
30
20
10
0
O N D J F M A M J J A S
Wave 1
Wave 2
Wave 3
Wave 4
Wave 5
0
50
100
150
200
250

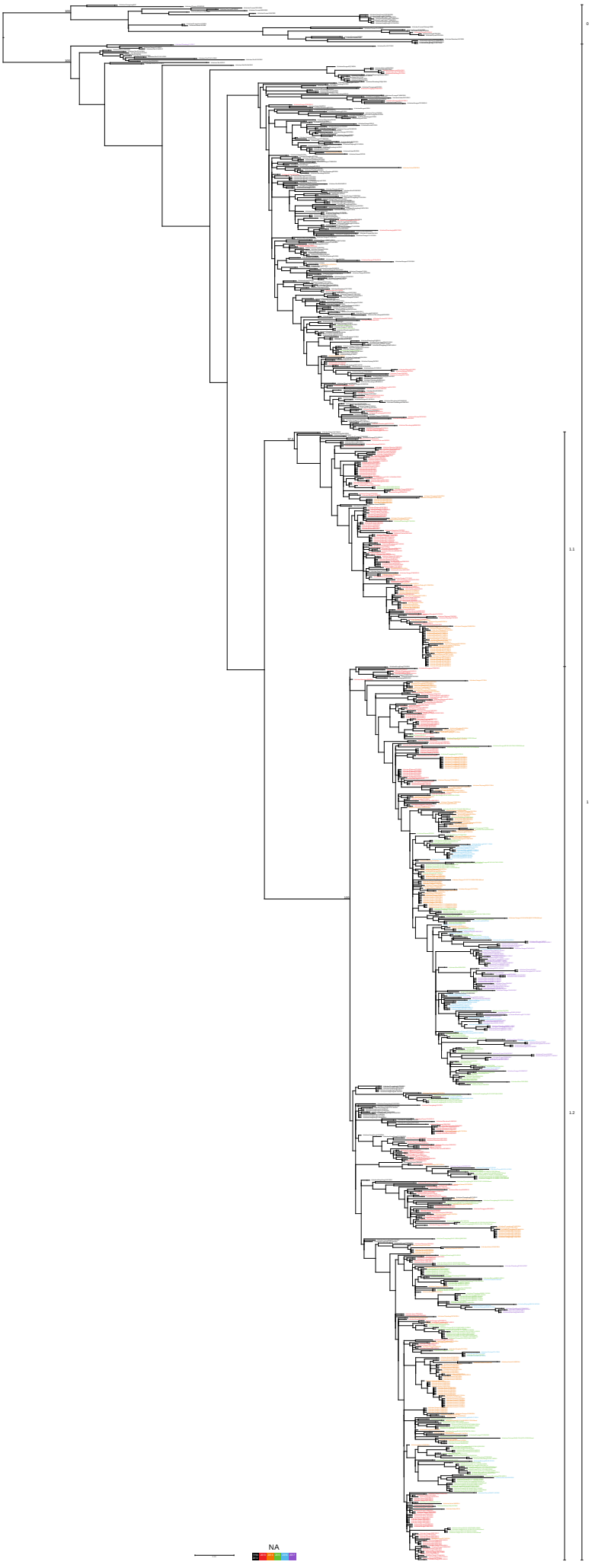

A
Percentage of dominant genotype strains (%)
Wave 1
Wave 2
Wave 3
Wave 4
Wave 5
G7
G8
G9
G12
G11
G13
G11
G10
G14
G12
G13
G14
G55
G57
G67
G72
G14
G13
G57
G12
G72
G13
G50
G14
G57
Total number of genotypes
Wave 1
Wave 2
Wave 3
Wave 4
Wave 5
B
Number of strains
G13
G72
2013
2014
2015
2016
2017
Wave 1
Wave 2
Wave 3
Wave 4
Wave 5
C
G13
G72

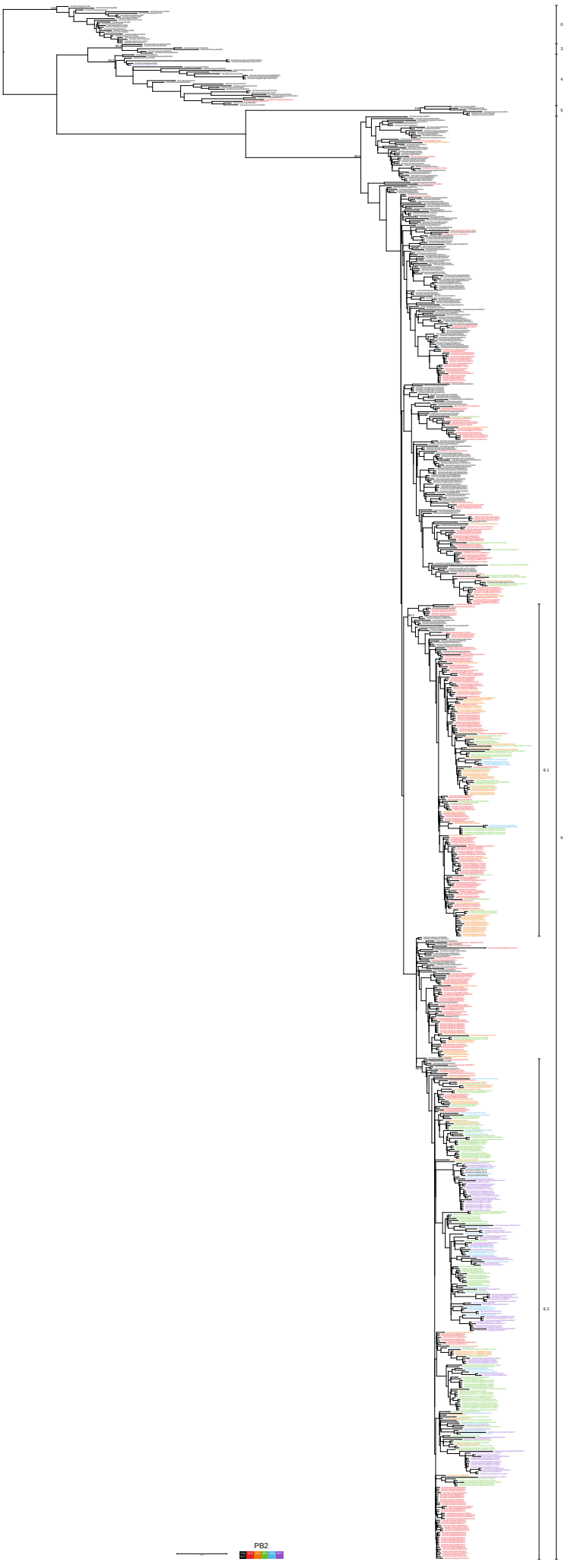

A
100
98.5
PB2
0.01
1994-2012
2013
2014
2015
2016
2017
6
6.2
H7N9
H9N2
G13 G72 6.2
B
95.8
89.5
PA
0.01
3
3.1
H7N9 H9N2
G13 G72 3.1
C
PB2
Prevalence (%)
H9N2 6.2
H7N9 G72
PA
H9N2 3.1
H7N9 G72
2010 2011 2012 2013 2014 2015 2016 2017
D
0
1
H9N2
PB2 6.2 588V
PA 3.1 70V
PA 3.1 100V
PA 3.1 343S
H7N9
PB2 G72 588V
PA G72 70V
PA G72 100V
PA G72 343S
2010 2011 2012 2013 2014 2015 2016 2017

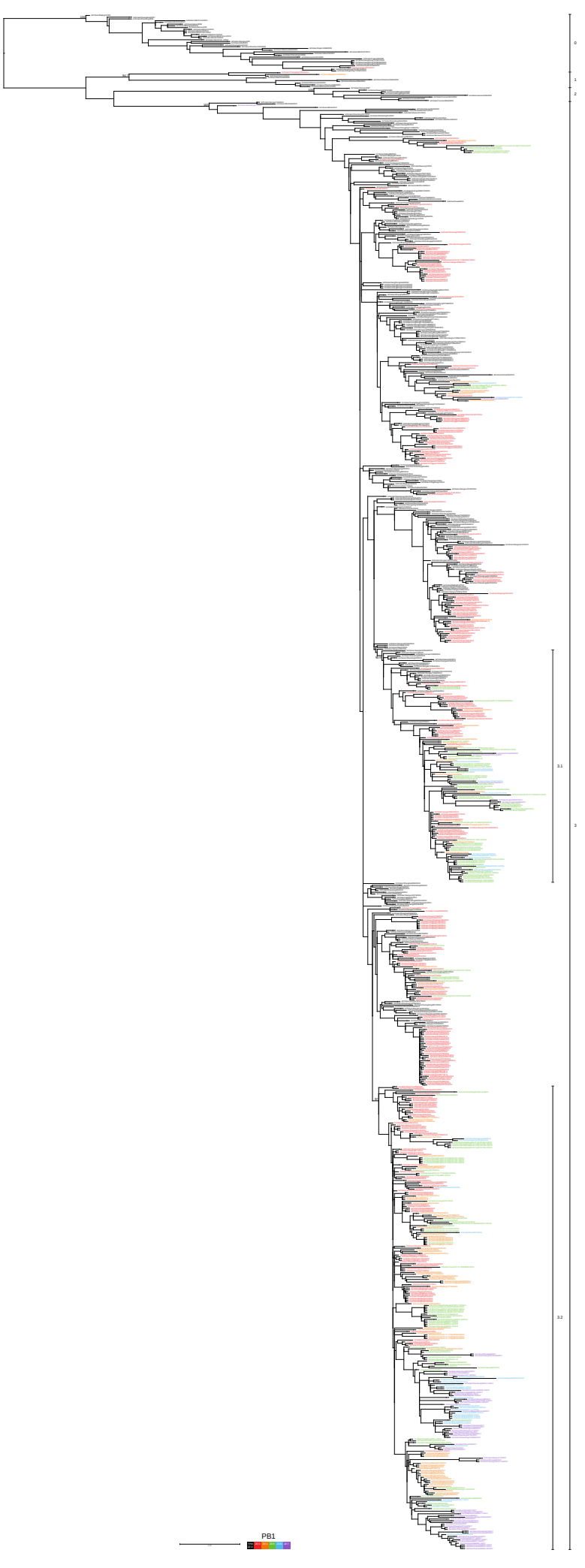

A
293T 33°C
293T 37°C
Relatively luciferase activity (%)
1500
1000
500
0
***
***
***
EV
rG13
rG13: PB2/PA-H9N2
rG13: PB2/PA-G72-1
rG13: PB2/PA-G72-2
B
DF-1 37°C
DF-1 39°C
Polymerase activity (%)
200
150
100
50
400
300
**
ns
*
ns
PB2 6.1 6.2 6.2 6.2
PB1 G13 G13 G13 G13
PA 3.2 3.1 3.1 3.1
NP G13 G13 G13 G13

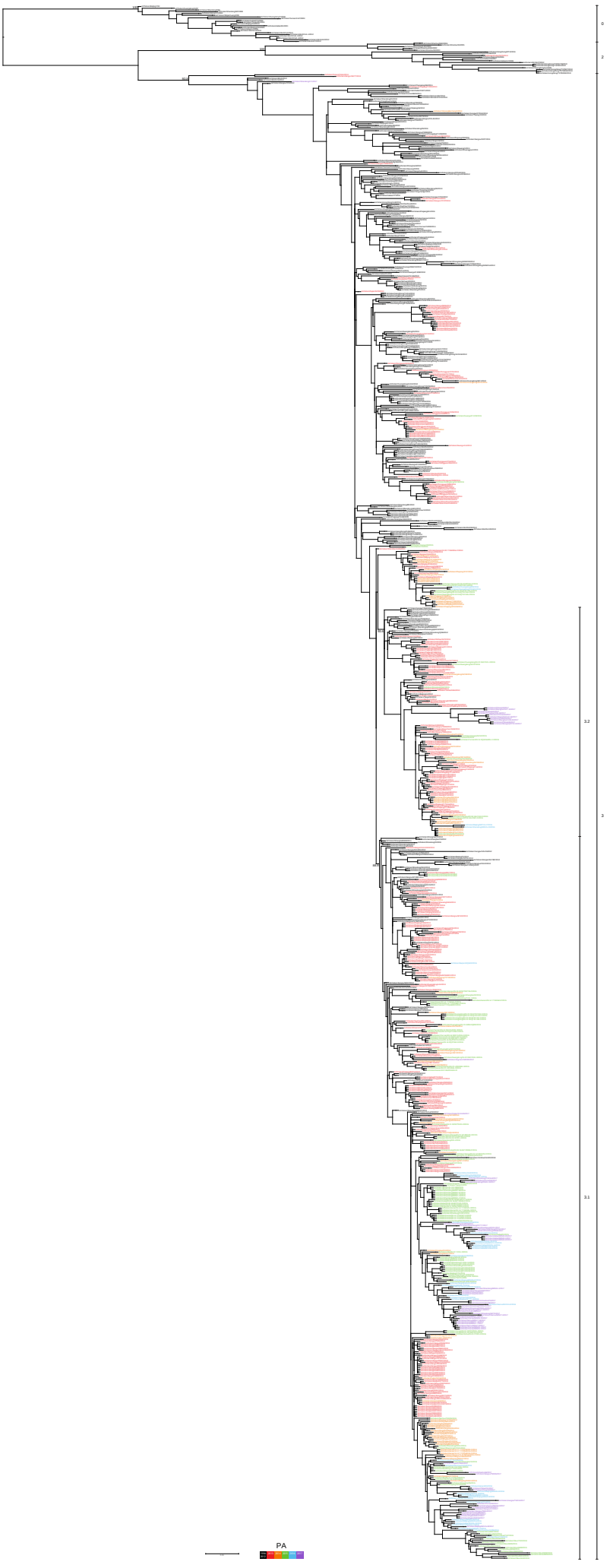

A
Body weight (%)
Days post infection (d)
Percent survival (%)
P=0.3679ns
P=0.0511ns
P=0.0511ns
rG13
rG13: PB2/PA-H9N2
rG13: PB2/PA-G72-1
rG13: PB2/PA-G72-2
B
Turbinate virus titers (log10TCID50/mL)
Lung virus titers (log10TCID50/mL)
Days post infection (d)
C
rG13
rG13
rG13: PB2/PA-H9N2
rG13: PB2/PA-H9N2
rG13: PB2/PA-G72-1
rG13: PB2/PA-G72-1
rG13: PB2/PA-G72-2
rG13: PB2/PA-G72-2

