

Report prepared for the WHO Consultation on the Composition of Influenza Virus Vaccines for the Southern Hemisphere 2024

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Influenza Epidemiology in the WHO European Region The epidemiological section of this report was prepared using data reported to the European Surveillance System (TESSy) and presented in Flu News Europe (<http://www.flunewseurope.org>) the joint ECDC-WHO Europe weekly influenza update.

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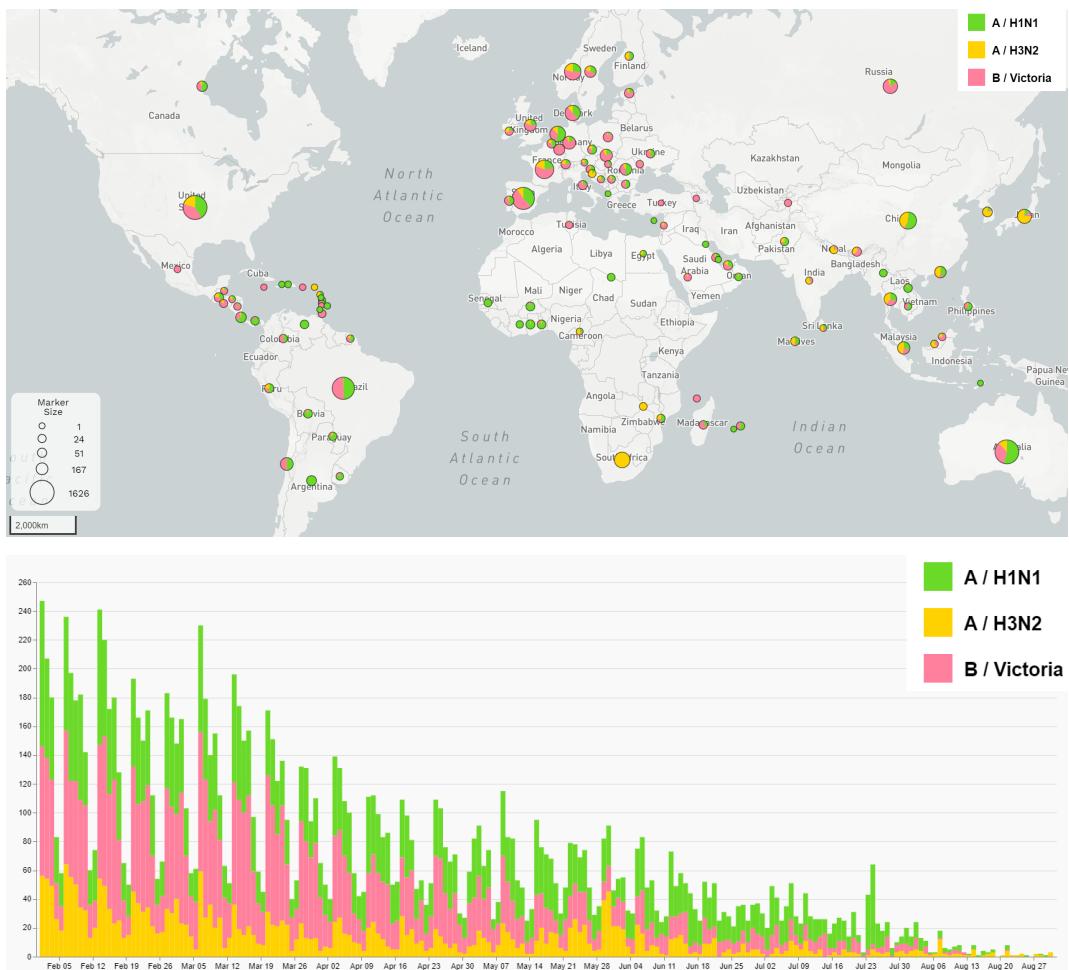
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Global influenza activity

Microreact: Influenza by type/subtype

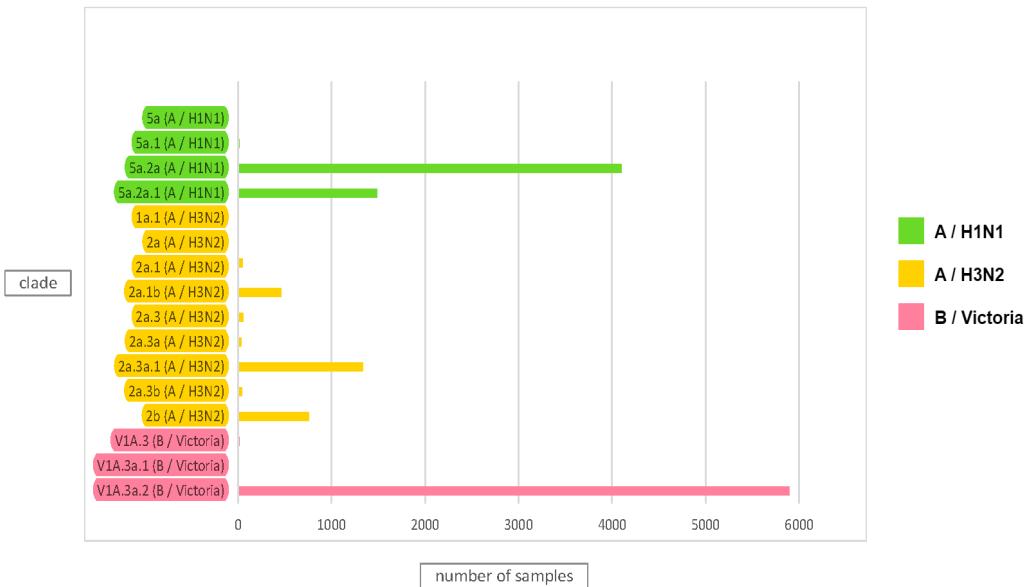
MicroReact map for influenza viruses with collection dates from 1st February 2023 onwards as deposited in GISAID, coloured by Type/subtype and downloaded on 15th September 2023. Geographic markers scaled to detection proportions. Full length HA.



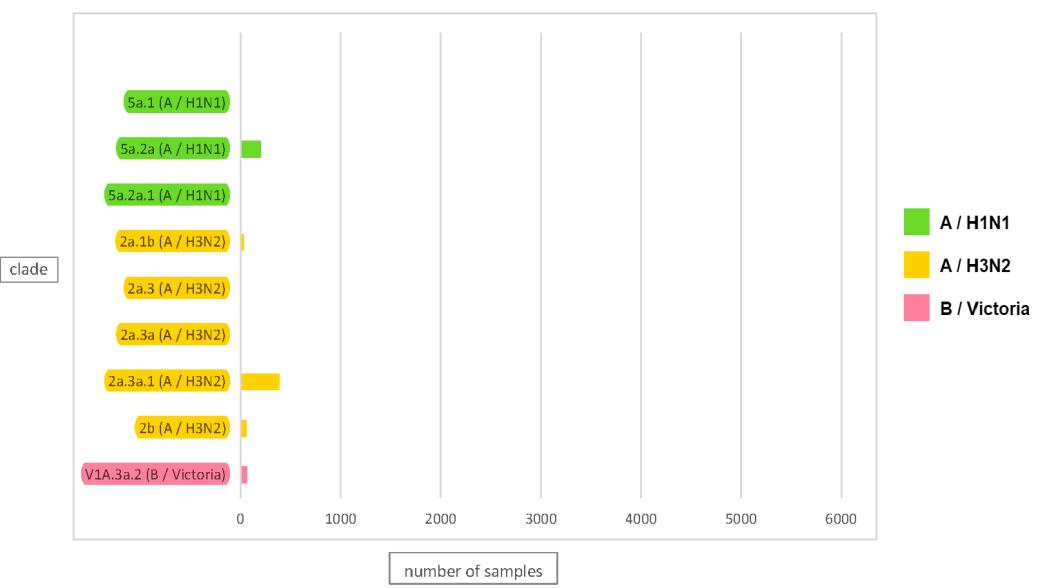
Regional influenza activity

Genetic diversity by Type/Lineage and group

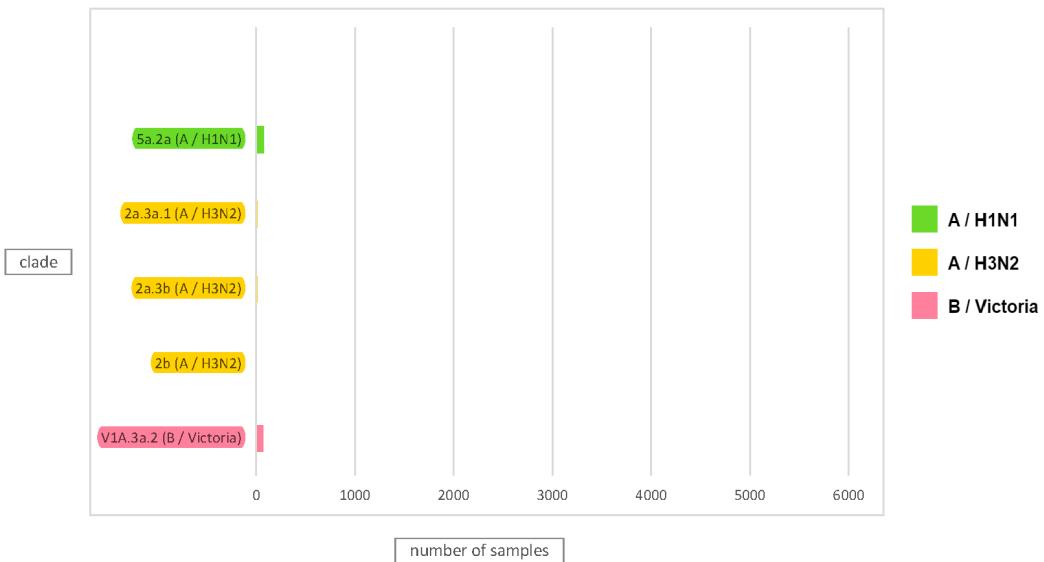
Genetic diversity of global samples



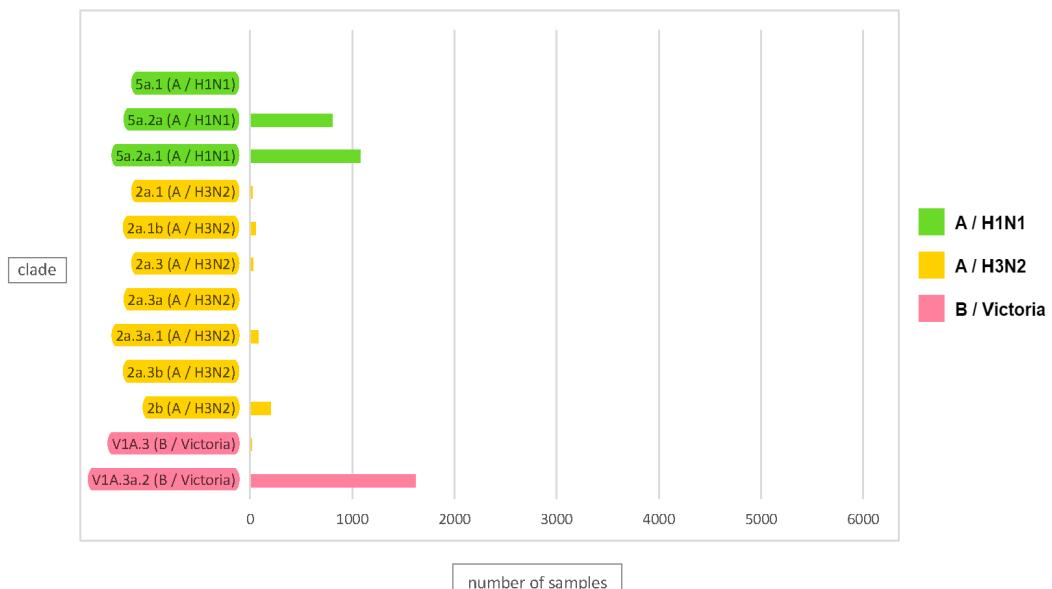
Genetic diversity of samples by region (Africa)



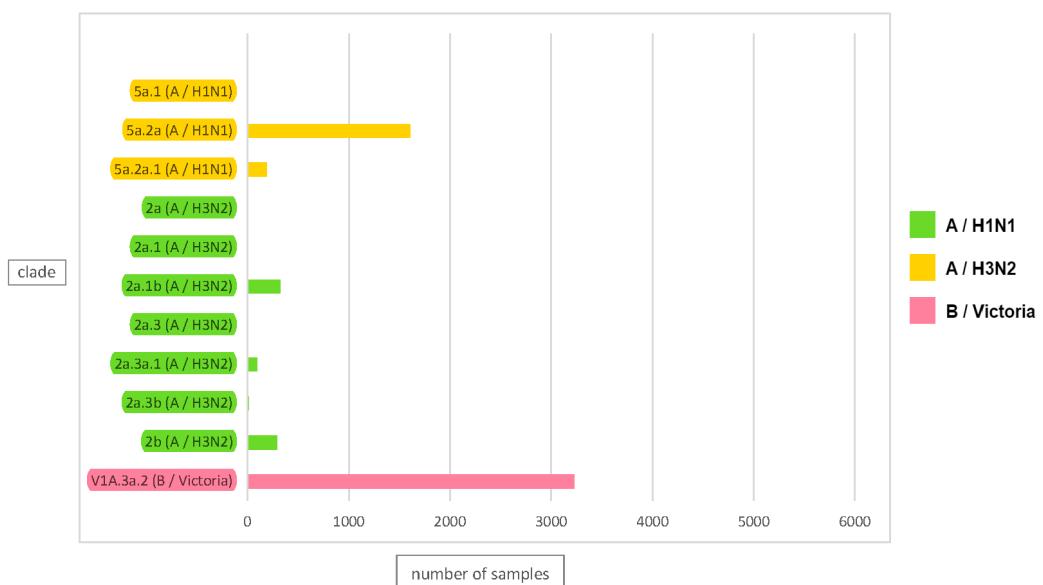
Genetic diversity of samples by region (Eastern Mediterranean)



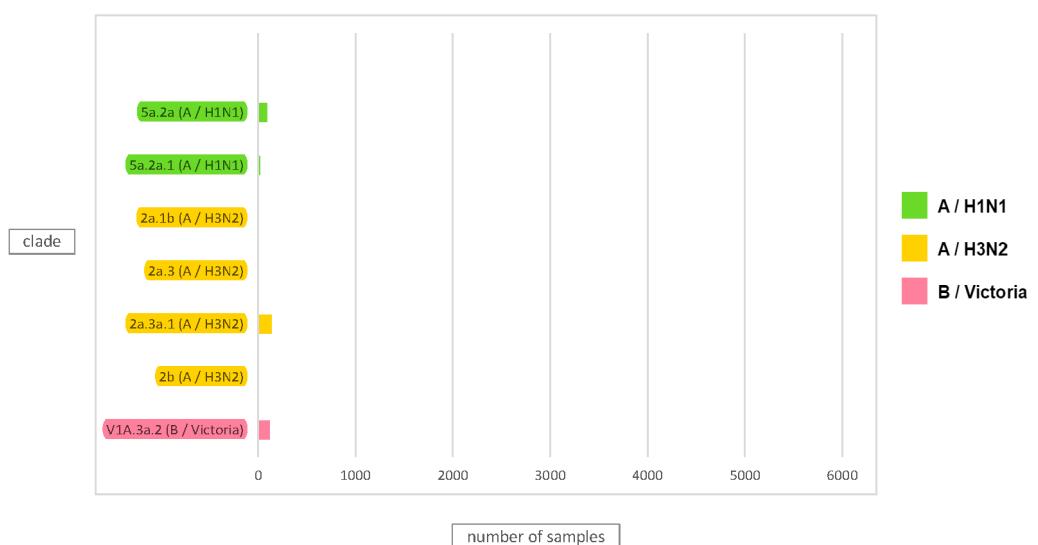
Genetic diversity of samples by region (Americas)



Genetic diversity of samples by region (Europe)



Genetic diversity of samples by region (South-East Asia)



Genetic diversity of samples by region (Western Pacific)

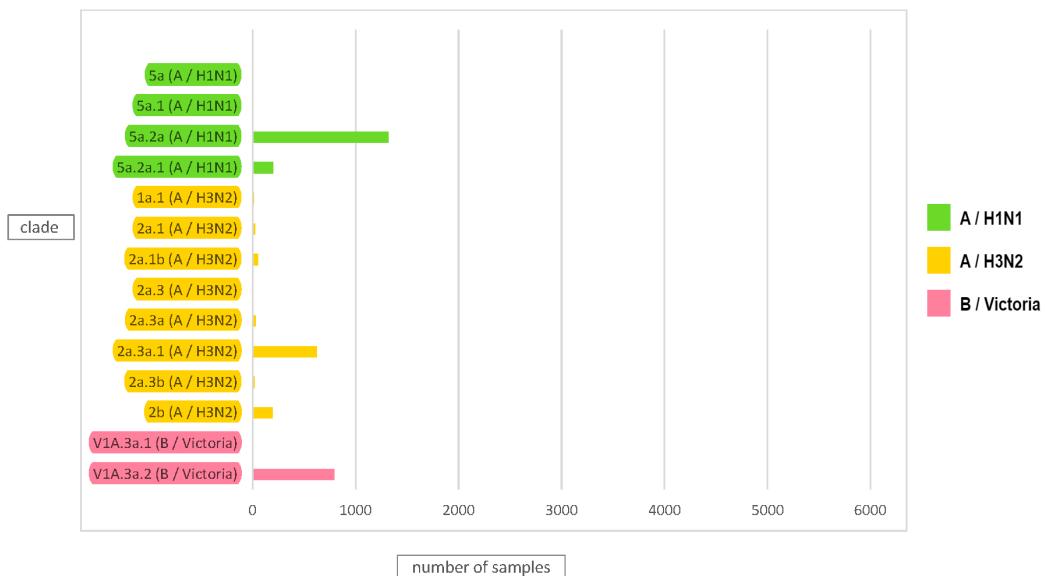


Table of shipments to the WIC

country	#samples received	A	B	BV	H1pdm
Algeria	9			2	2
Argentina	28	1			27
Armenia	20			6	13
Belgium	149	1	1	61	3
Bosnia and Herzegovina	19			7	4
Bulgaria	61			18	32
Cameroon	17		3	2	6
Cyprus	61			8	19
Egypt	25		4	1	9
Estonia	197			66	49
France	88			30	30
Germany	58			22	18
Ghana	40				35
Greece	29	1		3	5
Hong Kong	45			5	20
Hungary	19		1	6	8
Ireland	40			20	10
Italy	26			13	7
Kosovo	60	10	5	15	29
Kyrgyzstan	36			16	18
Latvia	20			3	7
Macedonia	22			1	8
Madagascar	42		4	26	12
Mauritius	100		2	15	69
Moldova	20			14	3
Morocco	39			19	14
Netherlands	72			24	14
Norway	32			11	9
Oman	26			3	22
Palestinian Territory	40		1	12	25
Poland	112		25	70	7
Portugal	40			17	21
Romania	37			28	8
Saudi Arabia	29			17	8
Senegal	16	3		1	11
Serbia	37		7	10	12
Slovakia	30			22	3
Slovenia	118		3	59	44
South Africa	54			2	
South Sudan	23				
Spain	168		12	59	33
Sweden	54			23	19
Switzerland	30			13	8
Tajikistan	47		7	18	22
Tunisia	95		3	52	26
Ukraine	39	1	5	11	20
United Kingdom	61		7	23	17
TOTALS	2430	17	90	854	786

Epidemiology

Summary of influenza activity in the WHO European Region, October 2022 - August 2023

Distribution of viruses

Between weeks 40/2022 and 32/2023, a total of 292,998 influenza detections from sentinel and non-sentinel primary care sources were reported to the European Surveillance System (TESSy) from countries and areas in the Region (Table E1). This is compared to 136,661 detections for the same period in 2021-2022 (Table E1), representing a 114% increase, or over a doubling in detections. However, this increase occurred in the context of a 6% decrease in the number of specimens tested in 2022-2023 compared to 2021-2022 (2,659,846 and 2,825,837 specimens, respectively) (Table E1).

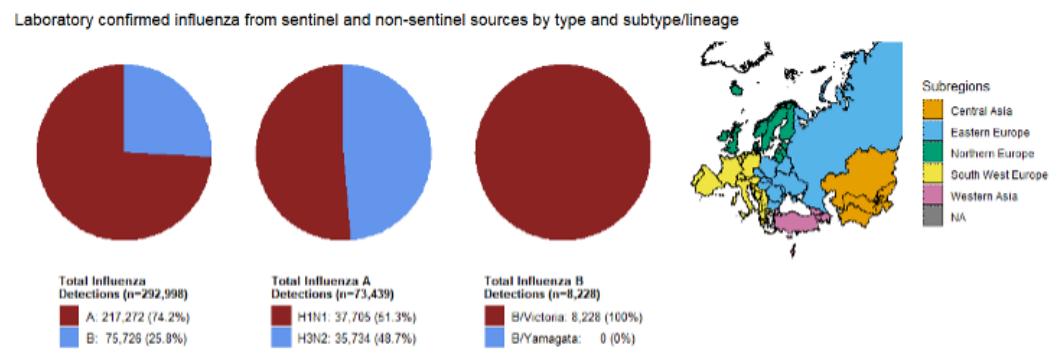
Table E1. 2022-2023 Influenza Season in the WHO European Region: weeks 40/2022-32/2023

Virus type/subtype/lineage	Cumulative number of detections for weeks 40/2022-32/2023				Cumulative number of detections for weeks 40/2020-32/2021			
	Sentinel sources	Non-sentinel sources	Totals	%	Sentinel sources	Non-sentinel sources	Totals	%
Influenza A	19,616	197,656	217,272	74.2	6,545	127,405	133,950	98
A(H1N1)pdm09	5,803	31,902	37,705	51.3	401	2,767	3,168	8.9
A(H3N2)	10,101	25,633	35,734	48.7	4,997	27,243	32,240	91.1
A not subtyped	3,712	140,121	143,833		1,147	97,395	98,542	
Influenza B	8,686	67,040	75,726	25.8	126	2,585	2,711	2
Victoria lineage	2,664	5,564	8,228	100	32	133	165	98.8
Yamagata lineage	0	0	0	0	0	2	2	1.2
Lineage not ascribed	6,022	61,476	67,498		94	2,450	2,544	
Total detections	28,302	264,696	292,998		6,671	129,990	136,661	
Total tested	144,663	2,515,183	2,659,846		62,689	2,763,148	2,825,837	

* Percentages are shown for total detections (types A & B [in bold type], and for viruses ascribed to influenza A subtype and influenza B lineage). Ratios are given for type A:B [in bold type], A(H3N2):A(H1N1)pdm09 and Victoria:Yamagata lineages.

Combined reports of sentinel and non-sentinel data for influenza virus detections in the Region showed that most viruses detected were type A (74% compared to 26% type B) (Table E1). This was generally consistent across the Region with all subregions detecting at least 73% type A, except for central Asia where there was a higher proportion of type B viruses (60%) (Table E2-A). Combined reports of sentinel and non-sentinel data for influenza type A viruses showed nearly equal proportion of the two subtypes: 51% were A(H1N1)pdm09 viruses and 49% were A(H3N2) viruses (Table E1). This was consistent with the observed distributions in northern Europe and west Asia. However, in central Asia and eastern Europe influenza A(H1N1)pdm09 viruses dominated (95% for central Asia and 89% for eastern Europe) and in south-west Europe and western Europe influenza A(H3N2) viruses dominated (66% for south-west Europe and 77% for western Europe) (Table E2-A). Of 8,228 type B viruses ascribed to a lineage, all were B/Victoria and no B/Yamagata lineage viruses were detected. The B/Yamagata viruses sporadically detected and reported by different countries have been further investigated and were proven to be LAIV related detections. When the analysis was restricted to sentinel data only for weeks 40/2022 to 32/2023, the regional distribution of influenza virus type was similar: of 28,302 specimens testing positive for influenza, the majority were type A (69%). Of type A viruses, the majority were A(H3N2) subtype (64%) and of the type B viruses ascribed to a lineage, all were B/Victoria (Table E2-B). This was consistent with the distribution observed in south-west Europe and western Europe (68% and 85% influenza A(H3N2) viruses, respectively). In central Asia, influenza A(H1N1)pdm09 viruses dominated (93%) and similar proportions of influenza subtypes were observed in eastern Europe, northern Europe and west Asia. All subregions reported at least 21% type B viruses: central Asia (48%), south-west Europe (34%), western Europe (33%), eastern Europe (30%), west Asia (25%) and northern Europe (21%). Of the total sentinel detections, 9,954 (35%) were from south-west Europe and 5,823 (21%) were from western-Europe (Table E2-B).

Table E2. Distribution of Influenza Detections in the WHO European Region, weeks 40/2022-32/2023



A. Laboratory confirmed influenza from sentinel and non-sentinel sources by geographic sub-region and influenza type and subtype/lineage

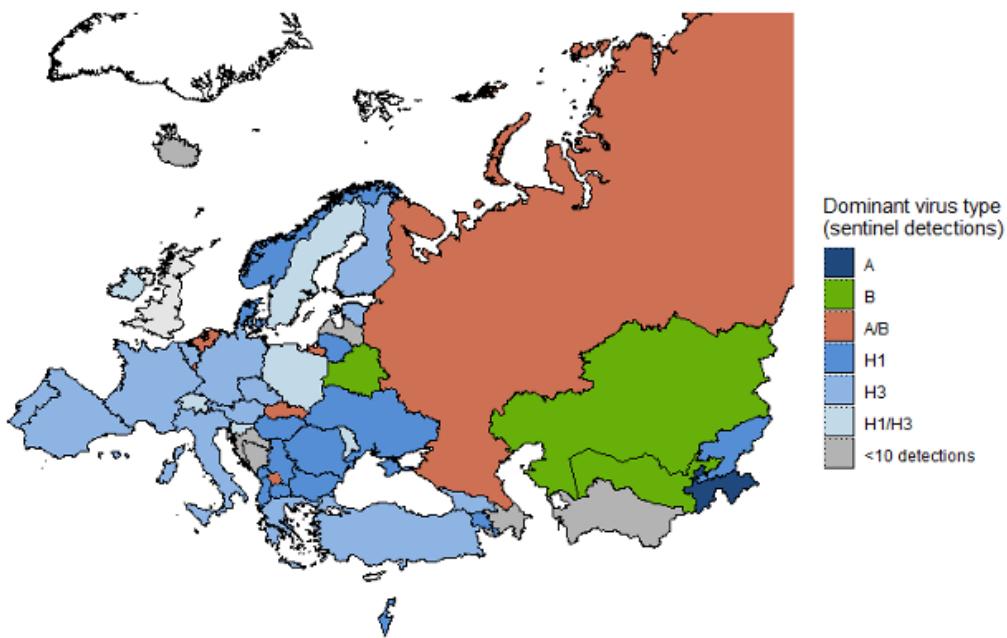
Influenza type	South West Europe	Western Europe	Eastern Europe	Northern Europe	West Asia	Central Asia	WHO European Region
Influenza A	36,756 (78%)	62,566 (74%)	39,136 (73%)	75,251 (73%)	2,704 (77%)	859 (40%)	217,272 (74%)
Influenza A subtyped	17,715	12,581	18,916	21,342	2,283	602	73,439
A(H1N1)pdm09	5,970 (34%)	2,870 (23%)	16,867 (89%)	10,174 (48%)	1,251 (55%)	573 (95%)	37,705 (51%)
A(H3N2)	11,745 (66%)	9,711 (77%)	2,049 (11%)	11,168 (52%)	1,032 (45%)	29 (5%)	35,734 (49%)
Influenza B	10,230 (22%)	21,758 (26%)	14,158 (27%)	27,456 (27%)	822 (23%)	1,302 (60%)	75,726 (26%)
Influenza B lineage determined	1,517	1,633	529	4,018	242	289	8,228
B/Yamagata-lineage	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
B/Victoria-lineage	1,517 (100%)	1,633 (100%)	529 (100%)	4,018 (100%)	242 (100%)	289 (100%)	8,228 (100%)
Total	46,986	84,324	53,294	102,707	3,526	2,161	292,998

B. Laboratory confirmed influenza from sentinel sources by geographic sub-region and influenza type and subtype/lineage

Influenza type	South West Europe	Western Europe	Eastern Europe	Northern Europe	West Asia	Central Asia	WHO European Region
Influenza A	6,604 (66%)	3,887 (67%)	3,390 (70%)	3,468 (79%)	1,811 (75%)	456 (52%)	19,616 (69%)
Influenza A subtyped	5,438	3,768	1,681	3,106	1,635	276	15,904
A(H1N1)pdm09	1,751 (32%)	566 (15%)	992 (59%)	1,438 (46%)	799 (49%)	257 (93%)	5,803 (36%)
A(H3N2)	3,687 (68%)	3,202 (85%)	689 (41%)	1,668 (54%)	836 (51%)	19 (7%)	10,101 (64%)
Influenza B	3,350 (34%)	1,936 (33%)	1,450 (30%)	913 (21%)	610 (25%)	427 (48%)	8,686 (31%)
Influenza B lineage determined	527	1,116	326	317	236	142	2,664
B/Yamagata-lineage	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
B/Victoria-lineage	527 (100%)	1,116 (100%)	326 (100%)	317 (100%)	236 (100%)	142 (100%)	2,664 (100%)
Total	9,954	5,823	4,840	4,381	2,421	883	28,302

A dominant virus (sub)type (comprising at least 60% of influenza virus detections from sentinel sources) could be assigned by 46 countries and areas within the Region, with six (Azerbaijan, Bosnia and Herzegovina, Croatia, Iceland, Latvia and Turkmenistan) considered as having insufficient numbers of detections (ten or fewer) for a robust dominance calculation. Thirty-eight countries and areas reported predominance of influenza type A viruses, while three (Belarus, Kazakhstan and Uzbekistan), reported predominance of influenza type B viruses and five (Luxembourg, Netherlands, Russian Federation, Slovakia and Kosovo) reported co-dominance of type A and type B viruses (Figure E1). In Tajikistan dominance of type A without a known subtype was observed, and 37 had dominance or co-dominance (between 41% and 59%) of influenza A virus subtypes ascribed for the season: 16 reported A(H3N2) dominance, 15 reported A(H1N1)pdm09 dominance and six (Ireland, Poland, Republic of Moldova, Slovenia, Sweden and Switzerland) reported co-dominance of A(H1N1)pdm09 and A(H3N2) viruses (Figure E1). Between weeks 20 and 32/2023, a total of 2,165 influenza detections from sentinel and non-sentinel primary care sources were reported to TESSy, of which, 1,224 (57%) were A viruses (80% were A(H1N1)pdm09 and 20% were A(H3N2)). All Influenza B viruses assigned to a lineage (n=153) were B/Victoria.

Figure E1. Influenza virus dominance³ in the WHO European Region by (sub)type and Country, territory or area, 2022-2023 season



³ Dominance of (sub)type is based on at least 60% of detections and co-dominance is based on between 41% and 59% of detections. Calculations are only considered valid if at least 10 viruses were detected.

Timing and spread

Historically, a threshold of 10% of influenza-like illness (ILI) or acute respiratory infection (ARI) specimens from sentinel primary care sites testing positive for influenza viruses for two consecutive weeks has been used to indicate the start of the influenza season in the Region. During the 2022-2023 season (weeks 40/2022 to 20/2023 representing the period in most seasons when influenza detections can be at or above the 10% threshold), the initial increase in influenza activity above the 10% threshold in the Region occurred in week 45/2022 (Figures E1-A and B). This was an earlier start of increased activity compared with recent seasons (between weeks 46 to 49 for the 2016-2017 to 2021-2022 seasons; Figures E2-A/B). The proportion of specimens testing positive for influenza on a weekly basis reached a peak for the season of 40% in week 51/2022, which is lower than peaks in most recent pre-pandemic seasons (between 53 and 60% in the 2016-2017 to 2019-2020 seasons, but higher than the 2021-2022 season). Following the peak, influenza activity initially decreased at the Regional level until week 4/2023 when it reached 21% positivity, then increased again and subsequently fluctuated around 25% positivity between weeks 6 and 11/2023 before decreasing below 10% positivity in week 16/2023. In total, activity in which greater than or equal to 10% of sentinel specimens tested positive for influenza lasted for 23 consecutive weeks, compared to an average of 20.8 weeks (range: 18-25 weeks) for the previous seasons (2016-2017 to 2019-2020), before falling below 10% in week 16/2023 (Figures E2-A/B). The proportion of subtyped influenza viruses that were A(H1N1)pdm09 increased over the course of season and there was also an increase in numbers of influenza type B virus detections (Figure E2-B). While a similar increase in influenza type B viruses was also observed later in the season with non-sentinel source detection data, there were similar proportions of influenza A virus subtypes over the season with these data (Figure E2-C). SARS-CoV-2 and Respiratory Syncytial Virus (RSV) co-circulated with influenza between weeks 40/2022 and 20/2023. The SARS-CoV-2 test positivity from sentinel specimens peaked at 13% in week 12/2023 but did not go below 7% over this period. The RSV test positivity peaked at 17% in week 47/2022 before returning to low levels (Figure E3). Based on weekly reporting of the intensity of influenza activity by each of the countries and areas, there was no apparent geographical pattern to initial sustained increases in activity across the Region (Figure E4). Over the season, a total of 49 countries and

areas reported activity above their calculated baselines, with 41 having reported medium or higher activity in some weeks. A total of nine countries reported very high intensity in some weeks (Austria, Finland, France, Latvia, Lithuania, Luxembourg, Republic of Moldova, Russian Federation and Spain). (Note: this indicator is typically based on ILI and/or ARI activity but at least one virus detection per week is required to meet the definition for an intensity level above baseline. Not all countries, territories or areas reporting intensity above baseline have reported detections) (Figure E4).

Figure E2. Seasonal influenza activity in the WHO European Region: weeks 40/2022-32/2023

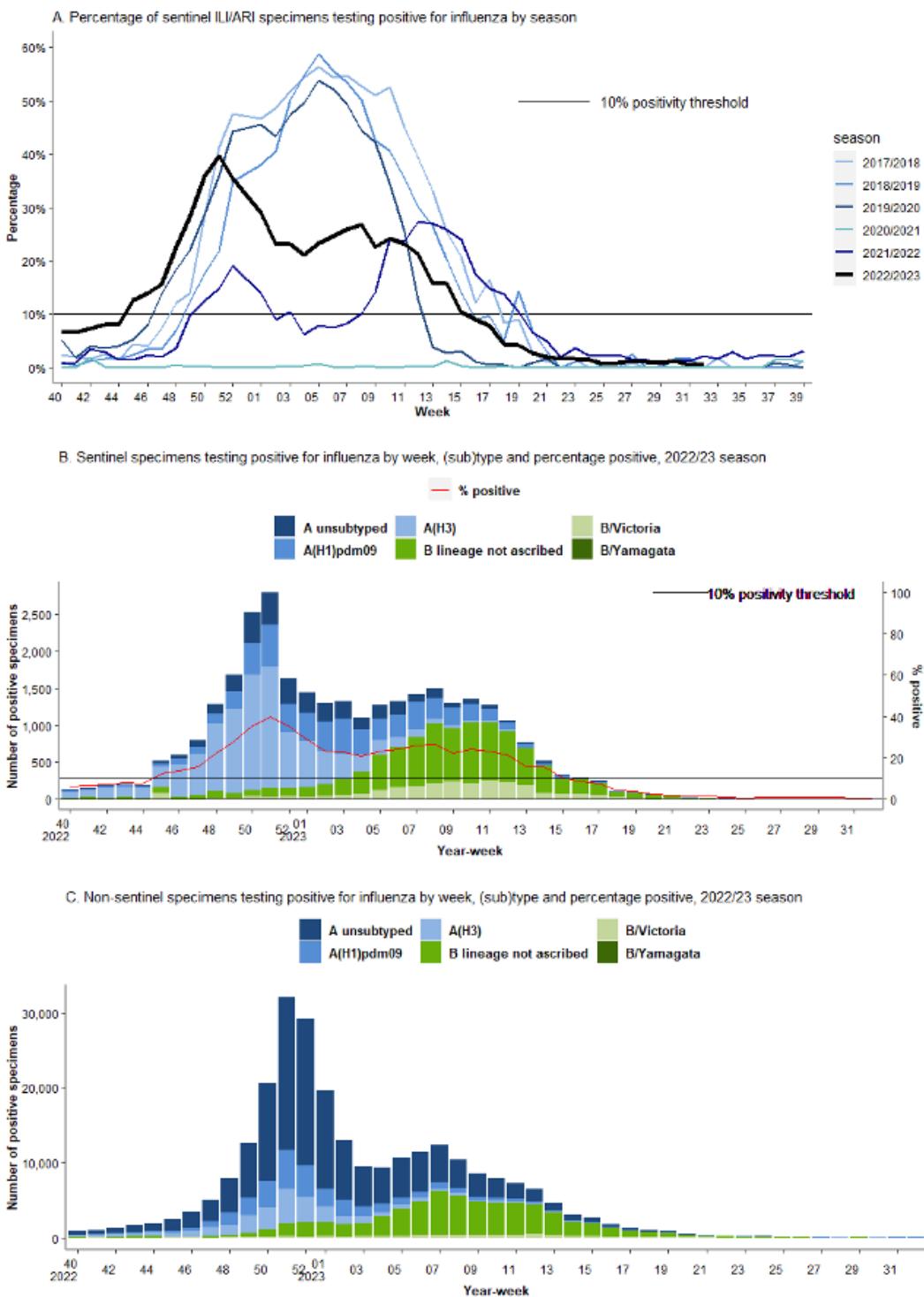


Figure E3. Sentinel specimens testing positive for influenza, RSV and SARS-CoV-2 (bars) by week and respective percentage positivity (lines), weeks 40/2022-20/2023

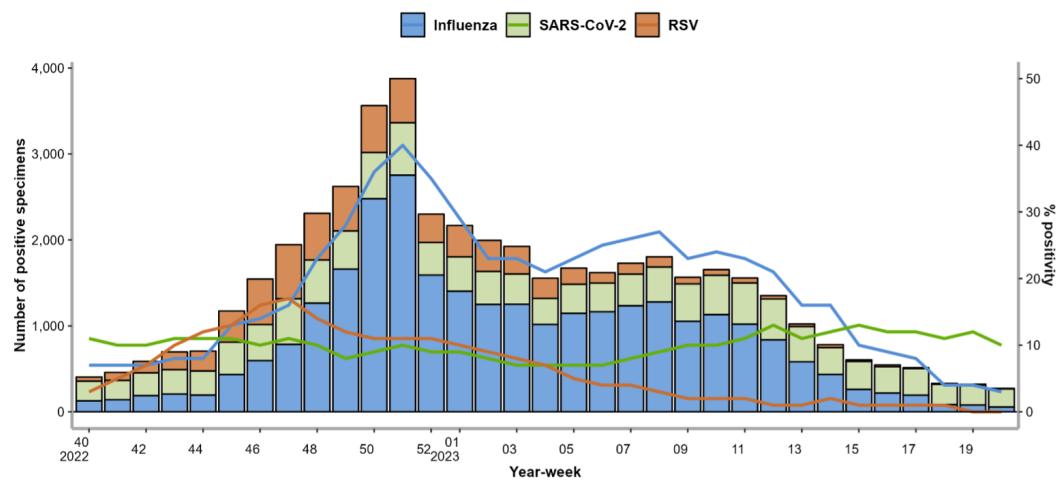
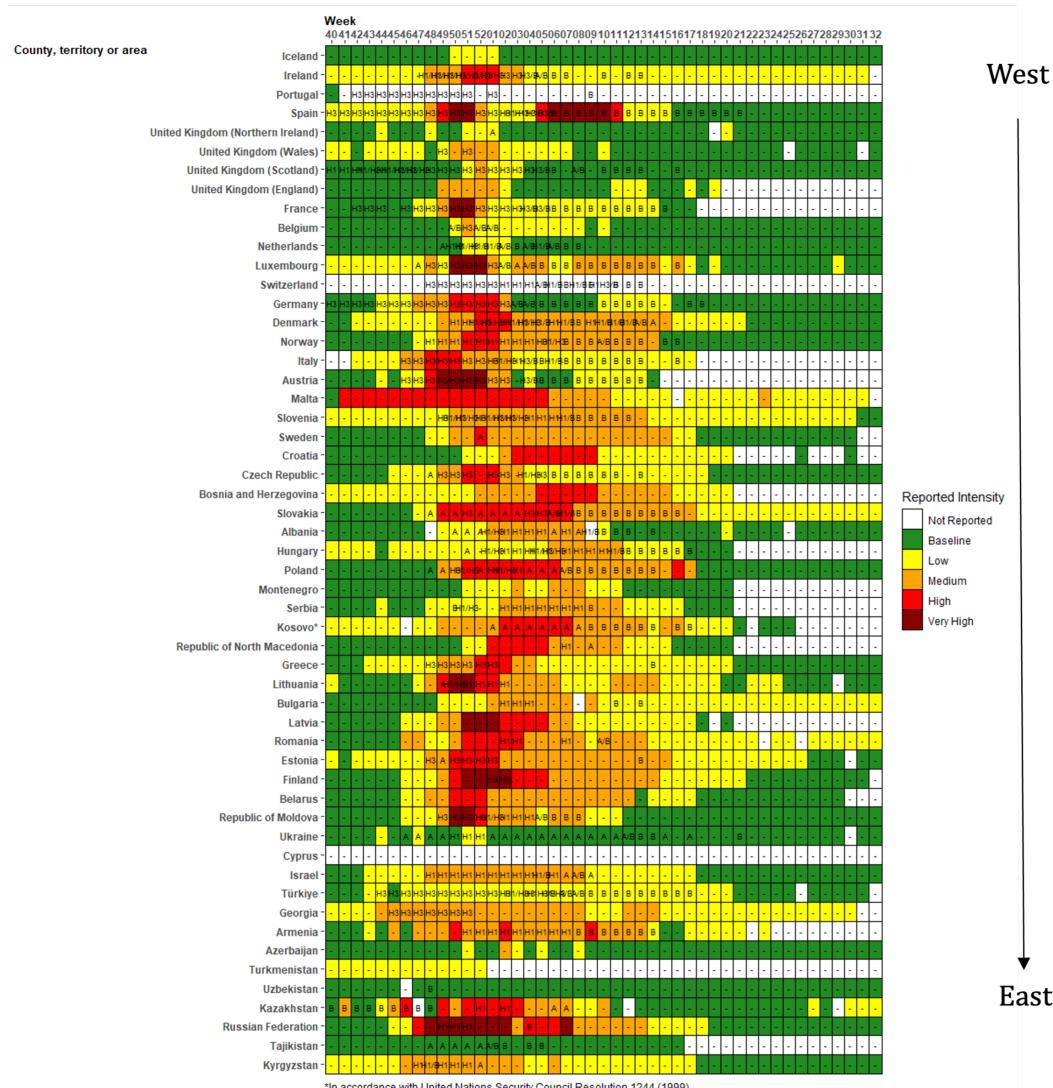


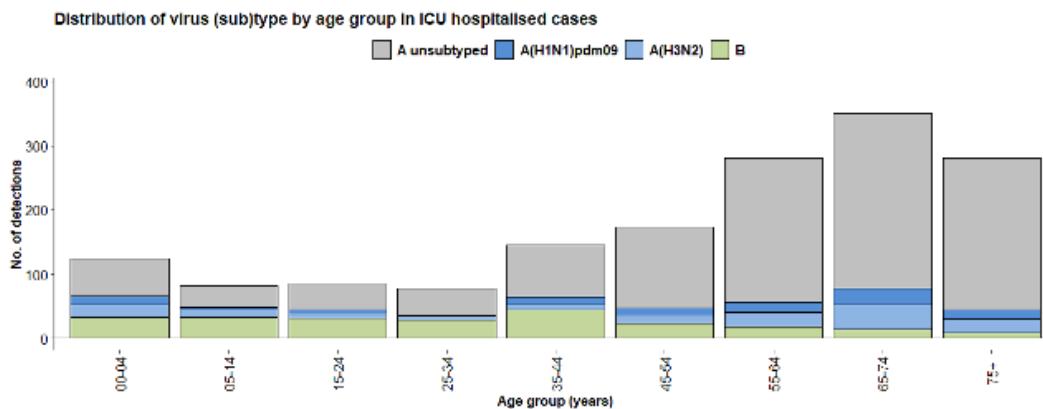
Figure E4. Intensity of influenza activity and dominant virus (sub)type in the WHO European Region by week and country, territory or area 2022-2023 season



*In accordance with United Nations Security Council Resolution 1244 (1999).

Hospitalised cases

Between weeks 40/2022 and 20/2023, five countries and areas (Czech Republic, France, Ireland, Sweden and United Kingdom (England)) reported a total of 7,319 laboratory-confirmed influenza cases from hospital settings to TESSy. Only Czechia and Ireland reported cases from both intensive care units (ICUs) and non-ICU hospital. Of these, 3,328 cases were admitted to ICUs in United Kingdom (England) (n=1,719, 52%), France (n= 957, 29%), Sweden (n= 358, 11%), Ireland (n= 151, 5%) and Czech Republic (n= 143, 4%). The remaining cases were reported from non-ICU hospital wards in Ireland (n= 3,817, 96%) and Czech Republic (n= 174, 4%). Among the 3,328 cases admitted to ICUs, 2,870 (86%) were infected with type A viruses (of those subtyped, 272 A(H3N2) and 262 A(H1N1)pdm09) and 458 (14%) with type B viruses (none ascribed to a lineage). A total of 1,599 cases had a recorded age, falling within different age groups: 647 were 30-64 years (40%), 631 were 65 years or older (39%), 124 were 0-4 years (8%), 115 were 15-29 years (7%) and 82 were 05-14 years (5%) (Figure E5).



A total of 27 countries, territories and areas (Albania, Armenia, Belarus, Belgium, Bosnia and Herzegovina, Croatia, Georgia, Germany, Ireland, Kazakhstan, Kyrgyzstan, Lithuania, Malta, Montenegro, North Macedonia, Republic of Moldova, Romania, Russian Federation, Serbia, Slovakia, Spain, Tajikistan, Türkiye, Turkmenistan, Ukraine, Uzbekistan and Kosovo) with surveillance systems for severe acute respiratory infection (SARI) reported a total of 103,101 cases between weeks 40/2022 and 32/2023. Data on age was available for 101,370 of these patients. Overall, children aged 0-4 years accounted for the largest proportion of cases (48%), followed by those aged 30-64 years (19%), those aged 5-14 years (15%), those aged 65 years or older (11%) and those aged 15-29 years (7%). SARI cases were predominantly among children aged less than 5 years in 15 countries (Armenia, Belgium, Croatia, Georgia, Germany, Kazakhstan, Kyrgyzstan, Malta, Montenegro, North Macedonia, Republic of Moldova, Slovakia, Tajikistan, Turkmenistan and Uzbekistan). Türkiye had the largest proportion (46%) of reported cases predominantly among those aged 65 years or older and 39% in those aged less than 5 years. Spain had the largest proportion (45%) in those aged 30-64 years and 42% in those aged less than 5 years (Table E3). Of 78,904 SARI cases tested for influenza virus over the period, 8% (n=6,006) were positive, ranging from 0% (Germany and Turkmenistan) to 59% (Lithuania), with a median of 15%. The majority (n= 4,149, 69%) were infected with type A viruses and, of these 3,217 were subtyped, 2,240 (70%) were A(H1N1)pdm09 and 977 (30%) were A(H3N2). A total of 1,857 infections by influenza type B viruses were reported from 25 countries, territories and areas. Of the 422 viruses ascribed to a lineage, all were B/Victoria.

Table E3. Percentage distribution of severe acute respiratory infection (SARI) cases by age group and country, territory or area, and influenza positives, 2022-2023 season

Country, territory or area	Total cases	Cases with age data	Percentage (%) of total cases						SARI specimens	Positive detections (%)
			0-4 years	5-14 years	15-29 years	30-64 years	>=65 years			
Albania	1,975	1,975	28	12	14	45	0	2,971	415 (14%)	
Armenia	3,499	3,499	48	15	9	16	13	2,633	500 (19%)	
Belarus	1,759	1,737	18	7	8	34	33	656	7 (1%)	
Belgium	708	636	58	11	3	28	0	1,150	193 (17%)	
Bosnia and Herzegovina	990	988	20	11	9	29	30	305	49 (16%)	
Croatia	624	624	47	13	7	33	0	1,156	59 (5%)	
Georgia	5,768	5,768	65	18	3	7	8	3,011	291 (10%)	
Germany	13,737	13,737	51	11	5	33	0	32,091	0 (0%)	
Ireland	186	186	0	0	9	91	0	669	70 (10%)	
Kazakhstan	28,359	28,355	56	20	10	11	4	4,653	851 (18%)	
Kyrgyzstan	6,841	6,841	79	9	2	6	3	3,488	532 (15%)	
Lithuania	1,601	0	-	-	-	-	-	562	332 (59%)	
Malta	752	752	49	14	5	32	0	1,441	127 (9%)	
Montenegro	421	421	46	12	5	15	22	231	73 (32%)	
North Macedonia	1,292	1,292	61	20	4	15	0	581	106 (18%)	
Republic of Moldova	6,554	6,554	43	7	1	20	29	249	38 (15%)	
Romania	279	279	33	9	5	53	0	527	220 (42%)	
Russian Federation	3,180	3,180	31	18	21	17	13	2,519	249 (10%)	
Serbia	3,149	3,149	15	9	8	39	29	656	209 (32%)	
Slovakia	65	65	62	17	3	18	0	121	39 (32%)	
Spain	3,305	3,305	42	10	4	45	0	8,456	729 (9%)	
Tajikistan	80	80	85	15	0	0	0	0	0 (-%)	
Türkiye	6,537	6,537	39	15	0	0	46	4,177	337 (8%)	
Turkmenistan	2,725	2,705	71	24	0	0	5	3,100	9 (0%)	
Ukraine	7,624	7,624	17	12	15	31	24	2,416	490 (20%)	
Uzbekistan	993	983	44	21	19	14	1	889	44 (5%)	
Kosovo*	98	98	28	29	12	32	0	196	37 (19%)	
Total	103,101	101,370	48,812 (48%)	14,798 (15%)	7,337 (7%)	19,101 (19%)	11,322 (11%)	78,904	6,006 (8%)	

Mortality data

Pooled analyses of all-cause excess and influenza-attributable mortality from 27 European countries or sub-national regions participating in the EuroMOMO network (Austria, Belgium, Cyprus, Berlin (Germany), Denmark, England (United Kingdom (UK)), Estonia, Finland, France, Germany, Greece, Hesse (Germany), Hungary, Ireland, Israel, Italy, Luxemburg, Malta, the Netherlands, Northern Ireland (UK), Portugal, Scotland (UK), Slovenia, Spain, Sweden, Switzerland and Wales (UK)) showed an overall substantially increased excess all-cause mortality overall for the participating European countries during the 2022-2023 season which is now declining. This excess mortality was driven by a substantial excess in 17 countries or sub-regions: Austria,

Belgium, Denmark, France, Germany, Germany (Berlin), Germany (Hesse), Ireland, Italy, the Netherlands, Portugal, Slovenia, Spain, Sweden, UK (England), UK (Northern Ireland) and UK (Scotland)). All age groups experienced excess mortality with the 14 years and younger experiencing the smallest impact and the 65 years and older age group experiencing the largest impact. Please refer to the EuroMOMO website for a cautionary note relating to interpretation of these data.

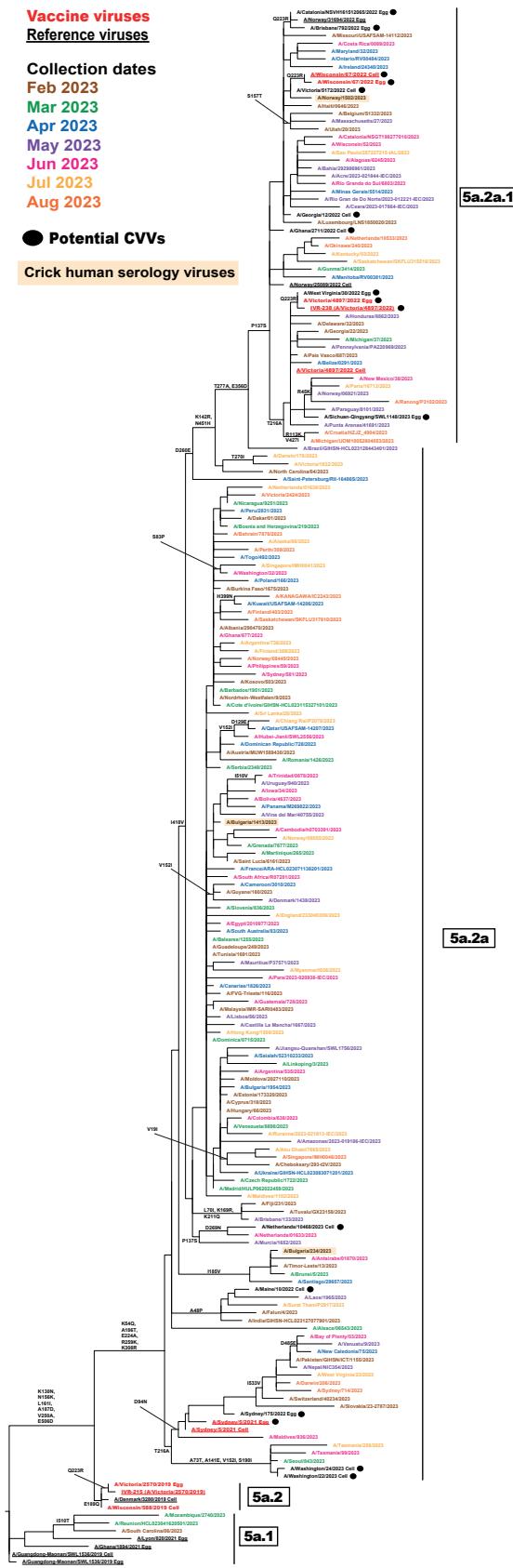
All references *In accordance with United Nations Security Council Resolution 1244 (1999).

