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Running Title: First detection of H5N1 HPAIV in Chile.

Keywords: Avian Influenza virus, Influenza A Virus, H5N1 Subtype, Wild birds, Viral dissemination.

Emergence and rapid dissemination of highly pathogenic avian influenza virus H5N1 clade 2.3.4.4b in wild birds, Chile.

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Abstract - word count

In December 2022, HPAI H5N1 clade 2.3.4.4b emerged in Chile. We detected the virus in 93 wild bird samples and sequenced the whole genome of nine Chilean strains from pelicans and gulls. Phylogenetic analysis suggests at least two different HPAI viral clusters in South America.

Text – word count (word counts are strictly enforced)

Highly pathogenic avian influenza (HPAI) viruses H5N1 subtype grouped within the HA clade 2.3.4.4b, are spreading globally and causing high mortalities in domestic and wild birds (1). These viruses had spilled over to several non-avian species, including humans (2). To contain the outbreaks culling HPAI-infected or exposed poultry has resulted in the disposal of around 120 million domestic birds in 2022 (3). Therefore, HPAI poses a threat not only to public health due to its zoonotic potential but also to food security.

In late 2021, the H5N1 clade 2.3.4.4b, which spread predominantly in Europe, Asia, and Africa, was detected in wild birds in North America and shortly after in poultry (3–5). In October 2022,

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HPAI reached South America and was officially reported for the first time in Colombia and later in Peru, Ecuador, and Venezuela (2).

In early December 2022, increased deaths among wild birds were detected across the north coast of Chile (Appendix Figure 1). Wild birds, mainly pelicans, were found dead or dying. Until December 22, 2022, the official Veterinary Services of the Chilean Agricultural and Livestock Service (SAG) had collected 1368 samples from domestic (n=1080) and wild birds (n=288) for HPAI detection and epidemiological investigation (Appendix Table 1). A total of 578 real-time RT-PCR (RT-qPCR) reactions and 790 agar gel immunodiffusion tests (AGID) were performed to detect active infection and previous exposure to the virus.

The RT-qPCR was performed with the VetMAX-Gold AIV Detection Kit (Applied Biosystems™), targeting the avian influenza virus (AIV) M gene. Samples included: tissues (n= 13, 15% of positivity), tracheal (n= 248, 17%), cloacal (n= 314, 15%), and oral swabs (n= 3, 33%). A total of 93 samples from Arica y Parinacota (n=18), Tarapaca (n=18), Antofagasta (n=53), and Atacama (n=4) regions were considered AIV-positive qRT-PCR (Ct value <40, 16 % of positivity) (Appendix Figure 1). No poultry samples were positive to AIV. The most frequently AIV-infected species were pelicans (*Pelecanus thagus*, n=50, 54%), followed by vultures (*Cathartes aura*) and Peruvian boobies (*Sula variegata*) (Appendix Table 1).

All serum samples collected mainly from domestic birds (n= 785 out of 790) and processed using the official AGID protocol tested negative for AIV (6). Next, full-genome sequencing was attempted in 11 RT-qPCR-positive samples selected by Ct value and location. The eight segments of AIV genome were amplified using the MS RT-PCR approach (7). Then they were sequenced using the whole-genome amplicon-based sequencing protocol by Oxford Nanopore

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Technology according to the manufacturer's instruction (Native Barcoding Kit 96, SQK-NBD114.96). Genome assembly was performed using the genome A/Falco_rusticolus/EdoMex/CPA-19638-22/2022(H5N1) (GenBank accession numbers OP691321 to OP691328) as a reference due to its highest similarity our *de novo* assemblies. Ten samples were sequenced with a mean coverage depth of 33.381x, and 9 of 10 complete genome were obtained (Table) (Accession numbers OQ455414 - OQ455462).

All samples were classified as H5N1 subtype and 2.3.4.4b H5 clade (Appendix). A/Peru/LIM-003/2022 and A/Peru/LAM-002/2022 (GISAID Isolate IDs EPI_ISL_16249730 and EPI_ISL_16249681) were the most closely related HA sequences found on the GISAID database (8) (Figure A). Similar results were observed on the NA (Figure B) and internal genes phylogenies (Appendix Figures 2-7). The Peruvian sequences correspond to isolates collected in November 2022 from domestic chickens. Sequences from Ecuador and Mexico were observed in the same subcluster when enough-quality sequences (n content < 0.5%) were available for the analyses (Appendix Figures 2-7). For HA, the Chile-Peru subcluster showed a non-synonymous mutation T392A (L131Q), previously associated with antigenic variability in H5N1 strains (9). Other synonymous and non-synonymous mutations, which are not associated with phenotypic changes to date, were found in NA (L269M and S339P) and the internal genes (Appendix Table 2). Sequences from Venezuela grouped outside the Chile-Peru subcluster for all its available complete sequences (H5, N1, M, and PA), suggesting a different introduction to South America. However, due to the low availability of HPAI H5N1 sequences from Central and South America, conclusions on the origin of the Chilean clusters are limited. Our analysis supports the idea of the HPAI H5N1 clade 2.3.4.4b introduction to the Americas across the Atlantic flyway and its posterior dissemination to all the other flyways

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(<https://www.usgs.gov/centers/nwhc/science/distribution-highly-pathogenic-avian-influenza-north-america-20212022>). These flyways reach the southernmost tip of the South American mainland, representing a high risk as an HPAI dissemination route across the continent (10). Thus, suggesting the prompt arrival of the HPAIV to the Austral region and hazardous proximity to Antarctica.

According to official data, until January 18, 2023, the HPAI virus H5N1 has disseminated as far as the Maule region, and no poultry cases have been confirmed. The SAG has implemented a contingency plan to perform extensive surveillance and reinforcement of biosecurity measurements to avoid the introduction of the HPAIV into poultry. Further studies are needed to determine the impact of H5N1 HPAIV in the country and the potential introduction to Antarctica.

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Table. Summary of sequencing results of highly pathogenic avian influenza virus H5N1 clade 2.3.4.4b in wild birds, December 2022, Chile.

Strain	Species	Region	Sample type	Collection Date	Ct*	Total reads	Influenza like reads (%)	Coverage (average)
226924-1	Pelican	Arica y Parinacota	Tracheal swab	12/6/2022	31	839824	716890 (92)	47593x
226618-1	Pelican	Arica y Parinacota	Tracheal swab	12/5/2022	26	170767	144419 (92)	11717x
226618-2	Pelican	Arica y Parinacota	Cloacal swab	12/5/2022	26	305220	255977 (92)	20429x
226955-1	Pelican	Antofagasta	Tracheal swab	12/6/2022	19	239414	193780 (87)	8700x
226955-3	Pelican	Antofagasta	Tracheal swab	12/6/2022	19	215419	166728 (84)	8300x
226958-1	Pelican	Antofagasta	Tracheal swab	12/6/2022	17	552755	387062 (77)	22680x
227023-1	Pelican	Tarapaca	Cloacal swab	12/7/2022	25	868	245 (81)	24x
227023-2	Belcher's gull	Tarapaca	Cloacal swab	12/7/2022	24	678724	594285 (95)	63145x
227023-3	Belcher's gull	Tarapaca	Tracheal swab	12/7/2022	21	1809324	1593584 (95)	151985x
227087-1	Pelican	Arica y Parinacota	Tracheal swab	12/7/2022	25	19121	15983 (92)	1237x

* Cycle threshold of the real time RT-PCR for the matrix gene of influenza A virus.