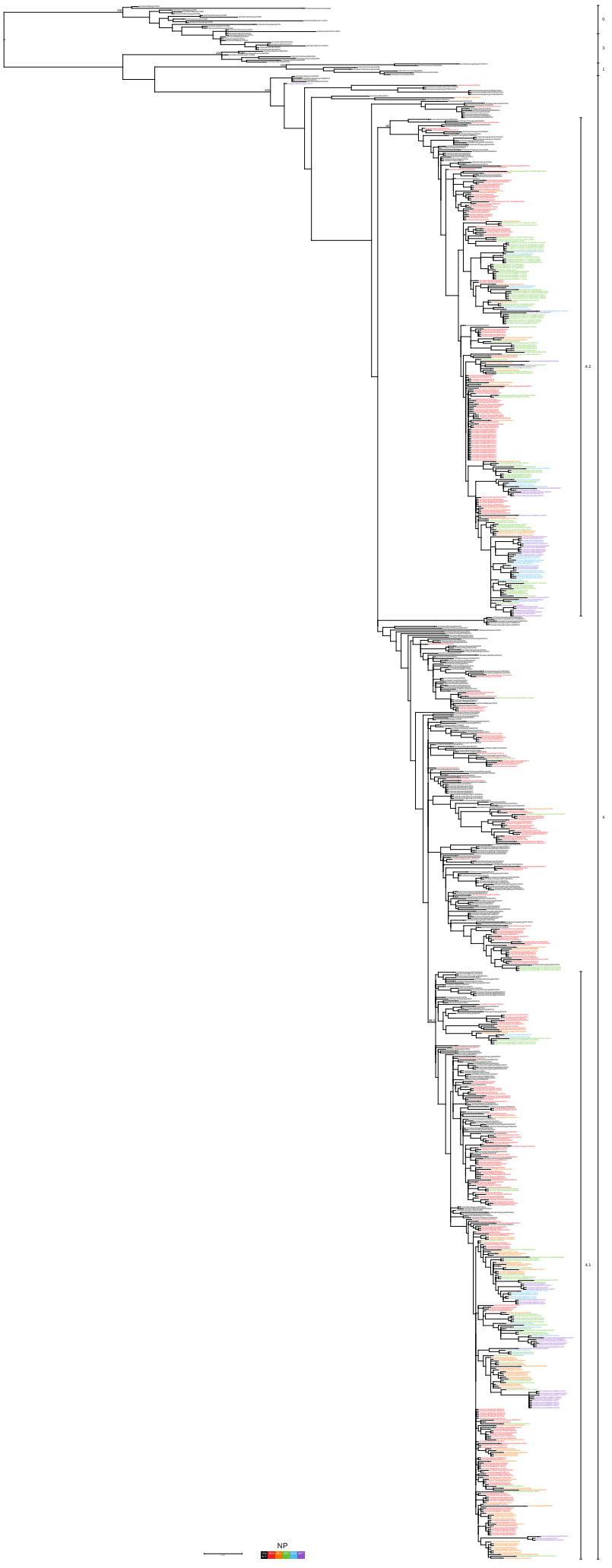

2
4
6
8
9
9.1
HA

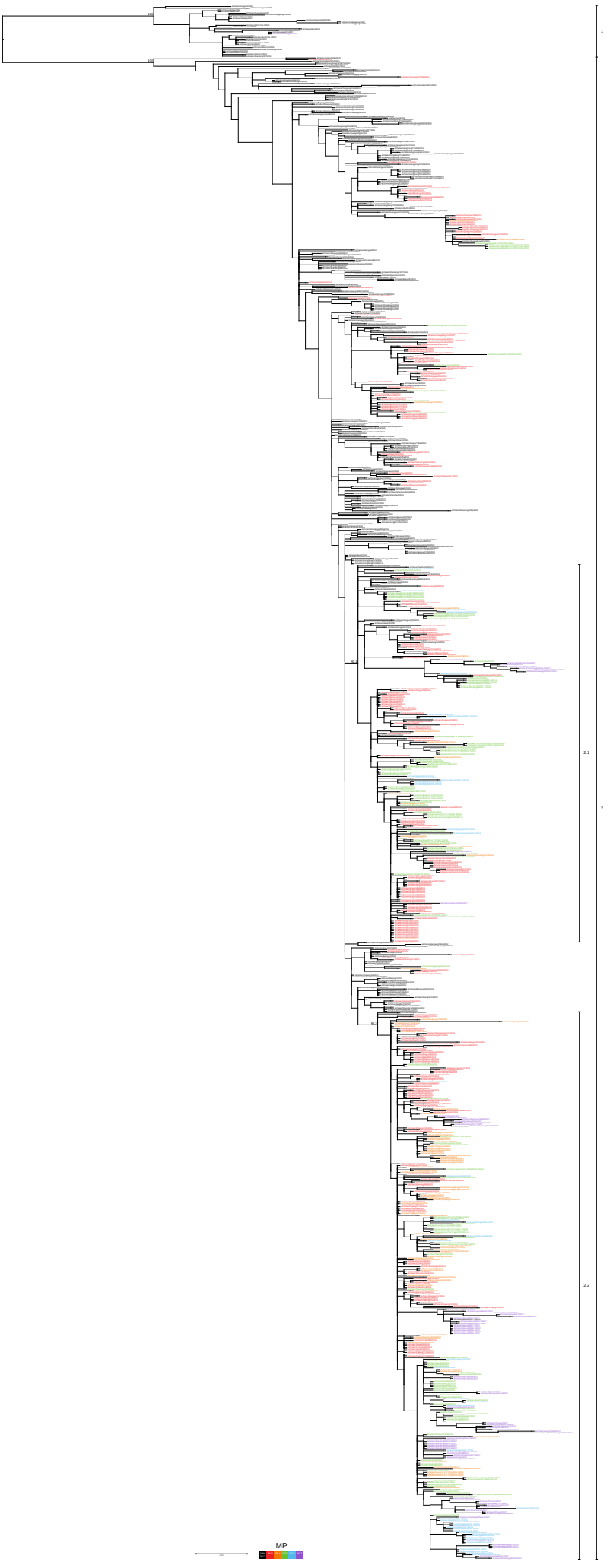

0
1
1.1
1.2
NA


0
3
4
5
6.1
6
6.2
PB2


0
1
2
3
3.1
3.2
PB1


0
2
3.2
3
3.1
PA


0
3
1
4.2
4
4.1
NP


1
2
2.1
2.2
MP

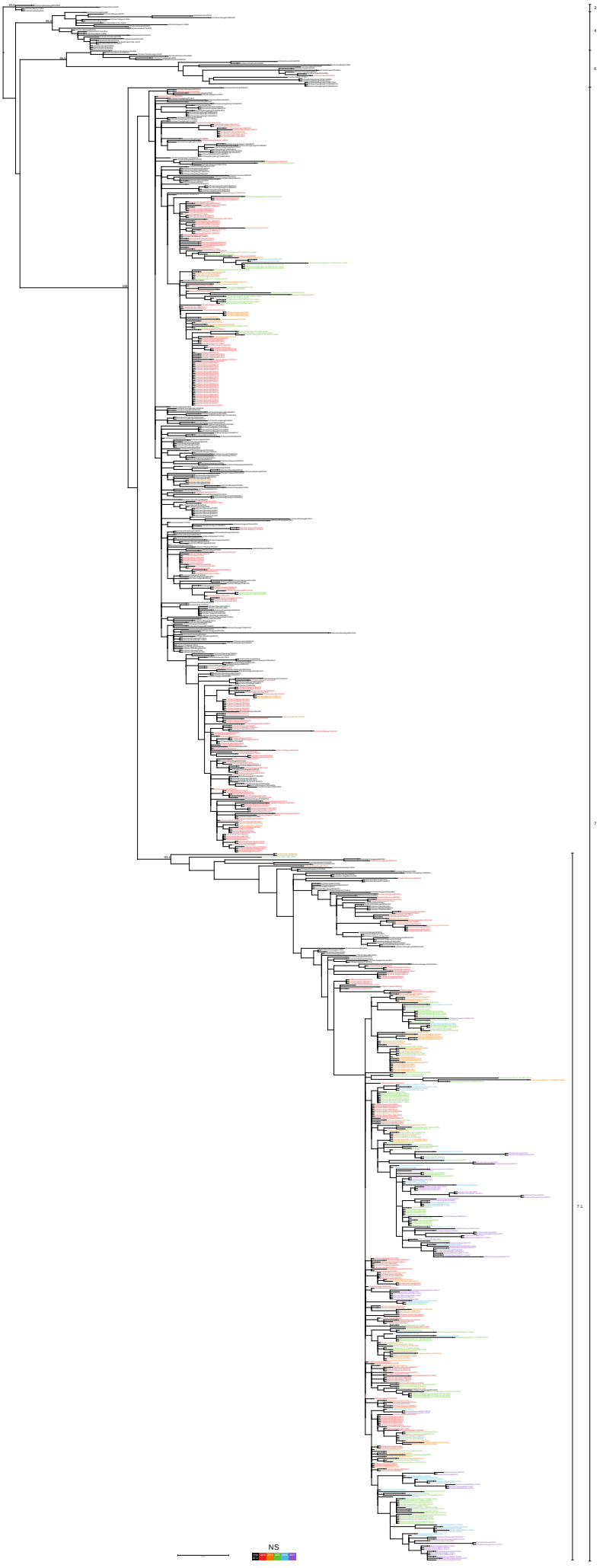
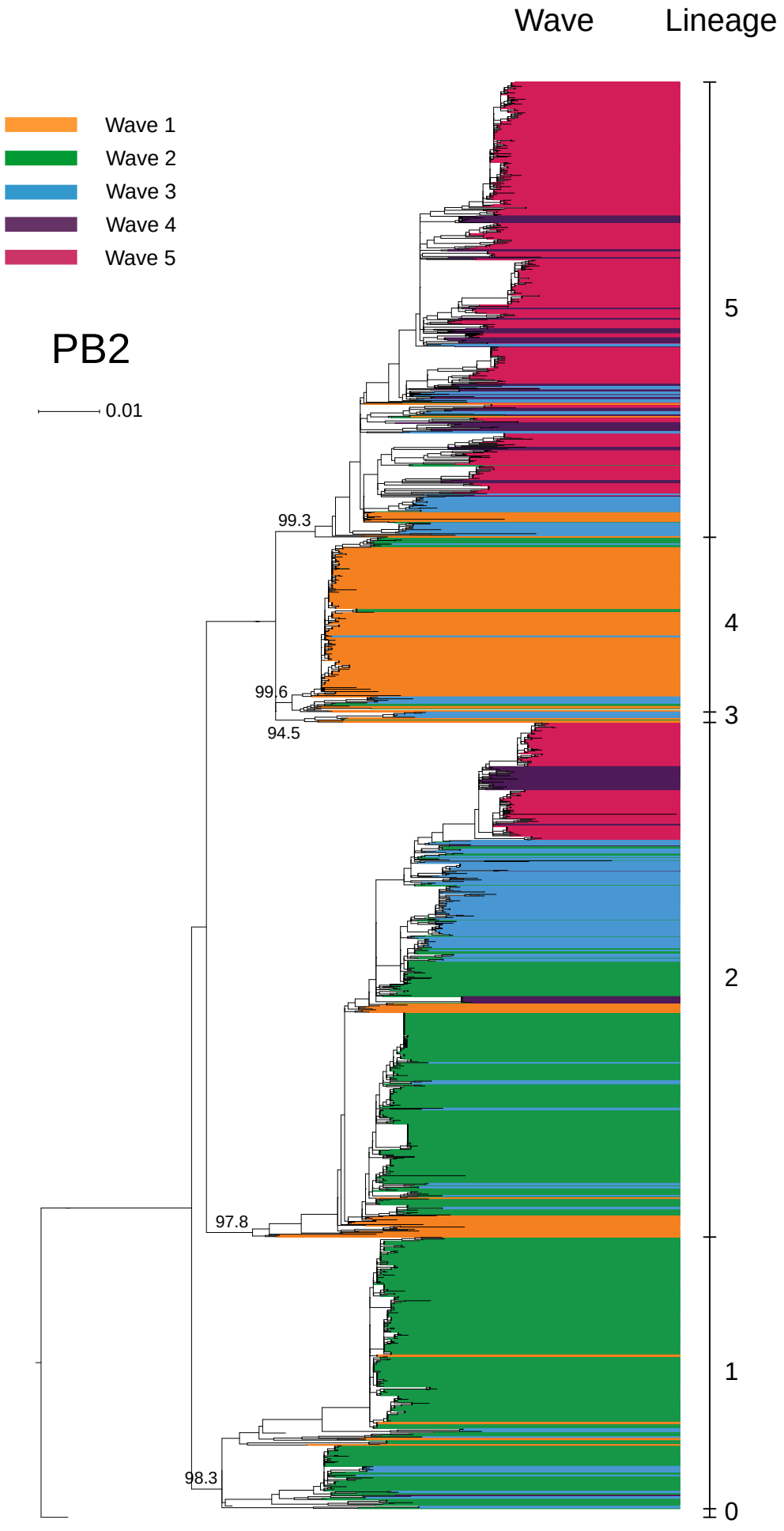
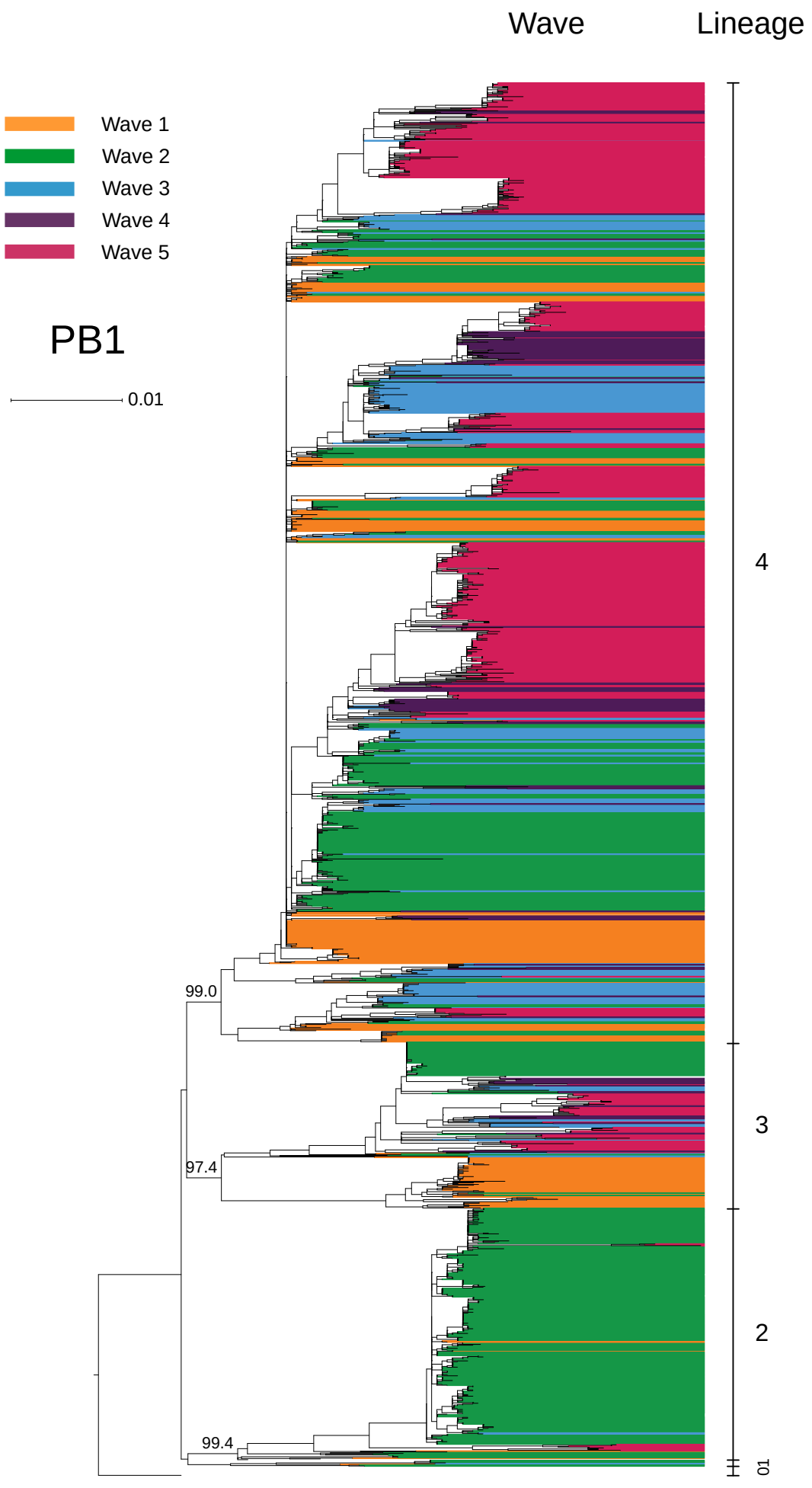
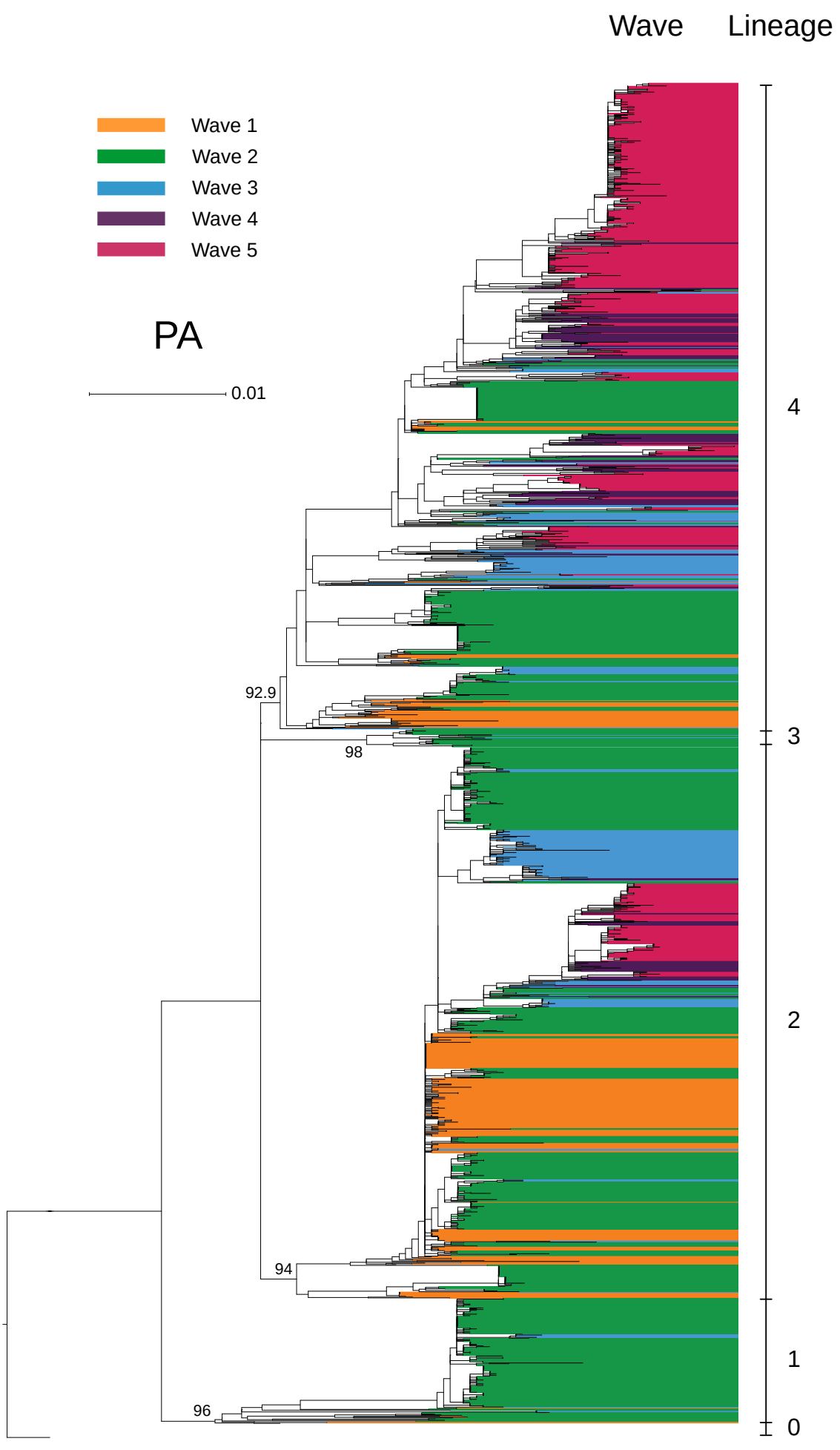
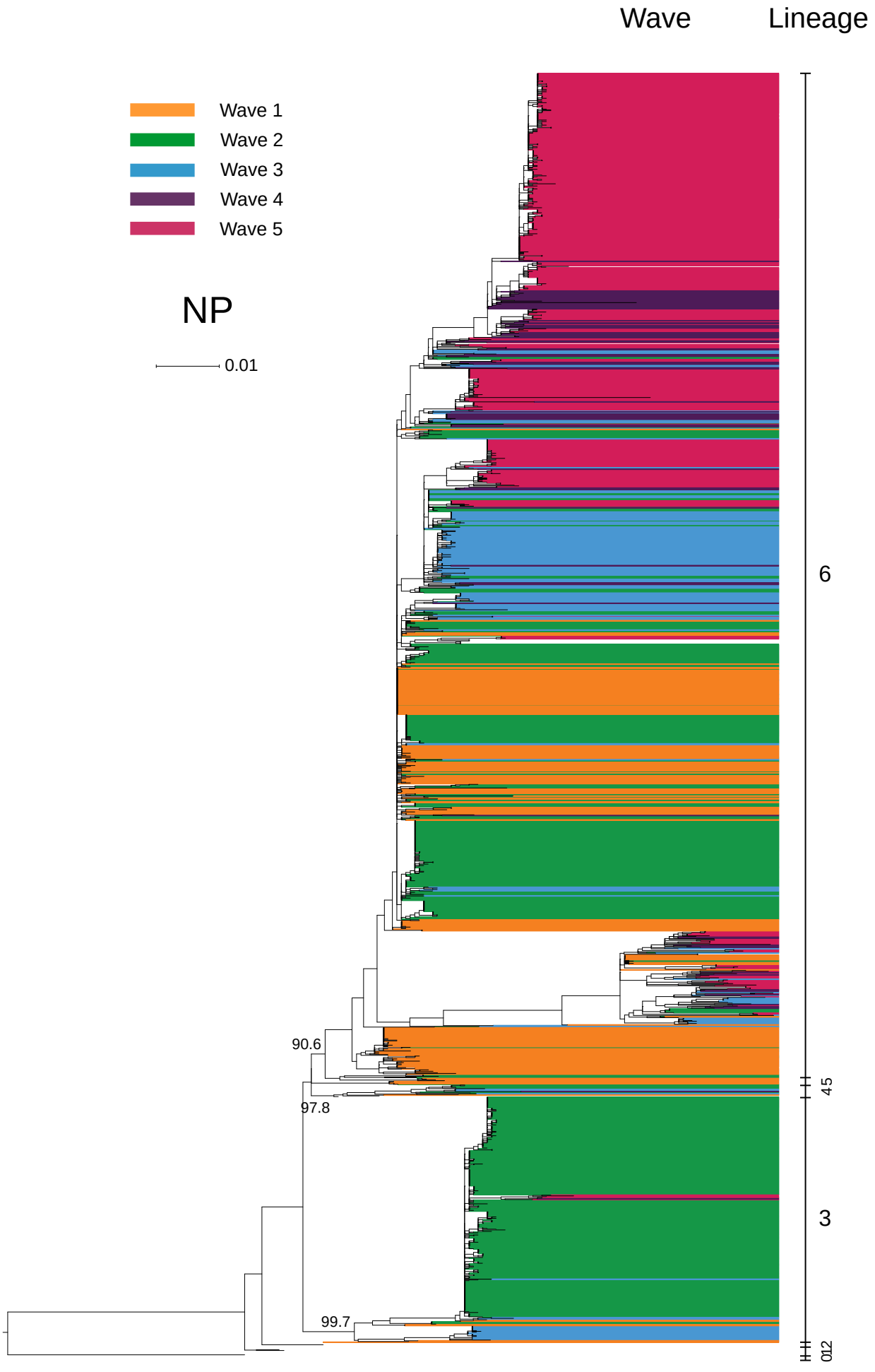

