Reactivity of monoclonal antibodies and immunochromatographic kits for detection and serotyping against SAT serotype FMDVs

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Self-introduction

Name:

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National Institute of Animal Health (NIAH)

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I started to work in the affiliation in 2005.

Main research theme:

Pathogenicity analysis of CSFV and FMDV

Reactivity against SAT FMDVs

Reactivity of monoclonal antibodies (MAb) against SAT1 FMDVs

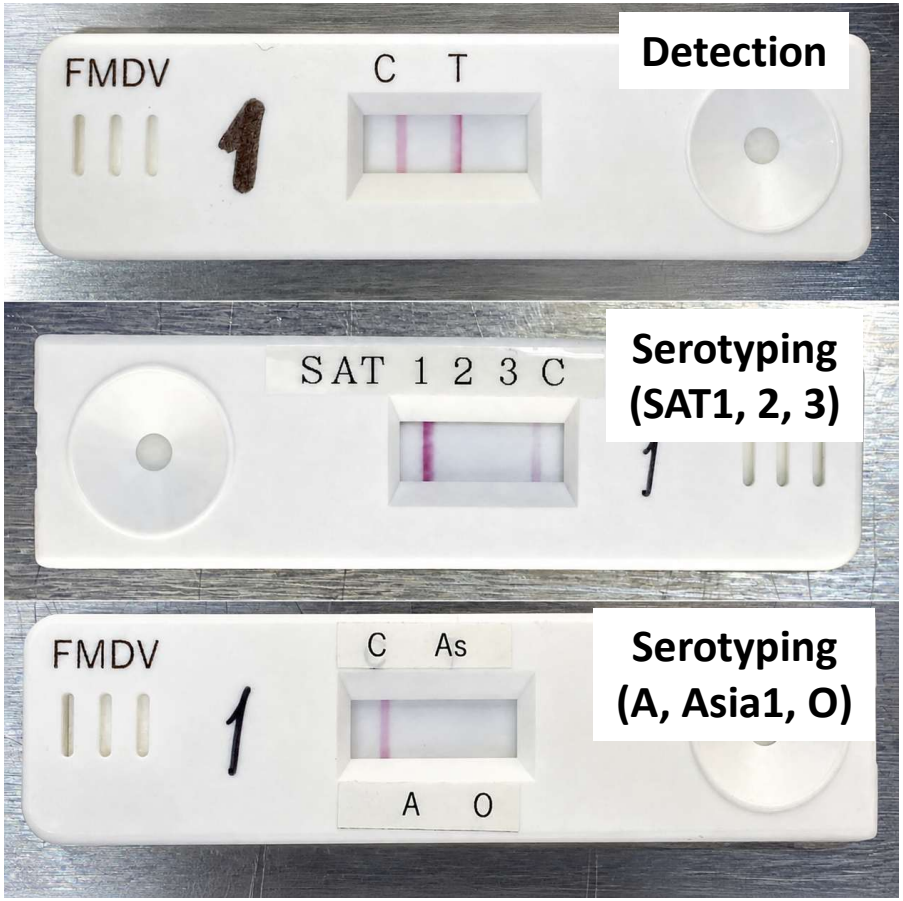
	FMDV isolates	Topotype	Serotype-specific					
			SAT1		SAT2		SAT3	
			MAb1	MAb2	MAb3	MAb4	MAb5	MAb6
SAT1	KEN 4/2013	I	1.31	-0.03	-0.03	-0.03	-0.03	-0.03
	TAN 36/2014	I	0.30	0.44	-0.03	-0.03	-0.03	-0.04
	SWZ 1/2000	II	0.42	1.21	-0.03	-0.03	-0.03	-0.03
	BOT 13/2006	III	0.36	0.52	-0.03	-0.04	-0.03	-0.04
	BOT 4/2014	III	0.16	1.50	-0.03	-0.04	-0.03	-0.03
	ETH 3/2007	IX	0.39	-0.02	-0.03	-0.03	-0.03	-0.03
SAT2	MOZ 1/2010	I	-0.02	-0.03	1.95	3.11	-0.02	0.00
	ZIM 1/2014	II	-0.03	-0.03	0.35	2.41	-0.03	-0.04
	NMB 4/2008	III	-0.03	-0.03	0.44	2.69	-0.03	-0.03
	KEN 4/2012	IV	-0.03	-0.03	0.46	2.13	-0.03	-0.04
	OMN 3/2015	VII	-0.04	-0.03	0.14	1.34	-0.03	-0.03
	LIB 39/2012	VII	-0.03	-0.03	0.32	2.39	-0.03	-0.03
	CAR 42/2013	VII	-0.02	-0.02	0.71	2.19	-0.01	-0.01
	PAT 1/2012	VII	-0.03	-0.03	0.39	2.22	-0.03	-0.03
SAT3	SAR 1/2006	I	-0.03	-0.04	-0.03	-0.03	1.05	0.27
	BOT P10/2010 (buffalo)	II	-0.03	-0.03	-0.02	-0.03	2.16	1.10
	ZIM P25/1991 (UR-7 Buffalo)	III	-0.03	-0.03	-0.02	-0.03	0.16	1.49
	ZAM P2/1996 (MUL-4)	IV	-0.03	-0.04	-0.02	-0.03	0.46	1.63
	UGA 10/1997	V	-0.04	-0.03	-0.03	-0.03	0.02	-0.03