Figure. A) Time-scale Bayesian MCC tree of 2.3.4.4b H5 clade. B) Time-scale Bayesian MCC tree of N1 from isolates of H5N1 subtype 2.3.4.4b H5 clade. The Chilean-Peruvian subcluster is

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157 highlighted in red, the Venezuelan strains in green, Ecuadorian in pink, the North American in
158 blue, and other reference sequences in black.

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161 **Appendix Table 1.** Samples of wild and domestic birds officially analyzed for HPAI detection
162 by real time RT-PCR up to December 22, 2022, Chile.

ID	Collection Date	Region	Species	Category	Sample type	Pooled samples	RT-PCR	Ct
226518	5-Dec	Metropolitana	ND	Wild or exotic bird	Tracheal swab	1	Negative	-
226518	5-Dec	Metropolitana	ND	Wild or exotic bird	Tissue	1	Negative	-
226518	5-Dec	Metropolitana	ND	Wild or exotic bird	Tracheal swab	1	Negative	-
226518	5-Dec	Metropolitana	ND	Wild or exotic bird	Tissue	1	Negative	-
226563	2-Dec	Maule	Geranoaetus sp.	Wild or exotic bird	Cloacal swab	1	Negative	-
226615	5-Dec	Tarapaca	Pelican	Wild or exotic bird	Tracheal swab	1	Positive	26
226615	5-Dec	Tarapaca	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	34
226615	5-Dec	Tarapaca	Pelican	Wild or exotic bird	Tracheal swab	1	Positive	25
226615	5-Dec	Tarapaca	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	36
226618	5-Dec	Arica y Parinacota	Pelican	Wild or exotic bird	Tracheal swab	1	Positive	26.21
226618	5-Dec	Arica y Parinacota	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	26.03
226665	4-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	33
226665	4-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	32
226666	5-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	0	Negative	-
226666	5-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	0	Negative	-
226666	5-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	0	Positive	27
226666	5-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	0	Positive	20
226666	5-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	1	Negative	-
226666	5-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	1	Negative	-
226666	5-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	1	Positive	25.5
226666	5-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	18
226769	5-Dec	Atacama	Macronectes halli	Wild or exotic bird	Oral swab	0	Negative	-
226769	5-Dec	Atacama	Macronectes halli	Wild or exotic bird	Cloacal swab	0	Negative	-
226776	6-Dec	Metropolitana	ND	Wild or exotic bird	Tracheal swab	1	Negative	-
226776	6-Dec	Metropolitana	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
226776	6-Dec	Metropolitana	ND	Wild or exotic bird	Tissue	1	Negative	-
226816	6-Dec	Metropolitana	Hen	Laying hen	Cloacal swab	4	Negative	-
226816	6-Dec	Metropolitana	Hen	Laying hen	Cloacal swab	4	Negative	-
226924	6-Dec	Arica y Parinacota	Pelican	Wild or exotic bird	Tracheal swab	2	Positive	31

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226924	6-Dec	Arica y Parinacota	Pelican	Wild or exotic bird	Tracheal swab	0	Positive	33
226924	6-Dec	Arica y Parinacota	Pelican	Wild or exotic bird	Cloacal swab	0	Positive	29
226924	6-Dec	Arica y Parinacota	Pelican	Wild or exotic bird	Cloacal swab	2	Positive	26
226955	6-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	1	Positive	18.65
226955	6-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	28.97
226955	6-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	1	Positive	19.01
226955	6-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	33
226958	6-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	2	Positive	16.98
226958	6-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	2	Positive	25.28
226960	6-Dec	Arica y Parinacota	Leucophaeus pipixcan	Wild or exotic bird	Cloacal swab	5	Negative	-
226960	6-Dec	Arica y Parinacota	Leucophaeus modestus	Wild or exotic bird	Cloacal swab	5	Negative	-
226960	6-Dec	Arica y Parinacota	Anas cyanoptera	Wild or exotic bird	Cloacal swab	1	Negative	-
226960	6-Dec	Arica y Parinacota	Pelican	Wild or exotic bird	Cloacal swab	5	Negative	-
226963	7-Dec	Maule	Falco sparverius	Wild or exotic bird	Cloacal swab	0	Negative	-
226963	7-Dec	Maule	Falco sparverius	Wild or exotic bird	Tracheal swab	0	Negative	-
227023	7-Dec	Tarapaca	Pelican	Wild or exotic bird	Cloacal swab	3	Positive	25.38
227023	7-Dec	Tarapaca	Larus belcheri	Wild or exotic bird	Cloacal swab	1	Positive	23.63
227023	7-Dec	Tarapaca	Larus belcheri	Wild or exotic bird	Tracheal swab	1	Positive	21.32
227079	7-Dec	Arica y Parinacota	Sula variegata	Wild or exotic bird	Tracheal swab	1	Positive	28
227079	7-Dec	Arica y Parinacota	Sula variegata	Wild or exotic bird	Cloacal swab	1	Positive	31
227087	7-Dec	Arica y Parinacota	Pelican	Wild or exotic bird	Cloacal swab	2	Positive	25
227087	7-Dec	Arica y Parinacota	Pelican	Wild or exotic bird	Tracheal swab	2	Positive	25
227157	8-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	0	Negative	-
227198	8-Dec	Arica y Parinacota	Nycticorax nycticorax	Wild or exotic bird	Tracheal swab	1	Negative	-
227198	8-Dec	Arica y Parinacota	Nycticorax nycticorax	Wild or exotic bird	Tracheal swab	1	Negative	-
227199	8-Dec	Valparaiso	ND	Wild or exotic bird	Cloacal swab	0	Negative	-
227199	8-Dec	Valparaiso	ND	Wild or exotic bird	Cloacal swab	0	Negative	-
227285	9-Dec	Los Lagos	Hen	Backyard Hen	Tracheal swab	3	Negative	-
227286	9-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	0	Negative	-
227286	9-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	0	Negative	-
227286	9-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	0	Negative	-
227287	9-Dec	Los Lagos	Hen	Backyard Hen	Tracheal swab	3	Negative	-
227294	9-Dec	Valparaiso	ND	Backyard Hen	Cloacal swab	1	Negative	-
227294	9-Dec	Valparaiso	ND	Backyard Hen	Cloacal swab	1	Negative	-