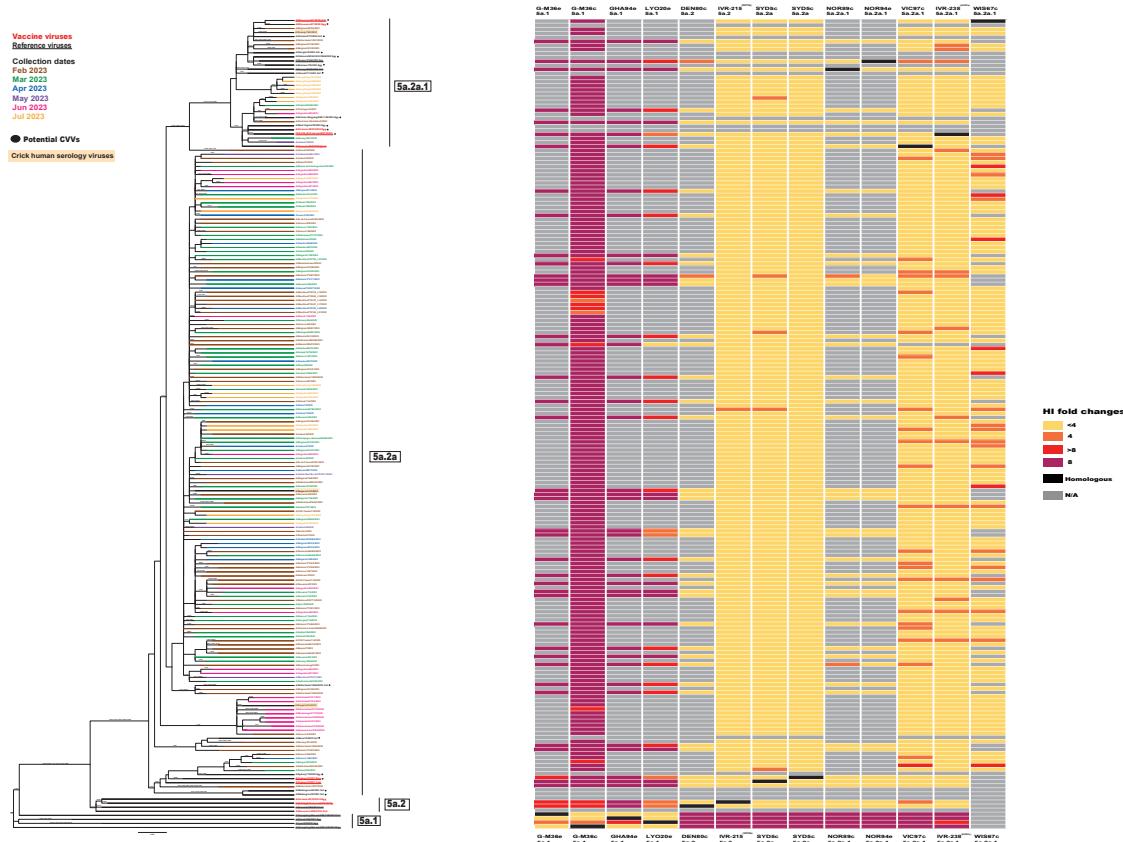
Influenza A H1N1

Genetic analyses: H1N1

Maximum likelihood phylogenetic trees: H1N1

Maximum likelihood phylogenetic tree inferred using IQTree2 from HA sequence data obtained from GISAID from 1st February onwards, manually curated and then downsampled using Treemer to retain a representative tree topology of 200 sequences and keep at least one representative from each country. Annotation of amino acids substitutions performed with Treetime ancestral reconstruction. References and CVVs are marked as Cell or Egg.





Antigenic analyses: H1N1

Haemagglutination inhibition tables: H1N1

Table H1-1. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-02-14)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre														
				Post-infection ferret antisera														
				A/G-M SWL1536/2019 MDCK Egg	A/G-M SWL1536/2019 MDCK Egg	A/Ghana 2021-01-16 E1/E2	A/Lyon 2021-01-16 E1/E2	A/Denmark 2021-01-16 MDCK Egg	IVR-215 AVIC/2021 MDCK Egg	A/Sydney 2021-01-16 F2/20 F3/21	A/Sydney 2021-01-16 F4/22	A/Norway 2021-01-16 MDCK Egg	A/Norway 2021-01-16 MDCK Egg	A/Norway 2021-01-16 MDCK Egg	A/Catalonia 2021-01-16 E3/21			
REFERENCE VIRUSES				Sa.1	Sa.1	Sa.1	Sa.1	Sa.1	Sa.1	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	C2/MDCK1	1280	2560	1280	320	40	80	40	80	40	<40	<40	<40	<40	40	
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	E3/E2	1280	640	>40	80	<40	40	40	<40	<40	<40	<40	<40	<40	<40	
A/Ghana/1894/2021	Sa.1	2021-01-21	E2/E1	1280	2560	1280	320	80	160	40	80	<40	<40	<40	<40	<40	<40	
A/Lyon/820/2022	Sa.1	2021-01-16	E1/E2	320	320	160	320	40	80	40	40	<40	<40	<40	<40	<40	<40	
A/Quebec/2020/2019	Sa.2	2018-11-22	MDCK1/MDCK1 ^a	80	80	80	80	1280	2560	1280	2560	1280	2560	1280	2560	1280	2560	
IVR-215 (AVICoria/2570/2019)	Sa.2	2018-11-22	E4/D7/E2	160	80	80	80	1280	1280	640	640	640	320	640	640	640	640	
A/Sydney/5/2021 clones 3.4.1	Sa.2a	2021-10-16	MDCK3/MDCK3	80	80	40	80	1280	2560	2560	2560	1280	640	1280	2560	1280	2560	
A/Sydney/5/2021 pooled clones 10-10	Sa.2a	2022-10-31	E3/E2	<40	40	40	80	1280	1280	1280	1280	640	320	640	1280	1280	1280	
A/Norway/2021/2022	Sa.2a.1	2022-09-24	MDCK3	<40	40	40	40	640	1280	1280	1280	1280	640	1280	1280	1280	1280	
A/Norway/169/2022	Sa.2a.1	2022-09-24	E3/E1 10 ⁻⁵	<40	<40	<40	<40	320	320	320	320	320	320	320	320	320	320	
A/Catalonia/NSVH191512065/2022	Sa.2a.1	2022-09-14	E3 (AM142) 10 ⁻⁵	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
TEST VIRUSES				Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	
A/Valadolid/42/2022	Sa.2	2022-12-15	MDCK1/MDCK1	80	80	80	80	40	1280	2560	2560	2560	1280	640	1280	2560	2560	
A/Mauritius/P7019/2022	Sa.2a	2022-12-20	MDCKx/MDCK1	80	80	40	80	1280	2560	2560	2560	1280	640	1280	2560	2560		
A/Mahajanga/07641/2022	Sa.2a	2022-12-21	MDCK1	80	80	40	80	2560	2560	2560	2560	1280	640	1280	2560	2560		
A/Flanders/sea/2021/2022	Sa.2a	2022-12-16	MDCK1	<40	40	<40	40	640	1280	1280	1280	1280	640	1280	1280	1280	1280	
A/Alaska/Bethel/4/2022	Sa.2a	2022-12-26	MDCK1	80	80	40	80	1280	2560	2560	2560	1280	640	1280	2560	2560		
A/Finland/07686/2022	Sa.2a	2022-12-27	MDCK1	40	40	<40	40	640	1280	1280	1280	1280	640	320	640	640	640	
A/Valadolid/1/2022	Sa.2a	2022-12-27	MDCK1/MDCK1	40	40	<40	40	640	1280	1280	1280	1280	640	640	640	640	640	
A/Altsiribate/07711/2022	Sa.2a	2022-12-28	MDCK1	80	80	160	160	2560	2560	2560	2560	>1280	2560	1280	2560	2560		
A/Toronto/2021/2022	Sa.2a	2022-12-28	MDCK1	80	80	40	40	640	1280	1280	1280	1280	640	320	640	640	640	
A/Valadolid/1/2023	Sa.2a	2023-01-01	MDCK1	80	80	40	80	1280	2560	2560	2560	1280	640	1280	2560	2560		
A/Burgos/10/2023	Sa.2a	2023-01-09	MDCK1/MDCK1	40	40	<40	40	640	1280	1280	1280	1280	640	320	640	640	640	
A/Alencia/1/2023	Sa.2a	2023-01-10	MDCK1/MDCK1	80	80	40	80	1280	2560	2560	2560	1280	640	1280	2560	2560		
A/Burgos/2/2023	Sa.2a	2023-01-10	MDCK1/MDCK1	40	40	<40	40	1280	1280	1280	1280	1280	1280	1280	1280	1280		
A/Alaska/253/2023/2023	Sa.2a	2023-01-11	MDCK1	80	80	40	80	1280	2560	2560	2560	1280	640	1280	2560	2560		
A/Albania/290892/2023	Sa.2a	2023-01-12	MDCK1	40	40	40	80	1280	1280	1280	1280	1280	1280	1280	1280	1280		
A/Albania/290870/2023	Sa.2a	2023-01-12	MDCK1	80	80	40	80	1280	2560	2560	2560	1280	640	1280	2560	2560		
A/Albania/290832/2023	Sa.2a	2023-01-12	MDCK1	80	80	40	80	1280	2560	2560	2560	1280	640	1280	2560	2560		
A/Valadolid/16/2023	Sa.2a	2023-01-12	MDCK1/MDCK1	80	80	40	80	1280	1280	1280	1280	1280	1280	1280	1280	1280		
A/Bulgaria/607/2023	Sa.2a	2023-01-16	MDCK1	40	40	<40	40	640	1280	1280	1280	1280	640	1280	1280	1280		
A/Mauritius/P09327/2023	Sa.2a	2023-01-17	MDCKx/MDCK1	80	80	40	80	2560	2560	2560	2560	1280	1280	1280	1280	1280		
A/Valadolid/18/2023	Sa.2a	2023-01-17	MDCK1/MDCK1	40	40	40	40	1280	1280	1280	1280	1280	1280	1280	1280	1280		
A/Mauritius/1601/2023	Sa.2a	2023-02-01	MDCK1	80	160	80	160	2560	2560	2560	2560	1280	1280	1280	1280	1280		
A/Albania/29041/2023	Sa.2a	2023-02-01	MDCK1	<40	<40	<40	<40	320	320	320	320	1280	1280	1280	1280	1280		
A/Burgos/55/2023	Sa.2a.1	2022-12-22	MDCK1/MDCK1	<40	<40	<40	<40	320	320	320	320	640	320	320	320	320	640	

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine

NH 2020-21

Vaccine

NH 2021

NH 2022

NH 2022-23

< 4-fold

4-fold

8-fold

> 8-fold

< not recognised by the antiserum

≥ 160 (no homologous titre)

Table H1-2. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-02-21)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre Post-infection ferret antisera															
				A/G-M			A/G-M			A/Ghana			A/Lyon			A/Paris			
				SWL1536/19	SWL1536/19	F09/20	Egg	Egg	Egg	1894/21	820/21	320/19	AVIC/23/19	F02/22	F06/22	F28/20	F37/21	F46/22	F04/22
				MDCK	MDCK	F12/20	F12/20	F02/22	F06/22	MDCK	MDCK	F28/20	F37/21	F46/22	F04/22	F38/22	F48/22	5/21	A/Sydney
			Passage history	5a.1	5a.1	5a.1	5a.1	5a.1	5a.1	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2
			Ferret number	5a.1	5a.1	5a.1	5a.1	5a.1	5a.1	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2
			Genetic group	5a.1	5a.1	5a.1	5a.1	5a.1	5a.1	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2	5a.2
REFERENCE VIRUSES																			
A/Guangdong-Maonan/SWL1536/2019		5a.1	2019-06-17	C2/MDCK1	1280	1280	640	320	40	80	40	40	<40	40	<40	40	<40	<40	
A/Guangdong-Maonan/SWL1536/2019		5a.1	2019-06-17	E3/E2	1280	1280	640	320	<40	80	<40	40	<40	40	<40	<40	<40	<40	
A/Ghana/1894/2021		5a.1	2021-07-21	E2/E1	2560	1280	1280	320	40	160	40	80	<40	40	<40	<40	<40	<40	
A/Lyon/820/2021		5a.1	2021-11-16	E1/E2	320	320	160	320	40	40	<40	40	<40	40	<40	<40	<40	<40	
A/Denmark/3280/2019		5a.2	2019-11-10	MDCK4/MDCK5	40	80	40	80	1280	2560	1280	2560	1280	640	320	320	320	320	
IVR-215 (AVictoria/2570/2019)		5a.2	2018-11-22	E4/D7/E2	80	80	40	80	640	1280	640	640	320	320	320	320	320	320	
A/Sydney/5/2021 clone 3.4.1		5a.2a	2021-10-16	MDCK3/MDCK3	40	40	40	40	1280	2560	2560	2560	1280	640	320	320	320	320	
A/Sydney/5/2021 pooled clones 10-10		5a.2a	2022-10-31	E3/E2	80	40	40	40	1280	1280	1280	1280	1280	1280	640	320	320	320	
A/Norway/25099/2022		5a.2a.1	2022-06-15	MDCK3	<40	<40	<40	<40	640	1280	1280	1280	1280	1280	1280	1280	1280	1280	
A/Norway/16394/2022		5a.2a.1	2022-09-24	E3/E1 10 ⁷	40	40	<40	<40	640	640	320	320	320	320	320	320	320	320	
TEST VIRUSES																			
A/Norway/342/2022		5a.2a	2022-10-23	MDCK1	80	40	<40	<40	40	640	640	640	640	640	640	320	320	320	
A/Norway/331/2022		5a.2a	2022-10-23	MDCK1	80	40	<40	<40	40	1280	1280	1280	1280	1280	1280	320	320	320	
A/Slovenia/10569/2022		5a.2a	2022-11-20	MDCK4/MDCK1	80	80	40	80	1280	2560	2560	2560	1280	1280	640	640	640		
A/Slovenia/10891/2022		5a.2a	2022-11-21	MDCK4/MDCK1	160	80	40	80	2560	2560	2560	2560	1280	1280	640	640	640		
A/Slovenia/11068/2022		5a.2a	2022-11-28	SIAT1/MDCK1	80	80	40	40	1280	2560	2560	2560	1280	1280	640	640	640		
A/Slovenia/11185/2022		5a.2a	2022-12-03	MDCK4/MDCK1	80	80	40	80	1280	2560	1280	2560	1280	1280	640	640	640		
A/Slovenia/11320/2022		5a.2a	2022-12-12	SIAT1/MDCK1	40	40	<40	<40	1280	1280	1280	1280	1280	1280	640	640	640		
A/Valladolid/41/2022		5a.2a	2022-12-18	MDCK1/MDCK1	40	40	<40	<40	80	1280	1280	1280	1280	1280	1280	640	640	640	
A/Valladolid/52/2022		5a.2a	2022-12-31	MDCK1/MDCK1	80	80	40	80	2560	2560	2560	2560	2560	2560	640	640	640		
A/Slovenia/43/2023		5a.2a	2023-01-04	MDCK4/MDCK1	40	40	<40	<40	40	1280	1280	1280	1280	1280	1280	640	640	640	
A/Valladolid/13/2023		5a.2a	2023-01-04	SIAT1/SIAT1	40	40	<40	<40	40	640	1280	1280	1280	1280	1280	1280	320	320	
A/Valladolid/16/2023		5a.2a.1	2023-01-10	SIAT1/SIAT1	50	50	40	40	40	1280	1280	1280	1280	1280	1280	2560	2560	2560	
A/Lisboa/581/2022		5a.2a.1	2022-09-29	MDCK1	40	40	<40	<40	80	1280	2560	1280	1280	1280	1280	1280	1280	1280	
A/Lisboa/52627/2022		5a.2a.1	2022-10-09	MDCK1	<40	<40	<40	<40	320	640	320	320	640	640	640	640	640		
A/Lisboa/5942/2022		5a.2a.1	2022-10-18	MDCK1	40	40	<40	<40	40	640	640	640	640	640	640	640	640		
A/Lisboa/602/2022		5a.2a.1	2022-10-23	MDCK1	40	40	<40	<40	40	1280	1280	1280	1280	1280	1280	1280	1280		
A/Salamanca/637/2022		5a.2a.1	2022-10-25	MDCK2	40	40	<40	<40	80	1280	1280	1280	1280	1280	1280	1280	1280		
A/Lisboa/618/2022		5a.2a.1	2022-10-31	MDCK1	40	40	<40	<40	40	1280	2560	1280	1280	1280	1280	1280	1280		
A/Valladolid/37/2022		5a.2a.1	2022-12-01	MDCK1/MDCK1	<40	<40	<40	<40	40	640	1280	640	640	640	640	640	640		
A/Valladolid/2/2023		5a.2a.1	2023-01-03	SIAT1/SIAT2	<40	<40	<40	<40	40	640	1280	640	640	640	640	640	640		
A/Burgo/6/2023		5a.2a.1	2023-01-04	SIAT1/SIAT2/MDCK1	<40	<40	<40	<40	40	640	1280	640	640	640	640	640	640		

< relates to the lowest dilution of antisera used

ND = Not Done

Vaccine
NH 2020-21

Vaccine
SH 2021-22

Vaccine
SH 2022-23

Vaccine
NH 2022-23

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antisera ≥ 160 (no homologous titre)

Table H1-3. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-02-28)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre												
				Post-infection ferret antiserum												
				A/G-M SWL1536/19 F09/20	A/G-M SWL1536/19 F12/20	A/Ghana 1894/21 F02/22	A/Lyon 820/21 F06/22	A/Denmark 3280/19 F28/20	IVR-215 A/Vic/2570/19 F37/21	A/Sydney 5/21 F46/22	A/Sydney 5/21 F47/22	A/Norway 25089/22 F48/22	A/Norway 31694/2022 Sa.2a.1			
			Passage history Ferret number Genetic group	MDCK Sa.1	Egg Sa.1	Egg Sa.1	Egg Sa.1	MDCK Sa.2	Egg Sa.2	MDCK Sa.2a	Egg Sa.2a	MDCK Sa.2a.1	Egg Sa.2a.1			
REFERENCE VIRUSES																
A/Guangdong-Moanon/SWL1536/2019	Sa.1	2019-06-17	C2/MDCK1	1250	640	640	160	40	80	<40	40	<40	<40			
A/Guangdong-Moanon/SWL1536/2019	Sa.1	2019-06-17	E3/E2	640	1250	320	160	<40	40	<40	40	<40	<40			
A/Guangdong-Moanon/SWL1536/2019	Sa.1	2019-07-21	E2/E1	1250	1250	1250	320	320	40	<40	40	<40	<40			
A/Lyon/320/2021	Sa.1	2021-11-16	E1/E2	320	320	160	320	320	40	40	<40	40	<40	<40		
A/Denmark/3280/2019	Sa.2	2019-11-10	MDCK4/MDCK5	40	80	40	80	1250	1250	1250	2560	1280	640	640		
IVR-215 (A/Victoria/2570/2019)	Sa.2	2018-11-22	E4/D7/E2	80	80	40	80	320	1250	320	640	320	160	160		
A/Sydney/5/2021 clone 3.4.1	Sa.2a	2021-10-16	MDCK3/MDCK3	80	80	40	80	640	1250	1250	1280	1280	1280	1280		
A/Sydney/5/2021 pooled clones 10-10	Sa.2a	2022-10-31	E3/E2	160	80	80	80	1280	1280	1280	1280	1280	1280	320		
A/Norway/25089/2022	Sa.2a.1	2022-06-15	MDCK3	40	40	<40	<40	640	1280	640	1280	1280	1280	640		
A/Norway/31694/2022	Sa.2a.1	2022-09-24	E3/E1 10 ³	40	<40	<40	<40	320	320	640	320	320	320	320		
TEST VIRUSES																
A/Victoria/4897/2022	Sa.2a.1	2022-10-02	SIAT2/MDCK1	<40	40	<40	<40	640	640	640	640	1280	640	640		
A/Victoria/4897/2022	Sa.2a.1	2022-10-02	E3/E1	<40	<40	<40	<40	640	640	320	640	640	640	320		
IVR-238 (A/Victoria/4897/2022)	Sa.2a.1	2022-10-02	E3/D6/E1	40	40	<40	<40	640	1280	640	1280	640	1280	640		
A/Argentina/3673/2022	Sa.1	2022-09-29	MDCK1	640	640	640	160	40	40	<40	40	<40	<40	<40		
A/Argentina/3741/2022	Sa.1	2022-10-07	MDCK1	640	640	640	160	40	40	<40	40	<40	<40	<40		
A/Qatar/10-VI-22-20865/2022	Sa.2a.1	2022-11-20	MDCK4/MDCK1	80	80	<40	40	640	1250	1250	640	640	640	320		
A/Qatar/10-VI-22-20867/2022	Sa.2a.1	2022-11-20	MDCK4/MDCK1	80	80	<40	40	640	1250	1250	640	640	640	320		
A/Qatar/10-VI-22-20868/2022	Sa.2a.1	2022-10-15	MDCK1	40	40	<40	<40	320	320	640	640	320	320	160		
A/Qatar/10-VI-22-20869/2022	Sa.2a.1	2022-10-15	MDCK1	40	40	<40	<40	640	640	640	640	320	320	160		
A/Qatar/10-VI-22-20870/2022	Sa.2a.1	2022-10-20	MDCK1	<40	<40	<40	<40	320	320	320	320	320	320	80		
A/Qatar/10-VI-22-21069/23/2022	Sa.2a.1	2022-10-23	MDCK1	40	<40	<40	<40	320	640	640	640	640	640	160		
A/Qatar/10-VI-22-21083/53/2022	Sa.2a.1	2022-10-24	MDCK1	<40	<40	<40	<40	160	320	320	320	320	320	80		
A/Romania/5/2287/2022	Sa.2a.1	2022-11-20	SIAT2/MDCK1	80	80	<40	40	640	640	640	640	640	640	320		
A/Castilla La Mancha/4/545/2022	Sa.2a.1	2022-11-27	MDCK1	40	80	<40	80	640	1280	640	1280	640	1280	320		
A/Romania/5/4276/2022	Sa.2a.1	2022-11-28	SIAT1/MDCK1	40	40	<40	<40	640	640	640	640	640	640	320		
A/Romania/5/4055/2022	Sa.2a.1	2022-11-28	SIAT1/MDCK1	80	80	40	40	640	1250	1250	1250	1250	1250	1250		
A/Romania/5/4055/2022	Sa.2a.1	2022-11-28	SIAT1/MDCK1	40	40	<40	<40	640	640	640	640	640	640	320		
A/Romania/5/44178/2022	Sa.2a.1	2022-12-28	SIAT1/MDCK1	80	80	40	80	640	640	1280	1280	640	640	320		
A/Romania/5/4406/1/2022	Sa.2a.1	2022-12-28	SIAT1/MDCK1	80	80	<40	40	640	1280	1280	640	640	640	320		
A/Romania/5/44308/2022	Sa.2a.1	2022-12-29	SIAT1/MDCK1	80	80	40	40	640	1280	1280	1280	1280	1280	1280		
A/Romania/5/44322/2022	Sa.2a.1	2022-12-30	SIAT1/MDCK1	40	40	<40	<40	640	640	640	640	640	640	320		
A/Romania/5/44307/2022	Sa.2a.1	2022-12-30	SIAT1/MDCK1	40	80	<40	<40	640	1280	1280	1280	1280	1280	1280		
A/Romania/5/44323/2022	Sa.2a.1	2022-12-31	SIAT1/MDCK1	40	40	<40	<40	320	640	640	640	640	640	320		
A/Qatar/10-VI-22-204918/2022	Sa.2a.1	2022-10-02	MDCK1	80	80	40	80	1280	2560	2560	2560	2560	2560	640		
			no seq													

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine
NH 2020-21

Vaccine
SH 2021
NH 2021-22
SH 2022
NH 2022-23

<4-fold 4-fold 8-fold >8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H1-4. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-03-07)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre												
				Post-infection ferret antiserum												
				A/G-M SWL1536/19	A/G-M SWL1536/19	A/Ghana 1894/21	A/Lyon 820/21	A/Denmark 3280/19	IVR-215 A/Vic/2570/19	A/Sydney 5/21	A/Sydney 5/21	A/Norway 25089/22	A/Norway 31694/2022			
			Passage history	MDCK F9/20	Egg F12/20	Egg F02/22	Egg F06/22	MDCK F28/20	Egg F37/21	MDCK F46/22	Egg F04/22	MDCK F38/22	Egg F48/22			
			Ferret number	Sa.1	Sa.1	Sa.1	Sa.1	Sa.2	Sa.2	Sa.2a	Sa.2a	Sa.2a	Sa.2a.1			
			Genetic group													
REFERENCE VIRUSES																
A/Guangdong-Meolan/SWL1536/2019	Sa.1	2019-06-17	C2/MDCK1	1280	1280	320	80	80	40	40	40	40	<40			
A/Guangdong-Meolan/SWL1536/2019	Sa.1	2019-06-17	E3/E2	1280	1280	640	320	40	80	<40	40	40	<40			
A/Ghana/1994/2021	Sa.1	2021-07-21	E2/E1	2560	1280	2560	320	80	160	40	40	40	<40			
A/Lyon/820/2021	Sa.1	2021-11-16	E1/E2	320	320	160	640	40	40	<40	40	40	<40			
A/Denmark/3280/2019	Sa.2	2019-11-10	MDCK4/MDCK5	80	160	80	160	1280	2560	1280	2560	1280	640			
IVR-215 (A/Victoria/2570/2019)	Sa.2	2018-11-22	E4/D7/E2	160	160	80	80	640	2560	640	640	640	320			
A/Sydney/5/2021 clone 34.1	Sa.2a	2021-10-16	MDCK3/MDCK3	80	80	40	40	1280	2560	1280	2560	1280	640			
A/Sydney/5/2021 pooled clones 10-10	Sa.2a	2022-10-31	E3/E2	80	80	80	40	1280	2560	1280	2560	1280	640			
A/Norway/25089/2022	Sa.2a.1	2022-06-15	MDCK3	40	40	<40	40	1280	2560	1280	2560	1280	640			
A/Norway/31694/2022	Sa.2a.1	2022-09-24	E3/E1 10 ⁻³	40	40	<40	40	640	640	640	640	640	640			
TEST VIRUSES																
A/Belgium/S2597/2022	Sa.1	2022-03-29	C1/MDCK1	2560	2560	2560	320	80	80	80	80	80	40	<40		
A/Belgium/S2616/2022	Sa.1	2022-03-18	C1/MDCK1	2560	2560	2560	640	160	160	80	80	80	80	40		
A/Israel/R10575/2022	Sa.2a	2022-11-03	P1/MDCK1	40	40	<40	40	1280	2560	1280	1280	1280	1280	640		
A/Israel/R10810/2022	Sa.2a	2022-11-08	P1/MDCK1	40	40	<40	<40	320	320	640	320	320	320	320		
A/Israel/R11323/2022	Sa.2a	2022-11-23	P1/MDCK1	80	160	40	80	2560	>5120	>5120	2560	>5120	2560	>5120	2560	
A/Israel/B1430/2022	Sa.2a	2022-12-02	P1/MDCK1	40	40	<40	<40	2560	2560	2560	2560	2560	2560	1280		
A/Israel/B1485/2022	Sa.2a	2022-12-05	P1/MDCK1	160	160	80	160	>5120	>5120	>5120	>5120	>5120	>5120	2560	2560	
A/Israel/B1438/2022	Sa.2a	2022-12-06	P1/MDCK1	40	80	<40	40	1280	2560	2560	2560	2560	2560	1280		
A/Israel/B1537/2022	Sa.2a	2022-12-11	P1/MDCK1	40	40	<40	<40	1280	1280	640	1280	1280	1280	640		
A/Israel/R12242/2022	Sa.2a	2022-12-12	P1/MDCK1	80	80	40	80	2560	2560	2560	2560	2560	2560	1280		
A/Israel/B1323/2022	Sa.2a.1	2022-11-21	P1/MDCK1	40	40	<40	<40	1280	2560	1280	1280	2560	2560	2560		

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine

NH 2020-21

Vaccine

SH 2023



Table H1-5. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-03-21)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre													
				Post-infection ferret antisera													
				A/G-M SWL1536/19	A/G-M SWL1536/19	A/Ghana 1894/21	A/Lyon 820/21	A/Denmark 3280/19	IVR-215 A/Vic/2575/19	A/Sydney 5/21	A/Sydney 5/21	A/Norway 25088/22	A/Norway 31694/22	A/Victoria/ 4897/22	A/Victoria/ 4897/22	IVR-238 A/Vic/4897/22	
			Passage history	MDCK F09/20	Egg F12/20	Egg F02/22	Egg F06/22	MDCK F28/20	Egg F37/21	MDCK F46/22	Egg F94/22	MDCK F38/22	Egg F40/22	MDCK F05/23	Egg F07/23		
			Ferret number	Sa.1	Sa.1	Sa.1	Sa.1	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2		
			Genetic group	Sa.1	Sa.1	Sa.1	Sa.1	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	
REFERENCE VIRUSES																	
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	C2/MDCK1	1280	1280	1280	320	40	80	40	40	40	40	<40	<40	160	
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	C2/MDCK1	1280	1280	1280	320	>40	40	40	40	40	40	<40	<40	80	
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2021-07-21	E3/E1	2560	2560	2560	320	80	160	40	80	40	<40	<40	<40	<40	160
A/Lyon/20/2021	Sa.1	2021-11-16	E1/E2	320	320	160	320	<40	40	<40	40	<40	<40	<40	<40	<40	160
A/Denmark/2280/2019	Sa.2	2019-11-10	MDCK/4/MDCK5	40	80	40	160	640	1280	1280	640	640	640	640	640	640	2560
A/Thuringen/1/2021	Sa.2	2019-11-22	E4/D7/E2	80	80	80	90	640	1280	640	640	640	640	640	640	640	2560
A/Sydney/5/2021 pooled clones 3.4.1	Sa.2	2021-04-16	MDCK/3/MDCK3	40	40	40	40	1280	2560	2560	1280	1280	1280	1280	1280	1280	2560
A/Sydney/5/2021 pooled clones 10-10	Sa.2	2022-10-31	E3/E2	40	40	80	40	640	1280	640	640	640	640	640	640	640	1280
A/Norway/23889/2022	Sa.2a.1	2022-06-15	MDCK3	40	40	<40	40	640	1280	640	640	640	640	640	640	640	1280
A/Norway/31694/2022	Sa.2a.1	2022-09-24	E3/E1 10 ³	40	40	<40	40	640	1280	640	640	640	640	640	640	640	1280
A/Victoria/97/2022	Sa.2a.1	2022-10-02	SIAT/2/MDCK1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-V/21-AV/2021-a4897/2022)	Sa.2a.1	2022-10-02	E3/Hebe 10 ⁻¹	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TEST VIRUSES																	
A/Saarland/7/2022/2022	Sa.2a	2022-09-28	MDCK1	80	80	<40	80	1280	2560	2560	2560	1280	1280	2560	2560	2560	2560
A/Saarland/22339/2022	Sa.2a	2023-10-15	MDCK1	<40	<40	<40	<40	320	320	320	320	640	160	640	640	320	
A/Nordrhein-Westfalen/58/2022	Sa.2a	2022-11-07	P1/MDCK1	80	80	80	80	2560	2560	2560	2560	2560	2560	2560	2560	2560	2560
A/Thuringen/46/2022	Sa.2a	2022-11-07	P1/MDCK1	80	40	80	80	1280	2560	2560	2560	640	640	640	640	640	1280
A/Berlin/196/2022	Sa.2a	2022-11-30	P2/MDCK1	80	40	40	80	640	1280	640	1280	1280	640	640	640	640	640
A/Sachsen/1/2022	Sa.2a	2023-02-05	P1/MDCK1	40	40	<40	40	1280	2560	2560	1280	1280	1280	1280	1280	1280	2560
A/Hessen/7/2023	Sa.2a	2023-03-01	P1/MDCK1	40	40	<40	40	640	1280	1280	1280	640	640	640	640	640	1280
A/Saarland/1/2023	Sa.2a	2023-02-03	P1/MDCK1	40	80	80	80	640	640	640	640	640	640	640	640	640	640
A/Niedersachsen/9/2023	Sa.2a	2023-02-06	P2/MDCK1	40	40	<40	40	640	1280	1280	1280	1280	1280	1280	1280	1280	1280
A/Brandenburg/2/2023	Sa.2a	2023-02-06	P1/MDCK1	40	40	<40	40	320	640	640	640	320	320	640	640	640	640
A/Sachsen/7/2023	Sa.2a	2023-02-06	P1/MDCK1	40	40	<40	40	640	1280	1280	1280	640	640	640	640	640	1280
A/Sachsen/3/2023	Sa.2a	2023-02-13	P1/MDCK1	40	40	<40	40	320	1280	640	640	640	320	320	1280	1280	1280
A/Berlin/4/2023	Sa.2a	2023-02-16	P1/MDCK1	40	40	<40	80	640	1280	1280	1280	1280	1280	1280	1280	1280	1280
A/Nordrhein-Westfalen/39/2022	Sa.2a.1	2023-10-24	P1/MDCK1	80	40	<40	40	1280	2560	1280	1280	2560	2560	2560	2560	2560	2560
A/Nordrhein-Westfalen/59/2022	Sa.2a.1	2023-10-24	P1/MDCK1	<40	<40	<40	40	640	640	640	640	640	640	640	640	640	640
A/Sachsen/12761/2022	Sa.2a.1	2023-12-20	P1/MDCK1	40	40	<40	40	640	1280	640	640	1280	1280	640	640	640	640
A/Thuringen/5/2023	Sa.2a.1	2023-02-02	P1/MDCK1	<40	40	<40	40	640	1280	640	1280	1280	640	640	640	640	640
A/Nordrhein-Westfalen/8/2023	Sa.2a.1	2023-02-17	P1/MDCK1	<40	40	<40	<40	320	1280	640	1280	1280	1280	1280	1280	1280	1280

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine NH 2020-21

Vaccine SH 2021

Vaccine SH 2023

Vaccine NH 2023-24

Vaccine NH 2023-24

<4-fold 4-fold 8-fold >8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H1-6. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-04-04)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre															
				Post-infection ferret antiserum															
				A/G-M SWL1536/19	A/G-M SWL1536/19	A/Ghana 1894/21	A/Lyon 820/21	A/Denmark 3269/19	IVR/215 AVic/2570/19	A/Sydney 5/21	A/Sydney 5/21	A/Norway 25089/22	A/Norway/ 31694/2022	A/Victoria/ 4897/2022	A/Victoria/ 4897/2022	IVR-238 AVic/4897/22			
			Passage history Ferret number Genetic group	MDCK F9/20 Sa.1	Egg F12/20 Sa.1	Egg F02/22 Sa.1	Egg F06/22 Sa.1	MDCK F28/20 Sa.2	Egg F37/21 Sa.2	MDCK F46/22 Sa.2a	Egg F04/22 Sa.2a	MDCK F38/22 Sa.2a.1	Egg F48/22 Sa.2a.1	MDCK F05/23 Sa.2a.1	Egg F07/23 Sa.2a.1				
REFERENCE VIRUSES																			
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	C2/MDCK1	1280	1280	1280	320	<40	80	40	40	<40	<40	<40	<40	<40	160		
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	E3/E2	640	1280	640	320	<40	40	40	<40	<40	<40	<40	<40	<40	80		
A/Guangdong-Maonan/SWL1536/2021	Sa.1	2021-07-21	E2/E1	1280	2560	1280	320	<40	80	40	40	<40	<40	<40	<40	<40	<40	80	
A/Lyons/2020/21	Sa.1	2021-11-16	E2/E1	320	320	320	320	<40	40	40	<40	<40	<40	<40	<40	<40	<40	160	
A/Denmark/2020/2019	Sa.2	2019-11-10	MDCK/MDCK1	80	80	40	80	1280	1280	1280	1280	640	320	640	640	640	640	640	640
IVR-215 (AVic/2570/2019)	Sa.2	2018-11-22	E4/07/E2	80	80	40	80	640	1280	640	1280	640	320	640	1280	1280	1280	1280	1280
A/Sydney/5/2021 clone 3.A.4	Sa.2a	2021-10-16	MDCK/MDCK1	40	40	80	<40	40	1280	2560	1280	1280	640	1280	1280	1280	1280	1280	2560
A/Sydney/5/2021 pooled clones 10-10	Sa.2a	2022-01-31	E3/E2	80	80	80	<40	80	1280	2560	1280	1280	640	1280	1280	1280	1280	1280	2560
A/Norway/31694/2022	Sa.2a.1	2022-06-15	MDCK	<40	<40	<40	<40	<40	640	1280	640	1280	640	1280	640	1280	640	1280	1280
A/Norway/31694/2022	Sa.2a.1	2022-09-24	E3/E1 10-3	<40	<40	40	40	640	640	640	640	640	640	640	640	640	640	1280	640
A/Victoria/4897/2022	Sa.2a.1	2022-10-02	SIAT2/MDCK2	40	40	<40	80	1280	2560	2560	2560	2560	2560	1280	2560	2560	2560	2560	2560
IVR-238 (AVic/4897/2022)	Sa.2a.1	2022-10-02	E3/D/E1 10-6	80	80	40	80	1280	2560	1280	2560	1280	640	2560	2560	2560	2560	2560	2560
TEST VIRUSES																			
A/England/156/2022	Sa.1	2022-08-23	SIAT1/MDCK1	640	640	640	160	40	80	40	40	40	40	40	40	40	40	160	
A/England/156/2022	Sa.2a	2022-08-23	SIAT1/MDCK1	80	80	80	80	2560	2560	2560	2560	2560	1280	2560	2560	2560	2560	2560	2560
A/England/156/2022	Sa.2a	2022-08-23	PM/MDCK	80	80	80	80	2560	2560	2560	2560	2560	1280	2560	2560	2560	2560	2560	2560
A/Falkland-Islands/12/2022	Sa.2a.1	2022-07-20	SIAT1/MDCK1	<40	<40	<40	<40	1280	2560	1280	1280	2560	1280	2560	2560	2560	2560	1280	1280
A/Falkland-Islands/9/2022	Sa.2a.1	2022-08-12	SIAT1/MDCK1	<40	<40	<40	<40	640	1280	640	1280	2560	1280	2560	2560	2560	2560	1280	640
A/Falkland-Islands/7/2022	Sa.2a.1	2022-08-12	SIAT1/MDCK1	40	40	<40	<40	1280	2560	1280	1280	2560	1280	2560	2560	2560	2560	1280	1280
A/Falkland-Islands/8/2022	Sa.2a.1	2022-08-12	SIAT1/MDCK1	40	40	<40	<40	640	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
A/Falkland-Islands/10/2022	Sa.2a.1	2022-08-12	SIAT1/MDCK1	<40	<40	<40	<40	640	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
A/Falkland-Islands/8/2022	Sa.2a.1	2022-08-22	MDCK1/MDCK1	<40	<40	<40	<40	1280	1280	1280	1280	2560	1280	2560	2560	2560	2560	1280	1280
A/England/158/2022	Sa.2a.1	2022-11-14	SIAT1/MDCK1	<40	<40	<40	<40	320	320	320	320	640	320	640	320	320	1280	1280	640
A/Wisconsin/67/2022	Sa.2a.1	2022-11-14	v/MDCK1	<40	<40	<40	<40	1280	1280	640	1280	1280	640	1280	1280	1280	1280	1280	1280

< relates to the lowest dilution of antiserum used
ND = Not Done

Vaccine NH 2020-21	Vaccine SH 2021	Vaccine SH 2023	Vaccine NH 2023-2024
NH 2021-22	SH 2022	SH 2023	NH 2023-2024
NH 2022-23			

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H1-7. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-04-25)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre															
				Post-infection ferret antisera								Inhibition titre							
				A/OM-Sw1L1536/2019	A/OM-Sw1L1536/2019	A/Ghans-1894/21	A/Ghans-826/21	A/Denmark-3280/19	N/H-215	A/Sydney-521	A/Sydney-521	A/Norway-2508/99	A/Norway-31694/2022	A/Victoria-4897/2022	A/Victoria-4897/2022	A/IN/23-F95/23	A/IN/23-F95/23	A/IN/23-F95/23	A/IN/23-F95/23
			Passage history Ferret number Genetic group	MDCK F9/20	Egg F1/20	Egg F0/22	Egg F0/22	MDCK F2/20	Egg F3/21	MDCK F4/22	Egg F3/22	MDCK F4/22	Egg F4/22	MDCK F4/22	Egg F4/22	MDCK F4/22	Egg F4/22	Egg F4/22	Egg F4/22
			Sa.1	Sa.1	Sa.1	Sa.1	Sa.1	Sa.1	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2
REFERENCE VIRUSES																			
A/Guangdong-Maonan/SW1L1536/2019																			
A/Silverdale/US/2022																			
A/Slender/US/2022																			
A/Ghania/S-19/2021																			
A/Lyon/20/2021																			
A/Denmark-3280/2019																			
A/Atlanta/23/2020/2019																			
A/Sydney/5/2021 clone 3.4.1																			
A/Sydney/5/2021 pooled clones 10-10																			
A/Norway/2508/2022																			
A/Sydney/5/2021																			
A/Atlanta/4897/2022																			
A/Atlanta/4897/2022																			
A/IN/23-F95/2022																			
TEST VIRUSES																			
A/Sydney/9/2022																			
A/Slender/US/2022																			
A/Slender/US/2022																			
A/Bahkesh/S-58/SAR/2022																			
A/Bahkesh/S-58/SAR/2022																			
A/Almipiro/43/2022 (1060193)																			
A/Almipiro/43/2022 (1060193)																			
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A/Almipiro/PL42/2022																			
A/Almipiro/PL42/2022																			

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A horizontal row of six small, square-shaped colored blocks. From left to right, the colors are light blue, yellow, orange, red, blue, and grey. The squares are evenly spaced and aligned horizontally.

Table H1-8. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-05-04)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre												
				Post-infection ferret antiserum												
				A/G-M SWL1536/19	A/G-M SWL1536/19	A/Ghana 1894/21	A/Lyon 3280/19	A/Denmark AVic/287/19	IVR-218 S/21	A/Sydney S/21	A/Sydney S/21	A/Norway 28889/22	A/Norway 31634/2022	A/Victoria 4897/2022	IVR-238 AVic/4897/2022	
			Passage history	MDCK F09/20 Sa.1	Egg F1/20 Sa.1	Egg F02/22 Sa.1	Egg F06/22 Sa.1	MDCK F28/20 Sa.2	Egg F37/21 Sa.2	MDCK F46/22 Sa.2a	Egg F40/22 Sa.2a	MDCK F38/22 Sa.2a	Egg F44/22 Sa.2a.1	MDCK F05/23 Sa.2a.1	Egg F07/23 Sa.2a.1	
REFERENCE VIRUSES																
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	C2/MDCK1	2560	1280	1280	320	40	80	40	40	40	<40	<40	<40	160
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	E3/E2	1280	2560	640	320	<40	80	<40	40	<40	<40	<40	<40	80
A/Guangdong-1984/2021	Sa.1	2021-07-21	E2/E1	2560	2560	1280	640	80	80	40	80	40	<40	<40	<40	80
A/Alvarez/2021	Sa.1	2021-07-16	E1/E2	320	320	160	640	40	40	40	40	40	<40	<40	<40	160
A/Denmark/3280/2019	Sa.2	2019-11-10	MDCK4/MDCK5	80	80	80	80	1280	1280	640	1280	640	320	640	640	640
IVR-215 (A/Victoria/2570/2019)	Sa.2	2018-11-22	E4/07/E2	160	160	40	90	640	1280	640	1280	640	320	640	640	1280
A/Sydney/5/2021 clone 3.4.1	Sa.2a	2019-10-16	MDCK3/MDCK3	40	80	40	40	1280	2560	2560	1280	640	640	1280	1280	2560
A/Sydney/5/2021 cloned clones 10-10	Sa.2a	2022-05-15	E3/E2	80	80	40	40	1280	1280	1280	1280	640	640	640	640	640
A/Norway/28889/2022	Sa.2a.1	2022-06-15	MDCK3	40	40	<40	<40	640	1280	640	1280	640	1280	640	1280	640
A/Norway/31634/2022	Sa.2a.1	2022-09-24	E3/E1/10-3	40	40	<40	<40	640	1280	640	1280	640	1280	640	1280	640
A/Victoria/4897/2022	Sa.2a.1	2022-10-02	SIAT2/MDCK2	80	80	<40	<40	1280	2560	2560	2560	1280	1280	1280	1280	2560
IVR-238 (A/Victoria/4897/2022)	Sa.2a.1	2022-10-02	E3/D/E1/10-6	40	40	<40	<40	1280	1280	1280	1280	640	640	640	640	2560
TEST VIRUSES																
A/Bishkek/021/2022	Sa.2a	2022-12-06	MDCK1/MDCK1	80	80	40	40	1280	2560	2560	2560	1280	640	2560	2560	2560
A/Bishkek/022/2022	Sa.2a	2022-12-06	MDCK1/MDCK1	80	80	40	40	640	1280	1280	1280	640	640	2560	2560	1280
A/Bishkek/023/2022	Sa.2a	2022-12-13	MDCK1/MDCK1	80	80	40	80	2560	2560	1280	2560	2560	1280	2560	2560	2560
A/Bishkek/033/2022	Sa.2a	2022-12-13	MDCK1/MDCK1	80	80	40	40	2560	2560	1280	2560	2560	1280	2560	2560	2560
A/Bishkek/027/2022	Sa.2a	2022-12-14	MDCK1/MDCK1	80	80	40	40	1280	2560	2560	2560	1280	640	2560	2560	2560
A/Bishkek/028/2022	Sa.2a	2022-12-15	MDCK1/MDCK1	80	80	40	50	1280	640	640	640	640	640	1280	1280	1280
A/Bishkek/034/2022	Sa.2a	2022-12-15	MDCK1/MDCK1	80	80	40	40	1280	2560	1280	1280	1280	1280	2560	2560	2560
A/Bishkek/026/2022	Sa.2a	2022-12-15	MDCK1/MDCK1	80	80	40	20	1280	2560	2560	2560	2560	640	2560	2560	2560
A/Bishkek/025/2022	Sa.2a	2022-12-16	MDCK1/MDCK1	80	80	40	40	2560	2560	2560	2560	640	640	2560	2560	2560
A/Bishkek/028/2022	Sa.2a	2022-12-17	MDCK1/MDCK1	80	80	40	80	1280	1280	1280	1280	1280	1280	1280	1280	1280
A/Bishkek/029/2022	Sa.2a	2022-12-17	MDCK1/MDCK1	80	80	40	40	1280	1280	1280	1280	1280	1280	1280	1280	1280
A/Bishkek/030/2022	Sa.2a	2022-12-19	MDCK1/MDCK2	40	40	<40	<40	1280	1280	1280	1280	1280	1280	1280	1280	1280
A/Bishkek/033/2022	Sa.2a	2022-12-20	MDCK1/MDCK2	160	160	80	80	1280	1280	1280	1280	1280	1280	1280	1280	2560
A/Bishkek/042/2022	Sa.2a	2022-12-21	MDCK1/MDCK1	80	80	40	40	1280	2560	2560	2560	1280	640	2560	2560	2560
A/Bishkek/041/2022	Sa.2a	2022-12-21	MDCK1/MDCK2	40	40	<40	<40	640	1280	1280	1280	1280	640	1280	1280	1280
A/Albania/290583/2022	Sa.2a	2022-12-22	MDCK1	80	80	40	40	1280	2560	2560	2560	1280	640	2560	2560	2560
A/Albania/290546/2023	Sa.2a	2023-01-05	MDCK1	80	40	40	40	1280	2560	2560	2560	1280	1280	2560	2560	2560
A/Albania/290529/2023	Sa.2a	2023-01-05	MDCK1	160	160	40	80	2560	2560	2560	2560	1280	1280	2560	2560	2560
A/Albania/290532/2023	Sa.2a	2023-01-05	MDCK2	160	160	40	40	2560	2560	2560	2560	1280	1280	1280	1280	1280
A/Israel/R7277023	Sa.2a	2023-01-10	MDCK2	40	40	<40	<40	1280	1280	1280	1280	1280	1280	640	1280	1280
A/Bishkek/027/2023	Sa.2a	2023-01-13	MDCK1/MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	2560	2560	2560
A/Albania/290345/2022	Sa.2a.1	2022-12-29	MDCK1	<40	<40	<40	<40	320	640	320	320	640	640	1280	1280	640

< relates to the lowest dilution of antiserum used

NH = Not Done

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H1-9. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-05-16)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre											
				Post-infection ferret antiserum											
				A/G-M SWL1536/19	A/G-M SWL1536/19	A/Ghana 1894/21	A/Lyon 820/21	A/Denmark 3280/19	IVR-215 AVic/2870/19	A/Sydney 5/21	A/Sydney 5/21	A/Norway 21689/22	A/Norway/ 31694/2022	A/Victoria/ 4897/2022	A/Victoria/ AVG/64997/22
Passage history	Ferret number			MDCK F09/20	Egg Sa.1	Egg Sa.1	Egg Sa.1	MDCK F28/20	Egg Sa.2	MDCK F37/21	Egg Sa.2	MDCK F46/22	Egg Sa.2	MDCK F58/22	Egg Sa.2
Genetic group				Sa.1	Sa.1	Sa.1	Sa.1	Sa.2	Sa.2	F04/23	F04/23	F07/23	Sa.2	Sa.2	Sa.2
REFERENCE VIRUSES															
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	C2/MDCK1	1280	1280	640	320	40	80	40	40	40	<40	<40	160
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	E3/E2	1280	1280	640	320	<40	40	<40	<40	<40	<40	<40	80
A/Guinea/1894/2021	Sa.1	2021-07-21	E2/E1	2560	1280	320	40	80	80	40	80	80	<40	<40	80
A/Guinea/1894/2021	Sa.1	2021-07-16	E1/E2	2560	320	160	<20	40	40	40	40	40	<40	<40	160
A/Denmark/13280/2019	Sa.2	2019-11-10	MDCK4/MDCK5	80	80	40	80	1280	1280	640	640	640	320	640	320
IVR-215 (AVictoria/2570/2019)	Sa.2	2018-11-22	E4/D7/E2	80	80	40	80	640	640	640	640	320	320	640	640
A/Sydney/5/2021 clone 3.4.1	Sa.2a	2021-10-16	MDCK3/MDCK3	40	80	40	40	1280	2560	1280	1280	1280	1280	1280	1280
A/Sydney/5/2021 pooled clones 10-10	Sa.2a	2022-10-31	E3/E2	40	40	40	40	1280	1280	640	640	320	320	640	640
A/Hong Kong/36/2002	Sa.2a.1	2002-09-15	MDCK	40	40	<40	40	640	640	640	640	1280	1280	1280	1280
A/Norway/31694/2022	Sa.2a.1	2022-09-24	E3/E1 10-3	40	40	<40	40	320	640	640	640	640	640	640	1280
A/Victoria/4897/2022	Sa.2a.1	2022-10-02	SIAT2/MDCK2	40	40	<40	40	1280	2560	1280	2560	2560	1280	2560	2560
IVR-238 (AVictoria/4897/2022)	Sa.2a.1	2022-10-04	E3/D6/E1 10-6	40	40	<40	40	640	640	1280	1280	320	1280	1280	1280
TEST VIRUSES															
A/Toamasina/07309/2022	Sa.1	2022-11-29	MDCK1	1280	1280	1280	80	40	80	80	160	40	<40	<40	80
A/Lisboa/755/2022	Sa.2a	2022-12-19	MDCK1	40	40	40	40	1280	2560	1280	1280	2560	640	2560	2560
A/Ireland/20514/2022	Sa.2a	2022-12-19	MDCK1	40	40	<40	40	1280	2560	1280	1280	2560	640	2560	2560
A/Ireland/20514/2022	Sa.2a	2022-12-22	MDCK1	40	40	<40	40	640	1280	1280	1280	1280	640	1280	1280
A/Albania/29956/2023	Sa.2a	2023-01-05	MDCK2	40	40	40	40	1280	2560	1280	1280	1280	640	1280	1280
A/Montenegro/101995/2023	Sa.2a	2023-01-09	MDCK1	80	80	40	40	2560	2560	1280	1280	1280	1280	2560	2560
A/Minerv/50074/2023	Sa.2a	2023-01-12	MDCK1	80	80	40	40	2560	2560	1280	2560	1280	640	2560	2560
A/Iceland/50078/2023	Sa.2a	2023-01-15	MDCK1	80	80	40	40	1280	2560	1280	2560	1280	640	2560	2560
A/Ireland/51102/2022	Sa.2a.1	2022-12-26	MDCK1	80	80	<40	640	1280	2560	1280	2560	1280	2560	1280	1280

< relates to the lowest dilution of antiserum used

ND = Not Done

NH 2020-21

Vaccine

Vaccine

Vaccine

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H1-10. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-05-23)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre											
				Post-infection ferret antiserum											
				A/G-M SWL1536/19	A/G-M SWL1536/19	A/Ghana 1894/21	A/Lyon 3230/21	A/Denmark 3280/19	A/Vic/2670/19	S/21 S21	I/VR215 2689/22	A/Sydney 31694/2022	A/Norway 4897/2022	A/Victoria AV/4897/22	I/VR238 AV/4897/22
REFERENCE VIRUSES			Passage history	MDCK F09/20 Sa.1	Egg F1/2/20 Sa.1	Egg F0/2/22 Sa.1	Egg F0/6/22 Sa.1	MDCK F28/20 Sa.2	Egg F3/7/21 Sa.2	MDCK F46/22 Sa.2a	Egg F0/4/22 Sa.2a	MDCK F3/8/22 Sa.2a	Egg F4/8/21 Sa.2a.1	MDCK F0/5/23 Sa.2a.1	Egg F0/7/23 Sa.2a.1
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	C2/MDCK1	2560	1280	640	320	40	<40	<40	<40	<40	<40	<40	80
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	E3/E2	640	640	640	320	<40	40	40	<40	<40	<40	<40	40
A/Ghana/1994/2021	Sa.1	2021-07-21	E2/E1	2560	1280	640	320	40	80	40	40	40	40	40	50
A/Lyons/1991/21	Sa.1	2021-07-16	E1/E2	2560	1280	640	320	40	80	40	40	40	40	40	100
A/Denmark/3280/2019	Sa.2	2019-11-10	MDCK4/MDCK6	40	40	<40	40	1280	1280	640	1280	1280	320	1280	640
IVR-215 (A/Victoria/2570/2019)	Sa.2	2018-11-22	E4/D7/E2	160	80	40	80	640	1280	640	640	320	640	320	640
A/Sydney/5/2021 clone 3.4.1	Sa.2a	2021-10-16	MDCK3/MDCK3	40	40	<40	40	1280	1280	1280	1280	1280	1280	1280	1280
A/Sydney/5/2021 cloned clones 10-10	Sa.2a	2022-10-01	E3/E5	80	80	40	40	640	1280	1280	1280	1280	1280	1280	2560
A/Norway/5/2022	Sa.2a.1	2022-08-15	MDCK3	<40	<40	<40	<40	640	640	640	640	640	640	640	640
A/Norway/5/2022	Sa.2a.1	2022-09-24	E3/E1 10-3	<40	<40	<40	<40	320	320	640	640	320	1280	640	640
A/Victoria/4897/2022	Sa.2a.1	2022-10-02	SIAT2/MDCK2	40	40	<40	<40	1280	1280	1280	1280	2560	1280	2560	1280
IVR-238 (A/Victoria/4897/2022)	Sa.2a.1	2022-10-02	E3/09/E1 10-6	80	80	40	80	1280	1280	1280	1280	640	1280	2560	1280
TEST VIRUSES															
A/Antisabre/07452/2022	Sa.2a	2022-12-05	MDCK1	40	40	<40	<40	640	640	640	640	320	1280	640	640
A/Lisboa/756/2022	Sa.2a	2022-12-19	MDCK1	40	40	<40	<40	640	1280	1280	1280	640	1280	1280	1280
A/Montenegro/1023/2022	Sa.2a	2022-12-19	MDCK1	40	40	<40	<40	320	640	640	640	320	640	640	640
A/MountLebanon/284/2022	Sa.2a	2022-12-20	MDCK1	40	40	<40	<40	1280	1280	1280	1280	640	1280	1280	1280
A/Albania/290499/2023	Sa.2a	2023-01-04	MDCK3	40	40	40	40	640	640	640	640	320	1280	1280	1280
A/Albania/290464/2023	Sa.2a	2023-01-04	MDCK2	80	40	<40	<40	1280	2560	1280	1280	640	2560	2560	2560
A/Albania/Lebanon/290463/2023	Sa.2a	2023-01-04	MDCK1	40	40	<40	<40	640	1280	1280	640	320	640	640	1280
A/Montenegro/1023/2023	Sa.2a	2023-01-10	MDCK1	80	40	<40	<40	1280	2560	2560	1280	640	2560	2560	2560
A/North Lebanon/50063/2023	Sa.2a	2023-01-11	MDCK1	40	<40	<40	<40	320	640	320	640	320	160	640	640
A/Estonia/1K282/2023	Sa.2a	2023-02-11	MDCK1	40	<40	<40	<40	320	640	320	640	320	160	640	640
A/Estonia/1K282/2023	Sa.2a	2023-02-14	MDCK1	40	40	<40	<40	640	1280	640	1280	640	320	1280	1280
A/Estonia/1T3456/2023	Sa.2a	2023-02-14	MDCK1	40	40	<40	<40	640	1280	640	1280	640	320	1280	1280
A/Estonia/1T3456/2023	Sa.2a	2023-02-14	MDCK1	40	40	<40	<40	640	1280	640	1280	640	320	1280	1280
A/Estonia/1T3456/2023	Sa.2a	2023-02-21	MDCK1	40	<40	<40	<40	320	640	320	640	320	320	640	640
A/Estonia/1T3652/2023	Sa.2a	2023-03-02	MDCK1	40	40	<40	<40	1280	1280	1280	2560	1280	640	1280	2560
A/Estonia/1T3780/2023	Sa.2a	2023-03-07	MDCK1	40	40	<40	<40	640	1280	1280	640	320	1280	1280	1280
A/Slovenia/812/2023	Sa.2a	2023-03-15	MDCK9/MDCK1	40	40	<40	<40	640	1280	640	640	640	320	640	640
A/Spain/1023/2023	Sa.2a	2023-03-15	MDCK1	40	40	<40	<40	640	1280	1280	1280	640	320	1280	640
A/Estonia/17471/2023	Sa.2a	2023-04-14	MDCK1	40	40	<40	<40	640	1280	640	1280	640	320	1280	2560
A/Albania/290245/2022	Sa.2a	2023-04-14	MDCK3	<40	<40	<40	<40	80	160	160	160	320	320	320	320
A/Ireland/79395/2022	Sa.2a.1	2022-12-17	MDCK3	<40	<40	<40	<40	160	320	160	160	320	160	640	160
A/Lisboa/733/2022	Sa.2a.1	2022-12-17	MDCK1	<40	<40	<40	<40	640	640	640	1280	1280	640	1280	640
< relates to the lowest dilution of antiserum used				Vaccine NH 2020-21				Vaccine SH 2021				Vaccine NH 2023			
ND = Not Done				Vaccine NH 2022-21				Vaccine SH 2022				Vaccine NH 2023-2024			