Strong, Moderate, Weak, Negative

Reactivity against SAT FMDVs

Reactivity of immunochromatographic kits against SAT1 FMDVs

	FMDV isolates	Topotype	Detection	Serotyping SAT1	Serotyping SAT2	Serotyping SAT3
SAT1	MAL 1/2016	I	>3	>3	-	-
	KEN 8/2017	I	3	>3	-	-
	KEN 3/2020	I	>3	>3	-	-
	KEN 9/2020	I	>3	>3	-	-
	QTR 5/2023	I	>3	>3	-	-
	UGA 14/2023	VII	>3	>3	-	-
	UGA 15/2023	VII	3	>3	-	-
SAT2	ZAM 12/2019	I	2	-	1	-
	MOZ 1/2022	II	>3	-	3	-
	ZIM 1/2022	III	>3	-	>3	-
	ETH 10/2015	VII	w1	-	w1	-
	ETH 31/2019	VII	1	-	2	-
	NIG 8/2020	VII	1~2	-	>3	-
	NIG 14/2020	VII	2~3	-	>3	-
	ETH 26/2022	VII	2~3	-	3	-
	ETH 27/2022	VII	2	-	3	-
	BAR 2/2022	XIV	3	-	1	-
	TUR 17/2023	XIV	2~3	-	1~2	-
	ETH 4/2023	XIV	3	-	2	-
SAT3	SAR 1/2006	I	>3	-	-	>3
	SAR 2/2006	I	3	-	-	>3
	ZAM 3/2015	II	>3	-	-	>3
	ZAM 1/2017	II	3	-	-	>3
	ZAM 9/2018	II	3	-	-	>3
	UGA 10/1997	V	>3	-	-	>3



Our kit evaluation in Mongolia

Strong, Moderate, Weak, Negative

Conclusions

- Our MAbs specifically detected **SAT1, SAT2, and SAT3** FMDVs, including **SAT1 topotype III** isolates relevant to the current outbreaks in **China and Mongolia**.
- Our immunochlomatographic kits successfully detected and serotyped SAT1, SAT2, and SAT3 FMDVs across multiple topotypes.
- These diagnostic tools may contribute to preparedness against SAT-type FMDVs in **East Asia** and beyond.

- We are grateful to the Pirbright institute for their collaboration in these evaluations.

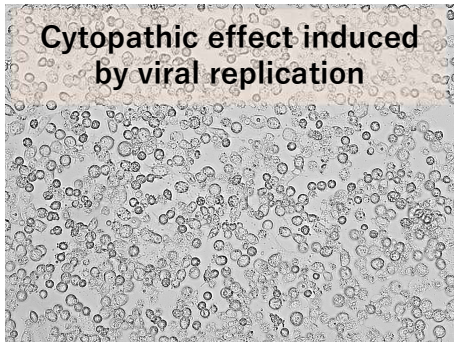
- NIAH, Japan remains ready to suppory regional diagnostic efforts as needed.

Isolation of an infectious FMDV from a livestock product detected at border quarantine by the Animal Quarantine Service (2026)

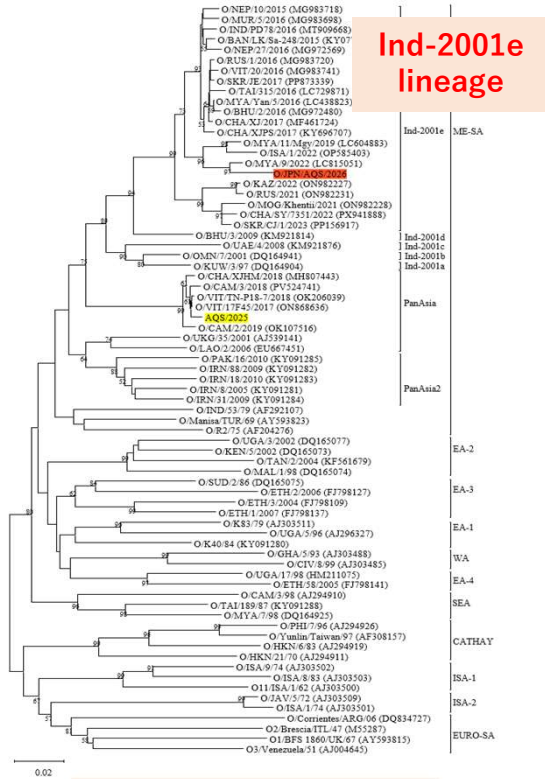
Detection of import-prohibited livestock products from a Chinese passenger's carry-on luggage at New Chitose Airport (**no clear vesicular lesions noted**). The Animal Quarantine Service identified the animal species as **goat** upon inspection.

FMDV gene-positive

Sample	Real-time RT-PCR	RT-PCR (FM8/9)
Muscle	–	–
Coronary band skin	27.1	+
Interdigital skin	23.9	+
Accessory digit skin	30.0	+



Serotyping



Phylogenetic analysis

- **FMDV was isolated** from hoof skin.
- The isolate was identified as **serotype O, ME-SA topotype, Ind-2001e lineage**, the predominant strain in recent outbreaks, primarily detected in Pools 1-3.