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227294	9-Dec	Valparaíso	ND	Backyard Hen	Tracheal swab	1	Negative	-
227294	9-Dec	Valparaíso	ND	Backyard Hen	Tracheal swab	1	Negative	-
227405	12-Dec	Valparaíso	ND	Wild or exotic bird	Tracheal swab	1	Negative	-
227405	12-Dec	Valparaíso	ND	Wild or exotic bird	Tracheal swab	1	Negative	-
227415	9-Dec	Valparaíso	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227415	9-Dec	Valparaíso	ND	Wild or exotic bird	Tracheal swab	1	Negative	-
227423	10-Dec	Antofagasta	<i>Sula variegata</i>	Wild or exotic bird	Cloacal swab	1	Positive	27.31
227423	10-Dec	Antofagasta	<i>Sula variegata</i>	Wild or exotic bird	Tracheal swab	1	Positive	27.33
227424	10-Dec	Antofagasta	ND	Wild or exotic bird	Cloacal swab	0	Negative	-
227424	10-Dec	Antofagasta	<i>Larus dominicanus</i>	Wild or exotic bird	Tracheal swab	1	Negative	-
227428	10-Dec	Antofagasta	<i>Sula variegata</i>	Wild or exotic bird	Cloacal swab	1	Positive	31.34
227428	10-Dec	Antofagasta	<i>Sula variegata</i>	Wild or exotic bird	Tracheal swab	1	Positive	23.39
227435	10-Dec	Antofagasta	<i>Phalacrocorax</i> sp.	Wild or exotic bird	Cloacal swab	1	Negative	-
227435	10-Dec	Antofagasta	<i>Phalacrocorax</i> sp.	Wild or exotic bird	Tracheal swab	1	Negative	-
227436	9-Dec	Tarapaca	Pelican	Wild or exotic bird	Tracheal swab	1	Positive	31.56
227436	9-Dec	Tarapaca	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	30.56
227440	9-Dec	Antofagasta	<i>Sterna hirundinacea</i>	Wild or exotic bird	Tracheal swab	2	Negative	-
227442	9-Dec	Tarapaca	ND	Wild or exotic bird	Cloacal swab	5	Positive	35
227480	12-Dec	Bio-Bio	ND	Wild or exotic bird	Tracheal swab	1	Negative	-
227480	12-Dec	Bio-Bio	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227484	11-Dec	Tarapaca	ND	Wild or exotic bird	Cloacal swab	0	Positive	26.78
227484	11-Dec	Tarapaca	ND	Wild or exotic bird	Oral swab	0	Positive	26.29
227487	9-Dec	Metropolitana	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227489	11-Dec	Los Lagos	Hen	Backyard Hen	Cloacal swab	2	Negative	-
227494	10-Dec	Los Lagos	ND	Wild or exotic bird	Tracheal swab	0	Negative	-
227494	10-Dec	Los Lagos	ND	Wild or exotic bird	Cloacal swab	0	Negative	-
227512	12-Dec	Metropolitana	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227512	12-Dec	Metropolitana	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227515	9-Dec	Arica y Parinacota	<i>Leucophaeus modestus</i>	Wild or exotic bird	Tracheal swab	1	Positive	29.14
227515	9-Dec	Arica y Parinacota	<i>Sula variegata</i>	Wild or exotic bird	Tracheal swab	1	Positive	26.18
227518	10-Dec	Arica y Parinacota	<i>Parabuteo unicinctus</i>	Wild or exotic bird	Cloacal swab	1	Negative	-
227518	10-Dec	Arica y Parinacota	<i>Parabuteo unicinctus</i>	Wild or exotic bird	Tracheal swab	1	Negative	-
227519	12-Dec	Arica y Parinacota	<i>Larosterna inca</i>	Wild or exotic bird	Cloacal swab	1	Positive	30.97
227519	12-Dec	Arica y Parinacota	<i>Larosterna inca</i>	Wild or exotic bird	Tracheal swab	1	Positive	27.26

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227607	12-Dec	Metropolitana	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227608	12-Dec	Metropolitana	Anas georgica	Wild or exotic bird	Cloacal swab	1	Negative	-
227631	12-Dec	Metropolitana	Turdus falcklandii	Wild or exotic bird	Cloacal swab	2	Negative	-
227631	12-Dec	Metropolitana	Turdus falcklandii	Wild or exotic bird	Tracheal swab	2	Negative	-
227648	13-Dec	Maule	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227667	12-Dec	Atacama	Theristicus melanopis	Wild or exotic bird	Tracheal swab	0	Negative	-
227667	12-Dec	Atacama	Theristicus melanopis	Wild or exotic bird	Cloacal swab	0	Negative	-
227667	12-Dec	Atacama	Theristicus melanopis	Wild or exotic bird	Tracheal swab	0	Negative	-
227667	12-Dec	Atacama	Theristicus melanopis	Wild or exotic bird	Cloacal swab	0	Negative	-
227667	12-Dec	Atacama	Theristicus melanopis	Wild or exotic bird	Tissue	0	Negative	-
227667	12-Dec	Atacama	Theristicus melanopis	Wild or exotic bird	Tissue	0	Negative	-
227681	13-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227729	13-Dec	Antofagasta	Pigeon	Wild or exotic bird	Cloacal swab	0	Negative	-
227729	13-Dec	Antofagasta	Pigeon	Wild or exotic bird	Tracheal swab	1	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Cloacal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Cloacal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Cloacal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Cloacal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Cloacal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Tracheal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Tracheal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Tracheal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Tracheal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Tracheal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Tracheal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Tracheal swab	5	Negative	-
227760	13-Dec	Parinacota	Hen	Laying hen	Tracheal swab	5	Negative	-
227817	14-Dec	Maule	ND	Wild or exotic bird	Cloacal swab	0	Negative	-
227818	13-Dec	Metropolitana	Raptor	Wild or exotic bird	Cloacal swab	1	Negative	-
227826	13-Dec	Atacama	Pelican	Wild or exotic bird	Cloacal swab	0	Positive	31.5
227826	13-Dec	Atacama	Pelican	Wild or exotic bird	Tracheal swab	0	Positive	28
227827	13-Dec	Atacama	Coragyps atratus	Wild or exotic bird	Cloacal swab	0	Negative	-
227827	13-Dec	Atacama	Coragyps atratus	Wild or exotic bird	Tracheal swab	0	Negative	-
227837	13-Dec	Tarapaca	ND	Wild or exotic bird	Cloacal swab	1	Positive	36.76
227837	13-Dec	Tarapaca	ND	Wild or exotic bird	Cloacal swab	1	Negative	-