3
4
6
7
7.1
NS

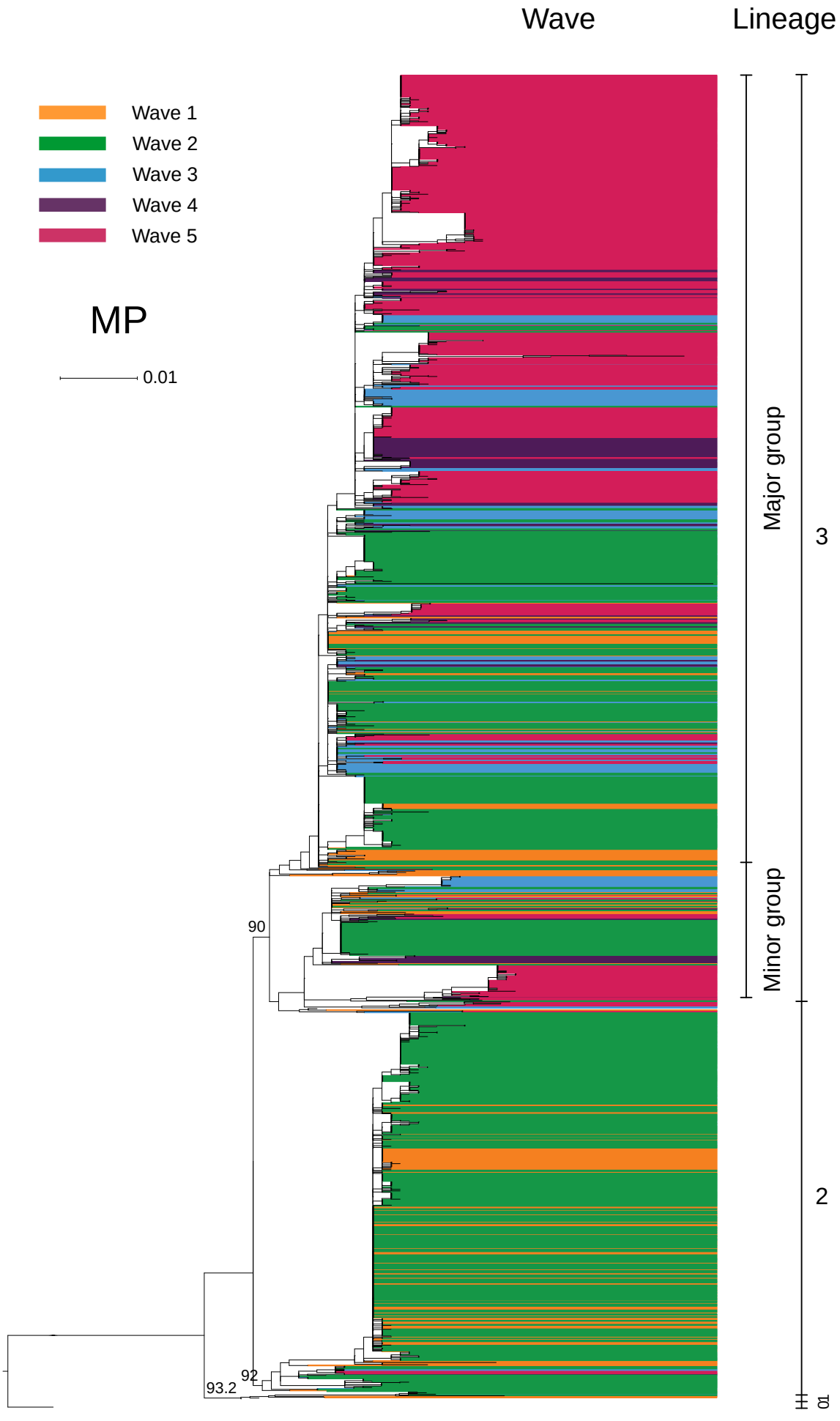
FIG S1 Phylogenies of HA, NA, PB2, PB1, PA, NP, MP and NS genes of chicken H9N2 influenza viruses during 2014-2017. Posterior values are shown for selected clades/sub-clades. Timescale is in years. Color of line at right of each leaf node indicates the year of isolation (see color bar). Vertical black lines mark clades/sub-clades.


Wave
Lineage
Wave 1
Wave 2
Wave 3
Wave 4
Wave 5
PB2
0.01
99.3
99.6
94.5
97.8
98.3
5
4
3
2
1
0


Wave
Lineage
Wave 1
Wave 2
Wave 3
Wave 4
Wave 5
PB1
0.01
99.0
97.4
99.4
4
3
2
1


Wave
Lineage
Wave 1
Wave 2
Wave 3
Wave 4
Wave 5
PA
0.01
92.9
98
94
96
4
3
2
1
0


Wave
Lineage
Wave 1
Wave 2
Wave 3
Wave 4
Wave 5
NP
0.01
90.6
97.8
99.7
6
45
3
012


Wave
Lineage
Wave 1
Wave 2
Wave 3
Wave 4
Wave 5
MP
0.01
Major group
Minor group
3
2
1
90
92
93.2

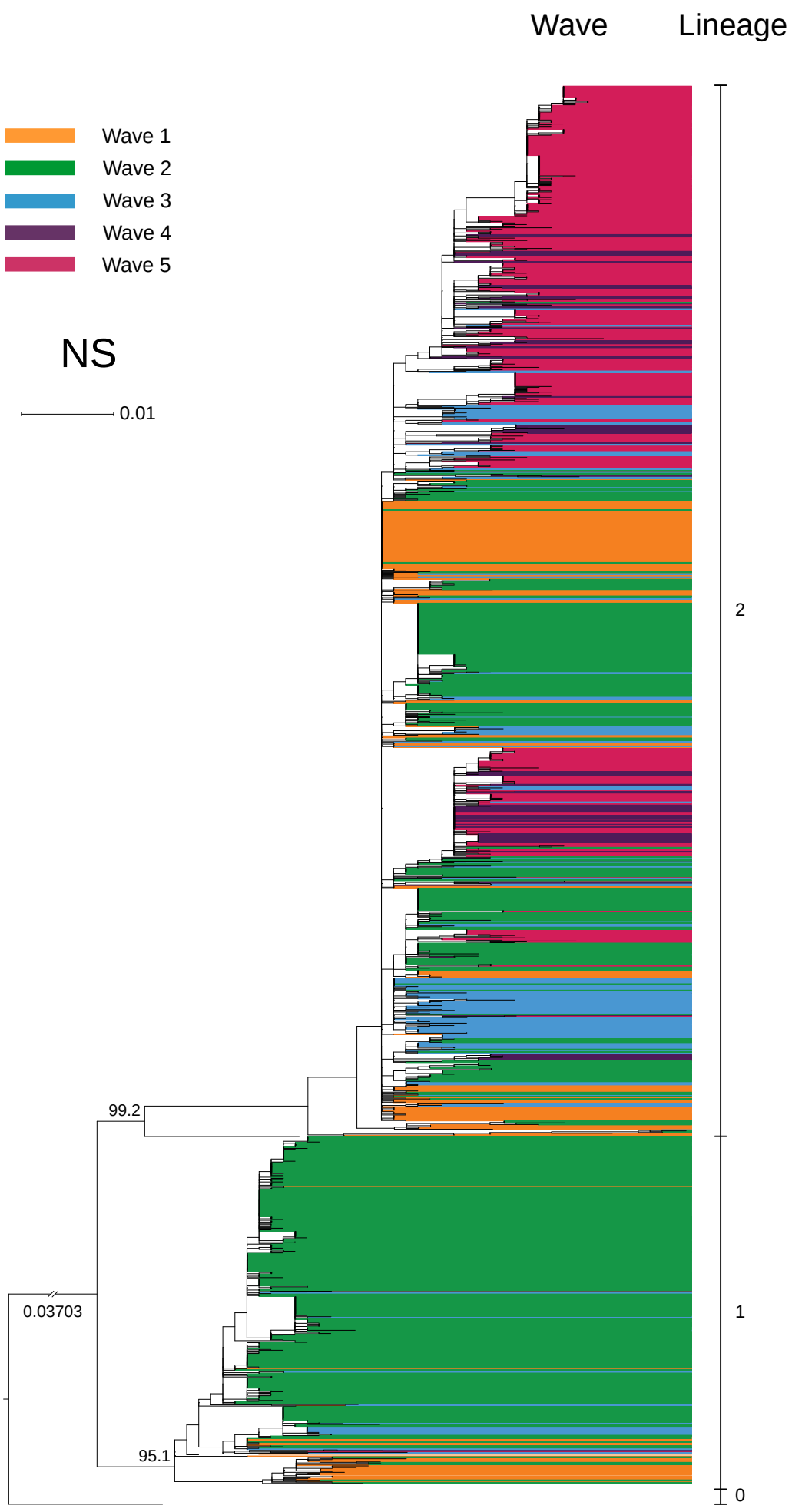

Wave
Lineage
Wave 1
Wave 2
Wave 3
Wave 4
Wave 5
NS
0.01
99.2
0.03703
95.1
2
1
0

FIG S2 Phylogenies of PB2, PB1, PA, NP, MP and NS genes of H7N9 influenza viruses from epidemic wave 1 to wave 5. Posterior values are shown for selected clades. Color of line at right of each leaf node indicates the wave of isolation (see color bar). Vertical black lines mark clades.

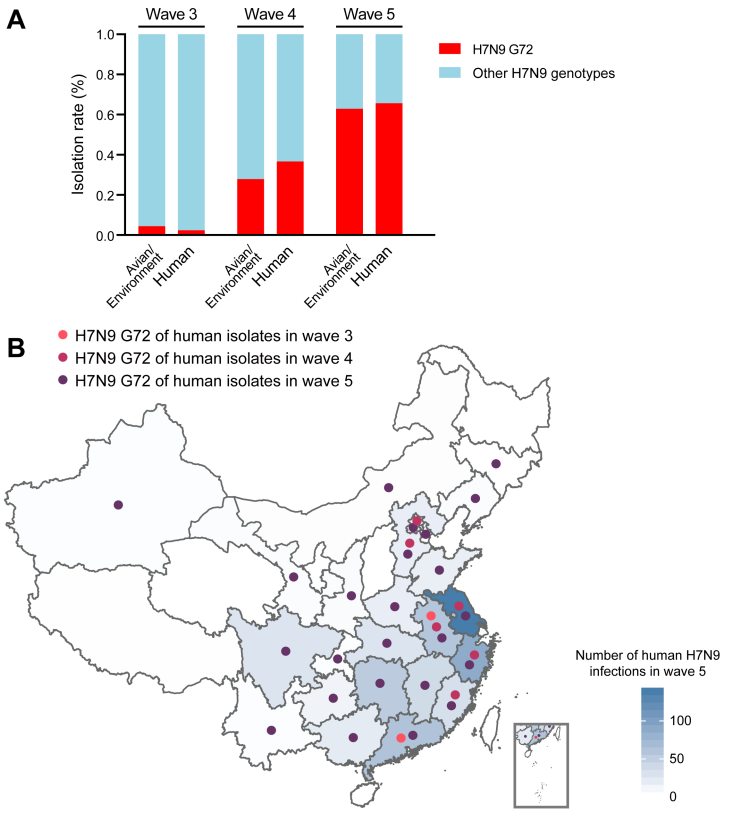
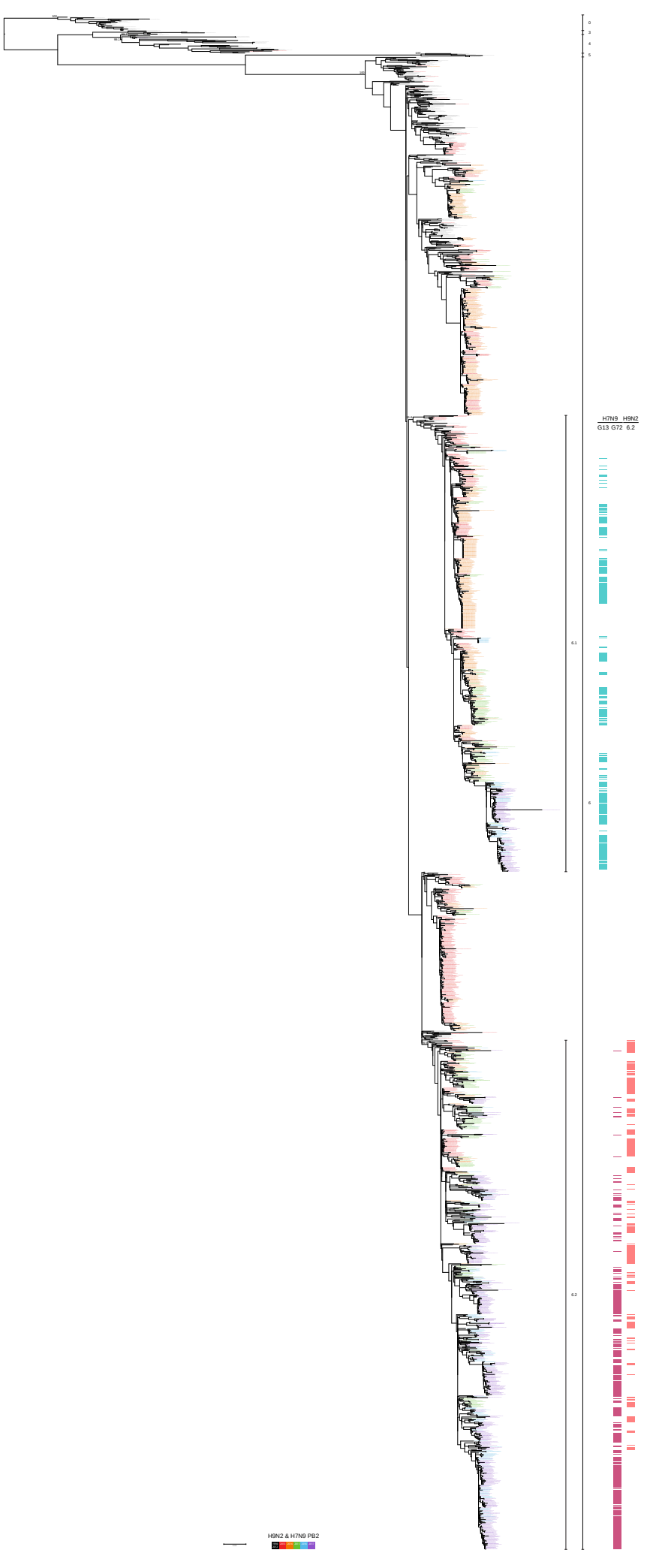


FIG S3 Distributions of G72 viruses in major hosts (A) and different Chinese provinces (B). Heat map of the number of human H7N9 cases in each province was built through the maptools package of the R language.


H7N9
G13
H9N2
G72
6.2
6.1
6
H9N2 & H7N9 PB2

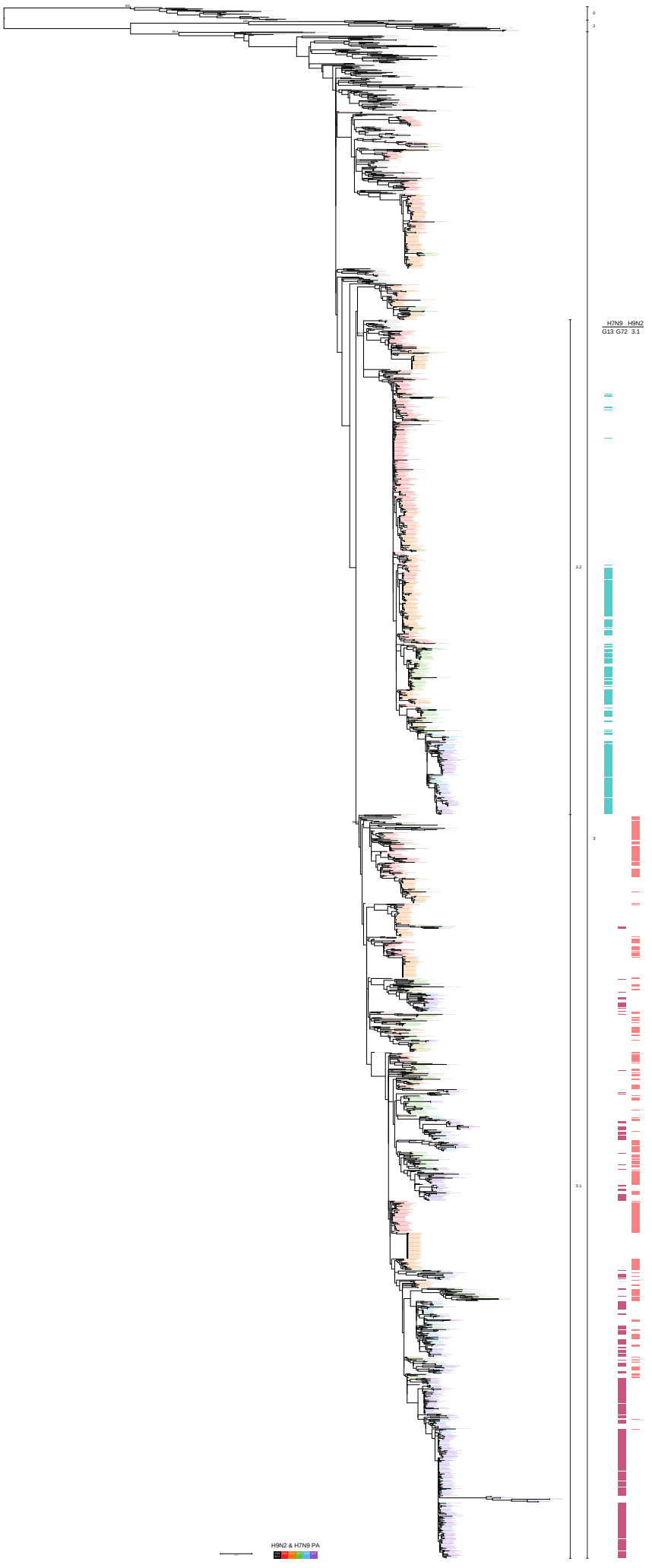

H7N9
G13
H9N2
G72
3.1
6
2
3.2
3
3.1
H9N2 & H7N9 PA

FIG S4 Phylogenetic relationship between H7N9 and H9N2 influenza viruses in PB2 and PA genes. Posterior values are shown for selected clades. Color of line at right of each leaf node indicates the year of isolation (see color bar). Vertical black lines mark clades/sub-clades. On the right side of each phylogenetic tree, PB2/PA genes of G13 H7N9, G72 H7N9, 6.2 or 3.1 sub-clade of H9N2 viruses are denoted by different color bars.

