



UPDATE ON NEWCASTLE DISEASE IN RUSSIA

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Background on the current ND situation in Russia

Viruses are regularly detected during monitoring:

- APMV-1 viruses of genotype I class II and class I mainly among wild birds;
- virulent viruses of genotype VI and its derivatives (XXI/Vlg) in pigeons;
- vaccine strains of genotypes II (LaSota, B1, Clone 30) and I (V4, Bor 74) are mainly from chickens.

Virulent viruses from chickens (most often genotype VII and its derivatives) are sporadically isolated, usually having similar isolates in the neighboring countries/regions.

A set of methods for laboratory diagnostics is required!!!



APMV-1 detected in the monitoring process

Isolate name, 2017	Collection date	Phylogenetic group
Pigeon/Kostroma/3606	19.09.17	VIg
Chicken/Primorje/1688	18.07.17	II .B1
Chicken/Primorje/1689	18.07.17	II B1
Chicken/Kostroma/2890	19.09.17	Ic Bor-74
Chicken/Kostroma/2908	19.09.17	Ic Bor-74
Mallard/Amurskaya/3077 (a total of 9 viruses in population)	23.11.17	Ib
Gadwall/Amurskaya/3158	23.11.17	Ib

Isolate name, 2018	Collection date	Phylogenetic group
pigeon/Vladimir/1141	14.06.18	VIg
pigeon/Vladimir/1142	14.06.18	VIg
chicken/Vladimir/3963	07.02.18	Ic Bor-74
turkey/Penza/3964	07.02.18	Ia V4
chicken/Krasnoyarsk/1120	23.05.18	II LaSota
wildduck/Vladimir/1849	12.07.18	Ib
wildduck/Vladimir/1848	12.07.18	Ib

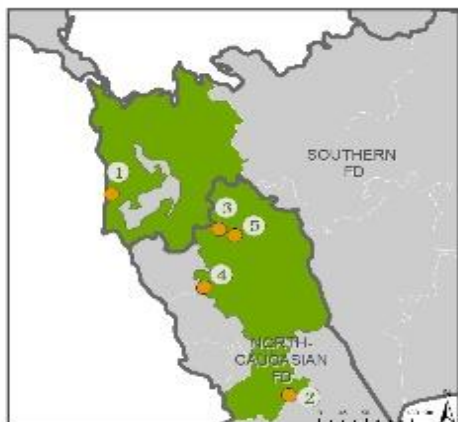
live vaccines are used in poultry industry, and PCR screening may not be sufficient



- The most important event in 2019-2020 in the field of control of Newcastle disease and the study of its causative agent was a large-scale outbreak of the disease caused by subtype VII-L virus.
- The virus was detected in eight regions of six federal districts of the Russian Federation: the North Caucasus (Chechnya, Stavropol Krai), Southern (Krasnodar Krai), Central (Kursk and Vladimir Oblasts), Volga (Saratov Oblast), Siberian (Zabaykalsky Krai, Omsk Oblast), and Far Eastern (Primorsky Krai).
- In some regions, outbreaks were reported repeatedly, in various regions: Kursk, Saratov, Omsk and Vladimir Oblasts, Zabaykalsky and Primorsky Krai.
- The outbreak began in February 2019 and appears to be continuing up to now. The group of isolates from Iran named subtype VII-L is the closest to the Russian isolates in 2019 (97-98% for the F gene) (Mayahi, Esmaelizad, 2017; Esmaelizad et al., 2017; Molouki et al., 2019).



Newcastle disease-affected regions of the Russian Federation 2019



number of affected settlements:

- | | |
|-------------------------|-----|
| 1. Krasnodar krai | - 1 |
| 2. Republic of Chechnya | - 1 |
| 3. Stavropol Krai | - 3 |
| 4. Primorsky Krai | - 2 |
| 5. Saratov Oblast | - 2 |
| 6. Zabaikalsky Krai | - 2 |
| 7. Altai krai | - 2 |
| 8. Omsk oblast | - 2 |
| 9. Kursk oblast | - 3 |



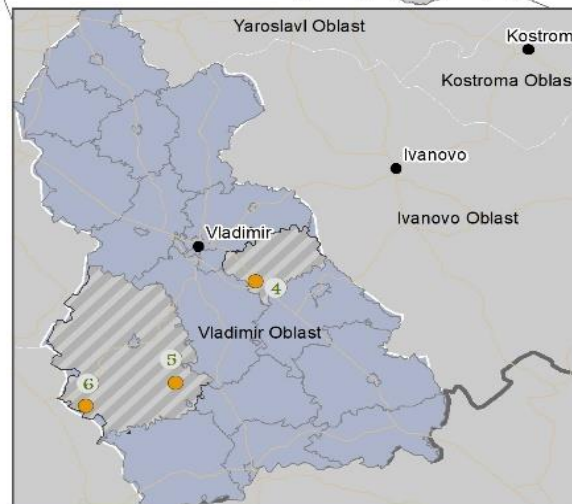
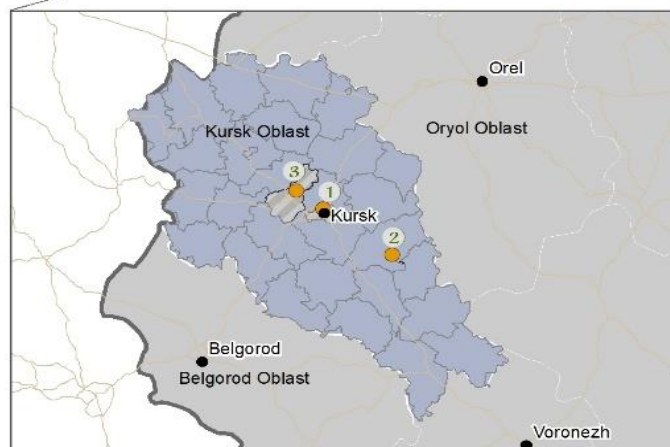
Isolates from ND outbreak of 2019