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227840	13-Dec	Tarapaca	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227840	13-Dec	Tarapaca	ND	Wild or exotic bird	Tracheal swab	1	Negative	-
227840	13-Dec	Tarapaca	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227840	13-Dec	Tarapaca	ND	Wild or exotic bird	Tracheal swab	1	Negative	-
227840	13-Dec	Tarapaca	ND	Wild or exotic bird	Cloacal swab	1	Positive	28
227840	13-Dec	Tarapaca	ND	Wild or exotic bird	Tracheal swab	1	Positive	27
227842	13-Dec	Tarapaca	ND	Wild or exotic bird	Cloacal swab	1	Positive	30
227842	13-Dec	Tarapaca	ND	Wild or exotic bird	Tracheal swab	1	Negative	-
227880	14-Dec	Bio-Bio	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227892	14-Dec	Los Rios	Goose	Backyard Goose	Tracheal swab	5	Negative	-
227898	13-Dec	Atacama	Duck	Wild or exotic bird	Tracheal swab	0	Negative	-
227898	13-Dec	Atacama	Duck	Wild or exotic bird	Cloacal swab	0	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Cloacal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Cloacal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Cloacal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Cloacal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Cloacal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Cloacal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Tracheal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Tracheal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Tracheal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Tracheal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Tracheal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Tracheal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Tracheal swab	5	Negative	-
227908	14-Dec	Parinacota Arica y	Hen	Laying hen	Tracheal swab	5	Negative	-
227942	14-Dec	Metropolitana	Zenaida auriculata	Wild or exotic bird	Cloacal swab	0	Negative	-
227955	14-Dec	Metropolitana	Tyto alba	Wild or exotic bird	Cloacal swab	0	Negative	-
227955	14-Dec	Metropolitana	Milvago chimango	Wild or exotic bird	Cloacal swab	2	Negative	-
227955	14-Dec	Metropolitana	Turdus falcklandii	Wild or exotic bird	Cloacal swab	0	Negative	-
227958	14-Dec	Ñuble	Seagull	Wild or exotic bird	Cloacal swab	0	Negative	-
227958	14-Dec	Ñuble	Seagull	Wild or exotic bird	Tracheal swab	0	Negative	-
227968	14-Dec	Metropolitana	Falco sparverius	Wild or exotic bird	Cloacal swab	1	Negative	-
227968	14-Dec	Metropolitana	Zenaida auriculata	Wild or exotic bird	Cloacal swab	6	Negative	-
227974	14-Dec	Bio-Bio	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
227977	14-Dec	Bio-Bio	ND	Wild or exotic bird	Cloacal swab	1	Negative	-

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228023	14-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	4	Negative	-
228035	15-Dec	Valparaiso	Vanellus chilensis	Wild or exotic bird	Tracheal swab	1	Negative	-
228035	15-Dec	Valparaiso	Vanellus chilensis	Wild or exotic bird	Cloacal swab	1	Negative	-
228050	15-Dec	Valparaiso	Hen	Backyard Hen	Tracheal swab	1	Negative	-
228050	15-Dec	Valparaiso	Hen	Backyard Hen	Cloacal swab	1	Negative	-
228050	15-Dec	Valparaiso	Hen	Backyard Hen	Tracheal swab	1	Negative	-
228050	15-Dec	Valparaiso	Hen	Backyard Hen	Cloacal swab	1	Negative	-
228083	15-Dec	Maule	Seagull	Wild or exotic bird	Cloacal swab	2	Negative	-
228083	15-Dec	Maule	Seagull	Wild or exotic bird	Oral swab	2	Negative	-
228161	15-Dec	Metropolitana	Hen	Backyard Hen	Cloacal swab	4	Negative	-
228161	15-Dec	Metropolitana	Hen	Backyard Hen	Cloacal swab	4	Negative	-
228164	16-Dec	Metropolitana	Enicognathus leptorhynchus	Wild or exotic bird	Cloacal swab	5	Negative	-
228164	16-Dec	Metropolitana	Enicognathus leptorhynchus	Wild or exotic bird	Cloacal swab	5	Negative	-
228168	16-Dec	Metropolitana	Platycercus sp	Wild or exotic bird	Cloacal swab	1	Negative	-
228170	16-Dec	Metropolitana	Milvago chimango	Wild or exotic bird	Cloacal swab	1	Negative	-
228181	15-Dec	Parinacota	Hen	Backyard Hen	Tracheal swab	4	Negative	-
228181	15-Dec	Parinacota	Hen	Backyard Hen	Cloacal swab	4	Negative	-
228181	15-Dec	Parinacota	Duck	Commercial Duck	Tracheal swab	5	Negative	-
228181	15-Dec	Parinacota	Duck	Commercial Duck	Cloacal swab	5	Negative	-
228184	15-Dec	Parinacota	Hen	Backyard Hen	Tracheal swab	5	Negative	-
228184	15-Dec	Parinacota	Hen	Backyard Hen	Tracheal swab	4	Negative	-
228184	15-Dec	Parinacota	Hen	Backyard Hen	Cloacal swab	5	Negative	-
228184	15-Dec	Parinacota	Hen	Backyard Hen	Cloacal swab	4	Negative	-
228184	15-Dec	Parinacota	Guineafowl	Backyard Hen	Tracheal swab	1	Negative	-
228184	15-Dec	Parinacota	Guineafowl	Backyard Hen	Cloacal swab	1	Negative	-
228198	15-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
228203	15-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
228204	15-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
228205	16-Dec	O'Higgins	Turkey	Backyard turkey	Cloacal swab	5	Negative	-
228205	16-Dec	O'Higgins	Duck	Breeding Duck	Cloacal swab	5	Negative	-
228208	15-Dec	Metropolitana	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
228208	15-Dec	Metropolitana	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
228208	15-Dec	Metropolitana	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
228209	16-Dec	O'Higgins	Chicken	Commercial Chicken	Tissue	5	Negative	-

