WEST EURASIA: RECENT EPIDEMIC SITUATION AND PROGRESS AND CHALLENGES TO IMPLEMENT THE REGIONAL ROADMAP FOR PROGRESSIVE FMD CONTROL

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LONG TERM CONTROL STRATEGY: WEST EURASIA FMD CONTROL ROADMAP-2020

✓The Progressive Control Pathway for FMD (PCP-FMD) is a set of control program activity stages leading to FMD freedom

✓Regional Roadmaps (RR) describe the anticipated progress along the PCP at national and regional level over longer term

✓West EurAsia FMD Control Roadmap-2020, which is one of the RR within the seven virus pools,was started by FAO/EUFMD Commission/OIE after the several approaches in order to achieve the vision of freedom from clinical case of FMD being achieved by the year 2020

Scope of the Roadmap

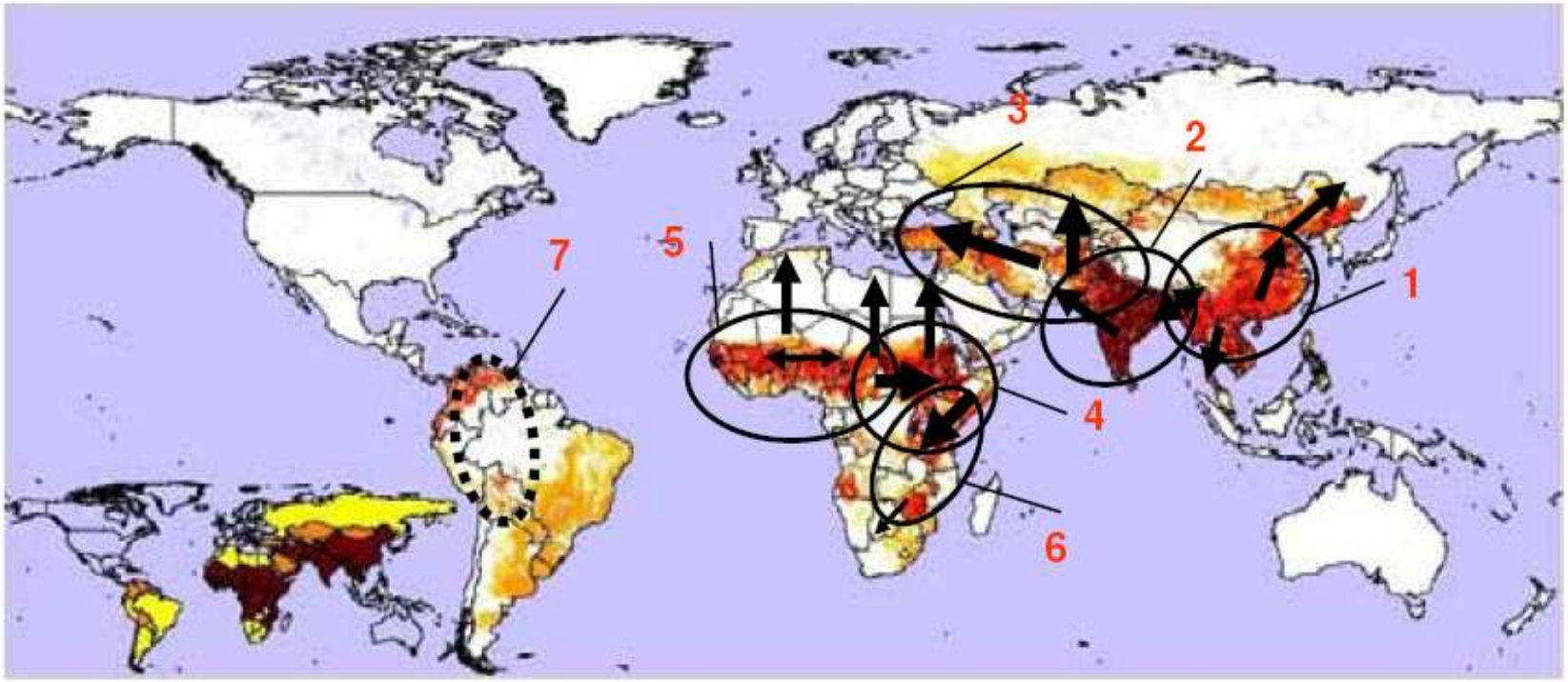
The West Eurasia FMD network covers the virus pool 3 countries,

14 countries are involved the network:

Turkey, Iran, Pakistan, Afghanistan, Azerbaijan, Armenia, Georgia, Turkmenistan, Uzbekistan, Tajikistan, Kyrgyzstan and Kazakhstan.