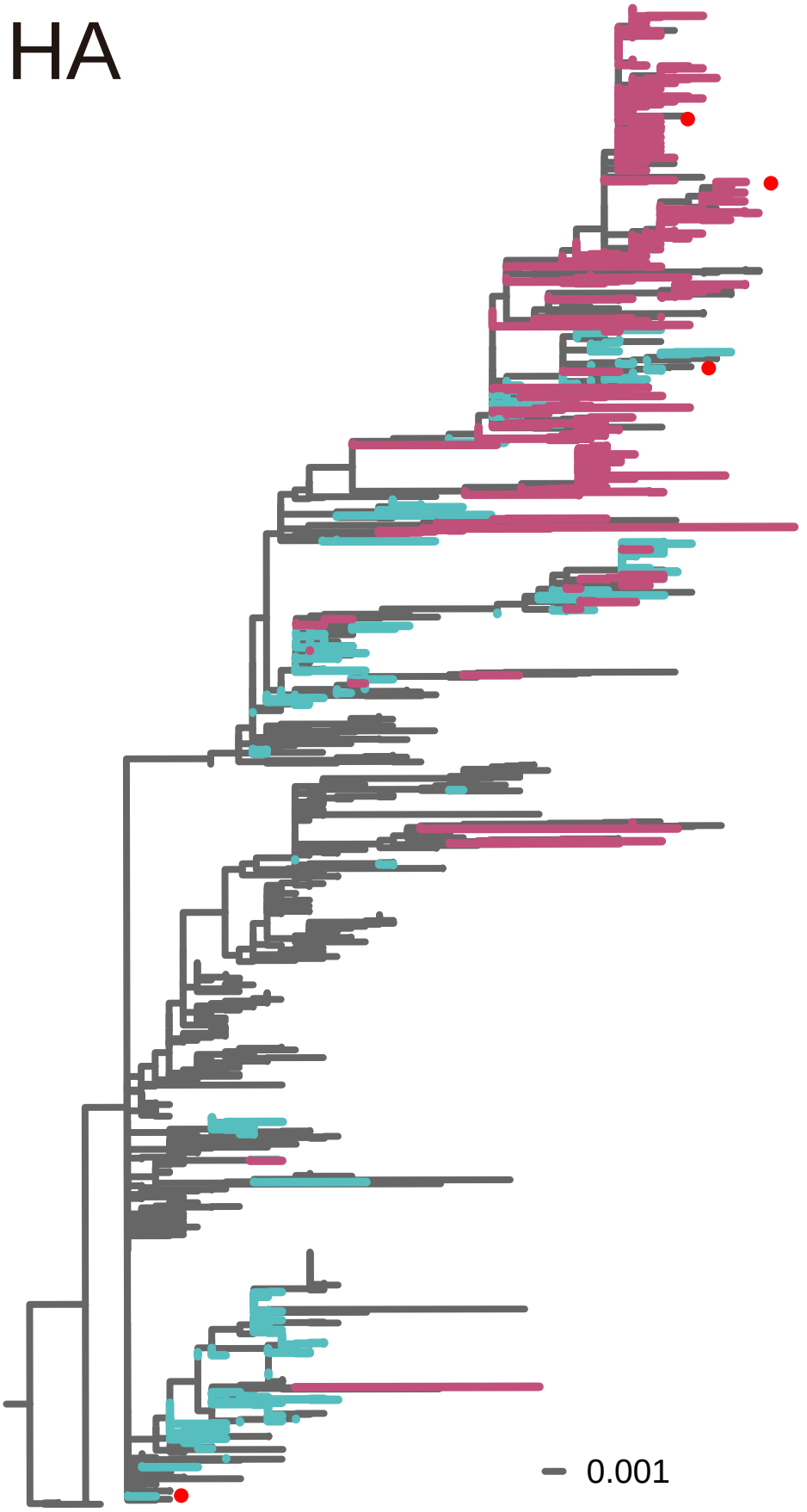


FIG S5 Phylogenies of HA gene of H7N9 influenza viruses. Four representative viruses (From bottom to top is A/chicken/Jiangsu/BD145/2014, A/chicken/Shandong/M0303-10/2017, A/chicken/Beijing/F0606-1/2017, and A/chicken/Shandong/F0513-60/2017, respectively) that were selected for mouse challenge study are labeled with a red dot.

TABLE S2 Hemagglutination inhibition (HI) assay of chicken H9N2 influenza viruses against reference antisera[a]

		Polyclonal antisera against reference strains							Lineage
Virus (abbreviation)	HI group	YT (F)	TS (F)	06 (F)	1 (G)	0701 (G)	M1211-20 (G)	M0530-1 (G)	HA
A/chicken/Hebei/YT/2010 (YT)[b]	F	**640**	1280	640	40	160	40	160	9
A/chicken/Jiangsu/TS/2010 (TS)[b]	F	320	**640**	320	20	40	20	40	9
A/chicken/Shandong/06/2011 (06)[b]	F	640	1280	**640**	20	40	20	80	9
A/chicken/Shandong/qd1115/2012 (qd1115)	F	640	1280	640	40	80	40	80	9
A/chicken/Liaoning/0517/2013 (0517)	F	640	2560	320	40	80	40	80	9
A/chicken/Beijing/xy1206/2014 (xy1206)	F	320	1280	320	20	80	20	40	9.1
A/chicken/Beijing/xy1208/2014 (xy1208)	F	160	320	160	<	40	<	40	9.1
A/chicken/Tianjin/11/2014 (11)	F	40	160	40	<	80	80	160	9.1
A/chicken/Beijing/xy1231/2014 (xy1231)	G	160	160	20	160	320	320	320	9.1
A/chicken/Tianjin/1/2015 (1)	G	160	160	20	**640**	320	320	320	9.1
A/chicken/Beijing/0701/2015 (0701)	G	40	80	<	160	**640**	160	160	9.1
A/chicken/Shandong/0104-2/2015 (0104-2)	G	320	1280	80	640	640	1280	640	9.1
A/chicken/Shandong/0202-2/2015 (0202-2)	G	320	640	80	640	320	320	320	9.1
A/chicken/Hebei/TS0701/2015 (TS0701)	G	80	80	<	160	640	**640**	640	9.1
A/chicken/Beijing/M1027-7/2016 (M1027-7)	G	160	160	40	320	640	1280	640	9.1
A/chicken/Hebei/M1106-3/2016 (M1106-3)	G	80	160	40	160	160	640	640	9.1
A/chicken/Hebei/M1211-20/2016 (M1211-20)	G	80	160	40	160	160	640	640	9.1
A/chicken/Beijing/M0428-16/2016 (M0428-16)	G	40	80	20	80	80	320	320	9.1
A/chicken/Gansu/M1210-41/2016 (M1210-41)	F	160	320	160	20	40	20	80	9
A/chicken/Gansu/M0227-16/2017 (M0227-16)	G	40	80	20	40	80	320	320	9.1
A/chicken/Gansu/M0427-8/2017 (M0427-8)	G	40	80	20	40	40	160	160	9.1
A/chicken/Gansu/M0527-3/2017 (M0527-3)	G	40	80	20	40	80	160	160	9.1
A/chicken/Hebei/M0530-1/2017 (M0530-1)	G	80	160	40	160	160	640	**640**	9.1

[a]Data represent HI titers. Homologous titers are indicated in bold, and titers less than 20 are indicated with a less than sign (<). Titers are colored differently: white = low titer (<, 20); light gray = moderate titer (40, 80); dark gray = high titer (160, 320, 640); and black = extremely high titer (1280, 2560).
[b]Viruses identified previously (1) that were selected as reference strains.

TABLE S3 Isolation rates of H9N2 influenza viruses on Chinese flocks reporting illness in vaccinated chickens during 2014–2017

Reporting illness in vaccinated chickens during 2014–2017	Month	Number of H9N2-positive flocks	Number of investigated flocks	Isolation rate (%)
2014	Jan.	15	50	30.00
	Feb.	21	46	45.65
	Mar.	47	86	54.65
	Apr.	17	28	60.71
	May.	23	37	62.16
	Jun.	16	29	55.17
	Jul.	8	23	34.78
	Aug.	5	15	33.33
	Sep.	1	16	6.25
	Oct.	0	11	0.00
	Nov.	0	13	0.00
	Dec.	7	35	20.00
	Whole year	160	389	41.13
2015	Jan.	10	40	25.00
	Feb.	4	12	33.33
	Mar.	9	26	34.62
	Apr.	9	24	37.50
	May.	1	26	3.85
	Jun.	4	25	16.00
	Jul.	0	9	0.00
	Aug.	0	16	0.00
	Sep.	2	8	25.00
	Oct.	1	12	8.33
	Nov.	12	18	66.67
	Dec.	11	34	32.35
	Whole year	63	250	25.20
2016	Jan.	5	25	20.00
	Feb.	1	10	10.00
	Mar.	5	27	18.52
	Apr.	10	23	43.48
	May.	7	38	18.42
	Jun.	13	40	32.50
	Jul.	7	19	36.84
	Aug.	3	23	13.04
	Sep.	21	65	32.31
	Oct.	15	41	36.59
	Nov.	15	51	29.41
	Dec.	7	29	24.14
	Whole year	109	389	28.02
2017	Jan.	1	10	10.00
	Feb.	16	25	64.00
	Mar.	11	59	18.64
	Apr.	12	65	18.46
	May.	46	97	47.42
	Jun.	22	61	36.07
	Jul.	3	17	17.65
	Aug.	1	15	6.67
	Sep.	0	11	0.00
	Oct.	8	26	30.77
	Nov.	5	11	45.45
	Dec.	8	30	26.67
	Whole year	133	427	31.15
2014–2017	Four years	465	1455	31.96

TABLE S4 Prevalence of mammalian adaptive amino acid residues in PB2 and PA segments of influenza A (H7N9) virus isolated from avian/environment and human

				Prevalence (%)			
				Avian/ Environment		Human	
Segment	Function	Reference	Residue	G13	G72	G13	G72
PB2	Increase polymerase activity in mammalian cell line	(2)	256G	0	0	0	0
	Enhance viral replication and virulence in mice	(3)	588V	0	100	0.6	100
	Enhance viral replication and virulence in mice	(4)	591K	0	0	3.4	1.3
	Enhance viral pathogenicity to mammals	(5)	627K	1.7	0	76.3	62.0
	Enhance the ability of viral transmission between mammals	(6)	701N	0	0	4.0	4.7
	Species-related signal sites	(7)	702R	0	1.3	0	6.9
PA	Enhance viral pathogenicity to mice	(8)	70V	0	72.9	0	86.0
	Enhance viral pathogenicity to mice	(9)	100V	0	100	0.6	98.7
	Enhance polymerase activity	(10)	336M	0	0	0	0
	Enhance viral pathogenicity to mice	(11)	343S	0	95.8	2.8	96.0
	Increase polymerase activity and enhance replication in mammalian host	(12)	356R	99.2	100	100	99.7
	Increase polymerase activity and replication in mammalian cell line	(13)	409N	100	97.2	100	99.7

TABLE S5 Segment information of recombinant viruses used in this study[a]

Recombinant virus	Segment	Sub-clade	Original virus (subtype)
rG13	PB2	6.1	A/chicken/Shandong/M0303-10/2017(H7N9)
	PA	3.2	A/chicken/Shandong/M0303-10/2017(H7N9)
rG13: PB2/PA-H9N2	PB2	6.2	A/chicken/Shandong/217/2017(H9N2)
	PA	3.1	A/chicken/Hebei/M1211-20/2016(H9N2)
rG13: PB2/PA-G72-1	PB2	6.2	A/chicken/Shandong/F0513-60/2017(H7N9)
	PA	3.1	A/chicken/Shandong/F0513-60/2017(H7N9)
rG13: PB2/PA-G72-2	PB2	6.2	A/chicken/Beijing/F0606-1/2017(H7N9)
	PA	3.1	A/chicken/Beijing/F0606-1/2017(H7N9)

[a]For all of the recombinant viruses, the HA and NA genes were from the G13 H7N9 virus (A/chicken/Jiangsu/BD145/2014), and the other four genes (PB1, NP, MP and NS) were from the G13 H7N9 virus (A/chicken/Shandong/M0303-10/2017).

TABLE S6 Difference of amino acid residues in rG13 and its recombinants used in this study

				Reassortants			
Segment	Situation[a]	Amino acid sites	References	rG13	rG13: PB2/PA-H9N2	rG13: PB2/PA-G72-1	rG13: PB2/PA-G72-2
PB2	Reported	66	(14)	M	I	M	M
		256	(2)	D	G	G	G
		292	(15)	I	V	V	V
		588	(3)	A	V	V	V
		591	(4)	Q	Q	Q	Q
		627	(5)	E	E	E	E
		701	(6)	D	D	D	D
		702	(7)	K	R	K	K
	Not reported	82	-	N	N	S	N
		105	-	T	T	T	M
		109	-	A	V	V	V
		122	-	I	V	V	V
		299	-	R	K	R	R
		340	-	R	K	K	K
		344	-	V	V	V	L
		395	-	A	A	S	A
		411	-	I	I	I	V
		451	-	I	I	T	I
		511	-	I	V	V	V
		526	-	R	K	K	K
		535	-	L	M	M	M
		570	-	I	M	M	M
		640	-	I	V	V	V
		647	-	V	I	I	I
		676	-	M	I	V	V
		704	-	Y	Y	F	Y
PA	Reported	70	(8)	A	A	V	V
		85	(16)	T	T	T	A
		100	(9)	A	V	V	V
		224	(17)	S	S	S	S
		336	(11)	L	L	L	L
		343	(10)	A	S	S	S
		356	(12)	R	R	R	R
		409	(13)	N	N	N	N
	Not reported	20	-	T	A	A	A
		204	-	R	R	R	R
		226	-	F	L	L	L
		251	-	R	K	K	K
		262	-	R	K	R	K
		297	-	Y	H	H	H
		341	-	V	V	V	M
		349	-	E	S	S	E
		365	-	Q	H	Q	H
		388	-	O	N	N	N
		394	-	N	D	D	D
		495	-	R	R	T	R
		547	-	D	D	E	D
		559	-	R	K	R	K
		603	-	K	R	K	R

[a]Situation indicates whether the function of corresponding amino acid site mutation is reported to be relative with viral mammalian adaption.

TABLE S7 MID_{50} determination of recombinant avian influenza viruses[a]

	Number of positive infections					
Recombinant virus	$1log_{10}TCID_{50}$	$2log_{10}TCID_{50}$	$3log_{10}TCID_{50}$	$4log_{10}TCID_{50}$	$5log_{10}TCID_{50}$	MID_{50} ($log_{10}TCID_{50}$)
rG13	0/5	0/5	1/5	2/5	3/5	4.5
rG13: PB2/PA-H9N2	0/5	1/5	2/5	3/5	5/5	3.5
rG13: PB2/PA-G72-1	0/5	1/5	2/5	3/5	5/5	3.5
rG13: PB2/PA-G72-2	1/5	4/5	5/5	5/5	5/5	1.5

[a]The mouse lungs were taken on 3 dpi, 4 times the volume of PBS containing penicillin and streptomycin was added, the lungs were ground and centrifuged at 5000 rpm for 5 minutes, the supernatant was taken to inoculate two 9-day-old chicken embryos. After 48 hours of incubation, test hemagglutination activity of allantoic fluid, and record the positive number of samples in each group. The Reed-Muench (RM) method is used to calculate MID_{50}.