Isolate name	Region	Host	Date	Virus subtype
Ck/Krasnodar/9/19	Krasnodar	Chicken	01.02.19	VII-L
Ck/Krasnodar/10/19	Krasnodar	Chicken	01.02.19	VII-L
Ck/Chechnya/431/19	Chechen Republic	Chicken	12.04.19	VII-L
Ck/Stavropol/509/19	Stavropol	Chicken	23.04.19	VII-L
Ck/Stavropol/888/19	Stavropol	Chicken	26.04.19	VII-L
Ck/ Stavropol/1190/19	Stavropol	Geese	15.05.19	VII-L
Ck/Primorsky/1284/19	Pimorsky Krai	Chicken	22.05.19	VII-L
Ck/Saratov/4521-1/19	Saratov	Chicken	20.06.19	VII-L
Ck/Saratov/3122/19	Saratov	Chicken	27.08.19	VII-L
Ck/Zabaikalsky/3915/19	Zabaykalsky Krai	Chicken	3-4.10.19	VII-L
Ck/Omsk/3941-4/19	Omsk	Chicken	10.10.19	VII-L
Ck/Zabaikalsky/4635/19	Zabaykalsky Krai	Chicken	21.10.19	VII-L
Ck/Omsk/2677/19	Omsk	Chicken	8.11.19	VII-L
Ck/Kursk/2819/19	Kursk	Domestic birds	18.11.19	VII-L
Ck/Kursk/2949_1/19	Kursk	Chicken	03.12.19	VII-L
Ck/Primorsky/3087_1/19	Primorsky Krai	Chicken	19.12.19	VII-L



Newcastle disease-affected regions of the Russian Federation 2020


as for
21.09.2020



number of affected settlements:

1. Kursk Oblast, Kursk

Quarantine was imposed on January 9, 2020

Quarantine was lifted on February 10, 2020

2. Kursk Oblast, Shchigry

Quarantine was imposed on January 10, 2020

Quarantine was lifted on January 27, 2020

3. Kursk Oblast, B. Dolzhenkova

Quarantine was imposed on January 17, 2020

Quarantine was lifted on February 3, 2020

4. Vladimir Oblast, Penkino

Quarantine was imposed on May 5, 2020

Quarantine was lifted on May 28, 2020

5. Vladimir Oblast, Parakhino

Quarantine was imposed on January 17, 2020

Quarantine was lifted on February 3, 2020

6. Vladimir Oblast, Lesnikovo

Условные обозначения

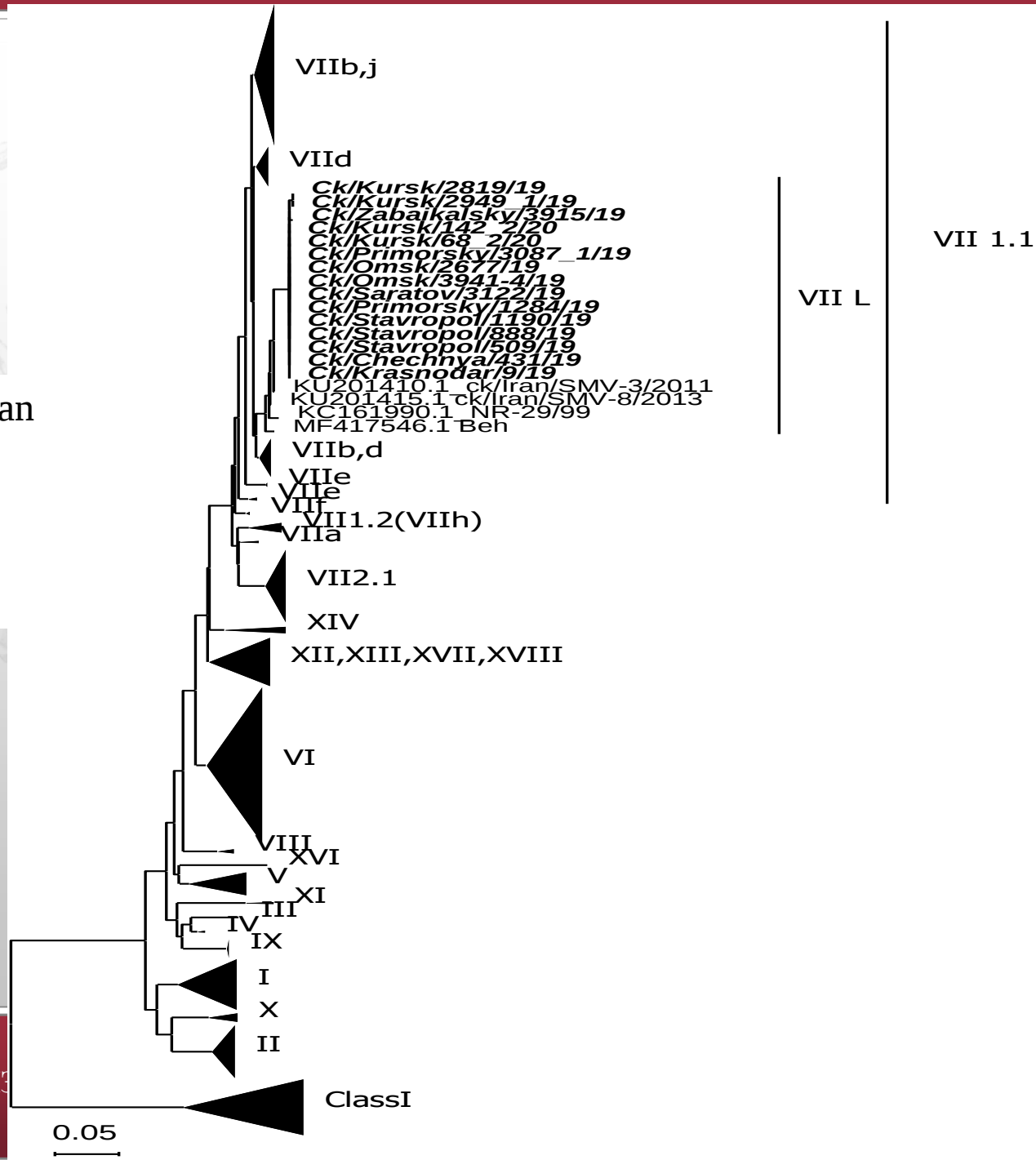
 Infected raions where outbreaks notified to the OIE in 2020 are located

 - Main road

 - Main city



Phylogenetic position of Russian
isolates VII L
(gene F fragment 20-420, NJ
method in
MEGA 6.06)



- Nucleotide sequences of the F gene for 9 isolates and complete genome sequences for 7 of them were determined.
- When comparing the sequences of Russian isolates and earlier isolates from Iran, the possibility of repeated introduction (isolate from Chechnya and all the others) of the virus is shown.
- In total, Russian isolates have 48 substitutions in the F gene, including 10 significant and 5 non-conservative ones.
- Comparison of complete genomes showed that the most variable, as in other cases, is the P (phosphoprotein) gene. The variability of other genes is approximately at the same level.
- The ck/Chechnya/431/19 isolate is the most remote from the rest of the Russian isolates.



Genetic Variability of Russian NDV isolates of VIIL genotype

Genome fragment	Genetic distance (%)	
	Beh (MF417546) vs. Russian isolates	Russian isolates vs. each other
NP	1.79 – 2.02	0.00 – 0.56
P	3.52 – 4.32	0.01 – 1.25
M	1.63 – 1.87	0.08 – 0.57
F	1.92 – 2.15	0.06 – 0.28
HN	1.74 – 1.94	0.00 – 0.49
L	1.62 – 1.74	0.02 – 0.45
Complete genome	1.93 – 2.01	0.05 – 0.46



- On a broader time scale, the emergence and evolution of viruses of the VIIL subgenotype appears to be a continuation of the epidemic process associated with the VIId subgenotype, a derivative of which is probably the VIIL subgenotype.
- The spread of the virus over 5-6 thousand km in a short time seems to indicate the involvement of an anthropogenic factor.
- It is possible that there are unidentified endemic zones, primarily in wild bird populations, and this requires further study.



Species and groups of birds studied in 2019	APMV-1	Samples
Anseriformes		1098
1. Wild duck (species not known)	-	515
2. Mallard	1	259
3. Wild geese (species not known)	1	173
4. Teal	-	93
5. Wild duck (11 species)	-	58
Wild birds and waterfowl (species not known)	3	324
Synanthropic birds		325
1. Pigeon	-	177
2. Family Corvidae (crow, rook, jackdaw, raven, magpie, sparrow)	-	95
3. Unspecified birds	1	28
4. Sparrow	-	25
Charadriiformes		211
1. Woodcock	-	102
2. Gull	1	62
3. Others (grebe, coot and 9 others)	-	47
Forest birds (capercaillie, black grouse, thrush, jay and 5 other species)	-	57
Total:	7	2015





Федеральное государственное бюджетное учреждение
«Федеральный центр охраны здоровья животных» (ФГБУ «ВНИИЗЖ»)



Thank you!