Table H1-11. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-06-01)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre																			
				Post-infection ferret antisera				Post-infection ferret antisera															
				A/G-M		A/G-M		A/Ghana		A/Lyon		A/Denmark		IVR-215		A/Sydney		A/Norway		A/Norway		A/Victoria	
Passage history	Ferret number			MDCK	Egg	F1/2/20	F02/22	Egg	MDCK	F2/20	Egg	MDCK	Egg	MDCK	Egg	MDCK	Egg	MDCK	F05/23	F4/22	F3/8/22	F4/22	F07/23
Genetic group		Sa.1	Sa.1	Sa.1	Sa.1	Sa.1	Sa.1	Sa.1	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	
REFERENCE VIRUSES																							
A/Guangdong/Maonan/9WL1536/2019	Sa.1	2019-06-17	C2/MDCK1	2560	1280	1280	320	40	80	40	40	40	<40	<40	<40	<40	<40	<40	<40	<40	<40	160	
A/Guangdong/Maonan/9WL1536/2019	Sa.1	2019-06-17	E3/E1	1280	640	320	40	80	<40	40	40	40	<40	<40	<40	<40	<40	<40	<40	<40	<40	80	
A/Ghana/1894/2021	Sa.1	2021-07-21	E2/E1	2560	2560	1280	320	40	80	40	80	40	40	<40	<40	<40	<40	<40	<40	<40	<40	80	
A/Lyon/2020/2021	Sa.1	2021-07-16	E1/E2	640	320	320	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	320	
A/Allemagne/2019/2019	Sa.1	2019-11-10	MDCK4/MDCK2	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160
IVR-215 (A/Victoria/2570/2019)	Sa.2	2018-11-22	E4/D7/E2	160	80	40	80	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
A/Sydney/9/2021 clade 3.4.1	Sa.2	2021-10-16	MDCK3/MDCK3	160	160	40	40	1280	2560	2560	2560	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
A/Algeria/2020/2020 cloned clones 10-10	Sa.2	2021-06-15	E3/E3	80	40	40	40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	
A/Norway/20889/2022	Sa.2	2022-06-15	MDCK3	40	80	<40	<40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	
A/Norway/11894/2022	Sa.2	2022-06-24	E3/E1/10-3	40	80	80	80	640	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	
A/Allemagne/2019/2022	Sa.2	2022-06-22	SIAT2/MDCK2	80	80	<40	<40	1280	2560	2560	2560	2560	2560	2560	2560	2560	2560	2560	2560	2560	2560	2560	
IVR-238 (A/Victoria/4897/2022)	Sa.2	2022-10-02	E3/M4/E1/10-8	80	80	40	80	640	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	
TEST VIRUSES																							
A/Macedonia/364/2022	Sa.2	2022-12-19	MDCK1	80	40	<40	<40	1280	2560	2560	2560	640	640	640	320	1280	1280	1280	1280	1280	1280	1280	
A/Malaysia/Region12/2022	Sa.2	2022-12-19	MDCK1	80	40	80	80	2560	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Algeria/2720/2022	Sa.2	2022-12-20	MDCK1	80	40	<40	<40	1280	2560	2560	2560	640	640	640	320	1280	1280	1280	1280	1280	1280	1280	
A/Estonia/172548/2022	Sa.2	2022-12-27	MDCK1	80	80	40	80	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/1727/2023	Sa.2	2023-01-09	SIAT/MDCK1	80	80	<40	<40	1280	1280	1280	1280	640	640	640	320	1280	1280	1280	1280	1280	1280	1280	
A/Slovenia/1727/2023	Sa.2	2023-01-09	MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	640	320	1280	1280	1280	1280	1280	1280	1280	
A/Slovenia/1727/2023	Sa.2	2023-01-09	MDCK1	160	160	40	80	2560	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/1727/2023	Sa.2	2023-01-11	MDCK1	160	160	40	80	2560	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/1727/2023	Sa.2	2023-01-13	MDCK1	80	80	40	80	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/1727/2023	Sa.2	2023-01-15	MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/1727/2023	Sa.2	2023-01-17	MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/1727/2023	Sa.2	2023-01-19	MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/1727/2023	Sa.2	2023-01-21	MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/1727/2023	Sa.2	2023-01-23	MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/27/2023	Sa.2	2023-01-23	SIAT/MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/27/2023	Sa.2	2023-01-23	SIAT/MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/27/2023	Sa.2	2023-01-23	SIAT/MDCK1	160	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/27/2023	Sa.2	2023-01-23	SIAT/MDCK1	160	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/27/2023	Sa.2	2023-01-23	SIAT/MDCK1	160	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/27/2023	Sa.2	2023-01-23	SIAT/MDCK1	160	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Slovenia/27/2023	Sa.2	2023-01-23	SIAT/MDCK1	160	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Bulgaria/1762/2023	Sa.2	2023-01-23	MDCK2	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Bulgaria/1762/2023	Sa.2	2023-01-27	MDCK2	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Bulgaria/1762/2023	Sa.2	2023-03-01	MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Serbia/31/2023	Sa.2	2023-01-09	MDCK1	80	40	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Serbia/185/2023	Sa.2	2023-01-09	MDCK2	40	80	<40	<40	1280	2560	2560	2560	1280	1280	1280	2560	2560	2560	2560	2560	2560	2560	2560	
A/Serbia/31/2023	Sa.2	2023-01-10	MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
A/Serbia/31/2023	Sa.2	2023-01-10	MDCK1	80	80	<40	<40	1280	2560	2560	2560	640	640	640	2560	2560	2560	2560	2560	2560	2560	2560	
Legend																							
< 4-fold																							
4-fold																							
8-fold																							

Table H1-12. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-06-07)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre																
				Post-infection ferret antiserum																
				A/G-M SWL1536/19	A/G-M SWL1536/19	A/Ghans 1894/21	A/lynn 820/21	A/Denmark 3286/19	A/US/2079/19	A/Sydney 5/21	A/Sydney 26889/22	A/Norway 3164/2022	A/Norway 4897/2022	A/Victoria A/Vic/4897/2022	A/Victoria VR-238					
			Passage history	MDCK	Egg	Egg	Egg	MDCK	Egg	MDCK	Egg	MDCK	Egg	MDCK	Egg	MDCK	Egg	MDCK	Egg	
			Ferret number	F09/20	F02/22	F06/22	F08/20	F37/21	F04/22	F06/22	F08/22	F04/22	F06/22	F08/22	F04/22	F06/22	F08/22	F04/22	F06/22	
			Genetic group	Sa.1	Sa.1	Sa.1	Sa.1	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	Sa.2	
REFERENCE VIRUSES																				
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	C2/MDCK1	1280	1280	1280	320	40	80	40	40	40	<40	<40	<40	<40	<40	<40	160	
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	E3/E2	1280	1280	640	160	<40	80	<40	40	<40	<40	<40	<40	<40	<40	<40	80	
A/Guinea/1894/2021	Sa.1	2021-07-21	E2/E1	2560	1280	320	80	160	80	80	80	80	40	<40	<40	<40	<40	<40	<40	160
A/lysophilis/2021	Sa.1	2021-07-16	E2/E1	640	320	<40	40	160	80	80	80	80	40	<40	<40	<40	<40	<40	<40	160
A/Denmark/3280/2019	Sa.2	2019-11-10	MDCK/MDCK6	160	320	80	160	2560	2560	2560	2560	1280	640	2560	2560	2560	2560	2560	2560	2560
IVR-215 (A/Victoria/2570/2019)	Sa.2	2018-11-22	E4/07/E2	160	80	80	80	640	1280	640	1280	640	320	640	320	640	320	640	320	1280
A/Sydney/9/2021 clone 3.4.1	Sa.2a	2021-10-16	MDCK/MDCK6	80	80	40	40	1280	2560	1280	2560	1280	640	2560	1280	2560	1280	640	2560	1280
A/Sydney/9/2021 pooled clones 10-10	Sa.2a	2022-01-31	E3/E3	80	80	40	40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	1280
A/Hong Kong/1/2022	Sa.2a.1	2022-06-15	MDCK	40	40	<40	40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	1280
A/Norway/31694/2022	Sa.2a.1	2022-09-24	E1/E1 10-3	40	40	<40	80	640	1280	1280	2560	1280	640	320	1280	2560	1280	640	2560	1280
A/Victoria/4897/2022	Sa.2a.1	2022-10-02	SIAT2/MDCK2	160	80	<40	80	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	1280
IVR-238 (A/Victoria/4897/2022)	Sa.2a.1	2022-10-02	E3/DE/1 10-6	80	80	40	80	640	1280	1280	2560	1280	640	320	1280	2560	1280	640	2560	1280
TEST VIRUSES																				
A/SaudiArabia/1317/2022	Sa.2a	2022-09-21	MDCK1	40	40	<40	<40	640	1280	640	640	640	320	640	1280	640	320	640	1280	
A/SaudiArabia/2248/2022	Sa.2a	2022-11-02	MDCK1	40	40	<40	<40	640	1280	640	640	640	320	640	1280	640	320	640	1280	
A/Iraq/10/2022	Sa.2a	2022-11-05	MDCK1	80	80	40	40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	
A/Greece/717/2022	Sa.2a	2022-12-27	MDCK1	80	40	<40	<40	320	640	640	640	640	320	1280	1280	640	320	1280	1280	
A/Greece/ILL_412/2023	Sa.2a	2023-01-09	MDCK1	40	40	<40	<40	640	1280	640	640	640	320	640	1280	640	320	640	1280	
A/Bulgaria/237/2023	Sa.2a	2023-01-15	MDCK/MDCK1	80	80	40	40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	
A/Bulgaria/238/2023	Sa.2a	2023-01-16	MDCK/MDCK1	160	80	40	50	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	
A/Bulgaria/514/2023	Sa.2a	2023-01-16	MDCK/MDCK1	80	80	40	40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	
A/Bulgaria/984/2023	Sa.2a	2023-01-17	MDCK/MDCK1	40	40	<40	<40	640	1280	640	640	640	320	1280	1280	640	320	1280	1280	
A/Greece/31/2023	Sa.2a	2023-01-18	MDCK1	40	40	<40	<40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	1280	
A/Bulgaria/1043/2023	Sa.2a	2023-01-20	MDCK/MDCK1	80	80	40	40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	
A/Bulgaria/1230/2023	Sa.2a	2023-01-24	MDCK/MDCK1	40	40	<40	<40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	
A/Bulgaria/147/2023	Sa.2a	2023-01-24	MDCK/MDCK1	160	160	40	40	2560	2560	2560	2560	2560	640	2560	2560	2560	640	2560	2560	
A/Bulgaria/1376/2023	Sa.2a	2023-01-31	MDCK/MDCK1	160	160	40	50	2560	2560	1280	2560	2560	640	2560	2560	1280	640	2560	1280	
A/Bulgaria/1319/2023	Sa.2a	2023-01-31	MDCK/MDCK1	40	40	<40	<40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	
A/Bulgaria/1418/2023	Sa.2a	2023-02-01	MDCK/MDCK1	80	80	40	40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	
A/Bulgaria/1502/2023	Sa.2a	2023-02-07	MDCK/MDCK1	80	80	40	40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	
A/Bulgaria/1552/2023	Sa.2a	2023-02-20	MDCK/MDCK1	80	80	40	40	640	1280	640	640	640	160	640	160	640	160	640	160	
A/Bulgaria/151/2023	Sa.2a	2023-02-20	MDCK/MDCK1	80	80	40	40	1280	2560	1280	2560	1280	640	1280	640	1280	640	1280	1280	
A/Bulgaria/1570/2023	Sa.2a	2023-02-21	MDCK/MDCK1	80	80	40	50	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	
A/Bulgaria/1582/2023	Sa.2a	2023-02-22	MDCK/MDCK1	80	80	40	40	1280	2560	1280	2560	1280	640	320	1280	2560	1280	640	2560	
A/Bulgaria/1752/2023	Sa.2a	2023-03-14	MDCK/MDCK1	80	80	40	40	1280	2560	1280	2560	1280	640	640	640	640	640	640	2560	
A/Bulgaria/379/2023	Sa.2a.1	2023-01-15	MDCK/MDCK1	40	80	<40	40	640	1280	640	1280	1280	640	640	2560	1280	640	2560	1280	
A/Bulgaria/920/2023	Sa.2a.1	2023-01-17	MDCK/MDCK1	40	40	<40	<40	1280	1280	640	1280	1280	640	1280	1280	640	1280	1280	1280	

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine NH 2020-21

Vaccine SH 2021

Vaccine SH 2023

Vaccine NH 2023-2024

SH 2022

SH 2022-23

NH 2022-23

> 160 (no homologous titre)

Table H1-13. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-06-27)

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre																					
				Post-infection ferret antiserum																					
				SWL1536/19		A/G-M F09/20		A/G-M F10/20		A/Ghana F02/22		A/Lyon F06/22		A/Denmark F28/20		IR-218 F37/21		A/Sydney F37/21		A/Sydney F21		A/Norway 2008/22		A/Norway 3169/2022	
				MDCK	Egg	Egg	Egg	MDCK	Egg	MDCK	Egg	MDCK	Egg	MDCK	Egg	MDCK	Egg	MDCK	Egg	MDCK	Egg				
				F09/20 Sa.1	F10/20 Sa.1	F02/22 Sa.1	F06/22 Sa.1	F28/20 Sa.2	F37/21 Sa.2	F37/21 Sa.2a	F46/22 Sa.2a	F46/22 Sa.2a	F46/22 Sa.2a	F46/22 Sa.2a	F46/22 Sa.2a	F46/22 Sa.2a	F46/22 Sa.2a	F46/22 Sa.2a	F46/22 Sa.2a	F46/22 Sa.2a	F46/22 Sa.2a	F05/23 Sa.2a.1	F05/23 Sa.2a.1	F05/23 Sa.2a.1	
REFERENCE VIRUSES																									
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	C2/MDCK1	1280	1280	640	320	40	80	80	40	40	<40	<40	<40	<40	<40	<40	<40	<40	160				
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	E3/E2	1280	1280	640	320	<40	80	80	<40	40	<40	<40	<40	<40	<40	<40	<40	<40	80				
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2021-07-21	E2/E1	2560	2560	1280	320	40	80	80	40	40	<40	<40	<40	<40	<40	<40	<40	<40	160				
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2021-07-21	E1/E2	320	320	320	320	40	80	80	40	40	<40	<40	<40	<40	<40	<40	<40	<40	160				
A/Denmark/328/2020/9	Sa.2	2019-11-10	MDCK4/MDCK6	160	160	40	80	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
IVR-215 (A/Victoria/257/2019)	Sa.2	2018-11-22	E4/D7/E2	160	160	80	80	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Sydney/5/2021 clone 3.4.1	Sa.2	2021-10-16	MDCK3/MDCK3	40	40	<40	<40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Sydney/5/2021 pooled clones 10-10	Sa.2	2021-10-16	E3/E5	160	80	40	80	640	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Norway/3/2022	Sa.2a.1	2022-06-15	MDCK3	40	40	<40	<40	640	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Norway/3/2022	Sa.2a.1	2022-09-24	E3/E1 10-3	40	40	<40	40	320	640	640	640	640	640	640	640	640	640	640	640	640					
A/Victoria/4897/2022	Sa.2a.1	2022-10-02	SIAT2/MDCK2	80	40	<40	40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
IVR-238 (A/Victoria/4897/2022)	Sa.2a.1	2022-10-02	E3/DE1/10-6	80	80	40	80	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
TEST VIRUSES																									
A/Egypt/232/2001/2022	Sa.2a	2022-11-23	MDCK3	40	40	<40	<40	640	640	640	640	640	640	640	640	640	640	640	640	640	1280				
A/Egypt/232/2001/2022	Sa.2a	2022-12-04	MDCK1	40	40	<40	<40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Egypt/232/2001/2022	Sa.2a	2022-12-08	MDCK1	40	40	<40	<40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Egypt/232/246/2022	Sa.2a	2022-12-13	MDCK1	80	80	<40	<40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Netherlands/10245/2023	Sa.2a	2023-02-07	MDCK-MIX2/MDCK1	40	40	<40	<40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Netherlands/10327/2023	Sa.2a	2023-02-09	MDCK-MIX2/MDCK1	40	40	<40	<40	640	640	640	640	640	640	640	640	640	640	640	640	640					
A/Netherlands/10329/2023	Sa.2a	2023-02-09	MDCK-MIX2/MDCK1	80	80	40	40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Netherlands/10334/2023	Sa.2a	2023-02-16	MDCK-MIX2/MDCK1	40	40	<40	<40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Ghax/114/2023	Sa.2a	2023-02-22	MDCK2	40	40	<40	<40	640	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Netherlands/10468/2023	Sa.2a	2023-03-13	MDCK-MIX2/MDCK1	40	40	<40	40	640	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Burgos/48/11/2023	Sa.2a	2023-04-18	MDCK1	40	80	<40	40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Leiden/76/2023	Sa.2a	2023-04-19	MDCK1	80	80	40	40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Netherlands/10519/2023	Sa.2a.1	2023-04-19	MDCK-MIX2/MDCK1	40	40	<40	<40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					
A/Netherlands/10331/2023	Sa.2a.1	2023-04-24	MDCK-MIX2/MDCK1	40	40	<40	<40	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280					

< relates to the lowest dilution of antiserum used

ND = Not Done

< 4-fold 4-fold 8-fold > 8-fold * not recognised by the antiserum ≥ 160 (no homologous titre)

Table H1-14. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-07-04)

Viruses	Other information	Collection date	Passage history	Antigenicity											
				A/G-M SWL1536/19		IVR-215 A/Vic/2570/19		A/Sydney 5/21		A/Sydney 5/21		A/Victoria/ 4897/2022		IVR-238 A/Vic/4897/22	
				Egg F1/20	Egg F37/21	MDCK F46/22	Egg F04/22	MDCK F05/23	Egg F07/23	MDCK F17/23					
REFERENCE VIRUSES															
A/Guangdong-Maonan/SWL1536/2019	5a.1	2019-06-17	E3/E2	640	80	<40	40	<40	40	40	<40				
IVR-215 (A/Victoria/2570/19)	5a.2	2018-11-22	E4/D7/E2	80	1280	640	640	640	640	640	320				
A/Sydney/5/2021 clone 3.4.1	5a.2a	2021-10-16	MDCK3/MDCK3	40	1280	1280	1280	1280	1280	1280	640				
A/Sydney/5/2021 pooled clones 10-10	5a.2a	2022-10-31	E3/E3	40	1280	640	1280	1280	1280	1280	640				
A/Victoria/4897/2022	5a.2a.1	2022-10-02	SIAT2/MDCK2	40	1280	1280	1280	5120	1280	1280	2560				
IVR-238 (A/Victoria/4897/2022)	5a.2a.1	2022-10-02	E3/D6/E1 10-6	40	1280	1280	1280	1280	1280	1280	1280				
A/Wisconsin/67/2022	5a.2a.1	2022-10-25	MDCK2	40	640	640	640	2560	640	640	1280				
TEST VIRUSES															
A/Mauritius/P9816_1-13/2023	5a.2a	2023-02-02	MDCK1/MDCK1	80	2560	1280	2560	1280	2560	2560	1280				
A/Mauritius/P10437_1-14/2023	5a.2a	2023-02-10	MDCKx/MDCK1	160	5120	2560	5120	2560	2560	2560	2560				
A/Mauritius/P10438_1-15/2023	5a.2a	2023-02-14	MDCK1/MDCK1	80	1280	1280	1280	1280	1280	1280	1280				
A/Mauritius/P10431_1-17/2023	5a.2a	2023-02-16	MDCKx/MDCK1	80	2560	2560	2560	2560	2560	2560	2560				
A/Mauritius/P10512_1-18/2023	5a.2a	2023-02-22	MDCKx/MDCK1	80	2560	1280	2560	2560	2560	2560	1280				
A/Mauritius/P10625_1-19/2023	5a.2a	2023-02-23	MDCKx/MDCK1	80	2560	2560	2560	2560	2560	2560	2560				
A/Mauritius/P10754_1-21/2023	5a.2a	2023-02-27	MDCKx/MDCK1	160	2560	2560	2560	2560	2560	2560	1280				
A/Burgos/3972/2023	5a.2a	2023-03-09	SIAT1	80	2560	2560	2560	2560	2560	2560	1280				
A/Mauritius/P21788_1-27/2023	5a.2a	2023-03-23	MDCK2/MDCK1	80	2560	1280	2560	1280	1280	1280	1280				
A/Mauritius/P23333_1-38/2023	5a.2a	2023-04-21	MDCKx/MDCK1	80	2560	1280	2560	2560	2560	2560	1280				
< relates to the lowest dilution of antiserum used				Vaccine NH 2020-21				Vaccine SH 2021				Vaccine NH 2023-24			
ND = Not Done				SH 2023				Vaccine SH 2022				Vaccine NH 2023-24			
								NH 2022-23							

Legend: < 4-fold (white), 4-fold (yellow), 8-fold (orange), > 8-fold (red), not recognised by the antiserum (grey), ≥ 160 (no homologous titre) (blue)

Table H1-15. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-07-11)

NEW

Viruses	Other information	Collection date	Passage history	NEW							
				A/G-M SWL1536/19		IVR-215 A/Vic/2570/19		A/Sydney 5/21		A/Sydney 5/21	
				Egg F1/2/20	Egg F37/2/21	Egg F46/22	Egg F04/22	Egg F05/23	Egg F07/23	MDCK F17/23	
REFERENCE VIRUSES											
A/Guangdong-Maonan/SWL1536/2019	5a.1	2019-06-17	E3/E2	1280	80	<40	40	<40	80	<40	
IVR-215 (A/Victoria/2570/2019)	5a.2	2018-11-22	E4/D7/E2	80	640	320	640	320	640	320	
A/Sydney/5/2021 clone 3.4.1	5a.2a	2021-10-16	MDCK3/MDCK3	80	1280	1280	1280	1280	1280	1280	
A/Sydney/5/2021 pooled clones 10-10	5a.2a	2022-10-31	E3/E3	80	1280	1280	1280	1280	1280	1280	
A/Victoria/4897/2022	5a.2a.1	2022-10-02	SIAT2/MDCK2	40	1280	1280	1280	1280	1280	1280	
IVR-238 (A/Victoria/4897/2022)	5a.2a.1	2022-10-02	E3/D6/E11 10-6	40	1280	640	1280	1280	1280	1280	
A/Wisconsin/67/2022	5a.2a.1	2022-10-25	MDCK2	40	1280	640	1280	2560	1280	1280	1280
TEST VIRUSES											
A/Oujda/388/2023	5a.2a	2023-01-03	MDCK1	80	2560	1280	2560	1280	1280	1280	
A/Moldova/2025143/2023	5a.2a	2023-01-03	MDCK1	80	1280	1280	1280	1280	1280	1280	
A/Moldova/2025271/2023	5a.2a	2023-01-05	MDCK1	80	1280	640	1280	1280	1280	1280	
A/Meknes/530/2023	5a.2a	2023-01-19	MDCK1	80	2560	1280	1280	1280	1280	1280	
A/Moldova/2027110/2023	5a.2a	2023-02-06	MDCK1	40	1280	640	1280	1280	640	640	
A/Ghana/222/2023	5a.2a	2023-02-14	MDCK1	40	1280	640	640	1280	640	640	
< relates to the lowest dilution of antiserum used				Vaccine NH 2020-21	Vaccine NH 2021-22	Vaccine SH 2022	Vaccine SH 2023	Vaccine NH 2023-24	Vaccine NH 2023-24		
ND = Not Done											
											

Table H1-16. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-07-19)

Viruses	Other information	Collection date	Passage history	Antigenic analysis results												
				A/G-M SWL1536/19		IVR-215 A/Vic/2570/19		A/Sydney 5/21		A/Sydney 5/21		A/Victoria/4897/2022				
				Egg F12/20	Egg F37/21	MDCK F46/22	Egg F04/22	MDCK F05/23	Egg F07/23	MDCK F17/23	Egg Sa.1	Egg Sa.2	MDCK Sa.2a	Egg Sa.2a	MDCK Sa.2a.1	Egg Sa.2a.1
REFERENCE VIRUSES																
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	E3/E2	1280	80	<40	40	<40	40	<40	40	<40				
IVR-215 (A/Victoria/2570/2019)	Sa.2	2018-11-22	E4/D7/E2	1280	640	640	640	640	640	640	640	640				
A/Sydney/5/2021 clone 3.4.1	Sa.2a	2021-10-16	MDCK3/MDCK3	80	1280	1280	1280	1280	1280	1280	1280	1280				
A/Sydney/5/2021 pooled clones 10-10	Sa.2a	2022-10-31	E3/E3	40	1280	640	1280	640	1280	1280	1280	1280				
A/Victoria/4897/2022	Sa.2a.1	2022-10-02	SIAT2/MDCK2	40	1280	1280	1280	2560	2560	2560	2560	2560				
IVR-238 (A/Victoria/4897/2022)	Sa.2a.1	2022-10-02	E3/D/E1 10-6	40	1280	640	1280	1280	1280	1280	1280	1280				
A/Wisconsin/67/2022	Sa.2a.1	2022-10-25	MDCK2	80	1280	1280	1280	2560	1280	2560	1280	2560				
TEST VIRUSES																
A/Armenia/1/52/2022	Sa.2a	2022-12-15	MDCK1	80	2560	1280	1280	1280	1280	1280	1280	1280				
A/Armenia/1/52/2022	Sa.2a	2022-12-15	MDCK1	160	2560	2560	2560	2560	2560	2560	2560	2560				
A/Tibesssa/443-4/2022	Sa.2a	2022-12-15	MDCK1	80	2560	1280	2560	2560	2560	2560	2560	1280				
A/Tibesssa/4437/2022	Sa.2a	2022-12-15	MDCK1	40	1280	1280	1280	1280	1280	1280	1280	640				
A/Agadir/22/2022	Sa.2a	2022-12-26	MDCK1	80	2560	1280	2560	2560	2560	2560	2560	1280				
A/Agadir/23/2022	Sa.2a	2022-12-27	MDCK1	40	1280	1280	1280	1280	1280	1280	1280	640				
A/Agadir/285/2022	Sa.2a	2022-12-28	MDCK1	80	2560	1280	2560	1280	1280	1280	1280	1280				
A/Armenia/84/2023	Sa.2a	2023-01-09	MDCK1	40	2560	1280	1280	2560	1280	1280	1280	1280				
A/Bulgaria/23/2023	Sa.2a	2023-01-15	MDCK2/SIAT1	80	1280	1280	2560	1280	1280	1280	1280	1280				
A/Armenia/24/2023	Sa.2a	2023-01-16	MDCK1	80	2560	2560	2560	2560	2560	2560	2560	1280				
A/Sweden/1883/2023	Sa.2a	2023-01-23	SIAT1/MDCK1	80	2560	1280	2560	2560	2560	1280	1280	1280				
A/BosniaAndHerzegovina/156/2023	Sa.2a	2023-01-31	MDCK1	40	640	640	640	1280	640	320	320	320				
A/Switzerland/8581/2023	Sa.2a	2023-02-06	MDCK1/MDCK1	80	2560	1280	2560	2560	2560	2560	2560	1280				
A/Switzerland/94869/2023	Sa.2a	2023-02-09	MDCK1/MDCK1	80	1280	1280	1280	1280	1280	1280	1280	1280				
A/Sweden/1987/2023	Sa.2a	2023-02-09	SIAT1/MDCK1	80	2560	1280	1280	1280	1280	1280	1280	1280				
A/Switzerland/40234/2023	Sa.2a	2023-02-15	SIAT1/MDCK1	40	640	640	1280	640	640	640	640	640				
A/Norway/3014/2023	Sa.2a	2023-02-21	MDCK1	80	2560	2560	2560	2560	2560	2560	2560	2560				
A/Bulgaria/1546/2023	Sa.2a	2023-02-21	MDCK2/MDCK1	80	1280	1280	2560	2560	2560	2560	2560	1280				
A/Bulgaria/1545/2023	Sa.2a	2023-02-21	MDCK2/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280				
A/Switzerland/12907/2023	Sa.2a	2023-02-21	MDCK2/MDCK1	80	2560	2560	2560	2560	2560	2560	2560	1280				
A/Switzerland/76467/2023	Sa.2a	2023-02-27	SIAT1/MDCK1	60	2560	1280	2560	2560	2560	2560	2560	1280				
A/Sweden/4141/2023	Sa.2a	2023-03-03	SIAT1/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	640				
A/Eskilstuna/3/2023	Sa.2a	2023-03-05	SIAT1/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	640				
A/Norway/3602/2023	Sa.2a	2023-03-06	MDCK1	80	2560	2560	2560	2560	2560	2560	2560	2560				
A/BosniaAndHerzegovina/219/2023	Sa.2a	2023-03-09	MDCK1	40	1280	1280	1280	1280	1280	1280	1280	640				
A/Sweden/50473/2023	Sa.2a	2023-03-13	SIAT1/MDCK1	40	1280	640	1280	1280	1280	1280	1280	640				
A/Sweden/4097/2023	Sa.2a	2023-03-14	SIAT1/MDCK1	80	1280	1280	1280	1280	1280	1280	1280	1280				
A/Ireland/19959/2023	Sa.2a	2023-03-22	MDCK1	80	1280	1280	1280	1280	1280	1280	1280	640				
A/Sweden/4722/2023	Sa.2a	2023-03-25	SIAT1/MDCK1	40	1280	640	1280	1280	1280	1280	1280	640				
A/Norway/4944/2023	Sa.2a	2023-03-27	MDCK1	80	1280	1280	2560	2560	2560	2560	2560	1280				
A/Norway/5249/2023	Sa.2a	2023-04-03	MDCK1	40	2560	1280	1280	1280	1280	1280	1280	640				
A/Sweden/5227/2023	Sa.2a	2023-04-15	SIAT1/MDCK1	80	2560	1280	2560	2560	2560	2560	2560	1280				
A/Sweden/5499/2023	Sa.2a	2023-04-24	SIAT1/MDCK1	80	1280	1280	1280	1280	1280	1280	1280	1280				
A/Norway/1502/2023	Sa.2a.1	2023-01-23	MDCK1	80	2560	1280	2560	2560	2560	1280	1280	2560				
A/Norway/5021/2023	Sa.2a.1	2023-03-17	MDCK1	40	1280	1280	1280	2560	2560	2560	2560	1280				
A/Falun/2/2023	no seq	2023-02-21	SIAT1/MDCK1	80	2560	1280	2560	2560	2560	2560	2560	1280				

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine NH 2020-21

Vaccine SH 2021

Vaccine SH 2022

Vaccine NH 2022-23

Vaccine NH 2023-24

Vaccine NH 2023-24

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H1-17. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-07-25)

Viruses	Other information	Collection date	Passage history																				
				A/G-M SWL1536/19		IVR-215 A/Vic/2570/19		A/Sydney 5/21		A/Sydney 5/21		A/Victoria/4897/2022		IVR-238 A/Vic/4897/22									
Passage history		Ferret number		Egg	Egg	MDCK	Egg	MDCK	Egg	MDCK	F05/23	F07/23	F17/23	Genetic group	Sa.1	Sa.2	Sa.2a	Sa.2a	Sa.2a.1	Sa.2a.1	Sa.2a.1		
REFERENCE VIRUSES																							
A/Guangdong-Maonan/SWL1536/2019	Sa.1	2019-06-17	E3/E2	1280	40	<40	40	<40	40	40	<40	40	40	<40									
IVR-215 (A/Victoria/2570/2019)	Sa.2	2018-11-22	E4/D7/E2	80	1280	640	640	640	640	1280	1280	1280	1280	320									
A/Sydney/5/2021 clone 3.4.1	Sa.2a	2021-10-16	MDCK3/MDCK3	80	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280									
A/Sydney/5/2021 pooled clones 10-10	Sa.2a	2022-10-31	E3/E3	80	1280	1280	1280	1280	1280	1280	2560	640	640	640									
A/Victoria/4897/2022	Sa.2a.1	2022-10-02	SIAT2/MDCK2	40	1280	1280	1280	1280	1280	1280	2560	1280	1280	1280									
IVR-238 (A/Victoria/4897/2022)	Sa.2a.1	2022-10-02	E3/D6/E110-6	40	1280	1280	2560	2560	2560	2560	2560	2560	640	640									
A/Wisconsin/67/2022	Sa.2a.1	2022-10-25	MDCK2	40	640	640	1280	2560	1280	1280	1280	1280	1280	1280									
TEST VIRUSES																							
A/Hungary/37/2023	Sa.2a	2023-01-26	MDCK1/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280	640	640									
A/Hungary/34/2023	Sa.2a	2023-01-30	MDCK1/MDCK1	40	1280	640	1280	640	1280	1280	1280	1280	640	640									
A/Norway/1/2023	Sa.2a	2023-01-31	MDCK2	40	1280	1280	1280	1280	1280	1280	1280	1280	640	640									
A/Estonia/17332/2023	Sa.2a	2023-02-05	MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280	640	640									
A/Estonia/17332/2023	Sa.2a	2023-02-07	MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280	640	640									
A/Hungary/66/2023	Sa.2a	2023-02-20	MDCK1/MDCK1	80	2560	1280	2560	2560	2560	2560	2560	1280	1280	1280									
A/Ireland/15762/2023	Sa.2a	2023-03-06	MDCK2	40	1280	1280	2560	2560	2560	2560	2560	1280	640	640									
A/Ireland/16836/2023	Sa.2a	2023-03-09	MDCK2	80	1280	1280	2560	2560	2560	2560	2560	1280	1280	1280									
A/Ireland/16739/2023	Sa.2a	2023-03-10	MDCK2	40	1280	1280	1280	1280	1280	1280	1280	1280	640	640									
A/Hungary/116/2023	Sa.2a	2023-03-29	MDCK1/MDCK1	80	2560	1280	2560	2560	2560	2560	2560	1280	1280	1280									
A/Serbia/2737/2023	Sa.2a	2023-03-29	C2/MDCK1	40	640	640	640	640	640	640	640	640	320	320									
Vaccine NH 2020-21 SH 2021 NH 2021-22 SH 2022 NH 2022-23																							
Vaccine NH 2023-24 SH 2023 NH 2023-24 NH 2023-24																							

< relates to the lowest dilution of antisera used

ND = Not Done

< 4-fold

4-fold

8-fold

> 8-fold

< not recognised by the antiserum

≥ 160 (no homologous titre)

Table H1-18. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-08-01)

Viruses	Other information	Collection date	Passage history	NEW										
				A/G-M SWL1336/19		IVR-215 AVic/2570/19		A/Sydney 5/21		A/Sydney 5/21		A/Victoria/ 4897/2022		A/Victoria/ 4897/2022
Passage history	Ferret number	Genetic group	Egg F1289	Egg F2721	Möller F4422	Egg F4422	Möller F6823	Möller F2232	Egg F9098	Möller F143	Egg F1289	Möller F143	Egg F9098	Möller F143
REFERENCE VIRUSES														
A/Guangdong-Massman/SWL1336/2019	Sa.1	2019-06-17	E3/E2	1280	80	<40	<40	<40	<40	40	<40	40	<40	
IVR-215 (A/Victoria/2570/2019)	Sa.2	2018-11-22	E4/D7E2	80	1280	640	640	640	640	640	640	640	320	
A/Sydney/2021 clone 3.4.1	Sa.2a	2021-10-16	MDCK3/MDCK1	40	1280	640	1280	640	1280	640	1280	640	640	
A/California/2009/2009 clonal clones 10-10	Sa.2b	2022-01-31	MDCK3/MDCK1	40	1280	640	1280	640	1280	640	1280	640	320	
A/Victoria/4897/2022	Sa.2a.1	2022-10-02	SIAT2/MDCK2	40	1280	1280	2560	2560	2560	1280	1280	2560	2560	
IVR-238 (A/Victoria/4897/2022)	Sa.2a.1	2022-10-02	E3/D6/E1 10-6	40	640	640	1280	2560	640	2560	640	2560	640	
A/Wisconsin/67/2022	Sa.2a.1	2022-10-25	MDCK2	40	1280	640	1280	2560	1280	1280	1280	1280	1280	
TEST VIRUSES														
A/Peru/11/2023	Sa.2a	2023-01-27	MDCK3/MDCK1	40	640	320	320	320	320	640	640	320	320	
A/Peru/4/2023	Sa.2a	2023-01-31	MDCK3/MDCK1	40	640	320	640	640	640	320	640	640	640	
A/FVG-Trieste/14/2023	Sa.2a	2023-02-03	MDCK3/MDCK1	40	640	320	640	640	640	320	640	640	320	
A/FVG-Soria/14/2023	Sa.2a	2023-02-03	MDCK3/MDCK1	40	640	640	640	640	640	320	640	640	320	
A/FVG-Trieste/15/2023	Sa.2a	2023-02-07	MDCK3/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280	640	
A/FVG-Trieste/15/2023	Sa.2a	2023-02-07	MDCK3/MDCK1	40	1280	640	640	640	640	320	640	640	320	
A/Estonia/1733/2023	Sa.2a	2023-02-09	MDCK2	40	1280	640	1280	640	640	640	1280	1280	320	
A/Belgium/S139/2023	Sa.2a	2023-02-09	MDCK1/MDCK1	40	2560	1280	2560	1280	640	640	1280	1280	640	
A/Belgium/S139/2023	Sa.2a	2023-02-12	MDCK1/MDCK1	40	1280	640	1280	640	640	640	1280	1280	640	
A/Belgium/G02/07/2023	Sa.2a	2023-02-13	MDCK1/MDCK1	40	1280	640	1280	640	640	640	1280	1280	640	
A/Belgium/S139/2023	Sa.2a	2023-02-16	MDCK1/MDCK1	40	1280	1280	640	640	640	640	1280	1280	640	
A/Belgium/S139/2023	Sa.2a	2023-02-16	MDCK1/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280	640	
A/Belgium/S178/2023	Sa.2a	2023-02-19	MDCK1/MDCK1	40	640	640	1280	1280	640	640	1280	1280	640	
A/Belgium/S0248/2023	Sa.2a	2023-03-06	MDCK1/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280	640	
A/Kyiv/1996/2023	Sa.2a	2023-03-10	MDCK3/MDCK1	40	2560	2560	2560	2560	2560	1280	2560	2560	1280	
A/Switzerland/1/2023	Sa.2a	2023-03-14	MDCK1/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280	640	
A/Belgium/S143/2023	Sa.2a	2023-03-14	MDCK1/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280	640	
A/Belgium/S137/2023	Sa.2a	2023-03-14	MDCK1/MDCK1	40	2560	2560	2560	2560	2560	1280	2560	2560	1280	
A/Belgium/S133/2023	Sa.2a	2023-03-14	MDCK1/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280	640	
A/Belgium/S133/2023	Sa.2a	2023-03-14	MDCK1/MDCK1	40	640	640	640	640	640	640	640	640	320	
A/Belgium/S131/2023	Sa.2a	2023-03-14	MDCK1/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280	640	
A/Belgium/G03/10/2023	Sa.2a	2023-04-04	MDCK1/MDCK1	40	2560	1280	2560	1280	1280	1280	1280	1280	1280	
A/Belgium/S118/2023	Sa.2a	2023-04-04	MDCK1/MDCK1	40	1280	1280	1280	1280	1280	1280	1280	1280	640	
A/Belgium/S118/2023	Sa.2a.1	2023-02-08	MDCK1/MDCK1	40	640	640	640	640	640	1280	1280	640	640	
A/Belgium/S132/2023	Sa.2a.1	2023-02-12	MDCK1/MDCK1	40	1280	640	640	1280	1280	1280	640	640	640	

< relates to the lowest dilution of antiserum used

ND = Not Done

Table H1-19. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-08-08)

< relates to the lowest dilution of antiserum used

ND = Not Done

□ 16.00 □ 16.10 □ 16.20 □ 16.30 □ 16.40 □ 16.50 □ 16.60 □ 16.70 □ 16.80 □ 16.90 □ 16.100 □ 16.110 □ 16.120

Table H1-20. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-08-16)

Viruses	Other information	Collection date	Passage history	SWL1536/19							
				A/IG-M F12/20 Sa.1	IVR-215 F37/21 Sa.2	A/Sydney F46/22 Sa.2a	A/Sydney F04/22 Sa.2a	A/Victoria F05/23 Sa.2a.1	IVR-238 F07/23 Sa.2a.1	A/Wisconsin F17/23 Sa.2a.1	
REFERENCE VIRUSES											
A/Guangdong-Maonan/SWL1536/2019		Sa.1	2019-06-17	E3/E2	2560	80	<40	<40	<40	40	<40
IVR-215 (A/Victoria/2570/2019)		Sa.2	2018-11-22	E4/D7/E2	1280	640	640	640	640	640	320
A/Sydney/9/2021 clone 3.4.1		Sa.2a	2021-10-03	MDCK/3/MDCK3	80	1280	1280	1280	1280	1280	1280
A/Argentina/769/2023		Sa.2a	2023-01-31	MDCK/1	80	640	640	640	640	640	640
A/Zakarpatty/1750/2023		Sa.2a	2022-10-02	SIAT2/MDCK2	40	1280	1280	1280	2560	2560	2560
A/Zakarpatty/1749/2023		Sa.2a.1	2022-10-02	E3/D/E1/10-6	80	1280	1280	2560	2560	2560	1280
A/Wisconsin/67/2022		Sa.2a.1	2022-10-25	MDCK2	20	1280	640	640	1280	1280	1280
TEST VIRUSES											
A/Kosovo/107/2023		Sa.2a	2023-01-30	MDCK1	80	1280	1280	640	1280	640	640
A/Kosovo/107/2023		Sa.2a	2023-01-30	MDCK1	80	2560	2560	2560	2560	2560	2560
A/Kosovo/769/2023		Sa.2a	2023-02-14	MDCK1	80	1280	1280	1280	1280	1280	1280
A/Zakarpatty/1750/2023		Sa.2a	2023-02-16	MDCK1	80	2560	2560	2560	2560	2560	640
A/Zakarpatty/1749/2023		Sa.2a	2023-02-16	MDCK1	80	2560	1280	2560	2560	2560	1280
A/Odesa/1935/2023		Sa.2a	2023-03-10	MDCK1	80	2560	2560	2560	2560	2560	1280
A/Odesa/1935/2023		Sa.2a	2023-03-14	MDCK1	80	2560	2560	2560	2560	2560	1280
A/Alaska/1892/2023		Sa.2a	2023-03-30	MDCK1	80	1280	1280	1280	2560	2560	1280
A/Salalah/323956/2023		Sa.2a	2023-04-06	MDCK1	80	1280	1280	1280	1280	1280	1280
A/Haymar/723207/2023		Sa.2a	2023-04-16	MDCK1	80	2560	1280	2560	2560	2560	1280
A/JaalanBanianBuAI/7232311/2023		Sa.2a	2023-05-08	MDCK1	80	1280	1280	1280	1280	1280	640
A/Alaska/1892/2023		Sa.2a	2023-06-08	MDCK1	80	640	640	1280	1280	1280	320
A/Ghana/1169/2023		Sa.2a	2023-06-06	MDCK1	160	2560	2560	2560	2560	2560	1280
A/HongKong/1429/2023		Sa.2a	2023-07-03	MDCK1/MDCK1	40	1280	1280	1280	1280	1280	640
A/HongKong/1515/2023		Sa.2a	2023-07-09	MDCK1/MDCK1	80	2560	2560	2560	2560	2560	1280
A/HongKong/1512/2023		Sa.2a	2023-07-10	MDCK1/MDCK1	80	2560	2560	2560	2560	2560	1280
A/HongKong/1512/2023		Sa.2a	2023-07-11	MDCK1/MDCK1	80	1280	1280	1280	1280	1280	640
A/Serbia/67/159/2023		Sa.2a.1	2023-03-28	MDCK1	40	1280	1280	1280	2560	2560	1280
A/HongKong/1430/2023		Sa.2a.1	2023-07-03	MDCK1/MDCK1	20	1280	1280	1280	2560	2560	1280
A/HongKong/1432/2023		Sa.2a.1	2023-07-04	MDCK1/MDCK1	20	1280	1280	1280	2560	2560	1280
A/HongKong/1510/2023		Sa.2a.1	2023-07-07	MDCK1/MDCK1	20	640	320	640	1280	640	1280
A/HongKong/1502/2023		Sa.2a.1	2023-07-07	MDCK1/MDCK1	20	1280	1280	1280	2560	2560	1280
A/HongKong/1502/2023		Sa.2a.1	2023-07-07	MDCK1/MDCK1	20	1280	1280	1280	2560	2560	1280
A/HongKong/1514/2023		Sa.2a.1	2023-07-08	MDCK1/MDCK1	40	2560	1280	2560	2560	2560	1280

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine NH 2020-21	Vaccine SH 2021	Vaccine SH 2023	Vaccine NH 2023-24
NH 2021-22			
SH 2022			
NH 2022-23			

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H1-21. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-08-30)

Viruses	Other information	Collection date	Passage history	A/G-M							
				SWL1536/19	A/Victoria/2570/19	A/Sydney/5/21	A/Sydney/5/21	A/Sydney/4897/2022	A/Victoria/4897/2022	IVR-238	AVic/4897/22
				Egg F12/20 Sa.1	Egg F37/21 Sa.2	MDCK F46/22 Sa.2a	Egg F04/22 Sa.2a	MDCK F05/23 Sa.2a.1	Egg F07/23 Sa.2a.1	MDCK F17/23 Sa.2a.1	
REFERENCE VIRUSES											
A/Guangdong-Maonan/SWL1536/2019		Sa.1	2019-06-17	E3/E2	1280	80	<40	<40	<40	40	<40
IVR-215 (AVic/Victoria/2570/2019)		Sa.2	2018-11-22	E4/D7/E2	40	640	640	640	640	1280	320
A/Sydney/5/21 clone 3.4.1		Sa.2	2020-10-16	MDCK/3/M/MDCK3	40	1280	1280	1280	1280	1280	640
A/Sydney/5/21 clone 3.4.1 clones 10-10		Sa.2	2020-10-31	E3/E3	40	640	640	640	640	1280	320
AVic/Victoria/4897/2022		Sa.2a.1	2022-10-02	SIAT2/MDCK2	40	2560	1280	2560	2560	2560	2560
IVR-238 (AVic/Victoria/4897/2022)		Sa.2a.1	2022-10-02	E3/D/E1 10-6	40	1280	320	1280	1280	1280	640
AWisconsin/57/2022		Sa.2a.1	2022-10-25	MDCK2	40	1280	640	1280	2560	1280	1280
TEST VIRUSES											
A/Lisboa/20/2023 (V2220919_1SIAT1)		Sa.2a	2023-02-15	SIAT1/MDCK1	40	1280	1280	1280	1280	1280	640
A/Lisboa/20/2023 (V2220940_1SIAT1)		Sa.2a	2023-02-27	SIAT1/MDCK1	40	640	640	640	640	640	320
A/Lisboa/49/2023 (RL223970_1MDCK)		Sa.2a	2023-03-02	MDCK1/MDCK1	40	1280	640	640	1280	1280	640
A/Lisboa/73/2023 (RL221086_1SIAT1)		Sa.2a	2023-03-16	SIAT1/MDCK1	40	640	640	640	1280	640	320
A/Lisboa/68/2023 (RL221144_1SIAT1)		Sa.2a	2023-03-25	SIAT1/MDCK1	40	1280	640	1280	1280	1280	640
A/Lisboa/71/2023 (RL221182_1SIAT1)		Sa.2a	2023-03-29	SIAT1/MDCK1	40	1280	640	640	1280	1280	640
A/Lisboa/72/2023 (RL221185_1SIAT1)		Sa.2a	2023-04-02	SIAT1/MDCK1	40	1280	640	1280	1280	1280	640
A/Lisboa/72/2023 (RL221187_1SIAT1)		Sa.2a	2023-04-04	SIAT1/MDCK1	40	1280	640	1280	1280	1280	640
ADakar/12/2023		Sa.2a	2023-04-27	MDCK3	40	2560	1280	2560	2560	2560	1280
A/Lisboa/57/2023 (RL221313_1SIAT1)		Sa.2a	2023-04-28	SIAT1/MDCK2	40	1280	640	1280	1280	1280	320
ADakar/13/2023		Sa.2a	2023-05-01	MDCK2	80	2560	1280	2560	2560	2560	640
A/Argentina/559/2023		Sa.2a	2023-05-16	MDCK1	40	2560	1280	2560	2560	2560	1280
A/Argentina/567/2023		Sa.2a	2023-06-16	MDCK1	40	2560	1280	2560	2560	2560	1280
A/Argentina/567/2023		Sa.2a	2023-06-22	MDCK1	80	1280	2560	1280	1280	1280	640
A/Argentina/567/2023		Sa.2a	2023-06-23	MDCK1	40	1280	1280	1280	1280	1280	640
A/Argentina/567/2023		Sa.2a	2023-06-23	MDCK1	80	1280	1280	1280	1280	1280	640
A/Argentina/567/2023		Sa.2a	2023-06-23	MDCK1	80	2560	1280	2560	2560	2560	1280
A/Argentina/585/2023		Sa.2a	2023-06-24	MDCK1	80	2560	1280	2560	2560	2560	1280
A/Argentina/531/2023		Sa.2a	2023-06-24	MDCK1	40	1280	1280	1280	1280	1280	640
A/Argentina/539/2023		Sa.2a	2023-06-26	MDCK1	40	1280	1280	1280	1280	1280	640
A/Argentina/535/2023		Sa.2a	2023-06-29	MDCK1	40	1280	1280	1280	1280	1280	640
A/Argentina/540/2023		Sa.2a	2023-06-30	MDCK1	40	640	640	640	1280	1280	640
A/Argentina/533/2023		Sa.2a	2023-07-02	MDCK1	40	1280	1280	1280	1280	1280	320
A/Argentina/563/2023		Sa.2a	2023-07-03	MDCK1	40	2560	1280	1280	1280	2560	640
A/Argentina/576/2023		Sa.2a	2023-07-04	MDCK1	40	1280	1280	1280	1280	1280	640
A/Argentina/584/2023		Sa.2a	2023-07-05	MDCK1	40	640	640	640	640	640	320
A/Argentina/584/2023		Sa.2a	2023-07-06	MDCK1	40	1280	1280	1280	1280	1280	640
A/Argentina/735/2023		Sa.2a	2023-07-06	MDCK1	40	1280	1280	1280	1280	1280	640
A/Argentina/577/2023		Sa.2a	2023-07-06	MDCK1	40	1280	1280	1280	1280	1280	640
A/Argentina/742/2023		Sa.2a	2023-07-07	MDCK1	40	1280	640	640	1280	1280	640
A/Argentina/772/2023		Sa.2a	2023-07-09	MDCK1	40	640	640	640	1280	1280	320
A/Argentina/825/2023		Sa.2a	2023-07-13	MDCK1	40	1280	640	1280	1280	1280	320
A/Argentina/825/2023		Sa.2a	2023-07-14	MDCK1	40	1280	640	1280	1280	1280	640
A/Argentina/538/2023		Sa.2a.1	2023-06-30	MDCK1	40	640	640	640	1280	640	640
A/Argentina/763/2023		Sa.2a.1	2023-07-06	MDCK1	40	1280	640	1280	2560	1280	1280
A/Argentina/768/2023		Sa.2a.1	2023-07-07	MDCK1	40	640	320	640	1280	640	640

< relates to the lowest dilution of antiserum used
ND = Not Done

Vaccine Vaccine Vaccine Vaccine

NH 2020-21 SH 2023 NH 2021-22 SH 2022

NH 2023-24 NH 2022-23

≥ 160 (no homologous titre)

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H1-22. Antigenic analyses of influenza A(H1N1)pdm09 viruses (2023-09-08)

Viruses	Other information	Collection date	Passage history	A/G-M							
				SWL1536/19	IVR-215	A/Sydney S/21	A/Sydney S/21	A/Victoria 4897/2022	IVR-238	A/Victoria 6712/2022	
				Egg F12/20	Egg F37/21	MDCK F46/22	Egg F04/22	MDCK F05/23	Egg F07/23	MDCK F17/23	
REFERENCE VIRUSES											
A/Guangdong-Maonan/SWL1536/2019		Sa.1	2019-06-17	E3/E2	640	80	<40	<40	<40	40	<40
IVR-215 (A/Victoria/2570/2019)		Sa.2	2018-11-22	E4/D7/E2	80	1280	640	640	640	640	320
A/Sydney/5/2021		Sa.2a	2021-01-16	MDCK3/MDCK3	40	1280	640	640	640	640	640
A/Argentina/19/2021		Sa.2a	2021-01-31	MDCK3	80	1280	1280	1280	1280	1280	1280
A/Victoria/4897/2022		Sa.2a.1	2022-10-02	SIAT2/MDCK2	40	2560	2560	2560	2560	2560	2560
IVR-238 (A/Victoria/4897/2022)		Sa.2a.1	2022-10-02	E3/D/E1 10-6	80	1280	1280	1280	1280	1280	640
A/Wisconsin/67/2022		Sa.2a.1	2022-10-25	MDCK2	40	1280	640	640	2560	1280	1280
TEST VIRUSES											
A/Cyprus/318/2023		Sa.2a	2023-05-30	MDCK1	80	2560	1280	2560	2560	2560	1280
A/Labrador/19/2023 (RL221314_SWAB)		Sa.2a	2023-05-30	MDCK1	80	1280	1280	1280	1280	1280	640
A/Finland/antico/0175/2023		Sa.2a	2023-06-05	MDCK1	40	2560	1280	2560	2560	2560	1280
A/Moramanga/01170/2023		Sa.2a	2023-06-06	MDCK1	<40	2560	2560	2560	2560	2560	1280
A/Artsarabe/0181/2023		Sa.2a	2023-06-12	MDCK1	40	2560	1280	2560	2560	2560	1280
A/Finland/antico/0175/2023		Sa.2a	2023-06-12	MDCK1	80	2560	2560	2560	2560	2560	1280
A/Artsarabe/0181/2023		Sa.2a	2023-06-15	MDCK1	80	2560	2560	1280	2560	2560	1280
A/Artsarabe/0181/2023		Sa.2a	2023-06-14	MDCK1	<40	1280	1280	1280	1280	1280	640
A/Artsarabe/0181/2023		Sa.2a	2023-06-14	MDCK1	40	1280	1280	2560	2560	2560	1280
A/Finland/antico/1809/2023		Sa.2a	2023-06-14	MDCK1	<40	640	1280	1280	1280	1280	640
A/Artsarabe/0187/2023		Sa.2a	2023-06-20	MDCK1	40	1280	1280	2560	2560	1280	1280
A/Artsarabe/0184/2023		Sa.2a	2023-06-20	MDCK1	40	1280	640	1280	1280	1280	640
A/Artsarabe/0184/2023		Sa.2a	2023-06-21	MDCK1	<40	1280	640	1280	1280	1280	640
A/Argentina/505/2023		Sa.2a	2023-06-26	MDCK2	40	640	1280	640	1280	1280	320
A/Argentina/490/2023		Sa.2a	2023-06-26	MDCK2	<40	640	640	640	640	640	320
A/Argentina/526/2023		Sa.2a	2023-06-29	MDCK2	40	1280	1280	1280	1280	1280	640
A/Argentina/501/2023		Sa.2a	2023-06-30	MDCK1	<40	640	320	640	320	640	320
A/Labrador/19/2023 (RL221378_SWAB)		Sa.2a.1	2023-05-25	MDCK1	40	2560	640	1280	2560	1280	1280

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine	Vaccine	Vaccine	Vaccine
NH 2020-21	SH 2021	SH 2023	NH 2023-24
	NH 2021-22		
	SH 2022		
	NH 2022-23		

Legend: <4-fold (white), 4-fold (light yellow), 8-fold (yellow), >8-fold (orange), < not recognised by the antiserum (red), ≥ 160 (no homologous titre) (blue)

Fold-reduction table: H1N1

		<4-fold difference		4-fold difference		>4-fold difference		total
		number	percentage	number	percentage	number	percentage	
A/Guangdong-Maonan/SWL1536/2019 Cell	5a.1	0	0%	0	0%	46	100%	46
A/Guangdong-Maonan/SWL1536/2019 Egg	5a.1	0	0%	2	0.8%	236	99.2%	238
A/Ghana/1894/2021 Egg	5a.1	0	0%	0	0%	46	100%	46
A/Lyon/820/2021 Egg	5a.1	0	0%	0	0%	46	100%	46
A/Denmark/3280/2019 Cell	5a.2	43	93.5%	3	6.5%	0	0%	46
IVR-215 (A/Victoria/2570/2019) Egg	5a.2	230	96.6%	8	3.4%	0	0%	238
A/Sydney/5/2021 Cell	5a.2a	229	96.2%	9	3.8%	0	0%	238
A/Sydney/5/2021 Egg	5a.2a	207	87.0%	31	13.0%	0	0%	238
A/Norway/25089/2022 Cell	5a.2a.1	44	95.7%	2	4.3%	0	0%	46
A/Norway/31694/2022 Egg	5a.2a.1	44	95.7%	2	4.3%	0	0%	46
A/Victoria/4897/2022 Cell	5a.2a.1	206	86.6%	31	13.0%	1	0%	238
IVR-238 (A/Victoria/4897/2022) Egg	5a.2a.1	219	92.0%	19	8.0%	0	0%	238
A/Wisconsin/67/2022 Cell	5a.2a.1	164	85.4%	28	14.6%	0	0%	192

A/H1N1: Egg isolates

Virus	Status	Genetic group/clade	Comment
A/Lyon/820/2021	CBER-49B, NIB-132, SAN-015	6B.1A.5a.1 (128T, P137S, G155E)	Egg adaptation: (X187V,T483N -CHO), 2-way pass
A/Norway/31694/2022	sent out	6B.1A.5a.2a.1 (P137S, K142R)	Egg adaptation: (Q223R)
A/Catalonia/NSVH161512065/2022	available to send out	6B.1A.5a.2a.1 (P137S, K142R)	Egg adaptation: (Q223R)
A/Ghana/1894/2021	Reference only	6B.1A.5a.1 (I166T, A186T)	Egg adaptation: (no change)

A/H1N1: HI reagents and references

Virus	Genetic group	Virus passage	Ferret ID
A/Guangdong-Maonan/SWL1536/2019	6B.1A.5a.1	C2/MDCK1	F09/20
A/Guangdong-Maonan/SWL1536/2019	6B.1A.5a.1	E3/E2	F12/20
A/Ghana/1894/2021	6B.1A.5a.1	E2/E1	F02/22
A/Lyon/820/2021	6B.1A.5a.1	E1/E2	F06/22
A/Denmark/3280/2019	6B.1A.5a.2	MDCK4/MDCK5	F28/20
A/Norway/25089/2022	6B.1A.5a.2	MDCK2	F38/22
A/Sydney/5/2021	6B.1A.5a.2a	MDCK3/MDCK1	F40/22
A/Sydney/5/2021	6B.1A.5a.2a	E3/E2	F04/22
IVR-215 (A/Victoria/2570/2019)	6B.1A.5a.2	E4/D7/E2	F37/21
A/Norway/25089/2022	6B.1A.5a.2a.1	MDCK3	F38/22
A/Norway/31694/2022	6B.1A.5a.2a.1	E3/E1 10-3.	F48/22
A/Victoria/4897/2022	6B.1A.5a.2a.1	SIAT2/MDCK2	F05/23
IVR-238 (A/Victoria/4897/2022)	6B.1A.5a.2a.1	E3/D6/E1 10-6	F07/23
A/Wisconsin/67/2022	6B.1A.5a.2a.1	MDCK2	F17/23

Summary: H1N1

Genetic analyses

Globally 6B.1A.**5a.2a** and 6B.1A.**5a.2a.1** clade viruses both continued to circulate with differing relative proportions depending on region.