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TABLE S1 H9N2 chicken viruses with different sub-genotypes from 2010 through 2017, and H7N9 viruses with different genotypes from wave 1 through wave 5 in China

Strain Name	PB2	PB1	PA	HA	NP	NA	MP	NS	Year	Region	Genotype/sub-genotype
A/chicken/Shandong/sd01/2010	6	3	3	9	4.2	1	2	7	2010	Shandong	G57-S1
A/chicken/Shandong/01/2010	6	3	3	9	4	1	2	7.1	2010	Shandong	G57-S2
A/chicken/Shandong/sd02/2010	6	3	3	9	4	1	2	7	2010	Shandong	G57
A/chicken/Jiangsu/Q3/2010	6	3	3	9	4.2	1	2	7	2010	Jiangsu	G57-S1
A/chicken/Shandong/02/2010	6	3	3	8	4	1	2	7	2010	Shandong	G61
A/chicken/Zhejiang/Q1D4/2010	6	3	3	9	4	1	2	7	2010	Zhejiang	G57
A/chicken/Yunnan/C1212/2010	4	3	3	9	4	1	2	7	2010	Yunnan	G49
A/chicken/Zhejiang/C1219/2010	6	3	3	9	4.2	1	2	7	2010	Zhejiang	G57-S1
A/chicken/Anhui/HF/2010	6	3	3	9	4.2	1	2	7	2010	Anhui	G57-S1
A/chicken/Hebei/fx05/2010	6	3	3	9	4	1	2	7	2010	Hebei	G57
A/chicken/Shandong/05/2010	6	3	3	9	4	1	2	7	2010	Shandong	G57
A/chicken/Shandong/Li-2/2010	4	3	3	9	4	1	2	7	2010	Shandong	G49
A/chicken/Shandong/03/2010	6	3	3	9	4	1	2	7	2010	Shandong	G57
A/chicken/Shandong/BD/2010	6	3	3	9	4	1	2	7	2010	Shandong	G57
A/chicken/Guangxi/067C4/2010	6	3	3	9	4	1	2	7	2010	Guangxi	G57
A/chicken/Shandong/06/2010	6	3.1	3	9	4	1	2	7	2010	Shandong	G57-S3
A/chicken/Guangxi/066C10/2010	6	3	3	9	4	1	2	7	2010	Guangxi	G57
A/chicken/Shanghai/A/2010	6	3	3	9	4.2	1	2	7	2010	Shanghai	G57-S1
A/chicken/Wuxi/7/2010	6	3	3	9	4.2	1	2	7	2010	Wuxi	G57-S1
A/chicken/Shanghai/B/2010	6	3	3	6	4	1	2	7	2010	Shanghai	G68
A/chicken/Shandong/397/2010	4	3	3	9	4	1	1	7	2010	Shandong	G67
A/chicken/Zhejiang/C3188/2010	6	3	3	9	4	1	2	7	2010	Zhejiang	G57
A/chicken/Shandong/10/2010	6	3.1	3	9	4	1	2	7	2010	Shandong	G57-S3
A/chicken/Taixing/10/2010	6	3	3	9	4.1	1	2	7.1	2010	Taixing	G57-S4
A/chicken/Beijing/HD/2010	6	3	3	9	4	1	2	7	2010	Beijing	G57
A/chicken/Hebei/ZR/2010	6	3	3	9	4	1	2.2	7.1	2010	Hebei	G57-S5
A/chicken/Yangzhou/11/2010	6	3	3	9	4.1	1	2	7.1	2010	Yangzhou	G57-S4
A/chicken/Hebei/YT/2010	6	3	3	9	4	1	2	7	2010	Hebei	G57
A/chicken/Jiangsu/TS/2010	6	3.1	3	9	4	1	2	7	2010	Jiangsu	G57-S3
A/chicken/Shandong/B1/2010	6	3	3	9	4.2	1	2	7	2010	Shandong	G57-S1
A/chicken/Shandong/HL/2010	6	3	3	9	4	1	2	7	2010	Shandong	G57
A/chicken/Anhui/11/2010	6	3	3	9	4.2	1	2	7	2010	Anhui	G57-S1
A/chicken/China/AH-10-01/2010	6	3	3	9	4.1	1	2	7.1	2010	-	G57-S4
A/chicken/Beijing/B7/2010	6	3	3	9	4	1	2	7	2010	Beijing	G57
A/chicken/Hebei/B5/2010	6	3	3	9	4.2	1	2	7	2010	Hebei	G57-S1
A/chicken/Qianzhou/12/2010	6	3	3	9	4.2	1	2	7	2010	Qianzhou	G57-S1
A/chicken/Guangxi/C4080/2010	6	3	3	9	4.1	1	2	7	2010	Guangxi	G57-S6
A/chicken/Hubei/C4071/2010	4	3	3	9	4	1.1	2	7.1	2010	Hubei	G49-S1
A/chicken/Guangdong/01/2011	6	3	3	6	4	1	2	7	2011	Guangdong	G68
A/chicken/Hebei/01/2011	6	3	3	9	4	1	2	7	2011	Hebei	G57
A/chicken/Shandong/01/2011	6	3	3	9	4.2	1	2	7.1	2011	Shandong	G57-S7
A/chicken/Jiangsu/SQ79/2011	6	3	3	9	4	1	2.2	7.1	2011	Jiangsu	G57-S5
A/chicken/Jiangsu/B20/2011	6	3	3	9.1	4.2	1	2	7	2011	Jiangsu	G57-S9
A/chicken/Jiangsu/DTNSZ/2011	6.1	3	3	9	4.2	1	2	7	2011	Jiangsu	G57-S8
A/chicken/Shangdong/SDWD/2011	6	3	3	9	4.2	1	2	7	2011	Shangdong	G57-S1
A/chicken/Tongshan/1/2011	6	3	3	9	4	1	2	7	2011	Tongshan	G57
A/chicken/Xiangshui/1/2011	6	3	3	9	4	1	2	7	2011	Xiangshui	G57
A/chicken/Yongcheng/1/2011	6	3	3	9	4	1	2	7	2011	Yongcheng	G57
A/chicken/Dawang/1/2011	6	3	3	9	4.1	1	2	7.1	2011	Dawang	G57-S4
A/chicken/Shuanggou/1/2011	6	3	3	9	4.1	1	2	7.1	2011	Shuanggou	G57-S4
A/chicken/Xigou/1/2011	6	3	3	9	4.1	1	2	7.1	2011	Xigou	G57-S4
A/chicken/Hebei/02/2011	6	3	3	9	4.2	1	2	7	2011	Hebei	G57-S1
A/chicken/Shandong/02/2011	6.1	3	3.1	9	4.1	1	2	7	2011	Shandong	G57-S10
A/chicken/Shandong/B2/2011	6	3	3	9	4	1	2	7	2011	Shandong	G57
A/chicken/Jiawang/2/2011	6	3	3	9	4	1	2	7	2011	Jiawang	G57
A/chicken/Hebei/03/2011	6	3	3	9	4	1	2	7	2011	Hebei	G57
A/chicken/Shandong/03/2011	6.1	3	3.1	9	4	1	2	7	2011	Shandong	G57-S11
A/chicken/Jiangsu/JT34/2011	6	3	3	9.1	4.1	1	2	7.1	2011	Jiangsu	G57-S12
A/chicken/Hainan/I22/2011	6	3	3	6	4	1	2	7	2011	Hainan	G68
A/chicken/Zhejiang/329/2011	6	3	3	9.1	4.2	1	2	7	2011	Zhejiang	G57-S9
A/chicken/Shandong/WG18/2011	6	3	3	9	4	1	2.2	7.1	2011	Shandong	G57-S5
A/chicken/Jiangsu/JT12/2011	6	3	3	9.1	4.2	1	2	7	2011	Jiangsu	G57-S9
A/chicken/Zhejiang/C1083/2011	6	3	3	9.1	4.2	1	2	7	2011	Zhejiang	G57-S9
A/chicken/Chongqing/C1258/2011	6	3	3	9	4.1	1	2	7.1	2011	Chongqing	G57-S4
A/chicken/Jiangsu/XZPZ/2011	6	3	3	9	4	1	2	7	2011	Jiangsu	G57
A/chicken/Shandong/05/2011	6.1	3	3	9	4.1	1	2	7	2011	Shandong	G57-S13
A/chicken/Jiangsu/YZ0511/2011	6	3	3	9	4.2	1	2	7	2011	Jiangsu	G57-S1
A/chicken/Jiangsu/ZJDT/2011	6	3	3	9	4.1	1	2	7.1	2011	Jiangsu	G57-S4
A/chicken/Shandong/C9YT/2011	6	3	3	9	4.2	1	2	7	2011	Shandong	G57-S1
A/chicken/Jiangsu/YZ0611/2011	6.1	3.1	3	9	4	1	2	7	2011	Jiangsu	G57-S14
A/chicken/Guangdong/ZHJ/2011	6	3	3	6	4	1	2	7	2011	Guangdong	G68
A/chicken/Shanghai/C/2011	6.1	3	3.1	9	4	1	2	7	2011	Shanghai	G57-S11
A/chicken/Zhejiang/607/2011	6	3	3.2	9	4	1	2	7	2011	Zhejiang	G57-S15
A/chicken/Zhejiang/611/2011	6	3	3	9	4.2	1	2	7	2011	Zhejiang	G57-S1
A/chicken/Jiangsu/YZ4/2011	6	3	3.2	9	4.2	1	2	7	2011	Jiangsu	G57-S16

A/chicken/Guangdong/ZCY/2011	6	3	3	6	4	1	2	7	2011	Guangdong	G68
A/chicken/Shanghai/D/2011	6	3.1	3	9	4.2	1	2	7	2011	Shanghai	G57-S17
A/chicken/Chongqing/A52/2011	4	3	3	9	4.1	1	2	7.1	2011	Chongqing	G49-S2
A/chicken/Shandong/384/2011	4	3	3	9	4	1	2	7	2011	Shandong	G49
A/chicken/Shandong/196/2011	6	3	3	9	4.2	1	2	7	2011	Shandong	G57-S1
A/chicken/Guizhou/C4058/2011	6	3	3	6	4	1	2	7	2011	Guizhou	G68
A/chicken/Yunnan/C4090/2011	6	3.1	3	9	4	1	2	7	2011	Yunnan	G57-S3
A/chicken/Hebei/FL/2011	6	3	3	9	4	1	2.2	7.1	2011	Hebei	G57-S5
A/chicken/Hunan/12/2011	6	3	3	9	4.1	1	2	7.1	2011	Hunan	G57-S4
A/chicken/Shandong/yt0106/2012	6	3	3.2	9.1	4.2	1	2	7	2012	Shandong	G57-S18
A/chicken/Jiangsu/XZ38/2012	6	3	3	9.1	4.2	1	2	7	2012	Jiangsu	G57-S9
A/chicken/Guangdong/SIC1/2012	6	3	3	9.1	4	1.2	2	7.1	2012	Guangdong	G57-S19
A/chicken/Hunan/1/2012	6	1	3	9	4.1	1	2	7	2012	Hunan	G69-S1
A/chicken/Beijing/F1/2012	6	3	3.1	9.1	4.2	1	2	7.1	2012	Beijing	G57-S20
A/chicken/Shandong/wf0202/2012	6	3	3.2	9	4.2	1	2	7	2012	Shandong	G57-S16
A/chicken/Jiangsu/XZ57/2012	6	3	3.2	9.1	4.2	1	2	7	2012	Jiangsu	G57-S18
A/chicken/Jiangsu/DT0112/2012	6	3	3	9	4.1	1	2	7.1	2012	Jiangsu	G57-S4
A/chicken/Jiangsu/WJ58/2012	6	3	3.1	9.1	4.2	1	2	7	2012	Jiangsu	G57-S21
A/chicken/Jilin/DH104/2012	6	3	3	9	4	1	2	7	2012	Jilin	G57
A/chicken/Gansu/419/2012	6	3.1	3	9	4.2	1	2	7	2012	Gansu	G57-S17
A/chicken/Guangxi/C1435/2012	6	3	3	9	4	1	2	7	2012	Guangxi	G57
A/chicken/Jiangsu/CZYWP/2012	6.1	3	3.1	9	4.2	1	2	7	2012	Jiangsu	G57-S23
A/chicken/Jiangsu/MYJMF/2012	6.1	3	3.1	9.1	4.2	1	2	7	2012	Jiangsu	G57-S22
A/chicken/Jiangsu/WJHDL/2012	6.1	3	3.1	9.1	4.2	1	2	7	2012	Jiangsu	G57-S22
A/chicken/Jiangsu/WJHRG/2012	6	3	3.1	9.1	4.2	1	2	7	2012	Jiangsu	G57-S21
A/chicken/Jiangsu/WJYBF/2012	6.1	3	3.1	9	4.2	1	2	7	2012	Jiangsu	G57-S23
A/chicken/Jiangsu/CZLJG/2012	6	3	3	9.1	4.1	1	2	7.1	2012	Jiangsu	G57-S12
A/chicken/Jiangsu/XZWHL/2012	6	3	3.1	9.1	4.2	1	2	7.1	2012	Jiangsu	G57-S20
A/chicken/Jiangsu/XZZSL/2012	6	3	3.1	9.1	4.2	1	2	7.1	2012	Jiangsu	G57-S20
A/chicken/Shandong/zc4/2012	6	3	3	9	4	1	2	7	2012	Shandong	G57
A/chicken/Jiangsu/XZMG/2012	6	3	3.1	9.1	4.2	1	2	7.1	2012	Jiangsu	G57-S20
A/chicken/Jiangsu/XZLZG/2012	6	3	3.1	9.1	4.2	1	2	7.1	2012	Jiangsu	G57-S20
A/chicken/Jiangsu/YZ640/2012	6	3.1	3.2	9	4	1	2	7	2012	Jiangsu	G57-S24
A/chicken/Shandong/qd0427/2012	6	3	3.1	9.1	4.2	1	2	7	2012	Shandong	G57-S21
A/chicken/Zhejiang/618/2012	6.1	3	3.1	9	4.2	1	2	7	2012	Zhejiang	G57-S23
A/chicken/Tianjin/61/2012	6	3	3.2	9.1	4	1	2	7.1	2012	Tianjin	G57-S25
A/chicken/Shandong/SDWF17/2012	6	3	3	9.1	4.2	1	2	7.1	2012	Shandong	G57-S26
A/chicken/Shangdong/SDWF14/2012	6	3	3	9.1	4.2	1	2	7.1	2012	Shangdong	G57-S26
A/chicken/Shangdong/SDWF29/2012	6	3	3	9.1	4.2	1	2	7.1	2012	Shangdong	G57-S26
A/chicken/Jiangsu/CZJJF/2012	6	3	3.1	9.1	4.2	1	2	7	2012	Jiangsu	G57-S21
A/chicken/Jiangsu/CZZWQ/2012	6	3	3.1	9.1	4.2	1	2	7	2012	Jiangsu	G57-S21
A/chicken/Shandong/WF0513/2012	6	3	3	9	4	1	2.2	7.1	2012	Shandong	G57-S5
A/chicken/Shandong/qd0516/2012	6	3	3.2	9	4.2	1	2	7	2012	Shandong	G57-S16
A/chicken/Guangxi/C2163/2012	6	3	3	9	4.1	1.1	2.2	7.1	2012	Guangxi	G57-S27
A/chicken/Sichuan/C2151/2012	4	3	3	9	4	1.1	2	7.1	2012	Sichuan	G49-S1
A/chicken/Jilin/0519/2012	6	3	3	6	4	1	2	7	2012	Jilin	G68
A/chicken/Beijing/HD06/2012	6	3	3	9.1	4	1	2	7.1	2012	Beijing	G57-S28
A/chicken/Tianjin/614/2012	6	3	3	9.1	4	1	2	7.1	2012	Tianjin	G57-S28
A/chicken/Jiangsu/YZ0657/2012	6	3	3	9.1	4	1.2	2	7	2012	Jiangsu	G57-S29
A/chicken/Shandong/zc0606/2012	6	3.1	3.2	9.1	4	1	2	7	2012	Shandong	G57-S30
A/chicken/Shandong/0613/2012	6	3	3.1	9.1	4.2	1	2	7	2012	Shandong	G57-S21
A/chicken/Jiangsu/XZ0616/2012	6	3.1	3.1	9.1	4	1	2	7	2012	Jiangsu	G57-S31
A/chicken/Shanxi/0703/2012	6	3.1	3.2	9.1	4	1	2	7	2012	Shanxi	G57-S30
A/chicken/Liaoning/0704/2012	6	3.1	3.2	9.1	4	1	2	7	2012	Liaoning	G57-S30
A/chicken/Shandong/818/2012	6	3	3	9	4	1	2	7	2012	Shandong	G57
A/chicken/Shandong/lc0830/2012	6	3.1	3.2	9.1	4	1	2	7	2012	Shandong	G57-S30
A/chicken/Jilin/SJ150/2012	6	3	3	9	4	1	2	7	2012	Jilin	G57
A/chicken/Shandong/qd0920/2012	6	3	3.2	9	4.2	1.2	2	7.1	2012	Shandong	G57-S32
A/chicken/Shandong/qd1013/2012	6	3	3.2	9	4.2	1	2	7	2012	Shandong	G57-S16
A/chicken/Hebei/1024/2012	6	3	3.1	9	4.2	1	2	7	2012	Hebei	G57-S33
A/chicken/Jilin/SJJT/2012	4	0	2	9	4	1	2	4	2012	Jilin	G70
A/chicken/Jilin/1031/2012	6	3.1	3.2	9	4	1	2	7	2012	Jilin	G57-S24
A/chicken/Zhejiang/JX42/2012	6	3	3	9	4.1	1	2	7.1	2012	Zhejiang	G57-S4
A/chicken/Guangdong/SIC2/2012	6	3	3	9.1	4	1.2	2	7	2012	Guangdong	G57-S29
A/chicken/Shandong/qd1115/2012	6.1	3	3.1	9	4.2	1	2	7	2012	Shandong	G57-S23
A/chicken/Liaoning/1116/2012	6	3	3.2	9	4.2	1	2.2	7	2012	Liaoning	G57-S34
A/chicken/Jilin/GYH1-1/2012	0	0	0	4	0	1	1	6	2012	Jilin	G71
A/chicken/Guangdong/C76/2012	6	3	3	9	4	1.2	2	7	2012	Guangdong	G57-S37
A/chicken/Jiangsu/C1020/2012	6	3	3.1	9.1	4.2	1	2.1	7	2012	Jiangsu	G57-S35
A/chicken/Jiangsu/C1243/2012	6.1	3	3.1	9.1	4.2	1.1	2	7	2012	Jiangsu	G57-S36
A/chicken/Zhejiang/B2013/2012	6	3	3.1	9.1	4.2	1	2	7	2012	Zhejiang	G57-S21
A/chicken/Shandong/wf1206/2012	6	3	3.1	9.1	4.2	1	2	7	2012	Shandong	G57-S21
A/chicken/Shandong/wf12010/2012	6	3	3.1	9.1	4.2	1	2	7	2012	Shandong	G57-S21
A/chicken/Hubei/SIC3/2012	6.2	3	3.1	9	4.1	1	2.2	7	2012	Hubei	G57-S38
A/chicken/Shandong/qd1224/2012	6	3	3.1	9	4.2	1	2	7	2012	Shandong	G57-S33
A/chicken/Hunan/C3229/2012	6	3	3	9	4.1	1.2	2	7	2012	Hunan	G57-S39
A/chicken/Jiangsu/C3226/2012	6.2	3	3.1	9	4.1	1	2.2	7	2012	Jiangsu	G57-S38