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228209	16-Dec	O'Higgins	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-	
228209	16-Dec	O'Higgins	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-	
228223	20-Dec	Los Lagos Arica y	ND	Wild or exotic bird	Cloacal swab	1	Negative	-	
228227	14-Dec	Parinacota Arica y	Leucophaeus modestus	Wild or exotic bird	Tracheal swab	1	Positive		26
228227	14-Dec	Parinacota Arica y	Leucophaeus modestus	Wild or exotic bird	Tracheal swab	1	Positive		20
228228	15-Dec	Parinacota Arica y	Falco sparverius	Wild or exotic bird	Tracheal swab	1	Negative	-	
228228	15-Dec	Parinacota	Falco sparverius	Wild or exotic bird	Cloacal swab	1	Negative	-	
228234	16-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	5	Negative	-	
228234	16-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	3	Negative	-	
228234	16-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	5	Negative	-	
228234	16-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	3	Negative	-	
228235	16-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	3	Negative	-	
228235	16-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	3	Negative	-	
228236	16-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	2	Negative	-	
228236	16-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	2	Negative	-	
228238	16-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	5	Negative	-	
228238	16-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	4	Negative	-	
228238	16-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	5	Negative	-	
228238	16-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	4	Negative	-	
228244	16-Dec	Antofagasta	Pelican	Wild or exotic bird	Tissue	0	Positive		24.31
228244	16-Dec	Antofagasta	Pelican	Wild or exotic bird	Tissue	0	Positive		22
228244	16-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	0	Positive		20.09
228244	16-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	0	Positive		29.52
228244	16-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	0	Positive		20.21
228244	16-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	0	Negative	-	
228244	16-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	0	Positive		20.25
228244	16-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	0	Positive		35
228245	15-Dec	Antofagasta	Vulture	Wild or exotic bird	Tracheal swab	0	Positive		26.1
228245	15-Dec	Antofagasta	Vulture	Wild or exotic bird	Cloacal swab	0	Positive		26.8
228245	15-Dec	Antofagasta	Vulture	Wild or exotic bird	Tracheal swab	3	Negative	-	
228245	15-Dec	Antofagasta	Vulture	Wild or exotic bird	Cloacal swab	3	Positive		29
228245	15-Dec	Antofagasta	Sula variegata	Wild or exotic bird	Tracheal swab	0	Positive		20.7
228245	15-Dec	Antofagasta	Sula variegata	Wild or exotic bird	Cloacal swab	0	Positive		20
228246	15-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	1	Positive		21.94

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228246	15-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	33
228246	15-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	0	Positive	16.93
228246	15-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	0	Positive	34.37
228247	16-Dec	Antofagasta	Hen	Backyard Hen	Tracheal swab	0	Negative	-
228247	16-Dec	Antofagasta	Hen	Backyard Hen	Cloacal swab	0	Negative	-
228247	16-Dec	Antofagasta	Goose	Backyard Goose	Tracheal swab	0	Negative	-
228247	16-Dec	Antofagasta	Goose	Backyard Goose	Cloacal swab	0	Negative	-
228247	16-Dec	Antofagasta	Goose	Backyard Goose	Tracheal swab	0	Negative	-
228247	16-Dec	Antofagasta	Goose	Backyard Goose	Cloacal swab	0	Negative	-
228247	16-Dec	Antofagasta	Duck	Breeding Duck	Tracheal swab	0	Negative	-
228247	16-Dec	Antofagasta	Duck	Breeding Duck	Cloacal swab	0	Negative	-
228248	17-Dec	Antofagasta	Goose	Backyard Goose	Tracheal swab	0	Negative	-
228248	17-Dec	Antofagasta	Goose	Backyard Goose	Cloacal swab	0	Negative	-
228248	17-Dec	Antofagasta	Goose	Backyard Goose	Tissue	0	Negative	-
228252	17-Dec	Antofagasta	Cathartes aura	Wild or exotic bird	Cloacal swab	1	Positive	23
228252	17-Dec	Antofagasta	Cathartes aura	Wild or exotic bird	Tracheal swab	1	Positive	26
228255	17-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	35
228255	17-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	1	Positive	29
228257	17-Dec	La Araucania	Theristicus melanopis	Wild or exotic bird	Cloacal swab	0	Negative	-
228257	17-Dec	La Araucania	Theristicus melanopis	Wild or exotic bird	Tracheal swab	0	Negative	-
228258	14-Dec	La Araucania	Swan	Wild or exotic bird	Cloacal swab	0	Negative	-
228258	14-Dec	La Araucania	Swan	Wild or exotic bird	Tracheal swab	0	Negative	-
228262	17-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	2	Negative	-
228262	17-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	2	Negative	-
228263	17-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	1	Negative	-
228263	17-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	1	Negative	-
228264	17-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	5	Negative	-
228264	17-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	4	Negative	-
228264	17-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	5	Negative	-
228264	17-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	4	Negative	-
228265	17-Dec	Antofagasta	Hen	Backyard Hen	Tracheal swab	0	Negative	-
228265	17-Dec	Antofagasta	Hen	Backyard Hen	Cloacal swab	0	Negative	-
228265	17-Dec	Antofagasta	Hen	Backyard Hen	Tissue	0	Negative	-
228265	17-Dec	Antofagasta	Hen	Backyard Hen	Tracheal swab	0	Negative	-

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228265	17-Dec	Antofagasta	Hen	Backyard Hen	Cloacal swab	0	Negative	-
228265	17-Dec	Antofagasta	Hen	Backyard Hen	Tissue Tracheal	0	Negative	-
228270	18-Dec	Tarapaca	Duck	Breeding Duck	swab	5	Negative	-
228270	18-Dec	Tarapaca	Duck	Breeding Duck	Tracheal swab	4	Negative	-
228270	18-Dec	Tarapaca	Duck	Breeding Duck	Cloacal swab	5	Negative	-
228270	18-Dec	Tarapaca	Duck	Breeding Duck	Cloacal swab	4	Negative	-
228271	18-Dec	Tarapaca	Rooster	Backyard Hen	Tracheal swab	1	Negative	-
228271	18-Dec	Tarapaca	Rooster	Backyard Hen	Cloacal swab	1	Negative	-
228272	18-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	1	Positive	25
228272	18-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	1	Positive	21
228298	16-Dec	Ñuble	Seagull	Wild or exotic bird	Tracheal swab	0	Negative	-
228298	16-Dec	Ñuble	Seagull	Wild or exotic bird	Cloacal swab	0	Negative	-
228298	16-Dec	Ñuble	Seagull	Wild or exotic bird	Tracheal swab	0	Negative	-
228298	16-Dec	Ñuble	Seagull	Wild or exotic bird	Cloacal swab	0	Negative	-
228316	17-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	5	Negative	-
228316	17-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	4	Negative	-
228316	17-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	5	Negative	-
228316	17-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	4	Negative	-
228317	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228317	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228317	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228317	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228317	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228317	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228317	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228318	16-Dec	Antofagasta	Vulture	Wild or exotic bird	Tracheal swab	0	Negative	-
228318	16-Dec	Antofagasta	Vulture	Wild or exotic bird	Cloacal swab	0	Negative	-
228318	16-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	0	Positive	23
228318	16-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	0	Positive	31
228318	16-Dec	Antofagasta	Sula variegata	Wild or exotic bird	Tracheal swab	0	Positive	31
228318	16-Dec	Antofagasta	Sula variegata	Wild or exotic bird	Cloacal swab	0	Negative	-
228324	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228324	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228324	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228324	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-