Clade 5a.2a viruses predominated since 1st February in Africa, the Eastern Mediterranean, and South East Asia, albeit with few viruses detected.

In Europe, Western Pacific and the Americas both 5a.2a and 5a.2a.1 viruses were detected, with 5a.2a viruses being the larger proportion.

Within the 5a.2a viruses, the A/Sydney/5/2021-like viruses were detected but in the minority. We note three subgroups; one detected in Australia and Europe, represented by the potential CVV A/Sydney/175/2022; a second detected in South East Asia (S83P, S85P, H273Q, V321I) and the other represented by A/Washington/22/2023 or A/Washington/24/2022 (A73T, A141E, V152I, S190I).

The larger 5a.2a group has split into three groups defined by the following references, with some additional amino acid substitutions: A/Maine/10/2022 -like (A48P), A/Netherlands/10468/2023-like (I418V, D269N, P137S) and the remaining group, without a potential CVV or reference, defined by I418V.

Within the 5a.2a.1 viruses (P137S, T277A, E356D) there are two main groups of viruses - either A/Wisconsin/67/2022-like or A/Victoria/4897/2022-like (with T216A).

Antigenic analyses

HI titre fold reductions against the SH2023 vaccine strain (A/Sydney/5/21 cell 5a.2a), especially when test viruses are 5a.2a.1, whereas the cell based NH 2023-24 cell based strain (A/Victoria/4897/2022) recognises both 5a.2a and 5a.2a.1 well

Egg-based A/Victoria/4897/2022 recognises both 5a.2a and 5a.2a.1 test viruses well

Influenza A H3N2

Genetic analyses: H3N2

Maximum likelihood phylogenetic tree: H3N2

Maximum likelihood phylogenetic tree inferred using IQTree2 from HA sequence data obtained from GISAID from 1st February onwards, manually curated and then downsampled using Treemer to retain a representative tree topology of 200 sequences and keep at least one representative from each country. Annotation of amino acids substitutions performed with Treetime ancestral reconstruction. References and CVVs are marked as Cell or Egg.

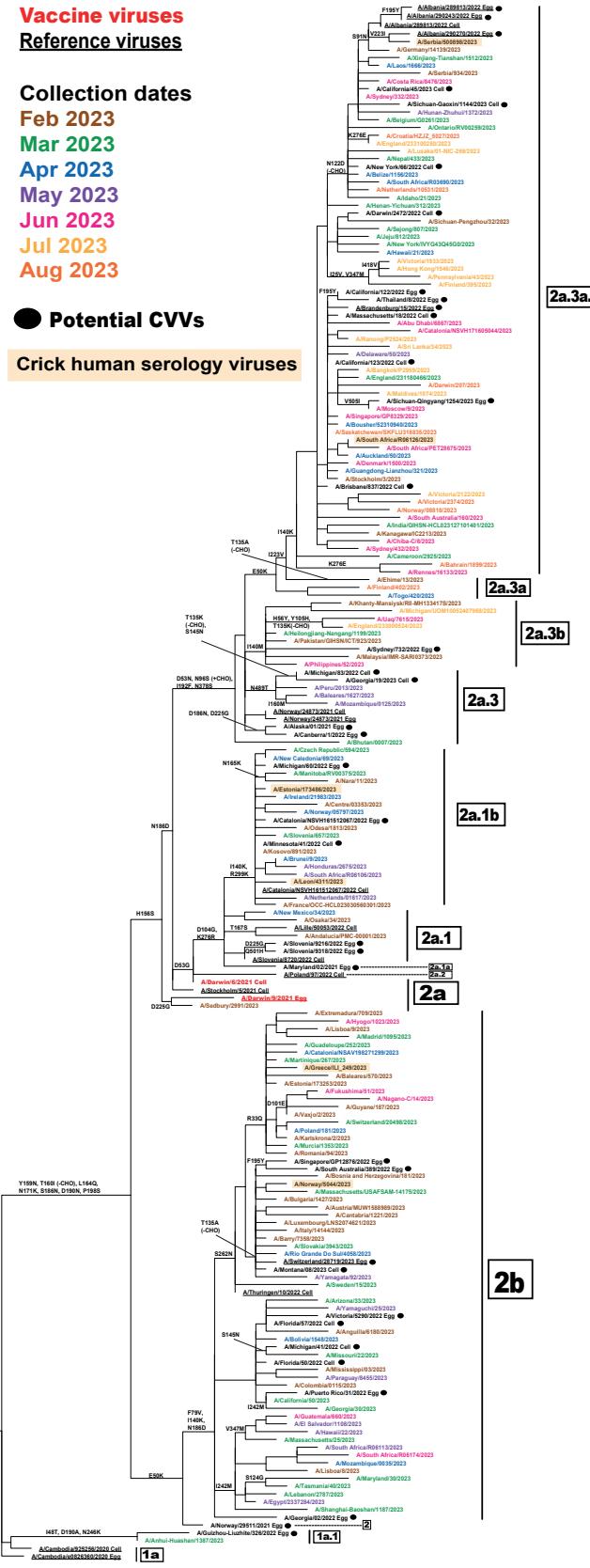
Vaccine viruses

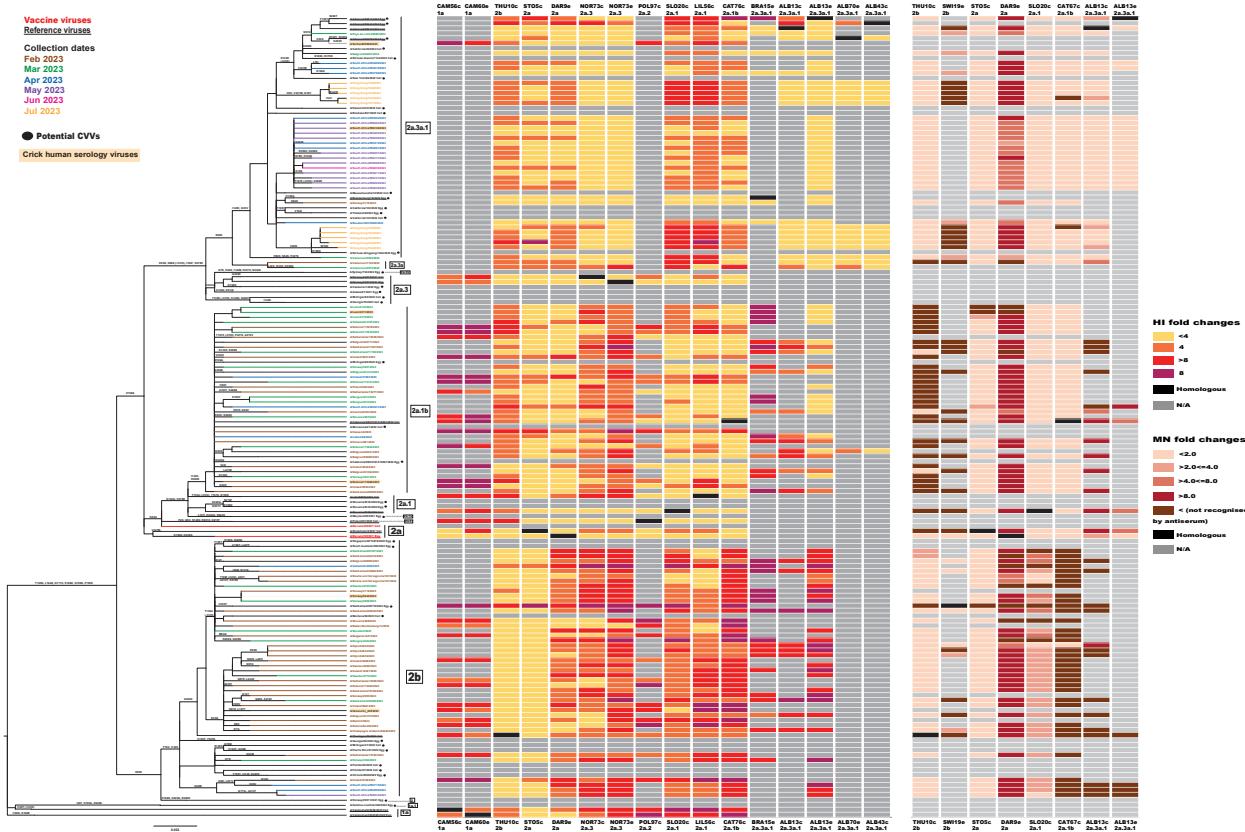
Reference viruses

Collection dates
Feb 2023
Mar 2023
Apr 2023
May 2023
Jun 2023
Jul 2023
Aug 2023

● Potential CVVs

Crick human serology viruses





Antigenic analyses: H3N2

Haemagglutination inhibition tables: H3N2

Table H3-1. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Osetamivir) 2023-02-17

Viruses	Collection date	Passage history	Haemagglutination inhibition titre															
			Post-infection ferret antisera															
			A/Cambodia/925256/2020 1a	A/Cambodia/e082636/2020 1a	A/Cambodia/925256/2020 2b	A/Thuringen/10/22 1a	A/Stockholm/5/21 2b	A/Darwin/9/21 2a	A/Norway/2487/21 2a	A/Poland/97/2022 2a.1	A/Slovenia/8720/2022 2a.1	A/Lille/50053/2022 2a.1	A/Cataluña/NSVH161512067/2022 2a.1b	A/Cataluña/NSVH161512067/2022 2a.1b				
REFERENCE VIRUSES																		
A/Cambodia/925256/2020 1a	2020-09-25	SIAT5	1280	160	<40	320	320	80	40	80	<40	160	<40	160	160	160	160	160
A/Cambodia/e082636/2020 1a	2020-07-16	E5/E3	80	640	40	160	320	40	80	40	80	80	160	320	40	320	160	<40
A/Thuringen/10/22 1a	2021-04-16	P1/SIAT5	80	80	640	320	320	80	80	320	80	320	320	320	320	320	320	160
A/Stockholm/5/21 2b	2021-04-16	SIAT/SIAT5	80	80	640	320	320	80	80	320	80	320	320	320	320	320	320	160
A/Darwin/9/21 2a	2021-04-17	E3/E4	80	640	320	640	1280	160	320	640	640	640	640	640	640	640	640	160
A/Norway/2487/2021 2a.3	2021-10-24	SIAT3	40	80	80	160	320	160	320	160	320	160	160	160	160	160	160	80
A/Norway/2487/3/2021 2a.3	2021-10-24	E3/E1	80	320	160	640	1280	320	1280	320	1280	1280	1280	1280	1280	1280	1280	160
A/Poland/97/2022 2a.2	2022-05-09	SIAT2	40	160	80	640	640	320	320	1280	1280	1280	1280	1280	1280	1280	1280	1280
A/Slovenia/8720/2022 2a.1	2022-02-10	SIAT1/MDCK/SIAT2	40	80	80	320	640	160	320	640	640	640	640	640	640	640	640	640
A/Lille/50053/2022 2a.1	2022-09-06	MDCK/SIAT3	40	160	40	320	320	80	160	320	640	640	640	640	640	640	640	640
A/Cataluña/NSVH161512067/2022 2a.1b	2022-09-14	SIAT/SIAT3	40	40	80	160	320	80	160	320	640	640	640	640	640	640	640	640
TEST VIRUSES																		
A/Albania/2/390586/2023 2b	2023-01-05	SIAT1	160	160	640	640	320	160	320	160	320	640	640	640	640	640	640	80
A/Valladolid/24/2022 2b	2022-10-06	SIAT5/SIAT1	40	80	320	160	160	40	80	80	160	160	160	160	160	160	160	<40
A/Valladolid/22/2022 2b	2022-10-06	SIAT5/SIAT1	80	160	320	320	320	80	160	160	160	160	160	160	160	160	160	80
A/Castilla La Mancha/3894/2022 2b	2022-10-09	SIAT1	40	80	160	160	160	40	80	80	160	160	160	160	160	160	160	160
A/Valladolid/27/2022 2b	2022-10-11	SIAT5/SIAT1	40	80	320	320	320	80	160	160	160	160	160	160	160	160	160	40
A/Valladolid/14/2022 2b	2022-11-01	SIAT5/SIAT1	40	80	320	320	320	80	160	160	160	160	160	160	160	160	160	80
A/Salamanca/33/2022 2b	2022-11-02	SIAT5/SIAT1	80	160	320	320	320	80	160	160	160	160	160	160	160	160	160	80
A/Burgo/28/2022 2b	2022-11-02	SIAT5/SIAT1	80	160	320	320	320	80	160	160	160	160	160	160	160	160	160	40
A/Ceuta/4232/2022 2b	2022-11-08	SIAT1	40	320	320	320	320	80	160	160	160	160	160	160	160	160	160	40
A/Bretagne/55452/2022 2b	2022-11-14	SIAT1	40	80	160	160	160	40	80	80	40	80	80	80	80	80	80	40
A/Avila/53/2022 2b	2022-12-29	SIAT5/SIAT1	80	160	320	320	320	80	160	160	160	160	160	160	160	160	160	40
A/Bulgaria/509/2023 2b	2023-01-16	SIAT1	40	640	320	640	640	160	160	160	160	160	160	160	160	160	160	160
A/Castilla La Mancha/4215/2022 2b	2022-10-28	SIAT1	80	320	320	320	320	80	80	80	80	80	80	80	80	80	80	40
A/Valladolid/41/2022 2b	2022-10-21	SIAT1	80	160	320	160	160	320	40	160	160	80	160	160	160	160	160	<40
A/Valladolid/31/2022 2b	2022-10-09	SIAT5/SIAT1	40	80	160	160	160	40	80	80	40	40	40	40	40	40	40	<40
A/Albania/2/390567/2023 2b	2023-01-05	SIAT1	160	160	320	320	320	80	80	80	80	80	80	80	80	80	80	80
A/Bulgaria/654/2023 2b	2023-01-12	SIAT1	40	160	320	160	160	320	40	80	80	80	80	80	80	80	80	<40
A/Burgos/1639/2022 2b	2022-12-14	MDCK/SIAT1	40	80	160	160	160	40	80	80	40	40	40	40	40	40	40	<40
A/Castilla La Mancha/3901/2022 2a.1	2023-01-07	SIAT5/SIAT1	40	80	440	440	320	80	160	160	320	320	320	320	320	320	320	320
A/Palencia/30/2022 2a.1	2022-10-25	SIAT5/SIAT1	40	80	440	440	320	80	160	160	320	320	320	320	320	320	320	320
A/Salamanca/34/2022 2a.1	2022-11-02	SIAT5/SIAT1	80	80	440	440	320	80	160	160	320	320	320	320	320	320	320	320
A/Burgos/4/2023 2a.1	2023-01-08	SIAT5/SIAT1	<40	40	<40	<40	<40	80	160	160	40	80	80	160	160	160	160	160
A/Valladolid/19/2022 2a.1	2022-10-05	SIAT5/SIAT1	40	80	440	440	320	80	160	160	320	320	320	320	320	320	320	320
A/Valladolid/32/2022 2a.1	2022-10-10	SIAT5/SIAT1	<40	40	<40	<40	<40	80	160	160	320	320	320	320	320	320	320	320
A/Valladolid/12/2022 2a.1	2022-10-13	SIAT5/SIAT1	40	80	440	440	320	40	80	80	160	160	160	160	160	160	160	160
A/Burgos/5/2023 2a.1	2023-01-07	SIAT5/SIAT1	<40	160	40	160	320	40	80	80	160	160	160	160	160	160	160	160
A/Valladolid/21/2022 2a.1b	2022-10-07	SIAT5/SIAT1	80	80	160	160	160	40	80	80	160	160	160	160	160	160	160	160
A/Aragon/4051/2022 2a.1b	2022-10-18	SIAT1	<40	40	40	40	160	160	160	40	80	80	160	160	160	160	160	160
A/Bretagne/5592/2022 2a.1b	2022-11-17	SIAT1	<40	80	80	80	160	160	160	40	80	80	160	160	160	160	160	160
A/Albania/2/390580/2023 2a.1b	2023-01-05	SIAT1	40	80	80	80	160	160	160	320	80	160	160	160	160	160	160	160
A/Valladolid/19/2023 2a.1b	2023-01-05	SIAT5/SIAT1	<40	80	40	160	160	320	40	160	160	320	320	320	320	320	320	320
A/Albania/2/390583/2023 2a.1b	2023-01-06	SIAT1	40	80	160	160	160	40	80	80	160	160	160	160	160	160	160	160
A/Segovia/23/2022 2a.1b	2022-10-08	SIAT1	<40	80	80	80	160	160	160	40	80	80	160	160	160	160	160	160
A/Navarra/4/22/2022 2a.1b	2022-11-09	SIAT1	<40	40	<40	<40	160	160	160	320	40	160	160	160	160	160	160	160
A/Brandenburg/15/2022 2a.1b	2022-10-17	Ex/E2	80	320	320	640	640	320	320	1280	320	320	320	320	320	320	320	320
A/Valladolid/17/2023 2a.3a.1	2023-01-16	SIAT5/SIAT1	40	80	80	80	320	320	320	320	320	320	320	320	320	320	320	320
A/Mauritius/P08894/2023 2a.3b	2023-01-08	MDCK/SIAT1	80	80	160	160	160	320	320	320	320	320	320	320	320	320	320	160

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine
NH 2021-22

Vaccine
SH 2022-23
SH 2023
NH 2023-24

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H3-2. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-02-24

Viruses	Collection date	Passage history	Haemagglutination inhibition titre													
			Post-infection ferret antisera													
			AICamb 925256/2020	AICamb e082636/20	AIThuringen F03/21	AStockholm F10/21	AStockholm F36/22	AStockholm F15/22	AStockholm F39/21	AStockholm F10/22	AStockholm F11/22	AStockholm F39/22	AStockholm F24/22	AStockholm F02/23	AStockholm F2/22	AStockholm F4/22
REFERENCE VIRUSES																
A/Cambodia/925256/2020	1a	2020-09-25	SIAT1	640	160	<40	320	160	80	80	40	<40	80	<40	80	<40
A/Cambodia/9082636/2020	1a	2020-07-16	ESE3	80	640	40	160	40	80	40	80	80	160	160	160	<40
A/Thuringen/10/2022	2b	2022-04-10	PSE2	80	160	320	320	320	80	160	80	160	320	40	320	40
A/Stockholm/10/2022	2a	2022-04-14	SIAT/SIAT1	80	160	50	540	80	160	160	320	320	320	320	160	160
A/Darwin/9/2021	2a	2021-04-17	E3E4	80	640	160	320	1280	160	320	320	640	640	640	640	160
A/Norway/24/873/2021	2a.3	2021-10-24	SIAT3	40	80	80	160	320	160	320	160	160	160	160	160	80
A/Norway/24/873/2021	2a.3	2021-10-24	E3E1	40	320	160	320	640	320	640	320	640	640	640	640	160
A/Poland/10/2022	2a.2	2022-05-09	SIAT1	40	160	80	320	640	160	320	640	640	640	640	640	320
A/Stockholm/10/2022	2a.1	2022-05-09	SIAT1/MDCKxSIAT2	80	160	80	320	640	160	320	640	1280	1280	1280	1280	80
A/Illinois/90953/2022	2a.1	2022-05-09	MDCK1/SIAT3	80	320	80	320	640	160	160	320	1280	320	320	320	80
A/Catalonia/NSVH161512067/2022	2a.1b	2022-05-14	SIAT1/SIAT3	80	80	80	160	640	80	160	320	640	640	640	640	640
TEST VIRUSES																
A/Argentina/1450/2022	2b	2022-10-28	SIAT1	40	160	160	160	160	40	160	40	160	160	160	160	40
A/Ibiza/7221128/2022	2b	2022-10-20	SIAT1	320	640	1280	1280	320	640	640	1280	1280	1280	1280	1280	160
A/Romania/54406/2022	2b	2022-12-27	SIAT1/SIAT1	40	160	160	160	160	80	80	40	160	160	160	160	40
A/Zamora/43/2022	2b	2022-10-03	SIAT2	40	80	160	160	160	40	40	40	80	80	80	80	<40
A/Burgos/18/2022	2b	2022-10-04	SIAT1	40	160	160	160	160	40	40	40	160	160	160	160	<40
A/Burgos/14/2022	2b	2022-10-04	SIAT1	40	80	160	160	160	40	40	40	80	80	80	80	<40
A/Burgos/9/2022	2b	2022-10-04	SIAT1	40	160	160	160	160	40	40	40	80	80	80	80	<40
A/Valleaddid/10/2022	2b	2022-10-11	SIAT1/SIAT1	80	160	160	160	160	80	80	160	160	160	160	160	40
A/Romania/514402/2022	2b	2022-11-01	SIAT1/SIAT1	40	160	160	160	160	40	40	40	80	80	80	80	<40
A/Argentina/145125/2022	2b	2022-11-06	SIAT1/SIAT1	40	160	320	160	160	80	80	80	160	160	160	160	<40
A/Burgos/7/2023	2b	2023-01-05	MDCK1/MDCK1	40	160	160	160	160	80	40	40	80	80	80	80	40
A/Salamanca/3/2022	2b	2022-11-02	MDCK1/MDCK1	40	160	640	320	320	80	80	80	160	320	320	320	40
A/Valencia/044157/2022	2b	2022-12-03	MDCK1/MDCK1	40	160	160	160	160	80	80	80	160	160	160	160	40
A/Belgium/0339/2022	2b	2022-12-13	CI/SIAT1	40	160	160	160	160	40	40	40	80	80	80	80	<40
A/Romania/42550/2022	2b	2022-12-14	SIAT2/SIAT1	40	160	160	160	160	80	80	80	80	80	80	80	<40
A/Slovenia/11198/2022	2b	2022-12-01	SIAT1/SIAT1	40	160	160	160	160	40	40	40	80	80	80	80	<40
A/Slovenia/11409/2022	2b	2022-12-13	MDCKx/SIAT1	40	80	80	160	160	40	40	40	40	160	320	320	<40
A/Slovenia/447/2023	2b	2023-01-04	SIATx/SIAT1	40	80	80	160	160	40	40	40	40	40	160	160	<40
A/Ibiza/72211258/2022	2b	2022-10-02	SIAT1	80	160	80	320	640	80	80	160	320	320	320	320	40
A/Belgium/1938/2022	2a.1	2022-08-19	CI/SIAT1	40	80	80	160	640	80	160	320	640	640	640	640	320
A/Ibiza/72211258/2022	2a.1	2022-08-19	CI/SIAT1	40	80	80	160	640	40	80	80	160	320	320	320	160
A/Belgium/3263/2022	2a.1b	2022-10-08	CI/SIAT1	40	80	160	160	320	40	80	160	320	320	320	320	160
A/Belgium/0381/2022	2a.1b	2022-12-15	CI/SIAT1	40	80	80	160	320	40	80	160	320	320	320	320	160
A/Slovenia/11406/2022	2a.1b	2022-12-15	SIAT1/SIAT1	40	80	80	160	320	80	160	160	320	320	320	320	160
A/Slovenia/11480/2022	2a.1b	2022-12-19	MDCKx/SIAT1	40	80	80	160	320	80	80	80	160	640	320	320	160
A/Slovenia/54415/2022	2a.1b	2022-12-19	SIAT1/SIAT1	40	80	80	160	320	40	80	80	160	640	320	320	160
A/Albania/29556/2023	2a.1b	2023-01-05	SIAT1	40	80	80	160	320	80	80	160	320	640	640	640	320
A/Belgium/S2455/2022	2a.1b	2023-01-05	SIAT1	40	80	80	160	320	80	80	160	320	320	320	320	160
A/Belgium/S2445/2022	2a.1b	2023-01-05	SIAT1	40	80	80	160	320	80	80	160	320	320	320	320	160
A/Zamora/57/2022	2a.1b	2023-01-05	SIAT2	<40	40	80	160	40	40	40	80	80	320	320	320	80
A/Belgium/142/2022	2a.1b	2023-01-17	CI/SIAT1	<40	40	80	160	320	40	40	80	80	320	320	320	160
A/Belgium/142/2022	2a.1b	2023-12-13	MDCKx/SIAT1	<40	40	80	160	320	40	40	80	80	320	320	320	80
A/Belgium/32851/2022	2a.1b	2023-12-14	CI/SIAT1	<40	40	80	160	320	40	40	40	160	160	320	320	160
A/Slovenia/11445/2022	2a.1b	2022-12-19	SIATx/SIAT1	40	80	80	80	320	40	80	80	160	320	320	320	160
A/Slovenia/11542/2022	2a.1b	2022-12-21	MDCKx/SIAT1	40	80	80	80	320	40	80	80	160	640	640	640	160
A/Slovenia/11542/2022	2a.1b	2022-12-21	SIATx/SIAT1	40	80	80	160	320	80	80	80	160	320	320	320	160
A/Slovenia/11321/2022	2a.1b	2022-12-22	SIATx/SIAT1	40	80	80	160	320	80	80	80	160	320	320	320	160
A/Argentina/3104/2022	2a.3	2023-08-16	SIAT1	40	80	80	40	160	80	160	80	160	80	80	320	40
A/Argentina/3150/2022	2a.3	2023-08-29	SIAT1	<40	160	80	80	160	160	80	160	320	80	80	320	40
A/Mutrah/52223973/2022	2a.3a	2022-12-28	SIAT1/SIAT1	40	80	80	160	160	320	160	320	80	160	160	80	80
A/Slovenia/1054/2022	2a.3a	2022-10-11	SIATx/SIAT1	40	160	90	160	320	160	160	160	80	160	160	80	80
A/Argentina/3150/2022	2a.3a	2022-10-11	MDCK1/SIAT1	<40	80	80	160	320	80	80	160	160	160	160	160	40
A/Ibiza/72211789/2022	2a.3a.1	2022-10-20	SIAT1	40	160	80	160	320	160	160	80	160	160	160	160	40
A/Slovenia/11413/2022	2a.3a.1	2022-12-15	MDCKx/SIAT1	40	80	80	80	160	160	160	160	160	160	160	160	40
A/Romania/54415/2022	2a.3b	2022-12-28	SIAT1/SIAT1	40	80	80	160	320	160	160	160	160	160	160	160	80

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine NH 2021-22

Vaccine SH 2022

Vaccine SH 2023

Vaccine NH 2023-24

< 4-fold

4-fold

8-fold

> 8-fold

< not recognised by the antiserum

≥ 160 (no homologous titre)

Table H3-3. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-03-03

Viruses	Collection date	Passage history	Haemagglutination inhibition titre																			
			Post-infection ferret antisera																			
			A/Cambodia/925256/2020		A/Cambodia/e0826360/20		A/Thuringen		A/Stockholm		A/Darwin		A/Norway		A/Poland		A/Slovenia		A/Lille		A/Catal	
			F03/21	SIAT	Egg	F10/21	SIAT	F36/22	SIAT	F15/22	Egg	F39/21	SIAT	Egg	F11/22	F39/22	SIAT	F24/22	F02/23	F41/22	2a.1b	
Passage history			1a	1a	2b	2a	2a	2a	2a	2a	2a	2a.3	2a.3	2a.2	2a.2	2a.1	2a.1	2a.1	2a.1b			
Ferret number																						
Genetic group																						
REFERENCE VIRUSES																						
A/Cambodia/925256/2020	1a	2020-09-25	SIAT5	640	320	40	320	320	80	80	80	<40	160	<40								
A/Cambodia/e0826360/2020	1a	2020-07-16	ES/ES	90	1280	40	160	320	40	80	40	160	160	160	<40							
A/Thuringen/10/2022	2b	2022-04-01	P1/SIAT2	80	160	320	320	320	80	160	80	320	320	320	80	320	320	160				
A/Stockholm/5/2021	2a	2021-04-16	SIAT/ISAT3	80	160	80	320	640	80	160	320	320	320	320	160	320	320	160				
A/Darwin/9/2021	2a	2021-04-17	E3/E4	80	320	160	320	640	160	320	320	320	640	640	160	320	320	160				
A/Norway/24/07/2021	2a.3	2021-10-24	SIAT3	40	80	80	160	320	160	320	160	320	160	160	320	320	80					
A/Norway/24/07/2021	2a.3	2021-10-24	E3/E1	40	320	160	320	640	320	640	320	640	640	640	160	320	320	160				
A/Poland/97/2022	2a.2	2022-05-09	SIAT2	40	80	80	320	640	160	320	320	640	640	640	320	320	320	160				
A/Slovenia/9/2022	2a.1	2022-02-10	SIAT1/MDCK/1/SIAT2	40	80	80	320	640	160	320	320	640	640	1280	1280	640	640	640	640			
A/Lille/50053/2022	2a.1	2022-09-06	MDCK/1/SIAT3	80	160	80	160	640	80	160	320	640	2560	2560	640	640	640	640				
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3	40	160	80	160	320	80	160	320	640	320	320	320	320	320	320				
TEST VIRUSES																						
A/Pais Vasco/44229/2022	2b	2022-11-23	SIAT1	40	160	160	320	160	80	80	80	160	160	160	40							
A/Belgium/G0013/2023	2b	Unknown	SIAT1/SIAT1	40	80	160	160	160	80	160	80	160	160	160	40							
A/Castilla La Mancha/4410/2022	2b	2022-11-21	SIAT1	40	160	160	160	160	80	160	80	160	160	160	40							
A/Castilla La Mancha/4540/2022	2b	2022-11-22	SIAT1	40	160	320	160	160	80	160	80	160	160	160	40							
A/Lithuania/48379/2022	2b	2022-11-18	SIAT1	40	160	160	160	160	80	80	40	80	320	<40								
A/Belgium/S2611/2022	2a.1	2022-03-16	C1/SIAT1	40	40	40	160	320	80	160	320	640	640	640	320							
A/Belgium/S2614/2022	2a.1	2022-03-18	C1/SIAT1	40	80	80	320	640	160	320	320	640	1280	1280	640							
A/Belgium/S2610/2022	2a.1	2022-03-16	C1/SIAT1	40	160	80	160	320	80	160	320	640	640	640	320							
A/Belgium/S2622/2022	2a.1	2022-03-19	C1/SIAT1	40	80	80	160	320	80	160	320	640	640	640	320							
A/Belgium/S2599/2022	2a.1	2022-03-22	C1/SIAT1	40	160	80	160	320	150	160	320	640	640	640	320							
A/Lithuania/48252/2022	2a.1b	2022-11-16	SIAT1	40	80	80	160	320	80	160	160	640	640	640	320							
A/Lithuania/48708/2022	2a.1b	2022-11-23	SIAT1	40	160	80	160	320	80	160	320	640	640	640	320							
A/Lithuania/46598/2022	2a.3a	2022-10-19	SIAT1	40	80	80	160	320	320	320	320	160	320	320	320	320	320	80				
A/Lithuania/47481/2022	2a.3a.1	2022-11-08	SIAT1	40	80	80	80	80	320	160	320	80	160	160	160	160	160	80				
A/Belgium/S2613/2022	2a.3b	2022-03-17	C1/SIAT1	40	80	80	160	320	160	320	160	320	160	320	320	320	320					

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine
NH 2021-22

Vaccine
SH 2022-23
SH 2023
NH 2023-24

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H3-4. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-03-10

Viruses	Collection date	Passage history	Haemagglutination Inhibition titre																	
			Post-infection ferret antisera																	
			A/Cambodia/9252/2020 9252/2020	A/Cambodia/9350/2020 e0626360/20	A/Thuringen/10/2022 F03/21	A/Stockholm/5/21 F10/21	A/Darwin/97/21 F36/22	A/Norway/24873/21 F16/22	A/Norway/24873/21 F39/21	A/Poland/97/22 F10/22	A/Slovenia/5000/2022 F24/22	A/Lille/97/22 F2/23	A/Catalan/97/22 2a.1	A/Catalan/97/22 2a.2	A/Catalan/97/22 2a.3	A/Catalan/97/22 2a.4				
REFERENCE VIRUSES																				
A/Cambodia/9252/2020 9252/2020	1a	2020-09-25	SIAT5	640	320	<40	320	320	40	40	80	<40	160	160	<40	160	160	<40		
A/Cambodia/9350/2020 e0626360/20	1a	2020-07-16	SIAT3	160	160	80	160	320	40	40	40	40	160	160	160	160	160	160		
A/Thuringen/10/2022	2a	2020-04-01	P1/SIAT2	80	160	320	320	320	40	160	160	320	320	320	320	320	320	320	320	
A/Stockholm/5/21	2a	2021-04-16	SIAT0/SIAT4	80	160	80	320	320	40	160	160	320	320	320	320	320	320	320	160	
A/Darwin/9/2021	2a	2021-04-17	E3/E4	80	320	160	320	1280	160	320	320	320	640	640	160	160	160	160	160	
A/Norway/24873/2021	2a.3	2021-10-24	SIAT3	40	80	80	160	320	160	320	160	160	160	320	320	80	80	80	80	80
A/Norway/24873/2021	2a.3	2021-10-24	E3/E1	80	320	160	320	320	640	320	640	320	640	640	160	160	160	160	160	
A/Poland/97/2022	2a.2	2022-05-09	SIAT3	40	80	80	80	320	640	160	320	640	640	640	320	320	320	320	320	
A/Slovenia/87/2022	2a.1	2022-02-10	SIAT1//MDCK1/SIAT2	80	80	80	320	640	160	320	640	160	1280	1280	640	640	640	640	640	
A/Lille/5003/2022	2a.2	2022-09-06	MDCK1/SIAT5	40	80	40	160	640	40	80	160	640	160	1280	1280	320	320	320	320	320
A/Catalan/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3	40	80	80	160	640	80	160	320	640	640	640	640	640	640	640	640	640
TEST VIRUSES																				
A/Ireland/45707/2022	2b	2022-10-17	SIAT1	40	80	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Tunisia/22634/2022	2b	2022-12-01	SIAT2	40	80	320	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Tunisia/22985/2022	2b	2022-12-05	SIAT1	40	80	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Parma/83/2022	2b	2022-11-14	SIAT3/SIAT1	40	160	160	160	40	80	40	160	160	160	160	160	160	160	160	160	
A/Burgo/258/2022	2b	2022-09-30	SIAT1	80	160	320	160	160	80	160	80	160	160	320	320	80	80	80	80	80
A/Palencia/63/2022	2b	2022-09-30	SIAT1	80	80	320	160	160	80	160	80	160	160	80	80	80	80	80	80	
A/Zamora/30/2022	2b	2022-09-30	SIAT1	80	160	320	160	160	80	160	80	160	160	80	80	80	80	80	80	
A/Burgos/25/2022	2b	2022-10-01	SIAT1	80	160	320	160	160	80	160	80	160	160	80	80	80	80	80	80	
A/Soria/217/2022	2b	2022-10-02	SIAT1	80	160	320	160	160	80	160	80	160	160	80	80	80	80	80	80	
A/Ireland/39199/2022	2b	2022-11-04	SIAT1	80	80	160	160	160	80	160	80	160	160	80	80	80	80	80	80	
A/Bayern/34/2022	2b	2022-11-15	P1/SIAT1	40	160	320	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Berlin/17/2022	2b	2022-11-21	P1/SIAT1	40	160	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Palermo/2/2022	2b	2022-11-21	SIAT3/SIAT2	40	80	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Burgos/15/2022	2b	2022-10-01	SIAT1	80	160	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Burgos/20/2022	2b	2022-10-06	SIAT2/SIAT1	40	80	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Parma/38/2022	2b	2022-11-06	SIAT3/SIAT1	40	80	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Milano/265/2022	2b	2022-11-16	SIAT2/SIAT1	40	80	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Nordrhein-Westfalen/75/2022	2b	2022-11-21	P1/SIAT1	80	160	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Bolzano/38/2022	2b	2022-11-21	SIAT2/SIAT1	40	80	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Palermo/3/2022	2b	2022-11-23	SIAT3/SIAT2	40	80	160	160	160	40	80	80	160	160	160	160	160	160	160	160	
A/Bolzano/47/2022	2b	2022-11-24	SIAT3/SIAT1	40	80	160	160	160	40	80	80	160	160	160	160	160	160	160	160	
A/Milano/339/2022	2b	2022-11-24	SIAT3/SIAT1	40	160	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Schleswig-Holstein/14/2022	2b	2022-11-11	SIAT1	40	80	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Milano/2/27/2022	2b	2022-11-16	SIAT2/SIAT1	40	80	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Parma/38/2022	2b	2022-11-16	SIAT3/SIAT1	40	80	160	160	160	80	80	80	160	160	160	160	160	160	160	160	
A/Burgos/24/2022	2a.1	2022-09-30	SIAT1	40	80	40	80	320	80	80	320	640	1280	1280	320	320	320	320	320	
A/Burgos/23/2022	2a.1	2022-10-01	SIAT1	40	80	40	160	320	80	160	320	640	1280	1280	320	320	320	320	320	
A/Burgos/19/2022	2a.1	2022-10-03	SIAT1	40	80	40	160	320	80	80	320	640	1280	1280	320	320	320	320	320	
A/Ireland/65034/2022	2a.1b	2022-10-17	SIAT1	80	80	80	160	320	80	80	320	640	1280	1280	320	320	320	320	320	
A/Berlin/17/2022	2a.2	2022-11-28	P1/SIAT1	40	80	80	160	320	80	80	320	640	1280	1280	320	320	320	320	320	
A/Tunisia/23062/2022	2a.1b	2022-12-09	SIAT2	40	80	80	160	320	80	80	160	160	160	160	640	640	320	320	320	
A/Bolzano/40/2022	2a.1b	2022-11-14	SIAT2/SIAT1	40	40	80	160	320	40	160	160	160	160	160	160	640	640	320	320	
A/Ireland/6986/2022	2a.3	2022-11-08	SIAT1	40	40	40	40	160	40	160	80	80	80	80	80	80	320	320	480	

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine
NH 2021-22
NH 2022-23
SH 2023
NH 2023-24

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H3-5. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-03-17

Viruses	Collection date	Passage history	Haemagglutination inhibition titre																
			Post-infection ferret antisera																
			A/Cambodia/92526/2020	A/Cambodia/e02363/2020	A/Thuringen/92526/2020	A/Stockholm/5/2022	A/Darwin/9/21	A/Norway/Egg/9/21	A/Norway/S/9/21	A/Poland/9/21	A/Slovenia/9/21	A/Lithuania/9/21	A/Catalonia/9/21	A/Catalonia/F/9/21	Egg/9/21	S/9/21	F/9/21	F/9/22	F/9/23
Passage history	Passage number	Genetic group	1a	1a	1a	2a	2a	2a	2a	2a	2a	2a	2a	2a	2a	2a	2a	2a	2a
REFERENCE VIRUSES																			
A/Cambodia/92526/2020	1a	2023-09-26	SIAT5	640	160	<40	320	320	40	40	80	<40	160	<40	<40	<40	<40	<40	<40
A/Cambodia/e02363/2020	1a	2023-07-16	ESIE3	160	1280	40	160	320	<40	80	40	160	160	<40	<40	<40	<40	<40	<40
A/Thuringen/92526/2022	2b	2022-04-01	P1/SIAT2	160	320	320	320	640	160	160	160	320	640	80	80	80	80	80	80
A/Stockholm/5/2021	2a	2021-04-16	SIAT0/SIAT4	80	160	80	640	640	160	160	320	320	320	320	320	320	320	320	320
A/Darwin/9/2021	2a	2021-04-17	E3/E4	160	640	320	640	1280	320	640	320	640	640	320	320	320	320	320	1280
A/Norway/9/2021	2a,3	2021-10-24	SIAT2	80	80	80	160	320	160	160	320	160	160	320	320	320	320	320	320
A/Norway/9/2021	2a,3	2022-04-24	E3/E4	80	320	160	320	640	320	640	320	640	640	320	320	320	320	320	320
A/Poland/97/2022	2a,2	2023-05-09	SIAT3	40	160	80	320	640	160	160	320	640	640	1280	320	320	320	320	320
A/Slovenia/8720/2022	2a,1	2022-02-10	SIAT1/MDCK1/SIAT2	160	160	640	640	320	320	640	2560	2560	640	1280	1280	1280	1280	1280	1280
A/Lille/50/05/2022	2a,1	2022-09-06	MDCK1/SIAT5	40	80	40	160	320	80	80	160	640	1280	320	320	320	320	320	320
A/Catalonia/NSVH1615/2027/2022	2a,1b	2022-09-14	SIAT1/SIAT3	40	80	80	160	320	80	160	320	640	640	320	320	320	320	320	320
A/Catalonia/NSVH1615/2027/2022	2a,1b	2022-09-14	E3 (Am1/Au2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	\$129
TEST VIRUSES																			
A/Turksia/2095/2022	2a,1	2022-10-21	SIAT3	40	40	80	160	320	80	160	320	640	640	320	320	320	320	320	320
A/Castilla La Mancha/4292/2022	2a,1b	2022-11-10	SIAT1	40	80	80	160	320	80	160	320	640	640	320	320	320	320	320	1280
A/Lisboa/698/2022	2a,1b	2022-11-22	SIAT1/SIAT1	40	80	80	320	640	80	160	320	640	640	640	640	640	640	640	1280
A/Lisboa/897/2022	2a,1b	2022-11-22	SIAT1/SIAT1	40	40	80	160	320	640	80	160	320	640	640	640	640	640	640	1280
A/Lisboa/730/2022	2a,1b	2022-11-27	SIAT1/SIAT1	<40	40	80	160	320	80	160	320	640	640	320	320	320	320	320	320
A/Lisboa/730/2022	2a,1b	2022-11-27	SIAT1/SIAT1	40	80	80	320	640	80	160	320	640	640	640	640	640	640	640	1280
A/Lisboa/719/2022	2a,1b	2022-11-27	SIAT1/SIAT1	40	80	80	160	320	80	160	320	640	640	320	320	320	320	320	1280
A/Lisboa/752/2022	2a,1b	2022-12-14	SIAT1/SIAT1	80	320	320	640	1280	320	1280	320	640	640	320	320	320	320	320	1280
A/Palencia/211/2022	2b	2022-09-22	SIAT1	80	160	320	320	320	160	160	80	160	160	40	40	320	320	320	320
A/Soria/2/2022	2b	2022-09-29	SIAT1	160	320	320	160	160	160	160	320	320	320	320	320	320	320	320	320
A/Zamora/35/2022	2b	2022-10-01	SIAT2	40	80	320	160	160	160	160	320	320	320	320	320	320	320	320	320
A/Trapani/1/2022	2b	2022-11-02	SIAT3/SIAT1	80	160	320	320	320	80	80	80	160	640	40	40	320	320	320	320
A/Castilla La Mancha/4374/2022	2b	2022-11-09	SIAT1	40	80	160	80	160	40	80	40	80	160	<40	<40	<40	<40	<40	<40
A/Castilla La Mancha/4360/2022	2b	2022-11-10	SIAT1	80	160	320	320	320	80	160	80	160	160	320	320	320	320	320	320
A/Castilla La Mancha/4373/2022	2b	2022-11-13	SIAT1	40	80	320	320	320	80	160	80	160	160	320	320	320	320	320	320
A/Castilla La Mancha/4359/2022	2b	2022-11-14	SIAT1	160	320	640	640	640	320	320	320	160	320	320	320	320	320	320	320
A/Navarra/4320/2022	2b	2022-11-14	SIAT1	80	160	320	640	640	320	320	320	80	160	80	80	320	320	320	320
A/Castilla La Mancha/4496/2022	2b	2022-11-15	SIAT1/SIAT1	320	640	640	640	640	320	320	320	640	640	640	640	640	640	640	1280
A/Lisboa/699/2022	2b	2022-11-15	SIAT1/SIAT1	80	160	320	320	320	80	160	80	160	160	320	320	320	320	320	320
A/Castilla La Mancha/4544/2022	2b	2022-11-17	SIAT1	80	80	80	160	160	40	40	40	80	80	320	320	320	320	320	320
A/Castilla La Mancha/4414/2022	2b	2022-11-20	SIAT1	160	160	320	320	320	160	160	160	320	320	320	320	320	320	320	320
A/Castilla La Mancha/4495/2022	2b	2022-11-21	SIAT1	160	160	320	320	320	160	160	160	320	320	320	320	320	320	320	320
A/Lisboa/696/2022	2b	2022-11-22	SIAT1/SIAT1	80	160	320	320	320	80	160	80	160	80	320	320	320	320	320	320
A/Lisboa/695/2022	2b	2022-11-22	SIAT1/SIAT1	80	160	320	320	320	80	160	80	160	80	320	320	320	320	320	320
A/Lisboa/708/2022	2b	2022-11-25	SIAT1/SIAT1	40	160	320	320	320	80	160	80	160	160	40	40	320	320	320	320
A/Lisboa/704/2022	2b	2022-11-27	SIAT1/SIAT1	80	160	320	320	320	80	160	160	320	320	320	320	320	320	320	320
A/Lisboa/706/2022	2b	2022-11-27	SIAT1/SIAT1	40	80	160	160	160	80	80	40	160	160	40	40	320	320	320	320
A/Lisboa/713/2022	2b	2022-11-28	SIAT1/SIAT1	80	160	320	320	320	80	160	80	160	80	320	320	320	320	320	320
A/Lisboa/707/2022	2b	2022-11-28	SIAT1/SIAT1	80	160	320	320	320	80	160	80	160	80	320	320	320	320	320	320
A/Lisboa/729/2022	2b	2022-11-29	SIAT1/SIAT1	160	640	1280	640	640	160	160	320	320	320	320	320	320	320	320	320