A/chicken/Jiangsu/C4258/2012	6	3	3	9	4	1	2	7	2012	Jiangsu	G57
A/chicken/Tianjin/120/2013	6	3.1	3.2	9.1	4.2	1	2	7	2013	Tianjin	G57-S40
A/chicken/Jiangsu/NTTZ/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Jiangsu	G57-S41
A/chicken/Shandong/qd0107/2013	6.1	3	3.1	9	4.2	1	2	7	2013	Shandong	G57-S23
A/chicken/Hebei/0109/2013	6.1	3	3.1	9	4.2	1	2	7	2013	Hebei	G57-S23
A/chicken/Jiangxi/506/2013	6	3	3	9	4.1	1.1	2	7.1	2013	Jiangxi	G57-S42
A/chicken/Guangdong/LG1/2013	6.1	3.1	3.1	9.1	4	1.2	2	7	2013	Guangdong	G57-S44
A/chicken/Jiangsu/NTTZ/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Jiangsu	G57-S41
A/chicken/Sichuan/SIC8/2013	6	3	3	9	4.1	1.1	2.2	7	2013	Sichuan	G57-S43
A/chicken/Jiangsu/CZJT2/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Jiangsu	G57-S41
A/chicken/Jiangsu/ZJ4/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Jiangsu	G57-S41
A/chicken/Beijing/11/2013	6	3	3.2	9	4.2	1	2	7	2013	Beijing	G57-S16
A/chicken/Jiangsu/TM55/2013	6	3.2	3.2	9.1	4	1.1	2.1	7.1	2013	Jiangsu	G57-S45
A/chicken/Fujian/C1161/2013	6	3	3	6	4	1.2	2.2	7	2013	Fujian	G68-S1
A/chicken/Jiangxi/6719/2013	6.2	3	3	9	4.2	1.1	2	7	2013	Jiangxi	G57-S46
A/chicken/Fujian/SIC9/2013	6	3	3	9	4	1	2	7	2013	Fujian	G57
A/chicken/Guangdong/SIC10/2013	6	3	3	6	4	1	2	7	2013	Guangdong	G68
A/chicken/Jiangxi/8281/2013	6	3	3	9	4.1	1.1	2	7	2013	Jiangxi	G57-S47
A/chicken/Jiangxi/8209/2013	6	3	3	9	4.1	1.1	2.2	7.1	2013	Jiangxi	G57-S27
A/chicken/Shandong/qd0225/2013	6.1	3	3.1	9	4.2	1	2	7	2013	Shandong	G57-S23
A/chicken/Beijing/324/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Beijing	G57-S41
A/chicken/Beijing/325/2013	6	3	3.2	9	4.2	1	2	7	2013	Beijing	G57-S16
A/chicken/Jiangxi/9696/2013	6	3	3	9	4.1	1.1	2	7	2013	Jiangxi	G57-S47
A/chicken/Shandong/qd0307/2013	6.1	3	3.1	9	4.2	1	2	7	2013	Shandong	G57-S23
A/chicken/Beijing/0309/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Beijing	G57-S41
A/chicken/Jiangxi/10269/2013	6	3	3	9	4.1	1.1	2	7	2013	Jiangxi	G57-S47
A/chicken/Jiangxi/10278/2013	6	3	3.1	9	4.1	1.1	2	7.1	2013	Jiangxi	G57-S48
A/chicken/Beijing/0311/2013	6	3.2	3.2	9	4.2	1.1	2.2	7	2013	Beijing	G57-S49
A/chicken/Shandong/qd0312/2013	6	3	3.2	9	4.2	1	2.2	7	2013	Shandong	G57-S34
A/chicken/Jiangsu/TM38/2013	6	3.2	3.2	9.1	4.2	1	2	7.1	2013	Jiangsu	G57-S50
A/chicken/Beijing/16/2013	6.1	3	3.1	9	4.2	1	2.2	7	2013	Beijing	G57-S52
A/chicken/Jiangxi/11708/2013	6	3	3.1	9	4.1	1.1	2	7	2013	Jiangxi	G57-S51
A/chicken/Jiangsu/ZJDT1/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Jiangsu	G57-S41
A/chicken/Beijing/0331/2013	6	3.2	3.2	9	4.2	1.1	2.1	7	2013	Beijing	G57-S53
A/chicken/Shandong/ZL1/2013	6	3	3	9.1	4	1	2	7.1	2013	Shandong	G57-S28
A/chicken/Jiangsu/DD6/2013	6	3	3	9	4.1	1.1	2.2	7	2013	Jiangsu	G57-S43
A/chicken/Jiangsu/HA2/2013	6.1	3.2	3.1	9.1	4.2	1.1	2.1	7.1	2013	Jiangsu	G57-S54
A/chicken/Jiangxi/12562/2013	6	3	3	9	4.1	1.1	2	7	2013	Jiangxi	G57-S47
A/chicken/Zhejiang/C485/2013	6	3	3.1	9.1	4.2	1.2	2.2	7	2013	Zhejiang	G57-S57
A/chicken/Zhejiang/C488/2013	6	3	3.2	9.1	4.1	1.2	2.1	7	2013	Zhejiang	G57-S58
A/Chicken/Suzhou/097-2/2013	6.1	3	3.1	9	4	1	2.1	7.1	2013	Suzhou	G57-S56
A/chicken/Zhejiang/C482/2013	6	3	3.2	9.1	4.1	1.1	2.1	7.1	2013	Zhejiang	G57-S55
A/chicken/Zhejiang/C489/2013	6	3	3.1	9.1	4.2	1.2	2.2	7.1	2013	Zhejiang	G57-S59
A/chicken/Zhejiang/C4910/2013	6	3	3.1	9.1	4.2	1.2	2.1	7	2013	Zhejiang	G57-S60
A/chicken/Zhejiang/C493/2013	6	3	3.1	9.1	4.2	1.2	2.1	7	2013	Zhejiang	G57-S60
A/chicken/Zhejiang/C496/2013	6	3	3.1	9.1	4.2	1.2	2.1	7	2013	Zhejiang	G57-S60
A/chicken/Hangzhou/48-2/2013	6	3	3.1	9.1	4.2	1.2	2.1	7.1	2013	Hangzhou	G57-S61
A/chicken/Hangzhou/50-2/2013	6	3	3.2	9.1	4.2	1.2	2	7.1	2013	Hangzhou	G57-S62
A/chicken/Shaanxi/xa0414/2013	6.2	3	3.1	9	4.1	1	2.2	7.1	2013	Shaanxi	G57-S63
A/chicken/Shanghai/020/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Shanghai	G57-S41
A/chicken/Zhejiang/C487/2013	6	3	3.1	9.1	4.2	1.1	2.2	7	2013	Zhejiang	G57-S66
A/chicken/Zhejiang/C494/2013	6	3	3.1	9.1	4.2	1.2	2.1	7	2013	Zhejiang	G57-S60
A/chicken/Zhejiang/C497/2013	6	3	3.1	9.1	4.2	1.1	2.1	7	2013	Zhejiang	G57-S64
A/chicken/Jiangsu/SIC11/2013	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2013	Jiangsu	G57-S65
A/chicken/Zhejiang/C484/2013	6	3	3.2	9.1	4.1	1.2	2.1	7.1	2013	Zhejiang	G57-S67
A/Chicken/Nanjing/023/2013	6	3	3	9	4.1	1.1	2.2	7	2013	Nanjing	G57-S43
A/Chicken/Nanjing/106-2/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Nanjing	G57-S41
A/Chicken/Nanjing/503/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Nanjing	G57-S41
A/Chicken/Nantong/031-2/2013	6	3	3	9	4.1	1.1	2.2	7	2013	Nantong	G57-S43
A/chicken/Shandong/qd01417/2013	6	3	3.1	9.1	4.2	1	2.1	7	2013	Shandong	G57-S35
A/chicken/Jiangsu/YZLH3/2013	6.1	3.2	3	9.1	4	1.2	2	7.1	2013	Jiangsu	G57-S68
A/chicken/Beijing/0512/2013	6	3	3.2	9	4	1.2	2	7	2013	Beijing	G57-S70
A/chicken/Hubei/SC122/2013	6.2	3	3.1	9.1	4.1	1.1	2.2	7	2013	Hubei	G57-S72
A/chicken/Shanghai/SC197/2013	6.2	3	3.1	9	4.1	1	2	7	2013	Shanghai	G57-S73
A/chicken/Zhejiang/SC324/2013	6.2	3.1	3.1	9	4.1	1.2	2.2	7	2013	Zhejiang	G57-S71
A/chicken/Chongqing/C2093/2013	4	1	3	9	4.1	1	2	7.1	2013	Chongqing	G72
A/chicken/Jiangsu/SC502/2013	6.1	3.2	3.1	9.1	4.2	1.1	2.1	7.1	2013	Jiangsu	G57-S54
A/chicken/Shanghai/SC387/2013	6.1	3	3.1	9.1	4.2	1.2	2	7.1	2013	Shanghai	G57-S69
A/chicken/Shandong/wf0514/2013	6	3.2	3.2	9.1	4	1	2	7.1	2013	Shandong	G57-S74
A/chicken/Liaoning/0517/2013	6	3	3.1	9	4.2	1	2	7	2013	Liaoning	G57-S33
A/chicken/Shandong/lc0523/2013	6	3	3.2	9	4	1.2	2	7	2013	Shandong	G57-S70
A/chicken/Shandong/yt0711/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Shandong	G57-S41
A/chicken/Jiangsu/WXWA021/2013	6.2	3	3.1	9.1	4.2	1.1	2.1	7	2013	Jiangsu	G57-S75
A/chicken/Shandong/wf0712/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Shandong	G57-S41
A/chicken/Zhejiang/C71914/2013	6.1	3.2	3.2	9.1	4.2	1.1	2.1	7	2013	Zhejiang	G57-S76
A/chicken/Zhejiang/C71916/2013	6.1	3.2	3.2	9.1	4.2	1.1	2.2	7	2013	Zhejiang	G57-S77
A/chicken/Zhejiang/C71921/2013	6.1	3.2	3.2	9.1	4.2	1.1	2.1	7	2013	Zhejiang	G57-S76

A/chicken/Zhejiang/C71926/2013	6.1	3.2	3.2	9.1	4.2	1.1	2.1	7	2013	Zhejiang	G57-S76
A/chicken/Zhejiang/C7195/2013	6.1	3.2	3.2	9.1	4.2	1.1	2.1	7	2013	Zhejiang	G57-S76
A/chicken/Zhejiang/C7199/2013	6.1	3.2	3.2	9.1	4.2	1.1	2.1	7	2013	Zhejiang	G57-S76
A/chicken/Hebei/0721/2013	6	3	3.1	9.1	4.2	1	2.1	7	2013	Hebei	G57-S35
A/chicken/Jiangxi/17403/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/17913/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangsu/TM59/2013	4	3	3	9.1	4	1	2	7	2013	Jiangsu	G49-S3
A/chicken/Jiangxi/18445/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Shandong/qd0808/2013	6.1	3	3.1	9	4.2	1	2	7	2013	Shandong	G57-S23
A/chicken/Jiangxi/18901/2013	6.2	3.1	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S71
A/chicken/Jiangxi/18913/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/18922/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/18946/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/18952/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/18957/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/18980/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangsu/SIC12/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Jiangsu	G57-S41
A/chicken/Jiangxi/19407/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/19436/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/19448/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Hangzhou/410/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Hangzhou	G57-S41
A/chicken/Jiangxi/19898/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/19934/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/19981/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/20443/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/20446/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/20457/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/20478/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/20482/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/20489/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/20506/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Shandong/lc0903/2013	6	3	3.2	9	4	1.2	2	7	2013	Shandong	G57-S70
A/chicken/Jiangxi/20927/2013	6.2	3	3.1	9.1	4.1	1.2	2.2	7	2013	Jiangxi	G57-S79
A/chicken/Jiangxi/20935/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/20976/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/21468/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/21481/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Shandong/qd0917/2013	6	3.1	3.1	9.1	4.1	1	2.2	7	2013	Shandong	G57-S80
A/chicken/Jiangxi/21978/2013	6.2	3	3.1	9.1	4.1	1.2	2.2	7	2013	Jiangxi	G57-S79
A/chicken/Jiangxi/21984/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Zhejiang/C16/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.2	7	2013	Zhejiang	G57-S82
A/chicken/Zhejiang/C50/2013	6.1	3.2	3.1	9.1	4.2	1.1	2.1	7	2013	Zhejiang	G57-S84
A/chicken/Zhejiang/C54/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.2	7	2013	Zhejiang	G57-S82
A/chicken/Zhejiang/C55/2013	6.1	3	3.2	9.1	4.2	1.2	2.2	7	2013	Zhejiang	G57-S83
A/chicken/Zhejiang/C1/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S81
A/chicken/Zhejiang/C19/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S81
A/chicken/Zhejiang/C2/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S81
A/chicken/Zhejiang/C2-5/2013	6	3.2	3.1	9.1	4.2	1.2	2	7.1	2013	Zhejiang	G57-S85
A/chicken/Zhejiang/C3/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S81
A/chicken/Zhejiang/C31/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S81
A/chicken/Zhejiang/C38/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S81
A/chicken/Zhejiang/C45/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S81
A/chicken/Zhejiang/C47/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S81
A/chicken/Zhejiang/C52/2013	6.1	3.2	3.1	9.1	4.2	1.1	2.1	7.1	2013	Zhejiang	G57-S54
A/chicken/Zhejiang/C58/2013	6	3	3.1	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S61
A/chicken/Jiangxi/23773/2013	6.2	3	3.1	9.1	4.1	1.2	2.2	7	2013	Jiangxi	G57-S79
A/chicken/Jiangxi/23797/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Ningbo/2727/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Ningbo	G57-S41
A/chicken/Ningbo/2929/2013	6.1	3.2	3.1	9.1	4.2	1.1	2.1	7.1	2013	Ningbo	G57-S54
A/chicken/Yantai/2243/2013	6.1	3.2	3.2	9.1	4.2	1.1	2.1	7.1	2013	Yantai	G57-S86
A/chicken/Yantai/2303/2013	6.1	3.2	3.2	9.1	4.2	1.1	2.1	7.1	2013	Yantai	G57-S86
A/chicken/Shandong/903/2013	6	3	3.2	9	4.2	1	2.2	7	2013	Shandong	G57-S34
A/chicken/Yantai/2468/2013	6.1	3.2	3.2	9.1	4.2	1.1	2.1	7.1	2013	Yantai	G57-S86
A/chicken/Yantai/2469/2013	6.1	3.2	3.2	9.1	4.2	1.1	2.1	7.1	2013	Yantai	G57-S86
A/chicken/Yantai/2484/2013	6	3	3.2	9	4.2	1	2.2	7.1	2013	Yantai	G57-S87
A/chicken/Qingdao/2144/2013	6.1	3	3	9.1	4.2	1.1	2.1	7	2013	Qingdao	G57-S88
A/chicken/Qingdao/2044/2013	6.2	3.2	3.2	9	4.2	1.1	2.1	7.1	2013	Qingdao	G57-S89
A/chicken/Jiangsu/TM58/2013	6.1	3.2	3	9.1	4.2	1.1	2.1	7.1	2013	Jiangsu	G57-S90
A/chicken/Wenzhou/3293/2013	6.1	3.1	3.1	9.1	4.2	1.2	2	7.1	2013	Wenzhou	G57-S91
A/chicken/Wenzhou/3330/2013	6.2	3	3.1	9	4.1	1	2.2	7.1	2013	Wenzhou	G57-S63
A/chicken/Huzhou/3892/2013	6.1	3.2	3.2	9.1	4.2	1.2	2	7	2013	Huzhou	G57-S93
A/chicken/Rizhao/2670/2013	6	3.2	3.2	9.1	4.2	1	2.2	7	2013	Rizhao	G57-S92
A/chicken/Huzhou/3801/2013	6.1	3.2	3	9.1	4.2	1.1	2.1	7.1	2013	Huzhou	G57-S90
A/chicken/Huzhou/3861/2013	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2013	Huzhou	G57-S65
A/chicken/Rizhao/2658/2013	6.2	3.2	3.2	9	4.2	1.1	2.1	7.1	2013	Rizhao	G57-S89
A/chicken/Rizhao/3052/2013	6.2	3.2	3.2	9	4.2	1.1	2.1	7.1	2013	Rizhao	G57-S89
A/chicken/Zhejiang/W41/2013	6.1	3.2	3	9.1	4.2	1.1	2.1	7.1	2013	Zhejiang	G57-S90