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228324	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228324	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228325	17-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	5	Negative	-
228325	17-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	4	Negative	-
228325	17-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	5	Negative	-
228325	17-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	4	Negative	-
228328	15-Dec	Los Rios	Hen	Backyard Hen	Tracheal swab	1	Negative	-
228330	18-Dec	Valparaiso	Myiopsitta monachus	Wild or exotic bird	Cloacal swab	1	Negative	-
228330	18-Dec	Valparaiso	Myiopsitta monachus	Wild or exotic bird	Cloacal swab	1	Negative	-
228333	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228333	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228333	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228333	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228333	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228333	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228333	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228334	16-Dec	Valparaiso	ND	Wild or exotic bird	Tracheal swab	1	Negative	-
228334	16-Dec	Valparaiso	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
228335	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228335	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228335	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228335	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228335	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228335	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228335	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228335	16-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228336	18-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
228338	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228338	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228338	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228338	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228338	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228338	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228338	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228340	18-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
228341	17-Dec	Valparaiso	Larus dominicanus	Wild or exotic bird	Tracheal swab	1	Negative	-
228341	17-Dec	Valparaiso	Larus dominicanus	Wild or exotic bird	Cloacal swab	1	Negative	-
228342	18-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	1	Negative	-

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228342	18-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
228345	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228345	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228345	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228345	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228345	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228345	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	5	Negative	-
228350	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	-
228350	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	-
228350	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	-
228350	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	-
228350	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	-
228350	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	-
228350	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	-
228350	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	-
228351	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228351	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228351	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228351	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228351	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228351	17-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	5	Negative	-
228358	16-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	1	Negative	-
228429	19-Dec	Metropolitana	Turdus falcklandii	Wild or exotic bird	Cloacal swab	1	Negative	-
228440	19-Dec	Tarapaca	Cathartes aura	Wild or exotic bird	Tracheal swab	1	Positive	31
228440	19-Dec	Tarapaca	Cathartes aura	Wild or exotic bird	Cloacal swab	1	Positive	34
228442	17-Dec	Aysen	ND	Wild or exotic bird	Cloacal swab	0	Negative	-
228444	19-Dec	Atacama	Pelican	Wild or exotic bird	Cloacal swab	0	Positive	26.5
228444	19-Dec	Atacama	Pelican	Wild or exotic bird	Tracheal swab	0	Positive	34.7
228447	19-Dec	Antofagasta	Hen	Backyard Hen	Cloacal swab	4	Negative	-
228447	19-Dec	Antofagasta	Hen	Backyard Hen	Tracheal swab	4	Negative	-
228448	19-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	5	Negative	-
228448	19-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	3	Negative	-
228448	19-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	5	Negative	-
228448	19-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	3	Negative	-
228449	19-Dec	Antofagasta	Hen	Backyard Hen	Cloacal swab	5	Negative	-
228449	19-Dec	Antofagasta	Hen	Backyard Hen	Tracheal swab	5	Negative	-

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228449	19-Dec	Antofagasta	Hen	Backyard Hen	Cloacal swab	4	Negative	-	
228449	19-Dec	Antofagasta	Hen	Backyard Hen	Tracheal swab	4	Negative	-	
228450	19-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	2	Negative	-	
228450	19-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	2	Negative	-	
228452	19-Dec	Antofagasta	Hen	Backyard Hen	Cloacal swab	5	Negative	-	
228452	19-Dec	Antofagasta	Hen	Backyard Hen	Tracheal swab	5	Negative	-	
228452	19-Dec	Antofagasta	Hen	Backyard Hen	Cloacal swab	5	Negative	-	
228452	19-Dec	Antofagasta	Hen	Backyard Hen	Tracheal swab	5	Negative	-	
228453	19-Dec	Antofagasta	Hen	Backyard Hen	Cloacal swab	5	Negative	-	
228453	19-Dec	Antofagasta	Hen	Backyard Hen	Tracheal swab	5	Negative	-	
228453	19-Dec	Antofagasta	Hen	Backyard Hen	Cloacal swab	5	Negative	-	
228453	19-Dec	Antofagasta	Hen	Backyard Hen	Tracheal swab	5	Negative	-	
228455	19-Dec	Antofagasta	Leucophaeus modestus	Wild or exotic bird	Tracheal swab	1	Negative	-	
228455	19-Dec	Antofagasta	Leucophaeus modestus	Wild or exotic bird	Cloacal swab	1	Negative	-	
228456	19-Dec	Bio-Bio	ND	Wild or exotic bird	Cloacal swab	1	Negative	-	
228456	19-Dec	Bio-Bio	ND	Wild or exotic bird	Tracheal swab	0	Negative	-	
228456	19-Dec	Bio-Bio	Larus dominicanus	Wild or exotic bird	Tissue	0	Negative	-	
228457	19-Dec	Bio-Bio	ND	Wild or exotic bird	Cloacal swab	1	Negative	-	
228457	19-Dec	Bio-Bio	Larus dominicanus	Wild or exotic bird	Tracheal swab	0	Negative	-	
228457	19-Dec	Bio-Bio	Larus dominicanus	Wild or exotic bird	Tissue	0	Negative	-	
228498	19-Dec	Atacama	Pelican	Wild or exotic bird	Cloacal swab	2	Negative	-	
228498	19-Dec	Atacama	Pelican	Wild or exotic bird	Tracheal swab	2	Negative	-	
228500	19-Dec	Atacama	Pelican	Wild or exotic bird	Cloacal swab	0	Negative	-	
228500	19-Dec	Atacama	Pelican	Wild or exotic bird	Tracheal swab	0	Negative	-	
228525	19-Dec	Antofagasta	Larus belcheri	Wild or exotic bird	Cloacal swab	1	Positive		25
228525	19-Dec	Antofagasta	Larus belcheri	Wild or exotic bird	Tracheal swab	1	Positive		25
228561	20-Dec	Coquimbo	ND	Wild or exotic bird	Cloacal swab	2	Negative	-	
228565	19-Dec	Atacama	Pigeon	Wild or exotic bird	Cloacal swab	2	Negative	-	
228565	19-Dec	Atacama	Pigeon	Wild or exotic bird	Tracheal swab	2	Negative	-	
228571	18-Dec	Parinacota	Oceanites oceanicus	Wild or exotic bird	Cloacal swab	2	Negative	-	
228571	18-Dec	Parinacota	Oceanites oceanicus	Wild or exotic bird	Tracheal swab	2	Negative	-	
228576	20-Dec	Antofagasta	Cathartes aura	Wild or exotic bird	Cloacal swab	1	Positive		30
228576	20-Dec	Antofagasta	Cathartes aura	Wild or exotic bird	Cloacal swab	1	Positive		27
228576	20-Dec	Antofagasta	Cathartes aura	Wild or exotic bird	Cloacal swab	1	Positive		33