< relates to the lowest dilution of antiserum used
ND = Not done

Vaccine	NH 2021-22
	NH 2022-23
	NH 2023-23
	NH 2023
	NH 2023-24

Table H3-6. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-03-24

Viruses	Collection date	Passage history	Ferret number	Genetic group	Haemagglutination inhibition titre											
					Post-infection ferret antisera											
					A/Camb 925256/2020 SIAT F03/21	A/Camb eB826360/20 Egg F16/21	A/Thuringen 16/2022 SIAT F36/22	A/Stockholm 5/21 SIAT F15/22	A/Darwin 9/21 SIAT F39/21	A/Norway 1/2022 SIAT F10/22	A/Norway 2/2022 SIAT F11/22	A/Poland 24873/21 SIAT F39/22	A/Slovenia 87/2022 SIAT F24/22	A/Lille 5005/22 SIAT F02/23	A/Catal NSVH-2065/22 SIAT F41/22	A/Catal 2a.1 2a.1b
REFERENCE VIRUSES																
A/Cambodia/925256/2020	1a	2020-09-25	SIAT	320	160	<40	160	160	<40	<40	80	<40	80	<40	80	<40
A/Cambodia/eB826360/2020	1a	2020-07-16	EgE5	160	160	40	160	220	40	80	80	160	160	160	160	<40
A/Thailand/16/2022	2a	2022-04-01	P1/SIAT2	160	640	320	320	540	320	160	160	320	320	320	320	160
A/Stockholm/5/2021	2a	2021-04-16	SIATO/SIAT4	80	160	80	640	320	80	160	320	320	320	320	320	160
A/Darwin/9/2021	2a	2021-04-17	E3/E4	80	320	160	320	640	160	320	320	640	320	160	160	160
A/Norway/24873/2021	2a.3	2021-10-24	SIAT3	40	80	80	160	320	160	160	160	160	160	160	160	80
A/Norway/24873/2021	2a.3	2021-10-24	E3/E1	40	160	160	320	640	160	160	640	160	640	320	80	80
A/Poland/97/2022	2a.2	2022-05-09	SIAT3	40	80	80	320	640	160	160	320	640	640	640	160	160
A/Slovenia/87/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT2	80	160	160	320	640	320	320	640	1280	1280	1280	1280	640
A/Lille/0053/2022	2a.1	2022-09-06	MDCK1/SIAT5	40	80	40	80	160	40	40	160	320	1280	1280	1280	160
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3	40	80	80	160	320	80	160	320	640	1280	1280	1280	1280
TEST VIRUSES																
A/England/123/2022	2a.1	2022-06-06	SIAT1/SIAT1	40	40	40	160	80	80	160	320	320	320	320	160	160
A/England/123/2022	2a.1	2022-06-06	SIAT2	<40	80	40	80	90	40	40	40	160	320	320	320	160
A/Lisbon/638/2022	2a.1	2022-11-02	SIAT1	<40	40	4480	80	160	<40	<40	80	160	640	640	640	640
A/Switzerland/69848/2022	2a.1b	2022-10-05	MDCK1/SIAT1	80	160	160	320	640	160	320	320	640	1280	1280	1280	1280
A/Hessen/6/2023	2a.1b	2023-02-03	P1/SIAT1	<40	40	40	80	160	40	40	40	80	320	320	320	320
A/England/139/2022	2a.3	2022-05-04	SIAT1/SIAT1	40	40	40	80	160	160	160	160	160	160	160	160	80
A/England/148/2022	2a.3a.1	2022-09-01	SIAT1/SIAT1	40	80	80	160	320	320	320	80	80	160	160	160	80
A/England/122/2022	2a.3a.1	2022-09-02	SIAT1/SIAT1	<40	40	80	80	160	80	160	80	160	160	160	160	<40
A/Soria/220/2022	2a.3a.1	2022-09-26	SIAT3	40	160	160	320	320	320	320	160	320	320	320	320	80
A/Bayern/123/2022	2a.3a.1	2023-01-25	P1/SIAT1	40	80	80	160	320	160	320	80	160	160	160	160	80
A/Basel/6/2023	2a.3a.1	2023-01-26	P1/SIAT1	40	80	80	160	320	160	320	80	160	160	160	160	80
A/Lisboa/731/2022	2b	2022-12-05	SIAT1	40	160	160	320	160	320	80	80	40	40	80	320	<40
A/Lisboa/739/2022	2b	2022-12-06	SIAT1	<40	80	80	80	80	40	80	80	40	40	80	160	<40
A/Lisboa/751/2022	2b	2022-12-14	SIAT1	40	80	80	160	80	80	80	40	40	80	160	160	<40
A/Baden-Wurttemberg/10/2023	2b	2023-01-26	P1/SIAT1	40	80	160	160	160	80	80	80	80	160	160	160	40
A/Baden-Wurttemberg/14/2023	2b	2023-02-10	P1/SIAT1	80	320	160	640	1280	320	320	80	320	640	160	160	40
A/Berlin/3/2023	2b	2023-02-14	P1/SIAT1	80	160	160	320	160	160	80	80	160	160	160	160	<40

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine

NH 2021-22

Vaccine

SH 2022

NH 2022-23

SH 2023

NH 2023-24



Table H3-7. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-04-21

Viruses	Collection date	Passage history	Haemagglutination inhibition titre															
			Post-infection ferret antisera															
			A/Cambodia/92/2020 925265/20 e0826360/20	A/Cambodia/90/2020 F03/21	A/Thuringen/10/22 SIAT F10/21	A/Stockholm/5/21 SIAT F36/22	A/Darwin/9/21 SIAT F15/22	A/Norway/24/73/21 Egg F39/21	A/Norway/97/22 SIAT F10/22	A/Norway/10/22 Egg F39/22	A/Slovenia/87/2022 SIAT F24/22	A/Lithuania/50/53/22 SIAT F20/23	A/Catalonia/NSVH161512067/2022 SIAT F41/22	A/Switzerland/2/20719/2022 SIAT F09/23				
REFERENCE VIRUSES																		
A/Cambodia/92/2020	1a	2020-09-25	SIAT5	640	160	40	160	160	40	40	80	<40	80	<40	<40	<40	<40	<40
A/Cambodia/e0826360/2020	1a	2020-07-16	E/IE3	160	1280	80	160	320	80	80	160	160	160	160	160	160	160	160
A/Thuringen/10/2022	2b	2022-04-01	PI/SAT2	160	320	640	640	320	320	320	320	320	320	320	320	320	320	320
A/Stockholm/5/2022	2a	2022-04-06	SIAT1	40	80	50	640	320	160	160	320	320	320	320	320	320	320	320
A/Darwin/9/2022	2a	2021-04-17	E/IE4	80	320	160	320	640	160	320	320	640	640	160	160	160	160	160
A/Norway/24/73/2021	2a.3	2021-10-24	SIAT3	80	80	80	160	320	160	320	160	160	160	160	160	160	160	160
A/Norway/24/73/2021	2a.3	2021-10-24	E/IE1	80	160	160	320	640	320	640	160	640	320	160	160	160	160	160
A/Poland/97/2022	2a.2	2022-05-09	SIAT3	40	160	80	320	640	160	320	640	640	640	640	320	320	320	320
A/Singapore/1/2022	2a.1	2022-02-10	SIAT1/MDCK/1/2022	160	320	640	640	320	320	320	320	320	320	1280	640	640	640	640
A/Lima/50/53/2022	2a.1	2022-05-06	MDCK/SIAT3	40	80	40	160	320	80	80	160	320	320	320	320	320	320	320
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3	80	80	160	320	320	80	320	640	640	640	1280	640	640	640	640
A/Switzerland/2/20719/2022	2b	2022-12-19	E3 (Am1A2) 10-5	<40	40	80	40	80	<40	40	40	<40	40	320	<40	640	640	640
TEST VIRUSES																		
A/Valadoloid/14/2022	2a.1	2022-09-30	SIAT1/SIAT1	40	80	40	80	320	80	80	160	320	1280	320	320	320	320	320
A/Valadoloid/18/2022	2a.1	2022-10-05	SIAT1/SIAT1	40	80	40	160	320	80	160	320	320	1280	320	320	320	320	320
A/Valadoloid/35/2022	2a.1	2022-11-02	MDCK/SIAT1	40	80	40	160	320	80	160	320	320	1280	320	320	320	320	320
A/Valadoloid/35/2022	2a.1	2022-11-06	SIAT1	40	80	40	160	320	80	160	320	320	1280	320	320	320	320	320
A/Valadoloid/12-02668/2022	2a.1b	2022-12-06	P2/SIAT1	40	80	160	320	640	160	320	320	640	640	320	320	320	320	320
A/Kyiv/494/2022	2a.1b	2022-12-20	SIAT1	40	80	80	80	160	80	80	160	320	320	320	160	160	160	160
A/Kyiv/506/2022	2a.1b	2022-12-22	SIAT1	80	80	40	160	160	80	160	160	640	320	320	160	160	160	160
A/Latvia/01-0493/2023	2a.2	2023-01-16	P2/SIAT1	80	160	160	320	640	160	320	320	640	1280	320	320	320	320	320
A/Latvia/01-0493/2023	2a.1b	2023-01-30	P2/SIAT1	80	160	160	320	640	160	320	320	640	640	320	320	320	320	320
A/Valadoloid/35/2022	2b	2022-09-29	SIAT1/SIAT1	160	160	320	320	320	160	160	160	320	320	320	320	320	320	320
A/Valadoloid/14/2022	2b	2022-09-30	SIAT1/SIAT1	80	160	320	160	160	80	80	160	160	160	40	160	160	160	160
A/Valadoloid/15/2022	2b	2022-10-01	SIAT1/SIAT1	80	160	320	160	160	80	160	160	160	160	160	40	160	160	160
A/Valadoloid/17/2022	2b	2022-10-03	SIAT1/SIAT1	80	160	320	160	160	80	160	160	160	160	160	80	160	160	160
A/Valadoloid/20/2022	2b	2022-10-04	SIAT1/SIAT1	80	160	320	160	160	80	160	160	160	160	160	40	160	160	160
A/Valadoloid/16/2022	2b	2022-10-04	SIAT1/SIAT1	40	80	160	160	160	40	80	40	160	160	160	40	160	160	160
A/Mellilla/443/2022	2b	2022-11-21	SIAT1	40	160	320	160	160	40	80	80	160	160	160	40	160	160	160
A/Ceuta/445/2022	2b	2022-11-17	SIAT1	40	80	320	160	160	80	80	80	160	160	160	40	160	160	160
A/Ceuta/445/2022	2b	2022-11-22	SIAT1	80	160	320	160	160	80	80	80	160	160	160	40	160	160	160
A/Valadoloid/20/2022	2b	2022-11-26	P2/SIAT1	40	80	160	160	160	40	80	40	160	160	160	40	160	160	160
A/Kyiv/471/2022	2b	2022-12-17	SIAT1	80	160	160	160	80	80	80	80	160	320	40	80	80	80	80
A/Latvia/12-084/27/2022	2b	2022-12-27	P2/SIAT1	80	160	160	320	160	80	80	80	160	640	40	80	80	80	80

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine
NH 2021-22
SH 2022-23
SH 2023
NH 2023-24

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H3-8. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-04-28

Viruses	Collection date	Passage history	Haemagglutination inhibition titre													
			Post-infection ferret antisera													
			A/Camb 925256/2020	A/Camb e0826586/2020	A/Camb F03/21	A/Thuringen 9/21	A/Stockholm 9/21	A/Darwin 9/21	A/Norway 24873/21	A/Norway 24873/21	A/Poland 97/22	A/Slovenia 872022	A/Lille 50053/2022	A/Catal NSVH-2022	A/Catal SIAT	A/Catal F41/22
REFERENCE VIRUSES																
A/Cambodia/925256/2020	1a	2020-09-25	SIAT5	640	160	40	80	160	80	80	80	<40	80	<40	320	320
A/Cambodia/e0826586/2020	1a	2020-07-16	SIAT3	160	160	80	160	160	80	160	80	160	320	320	320	320
A/Algeria/10/2022	2b	2022-04-01	P1/9/2022	200	300	640	640	640	320	320	320	320	640	640	160	160
A/Stockholm/5/2021	2a	2021-04-16	SIAT/ISAT4	160	160	640	640	640	160	320	320	320	640	640	160	160
A/Darwin/9/2021	2a	2021-04-17	E3/E4	80	320	320	640	640	320	320	320	640	640	320	320	320
A/Norway/24873/2021	2a,3	2021-10-24	SIAT3	80	80	160	320	320	320	640	320	320	320	320	320	80
A/Norway/24873/2021	2a,3	2021-10-24	E3/E1	80	320	320	640	640	320	640	320	640	640	640	640	160
A/Poland/97/2022	2a,2	2022-05-09	SIAT3	80	160	640	640	640	320	320	320	1280	640	1280	640	640
A/Slovenia/872022	2a,1	2022-02-10	SIAT1/MDCK/1/SIAT2	80	160	160	640	640	320	320	320	640	1280	1280	640	640
A/Lille/50053/2022	2a,1	2022-09-06	MDCK/1/SIAT5	40	160	80	160	320	80	160	320	640	1280	1280	320	320
A/Catalonia/NSVH161512067/2022	2a,1b	2022-09-14	SIAT/ISAT3	40	80	80	160	320	80	160	320	640	640	320	320	320
TEST VIRUSES																
A/Slovenia/10/19/2022	2a,1	2022-11-16	SIAT1	80	160	160	320	640	160	320	640	1280	1280	640	640	640
A/Austria/1573806/2022	2a,1b	2022-12-09	SIAT1	40	40	160	160	320	80	80	320	640	640	320	320	320
A/Slovenia/1309/2022	2a,1b	2022-12-12	SIAT1	40	80	80	160	320	80	160	320	640	640	320	320	320
A/Poland/PL65/2022	2a,1b	2022-12-21	SIAT1	160	160	320	320	640	320	320	640	1280	1280	640	640	640
A/Israel/B1743/2023	2a,1b	2023-01-08	SIAT1	80	80	160	320	320	160	160	320	640	640	640	640	640
A/Slovenia/14/2023	2a,1b	2023-01-10	SIAT1	80	160	160	320	320	160	160	320	640	640	320	320	320
A/Poland/PL78/2022	2a,3	2022-11-18	SIAT1	80	80	160	320	320	320	320	160	320	320	320	320	160
A/Poland/PL80/2022	2a,3	2022-11-30	SIAT1	80	80	160	320	640	320	640	320	640	640	320	320	160
A/Poland/PL80/2022	2a,3a,1	2022-12-14	SIAT1	80	320	320	320	640	320	640	320	640	640	640	640	160
A/Austria/1561460/2022	2b	2022-10-24	SIAT1	320	320	640	320	320	160	320	160	320	320	320	320	160
A/Austria/1572480/2022	2b	2022-12-05	SIAT1	160	160	320	320	320	160	320	160	320	320	320	320	160
A/Austria/1572440/2022	2b	2022-12-05	SIAT1	320	320	640	320	320	160	320	160	320	320	320	320	160
A/Poland/PL71/2022	2b	2022-12-08	SIAT1	160	320	640	320	320	160	320	160	320	320	320	320	80
A/Poland/PL83/2022	2b	2022-12-11	SIAT1	80	320	320	320	320	160	320	160	320	320	320	320	80
A/Poland/PL83/2022	2b	2022-12-11	SIAT1	160	320	320	320	320	160	320	160	320	320	320	320	80
A/Poland/PL83/2022	2b	2022-12-12	SIAT1	160	320	320	320	320	160	320	160	320	320	320	320	80
A/Poland/PL83/2022	2b	2022-12-12	SIAT1	320	320	640	640	640	160	320	160	640	640	640	640	80
A/Slovenia/1343/2022	2b	2022-12-13	SIAT1	640	320	640	640	640	320	320	160	640	640	320	320	160
A/Kyiv/4E3/2022	2b	2022-12-15	SIAT2	160	320	320	320	320	160	160	160	320	640	640	640	80
A/Slovenia/1443/2022	2b	2022-12-16	SIAT1	160	320	320	320	320	160	160	160	320	640	640	640	80
A/Israel/B17/19/2022	2b	2022-12-30	SIAT1	160	320	320	320	320	160	160	160	320	320	320	320	160
A/Slovenia/6/2023	2b	2023-01-04	SIAT1	320	320	320	320	320	160	160	160	160	320	640	640	80
A/Slovenia/5/2023	2b	2023-01-05	SIAT1	160	320	320	320	320	160	160	160	160	320	640	640	80
A/Israel/R49/8/2023	2b	2023-01-07	SIAT1	320	320	640	640	640	320	160	320	160	320	320	320	80
A/Slovenia/0596/2022	no seq	2022-10-14	S/SIAT1	320	1280	640	1280	640	640	640	1280	2560	2560	2560	2560	640

< relates to the lowest dilution of antiserum used

ND = Not Done



Table H3-9. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-05-05

Viruses	Collection date	Passage history	Haemagglutination inhibition titre														
			Post-infection ferret antisera														
			A/Cambodia/925256/2020 925256/2020	A/Cambodia/926380/2020 926380/2020	A/Thuringen/19/21 SIAT F03/21	A/Thuringen/19/21 Egg F36/22	A/Stockholm/5/21 SIAT F19/22	A/Darwin/9/21 SIAT F38/21	A/Norway/19/21 SIAT F10/22	A/Poland/87/22 SIAT F39/22	A/Slovenia/87/22 SIAT F24/22	A/Lille/5005/2022 SIAT F02/23	A/Catalonia/NSVH161512067/2022 2a.1b	A/Catalonia/NSVH161512067/2022 2a.1b			
REFERENCE VIRUSES																	
A/Cambodia/925256/2020 925256/2020	1a	2020-09-25	SIAT	640	160	40	160	320	60	40	60	<40	160	40	40	40	
A/Cambodia/926380/2020 926380/2020	1a	2020-07-19	ESE/2	60	640	40	160	320	40	80	80	160	160	40	40	40	
A/Thuringen/19/2022	2b	2022-04-01	P16/AT/2	160	320	640	640	320	160	320	320	320	320	320	320	320	320
A/Stockholm/5/2021	2a	2021-04-16	SIATO/SIAT4	80	160	160	640	640	160	320	320	640	320	640	320	640	60
A/Darwin/9/2021	2a	2021-04-17	E3/E2	80	320	320	320	640	160	320	320	640	640	640	320	320	320
A/Norway/24873/2021	2a.3	2021-10-24	SIAT3	40	80	160	160	320	320	320	320	320	320	320	320	320	80
A/Norway/24873/2021	2a.3	2021-10-24	E3/E1	40	160	320	320	640	320	640	160	640	640	640	640	640	160
A/Poland/97/2022	2a.2	2022-05-09	SIAT3	80	80	80	320	640	160	320	640	640	640	640	640	640	320
A/Slovenia/87/20/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT2	40	160	80	320	640	160	320	640	1280	1280	1280	1280	1280	640
A/Lille/5005/2022	2a.1	2022-09-06	MDCK1/SIAT5	40	160	40	160	160	40	80	160	640	1280	1280	1280	1280	320
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3	<40	40	80	160	320	80	160	320	640	640	640	640	640	320
TESTING/SE																	
A/Bulgaria/10/2023	2a.1	2022-12-19	SIAT1	40	80	80	320	1280	160	160	640	1280	1280	1280	1280	1280	640
A/Bulgaria/27/12/2022	2a.1b	2022-12-20	SIAT1	40	80	80	160	320	80	160	320	320	540	540	540	540	640
A/Albania/29058/2023	2a.1b	2023-01-05	SIAT1	40	320	160	640	640	160	320	640	2560	2560	2560	2560	2560	1280
A/Albania/29056/2023	2a.1b	2023-01-05	SIAT1	40	160	80	320	640	160	160	320	1280	1280	1280	1280	1280	640
A/Albania/29046/2023	2a.3a.1	2023-01-04	SIAT1	40	320	320	320	640	320	1280	320	640	320	320	320	320	160
A/Bulgaria/10/2023	2a.3a.1	2023-01-05	SIAT1	40	320	320	320	640	640	1280	320	320	640	640	640	640	160
A/Albania/29165/2022	2b	2022-12-23	SIAT1	40	160	320	320	160	160	80	320	640	320	640	320	640	40
A/Albania/29038/2022	2b	2022-12-30	SIAT1	80	160	320	320	160	80	80	80	80	80	160	640	640	40
A/Albania/29052/2023	2b	2023-01-05	SIAT1	80	160	160	160	320	80	80	80	160	160	160	640	640	40

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine
NH 2021-22

Vaccine
SH 2022
NH 2022-23
SH 2023
NH 2023-24

Legend: < 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H3-10. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-05-19

Viruses	Collection date	Passage history	Haemagglutination inhibition titre																		
			Post-infection ferret antisera																		
			A/Cambodia/925256/2020 SIAT F03/21	A/Cambodia/925263/2020 SIAT F03/21	A/Cambodia/e082636/20 SIAT F10/21	A/Thuringen/160/2022 Egg F36/22	A/Stockholm/52/2022 SIAT F15/22	A/Darwin/92/2022 SIAT F39/22	A/Norway/2487/2022 SIAT F10/22	A/Norway/99/2022 SIAT F11/22	A/Poland/87/2022 SIAT F39/22	A/Slovenia/50/2022 SIAT F24/22	A/Lille/NSVH-3/2022 SIAT F02/23	A/Catalonia/NSVH161512067/2022 SIAT SIAT3	1a	1a	2b	2a	2a.3	2a.2	2a.1
REFERENCE VIRUSES																					
A/Cambodia/925256/2020	1a	2020-09-25	SIAT3	640	320	40	160	320	80	80	160	<40	160	160	40						
A/Cambodia/925263/2020	1a	2020-07-16	E3/E2	80	640	40	160	320	40	40	160	160	160	160	160	160	160	160			
A/Thailand/10/2022	2a	2022-04-11	P1/SIAT2	160	320	640	640	320	160	160	160	320	640	640	640	640	640	640			
A/Stockholm/5/2021	2a	2021-04-16	SIAT0/SIAT4	80	160	160	640	640	160	160	160	320	640	640	640	640	640	640			
A/Darwin/20/2021	2a	2021-04-17	E3/E2	80	640	160	640	640	160	160	320	320	640	640	640	640	640	640			
A/Norway/2487/2021	2a.3	2021-10-24	SIAT3	80	80	80	160	320	160	320	320	320	320	320	320	320	320	160			
A/Norway/2487/2021	2a.3	2021-10-24	E3/E1	80	320	320	640	640	320	640	320	320	640	640	640	640	640	320			
A/Poland/97/2022	2a.2	2022-05-09	SIAT3	80	160	80	320	640	160	160	320	640	640	640	640	1280	1280	320			
A/Slovenia/87/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT2	80	160	160	640	640	160	160	320	640	1280	1280	1280						
A/Lille/50053/2022	2a.1	2022-09-06	MDCK1/SIAT5	80	160	40	160	320	80	80	320	640	2560	320							
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3	40	80	160	160	320	80	160	640	1280	1280	640							
TESTING VIRUSES																					
A/Ireland/1/2022	2a.1b	2022-12-21	SIAT1	40	160	160	640	320	160	160	320	320	1280	1280	640						
A/Montenegro/519452/2022	2a.1b	2022-12-24	SIAT1	40	80	80	320	320	160	320	320	320	640	640	640						
A/Albania/291350/2022	2a.1b	2022-12-27	SIAT1	80	320	160	320	640	80	160	320	320	1280	1280	640						
A/Montenegro/01668/2023	2a.1b	2023-01-08	SIAT1	80	160	160	320	640	160	160	640	640	1280	1280	1280						
A/Albania/29242/2022	2a.3a.1	2022-12-27	SIAT1	160	320	640	1280	1280	640	1280	320	640	1280	1280	320						
A/Albania/29072/2022	2a.3a.1	2022-12-28	SIAT1	80	160	160	160	320	640	640	160	320	320	320	320	320	320	160			
A/Albania/29272/2022	2a.3a.1	2022-12-28	SIAT1	40	160	160	160	320	320	640	640	160	320	320	320	320	320	160			
A/Akkar/22/2023	2a.3a.1	2023-01-03	SIAT1	160	320	320	320	320	1280	640	1280	320	640	640	320						
A/Albania/291350/2022	2b	2022-11-16	P1/SIAT1	80	160	320	320	320	160	160	160	320	320	320	320	320	320	160			
A/Rheinland-Pfalz/28/2022	2b	2022-11-16	P1/SIAT1	80	160	320	320	320	160	80	160	80	320	320	320	320	320	160			
A/Saida/S0215/2022	2b	2022-11-29	SIAT1	80	160	320	320	320	160	80	160	80	320	320	320	320	320	80			
A/Albania/28965/2022	2b	2022-12-07	SIAT1	80	160	320	320	320	160	80	160	80	160	160	320	320	320	80			
A/Albania/28990/2022	2b	2022-12-15	SIAT1	80	160	320	320	320	80	160	80	160	80	320	320	320	320	80			
A/Albania/28990/2022	2b	2022-12-15	SIAT1	160	640	640	640	640	640	320	320	160	320	320	1280	1280	160				
A/MountLebanon/2989/2022	2b	2022-12-20	SIAT1	320	320	320	320	320	160	640	640	640	640	640	640	640	640	640			
A/MountLebanon/2990/2022	2b	2022-12-21	SIAT1	160	160	320	320	320	160	160	160	320	320	320	320	320	320	160			
A/North Lebanon/3040/2023	2b	2023-01-05	SIAT1	160	320	320	640	320	160	160	80	80	320	320	320	320	320	80			
A/North Lebanon/3040/2023	2b	2023-01-05	SIAT1	80	160	320	320	320	80	160	160	80	80	320	320	320	320	80			
A/MountLebanon/65/2023	2b	2023-01-09	SIAT1	80	160	320	320	320	80	160	160	80	80	160	160	160	160	80			

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine NH 2021-22

Vaccine SH 2022-23

NH 2023-23

SH 2023

NH 2023-24

Table H3-11. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-05-26

Viruses	Collection date	Passage history	Haemagglutination inhibition titre															
			Post-infection ferret antisera															
			A/Cambodia/952256/2020 e0826360/2020	A/Cambodia/952256/2020 F03/21	A/Cambodia/952256/2020 F10/21	A/Thuringen/160/2020 SIAT	A/Thuringen/160/2020 Egg	A/Stockholm/52/2020 SIAT	A/Darwin/92/2020 SIAT	A/Norway/24873/2020 F09/22	A/Norway/24873/2020 F10/22	A/Poland/87742/2020 SIAT	A/Slovenia/50042/2020 F24/22	A/United States/NSVH-2022 F02/23	A/Catalonia/NSVH161512067/2022 F41/22	A/Catalonia/NSVH161512067/2022 F41/22	A/Catalonia/NSVH161512067/2022 F41/22	
REFERENCE VIRUSES																		
A/Cambodia/952256/2020	1a	2020-09-26	SIAT	640	320	40	160	320	80	80	160	<40	160	40				
A/Cambodia/9603360/2020	1a	2020-07-16	E3/E2	160	160	80	160	320	80	40	160	320	40					
A/AT/1/2020/2022	2a	2022-04-11	P1/SIAT	160	320	540	640	540	160	200	160	640	640	160				
A/Stockholm/5/2021	2a	2021-04-16	SIATO/SIAT	160	160	160	640	1280	160	320	640	1280	640	320				
A/Darwin/9/2021	2a	2021-04-17	E3/E2	80	640	160	640	640	160	320	640	640	640	160				
A/Norway/24873/2021	2a.3	2021-10-24	SIAT	160	160	160	320	320	160	320	160	640	320	320				
A/Norway/24873/2021	2a.3	2021-10-24	E3/E1	160	320	320	640	640	640	640	320	640	640	320				
A/Poland/97/2022	2a.2	2022-05-09	SIAT	80	160	160	640	640	160	320	1280	640	1280	640				
A/Slovenia/8/2022	2a.1	2022-02-10	SIAT/MDCK/SIAT	160	160	160	640	1280	320	640	640	1280	1280	1280				
A/United States/53/2022	2a.1	2022-09-06	MDCK/SIAT	80	160	80	320	640	80	160	320	640	2560	320				
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT/SIAT	80	80	160	320	640	160	160	640	1280	1280	640				
TEST VIRUSES																		
A/Georgia/178-4/2022	2a.1b	2022-11-28	SIAT	80	80	160	160	320	80	160	320	640	640	320				
A/Georgia/178-26/2022	2a.1b	2022-12-05	SIAT	80	160	80	160	320	80	160	320	640	2560	640				
A/Estonia/172437/2022	2a.1b	2022-12-14	SIAT	40	80	80	160	320	80	160	160	160	640	640	320			
A/Estonia/172464/2022	2a.1b	2022-12-19	SIAT	80	160	80	160	320	80	160	320	640	1280	640				
A/Estonia/KL7277/2022	2a.1b	2022-12-28	SIAT	80	160	80	320	320	80	160	320	640	1280	640				
A/Estonia/172631/2023	2a.1b	2023-01-01	SIAT	80	80	160	320	320	80	160	320	640	640	320				
A/Slovenia/125/2023	2a.1b	2023-01-09	MDCK/SIAT	80	80	160	160	320	80	160	320	640	640	320				
A/Slovenia/10/2023	2a.1b	2023-01-09	SIATO/SIAT	80	80	160	320	640	80	160	320	640	1280	640				
A/Slovenia/17/2023	2a.1b	2023-01-11	SIAT	40	80	80	160	320	640	160	160	320	640	640	320			
A/Serbia/63/2023	2a.1b	2023-01-12	SIAT	80	160	160	320	640	160	320	640	1280	1280	640				
A/Estonia/172883/2023	2a.1b	2023-01-13	SIAT	80	160	160	320	640	160	320	640	160	1280	640				
A/Slovenia/277/2023	2a.1b	2023-01-20	MDCK/SIAT	90	80	160	320	640	80	160	320	640	640	320				
A/Estonia/173486/2023	2a.1b	2023-02-19	SIAT	40	80	80	320	320	80	160	160	320	640	320				
A/Estonia/173578/2023	2a.1b	2023-02-25	SIAT	40	80	80	160	320	80	160	160	160	320	320	160			
A/Argentina/10/2023	2a.1b	2023-03-01	MDCK/SIAT	90	80	160	160	320	80	160	160	320	640	640	320			
A/Estonia/173545/2023	2a.1b	2023-03-02	SIAT	40	80	160	160	320	80	160	160	320	640	640	320			
A/Estonia/173545/2023	2a.1b	2023-03-03	SIAT	40	80	160	160	320	80	160	160	320	640	640	320			
A/Estonia/173741/2023	2a.1b	2023-03-06	SIAT	40	80	80	320	320	80	160	320	320	320	320	160			
A/Estonia/173741/2023	2a.1b	2023-03-08	SIAT	40	80	160	160	320	80	160	160	320	320	320	160			
A/Togo/202/2022	2a.3a	2022-10-06	SIAT	80	320	320	640	640	320	640	320	640	640	640	160			
A/Ireland/805/22/2022	2a.3a.1	2022-12-22	SIAT	40	160	160	160	320	160	640	160	160	320	320	160			
A/Serbia/500898/2023	2a.3a.1	2023-01-06	SIAT	40	160	160	320	640	320	640	160	320	320	320	160			
A/Bulgaria/246/2023	2a.3a.1	2023-01-15	SIAT2/SIAT1	80	320	320	640	640	320	640	320	640	640	640	160			
A/Argentina/122/2023	2b	2022-12-22	SIAT	80	160	160	320	320	80	160	160	320	320	160	80			
A/Estonia/172575/2022	2b	2022-12-24	SIAT	160	320	640	320	320	160	160	160	320	320	320	80			
A/Ireland/81103/2022	2b	2022-12-25	SIAT	80	160	320	320	320	80	160	160	320	320	320	80			
A/Serbia/2/2023	2b	2023-01-02	SIAT	80	160	320	320	320	80	80	80	80	160	640	40			
A/Macedonia/13/2023	2b	2023-01-09	SIAT1	80	160	320	320	320	80	160	160	320	320	320	80			
A/Macedonia/21/2023	2b	2023-01-11	SIAT1	80	160	320	320	320	80	80	80	80	160	640	80			
A/Serbia/501681/2023	2b	2023-01-12	SIAT1	80	320	320	640	640	320	80	160	160	320	320	640	80		
A/Bulgaria/63/2023	2b	2023-01-16	SIAT2/SIAT1	160	320	320	640	640	320	320	320	320	320	320	160			
A/Argentina/6/2023	2b	2023-01-16	SIAT2/SIAT1	50	160	320	320	320	80	160	160	320	320	320	80			
A/Bulgaria/598/2023	2b	2023-01-16	SIAT2/SIAT1	160	320	640	320	320	80	160	160	320	320	320	80			
A/Estonia/17303/2023	2b	2023-01-17	SIAT1	80	160	320	320	320	80	160	160	320	320	320	80			
A/Estonia/17302/2023	2b	2023-01-21	SIAT1	160	320	640	320	320	80	160	160	320	640	640	320			
A/Estonia/17303/2023	2b	2023-01-23	SIAT1	160	320	320	640	640	320	80	160	160	320	320	320	80		
A/Estonia/17309/2023	2b	2023-01-23	SIAT1	80	160	320	320	320	80	160	160	320	320	320	80			
A/Estonia/17325/2023	2b	2023-02-02	SIAT1	80	160	320	320	320	80	160	160	320	320	320	80			
A/Estonia/17327/2023	2b	2023-02-09	SIAT2/SIAT	80	160	320	320	320	80	160	160	320	320	320	80			
A/Estonia/17328/2023	2b	2023-02-15	SIAT1	80	160	320	320	320	80	160	160	320	320	320	80			
A/Slovenia/53/2023	2b	2023-02-17	SIATO/SIAT2	80	160	320	320	320	80	80	80	80	320	320	640	48		

< relative to the lowest dilution of antiserum used

ND = Not Done

Vaccine NH 2021-22

NH 2022-23

NH 2023-24



< 4-fold



4-fold



8-fold



> 8-fold



< not recognised by the antiserum



≥ 160 (no homologous titre)

Table H3-12. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-06-09

Viruses	Collection date	Passage history	Haemagglutination inhibition titre													
			Post-infection ferret antisera													
			A/Cambodia/91258/2020 9258/2020	A/Cambodia/e082639/2020 F03/20	A/Thuringia/10/22 Egg F3/22	A/Stockholm/5/2021 SIAT F15/22	A/Darwin/9/2021 SIAT F39/21	A/Norway/2487/2021 F10/22	A/Poland/8720/2022 SIAT F39/22	A/Slovenia/5005/2022 F24/22	A/Lithuania/NSVH-2022 SIAT F02/23	A/Catalonia/26/2022 SIAT 2a.1	A/Catalonia/26/2022 SIAT 2a.1b	A/Catalonia/26/2022 SIAT 2a.2	A/Catalonia/26/2022 SIAT 2a.3	
REFERENCE VIRUSES																
A/Cambodia/91258/2020 9258/2020	1a	2020-09-25	SIAT1	640	320	80	160	320	80	160	160	40	160	<40	40	40
A/Cambodia/e082639/2020 F03/20	1a	2020-07-19	SIAT2	160	1280	80	160	320	80	160	160	320	320	320	<40	<40
A/Armenia/10/2022	2b	2022-04-01	PI/SIAT2	<40	320	<20	320	320	160	320	160	320	320	320	160	160
A/Stockholm/5/2021	2a	2021-04-16	SIAT/SIAT4	160	160	160	640	640	80	320	160	320	640	320	320	320
A/Darwin/9/2021	2a	2021-04-17	E3/E2	80	640	160	640	1280	160	320	320	640	640	160	160	
A/Norway/2487/2021	2a.3	2021-10-24	SIAT4	80	160	160	320	640	320	160	320	320	320	320	320	320
A/Norway/2487/2021	2a.3	2021-10-24	E3/E1	80	320	320	320	640	320	640	320	640	640	640	320	320
A/Poland/97/2022	2a.2	2022-05-09	SIAT3	80	160	80	640	640	160	320	640	640	640	640	320	320
A/Slovenia/720/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT1	160	160	160	640	640	160	640	640	1280	1280	640	640	640
A/Lille/50053/2022	2a.1	2022-09-06	MDCK1/SIAT1	80	160	80	320	80	160	320	80	640	2560	640	640	640
A/Catalonia/NSVH-161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3	40	80	80	320	640	80	160	320	1280	640	640	640	640
TEST VIRUSES																
A/SaudiArabia/1404/2022	2a	2022-10-05	SIAT1	80	80	160	320	640	80	160	320	320	320	320	160	160
A/Catalonia/3505472NS/2022	2a.1b	2022-09-25	SIAT1	40	80	80	160	320	80	160	320	640	640	640	640	640
A/Greece/37/2022	2a.1b	2022-11-07	SIAT1	40	80	160	160	320	80	160	320	640	640	640	320	320
A/Catalonia/2262797NS/2022	2a.1b	2022-12-01	SIAT1	80	160	160	320	640	80	160	320	640	1280	640	640	640
A/Netherlands/12136/2022	2a.1b	2022-12-29	MDCK-MIX2/SIAT1	40	80	160	320	320	80	160	320	640	640	640	640	640
A/Estonia/172629/2023	2a.1b	2023-01-02	SIAT2	40	40	80	160	320	320	80	160	320	640	640	320	320
A/Greece/1_236/2023	2a.1b	2023-01-02	SIAT1	40	80	80	160	320	80	160	320	640	640	640	320	320
A/Greece/1_237/2023	2a.1b	2023-01-03	SIAT1	40	80	80	160	320	80	160	320	640	640	640	320	320
A/Greece/1_238/2023	2a.1b	2023-01-09	SIAT1	40	80	80	160	320	80	160	320	640	640	640	320	320
A/Armenia/157/2023	2a.1b	2023-01-11	SIAT1	40	80	80	160	320	80	160	320	640	640	640	640	640
A/Netherlands/10142/2023	2a.1b	2023-01-12	MDCK-MIX2/SIAT1	80	160	320	640	1280	160	320	1280	1280	1280	1280	1280	1280
A/Netherlands/10226/2023	2a.1b	2023-01-29	MDCK-MIX2/SIAT1	40	80	160	320	160	80	320	640	640	640	640	640	640
A/Netherlands/10228/2023	2a.1b	2023-01-30	MDCK-MIX2/SIAT1	80	160	160	320	640	80	160	640	1280	1280	1280	1280	1280
A/Ireland/9047/2023	2a.1b	2023-02-04	SIAT1	40	80	80	160	320	80	160	320	640	640	640	160	160
A/Ireland/9830/2023	2a.1b	2023-02-08	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10077/2023	2a.1b	2023-02-09	MDCK-MIX2/SIAT1	80	160	160	320	640	80	160	320	1280	1280	1280	1280	1280
A/Ireland/10140/2023	2a.1b	2023-02-09	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10141/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10142/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10143/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10144/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10145/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10146/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10147/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10148/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10149/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10150/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10151/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10152/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10153/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10154/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10155/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10156/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10157/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10158/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10159/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10160/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10161/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10162/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10163/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10164/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10165/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10166/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10167/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10168/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10169/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10170/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10171/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10172/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10173/2023	2a.1b	2023-02-10	SIAT1	40	80	80	160	320	80	160	320	320	320	320	320	320
A/Ireland/10174/2023	2a.1b	2023-02-1														

Table H3-13. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-06-23

Viruses	Collection date	Passage history	Ferret number	Genetic group	Haemagglutination inhibition titre													
					Post-infection ferret antisera													
					A/Camb 925256/2020 F03/21	A/Camb 925256/2020 F03/21	A/Thuringen 10/22	A/Stockholm 5/22	A/Darwin 9/21	A/Norway 24873/22	A/Norway 24873/21	A/Poland 97/22	A/Slovenia 8720/22	A/Slovenia 5000/22	A/Lille NSVH-2022	A/Catal SAT	A/Catal SAT	A/Catal F4/22
					1a	1a	1a	2b	2a	2a	2a	2a	2a	2a	2a	2a	2a	2a,1b
REFERENCE VIRUSES																		
A/Cambodia/925256/2020	1a	2020-09-25	SIA/T	320	160	80	160	160	40	80	80	40	80	40	160	160	160	40
A/Cambodia/925256/2020	1a	2020-07-18	E/S/E2	80	80	80	160	320	80	80	40	160	160	160	160	160	160	160
A/Thailand/10/2022	2a	2020-04-01	P1/GAT2	40	160	320	320	160	80	160	160	320	320	320	320	320	320	320
A/Stockholm/5/2021	2a	2021-04-16	SIA/T/SIA/T4	160	80	160	320	640	80	160	160	320	320	320	320	320	320	160
A/Darwin/9/2021	2a	2021-04-17	E3/E2	160	640	320	640	640	160	320	320	640	640	640	640	640	640	160
A/Norway/24873/2021	2a,3	2021-10-24	SIA/T4	80	80	160	320	320	320	640	640	320	640	640	640	640	640	160
A/Norway/24873/2021	2a,3	2021-10-24	E3/E2	80	160	320	320	640	320	640	640	320	640	640	640	640	640	320
A/Poland/97/2022	2a,2	2022-05-09	SIA/T3	40	80	40	320	640	160	320	640	640	640	640	640	640	640	320
A/Slovenia/8720/2022	2a,1	2022-02-10	SIA/T1/MDCK1/SIA/T2	80	80	80	320	320	160	320	320	320	320	1280	1280	640	640	640
A/Lille/5005/2022	2a,1	2022-09-06	MDCK1/SIA/T5	40	80	40	160	160	40	80	320	640	640	1280	640	640	640	640
A/Catalonia/NSVH161512067/2022	2a,1b	2022-09-14	SIA/T/SIA/T3	40	40	80	160	320	80	160	320	640	640	640	320	640	640	320
TESTING VIRUSES																		
A/Netherlands/11924/2022	2a,1	2022-12-07	MDCK-MIX2/SIA/T1	40	80	80	320	160	80	160	320	320	1280	1280	640	640	640	640
A/Netherlands/11817/2022	2a,1b	2022-11-03	MDCK-MIX2/SIA/T1	40	80	160	160	320	80	160	320	320	640	640	640	640	640	640
A/Netherlands/11833/2022	2a,1b	2022-11-11	MDCK-MIX2/SIA/T1	40	40	80	160	320	80	80	320	320	640	640	640	640	640	640
A/Netherlands/11854/2022	2a,1b	2022-11-27	MDCK-MIX2/SIA/T1	40	160	160	160	320	80	80	320	320	640	640	640	640	640	320
A/Netherlands/10236/2023	2a,1b	2023-02-03	MDCK-MIX2/SIA/T1	40	40	80	80	320	80	80	320	640	640	640	640	640	640	320
A/Palencia/102/2022	2b	2022-10-09	SIA/T1	40	80	160	160	80	40	40	40	40	80	320	320	40	40	40
A/Netherlands/11815/2022	2b	2022-11-02	MDCK-MIX2/SIA/T1	40	80	320	160	160	40	80	80	160	160	160	160	160	160	40
A/Netherlands/11818/2022	2b	2022-11-02	MDCK-MIX2/SIA/T1	160	320	640	320	320	80	160	160	320	320	320	320	320	320	80
A/Netherlands/11832/2022	2b	2022-11-03	MDCK-MIX2/SIA/T1	40	40	320	160	160	40	80	80	160	160	160	160	160	160	40
A/Netherlands/11832/2022	2b	2022-11-09	MDCK-MIX2/SIA/T3	40	80	160	160	40	40	80	40	80	80	80	80	80	80	40
A/Egypt/2327687/2022	2b	2022-12-01	SIA/T1	40	40	320	160	160	40	80	80	160	160	160	160	160	160	40
A/Egypt/231998/2022	2b	2022-12-01	SIA/T1	40	40	320	160	160	40	80	80	160	160	160	160	160	160	40
A/Egypt/2334749/2022	2b	2022-12-08	SIA/T1	40	40	320	160	160	40	80	80	40	40	160	160	160	160	40
A/Austria/1573851/2022	2b	2022-12-10	SIA/T1	40	80	160	160	40	40	40	80	160	320	320	320	320	320	40
A/Egypt/2352738/2022	2b	2022-12-29	SIA/T1	40	40	160	160	80	40	40	40	80	80	160	160	160	160	40

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine
NH 2021-22

Vaccine
SH 2022-23
SH 2023
NH 2023-24



Table H3-14. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-06-30

Viruses	Collection date	Passage history	Antigenicity											
			A/Thuringen/10/2022			A/Stockholm/5/21/2022			A/Darwin/2487/21/2022			A/Norway/2487/21/2022		
			SIAT	SIAT	Egg	SIAT	SIAT	Egg	SIAT	SIAT	Egg	SIAT	SIAT	Egg
Passage history	Collection date	Genetic group	F38/22	F16/22	F38/21	F10/22	F10/22	F10/22	F24/22	F02/23	F41/22	F41/22	F18/23	F18/23
Passage history	Collection date	Genetic group	2b	2a	2a	2a	2a	2a	2a	2a	2a	2a	2a	2a
REFERENCE VIRUSES														
A/Thuringen/10/2022	2b	2023-04-01	P1/SIAT2	320	320	80	160	320	320	80	160	160	80	80
A/Stockholm/5/21/2022	2a	2023-04-16	SIAT/SIAT4	80	320	80	160	320	320	80	160	80	80	160
A/Adelaide/24/21	2a	2021-04-17	E3/22	160	320	640	160	320	320	320	320	160	160	320
A/Norway/2487/21/2022	2a.3	2021-10-24	SIAT4	160	320	320	320	320	320	320	160	320	640	640
A/Norway/2487/2022	2a.3	2021-10-24	E3/E2	160	320	640	320	640	640	640	160	320	640	640
A/Slovenia/8720/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT2	80	320	320	160	320	1280	1280	640	160	160	320
A/Lille/50053/2022	2a.1	2022-09-06	MDCK1/SIAT5	<40	160	160	40	80	320	1280	320	40	80	80
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3	80	160	320	80	160	640	640	320	80	160	160
A/Brandenburg/15/2022	2a.3a.1	2022-12-13	E4/E4	320	640	1280	320	640	640	640	160	1280	1280	1280
A/Albania/289813/2022	2a.3a.1	2022-12-13	E3(Am1A12)	80	80	160	80	320	160	160	80	160	320	320
TEST VIRUSES														
ABurgos/410/4/2023	2a.1b	2023-05-10	SIAT1	50	160	320	80	160	320	320	320	80	80	160
ABurgos/410/4/2023	2a.1b	2023-05-11	SIAT1	80	160	320	80	160	640	640	320	80	160	160
ABurgos/401/2/2023	2a.1b	2023-03-11	SIAT1	80	160	320	80	160	320	640	320	80	160	160
ALeon/4311/2023	2a.1b	2023-03-20	SIAT1	80	160	320	40	160	320	640	320	80	160	160
AValladolid/4167/2023	2a.1b	2023-03-20	SIAT1	40	160	160	40	160	320	320	320	80	80	160
ALeon/4319/2023	2a.1b	2023-03-23	SIAT1	80	160	320	80	160	320	640	320	80	80	160
ABurgos/4245/2023	2b	2023-03-14	SIAT2	160	160	80	40	40	80	320	<40	<40	<40	<40
ABurgos/4245/2023	2b	2023-04-06	SIAT1	80	80	<40	40	40	80	160	<40	<40	<40	<40

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine
SH 2022
NH 2022-23
SH 2023
NH 2023-24

□ < 4-fold ■ 4-fold ▨ 8-fold ▨ > 8-fold ▨ not recognised by the antiserum □ ≥ 160 (no homologous titre)

Table H3-15. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-07-12

Viruses	Collection date	Passage history	Antigenic analysis results																			
			A/Thuringen/10/2022		A/Stockholm/5/2021		A/Darwin/9/21		A/Norway/2487/21		A/Norway/2487/21		A/Slovenia/87/2022		A/Lille/50/2022		NSVH-206/2022		A/Catal/15/2022		A/Brandenburg/15/2022	
			Passage history	Ferret number	Passage history	Ferret number	SIAT	SIAT	SIAT	SIAT	Egg	SIAT	SIAT	Egg	SIAT	F4/22	F4/22	F4/22	F4/22	F4/22	F4/22	F4/22
REFERENCE VIRUSES																						
A/Thuringen/10/2022	2b	2023-04-01	P1/SIAT2	320	320	320	80	160	160	320	320	320	320	320	40	80	80	80	80	80	80	
A/Stockholm/5/2021	2b	2023-04-16	SIAT0/SIAT4	80	320	320	80	160	320	320	320	320	320	320	320	40	40	40	40	40	40	40
A/Albania/2/2022	2b	2023-04-17	E3/E4	160	320	320	80	160	320	320	320	320	320	320	320	160	160	160	160	160	160	160
A/Norway/2487/2021	2a.3	2021-10-24	SIAT4	160	320	320	320	640	640	640	640	640	640	640	640	160	320	320	320	320	320	320
A/Norway/2487/2021	2a.3	2021-10-24	E3/E2	320	640	640	640	320	640	640	640	640	640	640	640	160	320	320	320	320	320	320
A/Slovenia/87/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT2	80	320	320	160	160	640	640	640	640	640	640	640	160	160	160	160	160	160	160
A/Lille/50/2022	2a.1	2022-09-06	MDCK1/SIAT5	<40	160	160	40	80	320	1280	320	320	320	320	320	40	80	80	80	80	80	80
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3	80	160	320	80	160	640	640	640	640	640	640	640	320	80	80	80	80	80	80
A/Brandenburg/15/2022	2a.3a.1	2022-12-13	Ex/E4	320	640	1280	320	320	640	640	320	160	160	160	160	640	640	640	640	640	640	640
A/Albania/2/2022	2a.3a.1	2022-12-13	E3(Am1A12)	80	160	320	80	320	320	160	160	80	80	80	80	160	160	160	160	160	160	160
TEST VIRUSES																						
A/Albania/2/2022	2a.1b	2023-01-05	SIAT1	50	160	160	40	80	320	320	320	320	320	320	320	160	40	40	40	40	40	40
A/Moldova/2023/2023	2a.1b	2023-01-19	SIAT1	80	160	320	80	160	640	640	640	640	640	640	640	80	160	160	160	160	160	160
A/Norway/3891/2023	2a.1b	2023-03-08	SIAT1	80	160	320	80	160	640	640	640	640	640	640	640	80	160	160	160	160	160	160
A/Norway/3821/2023	2a.1b	2023-03-10	SIAT1	80	160	320	80	160	640	640	640	640	640	640	640	80	160	160	160	160	160	160
A/Agadir/300/2023	2a.3a	2023-01-02	SIAT1	80	80	160	160	320	160	160	160	160	160	160	160	80	160	160	160	160	160	160
A/Albania/2/2022	2a.3a.1	2022-12-13	SIAT1	80	80	160	160	320	160	160	160	160	160	160	160	80	320	320	320	320	320	320
A/Norway/3179/2023	2a.3a.1	2023-01-20	SIAT1	320	640	320	640	320	640	640	640	640	640	640	640	160	640	640	640	640	640	640
A/Albania/2/2022	2a.3b	2022-12-06	SIAT1	80	80	320	160	640	320	320	320	320	320	320	320	80	160	160	160	160	160	160
A/Moldova/2023/2023	2b	2023-01-03	SIAT1	320	320	160	40	80	320	320	320	320	320	320	320	40	80	80	80	80	80	80
A/Albania/2/2022	2b	2023-01-07	SIAT1	160	160	160	40	80	160	160	160	160	160	160	160	40	40	40	40	40	40	40
A/Norway/1294/2023	2b	2023-01-22	SIAT1	160	160	320	40	80	160	160	160	160	160	160	160	<40	<40	<40	<40	<40	<40	<40
A/Norway/1998/2023	2b	2023-01-30	SIAT1	320	320	160	40	160	160	160	160	160	160	160	160	40	80	80	80	80	80	80
A/Norway/2003/2023	2b	2023-02-03	SIAT1	320	320	160	40	80	160	160	160	160	160	160	160	40	80	80	80	80	80	80
A/Ireland/1638/12/2023	2b	2023-02-10	SIAT1	320	160	160	80	160	160	160	160	160	160	160	160	40	80	80	80	80	80	80
A/Norway/3119/2023	2b	2023-02-12	SIAT1	80	160	160	40	80	160	160	160	160	160	160	160	320	40	<40	<40	<40	<40	<40
A/Norway/3384/2023	2b	2023-03-02	SIAT2	320	320	160	40	80	160	160	160	160	160	160	160	40	80	80	80	80	80	80
A/Norway/3809/2023	2b	2023-03-06	SIAT1	160	160	160	40	80	160	160	160	160	160	160	160	320	40	<40	<40	<40	<40	<40
A/Norway/5044/2023	2b	2023-03-30	SIAT1	160	160	40	80	160	160	160	160	160	160	160	160	320	40	40	40	40	40	40

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine

SH 2022

NH 2023-23

SH 2023

NH 2023-24

Legend: < 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table H3-16. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-07-18

Viruses	Genetic group	Collection date	Passage history	Post-infection ferret antisera																	
				A/Thuringen				A/Stockholm				A/Darwin				A/Norway					
				10/22	SIAT	5/21	Egg	9/21	SIAT	F39/21	Egg	24873/21	SIAT	F10/22	Egg	24873/21	SIAT	8720/22	50053/22	NSVH-2067/22	A/Catal
REFERENCE VIRUSES																	/289813/2022				
A/Thuringen/10/2022	2b	2022-04-01	P1/SIAT2	320	320	160	80	80	160	160	160	160	160	40	40	40					
A/Stockholm/5/2021	2a	2021-04-16	SIAT0/SIAT4	80	320	320	80	160	320	160	320	160	80	160	160	160	160				
A/Darwin/9/2021	2a	2021-04-17	E3/E4	160	320	640	80	320	640	320	640	320	160	160	320	320	320				
A/Norway/24873/2021	2a.3	2021-10-24	SIAT4	160	320	320	320	320	320	320	160	80	80	320	320	320					
A/Norway/24873/2021	2a.3	2021-10-24	E3/E2	320	640	640	320	640	640	640	640	160	160	160	640	640	640				
A/Slovenia/8720/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT2	80	320	320	80	160	640	640	640	640	640	640	640	640	640				
A/Lilie/50053/2022	2a.1	2022-09-06	MDCK1/SIAT5	<40	80	160	40	80	320	640	640	160	80	80	80	80	80				
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3	80	160	320	80	160	640	640	640	640	640	320	320	320	320	320			
A/Albania/289813/2022	2a.3a.1	2022-12-13	E3/Am1AI2	80	80	160	80	320	160	160	80	80	80	320	320	320	320	320			
TEST VIRUSES																	/289813/2022				
A/Boras/2/2023	2a.1b	2023-01-02	SIAT1/SIAT1	80	160	160	40	160	320	320	320	160	160	160	160	160	160	160			
A/BosniaAndHerzegovina/144/2023	2a.1b	2023-01-24	SIAT1	80	160	320	80	160	320	320	320	320	320	320	320	320	320	320			
A/Poland/204/2023	2a.1b	2023-01-25	SIAT1	80	160	320	40	160	640	640	640	640	640	320	320	320	320	320			
A/BosniaAndHerzegovina/154/2023	2a.1b	2023-01-31	SIAT1	80	80	160	40	80	320	320	320	320	320	160	160	160	160	160			
A/Poland/205/2023	2a.1b	2023-02-01	SIAT1	80	160	320	40	160	640	640	320	320	320	320	320	320	320	320			
A/South Africa/R03531/23	2a.1b	2023-04-11	MDCK1/SIAT1	40	80	160	40	80	320	320	320	160	160	160	160	160	160	160			
A/South Africa/R03530/23	2a.3a.1	2023-01-14	MDCK1/SIAT1	80	160	320	80	320	320	160	160	80	80	80	320	320	320	320			
A/South Africa/R03513/23	2a.3a.1	2023-04-12	MDCK1/SIAT1	160	160	320	160	320	320	160	160	80	80	80	320	320	320	320			
A/South Africa/R03512/23	2a.3a.1	2023-04-14	MDCK1/SIAT1	80	160	160	80	160	320	320	160	160	160	80	80	320	320	320			
A/South Africa/R03523/23	2a.3a.1	2023-04-18	MDCK1/SIAT1	80	160	320	160	320	320	160	160	80	80	80	320	320	320	320			
A/South Africa/R03618/23	2a.3a.1	2023-04-19	MDCK1/SIAT1	80	160	320	160	320	320	160	160	80	80	80	320	320	320	320			
A/South Africa/R04651/23	2a.3a.1	2023-04-21	MDCK1/SIAT1	80	160	320	160	320	320	160	160	80	80	80	320	320	320	320			
A/South Africa/R04953/23	2a.3a.1	2023-05-08	MDCK1/SIAT1	160	160	320	160	640	320	320	320	160	160	160	160	160	160	160			
A/South Africa/R05001/23	2a.3a.1	2023-05-11	MDCK1/SIAT1	80	160	320	160	320	320	160	160	80	80	80	320	320	320	320			
A/South Africa/R05520/23	2a.3a.1	2023-05-22	MDCK1/SIAT1	80	80	160	160	320	320	160	160	160	160	160	160	160	160	160			
A/South Africa/R05771/23	2a.3a.1	2023-05-25	MDCK1/SIAT1	160	160	320	160	640	320	320	160	160	160	160	160	160	160	160			
A/South Africa/R06064/23	2a.3a.1	2023-05-26	MDCK1/SIAT1	80	80	160	160	320	320	160	160	160	160	160	160	160	160	160			
A/South Africa/R06101/23	2a.3a.1	2023-05-30	MDCK1/SIAT1	80	160	320	160	320	320	160	160	160	160	160	160	160	160	160			
A/South Africa/R06096/23	2a.3a.1	2023-05-30	MDCK1/SIAT1	80	80	160	160	320	320	160	160	160	160	160	160	160	160	160			
A/South Africa/R06068/23	2a.3a.1	2023-05-30	MDCK1/SIAT1	160	160	320	160	320	320	160	160	320	320	160	160	160	160	160			
A/South Africa/R06131/23	2a.3a.1	2023-05-31	SIAT1/SIAT1	80	160	320	160	320	320	160	160	160	160	160	160	160	160	160			
A/South Africa/R06126/23	2a.3a.1	2023-05-31	SIAT1/SIAT1	160	160	320	160	640	320	320	160	160	160	160	160	160	160	160			
A/South Africa/R06085/23	2a.3a.1	2023-05-31	SIAT1/SIAT1	80	160	160	160	320	320	160	160	160	160	160	160	160	160	160			
A/South Africa/R06339/23	2a.3a.1	2023-06-09	MDCK1/SIAT1	80	80	160	160	320	320	160	160	160	160	160	160	160	160	160			
A/Poland/202/2023	2b	2023-01-18	SIAT1	160	160	160	40	80	160	160	160	40	80	80	80	80	80	80			
A/BosniaAndHerzegovina/167/2023	2b	2023-02-07	SIAT1	320	320	320	320	320	160	160	160	640	640	40	40	40	40	40			
A/Sweden/3088/2023	2b	2023-02-15	SIAT1	160	160	160	40	80	80	80	320	320	40	40	40	40	40	40			
A/Sweden/3088/2023	2b	2023-02-21	SIAT1/SIAT1	160	160	160	40	80	80	80	160	160	160	160	160	160	160	160			
A/Switzerland/7619/2023	2b	2023-02-24	SIAT2/SIAT2	160	160	160	40	80	80	80	160	160	160	160	160	160	160	160			
A/Switzerland/64419/2023	2b	2023-02-25	SIAT2/SIAT2	160	160	80	40	80	80	80	80	80	80	80	80	80	80	80			
A/Skovde/2/2023	2b	2023-03-05	SIAT1/SIAT1	160	160	80	40	80	80	80	160	160	160	160	160	160	160	160			
A/Switzerland/8720/2023	2b	2023-03-10	SIAT1/SIAT1	160	160	80	40	80	80	80	160	160	160	160	160	160	160	160			
A/Sweden/3772/2023	2b	2023-03-12	SIAT1/SIAT1	160	160	80	40	80	80	80	160	160	80	80	80	80	80	80			
A/Sweden/4723/2023	2b	2023-03-23	SIAT1/SIAT1	160	160	40	80	80	160	160	320	320	40	40	40	40	40	40			
A/South Africa/R03608/23	2b	2023-04-06	MDCK1/SIAT1	160	160	40	80	80	160	160	160	160	160	40	40	40	40	40			
A/South Africa/R03715/23	2b	2023-04-17	MDCK1/SIAT2	160	160	80	40	80	80	160	160	160	160	160	40	<40	<40	<40			
A/South Africa/R05834/23	2b	2023-05-22	MDCK1/SIAT1	160	160	160	40	80	80	160	160	160	160	160	40	40	40	40			
A/Boras/3/2023	no seq	2023-01-14	SIAT1/SIAT1	160	160	80	40	80	80	160	160	160	160	160	40	40	40	40			
A/South Africa/R03574/23	no seq	2023-04-06	MDCK1/SIAT1	80	160	320	80	160	640	320	320	320	320	320	320	320	320	320			