A/chicken/Jiaxing/4376/2013	6	3	3.1	9	4.1	1.1	2.2	7	2013	Jiaxing	G57-S96
A/chicken/Juxian/3387/2013	6	3.2	3.2	9.1	4.2	1.1	2.2	7	2013	Juxian	G57-S95
A/chicken/Juxian/3412/2013	6	3.2	3.2	9.1	4.2	1.1	2.2	7	2013	Juxian	G57-S95
A/chicken/Jiaxing/4321/2013	6.1	3.1	3.2	9.1	4	1.2	2.1	7.1	2013	Jiaxing	G57-S94
A/chicken/Jiaxing/4380/2013	6.1	3.1	3.2	9.1	4	1.2	2.1	7.1	2013	Jiaxing	G57-S94
A/chicken/Jiaxing/4725/2013	6.1	3	3.1	9.1	4.2	1.1	2.1	7	2013	Jiaxing	G57-S41
A/chicken/Jiaxing/4640/2013	6.1	3.2	3.1	9.1	4.2	1.1	2.2	7.1	2013	Jiaxing	G57-S97
A/chicken/Jiaxing/4713/2013	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2013	Jiaxing	G57-S65
A/chicken/Jiaxing/4742/2013	6.1	3.1	3.2	9.1	4	1.2	2.1	7.1	2013	Jiaxing	G57-S94
A/chicken/Suzhou/4957/2013	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7	2013	Suzhou	G57-S99
A/chicken/Suzhou/4960/2013	6.2	3.1	3.1	9.1	4.2	1.2	2.1	7	2013	Suzhou	G57-S100
A/chicken/Suzhou/4965/2013	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7	2013	Suzhou	G57-S98
A/chicken/Suzhou/4822/2013	6.2	3.1	3.1	9.1	4.1	1.1	2.2	7.1	2013	Suzhou	G57-S102
A/chicken/Suzhou/4837/2013	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2013	Suzhou	G57-S101
A/chicken/Suzhou/4954/2013	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2013	Suzhou	G57-S101
A/chicken/Shaoxing/5088/2013	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2013	Shaoxing	G57-S65
A/chicken/Shaoxing/5498/2013	6.1	3.2	3	9.1	4.2	1.1	2.1	7	2013	Shaoxing	G57-S107
A/chicken/Jinan/3925/2013	6.1	3	3.1	9.1	4.1	1.2	2.2	7.1	2013	Jinan	G57-S105
A/chicken/Jinan/3952/2013	6.1	3.2	3.1	9.1	4.2	1.2	2.2	7.1	2013	Jinan	G57-S104
A/chicken/Jinan/4225/2013	6.1	3.2	3.1	9.1	4.1	1.1	2.2	7.1	2013	Jinan	G57-S108
A/chicken/Jinan/4261/2013	6.1	3	3.1	9.1	4.1	1.1	2.2	7.1	2013	Jinan	G57-S103
A/chicken/Shaoxing/5453/2013	6.1	3	3.1	9.1	4	1.2	2.1	7.1	2013	Shaoxing	G57-S106
A/chicken/Shaoxing/5493/2013	6	3	3.1	9.1	4.2	1.2	2.1	7.1	2013	Shaoxing	G57-S61
A/chicken/Jiangsu/JT95/2013	6.1	3.2	3.1	9.1	4.2	1.1	2.1	7	2013	Jiangsu	G57-S84
A/chicken/Jiangxi/28563/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Jiangxi	G57-S78
A/chicken/Jiangxi/28601/2013	6	3.2	3.1	9.1	4.2	1.2	2.2	7	2013	Jiangxi	G57-S109
A/chicken/Zhejiang/3C2/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.2	7	2013	Zhejiang	G57-S82
A/chicken/Zhejiang/3C19/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.2	7.1	2013	Zhejiang	G57-S110
A/chicken/Zhejiang/3C22/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.2	7.1	2013	Zhejiang	G57-S110
A/chicken/Zhejiang/3C31/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S81
A/chicken/Zhejiang/3C7/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S81
A/chicken/Beijing/1115/2013	6.1	3.2	3	9.1	4.2	1.1	2.1	7	2013	Beijing	G57-S107
A/chicken/Shanghai/1107/2013	6.1	3.2	3.1	9.1	4.2	1.1	2.1	7	2013	Shanghai	G57-S84
A/chicken/Jiangxi/29099/2013	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7	2013	Jiangxi	G57-S112
A/chicken/Jiangxi/29075/2013	6.1	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2013	Jiangxi	G57-S111
A/chicken/Jiangxi/29086/2013	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2013	Jiangxi	G57-S101
A/chicken/Jiangxi/29117/2013	6.1	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2013	Jiangxi	G57-S111
A/chicken/Jiangxi/25970/2013	6.2	3	3.1	9.1	4.1	1.2	2.2	7	2013	Jiangxi	G57-S79
A/chicken/Zhejiang/4C105/2013	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2013	Zhejiang	G57-S81
A/chicken/Zhejiang/4C91/2013	6.1	3.2	3.1	9.1	4.2	1.1	2.1	7.1	2013	Zhejiang	G57-S54
A/chicken/Jiangxi/30772/2013	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7	2013	Jiangxi	G57-S99
A/chicken/Jiangxi/31872/2013	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7	2013	Jiangxi	G57-S98
A/chicken/Shenzhen/844/2013	6	3	3.2	9.1	4	1.2	2	7.1	2013	Shenzhen	G57-S113
A/chicken/Shenzhen/881/2013	6	3	3.2	9.1	4	1.2	2	7.1	2013	Shenzhen	G57-S113
A/chicken/Shenzhen/354/2013	6	3	3	9.1	4	1.2	2	7	2013	Shenzhen	G57-S29
A/chicken/Shenzhen/515/2013	6	3	3	9.1	4	1.2	2	7	2013	Shenzhen	G57-S29
A/chicken/Shenzhen/317/2013	6	3	3	9.1	4	1.2	2.2	7.1	2013	Shenzhen	G57-S114
A/chicken/Shenzhen/678/2013	6	3	3.2	9.1	4	1.2	2	7.1	2013	Shenzhen	G57-S113
A/chicken/Shenzhen/1047/2013	6	3	3.1	9.1	4	1.2	2	7	2013	Shenzhen	G57-S115
A/chicken/Shenzhen/1098/2013	6	3.1	3	9.1	4	1.2	2	7	2013	Shenzhen	G57-S117
A/chicken/Shenzhen/1426/2013	6	3.1	3	9.1	4.2	1.2	2.1	7	2013	Shenzhen	G57-S116
A/chicken/Shenzhen/1488/2013	6	3	3.1	9.1	4	1.2	2	7	2013	Shenzhen	G57-S115
A/chicken/Shenzhen/1377/2013	6	3	3.2	9.1	4	1.2	2	7.1	2013	Shenzhen	G57-S113
A/chicken/Shenzhen/1544/2013	6	3	3	9.1	4.2	1.2	2.2	7	2013	Shenzhen	G57-S119
A/chicken/Shenzhen/1638/2013	6	3.1	3	9.1	4	1.2	2	7	2013	Shenzhen	G57-S117
A/chicken/Shenzhen/1657/2013	6	3	3	9.1	4.1	1.2	2	7	2013	Shenzhen	G57-S118
A/chicken/Shenzhen/1664/2013	6	3.1	3	9.1	4	1.2	2	7	2013	Shenzhen	G57-S117
A/chicken/Shenzhen/1799/2013	6	3	3	9.1	4	1.2	2	7	2013	Shenzhen	G57-S29
A/chicken/Shenzhen/1519/2013	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2013	Shenzhen	G57-S65
A/chicken/Shenzhen/1591/2013	6	3	3.2	9.1	4.2	1.2	2	7.1	2013	Shenzhen	G57-S62
A/chicken/Shenzhen/1737/2013	6	3	3.2	9.1	4	1.2	2	7.1	2013	Shenzhen	G57-S113
A/chicken/Shenzhen/1770/2013	6	3	3.2	9.1	4	1.2	2	7.1	2013	Shenzhen	G57-S113
A/chicken/Shenzhen/1882/2013	6	3	3	9.1	4	1.2	2	7.1	2013	Shenzhen	G57-S19
A/chicken/Dongguan/2309/2013	6	3	3	9.1	4	1.2	2	7	2013	Dongguan	G57-S29
A/chicken/Shenzhen/2014/2013	6	3	3	9.1	4.1	1.2	2	7	2013	Shenzhen	G57-S118
A/chicken/Shenzhen/2121/2013	6	3	3	9.1	4.1	1.2	2	7	2013	Shenzhen	G57-S118
A/chicken/Shenzhen/2130/2013	6	3	3	9.1	4.1	1.2	2	7	2013	Shenzhen	G57-S118
A/chicken/Shenzhen/2172/2013	6	3	3	9.1	4.1	1.2	2	7	2013	Shenzhen	G57-S118
A/chicken/Shenzhen/2403/2013	6	3.1	3	9.1	4	1.2	2	7	2013	Shenzhen	G57-S117
A/chicken/Shenzhen/2477/2013	6	3	3	9.1	4	1.2	2	7	2013	Shenzhen	G57-S29
A/chicken/Shenzhen/2588/2013	6	3	3	9.1	4	1.2	2	7	2013	Shenzhen	G57-S29
A/chicken/Shenzhen/2636/2013	6	3	3.2	9	4	1.2	2	7	2013	Shenzhen	G57-S70
A/chicken/Shenzhen/1949/2013	6	3	3.2	9.1	4	1.2	2.2	7.1	2013	Shenzhen	G57-S120
A/chicken/Shenzhen/2066/2013	6	3	3.2	9.1	4.2	1.2	2	7.1	2013	Shenzhen	G57-S62
A/chicken/Guangdong/SIC14/2013	6	3.1	3	9.1	4	1.2	2	7	2013	Guangdong	G57-S117
A/chicken/Guangxi/SIC15/2013	6.2	3	3.1	9	4.1	1.2	2.2	7	2013	Guangxi	G57-S78
A/chicken/Fujian/SIC13/2013	6	3	3.2	9.1	4.2	1.2	2	7.1	2013	Fujian	G57-S62

A/chicken/Jiangxi/33542/2013	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2013	Jiangxi	G57-S101
A/chicken/Jiangxi/33552/2013	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2013	Jiangxi	G57-S101
A/chicken/Dongguan/2701/2013	6	3	3	9	4	1.2	2	7	2013	Dongguan	G57-S37
A/chicken/Dongguan/2754/2013	6	3	3	9.1	4	1.2	2	7	2013	Dongguan	G57-S29
A/chicken/Dongguan/2827/2013	6	3.1	3	9.1	4	1.2	2	7	2013	Dongguan	G57-S117
A/chicken/Dongguan/2900/2013	6	3	3	9.1	4	1.2	2	7	2013	Dongguan	G57-S29
A/chicken/Dongguan/2977/2013	6	3	3	9.1	4	1.2	2	7	2013	Dongguan	G57-S29
A/chicken/Dongguan/3056/2013	6	3.1	3	9.1	4	1.2	2	7	2013	Dongguan	G57-S117
A/chicken/Dongguan/3073/2013	6	3	3	9.1	4.1	1.2	2	7	2013	Dongguan	G57-S118
A/chicken/Dongguan/3225/2013	6	3	3	9	4	1.2	2	7	2013	Dongguan	G57-S37
A/chicken/Dongguan/3250/2013	6	3	3	9	4	1.2	2	7	2013	Dongguan	G57-S37
A/chicken/Dongguan/3315/2013	6	3	3	9	4	1.2	2	7	2013	Dongguan	G57-S37
A/chicken/Dongguan/3355/2013	6	3	3	9.1	4	1.2	2	7	2013	Dongguan	G57-S29
A/chicken/Dongguan/3186/2013	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2013	Dongguan	G57-S65
A/chicken/Dongguan/3409/2013	6	3	3	9.1	4	1.2	2	7	2013	Dongguan	G57-S29
A/chicken/Dongguan/3550/2013	6	3.1	3	9.1	4	1.2	2	7	2013	Dongguan	G57-S117
A/chicken/Dongguan/3562/2013	6	3	3	9.1	4	1.2	2	7	2013	Dongguan	G57-S29
A/chicken/Dongguan/3839/2013	6	3	3	9.1	4	1.2	2	7	2013	Dongguan	G57-S29
A/chicken/Dongguan/3964/2013	6	3	3	9	4	1.2	2	7	2013	Dongguan	G57-S37
A/chicken/Dongguan/4068/2013	6	3	3	9	4	1.2	2	7	2013	Dongguan	G57-S37
A/chicken/Dongguan/4189/2013	6	3	3	9	4	1.2	2	7	2013	Dongguan	G57-S37
A/chicken/Shenzhen/3745/2013	6	3.1	3	9.1	4	1.2	2	7	2013	Shenzhen	G57-S117
A/chicken/Dongguan/4231/2013	6.1	3.2	3	9.1	4.2	1.2	2.1	7.1	2013	Dongguan	G57-S121
A/chicken/Jiangxi/34682/2013	6.1	3.2	3.2	9.1	4.2	1.1	2.1	7.1	2013	Jiangxi	G57-S86
A/chicken/Hunan/12.28 YYGK0054-P/2013	6	3	3	9	4.1	1.1	2.2	7	2013	Hunan	G57-S43
A/chicken/Jiangxi/36277/2013	6.2	3.1	3	9.1	4.1	1.2	2.2	7.1	2013	Jiangxi	G57-S122
A/chicken/Jiangxi/1202/2014	6.1	3.1	3.1	9.1	4.1	1.2	2.1	7	2014	Jiangxi	G57-S123
A/chicken/Qingdao/001/2014	6	3.2	3.2	9.1	4.2	1.1	2.1	7	2014	Qingdao	G57-S124
A/chicken/Qingdao/002/2014	6	3.2	3.2	9.1	4.2	1.1	2.1	7	2014	Qingdao	G57-S124
A/chicken/Qingdao/005/2014	6	3.2	3.2	9.1	4.2	1.1	2.1	7	2014	Qingdao	G57-S124
A/chicken/Qingdao/003/2014	6	3.2	3.2	9.1	4.2	1.1	2.1	7.1	2014	Qingdao	G57-S126
A/chicken/Qingdao/006/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Qingdao	G57-S65
A/chicken/Qingdao/007/2014	6.1	3.2	3.1	9.1	4.2	1.1	2.1	7.1	2014	Qingdao	G57-S54
A/chicken/Qingdao/008/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Qingdao	G57-S65
A/chicken/Qingdao/009/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Qingdao	G57-S65
A/chicken/Qingdao/010/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Qingdao	G57-S65
A/chicken/Qingdao/011/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Qingdao	G57-S65
A/chicken/Qingdao/012/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Qingdao	G57-S65
A/chicken/Qingdao/013/2014	6.1	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2014	Qingdao	G57-S125
A/chicken/Qingdao/014/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Qingdao	G57-S65
A/chicken/Qingdao/015/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Qingdao	G57-S65
A/chicken/Qingdao/017/2014	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2014	Qingdao	G57-S101
A/chicken/Qingdao/018/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Qingdao	G57-S65
A/chicken/Qingdao/019/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Qingdao	G57-S65
A/chicken/Qingdao/020/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Qingdao	G57-S65
A/chicken/Jiangsu/TM71/2014	6.1	3.2	3	9.1	4.2	1.1	2.1	7.1	2014	Jiangsu	G57-S90
A/chicken/Guangxi/SIC22/2014	6.2	3	3.1	9	4.1	1.2	2.2	7	2014	Guangxi	G57-S78
A/chicken/Guangdong/SIC23/2014	6	3.1	3	9.1	4	1.2	2	7	2014	Guangdong	G57-S117
A/Chicken/Jilin/13200/2014	6.1	3.2	3	9.1	4.2	1.1	2.1	7.1	2014	Jilin	G57-S90
A/chicken/Dongguan/1674/2014	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7	2014	Dongguan	G57-S99
A/Chicken/Jilin/13204/2014	6.1	3.2	3	9.1	4.2	1.1	2.1	7.1	2014	Jilin	G57-S90
A/chicken/Zhejiang/3C14/2014	6.1	3.2	3	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S121
A/chicken/Zhejiang/3C28/2014	6.1	3.2	3	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S121
A/chicken/Zhejiang/3C34/2014	6	3.2	3	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S127
A/chicken/Zhejiang/3C9/2014	6.1	3.2	3	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S121
A/chicken/Wuxi/SC6395/2015/H9N2	6.1	3.1	3.1	9	4.2	1.1	2.1	7	2014	Wuxi	G57-S128
A/chicken/Shandong/SIC24/2014	6.2	3.2	3.2	9	4.2	1.1	2.1	7.1	2014	Shandong	G57-S89
A/chicken/Shandong/SIC25/2014	6.2	3.2	3.2	9.1	4.2	1.1	2.1	7.1	2014	Shandong	G57-S129
A/chicken/Hubei/2014	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7	2014	Hubei	G57-S99
A/chicken/Anhui/WB/2014	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7	2014	Anhui	G57-S99
A/chicken/Shandong/SIC26/2014	6.2	3.1	3.1	9	4.1	1.2	2.2	7	2014	Shandong	G57-S71
A/chicken/Wuxi/SC4315/2015/H9N2	6.1	3.1	3.1	9	4.2	1.1	2.1	7	2014	Wuxi	G57-S128
A/chicken/Jiangsu/JS4539/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Jiangsu	G57-S65
A/chicken/Zhejiang/77082/2014	6.1	3.2	3	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S121
A/chicken/Shanghai/014/2014	6	3.2	3.2	9.1	4.2	1.2	2.1	7	2014	Shanghai	G57-S130
A/chicken/Shanghai/015/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Shanghai	G57-S65
A/chicken/Guangdong/SIC27/2014	6.2	3	3.1	9.1	4	1.2	2.1	7	2014	Guangdong	G57-S131
A/chicken/Guangdong/SIC28/2014	6	3	3.2	9.1	4.2	1.2	2	7.1	2014	Guangdong	G57-S62
A/chicken/Zhejiang/727063/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S65
A/chicken/Zhejiang/727192/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S65
A/chicken/Zhejiang/727198/2014	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S81
A/chicken/Guangdong/SIC29/2014	6	3.2	3.1	9.1	4.2	1.2	2.1	7	2014	Guangdong	G57-S132
A/chicken/Zhejiang/SIC30/2014	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S81
A/chicken/Zhejiang/HZ03/2014	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S81
A/chicken/Zhejiang/HZ05/2014	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S81
A/chicken/Zhejiang/HZ26/2014	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S81
A/chicken/Zhejiang/TL27/2014	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S81