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228688	20-Dec	Maule	Larus dominicanus	Wild or exotic bird	Tracheal swab	5	Negative	-	
228695	20-Dec	Maule	ND	Wild or exotic bird	Tracheal swab	1	Negative	-	
228695	20-Dec	Maule	ND	Wild or exotic bird	Tracheal swab	1	Negative	-	
228695	20-Dec	Maule	ND	Wild or exotic bird	Tracheal swab	1	Negative	-	
228695	20-Dec	Maule	ND	Wild or exotic bird	Cloacal swab	1	Negative	-	
228695	20-Dec	Maule	ND	Wild or exotic bird	Cloacal swab	1	Negative	-	
228696	20-Dec	Metropolitana	Milvago chimango	Wild or exotic bird	Cloacal swab	5	Negative	-	
228696	20-Dec	Metropolitana	Bubo magellanicus	Wild or exotic bird	Cloacal swab	1	Negative	-	
228696	20-Dec	Metropolitana	Falco sparverius	Wild or exotic bird	Cloacal swab	5	Negative	-	
228696	20-Dec	Metropolitana	Glaucidium nanum	Wild or exotic bird	Cloacal swab	5	Negative	-	
228705	20-Dec	Antofagasta	Nycticorax nycticorax	Wild or exotic bird	Cloacal swab	1	Positive		36
228705	20-Dec	Antofagasta	Cathartes aura	Wild or exotic bird	Cloacal swab	1	Positive		34
228705	20-Dec	Antofagasta	Nycticorax nycticorax	Wild or exotic bird	Tracheal swab	1	Positive		36.6
228705	20-Dec	Antofagasta	Cathartes aura	Wild or exotic bird	Tracheal swab	1	Positive		28
228720	20-Dec	Atacama	Plover	Wild or exotic bird	Cloacal swab	0	Negative	-	
228720	20-Dec	Atacama	Plover	Wild or exotic bird	Tracheal swab	0	Negative	-	
228726	20-Dec	Ñuble	Seagull	Wild or exotic bird	Tracheal swab	1	Negative	-	
228726	20-Dec	Ñuble	Seagull	Wild or exotic bird	Cloacal swab	1	Negative	-	
228726	20-Dec	Ñuble	Seagull	Wild or exotic bird	Cloacal swab	1	Negative	-	
228765	21-Dec	Valparaiso	ND	Wild or exotic bird	Tracheal swab	0	Negative	-	
228765	21-Dec	Valparaiso	ND	Wild or exotic bird	Cloacal swab	0	Negative	-	
228769	20-Dec	Valparaiso	ND	Wild or exotic bird	Tracheal swab	1	Negative	-	
228769	20-Dec	Valparaiso	ND	Wild or exotic bird	Tracheal swab	1	Negative	-	
228784	21-Dec	Valparaiso	Larus dominicanus	Wild or exotic bird	Tracheal swab	1	Negative	-	
228784	21-Dec	Valparaiso	Larus dominicanus	Wild or exotic bird	Cloacal swab	1	Negative	-	
228804	20-Dec	La Araucania	Hen	Backyard Hen	Cloacal swab	0	Negative	-	
228804	20-Dec	La Araucania	Hen	Backyard Hen	Tracheal swab	0	Negative	-	
228804	20-Dec	La Araucania	Hen	Backyard Hen	Cloacal swab	0	Negative	-	
228804	20-Dec	La Araucania	Hen	Backyard Hen	Tracheal swab	0	Negative	-	
228806	21-Dec	Coquimbo	Pelican	Wild or exotic bird	Cloacal swab	1	Negative	-	
228815	21-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	5	Negative	-	
228815	21-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	4	Negative	-	
228815	21-Dec	Tarapaca	Duck	Breeding Duck	Cloacal swab	4	Negative	-	
228815	21-Dec	Tarapaca	Duck	Breeding Duck	Cloacal swab	5	Negative	-	

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228815	21-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	5	Negative	-	
228815	21-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	4	Negative	-	
228815	21-Dec	Tarapaca	Duck	Breeding Duck	Tracheal swab	5	Negative	-	
228815	21-Dec	Tarapaca	Duck	Breeding Duck	Tracheal swab	4	Negative	-	
228817	21-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	3	Negative	-	
228817	21-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	3	Negative	-	
228819	21-Dec	Tarapaca	Hen	Backyard Hen	Cloacal swab	1	Negative	-	
228819	21-Dec	Tarapaca	Hen	Backyard Hen	Tracheal swab	1	Negative	-	
228824	21-Dec	Los Lagos	Milvago chimango	Wild or exotic bird	Cloacal swab	1	Negative	-	
228824	21-Dec	Los Lagos	Theristicus melanopis	Wild or exotic bird	Cloacal swab	0	Negative	-	
228825	21-Dec	O'Higgins	Chroicocephalus maculipennis	Wild or exotic bird	Cloacal swab	3	Negative	-	
228825	21-Dec	O'Higgins	Leucophaeus pipixcan	Wild or exotic bird	Cloacal swab	5	Negative	-	
228827	21-Dec	La Araucania	Hen	Backyard Hen	Cloacal swab	0	Negative	-	
228827	21-Dec	La Araucania	Hen	Backyard Hen	Tracheal swab	0	Negative	-	
228827	21-Dec	La Araucania	Hen	Backyard Hen	Cloacal swab	0	Negative	-	
228827	21-Dec	La Araucania	Hen	Backyard Hen	Tracheal swab	0	Negative	-	
228827	21-Dec	La Araucania	Hen	Backyard Hen	Cloacal swab	0	Negative	-	
228827	21-Dec	La Araucania	Hen	Backyard Hen	Tracheal swab	0	Negative	-	
228832	21-Dec	Valparaiso	Larus dominicanus	Wild or exotic bird	Tracheal swab	1	Negative	-	
228832	21-Dec	Valparaiso	Larus dominicanus	Wild or exotic bird	Cloacal swab	1	Negative	-	
228833	21-Dec	Antofagasta	Pelican	Wild or exotic bird	Cloacal swab	1	Positive		30
228833	21-Dec	Antofagasta	Pelican	Wild or exotic bird	Tracheal swab	1	Positive		21
228834	21-Dec	Metropolitana	Tyto alba	Wild or exotic bird	Cloacal swab	4	Negative	-	
228835	21-Dec	La Araucania	Goose	Backyard Goose	Tracheal swab	2	Negative	-	
228835	21-Dec	La Araucania	Goose	Backyard Goose	Cloacal swab	2	Negative	-	
228836	21-Dec	La Araucania	Hen	Backyard Hen	Tracheal swab	0	Negative	-	
228836	21-Dec	La Araucania	Hen	Backyard Hen	Cloacal swab	0	Negative	-	
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative		
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative		
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative		
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative		
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative		
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative		
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative		
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative		