< relates to the lowest dilution of antiserum used
ND = Not Done

Vaccine

SH 2022

NH 2022-23

SH 2023

NH 2023-24

< 4-fold

4-fold

8-fold

> 8-fold

< not recognised by the antiserum

≥ 160 (no homologous titre)

Table H3-17. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-07-28

NEW

Viruses	Genetic group	Collection date	Passage history	Post-infection ferret antisera																
				A/Harlingen/10/2022				A/Stockholm/5/2021				A/Darwin/9/2021				A/Norway/2/2021				
				F1/22	SIAT	F1/22	SIAT	F1/22	Egg	SIAT	F1/22	F2/22	SIAT	F1/22	F2/22	SIAT	F1/22	F2/22	SIAT	
A/Thuringen/10/2022	2b	2022-04-01	P1/SIAT2	320	320	320	80	160	320	320	40	80	40	80	40	80	40	80	40	
A/Stockholm/5/2021	2a	2021-04-16	SIAT3/SIAT4	80	320	640	80	160	320	320	80	80	160	80	160	80	160	80	160	
A/Darwin/9/2021	2a	2021-04-17	E3/E4	160	320	640	160	320	640	640	640	160	320	320	160	320	320	160	320	
A/Norway/2/2021	2a	2021-04-17	SIAT1	160	320	320	80	160	320	640	320	160	640	640	640	640	640	640	640	
A/Norway/2/2021	2a	2021-04-17	SIAT1	160	320	320	80	160	320	640	320	160	640	640	640	640	640	640	640	
A/Slovenia/873/2022	2a	2022-04-24	E3/E4	320	640	1280	320	1280	40	40	40	160	1280	1280	1280	1280	1280	1280	1280	
A/Slovenia/873/2022	2a	2022-04-20	SIAT1/M/DCK1/SIAT2	80	320	640	160	160	160	1280	640	640	640	320	320	320	320	320	320	320
A/Lille/6005/3/2022	2a	2022-09-06	MDCK1/SIAT5	40	160	320	40	80	320	1280	320	160	160	160	160	160	160	160	160	160
A/Catalonia/NSVH161/01/2027/2022	2a	2022-09-06	SIAT1/SIAT3	80	160	320	80	160	320	640	640	320	160	160	160	160	160	160	160	160
A/Alaska/2389/13/2022	2a	2022-12-13	MDCK1	320	320	640	320	320	640	320	320	160	160	160	160	160	160	160	160	160
A/Alaska/2389/13/2022	2a	2022-12-13	E3(Am)1/A/E4	80	80	160	80	320	160	160	40	320	320	320	320	320	320	320	320	320
A/Alaska/2389/13/2022	2a	2022-12-13	E4/E5	320	640	1280	320	640	40	320	160	1280	1280	1280	1280	1280	1280	1280	1280	1280
A/Brandenburg/15/2022	2a	2022-12-13	SIAT1	160	320	640	160	320	640	640	640	160	160	160	160	160	160	160	160	160
TEST VIRUSES																				
A/Pays_de_Loire/01/1997/2023	2a	2023-01-17	MDCK1/SIAT1	80	160	320	80	160	640	640	640	160	160	160	160	160	160	160	160	160
A/Pays_de_Lorraine/01/2023	2a	2023-01-21	SIAT3/SIAT1	80	160	320	40	160	640	640	640	320	320	160	160	160	160	160	160	160
AFVG-Lidde/9/2023	2a	2023-01-21	SIAT3/SIAT1	80	160	320	40	80	320	320	320	320	320	160	160	160	160	160	160	160
A/Bretagne/0288/2023	2a	2023-01-27	MDCK1/SIAT1	80	320	640	80	160	640	640	640	640	640	320	320	320	320	320	320	320
A/Tunisia/1652/2023	2a	2023-01-31	SIAT1	80	160	320	80	160	640	640	640	320	320	160	160	160	160	160	160	160
A/Algeria/1757/2023	2a	2023-01-31	MDCK1/SIAT1	80	160	320	80	160	640	640	640	640	640	160	160	160	160	160	160	160
A/Algeria/2038/2023	2a	2023-02-01	SIAT1/SIAT1	160	320	320	80	160	640	640	640	640	640	320	320	320	320	320	320	320
A/Belgium/0308/2023	2a	2023-02-02	SIAT1/SIAT1	80	160	320	80	160	640	640	640	640	640	320	320	320	320	320	320	320
A/Centre/0335/2023	2a	2023-02-04	MDCK1/SIAT1	80	320	640	160	160	1280	1280	1280	1280	1280	320	320	320	320	320	320	320
A/Algeria/1547/2023	2a	2023-02-04	SIAT1	80	160	320	80	160	640	640	640	640	640	320	320	320	320	320	320	320
A/Algeria/1547/2023	2a	2023-02-04	MDCK1/SIAT1	80	160	320	80	160	640	640	640	640	640	320	320	320	320	320	320	320
A/Algeria/1547/2023	2a	2023-02-04	SIAT1	160	320	320	80	160	640	640	640	640	640	320	320	320	320	320	320	320
A/Serbia/23/2023	2a	2023-01-13	C2/SIAT2	160	80	320	160	640	160	160	160	160	160	1280	1280	1280	1280	1280	1280	1280
A/Serbia/23/2023	2a	2023-01-13	C1/SIAT1	160	160	320	320	640	320	320	320	320	320	1280	1280	1280	1280	1280	1280	1280
A/Franche_Comte/2032/2023	2a	2023-01-20	MDCK1/SIAT1	320	160	640	320	1280	320	320	320	320	320	2560	2560	2560	2560	2560	2560	2560
A/Alpes_de_Provence/02/2023	2a	2023-01-20	MDCK1/SIAT1	320	160	640	320	1280	320	320	320	320	320	2560	2560	2560	2560	2560	2560	2560
A/Alsace/02/2023	2a	2023-01-21	SIAT1/SIAT1	320	160	640	320	1280	320	320	320	320	320	1280	1280	1280	1280	1280	1280	1280
A/Champagne_Ardenne/0210/2023	2a	2023-01-21	MDCK1/SIAT1	160	80	160	80	160	160	160	160	160	160	160	160	160	160	160	160	160
A/Italie_de_France/0210/2023	2a	2023-01-21	MDCK1/SIAT1	160	80	160	80	160	160	160	160	160	160	160	160	160	160	160	160	160
A/FVG-Pordenone/10/2023	2a	2023-01-26	SIAT1/SIAT1	320	160	640	320	1280	320	320	320	320	320	1280	1280	1280	1280	1280	1280	1280
A/Adria/04/2023	2a	2023-01-26	SIAT1/SIAT1	320	160	640	320	1280	320	320	320	320	320	1280	1280	1280	1280	1280	1280	1280
A/Adria/04/2023	2a	2023-01-26	MDCK1/SIAT1	320	160	640	320	1280	320	320	320	320	320	1280	1280	1280	1280	1280	1280	1280
A/Adria/04/2023	2a	2023-01-26	SIAT1	320	160	640	320	1280	320	320	320	320	320	1280	1280	1280	1280	1280	1280	1280
A/Belgium/3172/2023	2a	2023-02-16	SIAT1	160	320	160	80	80	160	320	40	80	40	40	40	40	40	40	40	40
A/Switzerland/0565/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Adria/04/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Switzerland/0566/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Adria/04/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Switzerland/0567/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Adria/04/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Switzerland/0568/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Adria/04/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Switzerland/0569/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Adria/04/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Switzerland/0570/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Adria/04/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Switzerland/0571/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Adria/04/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Switzerland/0572/2023	2b	2023-02-17	MDCK1/SIAT1	320	320	80	160	320	320	320	320	320	320	320	320	320	320	320	320	320
A/Adria/04/2023	2b	2023-02-17	MDCK1																	

Table H3-18. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseltamivir) 2023-08-09

Viruses	Genetic group	Collection date	Passage history	Post-infection serum antisera																			
				A/Thuringia/19/2022				A/Stockholm/19/2022				A/Darwin/92/2021				A/Iceland/27/2022				A/Albania/28/2022			
				F1/22	F2/22	SIAT	SIAT	F1/22	F2/22	SIAT	Egg	F1/22	F2/22	SIAT	F1/22	F2/22	Egg	F1/22	F2/22	Egg			
REFERENCE VIRUSES																							
A/Hanover/19/2022	2a	2023-04-17	PI/SIAT	320	320	320	80	160	320	160	40	80	40	320	320	320	320	320	320	640			
A/Stockholm/19/2022	2a	2023-04-17	SIAT/SIAT	80	320	640	80	160	320	160	160	160	160	320	320	320	320	320	320	640			
A/Darwin/92/2021	2a	2023-04-17	E3/54	160	320	640	160	320	640	640	160	160	160	320	320	320	320	320	320	640			
A/Norway/24/73/2021	2a.3	2021-10-24	SIAT/4	160	320	320	160	640	320	160	160	160	160	640	320	320	320	320	320	640			
A/Alaska/20/2021	2a.3	2021-10-24	E3/52	160	320	320	160	640	320	160	160	160	160	640	320	320	320	320	320	640			
A/Slovenia/72/03/2022	2a.1	2022-04-10	SIAT/MDCK/1/SIAT/2	80	320	640	160	160	1280	640	160	160	160	320	320	320	320	320	320	320			
A/Lithuania/53/2022	2a.1	2022-04-06	MDCK/1/SIAT/5	40	160	160	40	80	320	1280	320	160	160	160	160	160	160	160	160	160			
A/Croatia/11/2021/15/15/2022	2a.1	2022-04-14	SIAT/MDCK/1	80	160	320	160	160	160	640	160	160	160	160	160	160	160	160	160	160			
A/Albania/28/2022	2a.3a.1	2022-12-13	MDCK/1	160	160	640	320	640	320	320	160	160	1280	640	640	640	640	640	640	640			
A/Albania/28/2022	2a.3a.1	2022-12-13	E3/Al/AT/2/54	80	80	160	80	320	160	160	40	320	320	320	320	320	320	320	320	320	640		
A/Albania/28/2022	2a.3a.1	2022-12-13	E4/Al/AT/5	160	80	640	320	640	640	320	160	160	1280	640	640	640	640	640	640	640	640		
A/Albania/28/2022	2a.3a.1	2022-12-13	E5/Al/AT/5	40	80	80	40	160	160	160	160	160	160	160	160	160	160	160	160	160			
TEST VIRUSES																							
A/France_Combat/18/2023	2a.1b	2023-01-16	MDCK/1/SIAT/1	40	80	160	40	80	320	320	160	160	80	80	80	160	160	160	160	160			
A/Algeria/20/2023	2a.1b	2023-01-28	MDCK/1/SIAT/1	80	160	160	80	160	160	160	160	160	160	160	160	160	160	160	160	160			
A/Cameroun/54/2023	2a.3a	2023-01-13	SIAT/1	40	80	160	160	160	160	160	160	80	320	320	320	320	320	320	320	320	640		
A/Cameroun/17/2023	2a.3a	2023-02-17	SIAT/1	80	80	160	160	160	320	160	160	160	160	1280	1280	1280	1280	1280	1280	1280			
A/Cameroun/23/2023	2a.3a	2023-02-17	SIAT/1	80	80	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160			
A/Cameroun/29/2023	2a.3a.1	2023-02-21	SIAT/1	80	160	320	320	320	160	160	160	160	1280	1280	1280	1280	1280	1280	1280				
A/HongKong/15/2023	2a.3a.1	2023-07-07	MDCK/1/SIAT/1	160	80	160	80	320	160	160	160	160	160	160	160	160	160	160	160	640			
A/HongKong/15/2023	2a.3a.1	2023-07-08	MDCK/1/SIAT/1	80	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	640			
A/HongKong/15/2023	2a.3a.1	2023-07-08	MDCK/1/SIAT/1	80	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	640			
A/HongKong/15/2023	2a.3a.1	2023-07-09	MDCK/1/SIAT/1	80	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	640			
A/HongKong/15/2023	2a.3a.1	2023-07-10	MDCK/1/SIAT/1	80	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	640			
A/HongKong/15/2023	2a.3a.1	2023-07-10	MDCK/1/SIAT/1	80	80	160	160	160	320	160	160	160	160	160	160	160	160	160	160	640			
A/HongKong/15/2023	2a.3a.1	2023-07-10	MDCK/1/SIAT/1	80	80	160	160	160	160	160	160	160	160	160	160	160	160	160	160	640			
A/HongKong/15/2023	2a.3a.1	2023-07-11	MDCK/1/SIAT/1	80	160	160	160	160	320	160	160	160	160	160	160	160	160	160	160	640			
A/Cameroun/25/2023	no ser	2023-03-22	SIAT/1	40	160	160	80	160	160	80	40	320	320	320	320	320	320	320	320	320			

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine

SH 2022

NH 2022-23

Table H3-19. Antigenic analyses of influenza A(H3N2) viruses (Guinea Pig RBC with 20nM Oseeltamivir) 2023-09-15

Viruses	Genetic group	Collection date	Passage history	Post-infection ferret antisera														
				A/Haninge/10/2022			A/Stockholm/2021			A/Denver/2021			A/Norway/2487/3/2021			A/Norway/2487/3/2021		
				A/Arthuringen F3/22	SIAT F1/22	F1/22	A/Arthuringen F3/21	SIAT F3/21	Egg F1/22	A/Arthuringen F1/22	SIAT F1/22	F2/22	A/Slovenia F2/22	SIAT F2/22	N/2021/289813/2021	SIAT F4/22	A/Albania F1/23	A/Albania F1/23
REFERENCE VIRUSES																		
A/Haninge/10/2022	2b	2021-04-01	P1/SIAT3	320	160	80	160	320	160	40	80	40	40	40	40	40		
A/Stockholm/2021	2a	2021-04-15	SIAT/F3/21	160	640	160	160	640	640	160	160	160	160	160	160	160		
A/Denver/2021	2a	2021-04-17	E3/E4	160	320	640	160	320	640	640	160	160	320	320	320	160		
A/Norway/2487/3/2021	2a.3	2021-10-24	SIAT4	80	320	320	160	640	320	320	80	640	640	640	640	320		
A/Norway/2487/3/2021	2a.3	2021-10-24	E3/E2	320	320	640	320	640	640	640	160	1280	640	640	640	320		
A/Stockholm/2022	2a.1	2022-09-06	SIAT/MDCKxSIAT2	80	640	640	160	320	160	160	640	640	640	640	320	160		
A/Ile-de-France/2022	2a.1	2022-09-06	MDCKxSIAT5	40	160	160	40	40	320	1280	320	320	160	80	80	40		
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3	80	160	320	80	160	640	1280	640	160	160	160	80	80		
A/Albania/238913/2022	2a.3a.1	2022-12-13	MDCK1	320	640	320	640	320	320	320	320	160	1280	1280	640	640		
A/Albania/238913/2022	2a.3a.1	2022-12-13	E3(Am)A2/E4	80	80	160	80	320	160	160	40	320	320	160	160	160		
A/Brandenburg/15/2022	2a.3a.1	2022-12-13	E4/E5	640	640	1280	640	1280	640	640	320	2560	2560	1280	1280	1280		
TEST VIRUSES																		
A/Lisbon/09/2023 (RL221188_1*SIAT1)	2a.1b	2023-04-04	SIAT1/SIAT1	80	160	320	80	160	640	640	320	320	320	160	80	80		
A/Lisbon/09/2023	2a.3a.1	2023-04-04	SIAT1/SIAT2	160	320	320	640	320	320	320	320	160	1280	1280	640	640		
A/Kosice/119/2023	see pending	2023-04-27	MDCKxSIAT1	40	160	160	40	160	640	1280	320	320	320	320	160	80		
A/Kosice/119/2023	see pending	2023-04-27	MDCKxSIAT1	40	80	160	40	80	320	320	160	160	160	160	80	80		

< relates to the lowest dilution of antiserum used

ND = Not Done

Vaccine
SH 2022
NH 2022-23
SH 2023
NH 2023-24

< < not recognised by the antiserum ≥ 160 (no homologous titre)

Microneutralisation tables: H3N2

Table MN-1. Antigenic analysis of influenza A(H3N2) viruses - Plaque Reduction Neutralisation (MDCK-SIAT) 2023-07-06

Viruses	Genetic group	Collection Date	Passage history Format number Passage History	Neutralisation Titer Post-infection ferret antisera					
				A/Thuringen 10/2022 SIAT F04/22 2b	A/Stockholm 5/2021 SIAT F14/22 2a	A/Darwin 9/2021 Egg F04/22 2a	A/Slovenia 8/2022 SIAT F14/22 2a.1	A/Catalonia NSVH-2667/2022 SIAT F14/22 2a.1b	
REFERENCE VIRUSES									
A/Thuringen/10/2022	2b	2022-04-01	P1/SIAT3 10 ⁻³	91	60	45	56	<	
A/Stockholm/5/2021	2a	2021-04-16	SIAT0/SIAT4 10 ⁻³	<	95	74	158	71	
A/Darwin/9/2021	2a	2021-04-17	E3/E4 10 ⁻³	101	470	983	924	239	
A/Slovenia/8720/2022	2a.1	2022-02-10	SIAT1/MDCK/SIAT1 10 ⁻³	<	61	40	185	90	
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3 10-3 10 ⁻³	<	50	47	170	65	
TEST VIRUSES									
A/Estonia/KL383/2023	2b	2023-02-15	SIAT1	117	82	55	75	<	
A/Estonia/17353/2023	2b	2023-02-02	SIAT1	111	72	55	77	<	
A/Ireland/9448/2023	2b	2023-03-07	SIAT1	97	62	43	53	<	
A/Ireland/9861/2023	2b	2023-03-02	SIAT1	85	61	52	51	<	
A/Ireland/9168/2023	2b	2023-02-01	SIAT1	102	66	50	60	<	
A/Netherlands/10299/2023	2b	2023-03-14	M-MIX2/SIAT1	118	93	62	70	<	
A/Netherlands/10193/2023	2b	2023-02-01	M-MIX2/SIAT1	111	77	45	70	<	
A/Estonia/17374/2023	2a.1b	2023-03-08	SIAT1	<	48	43	118	50	
A/Estonia/17361/2023	2a.1b	2023-03-06	SIAT1	<	51	40	134	52	
A/Estonia/17364/2023	2a.1b	2023-03-02	SIAT1	<	67	59	151	63	
A/Estonia/17357/2023	2a.1b	2023-02-25	SIAT1	<	54	43	158	59	
A/Ireland/97488/2023	2a.1b	2023-02-19	SIAT1	<	54	48	152	62	
A/Ireland/21983/2023	2a.1b	2023-04-02	SIAT1	<	55	62	139	59	
A/Ireland/9830/2023	2a.1b	2023-02-08	SIAT1	<	62	59	98	47	
A/Ireland/9847/2023	2a.1b	2023-02-04	SIAT1	<	57	52	190	73	
A/Ireland/9045/2023	2a.1b	2023-02-04	SIAT1	<	55	63	184	76	
A/Netherlands/10277/2023	2a.1b	2023-02-09	M-MIX2/SIAT1	<	64	53	197	74	

<=2-fold >2<4-fold >4<8-fold >8-fold not recognised by the antiserum

Table MN-2. Antigenic analysis of influenza A(H3N2) viruses - Plaque Reduction Neutralisation (MDCK-SIAT) 2023-07-13

Viruses	Genetic group	Collection Date	Passage history Ferret number Passage History	Neutralisation Titre Post-infection ferret antisera					
				A/Thuringen 10/2022 SIAT F36/22 2b	A/Stockholm 5/2021 SIAT F15/22 2a	A/Darwin 9/2021 Egg F05/22 2a	A/Slovenia 8720/2022 SIAT F24/22 2a.1	A/Catalonia NSVH-2057/2022 SIAT F41/22 2a.1b	
REFERENCE VIRUSES									
A/Thuringen/10/2022	2b	2022-04-01	P1/SIAT3 10 ⁻¹	91	60	45	56	<	
A/Stockholm/5/2021	2a	2021-04-16	SIAT0/SIAT4 10 ⁻¹	<	95	74	158	71	
A/Darwin/9/2021	2a	2021-04-17	E3/E4 10 ⁻¹	101	470	983	924	239	
A/Slovenia/8720/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT1 10 ⁻¹	<	61	40	185	90	
A/Catalonia/NSVH161512057/2022	2a.1b	2022-09-14	SIAT1/SIAT3 10-3 10 ⁻¹	<	50	47	170	65	
TEST VIRUSES									
A/Slovenia/526/2023	2b+T135A	2023-02-17	SIAT0/SIAT2	46	56	<	<	<	
A/Valleolid/4550/2023	2b+T135A	2023-04-06	SIAT1	51	53	<	<	<	
A/Burgos/4245/2023	2b+T135A	2023-03-14	SIAT2	45	50	<	<	<	
A/Bulgaria/1427/2023	2b+T135A	2023-02-09	SIAT2/SIAT2	63	77	53	45	<	
A/Slovenia/657/2023	2a.1b	2023-03-01	MDCK0/SIAT1	<	47	47	144	56	
A/Burgos/4014/2023	2a.1b	2023-03-11	SIAT1	<	51	52	146	45	
A/Burgos/4012/2023	2a.1b	2023-03-11	SIAT1	<	48	48	136	51	
A/Leon/4311/2023	2a.1b	2023-03-20	SIAT1	<	<	<	132	56	
A/Leon/4132/2023	2a.1b	2023-03-10	SIAT1	<	<	<	140	41	
A/Leon/4319/2023	2a.1b	2023-03-23	SIAT1	<	43	48	141	62	
A/Valleolid/4167/2023	2a.1b	2023-03-20	SIAT1	<	46	41	157	65	

Legend: <=2-fold >2-4-fold >4-8-fold >8-fold not recognised by the antiserum

Table MN-3. Antigenic analysis of influenza A(H3N2) viruses - Plaque Reduction Neutralisation (MDCK-SIAT) 2023-07-17

Viruses	Genetic group	Collection Date	Passage history Ferret number Passage History	Neutralisation Titre Post-infection ferret antisera					
				A/Thuringen 10/2022 SIAT F36/22 2b	A/Stockholm 5/2021 SIAT F15/22 2a	A/Alaska 9/2021 Egg F05/22 2a	A/Slovenia 8/2022 SIAT F24/22 2a.1	A/Catalonia NSVH161512067/2022 SIAT F41/22 2a.1b	
REFERENCE VIRUSES									
A/Thuringen/10/2022	2b	2022-04-01	P1/SIAT3 10 ⁻³	91	60	45	56	<	
A/Stockholm/5/2021	2a	2021-04-16	SIATO/SIAT4 10 ⁻³	<	95	74	158	71	
A/Darwin/9/2021	2a	2021-04-17	E3/E4 10 ⁻⁴	101	470	983	924	239	
A/Slovenia/8720/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT1 10 ⁻³	<	61	40	185	90	
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3 10-3 10 ⁻³	<	50	47	170	65	
TEST VIRUSES									
A/Ireland/16381/2023	2b	2023-02-10	SIAT1	70	60	40	51	<	
A/Norway/5044/2023	2b+T135A	2023-03-30	SIAT1	47	60	40	40	<	
A/Norway/3809/2023	2b+T135A	2023-03-06	SIAT1	62	61	42	48	<	
A/Norway/3821/2023	2a.1b	2023-03-10	SIAT1	<	95	58	277	140	
A/Norway/3891/2023	2a.1b	2023-03-08	SIAT1	<	61	60	219	108	
A/Norway/3170/2023	2a.3a.1	2023-02-20	SIAT1	105	187	128	389	92	

Legend: <=2-fold >2<4-fold >4<8-fold >8-fold not recognised by the antiserum

Table MN-4. Antigenic analysis of influenza A(H3N2) viruses - Plaque Reduction Neutralisation (MDCK-SIAT) 2023-07-27

Viruses	Genetic group	Collection Date	Passage history Ferret number Passage History	Neutralisation Titre Post-infection ferret antisera					
				A/Thuringen 10/2022 SIAT F36/22 2b	A/Stockholm 5/2021 SIAT F15/22 2a	A/Stockholm 9/2021 Egg F05/22 2a	A/Slovenia 8720/2022 SIAT F24/22 2a.1	A/Slovenia 8720/2022 SIAT F41/22 2a.1b	
REFERENCE VIRUSES									
A/Thuringen/10/2022	2b	2022-04-01	P1/SIAT3 10 ⁻³	91	60	45	56	<	
A/Stockholm/5/2021	2a	2021-04-16	SIATO/SIAT4 10 ⁻³	<	95	74	158	71	
A/Darwin/9/2021	2a	2021-04-17	E3/E4 10 ⁻⁴	101	470	983	924	239	
A/Slovenia/8720/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT1 10 ⁻³	<	61	40	185	90	
A/Catalonia/NSVH161512067/2022	2a.1b	2022-09-14	SIAT1/SIAT3 10-3 10 ⁻³	<	50	47	170	65	
TEST VIRUSES									
A/Sweden/3772/2023	2b	2023-03-12	SIAT1/SIAT1	111	76	56	71	<	
A/Sweden/3098/2023	2b	2023-02-21	SIAT1/SIAT1	107	72	47	55	<	
A/Switzerland/76199/2023	2b	2023-02-24	SIAT2/SIAT2	94	67	51	54	<	
A/BosniaAndHerzegovina/181/2023	2b+T135A	2023-02-15	SIAT1	157	265	157	270	<	
A/BosniaAndHerzegovina/167/2023	2b+T135A	2023-02-07	SIAT1	150	255	172	270	<	
A/Switzerland/87207/2023	2b+T135A	2023-03-10	SIAT1/SIAT1	42	60	41	<	<	
A/Sweden/4723/2023	2b+T135A	2023-03-23	SIAT1/SIAT1	47	56	<	<	<	
A/Skodde/2/2023	2b+T135A	2023-03-05	SIAT1/SIAT1	59	77	48	48	<	
A/Switzerland/64418/2023	2b+T135A	2023-02-25	SIAT2/SIAT2	40	53	<	42	<	
A/Poland/205/2023	2a.1b	2023-02-01	SIAT1	<	72	66	192	86	

Legend: <=2-fold >2<4-fold >4<8-fold >8-fold not recognised by the antiserum

Table MN-5. Antigenic analysis of influenza A(H3N2) viruses - Plaque Reduction Neutralisation (MDCK-SIAT) 2023-07-31

Viruses	Genetic group	Collection Date	Passage history Ferret number Passage History	Neutralisation Titre Post-infection ferret antisera							
				A/Thuringen/10/2022 SIAT F36/22 2b	A/Stockholm/5/2021 SIAT0/SIAT4 10 ⁻³ F15/22 2a	A/Darwin/9/2021 Egg F05/22 2a	A/Slovenia/8/2022 SIAT F24/22 2a.1	A/Catalonia/NSVH161512087/2022 SIAT1/SIAT3 10-3 10 ⁻³ 2a.1b	A/Catalonia/NSVH161512087/2022 F41/22 2a.1b	A/Albania/289813/2022 2a.3a.1+N122D MDCK1 10 ⁻³	A/Albania/289813/2022 F21/23 2a.3a.1+N122D
REFERENCE VIRUSES											
A/Thuringen/10/2022	2b	2022-04-01	P1/SIAT3 10 ⁻³	91	60	45	56	<	<	<	<
A/Stockholm/5/2021	2a	2021-04-16	SIAT0/SIAT4 10 ⁻³	<	95	74	158	71	54	107	
A/Darwin/9/2021	2a	2021-04-17	E3/E4 10 ⁻³	101	470	983	924	239	211	663	
A/Slovenia/8720/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT1 10 ⁻³	<	61	40	185	90	44	92	
A/Catalonia/NSVH161512087/2022	2a.1b	2022-09-14	SIAT1/SIAT3 10-3 10 ⁻³	<	50	47	170	65	41	84	
A/Albania/289813/2022	2a.3a.1+N122D	2022-12-13	MDCK1 10 ⁻³	95	148	118	276	67	519	498	
A/Albania/289813/2022	2a.3a.1+N122D	2022-12-13	E4 10 ⁻³	57	123	51	249	56	220	520	
TEST VIRUSES											
A/South Africa/R05534/23	2b	2023-06-09	MDCK1/SIAT1	138	132	92	118	<	<	<	<
A/South Africa/R03608/23	2b	2023-05-22	MDCK1/SIAT1	70	65	44	50	<	<	<	<
A/South Africa/R03511/23	2a.1b	2023-05-25	MDCK1/SIAT1	<	45	42	132	60	<	64	
A/South Africa/R05001/23	2a.3a.1	2023-05-31	MDCK1/SIAT1	119	197	171	466	110	960	613	
A/South Africa/R04953/23	2a.3a.1	2023-05-31	MDCK1/SIAT1	98	184	143	320	78	440	480	
A/South Africa/R04061/23	2a.3a.1	2023-05-31	MDCK1/SIAT1	102	173	129	271	66	739	546	
A/South Africa/R03952/23	2a.3a.1	2023-05-30	MDCK1/SIAT1	92	173	114	267	71	640	684	
A/South Africa/R03511/23	2a.3a.1	2023-05-26	MDCK1/SIAT1	142	429	442	614	132	950	1115	
A/South Africa/R03816/23	2a.3a.1+N122D	2023-05-30	MDCK1/SIAT1	92	148	98	247	58	480	443	
A/South Africa/R03696/23	2a.3a.1+N122D	2023-05-30	MDCK1/SIAT1	67	116	72	183	41	366	312	
A/South Africa/R03574/23	no seq	2023-04-17	MDCK1/SIAT2	<	40	<	103	40	<	60	

<=2-fold >2<4-fold >4<8-fold >8-fold not recognised by the antiserum

Table MN-6. Antigenic analysis of influenza A(H3N2) viruses - Plaque Reduction Neutralisation (MDCK-SIAT) 2023-08-03

Viruses	Genetic group	Collection Date	Purified history Ferret number Passage history	Neutralisation Titer Post-infection sera antisera									
				A/Thuringen 10/2022 F36/22 2b		A/Stockholm 5/2021 F19/22 2a		A/Darwin 9/2021 F09/22 2a.1		A/Inovena 8720/2022 F34/22 2a.1		A/Catalonia NSVH-2007/2022 F41/22 2a.1b	
				A/Albania 289813/2022 F31/23 2a.3a.1+N122D	A/Albania 289813/2022 F19/23 2a.3a.1+N122D								
REFERENCE VIRUSES													
A/Thuringen/10/2022	2b	2022-04-01	P1/SIAT3 10 ³	91	60	45	56	<	<	<	<		
A/Stockholm/5/2021	2a	2021-04-16	SIAT1/SIAT4 10 ³	<	95	74	158	71	54	107			
A/Darwin/9/2021	2a	2021-04-17	E3/E4 10 ³	101	470	983	924	239	211	663			
A/Inovena/8720/2022	2a.1	2022-02-10	SIAT1/MOCK1/SIAT1 10 ³	<	61	40	185	90	44	92			
A/Catalonia/NSVH161512057/2022	2a.1b	2022-09-14	SIAT1/SIAT3 10-3 10 ³	<	50	47	170	65	41	84			
A/Albania/289813/2022	2a.3a.1 + N122D	2022-12-13	MDCK1 10 ³	95	148	118	276	67	519	498			
A/Albania/289813/2022	2a.3a.1 + N122D	2022-12-13	E4 10 ³	57	123	51	249	56	220	520			
TEST VIRUSES													
A/South Africa/R03715/23	2b	2023-04-17	MDCK1/SIAT3	99	76	82	62	<	<	<	<		
A/South Africa/R06839/23	2a.3a.1	2023-06-09	MDCK1/SIAT1	111	191	134	284	77	411	441			
A/South Africa/R06112/23	2a.3a.1	2023-05-31	MDCK1/SIAT1	104	153	114	300	77	555	545			
A/South Africa/R06126/23	2a.3a.1	2023-05-31	MDCK1/SIAT1	108	188	143	376	77	468	468			
A/South Africa/R06065/23	2a.3a.1	2023-05-31	MDCK1/SIAT1	190	307	155	474	87	1485	933			
A/South Africa/R06101/23	2a.3a.1	2023-05-30	MDCK1/SIAT1	113	211	167	335	77	499	504			
A/South Africa/R06065/23	2a.3a.1	2023-05-30	MDCK1/SIAT1	84	189	152	371	77	557	530			
A/South Africa/R06065/23	2a.3a.1	2023-05-30	MDCK1/SIAT1	100	233	160	440	111	397	400			
A/South Africa/R06064/23	2a.3a.1	2023-05-26	MDCK1/SIAT1	91	149	128	295	76	514	452			
A/South Africa/R05871/23	2a.3a.1	2023-05-25	MDCK1/SIAT1	103	209	140	284	109	673	670			
A/South Africa/R05520/23	2a.3a.1	2023-05-22	MDCK1/SIAT1	77	150	124	276	83	533	391			

=<2-fold >2-4-fold >4-8-fold >8-fold not recognised by the antiserum

Table MN-7. Antigenic analysis of influenza A(H3N2) viruses - Plaque Reduction Neutralisation (MDCK-SIAT) 2023-08-14

Viruses	Genetic group	Collection Date	Purified history Ferret number Passage history	Neutralisation Titer							
				Post-infection ferret antisera				A/Switzerland 28719/2022 F9/23 2b + T135A			
				A/Turingen 10/2022 F9/22 2b	A/Switzerland 28719/2022 F9/23 2b + T135A	A/Stockholm 5/2021 F19/22 2a	A/Darwin 9/2021 F9/22 2a	A/Slovenia 8726/2022 F34/22 2a.1	A/Catalonia NSVH-2967/2022 F4/22 2a.1b	A/Albania 389813/2022 F1/23 2a.3a.1 + N122D	A/Albania 389813/2022 F1/23 2a.3a.1 + N122D
REFERENCE VIRUSES											
A/Turingen/10/2022	2b	2022-04-01	P1/SIAT3 10 ³	91	<	60	45	56	<	<	<
A/Switzerland/28719/2022	2b + T135A	2022-12-19	E4 (AmrAI) 10 ³	<	133	<	<	<	<	<	<
A/Stockholm/5/2021	2a	2021-04-16	SIAT0/SIAT4 10 ³	<	<	95	74	158	71	54	
A/Darwin/9/2021	2a	2021-04-17	E3/E4 10 ³	101	72	470	883	924	239	211	
A/Slovenia/8726/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT1 10 ³	<	<	61	40	185	90	44	
A/Catalonia/NSVH-2967/2022	2a.1b	2022-09-14	SIAT1/SIAT3 10 ³	<	<	50	47	170	65	41	
A/Albania/389813/2022	2a.3a.1 + N122D	2022-12-13	MDCK1 10 ³	95	<	148	118	276	67	519	
TEST VIRUSES											
A/Switzerland/310486/2023	2b	2023-03-23	SIAT1	110	<	77	54	54	<	<	<
A/Belgium/5/1372/2023	2b	2023-02-14	SIAT1/SIAT1	131	<	86	67	56	<	<	<
A/Witzerland/312862/2023	2b + T135A	2023-02-23	SIAT1	74	403	52	51	46	<	<	<
A/Witzerland/85535/2023	2b + T135A	2023-02-16	SIAT1	57	288	68	44	41	<	<	<
A/Belgium/5/0896/2023	2b + T135A	2023-02-02	SIAT1/SIAT1	83	247	89	70	44	<	<	<
A/Witzerland/111159/2023	2a.1b	2023-03-14	SIAT1	51	<	59	<	103	66	<	<
A/Witzerland/111159/2023	2a.1b	2023-02-06	SIAT1	<	<	69	60	135	73	<	<
A/Belgium/5/0559/2023	2a.1b	2023-02-06	SIAT1	<	<	62	60	155	100	53	
A/Belgium/5/1414/2023	2a.1b	2023-03-02	SIAT1/SIAT1	<	<	66	64	149	62	<	<
A/Belgium/5/1204/2023	2a.1b	2023-02-16	SIAT1/SIAT1	63	<	78	55	185	116	56	
A/Belgium/5/0888/2023	2a.1b	2023-02-02	SIAT1/SIAT1	<	<	66	71	115	60	49	
A/Belgium/5/0517/2023	2a.1b	2023-02-01	SIAT1/SIAT1	<	<	53	49	120	63	<	
A/Belgium/5/0261/2023	2a.3a.1 + N122D	2023-03-07	SIAT1/SIAT1	100	49	142	106	228	66	315	

Legend: <=2-fold (white), >2<4-fold (light yellow), >4<8-fold (orange), >8-fold (dark orange), not recognised by the antiserum (red)

Table MN-8. Antigenic analysis of influenza A(H3N2) viruses - Plaque Reduction Neutralisation (MDCK-SIAT) 2023-08-17

Viruses	Genetic group	Collection Date	Purified history Ferret number Passage History	Neuraminidase Titre							
				Post-infection ferret antisera							
				A/Turingen 10/2022 2b	A/Switzerland 28719/2022 F99/23 2b + T135A	A/Stockholm 5/2021 F19/22 2a	A/Darwin 9/2021 F9/22 2a.1	A/Slovenia 8726/2022 F9/22 2a.1	A/Catalonia NSVH-2967/2022 F4/22 2a.1b	A/Albania 389813/2022 F1/23 2a.3a.1 + N122D	
REFERENCE VIRUSES											
A/Turingen/10/2022	2b	2022-04-01	P1/SIAT3 10 ³	91	<	60	45	56	<	<	<
A/Switzerland/28719/2022	2b + T135A	2022-12-19	E4 (AmrAI) 10 ³	<	133	<	<	<	<	<	<
A/Stockholm/5/2021	2a	2021-04-16	SIAT0/SIAT4 10 ³	<	<	95	74	158	71	54	
A/Darwin/9/2021	2a	2021-04-17	E3/E4 10 ³	101	72	470	983	924	239	211	
A/Slovenia/8726/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT1 10 ³	<	<	61	40	185	90	44	
A/Catalonia/NSVH161512967/2022	2a.1b	2022-09-14	SIAT1/SIAT3 10 ³	<	<	50	47	170	65	41	
A/Albania/389813/2022	2a.3a.1 + N122D	2022-12-13	MDCK1 10 ³	95	<	148	118	276	67	519	
TEST VIRUSES											
A/Champagne-Ardenne/05343/2023	2b	2023-03-27	MDCK1/SIAT1	155	44	93	73	73	<	<	
A/Dijon/0483/2023	2b	2023-02-17	MDCK1/SIAT1	160	56	107	103	82	<	<	
A/Dijon/0483/2023	2b	2023-02-17	MDCK1/SIAT1	128	<	86	80	58	<	<	
A/Dijon/0483/2023	2b	2023-02-12	MDCK1/SIAT1	248	80	142	123	117	57	51	
A/Kosovo/089/2023	2a.1b	2023-02-23	SIAT1	<	<	68	89	219	101	58	
A/Centre/0335/2023	2a.1b	2023-02-03	MDCK1/SIAT1	71	<	147	185	372	124	96	
A/Champagne-Ardenne/05343/2023	2a.3a	2023-02-17	SIAT1	<	<	63	<	96	52	122	
A/Champagne-Ardenne/05343/2023	2a.3a	2023-02-17	SIAT1	<	<	61	241	251	424	86	70
A/Champagne-Ardenne/05343/2023	2a.3a.1	2023-02-21	SIAT1	131	61	241	251	251	424	86	70
A/Bushuit/52101940/2023	2a.2a.1	2023-04-21	SIAT1	102	45	105	157	345	89	559	
A/Paris_de_Lorraine/05598/2023	2a.3a.1 + N122D	2023-03-01	MDCK1/SIAT1	104	44	152	140	238	64	466	
A/South Africa/R03796/23	2a.3a.1 + N122D	2023-04-17	MDCK2/SIAT1	62	51	104	67	154	50	565	

=<2-fold >2-4-fold >4-8-fold >8-fold not recognised by the antiserum

Table MN-9. Antigenic analysis of influenza A(H3N2) viruses - Plaque Reduction Neutralisation (MDCK-SIAT) 2023-08-21

Viruses	Genetic group	Collection Date	Purified history Ferret number Passage History	Neuraminidase Titer							
				Post-infection titer antisera							
				A/Thuringen 10/2022 2b	A/Switzerland 28719/2022 F99/23 2b + T135A	A/Stockholm 5/2021 F19/22 2a	A/Darwin 9/2021 F9/22 2a	A/Slovenia 8726/2022 F34/22 2a.1	A/Catalonia NSVH-2967/2022 F4/22 2a.1b	A/Albania 389813/2022 F1/23 2a.3a.1 + N122D	
REFERENCE VIRUSES											
A/Thuringen/10/2022	2b	2022-04-01	P1/SIAT3 10 ³	91	<	60	45	56	<	<	<
A/Switzerland/28719/2022	2b + T135A	2022-12-19	E4 (AmrAI3) 10 ³	<	133	<	<	<	<	<	<
A/Stockholm/5/2021	2a	2021-04-16	SIAT0/SIAT4 10 ³	<	<	95	74	158	71	54	
A/Darwin/9/2021	2a	2021-04-17	E3/E4 10 ³	101	72	470	883	924	239	211	
A/Slovenia/8720/2022	2a.1	2022-02-10	SIAT1/MDCK1/SIAT1 10 ³	<	<	61	40	185	90	44	
A/Catalonia/NSVH161512967/2022	2a.1b	2022-09-14	SIAT1/SIAT3 10 ³	<	<	50	47	170	65	41	
A/Albania/389813/2022	2a.3a.1 + N122D	2022-12-13	MDCK1 10 ³	95	<	148	118	276	67	519	
TEST VIRUSES											
A/HongKong/154/2023	2a.3a.1	2023-07-11	MDCK1/SIAT1	69	<	115	71	148	60	311	
A/HongKong/154/2023	2a.3a.1	2023-07-10	MDCK1/SIAT1	69	<	118	82	155	64	408	
A/HongKong/153/2023	2a.3a.1	2023-07-10	MDCK1/SIAT1	80	<	129	77	194	65	382	
A/HongKong/153/2023	2a.3a.1	2023-07-10	MDCK1/SIAT1	59	<	116	71	133	49	259	
A/HongKong/153/2023	2a.3a.1	2023-07-10	MDCK2/SIAT1	70	<	117	87	164	52	296	
A/HongKong/153/2023	2a.3a.1	2023-07-10	MDCK1/SIAT1	73	<	147	121	174	68	386	
A/HongKong/154/2023	2a.3a.1	2023-07-09	MDCK1/SIAT1	58	<	127	77	94	52	320	
A/HongKong/154/2023	2a.3a.1	2023-07-09	MDCK1/SIAT1	90	<	84	57	130	40	167	
A/HongKong/154/2023	2a.3a.1	2023-07-08	MDCK1/SIAT1	68	<	127	93	154	<	167	
A/HongKong/153/2023	2a.3a.1	2023-07-07	MDCK1/SIAT1	53	<	88	67	143	<	172	

Legend: <=2-fold >2<4-fold >4<8-fold >8-fold not recognised by the antisera

Fold-reduction table: H3N2

		<4-fold difference		4-fold difference		>4-fold difference		total
		number	percentage	number	percentage	number	percentage	
A/Thuringen/10/2022 Cell	2b	56	50.90%	47	42.70%	7	6.40%	110
A/Stockholm/5/2021 Cell	2a	91	82.70%	17	15.50%	2	1.80%	110
A/Darwin/9/2021 Egg	2a	54	49.10%	44	40%	12	10.90%	110
A/Norway/24973/2021 Cell	2a.3	48	43.60%	40	36.40%	22	20%	110
A/Norway/24973/2021 Egg	2a.3	36	32.70%	30	27.30%	44	40%	110
A/Slovenia/8720/2022 Cell	2a.1	33	30%	52	47.30%	25	22.70%	110
A/Lille/50053/2022 Cell	2a.1	31	28.20%	46	41.80%	33	30%	110
A/Catalonia/NSVH-2067/2022 Cell	2a.1b	42	38.20%	32	29.10%	36	32.70%	110
A/Albania/289813/2022 Cell	2a.3a.1	16	43.20%	7	18.90%	14	37.80%	37
A/Albania/289813/2022 Egg	2a.3a.1	49	57%	10	11.60%	27	31.40%	86

A/H3N2: Egg isolates

Virus	Status	Genetic group/clade	Comment
A/Norway/29511/2021	SAN-017/017A	3C.2a1b.2a.2 (E50K)	Egg adaptation: (D186N, D225G), 1-way pass
A/Norway/24873/2021	sent out	3C.2a1b.2a.2 (N96S, I192F, N378S)	Egg adaptation: (D225G)
A/Slovenia/9216/2022	sent out	3C.2a1b.2a.2 (H156S, D53G, D104G)	Egg adaptation: (S219F, D225G)
A/Slovenia/9318/2022	sent out	3C.2a1b.2a.2 (H156S, D53G, D104G)	Egg adaptation: (D186N, D225G)
A/Catalonia/NSVH161512067/2022	sent out	3C.2a1b.2a.2 (I140K, R299K)	Egg adaptation: (D225G)
A/Catalonia/NSVH172304934/2022	available to send out	3C.2a1b.2a.2 (I140K, R299K)	Egg adaptation: (D225G)
A/Poland/97/2022	Reference only	3C.2a1b.2a.2 (S145N)	Egg adaptation: (D225G)
A/Norway/24873/2021	sent out	2a.3 (E50K, D53N, N96S, I192F)	Egg adaptation: (D225G)
A/Brandenburg/15/2022	sent out recently	2a.3a.1 (E50K, I223V, I140R, R140K)	Egg adaptation: (D186G)
A/Albania/290243/2022	sent out recently	2a.3a.1 (E50K, I223V, I140R, R140K, S91N, N122D)	Egg adaptation: (F195Y)
A/Albania/290270/2022	sent out recently	2a.3a.1 (E50K, I223V, I140R, R140K, S91N, N122D)	Egg adaptation: (N190T, S228G)
A/Albania/289813/2022	sent out recently	2a.3a.1 (E50K, I223V, I140R, R140K, S91N, N122D)	Egg adaptation: (F195Y, S228T)
A/Switzerland/28719/2022	NIB-136A	2b (T135A, S262N - Thuringen group)	Egg adaptation: (H183F), 2-way pass

A/H3N2: HI reagents and references

Virus	Genetic group	Virus passage	Ferret ID
A/Cambodia/925256/2020	1a	SIAT5	F03/21
A/Cambodia/e0826360/2020	1a	E5/E2	F10/21
A/Thuringen/10/2022	2b	P1/SIAT2	F36/22
A/Stockholm/5/2021	2a	SIAT0/SIAT3	F35/21
A/Darwin/9/2021	2a	E3/E4	F39/21
A/Norway/24873/2021	2a.3	SIAT2	F10/22
A/Norway/24873/2021	2a.3	E3 (Am2Al1)	F11/22
A/Poland/97/2022	2a.2	S2	F39/22
A/Slovenia/8720/2022	3C.2a1b.2a.2	SIAT1/MDCK1/SIAT2	F24/22
A/Lille/50053/2022	2a.1	MDCK1/SIAT3	F02/23
A/Catalonia/NSVH161512067/2022	3C.2a1b.2a.2	SIAT1/SIAT3	F41/22
A/Albania/289813/2022	2a.3a.1	E3(Am1AI2)	F19/23

A/H3N2: MN reagents and references

Virus	Genetic group	Virus passage	Ferret ID
A/Thuringen/10/2022	2b	P1/S3 10-3	F36/22
A/Stockholm/5/2021	2a	S0/S4 10-3	F15/22
A/Darwin/9/2021	2a	E3/E4	F05/22
A/Slovenia/8720/2022	2a.1	S1/MDCK1/S1 10-3	F24/22
A/Catalonia/NSVH161512067/2022	2a.1b	S1/S3	F41/22
A/Albania/289813/2022	2a.3a.1	MDCK1	F21/23
A/Albania/289813/2022	2a.3a.1	E4	F19/23

Summary: H3N2

Genetic analyses

Clade 3C.2a1b.2a.2 predominated since 1st February in all geographic regions where H3N2 circulated.

We observed continued co-circulation of multiple genetic clades - however the **2a.2b**, the **2a.3a.1** and the **2a.1b** were the most frequently detected.

Viruses from clade 2b (E50K, F79V, I140K) are split into three subclades: one with I242M; a second represented by A/Florida/50/2022, A/Puerto Rico/31/2022 as potential CVVs; and a third subclade (S262N) with two groups: viruses from Europe and Japan (R33Q) and viruses from Europe represented by A/Montana/08/2023 (T135A with potential loss of glycosylation).

Viruses from clade 2a.1b (I140K, R299K) were detected in Europe and South Africa, represented by A/Catalonia/NSVH161512067/2022.

Clade 2a.3a.1 viruses were detected worldwide, characterised by I140K with a subclade showing N122D (loss of glycosylation), represented by A/New York/66/2022 and another subclade with I25V, V347M, I418V, detected in China and the US.

Additional potential CVVs were located throughout the phylogeny representing nearly all of the genetic subgroups in these clades.

Antigenic analyses

For the 2a.2 viruses we observed that, where we have titrations, the post-infection antisera raised against new reference viruses discriminated antigenic properties among the different genetic subgroups.

In HI assays, the egg-based A/Darwin/9/21 vaccine strain is showing reduced recognition of 2a.1b and 2a.3a.1 groups and a more dramatic loss in recognition for test viruses in the 2b subclade.

In MN assay the egg based A/Darwin/9/21 vaccine strain is showing significantly reduced recognition to all other subclades of test viruses.

A/Albania/289813/2022 (2a.3a.1) shows good recognition of test viruses in its own clade, but this antiserum does not recognise viruses in 2b at all.

A/Slovenia/8720/2022 (2a.1) shows good recognition of 2a.1b and 2a.3a.1 viruses, with some lower recognition of 2b viruses.

Influenza B

Genetic analyses: B/Victoria

Maximum likelihood phylogenetic tree: B/Victoria

Maximum likelihood phylogenetic tree inferred using IQTree2 from HA sequence data obtained from GISAID from 1st February onwards, manually curated and then downsampled using Treemer to retain a representative tree topology of 200 sequences and keep at least one representative from each country. Annotation of amino acids substitutions performed with Treetime ancestral reconstruction. References and CVVs are marked as Cell or Egg.