A/chicken/Zhejiang/925060/2014	6	3.2	3	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S127
A/chicken/Zhejiang/925117/2014	6	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S133
A/chicken/Zhejiang/925122/2014	6.1	3.2	3	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S121
A/chicken/Zhejiang/925134/2014	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S81
A/chicken/Zhejiang/925159/2014	6.1	3.2	3	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S121
A/chicken/Guangdong/SIC31/2014	6	3	3	9.1	4	1.2	2.1	7.1	2014	Guangdong	G57-S134
A/chicken/Tianjin/11/2014	6.1	3	3.1	9.1	4.2	1.1	2.1	7.1	2014	Tianjin	G57-S135
A/chicken/Zhejiang/SIC32/2014	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2014	Zhejiang	G57-S81
A/chicken/Beijing/XY1125/2014	6.1	3.2	3	9.1	4.2	1.1	2.1	7	2014	Beijing	G57-S107
A/chicken/Shandong/SIC34/2014	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2014	Shandong	G57-S101
A/chicken/Hunan/14.12 YYFQH0019-O/2014	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2014	Hunan	G57-S136
A/chicken/Beijing/XY1206/2014	6	1	3	9.1	4	1.1	2.1	7	2014	Beijing	G69-S2
A/chicken/Beijing/XY1208/2014	6.1	3.2	3	9.1	4.2	1.1	2.1	7	2014	Beijing	G57-S107
A/chicken/Beijing/XY1210/2014	6.1	3.2	3	9.1	4.2	1.1	2.1	7	2014	Beijing	G57-S107
A/chicken/Sichuan/SIC36/2014	6.2	3	3.1	9.1	4.1	1.2	2	7	2014	Sichuan	G57-S137
A/chicken/Beijing/XY1231/2014	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2014	Beijing	G57-S138
A/chicken/Shandong/SIC35/2014	6.2	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2014	Shandong	G57-S139
A/chicken/Wenzhou/YHQL04/2014	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2014	Wenzhou	G57-S65
A/chicken/Hunan/12.17 YYFQH0015-O/2014	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2014	Hunan	G57-S136
A/chicken/Hunan/12.17 YYFQH0059-O/2014	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2014	Hunan	G57-S136
A/chicken/Jiangsu/CZ73/2014	6.2	3.1	3.1	9.1	4.2	1.2	2.2	7.1	2014	Jiangsu	G57-S140
A/chicken/Wuhan/JXQL01/2015	6.1	3.1	3.1	9.1	4.1	1.2	2.2	7	2015	Wuhan	G57-S142
A/chicken/Guangdong/SIC38/2015	6	3	3	9.1	4	1.2	2	7.1	2015	Guangdong	G57-S19
A/chicken/Shandong/0104-1/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2015	Shandong	G57-S138
A/chicken/Shandong/0104-2/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Shandong	G57-S101
A/chicken/Shandong/LY0101/2015	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2015	Shandong	G57-S65
A/chicken/Shandong/SIC39/2015	6.2	3.2	3.2	9	4.2	1.1	2.1	7.1	2015	Shandong	G57-S89
A/chicken/Shandong/YT0101/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2015	Shandong	G57-S136
A/chicken/Shanghai/02/2015	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2015	Shanghai	G57-S65
A/chicken/Tianjin/1/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Tianjin	G57-S141
A/chicken/Zhejiang/SIC40/2015	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2015	Zhejiang	G57-S65
A/chicken/Beijing/F0123-10/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2015	Beijing	G57-S138
A/chicken/Jiangsu/02.06 NJLC042-O/2015	6	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2015	Jiangsu	G57-S143
A/chicken/Jiangsu/02.06 NJLC067-O/2015	6	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2015	Jiangsu	G57-S143
A/chicken/Jiangsu/02.06 NJLC068-O/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2015	Jiangsu	G57-S136
A/chicken/Guangdong/SIC41/2015	6.2	3	3.1	9.1	4.1	1.2	2	7	2015	Guangdong	G57-S137
A/chicken/Shandong/0202-1/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2015	Shandong	G57-S136
A/chicken/Guangxi/C227/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Guangxi	G57-S141
A/chicken/Anhui/03.01 FY001-O/2015	6.2	3.1	3.1	9.1	4.2	1.2	2.1	7	2015	Anhui	G57-S100
A/chicken/Hubei/03.06 WHWTZ0088-P/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7	2015	Hubei	G57-S99
A/chicken/Hubei/03.06 WHWTZ0048-P/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Hubei	G57-S141
A/chicken/Hubei/03.06 WHWTZ0068-P/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Hubei	G57-S141
A/chicken/Hubei/03.06 WHWTZ0117-O/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Hubei	G57-S141
A/chicken/Hubei/03.06 WHWTZ132-O/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Hubei	G57-S141
A/chicken/Jiangsu/03.06 WXBT054-O/2015	6.1	3.2	3	9.1	4.2	1.2	2.1	7.1	2015	Jiangsu	G57-S121
A/chicken/Yunnan/03.15 DQWGH005-Z-O/2015	6.1	3.2	3.2	9.1	4	1.2	2.1	7.1	2015	Yunnan	G57-S144
A/chicken/Yunnan/03.15 DQXYL0029-O/2015	6	3	3.1	9.1	4.1	1.2	2.2	7.1	2015	Yunnan	G57-S145
A/chicken/Yunnan/03.16 DQJT0070-O/2015	6.2	3	3.1	9.1	4.1	1.2	2.2	7	2015	Yunnan	G57-S79
A/chicken/Yunnan/03.16 DQJT0071-O/2015	6.2	3	3.1	9.1	4.1	1.2	2.2	7	2015	Yunnan	G57-S79
A/chicken/Yunnan/03.16 DQJT062-O/2015	6.2	3	3.1	9.1	4.1	1.2	2.2	7	2015	Yunnan	G57-S79
A/chicken/Yunnan/03.16 DQXYL0019-O/2015	6.2	3	3.1	9.1	4.1	1.2	2.2	7	2015	Yunnan	G57-S79
A/chicken/Yunnan/03.16 DQXYL0031-O/2015	6.2	3	3.1	9.1	4.1	1.2	2.2	7	2015	Yunnan	G57-S79
A/chicken/Yunnan/03.16 DQXYL058-O/2015	6	3	3.1	9.1	4.1	1.2	2.2	7.1	2015	Yunnan	G57-S145
A/chicken/Jiangxi/04.01 NCDTZ0261-P/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7	2015	Jiangxi	G57-S99
A/chicken/Jiangxi/04.01 NCJD0116-O/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7	2015	Jiangxi	G57-S99
A/chicken/Jiangxi/04.01 NCJD0129-O/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7	2015	Jiangxi	G57-S99
A/chicken/Jiangxi/04.01 NCDZT0055-O/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Jiangxi	G57-S141
A/chicken/Jiangxi/04.01 NCDZT0103-O/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2015	Jiangxi	G57-S138
A/chicken/Jiangxi/04.01 NCJD0106-O/2015	6.2	3	3.1	9.1	4.1	1.2	2.2	7.1	2015	Jiangxi	G57-S146
A/chicken/Jilin/04.04 CCHSL002-O/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Jilin	G57-S101
A/chicken/Jilin/04.04 SY001-O/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Jilin	G57-S101
A/chicken/Jilin/04.05 CCCJ005/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Jilin	G57-S101
A/chicken/Jilin/04.05 CCCJ006/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Jilin	G57-S141
A/chicken/Jilin/04.11 CCHSL009/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Jilin	G57-S101
A/chicken/Hunan/04.14 YYFQH661-O/2015	6.2	3.2	3.1	9	4.1	1.2	2.1	7.1	2015	Hunan	G57-S147
A/chicken/Hunan/04.14 YYGK501-O/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2015	Hunan	G57-S138
A/chicken/Hunan/04.14 YYGK506-O/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Hunan	G57-S101
A/chicken/Hunan/04.14 YYGK507-O/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Hunan	G57-S101
A/chicken/Hunan/04.14 YYGK521-P/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2015	Hunan	G57-S138
A/chicken/Hunan/04.14 YYGK522-O/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Hunan	G57-S101
A/chicken/Hunan/04.14 YYGK563-P/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2015	Hunan	G57-S138
A/chicken/Hunan/YueYang0501/2015/04.14	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2015	Hunan	G57-S138
A/chicken/Hunan/YueYang0506/2015/04.14	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Hunan	G57-S101
A/chicken/Hunan/YYFQH689-O/2015	6.2	3.2	3.1	9	4.1	1.2	2.1	7.1	2015	Hunan	G57-S147
A/chicken/Guangdong/04.15 SZBAXQ005/2015	6	3.1	3.1	9	4.1	1.2	2.2	7	2015	Guangdong	G57-S149
A/chicken/Guangdong/04.15 SZBAXQ025/2015	6.2	3.1	3.1	9.1	4.1	1.2	2	7.1	2015	Guangdong	G57-S148
A/chicken/Jiangsu/SIC42/2015	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2015	Jiangsu	G57-S81

A/chicken/Guangdong/04.22/DGCP102-O/2015	6	3	3.1	9.1	4	1.2	2	7	2015	Guangdong	G57-S115
A/chicken/Hunan/04.22/LDDX069-O/2015	6.1	3.1	3.1	9.1	4.2	1.2	2	7	2015	Hunan	G57-S152
A/chicken/Guangdong/04.22/DGCP100-O/2015	6.1	3.2	3	9.1	4.2	1.2	2	7.1	2015	Guangdong	G57-S151
A/chicken/Hunan/04.22/LDDX046-O/2015	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2015	Hunan	G57-S150
A/chicken/Hunan/XKY/46/2015/04.22	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2015	Hunan	G57-S150
A/chicken/Guangdong/04.23 DGQTXC193-O/2015	6.1	3.2	3	9.1	4.2	1.2	2	7.1	2015	Guangdong	G57-S151
A/chicken/Guangdong/04.23 DGQTXC194-P/2015	6.1	3.2	3	9.1	4.2	1.2	2	7.1	2015	Guangdong	G57-S151
A/chicken/Guangdong/04.23 DGQTXC195-P/2015	6.1	3.2	3	9.1	4	1.2	2	7.1	2015	Guangdong	G57-S68
A/chicken/Jilin/04.25 DH003/2015	6.2	3.1	3.1	9.1	4.2	1.2	2.2	7.1	2015	Jilin	G57-S140
A/chicken/Beijing/M0430-10/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Beijing	G57-S101
A/chicken/Beijing/M0430-12/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Beijing	G57-S101
A/chicken/Beijing/M0430-9/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Beijing	G57-S101
A/chicken/Shandong/M0501-60/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Shandong	G57-S141
A/chicken/Shandong/M0501-70/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Shandong	G57-S141
A/chicken/Shandong/M0501-77/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Shandong	G57-S141
A/chicken/Jilin/05.03 YJ011-O/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Jilin	G57-S101
A/chicken/Shandong/1167/2015	6.2	3	3.2	9.1	4.1	1.2	2.2	7.1	2015	Shandong	G57-S153
A/chicken/Jiangxi/05.06 NCDZT0077B-P/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7	2015	Jiangxi	G57-S99
A/chicken/Shanghai/06/2015	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2015	Shanghai	G57-S65
A/chicken/Shanghai/15/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2015	Shanghai	G57-S136
A/chicken/Wuxi/6085/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2015	Wuxi	G57-S136
A/chicken/Wuxi/6224/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2015	Wuxi	G57-S136
A/chicken/Yunan/07.13 DQDBS051/2015	6.2	3.2	3.1	9.1	4.2	1.2	2.2	7.1	2015	Yunan	G57-S154
A/chicken/Beijing/0701/2015	6.2	3.1	3.1	9.1	4.2	1.2	2.2	7.1	2015	Beijing	G57-S140
A/chicken/Hebei/TS0701/2015	6.2	3.2	3.1	9.1	4.2	1.2	2.2	7.1	2015	Hebei	G57-S154
A/chicken/Anhui/AH120/2015	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2015	Anhui	G57-S81
A/chicken/Wuxi/6440/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2015	Wuxi	G57-S136
A/chicken/Wuxi/6442/2015	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2015	Wuxi	G57-S150
A/chicken/Wuxi/6468/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2015	Wuxi	G57-S136
A/chicken/Wuxi/6414/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2015	Wuxi	G57-S101
A/chicken/Wuxi/6650/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2015	Wuxi	G57-S138
A/chicken/Xiamen/09/2015	6.2	3.2	3	9.1	4.1	1.2	2.1	7.1	2015	Xiamen	G57-S155
A/chicken/Wuxi/6688/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2015	Wuxi	G57-S138
A/chicken/Wuxi/6657/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2015	Wuxi	G57-S138
A/chicken/Wuxi/6808/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2015	Wuxi	G57-S136
A/chicken/Hubei/01/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2015	Hubei	G57-S141
A/chicken/Xiamen/10/2015	6.2	3.2	3	9.1	4.2	1.2	2.1	7.1	2015	Xiamen	G57-S156
A/chicken/Shanghai/PT02/2015	6.1	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2015	Shanghai	G57-S81
A/chicken/Wuxi/7022/2015	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2015	Wuxi	G57-S136
A/chicken/Wuxi/7109/2015	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2015	Wuxi	G57-S138
A/chicken/Guangxi/C1228/2015	6	3	3	9	4.1	1.2	2	7	2015	Guangxi	G57-S39
A/chicken/Shandong/F1228-60/2015	6.2	3.1	3.1	9.1	4.2	1.2	2.2	7.1	2015	Shandong	G57-S140
A/chicken/Shandong/F1228-65/2015	6.2	3.1	3.1	9.1	4.2	1.2	2.2	7.1	2015	Shandong	G57-S140
A/chicken/Shandong/F1228-76/2015	6.2	3.1	3.1	9.1	4.2	1.2	2.2	7.1	2015	Shandong	G57-S140
A/chicken/Shandong/F1228-95/2015	6.2	3.1	3.1	9.1	4.2	1.2	2.2	7.1	2015	Shandong	G57-S140
A/chicken/Ganzhou/GZ86/2016	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2016	Ganzhou	G57-S136
A/chicken/Zhejiang/221/2016	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2016	Zhejiang	G57-S136
A/chicken/Guangdong/835/2016	6.1	3.2	3	9	4.2	1.2	2.2	7	2016	Guangdong	G57-S157
A/chicken/Yuhuan/YH15/2016	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2016	Yuhuan	G57-S150
A/chicken/Ganzhou/GZ140/2016	6.2	3	3.1	9.1	4.1	1.2	2.1	7.1	2016	Ganzhou	G57-S158
A/chicken/Henan/815/2016	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2016	Henan	G57-S136
A/chicken/Guangdong/GD1601/2016	6.1	3.2	3	9	4.2	1.2	2.2	7	2016	Guangdong	G57-S157
A/chicken/Anhui/AH326/2016	6.1	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2016	Anhui	G57-S111
A/chicken/Huaian/HA9/2016	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2016	Huaian	G57-S101
A/chicken/Suqian/SQ1602/2016	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2016	Suqian	G57-S141
A/chicken/Wuxi/8501/2016	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2016	Wuxi	G57-S150
A/chicken/Beijing/M0428-16/2016	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2016	Beijing	G57-S65
A/chicken/Beijing/M0428-22/2016	6.2	3.1	3.1	9.1	4.2	1.2	2.1	7.1	2016	Beijing	G57-S159
A/chicken/Beijing/M0428-27/2016	6.2	3.1	3.1	9.1	4.2	1.2	2.2	7.1	2016	Beijing	G57-S140
A/chicken/Beijing/M0428-3/2016	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2016	Beijing	G57-S138
A/chicken/Xuzhou/XZ270/2016	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2016	Xuzhou	G57-S101
A/chicken/Shandong/M0515-20/2016	6.2	3.2	3.2	9.1	4.1	1.2	2.2	7.1	2016	Shandong	G57-S160
A/chicken/Beijing/M0622-1/2016	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2016	Beijing	G57-S65
A/chicken/Beijing/M0622-8/2016	6.1	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2016	Beijing	G57-S65
A/chicken/Beijing/M0703-11/2016	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2016	Beijing	G57-S136
A/chicken/Beijing/M0703-12/2016	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2016	Beijing	G57-S136
A/chicken/Anhui/AH329/2016	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2016	Anhui	G57-S138
A/chicken/Beijing/M0715-17/2016	6.2	3.2	3.2	9.1	4.1	1.2	2.1	7.1	2016	Beijing	G57-S161
A/chicken/Beijing/M0929-5/2016	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2016	Beijing	G57-S136
A/chicken/Beijing/M1019-17/2016	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2016	Beijing	G57-S136
A/chicken/Hebei/M1106-22/2016	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2016	Hebei	G57-S136
A/chicken/Hebei/M1106-3/2016	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2016	Hebei	G57-S136
A/chicken/Hebei/M1211-20/2016	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2016	Hebei	G57-S136
A/chicken/Gansu/M1210-41/2016	6.2	3	3.1	9	4.1	1.2	2.2	7.1	2016	Gansu	G57-S162
A/chicken/Beijing/M0115-28/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	Beijing	G57-S136
A/chicken/ShanDong/210WZ/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	ShanDong	G57-S150
A/chicken/Gansu/M0227-16/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	Gansu	G57-S136

A/chicken/ShanDong/227AC/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	ShanDong	G57-S150
A/chicken/ShanDong/306SZ/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	ShanDong	G57-S150
A/chicken/Daye/DY0602/2017	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2017	Daye	G57-S101
A/chicken/Jingmen/JM0305/2017	6.2	3	3.1	9.1	4.1	1.2	2.2	7.1	2017	Jingmen	G57-S146
A/chicken/Fujian/S1XA35/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.2	7.1	2017	Fujian	G57-S141
A/chicken/Fujian/SD037/2017	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2017	Fujian	G57-S138
A/chicken/Fujian/SD056/2017	6.2	3.1	3.1	9.1	4.1	1.2	2.1	7.1	2017	Fujian	G57-S138
A/chicken/ShanDong/321ZL/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	ShanDong	G57-S150
A/chicken/ShanDong/413ZDM/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	ShanDong	G57-S150
A/chicken/Gansu/M0427-8/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Gansu	G57-S150
A/chicken/China/231/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	-	G57-S136
A/chicken/Shandong/F0503-33/2017	6.2	3.1	3.1	9.1	4.2	1.2	2.2	7.1	2017	Shandong	G57-S140
A/chicken/Shandong/F0506-42/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	Shandong	G57-S136
A/chicken/Shandong/F0511-58/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	Shandong	G57-S136
A/chicken/Gansu/M0517-7/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Gansu	G57-S150
A/chicken/Gansu/M0527-3/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Gansu	G57-S150
A/chicken/Shandong/M0515-1/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Shandong	G57-S150
A/chicken/Gansu/M0517-18/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Gansu	G57-S150
A/chicken/Hebei/M0530-1/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Hebei	G57-S150
A/chicken/Hebei/M0530-22/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Hebei	G57-S150
A/chicken/Hebei/M0530-25/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Hebei	G57-S150
A/chicken/Gansu/M0626-1/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Gansu	G57-S150
A/chicken/Gansu/M0626-2/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Gansu	G57-S150
A/chicken/Gansu/M0626-20/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Gansu	G57-S150
A/chicken/Shanghai/0710-10/2017	6.2	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2017	Shanghai	G57-S139
A/chicken/Anhui/AH450/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	Anhui	G57-S136
A/chicken/Anhui/LH66/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	Anhui	G57-S136
A/chicken/Anhui/LH99/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	Anhui	G57-S136
A/chicken/Shanghai/1106-58/2017	6.2	3.2	3.2	9.1	4.1	1.2	2.1	7.1	2017	Shanghai	G57-S161
A/chicken/Shanghai/1106-65/2017	6.2	3.2	3.2	9.1	4.1	1.2	2.1	7.1	2017	Shanghai	G57-S161
A/chicken/Shanghai/1127-30/2017	6.2	3.2	3.2	9.1	4.2	1.2	2.1	7.1	2017	Shanghai	G57-S139
A/chicken/Shanghai/1127-35/2017	6.2	3.2	3.2	9.1	4.1	1.2	2.1	7.1	2017	Shanghai	G57-S161
A/chicken/Anhui/AH475/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	Anhui	G57-S136
A/chicken/Anhui/AH480/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	Anhui	G57-S136
A/chicken/Jiangsu/TM315/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	Jiangsu	G57-S136
A/chicken/Shandong/WF75/2017	6.2	3.2	3.1	9.1	4.2	1.2	2.1	7.1	2017	Shandong	G57-S150
A/chicken/China/330/2017	6.2	3.2	3.1	9.1	4.1	1.2	2.1	7.1	2017	-	G57-S136
A/chicken/China/333/2017	6.2	3.1	3.1	9.1	4.1	1.2	2.2	7.1	2017	-	G57-S101