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228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228852	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228854	21-Dec	Arica y Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228858	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	5	Negative	-
228858	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	4	Negative	-
228858	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	5	Negative	-
228858	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	4	Negative	-
228860	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	5	Negative	-
228860	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	4	Negative	-
228860	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	5	Negative	-
228860	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	4	Negative	-
228862	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	5	Negative	-
228862	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	4	Negative	-
228862	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	5	Negative	-
228862	21-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	4	Negative	-
228868	20-Dec	Los Lagos	ND	Wild or exotic bird	Cloacal swab	0	Negative	-
228868	20-Dec	Los Lagos	ND	Wild or exotic bird	Tracheal swab	0	Negative	-
228906	22-Dec	Coquimbo	Chicken	Commercial Chicken	Cloacal swab	2	Negative	-
228906	22-Dec	Coquimbo	Chicken	Commercial Chicken	Tracheal swab	2	Negative	-
228911	20-Dec	Coquimbo	Seagull	Wild or exotic bird	Cloacal swab	1	Negative	-

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228919	20-Dec	Coquimbo	Seagull	Wild or exotic bird	Cloacal swab	1	Negative	-
228933	21-Dec	Ñuble	Seagull	Wild or exotic bird	Tracheal swab	1	Negative	-
228933	21-Dec	Ñuble	Seagull	Wild or exotic bird	Cloacal swab	1	Negative	-
228938	21-Dec	Coquimbo	Seagull	Wild or exotic bird	Cloacal swab	1	Negative	-
228949	21-Dec	Coquimbo	Seagull	Wild or exotic bird	Cloacal swab	1	Negative	-
228963	21-Dec	Coquimbo	Seagull	Wild or exotic bird	Cloacal swab	1	Negative	-
228969	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228969	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228969	22-Dec	Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228969	22-Dec	Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228969	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228969	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228969	22-Dec	Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228969	22-Dec	Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228969	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228972	21-Dec	Coquimbo	Seagull	Wild or exotic bird	Cloacal swab	1	Negative	-
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Tracheal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228974	22-Dec	Parinacota	Chicken	Commercial Chicken	Cloacal swab	0	Negative	
228978	21-Dec	Coquimbo	Seagull	Wild or exotic bird	Cloacal swab	2	Negative	-
228981	21-Dec	Coquimbo	Seagull	Wild or exotic bird	Cloacal swab	1	Negative	-
229009	22-Dec	O'Higgins	ND	Wild or exotic bird	Tracheal swab	3	Negative	-
229009	22-Dec	O'Higgins	ND	Wild or exotic bird	Cloacal swab	3	Negative	-
229098	22-Dec	Parinacota	Hen	Backyard Hen	Tracheal swab	5	Negative	-
229098	22-Dec	Parinacota	Hen	Backyard Hen	Tracheal swab	4	Negative	-
229098	22-Dec	Parinacota	Hen	Backyard Hen	Cloacal swab	5	Negative	-

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229098	22-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	4	Negative	-
229100	22-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	5	Negative	-
229100	22-Dec	Arica y Parinacota	Hen	Backyard Hen	Tracheal swab	4	Negative	-
229100	22-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	5	Negative	-
229100	22-Dec	Arica y Parinacota	Hen	Backyard Hen	Cloacal swab	4	Negative	-

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164 **Appendix Table 2.** Featured mutations found in HPAI H5N1 Chilean viral strains sequenced in
165 this study compared to representative strains included in the phylogenetic analyses from other
166 countries.

Segment	Nucleotide	Synonymous	Amino acid	Comments
HA	T392A	No	L131Q	Unique for the cluster containing Chilean strains
	C549T	Yes		Unique for the cluster containing Chilean strains
	G1686A	Yes		Unique for the cluster containing Chilean strains
NA	T805A	No	L269M	Unique for the cluster containing Chilean strains
	T1015C	No		Unique for the cluster containing Chilean strains
	C444A	Yes		Unique for the cluster containing Chilean strains
	G696T	Yes		Unique for the cluster containing Chilean strains
M	A254G	No	N85S	Unique for the cluster containing Chilean strains
	A260C	No		Unique for Peruvian and Chilean strains
	G333T	Yes		Unique for Peruvian and Chilean strains
PB2	A1846G	No	I616V	Unique for the cluster containing Chilean strains
	C2035T	No		Unique for A/Pelican/Chile/226955-1/2022(H5N1)
	A1155T	Yes		Unique for Chilean strains
	A1846G	Yes		Unique for the cluster containing Chilean strains
PB1	C1132A	No	L378M	Unique for Peruvian and Chilean strains
	G1196A	No		Unique for Peruvian and Chilean strains
	T1542C	No		Unique for Chilean strains except A/Pelican/Chile/226924-1/2022(H5N1) and A/Seagull/Chile/227023-3/2022(H5N1)
PA	G170A	No	R53Q	Unique for South American strains
NS1	T346A	No	C116S	Unique for Peruvian and Chilean strains
	C668A	No		Unique for the cluster containing Chilean strains
	G721T	No		Unique for Peruvian and Chilean strains
NP	T688C	No	F230L	Unique for Peruvian and Chilean strains
	C1317T	Yes		Unique for Peruvian and Chilean strains

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Appendix Figure 1. Distribution of samples tested for avian influenza virus and affected pelicans are shown, Chile, December 22, 2022.

Appendix Figure 2. Maximum likelihood tree depicting the phylogeny of PB1 from isolates of H5N1 subtype 2.3.4.4b H5 clade. The Chilean-Peruvian subcluster is highlighted in red, the North American in blue, and other reference sequences in black.

Appendix Figure 3. Maximum likelihood tree depicting the phylogeny of PB2 from isolates of H5N1 subtype 2.3.4.4b H5 clade. The Chilean-Peruvian subcluster is highlighted in red, the North American in blue, and other reference sequences in black.

Appendix Figure 4. Maximum likelihood tree depicting the phylogeny of PA from isolates of H5N1 subtype 2.3.4.4b H5 clade. The Chilean-Peruvian subcluster is highlighted in red, the Venezuelan strains in green, Ecuadorian in pink, the North American in blue, and other reference sequences in black.

Appendix Figure 5. Maximum likelihood tree depicting the phylogeny of NP from isolates of H5N1 subtype 2.3.4.4b H5 clade. The Chilean-Peruvian subcluster is highlighted in red, the North American in blue, and other reference sequences in black.

Appendix Figure 6. Maximum likelihood tree depicting the phylogeny of M from isolates of H5N1 subtype 2.3.4.4b H5 clade. The Chilean-Peruvian subcluster is highlighted in red, the Venezuelan strains in green, the North American in blue, and other reference sequences in black.

Appendix Figure 7. Maximum likelihood tree depicting the phylogeny of NS from isolates of H5N1 subtype 2.3.4.4b H5 clade. The Chilean-Peruvian subcluster is highlighted in red, the North American in blue, and other reference sequences in black.