Vaccine viruses
Reference viruses

Collection dates

Feb 2023

Mar 2023

Apr 2023

May 2023

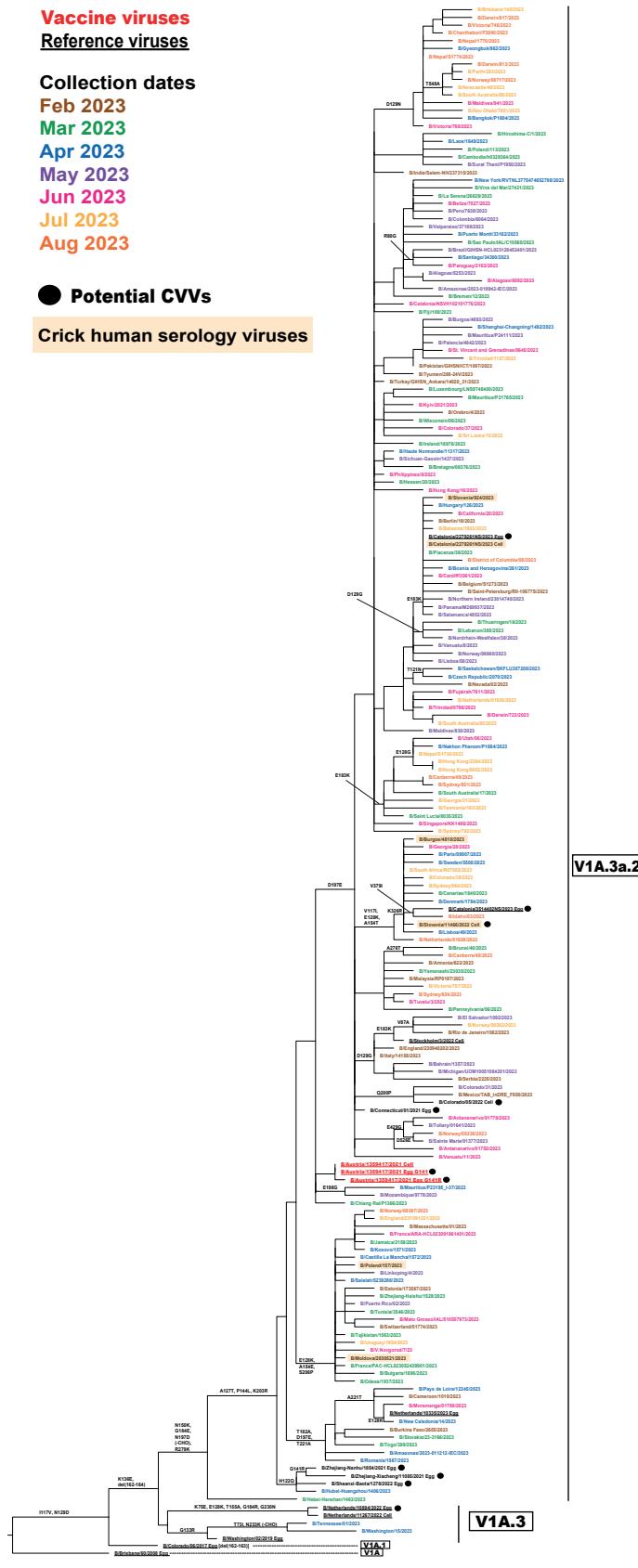
Jun 2023

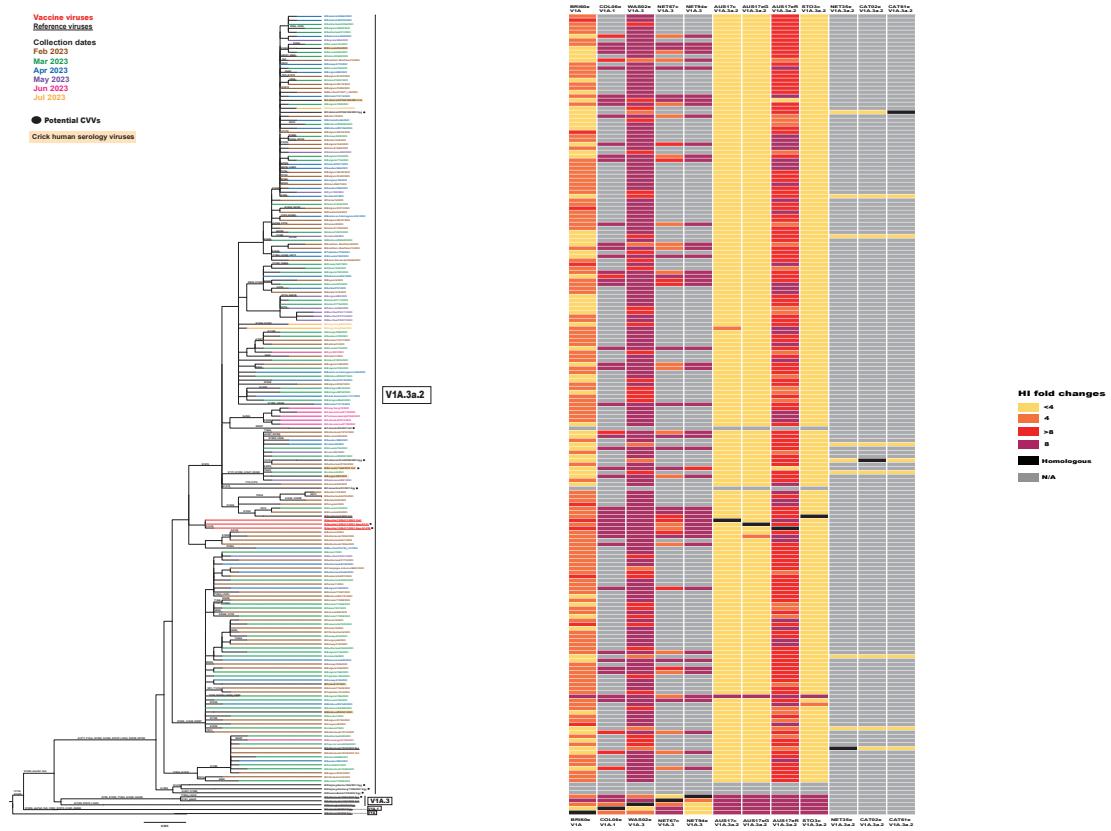
Jul 2023

Aug 2023

● Potential CVVs

Crick human serology viruses





Antigenic analyses: B/Victoria

Haemagglutination inhibition tables: B/Victoria

Table BV-1. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-02-14

Viruses	Collection date	Passage history	Haemagglutination inhibition titre									
			Post-infection ferret antiserum									
		Passage history	B/Brisbane/60/2008 Egg	B/Colorado/60/08 Egg	B/Wash19 Egg	B/Neth MDCK	B/Neth MDCK	B/Austria Egg	B/Austria MDCK	B/Austria Egg G141	B/Austria Egg G141R	B/Stock MDCK
		Ferret number	Sh 539, 540, 543, 544, 570, 571, 572	F44/18	F29/20	F29/22	F37/22	NIB F01/21	F1/21	F44/21	F28/22	
		Genetic group	V1A	V1A.1	V1A.3	V1A.3	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2
REFERENCE VIRUSES												
B/Brisbane/60/2008	V1A	2008-08-04	E4/E4	2560	160	<10	80	<40	<40	<40	<40	<40
B/Colorado/60/08	V1A.1	2017-02-05	E3/E2	1280	320	<10	160	<40	<40	<40	<40	<40
B/Wash19	V1A.3	2019-01-19	E3/E3	640	160	160	40	320	<40	<40	<40	<40
B/Netherlands/1287/2022	V1A.3	2022-04-14	MDCK-MIX/MDCK2		<40	<10	>20	80	<10	<40	<40	<40
B/Netherlands/10894/2022	V1A.3	2022-04-02	E4/E1	640	40	<20	40	160	<40	<40	<40	<40
B/Austria/1359417/2021 G141	V1A.3a.2	2021-01-09	SIAT1/MDCK4	640	20	<20	<10	<10	1280	1280	640	640
B/Austria/1359417/2021 Isolate 2 G141	V1A.3a.2	2021-01-09	E3/E5	640	20	<20	40	<10	1280	1280	640	1280
B/Austria/1359417/2021 Isolate 2 G141R	V1A.3a.2	2021-01-09	E3/E5	320	20	<20	20	<10	1280	640	2560	640
B/Stockholm/3/2022	V1A.3a.2	2022-03-22	SIAT1/MDCK2	320	40	<20	<10	<10	1280	1280	320	1280
TEST VIRUSES												
B/Morondava/07368/2022	V1A.3a.2	2022-12-02	MDCK1	640	40	<20	<10	<10	1280	1280	640	1280
B/Morondava/07092/2022	V1A.3a.2	2022-11-21	MDCK1	640	40	<20	<10	<10	1280	1280	320	1280

< relates to the lowest dilution of antiserum used
¹ hyperimmune sheep serum; ND = Not Done



Vaccine
NH 2021-22

Vaccine
SH 2022
NH 2022-23
SH 2023
NH 2023-24

Table BV-2. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-02-21

Viruses	Collection date	Passage history	Haemagglutination inhibition titre											
			Post-infection ferret antiserum											
			B/Bratislava/60/2008 B/Colorado/05/2017 B/Washington/02/2019 B/Netherlands/11/267/2022 B/Netherlands/10/894/2022 B/Austria/1359417/2021 Isolate 1 G141 B/Austria/1359417/2021 Isolate 2 G141 B/Austria/1359417/2021 Isolate 2 G141R B/Stockholm/3/2022											
			VIA	VIA.1	VIA.1	VIA.3	VIA.3	VIA.3	VIA.3	VIA.3a.2	VIA.3a.2	VIA.3a.2	VIA.3a.2	VIA.3a.2
REFERENCE VIRUSES														
B/Brisbane/60/2008	VIA	2008-08-04	E4/E4	2560	160	40	<10	80	<40	<40	<40	<40	<40	<40
B/Colorado/05/2017	VIA.1	2017-02-05	E5/E2	640	320	40	<10	80	<40	<40	<40	<40	<40	<40
B/Washington/02/2019	VIA.3	2019-01-19	E3/E3	640	160	80	10	160	<40	<40	<40	<40	<40	<40
B/Netherlands/11/267/2022	VIA.3	2022-04-14	MDCK-MIX/MDCK2 Sh 539, 540, 543, 544, 570, 571, 574 ¹	<40	10	<20	80	<10	<40	<40	<40	<40	<40	<40
B/Netherlands/10/894/2022	VIA.3	2022-04-02	E4/E1	320	40	<20	40	160	<40	<40	<40	<40	<40	<40
B/Austria/1359417/2021 Isolate 1 G141	VIA.3a.2	2021-01-09	SIAT1/MDCK4	20	<20	<10	<10	1280	1280	1280	1280	1280	1280	1280
B/Austria/1359417/2021 Isolate 2 G141	VIA.3a.2	2021-01-09	E3/E4	320	20	<20	40	<10	1280	1280	1280	1280	1280	1280
B/Austria/1359417/2021 Isolate 2 G141R	VIA.3a.2	2021-01-09	E3/E5	160	10	<20	20	<10	1280	1280	1280	1280	1280	1280
B/Stockholm/3/2022	VIA.3a.2	2022-03-22	SIAT1/MDCK3	320	20	<20	<10	<10	1280	640	320	640	640	640
TEST VIRUSES														
B/Salamanca/4/7/2022	VIA.3a.2	2022-12-30	SIAT1/SIAT1	640	80	<20	<10	<10	640	640	320	640	640	640
B/Belgium/S1989/2022	VIA.3a.2	2022-09-30	C1/MDCK1	640	20	<20	<10	<10	1280	640	320	640	640	640
B/Belgium/G03370/2022	VIA.3a.2	2022-12-12	C1/MDCK1	640	20	<20	<10	<10	640	640	320	640	640	640
B/Lecce/4/2022	VIA.3a.2	2022-12-30	SIAT1/SIAT1	640	80	<20	<10	<10	640	640	320	640	640	640
B/Belgium/S24/19/2022	VIA.3a.2	2022-01-09	C1/MDCK1	640	40	<20	<10	<10	640	640	320	640	640	640
B/Dakar/15/2022	VIA.3a.2	2022-10-11	P2/MDCK2	640	20	<20	<10	<10	640	640	160	640	640	640
B/Dakar/08/2022	VIA.3a.2	2022-10-16	P1/MDCK1	640	20	<20	<10	<10	1280	640	320	640	640	640
B/Dakar/16/2022	VIA.3a.2	2022-10-17	P2/MDCK1	640	40	<20	<10	<10	1280	640	320	640	640	640
B/Dakar/19/2022	VIA.3a.2	2022-10-19	P1/MDCK1	640	40	<20	<10	<10	640	640	320	640	640	640
B/Dakar/11/2022	VIA.3a.2	2022-10-21	P1/MDCK1	640	40	<20	<10	<10	1280	640	320	640	640	640
B/Belgium/S1989/2022	VIA.3a.2	2022-01-26	C1/MDCK1	640	40	<20	<10	<10	1280	1280	320	640	640	640
B/Dakar/01/2022	VIA.3a.2	2022-09-17	P1/MDCK1	640	40	<20	<10	<10	1280	1280	320	1280	1280	1280
B/Dakar/17/2022	VIA.3a.2	2022-10-16	P2/MDCK1	640	40	<20	<10	<10	1280	640	320	640	640	640
B/Dakar/05/2022	VIA.3a.2	2022-10-16	P2/MDCK1	640	20	<20	<10	<10	1280	640	320	640	640	640
B/Dakar/18/2022	VIA.3a.2	2022-10-17	P1/MDCK1	640	40	<20	<10	<10	1280	640	320	640	640	640
B/Belgium/S26/29/2022	VIA.3a.2	2022-12-13	C1/MDCK1	640	40	<20	<10	<10	1280	640	320	640	640	640
B/Belgium/C02/22	VIA.3a.2	2022-10-22	P1/MDCK1	640	40	<20	<10	<10	640	640	320	640	640	640
B/Belgium/C02/24/2022	VIA.3a.2	2022-10-24	C1/MDCK1	640	<10	<20	<10	<10	1280	640	640	320	320	320
B/Belgium/G03/04/2022	VIA.3a.2	2022-11-28	C1/MDCK1	320	<10	<20	<10	<10	1280	640	320	1280	1280	1280
B/Belgium/G03/04/2022	VIA.3a.2	2022-12-05	C1/MDCK1	640	20	<20	<10	<10	1280	640	640	640	640	640
B/Belgium/G03/84/2022	VIA.3a.2	2022-12-13	C1/MDCK1	640	40	<20	<10	<10	1280	1280	640	640	640	640
B/Segovia/3/2023	VIA.3a.2	2023-01-07	MDCK/MDCK1	640	40	<20	<10	<10	1280	640	320	640	640	640
B/Slovenia/18/2023	VIA.3a.2	2023-01-03	MDCKx/MDCK1	320	20	<20	<10	<10	640	320	160	640	640	640

< relates to the lowest dilution of antiserum used

¹ hyperimmune sheep serum; ND = Not Done



Vaccine

NH 2021-22

Vaccine

SJ 2022-23

NH 2023-24

NH 2023-24

Table BV-3. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-03-01

Viruses	Collection date	Passage history	Haemagglutination inhibition titre											
			Pre-infection Ferret antiserum			Post-infection Ferret antiserum								
Passage history	BIDris 50/08 Egg	B/Colo 06/17 Egg	B/Wash 02/19 Egg	B/Neth 12/67/22 MDCK	B/Neth 10/84/22 Egg	B/Aust 1359417/21 MDCK	B/Aust 1359417/21 Egg G141	B/Aust 1359417/21 Egg G141R	B/Aust 3/22 MDCK	B/Stock 3/22				
Ferret number														
Genetic group	VIA	VIA.1	VIA.3	VIA.3	VIA.3	VIA.3a.1	VIA.3a.2	VIA.3a.2	VIA.3a.2	VIA.3a.2				
REFERENCE VIRUSES														
B/Qatar/10-VI-22-2092996/2022	VIA	2009-05-04	E4/E4	2560	320	40	<10	160	>10	<40	<40	<40	<40	<40
B/Qatar/06/2017	VIA.1	2017-02-05	E5/E2	1280	640	40	<10	160	>10	<40	<40	<40	<40	<40
B/Washington/02/2019	VIA.3	2019-01-19	E3/E3	640	320	80	20	160	>10	<40	<40	<40	<40	<40
B/Netherlands/1267/2022	VIA.3	2022-04-14	MDCK-MIX/MDCK2	<40	<10	<10	160	20	>10	<40	<40	<40	<40	<40
B/Netherlands/10894/2022	VIA.3	2022-04-02	E4/E1	640	40	<10	40	160	>10	<40	<40	<40	<40	<40
B/Spain/1359417/2021 G141	VIA.3a.2	2021-09-09	SIAT1/MDCK3	320	20	10	<10	160	>10	1280	320	640	640	640
B/Austria/1359417/2021 Isolate 1 G141	VIA.3a.2	2021-01-09	E3/E4	640	40	<10	40	160	>10	2560	1280	640	640	640
B/Austria/1359417/2021 Isolate 2 G141R	VIA.3a.2	2021-01-09	E3/E5	320	20	<10	40	160	>10	1280	1280	2560	640	640
B/Stockholm/3/2022	VIA.3a.2	2022-03-22	SIAT1/MDCK3	640	20	<10	10	10	640	640	320	640	640	640
TEST VIRUSES														
B/Qatar/10-VI-22-2092996/2022	VIA.3a.2	2022-10-18	MDCK1	640	80	<10	20	10	1280	1280	640	1280		
B/Qatar/10-VI-22-2090416/2022	VIA.3a.2	2022-10-17	MDCK2	640	80	<10	20	10	1280	1280	320	1280		
B/Qatar/10-VI-22-1923371/2022	VIA.3a.2	2022-08-24	MDCK1	640	80	<10	20	10	1280	1280	320	640		
B/Qatar/10-VI-22-192/2022	VIA.3a.2	2022-10-17	MDCK2	640	40	<10	10	10	1280	1280	320	640		
B/Argentina/3350/2022	VIA.3a.2	2022-09-13	MDCK4	320	40	<10	10	<10	640	640	160	640		
B/Argentina/3268/2022	VIA.3a.2	2022-09-16	MDCK1	640	40	<10	10	<10	1280	640	320	640		
B/Argentina/3761/2022	VIA.3a.2	2022-10-08	MDCK1	640	40	<10	20	10	1280	640	320	1280		
B/Argentina/3637/2022	VIA.3a.2	2022-10-01	MDCK1	640	80	<10	20	10	1280	1280	320	1280		
B/Argentina/3402/2022	VIA.3a.2	2022-09-22	MDCK1	320	40	<10	10	10	1280	640	320	1280		

< relates to the lowest dilution of antiserum used
¹ hyperimmune sheep serum; ND = Not Done



Vaccine
NH 2021-22

Vaccine
SH 2022
NH 2022-23
SH 2023
NH 2023-24

Table BV-4. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-03-22

Viruses	Collection date	Passage history	Haemagglutination inhibition titre													
			Post-infection ferret antiseraum													
			B/Bris 6/08	B/Colorado Egg	B/Wash'ton Egg	02/19 Egg	11/26/22 MDCK	10/89/22 Egg	13/59/41/21 MDCK	13/59/41/21 Egg G141	13/59/41/21 Egg G141R	13/59/41/21 MDCK	B/Austria Egg G141	B/Stock MDCK		
Passage history	Ferret number	V1A.1	2005-08-04	E4/E4	1200	160	20	10	160	<40	<40	<40	<40	<40		
		V1A.1	2017-02-05	E5/E2	640	640	20	10	160	<40	<40	<40	<40	<40		
		V1A.3	2019-01-19	E3/E3	640	160	40	40	160	<40	<40	<40	<40	<40		
Genetic group	V1A.3	2022-04-14	MDCK-MIX/MDCK2		<40	<10	<10	80	20	<40	<40	<40	<40	<40		
	V1A.3	2022-04-02	E4/E1		320	40	<10	40	160	<40	<40	<40	<40	<40		
	V1A.3	2021-01-09	SIAT1/MDCK4		320	20	<10	20	<10	1280	640	160	320	320		
REFERENCE VIRUSES																
B/Brisbane/02/2000																
B/Brisbane/02/2017																
B/Washington/02/2019																
B/Netherlands/1/2027/2022																
B/Netherlands/1/0894/2022																
B/Austria/135941/2021 G141																
B/Austria/135941/2021 Isolate 2 G141																
B/Austria/135941/2021 Isolate 2 G141R																
B/Stockholm/3/2022																
TEST VIRUSES																
B/Belgium/S/004/2023																
B/Almerat/5222563/2022																
B/Baden-Wurttemberg/2023																
B/Niedersachsen/2023																
B/Hessen/2023																
B/Sachsen/2023																
B/Sachsen-Anhalt/2023																
B/Sachsen/2023																
B/Nordrhein-Westfalen/13/2023																
B/Bayern/6/2023																
B/Bremen/4/2023																
V1A.3a.2	2022-03-20	C1/MDCK1	320	40	<10	20	<10	640	640	640	320	640	320	640		
V1A.3a.2	2022-10-09	MDCK1	320	40	<10	20	<10	640	640	640	160	320	320	640		
V1A.3a.2	2023-01-26	P1/MDCK1	320	20	<10	10	<10	1280	640	640	320	320	320	320		
V1A.3a.2	2023-11-30	P1/MDCK1	320	20	<10	10	<10	640	640	640	160	320	320	320		
V1A.3a.2	2023-03-03	P1/MDCK1	320	40	<10	20	<10	640	640	640	320	320	320	320		
V1A.3a.2	2023-02-14	P1/MDCK1	640	40	<10	20	<10	1280	1280	1280	320	640	320	640		
V1A.3a.2	2023-02-17	P1/MDCK1	320	40	<10	20	<10	640	640	640	160	320	320	320		
V1A.3a.2	2023-02-20	P1/MDCK1	320	20	<10	10	<10	640	640	640	160	320	320	320		
V1A.3a.2	2023-02-20	P1/MDCK1	320	20	<10	10	<10	640	640	640	160	320	320	320		
< relates to the lowest dilution of antiserum used												Vaccine				
1) hyperimmune sheep serum: ND =												NH 2021-22	NH 2022	NH 2023	NH 2023-24	

< relates to the lowest dilution of antiserum used

¹ hyperimmune sheep serum: ND =

Vaccine

Vaccine
SII 2022

SH 2022
IH 2022-23

SH 2023
NH 2023-24

< 4-fold

< 4-fold 4-fold 8-fold

92

Table BV-5. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-04-05

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre													
				Post-infection ferret antiserum													
				B/Br/6/2020/60/8 Egg	B/Colo/06/2017 Egg	B/Wash/06/17 Egg	B/Neth/02/19 MDCK	B/Neth/11/26/22 Egg	B/Neth/13/59/41/72/1 MDCK	B/Aust/13/59/41/72/1 Egg G141	B/Aust/13/59/41/72/1 Egg G141R	B/Stock/3/22 MDCK					
				Sh 539, 540, 543, 544, 545, 571, 574 ^a	F44/18	F20/20	F29/22	F37/22	NIB F01/21	F15/21	F44/21	F28/22					
REFERENCE VIRUSES				V1A	V1A.1	V1A.3	V1A.3	V1A.3	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2					
B/Colorado/06/2017		2018-08-04	E4/E4	1280	160	20	10	160	<40	<40	<40	<40					
B/Colorado/06/2017		2017-02-05	E5/E2	640	640	20	10	160	<40	<40	<40	<40					
B/Washington/02/2019		2019-01-19	E3/E3	640	160	80	40	160	<40	<40	<40	<40					
B/Netherlands/11/26/22		2022-04-14	MDCK-MIX/MDCK2		<40	<10	80	20	<40	<40	<40	<40					
B/Netherlands/10/89/4/2022		2022-04-02	E4/E1	320	40	<10	40	160	<40	<40	<40	<40					
B/Br/6/2020/60/8 Egg		2021-01-09	E3/E4	320	20	<10	20	<10	2560	640	160	320					
B/Aust/13/59/41/72/1 G141		2021-01-09	E3/E5	160	10	<10	40	<10	1280	1280	320	640					
B/Aust/13/59/41/72/1 Isolate 1 G141		2021-01-09	E3/E5	160	10	<10	40	<10	640	640	2560	5120					
B/Aust/13/59/41/72/1 Isolate 2 G141R		2021-01-09	E3/E5	160	10	<10	40	<10	1280	1280	320	640					
B/Stockholm/3/2022		2022-03-22	SIAT1/MDCK3		320	20	<10	10	<10	640	640	160	320				
TEST VIRUSES				V1A.3a.2	16/02/2023	P1/MDCK1	640	40	20	20	10	1280	1280	640	1280		
B/Nordrhein-Westfalen/9/2023		16/02/2023	P1/MDCK1	1280	80	20	40	10	1280	1280	2560	5120					
B/Baden-Wurttemberg/6/2023		16/02/2023	P1/MDCK1	1280	80	20	20	10	1280	1280	2560	5120					
B/Nordrhein-Westfalen/12/2023		17/02/2023	P1/MDCK1	1280	80	20	20	10	1280	1280	2560	5120					

^a relates to the lowest dilution of antiserum used

^b hyperimmune sheep serum; ND = Not Done

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Vaccine

NH 2021-22

Vaccine

SH 2022

NH 2022-23

SH 2023

NH 2023-24

Table BV-6. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-04-26

< relates to the lowest dilution of antiserum used

¹ hyperimmune sheep serum; ND = Not Done

< 4-fold 4-fold 8-fold > 8-fold < = not recognised by the antiserum > 160 (no homologous titre)

Vaccine

Vaccine
SH 2022

Table BV-7. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-05-04

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre											
				Post-infection ferret antiserum											
				B/Brus 60/08	B/Colorado 06/17	B/Wash/Hon 02/19	B/Neth 11/26/22	B/Neth 10/89/22	B/Austria 1359417/21	B/Austria 1359417/21	B/Austria 1359417/21	B/Stock 9/22			
				Egg	Egg	Egg	MDCK	Egg	MDCK	Egg G141	Egg G141R	MDCK			
Passage history				540, 543, 544, 570, 571, 574	F44/18	F20/20	F29/22	F37/22	NIB F01/21	F15/21	F44/21	F28/22			
Ferret number				VIA	VIA.1	VIA.3	VIA.3	VIA.3	VIA.3a.1	VIA.3a.2	VIA.3a.2	VIA.3a.2			
Genetic group															
REFERENCE VIRUSES															
B/Brisbane/05/2009	VIA	2008-08-04	E4/E4	2560	100	40	<10	40	<40	<40	<40	<40	<40		
B/Colorado/06/2017	VIA.1	2017-02-05	E5/E2	640	640	80	<10	80	<40	<40	<40	<40	<40		
B/Washington/02/2019	VIA.3	2019-01-19	E3/E3	640	160	160	<10	80	<40	<40	<40	<40	<40		
B/Netherlands/12/2022	VIA.3	2022-04-14	MDCK-MIX/MDCK2	<40	<10	<10	80	20	<40	<40	<40	<40	<40		
B/Netherlands/10/2022	VIA.3	2022-04-02	E4/E1	640	40	20	10	160	<40	<40	<40	<40	<40		
B/Austria/1359417/2021 Isolate 1 G141	VIA.3a.2	2021-01-09	SIAT1/MDCK4	320	<10	<10	<10	<10	1280	640	320	320	320		
B/Austria/1359417/2021 Isolate 2 G141	VIA.3a.2	2021-01-09	E3/E4	640	<10	<10	<10	20	1280	1280	640	640	640		
B/Austria/1359417/2021 Isolate 2 G141R	VIA.3a.2	2021-01-09	E3/E5	160	<10	<10	<10	10	1280	640	1280	320	320		
B/Stockholm/3/2022	VIA.3a.2	2022-03-22	SIAT1/MDCK3	320	<10	<10	<10	<10	640	640	320	640			
TEST VIRUSES															
B/Austria/15696/2022	VIA.3a.2	2022-11-25	MDCK2	320	<10	<10	<10	<10	640	640	320	640			
B/Bishkek/019/2022	VIA.3a.2	2022-11-30	MDCK/M/MDCK1	640	40	<10	<10	<10	1280	1280	640	1280			
B/Bishkek/020/2022	VIA.3a.2	2022-12-01	MDCK/M/MDCK1	640	<10	<10	<10	<10	1280	1280	640	640			
B/Bishkek/035/2022	VIA.3a.2	2022-12-14	MDCK/MDCK1	640	<10	<10	<10	<10	1280	640	640	640			
B/Bishkek/024/2022	VIA.3a.2	2022-12-14	MDCK1/MDCK1	640	<10	<10	<10	<10	1280	640	320	640			
B/Bishkek/031/2022	VIA.3a.2	2022-12-15	MDCK1/MDCK1	640	<10	<10	<10	<10	1280	640	320	320			
B/Bishkek/030/2022	VIA.3a.2	2022-12-15	MDCK1/MDCK1	640	<10	<10	<10	10	2560	1280	640	640			
B/Bishkek/038/2022	VIA.3a.2	2022-12-16	MDCK1/MDCK1	640	40	10	<10	10	1280	1280	640	1280			
B/Bishkek/036/2022	VIA.3a.2	2022-12-20	MDCK1/MDCK1	640	<10	<10	<10	<10	1280	640	320	640			

< relates to the lowest dilution of antiserum used
[†] hyperimmune sheep serum; ND = Not Done

Vaccine
NH 2021-22

Vaccine
SIH 2022
NH 2022-23
SIH 2023
NH 2023-24

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Table BV-8. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-05-16

< relates to the lowest dilution of antiserum used
1 hyperimmune sheep serum; ND = Not Done

¹ hyperimmune sheep serum; ND = Not Done

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Vaccine
SH 2022
NH 2022-23
SH 2023
NH 2023-24

Table BV-9. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-05-24

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre											
				Post-infection ferret antiserum											
				B/Bris 50/08 Egg	B/Colorado 06/17 Egg	B/WashN 02/19 Egg	B/Neth 11/27/22 MDCK	B/Austri 10/89/22 Egg	B/Austri 13/94/7/21 MDCK	B/Austri 13/94/7/21 Egg G141	B/Austri 13/94/7/21 Egg G141R	B/Stock 9/22 MDCK			
				Ferret number	F44/18	F20/20	F29/22	F37/22	NIB F01/21	F15/21	F44/21	F28/22			
			Genetic group	VIA	VIA.1	VIA.3	VIA.3	VIA.3	VIA.3a.2	VIA.3a.2	VIA.3a.2	VIA.3a.2			
REFERENCE VIRUSES															
B/Slovenia/50/2023	VIA	2020-08-04	E4/E4	1200	100	40	<10	40	>40	<40	<40	<40	<40		
B/Colorado/06/2017	VIA.1	2017-02-05	E5/E2	1280	640	80	10	80	>40	<40	<40	<40	<40		
B/Washington/02/2019	VIA.3	2019-01-19	E3/E3	640	160	20	80	>40	<40	<40	<40	<40	<40		
B/Netherlands/12/2022	VIA.3	2022-04-14	MDCK-MIX/MDCK2	<40	<10	<10	<10	<10	<40	<40	<40	<40	<40		
B/Netherlands/10/2022	VIA.3	2022-04-02	E4/E1	640	40	40	40	80	>40	<40	<40	<40	<40		
B/Austria/10/2021 G141	VIA.3a.2	2021-01-09	SIAT1/MDCK4	320	<10	<10	<10	<10	<40	640	640	160	320		
B/Austria/13/2021 Isolate 1 G141	VIA.3a.2	2021-01-09	E3/E4	320	<10	<10	<10	<10	1280	640	320	320			
B/Austria/13/2021 Isolate 2 G141R	VIA.3a.2	2021-01-09	E3/E5	160	<10	<10	<10	<10	640	640	2560	320			
B/Stockholm/3/2022	VIA.3a.2	2022-03-22	SIAT1/MDCK3	320	<10	<10	20	<10	640	640	320	640			
TEST VIRUSES															
B/Slovenia/186/2023	VIA.3a.2	2023-01-16	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	160	640			
B/Slovenia/237/2023	VIA.3a.2	2023-01-19	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	160	640			
B/Slovenia/238/2023	VIA.3a.2	2023-01-20	MDCK0/MDCK1	640	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/265/2023	VIA.3a.2	2023-01-23	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/233/2023	VIA.3a.2	2023-01-24	MDCK0/MDCK1	640	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/304/2023	VIA.3a.2	2023-01-25	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	160	640			
B/Slovenia/59/2023	VIA.3a.2	2023-01-31	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/10/2023	VIA.3a.2	2023-02-05	MDCK0/MDCK1	320	<10	<10	<10	<10	640	320	160	640			
B/Slovenia/14/2023	VIA.3a.2	2023-02-06	MDCK0/MDCK1	320	<10	<10	<10	<10	1280	640	320	640			
B/Slovenia/15/2023	VIA.3a.2	2023-02-15	SIAT0/MDCK1	640	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/105/2023	VIA.3a.2	2023-02-16	SIAT0/MDCK1	320	<10	<10	<10	<10	640	320	160	320			
B/Slovenia/547/2023	VIA.3a.2	2023-02-20	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/590/2023	VIA.3a.2	2023-02-22	MDCK0/MDCK1	640	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/635/2023	VIA.3a.2	2023-02-27	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/636/2023	VIA.3a.2	2023-02-28	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/638/2023	VIA.3a.2	2023-03-05	SIAT0/MDCK1	320	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/724/2023	VIA.3a.2	2023-03-06	MDCK0/MDCK1	640	<10	<10	<10	<10	640	1280	320	640			
B/Slovenia/732/2023	VIA.3a.2	2023-03-09	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/76/2023	VIA.3a.2	2023-03-09	MDCK0/MDCK1	320	<10	<10	<10	<10	640	320	160	320			
B/Slovenia/758/2023	VIA.3a.2	2023-03-08	MDCK0/MDCK1	320	<10	<10	<10	<10	1280	640	320	640			
B/Slovenia/473/2023	VIA.3a.2	2023-03-08	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/853/2023	VIA.3a.2	2023-03-14	MDCK0/MDCK1	640	<10	20	<10	<10	640	640	320	640			
B/Slovenia/924/2023	VIA.3a.2	2023-03-22	MDCK0/MDCK1	640	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/930/2023	VIA.3a.2	2023-03-23	MDCK0/MDCK1	640	<10	<10	<10	<10	640	640	160	640			
B/Slovenia/790/2023	VIA.3a.2	2023-03-28	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	160	640			
B/Slovenia/103/2023	VIA.3a.2	2023-04-06	MDCK0/MDCK1	320	<10	<10	<10	<10	640	640	320	640			
B/Slovenia/105/2023	VIA.3a.2	2023-04-07	MDCK0/MDCK1	640	<10	<10	<10	<10	640	640	320	640			
B/Estonia/17417/2023	VIA.3a.2	2023-04-11	MDCK1	320	<10	<10	<10	<10	1280	640	320	640			
B/Estonia/17417/2023	VIA.3a.2	2023-04-12	MDCK1	320	<10	<10	<10	<10	640	640	320	640			
B/Estonia/17417/2023	VIA.3a.2	2023-04-13	MDCK1	320	<10	<10	<10	<10	640	640	160	640			
B/Estonia/KL54/2023	VIA.3a.2	2023-04-13	MDCK1	320	<10	<10	<10	<10	640	640	320	640			
B/Estonia/17417/2023	VIA.3a.2	2023-04-14	MDCK1	320	<10	<10	<10	<10	640	640	320	640			

< relates to the lowest dilution of antiserum used

¹ hyperimmune sheep serum; ND = Not Done



Vaccine
NH 2021-22

Vaccine
SH 2022-23

NH 2023-24

NH 2023-24

Table BV-10. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-06-01

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre Post-infection ferret antisera														
				B/Br/Br/60/2008			B/Col/Col/6/17			B/Wash/Bon/02/19			B/Neth/1257/22			B/Austri/13594/21		
				Egg	Egg	Egg	Egg	Egg	Egg	Egg	Egg	Egg	Egg	Egg	Egg	Egg	Egg	
				Sh 539, 540, 543, 544, 570,	F44/18	F20/20	F29/22	F37/22	NIB F01/21	F15/21	F44/21	F28/22						
			Passage history	571, 574	VIA	VIA.1	VIA.3	VIA.3	VIA.3	VIA.3a.2	VIA.3a.2	VIA.3a.2	VIA.3a.2	VIA.3a.2	VIA.3a.2	VIA.3a.2		
			Ferret number															
			Genetic group															
REFERENCE VIRUSES																		
B/Brisbane/60/2008		2005-04-04	E4/E4	1280	80	40	<10	80	<40	<40	<40	<40	<40	<40	<40	<40		
B/Brisbane/10/2009		2009-04-05	E4/E4	640	80	40	<10	640	<40	<40	<40	<40	<40	<40	<40	<40		
B/Washington/03/2019		2019-01-19	E3E3	320	80	40	<10	20	160	<40	<40	<40	<40	<40	<40	<40		
B/Netherlands/11567/2022		2022-04-02	MDCK-MIX/MDCK2	<40	<10	10	<10	80	40	<40	<40	<40	<40	<40	<40	<40		
B/Netherlands/10944/2022		2022-04-02	E4/E1	320	20	40	40	160	<40	<40	<40	<40	<40	<40	<40	<40		
B/Austria/13594/2021 G141		2021-01-09	SIAT1/MDCK4	160	<10	<10	10	<10	640	640	640	160	320	320	320	320		
B/Austria/13594/2021 Isolate 2 G141		2021-01-09	E3E4	320	<10	10	20	10	1280	<40	<40	<40	<40	<40	<40	<40		
B/Austria/13594/2021 Isolate 2 G141R		2021-01-09	E3E5	160	<10	<10	20	<10	1280	<40	<40	<40	<40	<40	<40	<40		
B/Stockholm/10/22		2022-03-22	SIAT1/MDCK3	320	<10	<10	10	<10	640	640	640	640	320	320	320	320		
TEST VIRUSES																		
B/Atlanta/1884/2022 (1902)			VIA.3	MDCK1	1280	20	80	40	80	<40	<40	<40	<40	<40	<40	<40		
B/Bosnia and Herzegovina/48/2022		2022-11-22	MDCK1	640	20	<10	10	20	<10	640	640	640	320	320	320	320		
B/Estonia/17250/2022		2022-12-01	MDCK1	320	<10	<10	10	10	<10	1280	640	640	320	320	320	320		
B/Estonia/17235/2022		2022-12-05	MDCK1	320	10	10	10	10	<10	640	640	640	160	160	160	160		
B/Bosnia and Herzegovina/61/2022		2022-12-06	MDCK1	640	20	10	20	20	<10	640	640	640	320	320	320	320		
B/Bosnia and Herzegovina/10/2022		2022-01-04	MDCK1	640	20	10	20	20	<10	640	640	640	320	320	320	320		
B/Serbia/5/2004/2023		2023-01-04	MDCK1	640	<10	10	20	20	<10	640	640	640	320	320	320	320		
B/Serbia/3/2023/2023		2023-01-15	MDCK1	320	<10	10	20	20	<10	1280	640	640	320	320	320	320		
B/Macedonia/335/2023		2023-01-17	MDCK1	320	10	10	20	20	<10	640	640	640	320	320	320	320		
B/Estonia/173044/2023		2023-01-20	MDCK1	320	<10	10	20	20	<10	1280	640	640	320	320	320	320		
B/Bulgaria/1485/2023		2023-02-14	MDCK2/MDCK1	640	20	10	20	20	<10	640	640	640	320	320	320	320		
B/Bulgaria/1643/2023		2023-02-22	MDCK2/MDCK1	640	20	10	20	10	<10	640	640	640	160	160	160	160		
B/Bulgaria/1647/2023		2023-02-23	MDCK2/MDCK1	320	<10	10	20	20	<10	1280	640	640	320	320	320	320		
B/Bulgaria/1671/2023		2023-03-07	MDCK2/MDCK1	320	20	10	10	10	<10	1280	640	640	320	320	320	320		
B/Bulgaria/1742/2023		2023-03-14	MDCK2/MDCK1	320	<10	10	10	10	<10	640	640	640	320	320	320	320		
B/Bulgaria/1757/2023		2023-03-15	MDCK2/MDCK1	640	20	10	20	20	<10	640	640	640	320	320	320	320		
B/Bulgaria/1756/2023		2023-03-15	MDCK2/MDCK1	320	<10	<10	20	20	<10	1280	640	640	320	320	320	320		
B/Bulgaria/1860/2023		2023-03-21	MDCK2/MDCK1	320	10	10	20	20	<10	1280	640	640	320	320	320	320		
B/Bulgaria/1830/2023		2023-03-21	MDCK2/MDCK1	320	10	10	20	20	<10	640	640	640	320	320	320	320		
B/Bulgaria/1823/2023		2023-03-21	MDCK2/MDCK1	320	10	10	20	20	<10	640	640	640	320	320	320	320		
B/Bulgaria/1808/2023		2023-03-21	MDCK2/MDCK1	320	10	10	20	20	<10	640	640	640	320	320	320	320		
B/Bulgaria/1903/2023	D197N (+CHO)	2023-03-27	MDCK2/MDCK1	<40	<10	<10	20	20	<10	40	<40	<40	<40	<40	<40	<40		
B/Bulgaria/1898/2023	D197N (+CHO)	2023-03-27	MDCK2/MDCK1	<40	<10	<10	20	20	<10	40	<40	<40	<40	<40	<40	<40		
B/Bulgaria/1915/2023		2023-03-29	MDCK2/MDCK1	640	20	<10	20	10	<10	640	640	640	320	320	320	320		
B/Bulgaria/1929/2023		2023-04-04	MDCK2/MDCK1	320	<10	<10	10	10	<10	1280	640	640	320	320	320	320		
B/Slovenia/1024/2023		2023-04-05	MDCK9/MDCK3	320	10	<10	20	20	<10	640	640	640	320	320	320	320		
B/East Kazakhstan/10/15/2022 (11954)			MDCK1	640	<10	10	20	10	<10	1280	640	640	320	320	320	320		

< relates to the lowest dilution of antisera used

† hyperimmune sheep serum; ND = Not Done

< relates to the lowest dilution of antiserum used

¹ hyperimmune sheep serum; ND = Not Done

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titres)

Vaccine
SH 2022
NH 2022-23
SH 2023
NH 2023-24

Table BV-11. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-06-08

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre										
				Post-infection ferret antiserum										
				B/Bratislava/02/2009 B/Colorado/06/2017 B/Washington/02/2019 B/Netherlands/11267/2022 B/Netherlands/10894/2022 B/Austria/1394/17/2021 G141 B/Austria/1394/17/2023 Isolate 1 G141 B/Austria/1394/17/2021 Isolate 2 G141R B/Stockholm/3/2022	B/Bratislava/02/2009 B/Colorado/06/2017 B/Washington/02/2019 B/Netherlands/11267/2022 B/Netherlands/10894/2022 B/Austria/1394/17/21 G141 B/Austria/1394/17/21 Egg G141R B/Stockholm/3/22 MDCK									
				V1A	V1A.1	V1A.2	V1A.3	V1A.3	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2	
REFERENCE VIRUSES				V1A.1	2008-08-04	E4/E4	1280	80	<10	80	<10	<10	<10	<10
B/SaudiArabia/87/2022				V1A.1	2017-02-05	E5/E2	1280	320	80	10	160	<40	<40	<40
B/SaudiArabia/929/2022				V1A.3	2019-01-19	E3/E2	320	40	80	20	80	<40	<40	<40
B/SaudiArabia/11267/2022				V1A.3	2022-04-14	MDCK-MIX/MDCK2	<40	<10	<10	160	20	<40	<40	<40
B/Netherlands/10894/2022				V1A.3	2022-04-02	E4/E1	640	10	40	80	160	<40	<40	<40
B/Austria/1394/17/2021 G141				V1A.3a.2	2021-01-09	SIAT1/MDCK4	320	<10	<10	10	20	<10	320	160
B/Austria/1394/17/2023 Isolate 1 G141				V1A.3a.2	2021-01-09	E3/E3	320	<10	<10	10	40	<10	1280	640
B/Austria/1394/17/2021 Isolate 2 G141R				V1A.3a.2	2021-01-09	E3/E5	160	<10	<10	20	<10	640	320	1280
B/Stockholm/3/2022				V1A.3a.2	2022-03-22	SIAT1/MDCK3	320	<10	<10	10	<10	640	320	160
TEST VIRUSES				V1A.3a.2	2022-08-10	MDCK1	320	<10	<10	20	<10	640	320	160
B/SaudiArabia/87/2022				V1A.3a.2	2022-09-02	MDCK1	320	<10	<10	20	<10	1280	320	320
B/SaudiArabia/929/2022				V1A.3a.2	2022-09-11	MDCK1	640	<10	<10	20	<10	640	320	320
B/SaudiArabia/1259/2022				V1A.3a.2	2022-09-13	MDCK1	320	<10	<10	20	<10	640	320	640
B/Togo/2656/2022				V1A.3a.2	2022-11-08	MDCK1	640	<10	<10	20	<10	640	640	320
B/Togo/2847/2022				V1A.3a.2	2022-11-18	MDCK1	640	<10	10	20	<10	640	640	320
B/Togo/2846/2022				V1A.3a.2	2022-11-18	MDCK1	640	<10	<10	20	<10	640	640	320
B/Togo/2847/2022				V1A.3a.2	2022-11-18	MDCK1	640	<10	<10	20	<10	640	640	320
B/Tajikistan/375/2022				V1A.3a.2	2022-12-15	MDCK1	320	<10	<10	20	<10	640	320	160
B/Greece/ILI_252/2023				V1A.3a.2	2023-01-08	MDCK1	640	<10	<10	160	<10	640	320	160
B/Greece/ILI_252/2023				V1A.3a.2	2023-01-04	MDCK1	640	<10	<10	40	<10	1280	640	320
B/Tajikistan/1133/2023				V1A.3a.2	2023-01-11	MDCK1	320	<10	<10	20	<10	640	320	160
B/Tajikistan/1139/2023				V1A.3a.2	2023-01-18	MDCK1	320	<10	<10	10	<10	640	320	160
B/SaudiArabia/073/2022				V1A.3a.2	2022-09-12	MDCK1	160	<10	<10	<10	<10	320	160	160

< relates to the lowest dilution of antiserum used

¹ hyperimmune sheep serum; ND = Not Done



Vaccine
NH 2021-22
NH 2022-23
NH 2023-24

Table BV-12. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-06-28

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre									
				Post-infection ferret antiserum									
				B/Br/6/2020/08/2017	B/Colo/6/2017	B/Wash/0/2019	B/Nam/6/2019	B/Net/6/2019	B/Aust/6/2019	B/Aust/6/2019	B/Aust/6/2019	B/Stock/6/2022	
				Egg	Egg	Egg	MDCK	Egg	MDCK	Egg	G141	Egg G141R	
REFERENCE VIRUSES													
B/SaudiArabia/98/2022	V1A	2008-08-04	E4/E4	1280	80	40	<10	80	<40	<40	<40	<40	<40
B/Colorado/08/2017	V1A.1	2017-02-05	E5/E2	1280	320	40	<10	160	<40	<40	<40	<40	<40
B/Washington/02/2019	V1A.3	2019-01-19	E3/E2	640	80	160	<10	20	160	<40	<40	<40	<40
B/Netherlands/11267/2022	V1A.3	2022-04-14	MDCK-MIX/MDCK2	<40	<10	<10	80	10	<40	<40	<40	<40	<40
B/Netherlands/10894/2022	V1A.3	2022-04-02	E4/E1	640	20	20	40	160	<40	<40	<40	<40	<40
B/Australia/13594/2021 G141	V1A.3a.2	2021-01-09	SIAT1/MDCK4	640	10	<10	10	<10	1280	640	320	320	320
B/Australia/13594/2021 Isolate 2 G141	V1A.3a.2	2021-01-09	E3/E3	320	10	<10	40	<10	1280	640	320	320	320
B/Australia/13594/2021 Isolate 2 G141R	V1A.3a.2	2021-01-09	E3/E5	160	10	<10	20	<10	1280	320	2560	320	320
B/Stockholm/3/2022	V1A.3a.2	2022-03-22	SIAT1/MDCK3	320	20	<10	20	<10	640	320	320	640	320
TEST VIRUSES													
B/SaudiArabia/98/2022	V1A.3a.2	2022-09-05	MDCK3	640	20	<10	20	<10	1280	640	320	320	320
B/Netherlands/11856/2022	V1A.3a.2	2022-09-05	MDCK-MIX/MDCK1	640	40	20	<10	10	640	320	160	640	640
B/Netherlands/10919/2022	V1A.3a.2	2022-09-19	MDCK-MIX/MDCK1	640	40	20	<10	10	640	320	160	640	640
B/Netherlands/10109/2023	V1A.3a.2	2023-01-31	MDCK-MIX2/MDCK1	640	20	<10	<10	<10	640	320	160	640	640
B/Netherlands/10195/2023	V1A.3a.2	2023-01-31	MDCK-MIX2/MDCK2	640	20	<10	<10	<10	1280	320	320	320	320
B/Netherlands/10191/2023	V1A.3a.2	2023-02-01	MDCK-MIX2/MDCK1	640	40	<10	20	<10	640	320	320	640	640
B/Netherlands/10253/2023	V1A.3a.2	2023-02-08	MDCK-MIX2/MDCK1	320	<10	<10	<10	<10	640	160	160	320	320
B/Netherlands/10258/2023	V1A.3a.2	2023-02-09	MDCK-MIX2/MDCK1	640	40	<10	20	<10	640	320	320	640	640
B/Netherlands/10257/2023	V1A.3a.2	2023-02-09	MDCK-MIX2/MDCK1	640	20	<10	<10	<10	640	320	320	640	640
B/Netherlands/10259/2023	V1A.3a.2	2023-02-10	MDCK-MIX2/MDCK1	640	20	<10	<10	<10	1280	640	320	320	640
B/Netherlands/10316/2023	V1A.3a.2	2023-02-16	MDCK-MIX2/MDCK1	640	40	<10	20	<10	1280	640	320	640	640
B/Netherlands/10335/2023	V1A.3a.2	2023-02-17	MDCK-MIX2/MDCK1	640	40	<10	20	<10	640	640	320	640	640
B/Netherlands/10486/2023	V1A.3a.2	2023-03-21	MDCK-MIX2/MDCK1	640	40	<10	20	<10	640	320	320	640	640
B/Burgos/4810/2023	V1A.3a.2	2023-04-19	MDCK1	640	20	<10	20	<10	640	640	320	320	640
B/Salamanca/4829/2023	V1A.3a.2	2023-04-21	MDCK1	640	20	<10	<10	<10	1280	640	320	320	640
B/Salamanca/4831/2023	V1A.3a.2	2023-04-28	MDCK1	640	40	<10	<10	<10	640	640	320	320	640
B/Salamanca/4828/2023	V1A.3a.2	2023-04-29	MDCK1	640	40	<10	20	<10	1280	640	320	320	1280

< relates to the lowest dilution of antiserum used

* hyperimmune sheep serum; ND = Not Done

< 4-fold 4-fold 8-fold > 8-fold < not recognised by the antiserum ≥ 160 (no homologous titre)

Vaccine
NH 2021-22

Vaccine
SH 2022-23
SH 2023
NH 2023-24

Table BV-13. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-07-11

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre							
				Post-infection ferret antiserum							
				B/Bris 60/08	B/Wash'ton 02/19	B/Austria 1359417/21	B/Austria 1359417/21	B/Austria 1359417/21	B/Austria Egg G141	B/Stock 3/22	B/Stock 3/22
				Sh 539, 540, 543, 544, 570, 571, 574 ¹	Egg	MDCK	Egg G141	Egg G141R	MDCK		
				F20/20	NIB F01/21	F15/21	F44/21	F28/22			
				V1A	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2		
REFERENCE VIRUSES											
B/Brisbane/60/2008	V1A	2008-08-04	E4/E4	1280	40	<40	<40	<40	<40	<40	<40
B/Washington/02/2019	V1A.3	2019-01-19	E3/E2	1280	320	<10	1280	640	320	320	320
B/Austria/1359417/2021 G141	V1A.3a.2	2021-01-09	SIAT1/MDCK4	320							
B/Austria/1359417/2021 Isolate 2 G141	V1A.3a.2	2021-01-09	E3/E3	320	<10	1280	640	320	640		
B/Austria/1359417/2021 Isolate 2 G141R	V1A.3a.2	2021-01-09	E3/E5	160	<10	1280	320	2560	320		
B/Stockholm/3/2022	V1A.3a.2	2022-03-22	SIAT1/MDCK5	320	<10	640	320	160	640		
TEST VIRUSES											
B/Sale/24/2022	V1A.3a.2	2022-11-09	MDCK1	640	<10	1280	640	320	640		
B/Fes/185/2022	V1A.3a.2	2022-12-21	MDCK1	80	<10	640	320	160	640		
B/Marrakech/246/2022	V1A.3a.2	2022-12-22	MDCK2	320	<10	640	320	320	640		
B/Moldova/2027197/2023	V1A.3a.2	2023-02-08	MDCK1	640	<10	2560	1280	320	640		
B/Mauritius/P10571_L_20/2023	V1A.3a.2	2023-02-23	MDCKx/MDCK1	640	<10	1280	640	320	640		
B/Moldova/2030616/2023	V1A.3a.2	2023-03-20	MDCK1	640	<10	2560	640	640	640		
B/Moldova/2030610/2023	V1A.3a.2	2023-03-21	MDCK1	640	<10	1280	640	320	1280		
B/Moldova/2030527/2023	V1A.3a.2	2023-03-22	MDCK1	640	<10	1280	640	640	1280		
B/Moldova/2030521/2023	V1A.3a.2	2023-03-22	MDCK1	640	<10	2560	640	640	640		
B/Moldova/2030620/2023	V1A.3a.2	2023-03-23	MDCK1	640	20	1280	320	320	640		
B/Ireland/20627/2023	V1A.3a.2	2023-03-28	MDCK1	640	<10	1280	640	320	1280		
B/Ireland/21113/2023	V1A.3a.2	2023-03-29	MDCK1	640	<10	1280	640	320	1280		
B/Moldova/2030891/2023	V1A.3a.2	2023-03-29	MDCK1	640	<10	1280	640	320	1280		
B/Moldova/2030885/2023	V1A.3a.2	2023-03-29	MDCK1	640	20	1280	640	640	1280		
B/Ireland/23609/2023	V1A.3a.2	2023-03-30	MDCK1	640	10	1280	640	320	1280		
B/Moldova/2030963/2023	V1A.3a.2	2023-03-30	MDCK1	640	<10	2560	640	640	640		
B/Moldova/2031302/2023	V1A.3a.2	2023-04-03	MDCK1	640	20	2560	1280	1280	1280		
B/Ireland/23071/2023	V1A.3a.2	2023-04-06	MDCK1	320	<10	640	320	160	640		
B/Moldova/2031294/2023	V1A.3a.2	2023-04-06	MDCK1	640	20	640	320	320	640		
B/Moldova/2031629/2023	V1A.3a.2	2023-04-13	MDCK1	320	<10	1280	640	320	640		
B/Moldova/2031620/2023	V1A.3a.2	2023-04-13	MDCK1	320	<10	640	320	160	160		
B/Mauritius/P23195_L_37/2023	V1A.3a.2	2023-04-18	MDCK1	320	<10	1280	640	320	640		
B/Moldova/2031877/2023	V1A.3a.2	2023-04-20	MDCK1	320	<10	2560	640	320	640		

< relates to the lowest dilution of antiserum used

¹ hyperimmune sheep serum; ND = Not Done

 < 4-fold  4-fold  8-fold  > 8-fold  < not recognised by the antiserum  ≥ 160 (no homologous titre)

Table BV-14. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-07-25

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre							
				Post-infection ferret antiserum							
				B/Bris 6/008	B/Wash'ton 02/19	B/Austria 1359417/21	B/Austria 1359417/21	B/Austria 1359417/21	B/Stock 3/22		
				Egg	Egg	MDCK	Egg G141	Egg G141R	MDCK		
				Sh 539, 540, 543, 544, 570, 571, 574 ¹	F20/20	NIB F01/21	F15/21	F44/21	F28/22		
				V1A	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2		
REFERENCE VIRUSES											
B/Brisbane/60/2008	V1A	2008-08-04	E4/E4	1280	80	<40	<40	<40	<40	<40	
B/Washington/02/2019	V1A.3	2019-01-19	E3/E3	640	320	<40	<40	<40	<40	<40	
B/Austria/1359417/2021	V1A.3a.2	2021-01-09	SIAT1/MDCK4	160	<10	640	640	640	320	320	
B/Austria/1359417/2021 Isolate 2	V1A.3a.2	2021-01-09	E3/E4	160	<10	640	640	640	160	320	
B/Austria/1359417/2021 Isolate 2	V1A.3a.2	2021-01-09	E3/E5	160	<10	1280	320	2560	320		
B/Stockholm/3/2022	V1A.3a.2	2022-03-22	SIAT1/MDCK3	320	<10	640	320	320	640		
TEST VIRUSES											
B/Medea/4341/2022	V1A.3a.2	2022-11-23	MDCK1	320	<10	1280	640	320	320	320	
B/Tebessa/43789/2022	V1A.3a.2	2022-12-01	MDCK1	320	<10	1280	320	320	320	320	
B/Uppsala/1/2023	V1A.3a.2	2023-01-02	SIAT1/MDCK1	320	<10	640	320	320	320	320	
B/South Africa/R00198/23	V1A.3a.2	2023-01-09	MDCK1/MDCK1	320	<10	1280	320	320	320	320	
B/BosniaAndHerzegovina/148/2023	V1A.3a.2	2023-01-24	MDCK2	320	<10	1280	320	320	320	320	
B/Parma/9/2023	V1A.3a.2	2023-02-01	MDCK3/MDCK1	320	<10	640	320	160	640		
B/Parma/10/2023	V1A.3a.2	2023-02-03	MDCK3/MDCK1	320	<10	640	320	160	640		
B/Perugia/4/2023	V1A.3a.2	2023-02-03	MDCK3/MDCK1	160	<10	320	320	160	320		
B/Armenia/600/2023	V1A.3a.2	2023-02-06	MDCK2	320	<10	1280	320	320	320	320	
B/Ireland/9152/2023	V1A.3a.2	2023-02-06	MDCK1	320	<10	640	320	160	640		
B/Switzerland/58634/2023	V1A.3a.2	2023-02-06	MDCK1/MDCK1	640	<10	640	320	320	640		
B/Switzerland/45344/2023	V1A.3a.2	2023-02-06	MDCK1/MDCK1	320	<10	320	160	160	320		
B/Hungary/40/2023	V1A.3a.2	2023-02-06	MDCK1/MDCK1	160	<10	640	320	160	320		
B/Serbia/1124/2023	V1A.3a.2	2023-02-06	C1/MDCK1	320	<10	640	320	160	640		
B/Parma/7/2023	V1A.3a.2	2023-02-06	MDCK3/MDCK1	320	<10	1280	320	320	320	320	
B/Armenia/622/2023	V1A.3a.2	2023-02-07	MDCK1	640	<10	640	320	160	640		
B/Ireland/9627/2023	V1A.3a.2	2023-02-08	MDCK1	320	<10	640	320	160	640		
B/Switzerland/6471/2023	V1A.3a.2	2023-02-10	MDCK1/MDCK1	320	<10	640	320	160	640		
B/Parma/11/2023	V1A.3a.2	2023-02-13	MDCK3/MDCK1	320	<10	640	320	320	320		
B/Switzerland/51774/2023	V1A.3a.2	2023-02-14	MDCK1/MDCK1	320	<10	1280	320	320	320		
B/Hungary/46/2023	V1A.3a.2	2023-02-14	MDCK1/MDCK1	320	<10	640	320	320	320		
B/Hungary/64/2023	V1A.3a.2	2023-02-14	MDCK1/MDCK1	320	<10	640	320	160	320		
B/Serbia/1430/2023	V1A.3a.2	2023-02-14	C2/MDCK1	320	<10	640	320	160	640		
B/Serbia/1428/2023	V1A.3a.2	2023-02-14	C1/MDCK1	320	<10	640	320	160	640		
B/Serbia/1415/2023	V1A.3a.2	2023-02-14	C1/MDCK1	320	<10	640	320	160	640		
B/Parma/16/2023	V1A.3a.2	2023-02-14	MDCK3/MDCK1	320	<10	640	320	160	640		
B/Parma/15/2023	V1A.3a.2	2023-02-14	MDCK3/MDCK1	640	<10	640	320	160	640		
B/Ireland/13684/2023	V1A.3a.2	2023-02-16	MDCK1	320	<10	640	320	160	640		
B/Stockholm/6/2023	V1A.3a.2	2023-02-16	SIAT1/MDCK1	320	<10	640	320	160	640		
B/Orebro/1/2023	V1A.3a.2	2023-02-19	SIAT1/MDCK1	320	<10	640	320	320	640		
B/Stockholm/2/2023	V1A.3a.2	2023-02-20	SIAT1/MDCK1	320	<10	640	320	160	640		
B/Norway/749/2023	V1A.3a.2	2023-02-22	MDCK1	320	<10	640	320	160	640		
B/Norway/3226/2023	V1A.3a.2	2023-02-22	MDCK1	320	<10	1280	320	320	320		
B/Hungary/75/2023	V1A.3a.2	2023-02-24	MDCK1/MDCK1	320	<10	640	320	160	640		
B/Karlstad/1/2023	V1A.3a.2	2023-02-25	SIAT1/MDCK1	320	<10	640	320	160	640		
B/Switzerland/64703/2023	V1A.3a.2	2023-02-27	MDCK1/MDCK1	320	<10	640	320	320	640		
B/Serbia/2225/2023	V1A.3a.2	2023-02-28	C1/MDCK1	320	<10	640	320	160	640		
B/Ireland/14244/2023	V1A.3a.2	2023-03-01	MDCK1	320	<10	640	320	320	640		
B/Skovde/1/2023	V1A.3a.2	2023-03-01	SIAT1/MDCK1	320	<10	1280	320	320	320		
B/Switzerland/20084/2023	V1A.3a.2	2023-03-03	MDCK1/MDCK1	320	<10	1280	320	320	320		
B/Norway/5807/2023	V1A.3a.2	2023-03-06	MDCK1	160	<10	320	320	160	320		
B/Sweden/4139/2023	V1A.3a.2	2023-03-06	SIAT1/MDCK1	320	<10	640	320	320	640		
B/Ireland/15857/2023	V1A.3a.2	2023-03-07	MDCK1	640	<10	640	320	320	640		
B/Boras/1/2023	V1A.3a.2	2023-03-08	SIAT1/MDCK1	320	<10	1280	320	320	320		
B/Norway/5989/2023	V1A.3a.2	2023-03-13	MDCK1	320	<10	640	320	160	640		
B/Switzerland/219/2023	V1A.3a.2	2023-03-13	MDCK1/MDCK1	320	<10	640	320	320	640		
B/Sweden/3764/2023	V1A.3a.2	2023-03-13	SIAT1/MDCK1	320	<10	1280	320	320	320		
B/Ireland/17744/2023	V1A.3a.2	2023-03-14	MDCK1	640	<10	640	320	320	640		
B/Norway/4000/2023	V1A.3a.2	2023-03-14	MDCK3/MDCK1	320	<10	1280	640	320	320		
B/Placerville/36/2023	V1A.3a.2	2023-03-14	MDCK1	320	<10	640	320	160	640		
B/Ireland/15570/2023	V1A.3a.2	2023-03-16	MDCK1	640	<10	640	320	320	640		
B/Ireland/16976/2023	V1A.3a.2	2023-03-20	MDCK1	320	<10	640	320	160	640		
B/Ireland/16286/2023	V1A.3a.2	2023-03-21	MDCK1	320	<10	640	320	160	640		
B/Norway/5216/2023	V1A.3a.2	2023-03-28	MDCK1	320	<10	320	320	160	640		
B/Norway/5216/2023	V1A.3a.2	2023-03-31	MDCK1	320	<10	1280	640	320	320		
B/Norway/172/2023	V1A.3a.2	2023-04-03	MDCK1	320	<10	640	320	160	640		
B/Norway/159/2023	V1A.3a.2	2023-04-03	MDCK1/MDCK1	320	<10	1280	640	320	320		
B/Hungary/126/2023	V1A.3a.2	2023-04-03	C1/MDCK1	320	<10	640	320	160	640		
B/Serbia/2781/2023	V1A.3a.2	2023-04-03	SIAT1/MDCK1	320	<10	1280	320	320	320		
B/Switzerland/55100/2023	V1A.3a.2	2023-04-06	SIAT1/MDCK1	320	<10	640	320	320	640		
B/Estonia/174086/2023	V1A.3a.2	2023-04-09	MDCK1	320	<10	640	320	160	640		
B/BosniaAndHerzegovina/256/2023	V1A.3a.2	2023-04-11	MDCK1	320	<10	640	320	320	640		
B/Sweden/5303/2023	V1A.3a.2	2023-04-13	SIAT1/MDCK1	320	<10	640	320	320	640		
B/Norway/5977/2023	V1A.3a.2	2023-04-14	MDCK1	640	<10	1280	640	320	320		
B/Serbia/3004/2023	V1A.3a.2	2023-04-16	C2/MDCK1	320	<10	640	160	160	320		
B/BosniaAndHerzegovina/261/2023	V1A.3a.2	2023-04-18	MDCK1	320	<10	640	320	320	640		
B/Sweden/5500/2023	V1A.3a.2	2023-04-23	SIAT1/MDCK1	320	<10	640	320	320	640		
B/Sweden/5454/2023	V1A.3a.2	2023-04-24	SIAT1/MDCK1	320	<10	640	320	160	640		
B/Sweden/5533/2023	V1A.3a.2	2023-04-26	SIAT1/MDCK1	320	<10	640	320	160	640		

< relates to the lowest dilution of antiserum used

¹ hyperimmune sheep serum; ND = Not Done

< 4-fold 4-fold 8-fold > 8-fold

< not recognised by the antiserum

Vaccine
NH 2021-22

Vaccine
SH 2022-23

SH 2023

NH 2023-24

Table BV-15. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-08-01

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre							
				Post-infection ferret antisera							
				B/Bratis 6/0/8	B/Washington 02/19	B/Austria 135941/7/21	B/Austria 135941/7/21	B/Austria 135941/7/21	B/Austria 135941/7/21	B/Stockholm 3/22	
				Egg	Egg	MDCK	Egg G141	Egg G141R	MDCK		
			Passage history	Sh 539, 540, 543, 544, 570, 571, 574 ¹	F20/20	NIB F01/21	F15/21	F44/21	F28/22		
			Ferret number	V1A	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2		
			Genetic group								
REFERENCE VIRUSES											
B/Brisbane/60/2008	V1A	2008-08-04	E4/E4	2560	80	<40	<40	<40	<40	<40	
B/Washington/02/2019	V1A.3	2019-01-19	E3/E3	640	160	<40	<40	<40	<40	<40	
B/Austria/135941/7/2021 G141	V1A.3a.2	2021-01-09	SIAT1/MDCK4	320	10	1280	640	320	640		
B/Austria/135941/7/2021 Isolate 2 G141	V1A.3a.2	2021-01-09	E3/E4	160	10	2560	640	640	640		
B/Austria/135941/7/2021 Isolate 2 G141R	V1A.3a.2	2021-01-09	E3/E5	320	10	1280	640	2560	640		
B/Stockholm/3/2022	V1A.3a.2	2022-03-22	SIAT1/MDCK3	640	10	1280	640	320	640		
TEST VIRUSES											
B/Parma/8/2023	V1A.3a.2	2023-02-01	MDCK1/MDCK1	320	<10	640	320	320	640		
B/FVG-Gorizia/34/2023	V1A.3a.2	2023-02-01	MDCK1/MDCK1	640	10	1280	640	320	320		
B/FVG-Gorizia/33/2023	V1A.3a.2	2023-02-01	MDCK1/MDCK1	640	10	1280	640	320	1280		
B/Belgium/S1509/2023	V1A.3a.2	2023-02-01	MDCK1/MDCK1	640	10	640	320	320	640		
B/Belgium/G0178/2023	V1A.3a.2	2023-02-02	MDCK1/MDCK1	640	10	640	320	320	640		
B/Belgium/G0192/2023	V1A.3a.2	2023-02-03	MDCK1/MDCK1	320	10	640	320	320	640		
B/Belgium/G0182/2023	V1A.3a.2	2023-02-06	MDCK1/MDCK1	640	10	1280	640	320	1280		
B/Belgium/S1322/2023	V1A.3a.2	2023-02-07	MDCK1/MDCK1	640	10	640	640	320	640		
B/Belgium/G0187/2023	V1A.3a.2	2023-02-07	MDCK1/MDCK1	640	10	640	640	320	640		
B/Belgium/S1167/2023	V1A.3a.2	2023-02-09	MDCK1/MDCK1	320	<10	640	640	320	640		
B/Belgium/S1674/2023	V1A.3a.2	2023-02-12	MDCK1/MDCK1	320	10	1280	640	640	640		
B/Belgium/S1273/2023	V1A.3a.2	2023-02-13	MDCK1/MDCK1	320	10	640	320	320	640		
B/Belgium/S1762/2023	V1A.3a.2	2023-02-14	MDCK1/MDCK1	640	10	2560	640	640	640		
B/Ireland/11305/2023	V1A.3a.2	2023-02-15	MDCK1	640	10	1280	1280	320	1280		
B/Belgium/S1933/2023	V1A.3a.2	2023-02-21	MDCK1/MDCK1	640	10	1280	640	320	640		
B/Belgium/G0231/2023	V1A.3a.2	2023-02-21	MDCK1/MDCK1	640	10	640	640	320	640		
B/Belgium/S1960/2023	V1A.3a.2	2023-02-22	MDCK1/MDCK1	640	10	1280	640	640	640		
B/Belgium/S1397/2023	V1A.3a.2	2023-02-23	MDCK1/MDCK1	640	10	2560	640	640	640		
B/Belgium/S1957/2023	V1A.3a.2	2023-02-26	MDCK1/MDCK1	640	10	640	640	320	640		
B/Belgium/S1420/2023	V1A.3a.2	2023-02-27	MDCK1/MDCK1	640	10	1280	640	320	640		
B/Belgium/G0282/2023	V1A.3a.2	2023-03-16	MDCK1/MDCK1	640	10	1280	640	320	1280		
B/Poland/157/2023	V1A.3a.2	2023-03-29	MDCK1	640	10	2560	1280	640	640		
B/Estonia/KL/484/2023	V1A.3a.2	2023-04-04	MDCK2	1280	20	1280	1280	640	1280		

< relates to the lowest dilution of antisera used

¹ hyperimmune sheep serum; ND = Not Done

Vaccine

NH 2021-22

Vaccine

SH 2022

NH 2022-23

SH 2023

NH 2023-24



Table BV-16. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-08-08

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre							
				Post-infection ferret antisera							
				B/Bris 6/0/08 Egg Sh 539, 540, 543, 544, 570, 571, 574 ¹	B/Wash/ton 02/19 Egg	B/Austria 135941/7/21 MDCK	B/Austria 135941/7/21 Egg G141	B/Austria 135941/7/21 Egg G141R	B/Stock 3/22 MDCK		
			Ferret number		F20/20	NIB F01/21	F15/21	F44/21	F28/22		
			Genetic group	V1A	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2		
REFERENCE VIRUSES											
B/Brisbane/60/2008	V1A	2008-08-04	E4/E4	2560	160	<40	<40	<40	<40		
B/Washington/02/2019	V1A.3	2019-01-19	E3/E3	640	160	<40	<40	<40	<40		
B/Austria/135941/7/2021 G141	V1A.3a.2	2021-01-09	SIAT1/MDCK4	320	10	1280	640	320	320		
B/Austria/135941/7/2021 Isolate 2 G141	V1A.3a.2	2021-01-09	E3/E4	320	10	2560	640	640	640		
B/Austria/135941/7/2021 Isolate 2 G141R	V1A.3a.2	2021-01-09	E3/E5	640	10	1280	640	2560	640		
B/Stockholm/3/2022	V1A.3a.2	2022-03-22	SIAT1/MDCK3	640	10	1280	640	320	320		
TEST VIRUSES											
B/Romania/545694/2023	V1A.3a.2	2023-01-30	SIAT1/MDCK1	640	10	1280	640	320	640		
B/Switzerland/97362/2023	V1A.3a.2	2023-02-20	MDCK1	640	10	1280	640	320	640		
B/Paris/05461/2023	V1A.3a.2	2023-02-21	MDCK1/MDCK1	640	10	1280	640	320	320		
B/Champagne_Ardenne/04851/2023	V1A.3a.2	2023-02-21	MDCK1/MDCK1	640	40	1280	640	320	640		
B/Romania/546753/2023	V1A.3a.2	2023-02-21	SIAT1/MDCK1	640	10	1280	640	320	640		
B/Romania/546872/2023	V1A.3a.2	2023-02-22	SIAT1/MDCK1	320	20	1280	640	320	320		
B/Basse_Normandie/05466/2023	V1A.3a.2	2023-02-28	MDCK1/MDCK1	640	20	1280	640	320	640		
B/Aisace/05588/2023	V1A.3a.2	2023-03-02	MDCK1/MDCK1	640	10	1280	640	320	640		
B/Switzerland/43256/2023	V1A.3a.2	2023-03-06	MDCK1	640	20	1280	640	320	640		
B/Nord_Pas_de_Calais/06089/2023	V1A.3a.2	2023-03-06	MDCK1/MDCK1	640	10	1280	640	320	640		
B/Odesa/1930/2023	V1A.3a.2	2023-03-08	MDCK1	640	20	1280	640	320	640		
B/Romania/547838/2023	V1A.3a.2	2023-03-08	SIAT1/MDCK1	320	20	1280	640	320	320		
B/Paris/06331/2023	V1A.3a.2	2023-03-09	MDCK1/MDCK1	640	10	1280	640	320	640		
B/Bretagne/06819/2023	V1A.3a.2	2023-03-13	MDCK1/MDCK1	640	20	1280	640	320	640		
B/Odesa/1937/2023	V1A.3a.2	2023-03-15	MDCK1	640	20	1280	640	640	320		
B/Romania/548449/2023	V1A.3a.2	2023-03-15	SIAT1/MDCK1	640	20	1280	640	640	320		
B/Switzerland/53639/2023	V1A.3a.2	2023-03-17	MDCK1	640	20	1280	640	320	640		
B/Bretagne/08376/2023	V1A.3a.2	2023-03-20	MDCK1/MDCK1	640	20	1280	640	640	640		
B/Switzerland/528/2023	V1A.3a.2	2023-03-22	MDCK1	640	20	2560	1280	640	640		
B/Pays_de_Loire/08365/2023	V1A.3a.2	2023-03-24	MDCK1/MDCK1	640	20	1280	640	320	640		
B/Bretagne/08463/2023	V1A.3a.2	2023-03-27	MDCK1/MDCK1	640	20	1280	640	640	640		
B/Bretagne/08762/2023	V1A.3a.2	2023-03-28	MDCK1/MDCK1	1280	20	1280	640	640	640		
B/Romania/549369/2023	V1A.3a.2	2023-03-29	SIAT1/MDCK1	640	10	1280	640	320	320		
B/Romania/549363/2023	V1A.3a.2	2023-03-29	SIAT1/MDCK1	640	20	1280	640	320	640		
B/Romania/549662/2023	V1A.3a.2	2023-04-03	SIAT1/MDCK1	640	10	1280	640	320	640		
B/Switzerland/24464/2023	V1A.3a.2	2023-04-03	SIAT1/MDCK1	640	10	1280	640	320	640		
B/Hauts_Normandie/11317/2023	V1A.3a.2	2023-04-05	MDCK1	640	20	1280	1280	640	640		
B/Mauritius/P23120/2023	V1A.3a.2	2023-04-12	MDCK1/MDCK1	640	20	640	640	320	640		
B/Mauritius/P23177/2023	V1A.3a.2	2023-04-17	MDCK1	1280	20	1280	640	320	640		
B/Mauritius/P23811/2023	V1A.3a.2	2023-05-02	MDCK1	640	10	1280	640	320	640		
B/Mauritius/P24111/2023	V1A.3a.2	2023-05-05	MDCK1	1280	20	1280	1280	640	1280		
B/Mauritius/P37214/2023	V1A.3a.2	2023-05-09	MDCK1	640	10	1280	640	320	640		
B/Romania/552603/2023	V1A.3a.2	2023-05-16	SIAT1/MDCK1	640	20	1280	640	640	640		
B/Kyiv/1986/2023	V1A.3a.2	2023-05-24	MDCK1	640	20	1280	640	640	1280		
B/Kyiv/1985/2023	V1A.3a.2	2023-05-24	MDCK1	640	20	1280	640	320	640		
B/Kyiv/2021/2023	V1A.3a.2	2023-06-12	MDCK1	640	20	1280	640	640	1280		
B/Paris/04385/2023	no seq	2023-02-17	MDCK1/MDCK1	640	20	1280	640	640	320		
B/Champagne_Ardenne/07355/2023	no seq	2023-03-15	MDCK1/MDCK1	640	10	640	640	320	640		
B/Bourgogne/07365/2023	no seq	2023-03-16	MDCK1/MDCK1	640	20	1280	640	320	640		
B/Romania/549368/2023	no seq	2023-03-29	SIAT1/MDCK1	640	20	1280	640	320	320		
B/Mauritius/P23195/2023	no seq	2023-04-18	MDCK1	640	20	1280	640	640	640		

< relates to the lowest dilution of antisera used

¹ hyperimmune sheep serum; ND = Not Done



Vaccine
NH 2021-22

Vaccine
SH 2022-23
SH 2023
NH 2023-24

Table BV-17. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-08-15

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre							
				Post-infection ferret antiserum							
				B/Bris 60/08 Egg	B/Wash10n 02/19 Egg	B/Austria 135941/721 MDCK	B/Austria 135941/721 Egg G141	B/Austria 135941/721 Egg G141R	B/Stock 3/22 MDCK		
				Sh 539, 540, 543, 544, 570, 571, 574 ¹	F20/20	NIB F01/21	F15/21	F44/21	F28/22		
			Passage history	V1A	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2		
			Ferret number	V1A	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2		
			Genetic group	V1A	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2		
REFERENCE VIRUSES											
B/Brisbane/60/2008	V1A	2008-08-04	E4/E4	2560	160	<40	<40	<40	<40		
B/Washington/02/2019	V1A.3	2019-01-19	E3/E3	640	320	<40	<40	<40	<40		
B/Austria/135941/72021 G141	V1A.3a.2	2021-01-09	SIAT1/MDCK4	320	20	1280	640	320	320		
B/Austria/135941/72021 Isolate 2 G141	V1A.3a.2	2021-01-09	E3/E4	640	20	1280	640	640	640		
B/Austria/135941/72021 Isolate 2 G141R	V1A.3a.2	2021-01-09	E3/E5	320	20	1280	640	2560	640		
B/Stockholm/3/2022	V1A.3a.2	2022-03-22	SIAT1/MDCK3	640	10	640	640	320	640		
TEST VIRUSES											
B/Estonia/173317/2023	V1A.3a.2	2023-02-03	MDCK1	640	20	640	640	320	640		
B/Estonia/173429/2023	V1A.3a.2	2023-02-15	MDCK1	640	20	1280	640	320	320		
B/Estonia/173580/2023	V1A.3a.2	2023-02-22	MDCK1	640	20	1280	640	320	640		
B/Estonia/173587/2023	V1A.3a.2	2023-02-27	MDCK1	640	20	1280	640	320	320		
B/Estonia/173777/2023	V1A.3a.2	2023-03-07	MDCK1	1280	40	1280	640	320	640		
B/Estonia/173928/2023	V1A.3a.2	2023-03-23	MDCK1	1280	40	1280	1280	640	640		
B/Estonia/173900/2023	V1A.3a.2	2023-03-25	MDCK1	640	20	1280	640	320	640		
B/Estonia/173585/2023	V1A.3a.2	2023-03-27	MDCK1	1280	40	1280	640	640	640		
B/Romania/50/75/2023	V1A.3a.2	2023-04-21	SIAT1/MDCK1	320	10	640	320	320	320		
B/Burgos/4840/2023	V1A.3a.2	2023-04-25	MDCK1	640	20	640	640	320	640		
B/Avila/483/2023	V1A.3a.2	2023-04-29	MDCK1	1280	20	1280	640	320	640		
B/Palencia/4842/2023	V1A.3a.2	2023-05-03	MDCK1	1280	40	1280	640	640	640		
B/Salamanca/4852/2023	V1A.3a.2	2023-05-05	MDCK1	1280	40	1280	640	640	640		
B/Salamanca/4851/2023	V1A.3a.2	2023-05-05	MDCK1	640	20	1280	640	320	640		
B/Burgos/4893/2023	V1A.3a.2	2023-05-08	MDCK1	1280	20	1280	640	320	640		
B/Segovia/4864/2023	V1A.3a.2	2023-05-10	MDCK1	640	20	1280	640	320	640		
B/Leon/4901/2023	V1A.3a.2	2023-05-16	MDCK1	640	20	1280	640	640	640		
B/HongKong/15/2023	V1A.3a.2	2023-06-17	MDCK1/MDCK1	640	20	640	640	320	640		

< relates to the lowest dilution of antiserum used

¹ hyperimmune sheep serum; ND = Not Done

Vaccine

NH 2021-22

Vaccine

SH 2022

NH 2022-23

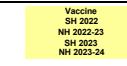
SH 2023

NH 2023-24



Table BV-18. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-08-31

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre Post-infection ferret antiserum										
				B/Brisbane/60/2008	B/Washington/2019	B/Austria/1359417/2021	B/Austria/1359417/2021	B/Austria/1359417/2021 Isolate 2	B/Austria/1359417/2021 Isolate 2	B/Stockholm/31/2023	B/Netherlands/1033/2023	B/Catalonia/3514402NS/2023	B/Catalonia/2279261NS/2023	
Passage history				60/08	02/19	1359417/21	1359417/21	3/22	/1033/2023	3514402NS/2023	2279261NS/2023			
Ferret number				S1, 538, 540, 543, 544, 570, 571, 574 ^a	F20/20	NIB F01/21	F40/21	F44/21	F28/22	F27/23	F25/23	F26/23		
Genetic group				V1A	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2	
REFERENCE VIRUSES														
B/Brisbane/60/2008	V1A	2008-08-04	E4/E4	1280	40	<40	<40	<40	<40	<40	<40	40	40	
B/Washington/2019	V1A.3	2019-01-19	E5/E5	640	100	40	<40	<40	<40	<40	<40	40	40	
B/Austria/1359417/2021	V1A.3a.2	2021-01-09	SIAT1/1MDCK4	640	20	1280	640	320	320	640	2560	2560	2560	
B/Austria/1359417/2021 Isolate 2	V1A.3a.2	2021-01-09	E3/E4	640	20	1280	640	320	320	640	2560	2560	2560	
B/Stockholm/31/2023	V1A.3a.2	2021-01-09	E3/E5	160	20	1280	320	2560	320	640	1280	1280	1280	
B/Netherlands/1033/2023	V1A.3a.2	2022-05-22	SIAT1/1MDCK3	640	20	1280	640	320	640	640	2560	2560	2560	
B/Catalonia/3514402NS/2023	V1A.3a.2	2023-01-17	E3 (Am1A4)	1280	40	1280	640	640	640	1280	5120	5120	5120	
B/Catalonia/2279261NS/2023	V1A.3a.2	2023-01-03	E4 (Am1A3)	640	40	1280	640	320	640	1280	2560	2560	2560	
B/Catalonia/2279261NS/2023	V1A.3a.2	2023-01-03	E5 (Am1A4)	640	40	1280	640	320	640	1280	5120	5120	5120	
TEST VIRUSES														
B/Lisboa/5/2023 (RL221033_1*MDCK)	V1A.3a.2	2023-03-06	MDCK1/1MDCK1	640	20	1280	640	320	320	320	1280	1280	1280	
B/Lisboa/4/2023 (V0221012_1*MDCK)	V1A.3a.2	2023-03-06	MDCK1/1MDCK1	640	40	1280	640	320	320	640	2560	2560	2560	
B/Lisboa/4/2023 (V0221012_1*MDCK)	V1A.3a.2	2023-03-27	MDCK1/1MDCK1	640	20	1280	640	320	640	640	2560	2560	2560	
B/Lisboa/5/2023 (RL221025_1*MDCK)	V1A.3a.2	2023-03-31	MDCK1/1MDCK1	640	40	1280	640	320	320	640	1280	1280	1280	
B/Lisboa/5/2023 (V0221021_1*MDCK)	V1A.3a.2	2023-04-06	MDCK1/1MDCK1	640	40	1280	640	320	640	1280	2560	2560	2560	
B/Lisboa/4/2023 (V0221019_1*MDCK)	V1A.3a.2	2023-04-10	MDCK1/1MDCK1	640	20	1280	640	320	640	1280	2560	2560	2560	
B/Lisboa/5/2023 (V0221019_1*MDCK)	V1A.3a.2	2023-04-10	MDCK1/1MDCK1	640	20	640	320	320	320	640	2560	2560	2560	
B/Lisboa/5/2023 (RL221010_1*MDCK)	V1A.3a.2	2023-04-25	MDCK1/1MDCK1	640	20	640	640	320	640	640	2560	2560	2560	
B/Lisboa/5/2023 (RL221051_SWAB)	V1A.3a.2	2023-05-10	MDCK1	640	20	640	640	320	640	640	2560	2560	2560	

^a relates to the lowest dilution of antiserum used^b hyperimmune sheep serum; ND = Not Done

Legend for antiserum dilutions:
 < 4-fold (white square)
 4-fold (yellow square)
 8-fold (orange square)
 > 8-fold (red square)
 < not recognised by the antiserum (blue square)
 ≥ 160 (no homologous titre) (blue square)

Table BV-19. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-09-08

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre						
				Post-infection ferret antisera						
				B/Briss 6/08 Egg	B/Wash'ton 02/19 Egg	B/Austria 135941/721 MDCK	B/Austria 135941/721 Egg G141	B/Austria 135941/721 Egg G141R	B/Stock 3/22 MDCK	
			Passage history	Sh 539, 540, 543, 544, 570, 571, 574 ¹	F20/20	NIB F01/21	F40/21	F44/21	F28/22	
			Ferret number	V1A	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2	
			Genetic group							
REFERENCE VIRUSES										
B/Brisbane/60/2008	V1A	2008-08-04	E4/E4	1280	40	<40	<40	<40	<40	<40
B/Washington/02/2019	V1A.3	2019-01-19	E3/E3	640	160	<40	<40	<40	<40	<40
B/Austria/135941/72021 G141	V1A.3a.2	2021-01-09	SIAT1/MDCK4	320	20	1280	640	320	320	320
B/Austria/135941/72021 Isolate 2 G141	V1A.3a.2	2021-01-09	E3/E4	320	20	1280	640	320	320	320
B/Austria/135941/72021 Isolate 2 G141R	V1A.3a.2	2021-01-09	E3/E5	160	10	1280	320	2560	320	320
B/Stockholm/3/2022	V1A.3a.2	2022-03-22	SIAT1/MDCK3	320	20	640	320	320	320	320
TEST VIRUSES										
B/Tajikistan/1275/2023	V1A.3a.2	2023-02-03	MDCK1	320	20	640	320	160	320	320
B/Tajikistan/1314/2023	V1A.3a.2	2023-02-06	MDCK1	320	20	1280	640	320	320	320
B/Tajikistan/1449/2023	V1A.3a.2	2023-02-22	MDCK1	320	10	1280	640	320	320	320
B/Tajikistan/1563/2023	V1A.3a.2	2023-03-10	MDCK1	320	20	1280	640	320	320	320
B/Tajikistan/1728/2023	V1A.3a.2	2023-04-03	MDCK1	640	20	640	320	320	640	640
B/Antananarivo/01778/2023	V1A.3a.2	2023-06-13	MDCK1	320	10	640	320	160	320	320
B/Antirabe/01813/2023	V1A.3a.2	2023-06-14	MDCK1	320	10	640	320	160	320	320
B/Antananarivo/01799/2023	V1A.3a.2	2023-06-14	MDCK1	640	10	640	320	320	640	640
B/Moramanga/01789/2023	V1A.3a.2	2023-06-14	MDCK1	640	20	640	320	320	640	640
B/Tiroaonemandidy/01648/2023	V1A.3a.2	2023-06-19	MDCK1	320	10	640	320	160	320	320
B/Fianarantsoa/01942/2023	V1A.3a.2	2023-07-03	MDCK1	640	20	640	320	320	640	640
B/HongKong/2394/2023	V1A.3a.2	2023-07-05	MDCK1	640	10	640	320	320	320	320
B/HongKong/695/2023	V1A.3a.2	2023-07-12	MDCK1	640	20	640	320	320	640	640
B/HongKong/842/2023	V1A.3a.2	2023-07-14	MDCK1	320	10	320	320	160	320	320

< relates to the lowest dilution of antiserum used

¹ hyperimmune sheep serum; ND = Not Done

Vaccine
NH 2021-22

Vaccine
SH 2022
NH 2022-23
SH 2023
NH 2023-24



Table BV-20. Antigenic analyses of influenza B viruses (Victoria lineage) 2023-09-12

Viruses	Other information	Collection date	Passage history	Haemagglutination inhibition titre						
				Post-infection ferret antisera						
				B/Bris 6/0/08	B/Wash'Ton 02/19	B/Austria 1359417/21 Egg	B/Austria 1359417/21 MDCK	B/Austria 1359417/21 Egg G141	B/Austria 1359417/21 Egg G141R	B/Stock 3/22 MDCK
			Ferret number	Sh 539, 540, 543, 544, 570, 571, 574 ¹	F20/20	NIB F01/21	F40/21	F44/21	F28/22	
			Genetic group	V1A	V1A.3	V1A.3a.2	V1A.3a.2	V1A.3a.2	V1A.3a.2	
REFERENCE VIRUSES										
B/Brisbane/60/2008	V1A	2008-08-04	E4/E4	2560	80	40	<40	<40	<40	<40
B/Washington/02/2019	V1A.3	2019-01-19	E3/E3	1280	160	40	<40	<40	<40	<40
B/Austria/1359417/2021 G141	V1A.3a.2	2021-01-09	SIAT1/MDCK4	640	20	1280	640	320	320	
B/Austria/1359417/2021 Isolate 2 G141	V1A.3a.2	2021-01-09	E3/E4	640	20	1280	640	640	640	
B/Austria/1359417/2021 Isolate 2 G141R	V1A.3a.2	2021-01-09	E3/E5	320	20	1280	320	2560	320	
B/Stockholm/3/2022	V1A.3a.2	2022-03-22	SIAT1/MDCK3	640	20	640	320	320	320	
TEST VIRUSES										
B/Secovska Polianka/1/59/2023	seq pending	2023-02-06	MDCKx/MDCK1	640	10	1280	640	320	640	
B/Nizny Hrabovec/161/2023	seq pending	2023-02-08	MDCKx/MDCK1	640	10	640	640	320	640	
B/England/20/2023	seq pending	2023-02-08	SIAT1/MDCK1	640	20	640	320	320	640	
B/England/19/2023	seq pending	2023-02-08	SIAT1/MDCK1	640	20	640	320	320	640	
B/England/16/2023	seq pending	2023-02-08	MDCK1/MDCK1	640	20	640	640	320	640	
B/Vranov nad Toplou/164/2023	seq pending	2023-02-09	MDCKx/MDCK1	640	20	1280	320	320	640	
B/England/21/2023	seq pending	2023-02-09	SIAT1/MDCK1	640	20	640	640	320	640	
B/England/18/2023	seq pending	2023-02-09	SIAT1/MDCK1	640	20	640	320	320	640	
B/England/22/2023	seq pending	2023-02-10	SIAT1/MDCK1	640	20	640	640	320	640	
B/Vranov nad Toplou/181/2023	seq pending	2023-02-13	MDCKx/MDCK1	1280	20	1280	640	320	640	
B/Kladzany/163/2023	seq pending	2023-02-13	MDCKx/MDCK1	640	20	640	640	320	640	
B/Kosice/160/2023	seq pending	2023-02-13	MDCKx/MDCK1	1280	20	1280	640	640	640	
B/Hencovce/162/2022	seq pending	2023-02-13	MDCKx/MDCK1	640	20	640	320	320	640	
B/Banská Bystrica/183/2022	seq pending	2023-02-17	MDCKx/MDCK1	640	10	1280	640	320	640	
B/Banská Bystrica/166/2023	seq pending	2023-02-17	MDCKx/MDCK1	640	20	1280	640	320	640	
B/England/6/2023	seq pending	2023-02-20	SIAT1/MDCK1	640	20	1280	640	320	640	
B/England/5/2023	seq pending	2023-02-20	SIAT1/MDCK1	640	20	640	640	320	640	
B/England/4/2023	seq pending	2023-02-20	SIAT1/MDCK1	320	20	640	320	160	320	
B/England/7/2023	seq pending	2023-02-22	SIAT1/MDCK1	640	10	1280	640	320	320	
B/England/8/2023	seq pending	2023-02-22	SIAT1/MDCK1	640	10	640	640	320	640	
B/Banská Bystrica/237/2023	seq pending	2023-03-02	MDCK1/MDCK1	640	10	1280	640	320	320	
B/Banská Bystrica/238/2023	seq pending	2023-03-06	MDCKx/MDCK1	640	20	1280	640	320	320	
B/England/11/2023	seq pending	2023-03-07	MDCK1/MDCK1	1280	20	2560	640	320	320	
B/England/10/2023	seq pending	2023-03-07	SIAT1/MDCK1	640	<10	640	320	160	640	
B/Kosice/327/2023	seq pending	2023-03-08	MDCKx/MDCK1	640	20	1280	640	320	640	
B/England/12/2023	seq pending	2023-03-09	SIAT1/MDCK1	640	10	640	320	320	640	
B/Banská Bystrica/328/2023	seq pending	2023-03-20	MDCKx/MDCK1	640	20	1280	640	320	640	
B/Kralky/291/2023	seq pending	2023-03-24	MDCKx/MDCK1	640	20	640	640	320	640	
B/Ocová/305/2023	seq pending	2023-03-30	MDCKx/MDCK1	640	20	640	320	160	320	
B/Kralky/374/2023	seq pending	2023-05-09	MDCKx/MDCK1	640	20	1280	640	320	640	
B/Moramanga/01821/2023	seq pending	2023-06-15	MDCK2	1280	20	1280	640	320	640	

< relates to the lowest dilution of antiserum used
¹ hyperimmune sheep serum; ND = Not Done

Vaccine
NH 2021-22

Vaccine
SH 2022
NH 2022-23
SH 2023
NH 2023-24



Fold-reduction table: B/Vic

		<4-fold difference		4-fold difference		>4-fold difference		total
		number	percentage	number	percentage	number	percentage	
B/Washington/02/2019 Egg	V1A.3	1	0.3%	3	1.0%	282	98.6%	286
B/Austria/1359417/2021 Cell G141	V1A.3a.2	284	99.3%	1	0.3%	1	0.3%	286
B/Austria/1359417/2021 Egg G141	V1A.3a.2	282	98.6%	3	1.0%	1	0.3%	286
B/Austria/1359417/2021 Egg G141R	V1A.3a.2	1	0.3%	37	12.9%	248	86.7%	286
B/Stockholm/3/2022 Cell	V1A.3a.2	284	99.3%	1	0.3%	1	0.3%	286

B/Victoria: Egg isolates

Virus	Status	Genetic group/clade	Comment
B/Netherlands/10894/2022	BX-119	V1A.3 (G184R)	Egg adaptation: (T199A), 2-way pass
B/Catalonia/3514402NS/2023	sent out	V1A.3a.2 (D197E, E128K, A154T, V117I, K326R)	Egg adaptation: (no change)
B/Catalonia/2279261NS/2023	sent out	V1A.3a.2 (E183K)	Egg adaptation: (no change)
B/Netherlands/10335/2023	sent out	V1A.3a.2 (E128K, A221T, T182A, D197E, T221A)	Egg adaptation: (no change)
B/Norway/5216/2023	available to send out	V1A.3a.2 (E128K, A154E, S208P)	Egg adaptation: (no change)
B/Norway/3749/2023	available to send out	V1A.3a.2 (E128K, A154E, S208P)	Egg adaptation: (no change)
B/Switzerland/53639/2023	sequencing in progress	V1A.3a.2 (E128K, A154E, S208P)	

B/Victoria: Reagents and references

Virus	Genetic group	Virus passage	Ferret ID
B/Brisbane/60/2008	V1A	E4/E4	sheep pool
B/Washington/02/2019	V1A.3	E3/E3	F20/20
B/Stockholm/3/2022	V1A.3a.2	SIAT1/MDCK3	F28/22
B/Austria/1359417/2021	V1A.3a.2	SIAT1/MDCK4	NIB F01/21
B/Austria/1359417/2021 G141	V1A.3a.2	E3/E5	F15/21
B/Austria/1359417/2021 G141R	V1A.3a.2	E3/E5	F44/21

Summary: B/Victoria

Genetic analyses

Clade V1A.3a.2 viruses predominated since 1st February 2023 in geographic regions where B/Victoria-lineage viruses were detected.

No Clade V1A.3 viruses were detected since 1st February 2023.

No B/Yamagata lineage viruses have been detected since March 2020.

Antigenic analyses

All V1A.3a.2 viruses tested were well-recognised by antisera raised against B/Austria/1359417/2021 and -like viruses.

Antiviral (NAI) testing of isolates with collection dates after 2023-01-31*

Month of Collection	Number of viruses tested for phenotype ¹								Totals	
	A(H1N1)pdm09		A(H3N2)		Influenza B-Victoria		Influenza B-Yamagata			
	NI	RI/HRI	NI	RI/HRI	NI	RI/HRI	NI	RI/HRI		
2023										
February	60	1	64		65				0	
March	36		26		63	0			190	
April	9		4		39				125	
May	2		3		9				52	
June	3								14	
July	4									
Totals	114	1	97	0	176		0	0	388	

¹Phenotype: NI (normal inhibition), RI (reduced inhibition), HRI (highly reduced inhibition) as defined in WHO Wkly. Epidemiol. Rec. (2012) 87, 369-374

* As of 2023-07-31

Virus name	Subtype/ Lineage	Collection date	Fold difference		NA substitution
			Oseltamivir	Zanamivir	
A/Netherlands/10294/2023 Outliers	A(H1pdm)	2023-02-16	489.81 (HRI)	NI	H275Y

² Clinical sample not available

In-silico assessment for potential oseltamivir and zanamivir resistance of 285 H1N1-, 112 H3N2- and 412 B/Victoria-associated NA gene sequences deposited in GISAID for viruses with collection dates from 1st February 2023.

H1N1:

- A/Switzerland/94869/2023 is polymorphic at position 136, Q65%: K35% and showed 6-fold higher than normal inhibition when tested for zanamivir resistance.

- A/Netherlands/10294/2023 clinical sample showed D199G; the isolate exhibited HRI with H275Y. Minority variants analysis of the clinical sample showed presence of NA H275Y in proportions ~90/10% and D199G in proportions ~10/90%, whereas the isolate showed NA mixtures of H275Y ~10/90% and D199G ~90/10%.

Influenza B:

- B/Switzerland/6471/2023, B/Kosovo/1306/2023, B/Netherlands/10253/2023, B/Kosovo/1561/2023, B/Bremen/4/2023 have K360E, which is a substitution associated with HRI against peramivir, which is not tested in our phenotypic NAI resistance assays.

Based on whole genome sequencing at the WIC, full-length gene sequences were generated for totals of 210 H1N1-, 108 H3N2- and 401 B/Victoria-associated PA genes from individual viruses with collection dates after 31 January 2023 were determined, as of 15th September 2023. No sequences with mutations encoding amino acid markers associated with reduced susceptibility/resistance to Baloxavir marboxil were identified, except for A/Salalah/5239001/2023 (H1N1) which showed substitution I38V (Phenotypic testing in progress).

For 15 H1N1, 15 H3N2 and 15 B/Victoria lineage viruses the lack of reduced susceptibility was confirmed by phenotypic testing.

Annex

Tanglegrams

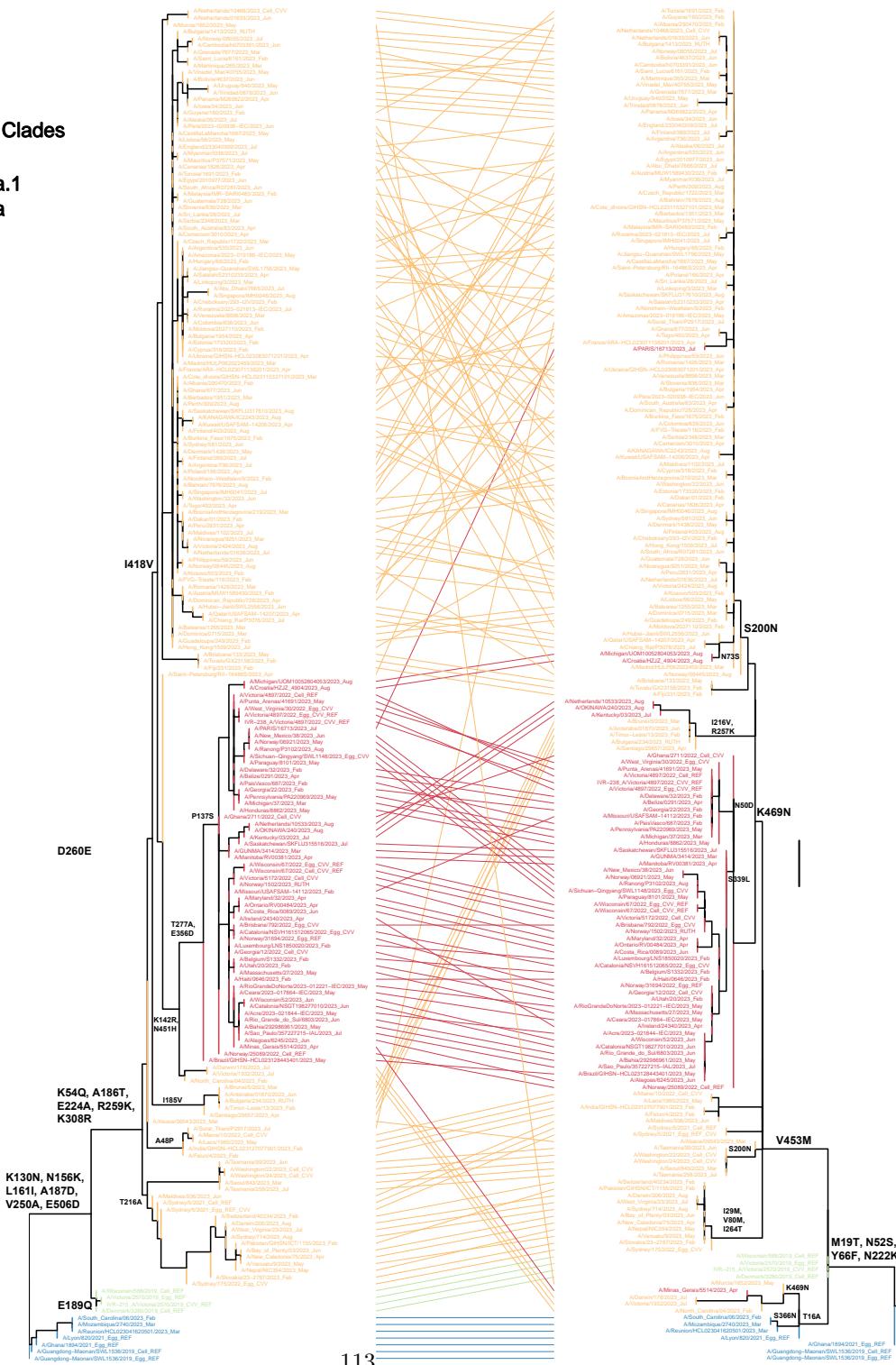
H1N1

HA

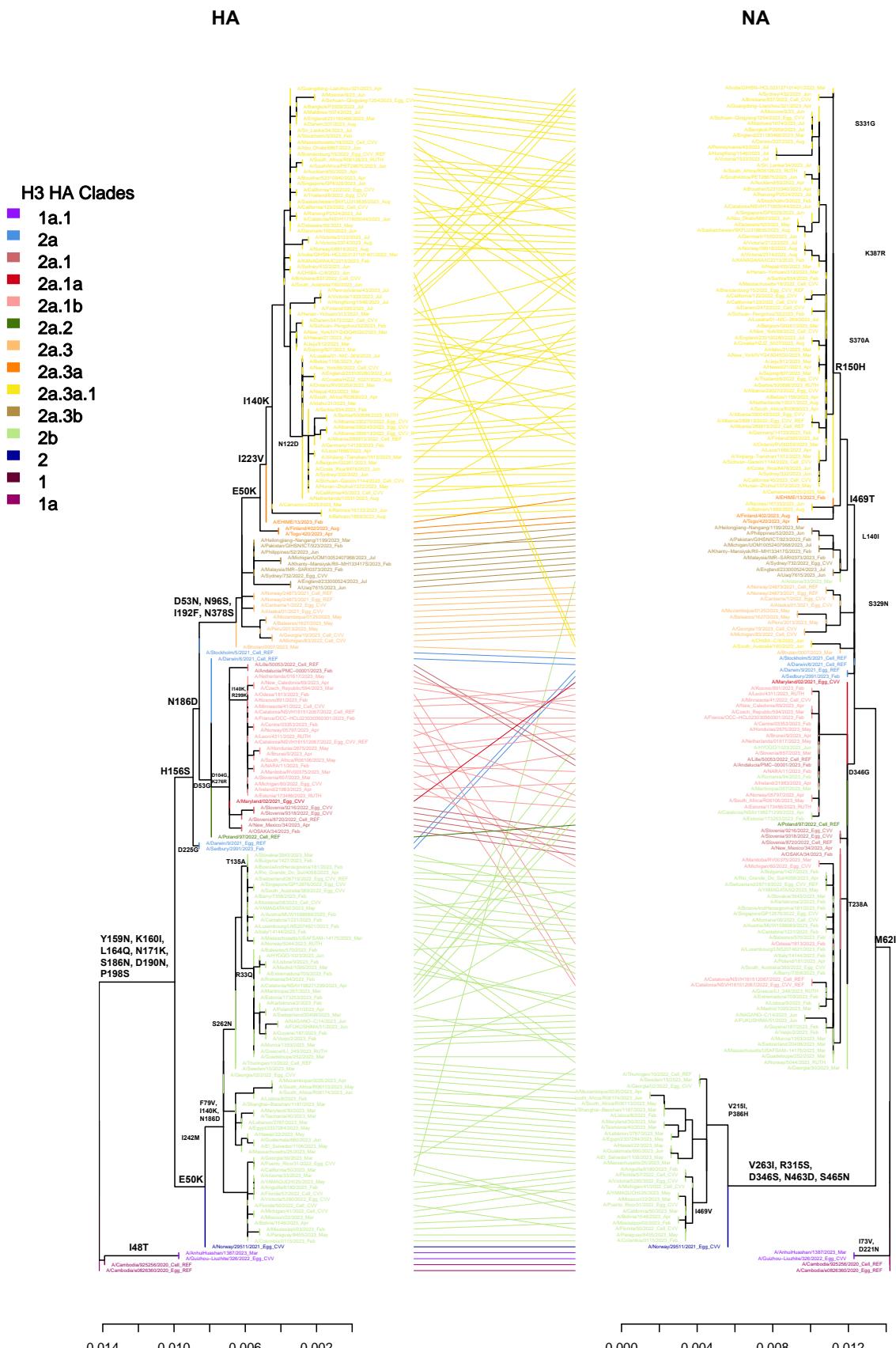
NA

H1 HA Clades

- 5a.1
- 5a.2a.1
- 5a.2a.2
- 5a.2



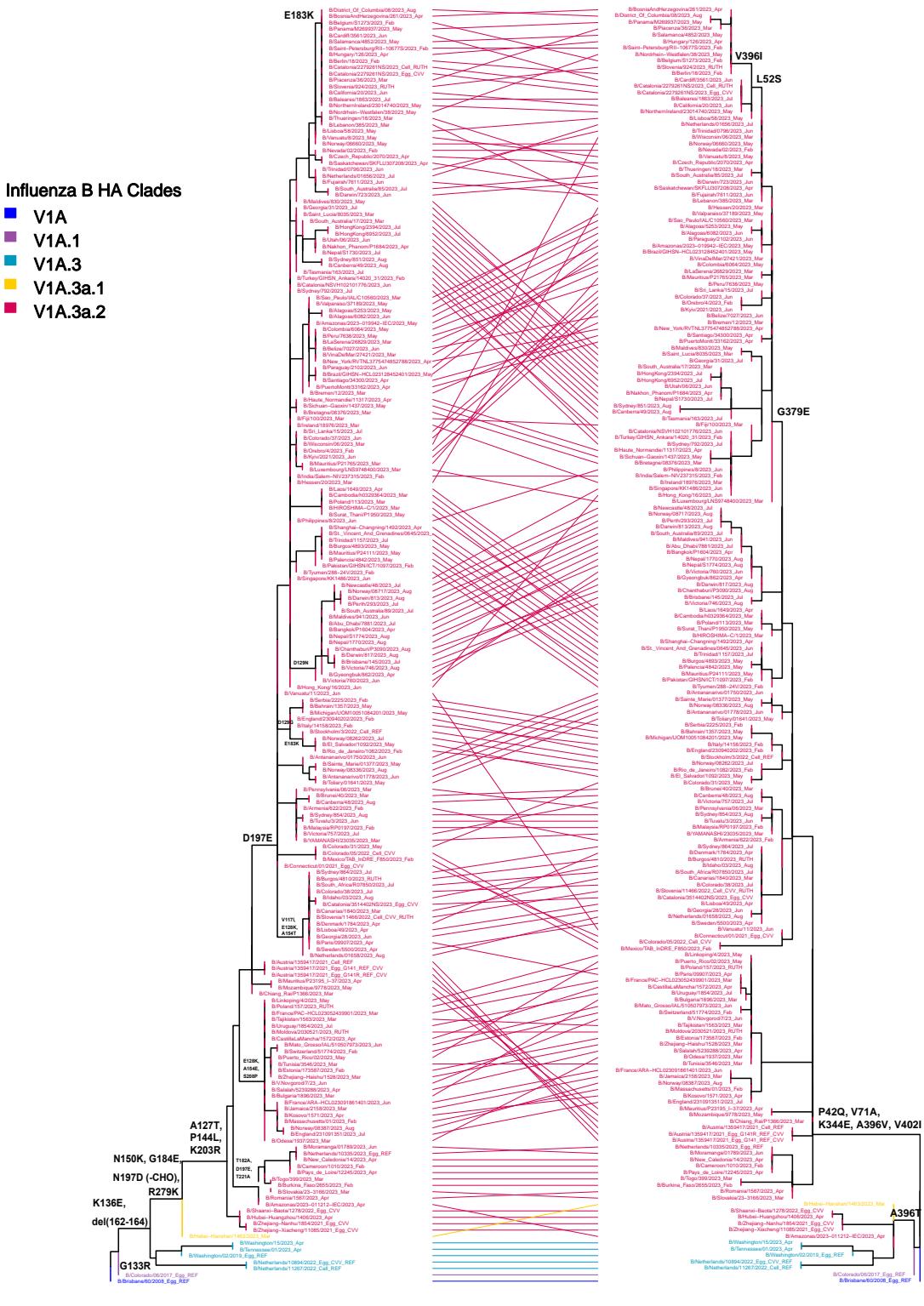
H3N2



B/Victoria

HA

NA



0.012 0.008 0.004 0.000

0.000 0.004 0.008 0.012

B/Yamagata dynamics