In addition to the virus pool 3 countries, Syria and Iraq were also included the network in concept of FMD control in the European neighbourhood.

Seven major virus pools



- basis for action against the regional virus types
- Continual virus circulation and evolution within regional pools
- Epidemic jumps between pools and to free regions (arrows)

Source: EuFMD

Assessment of country Stage position for 2010, together with the expected progression to 2020

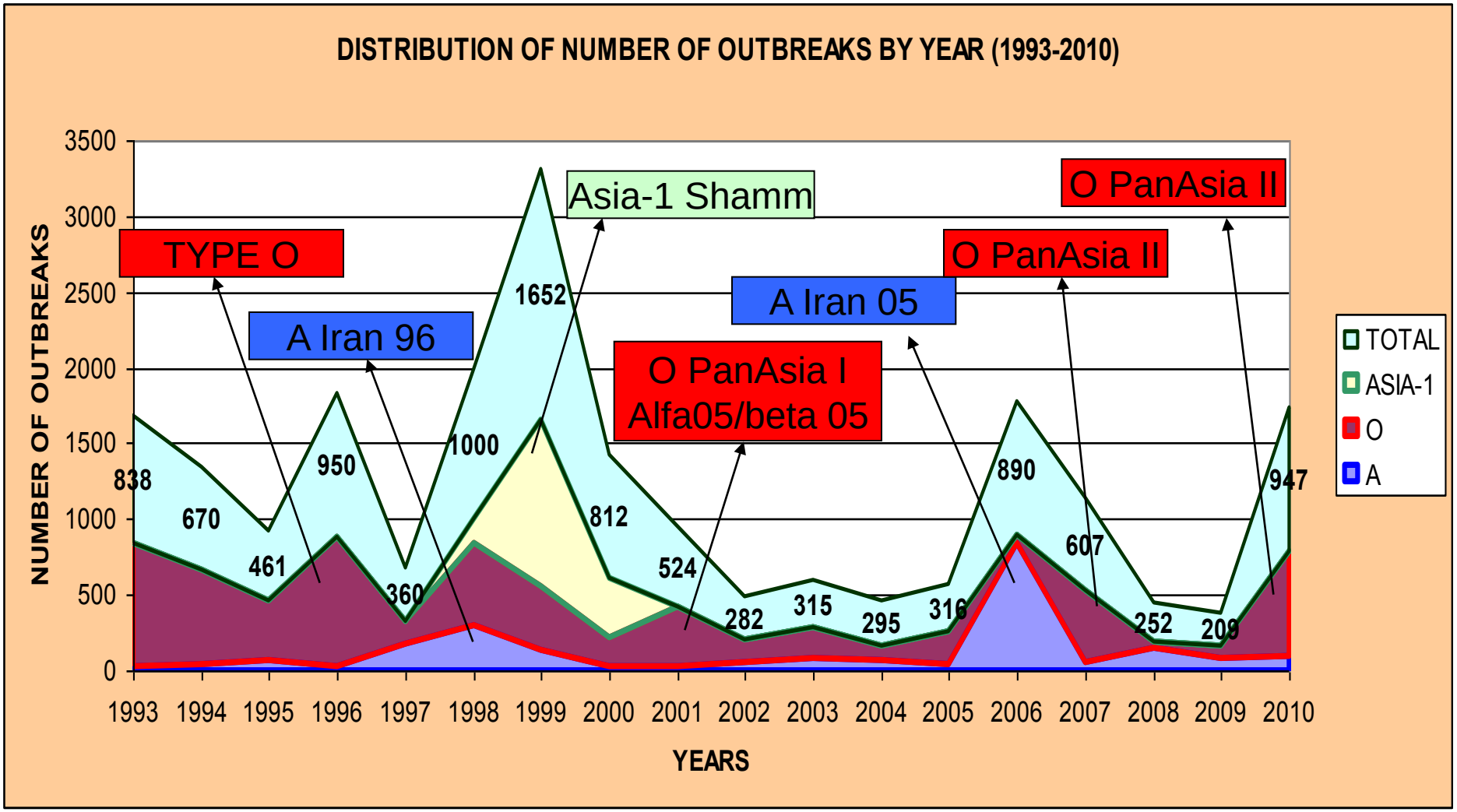
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Kazak	1(new)	2	2	2	2	3	3	3	3	4	4
Kyrgy	0	1	1	2	2	3	3	3	4	4	5
Tajik	1	1	2	2	2	3	3	3	3	4	4
Turk	0(New)	1	1	2	2	3	3	3	4	4	4
Uzbek	0(New)	1	1	2	2	3	3	3	3	3	3
Afgan	1	1	2	2	2	3	3	4	4	4	4
Iran	2	2	2	3	3	3	4	4	4	4	5
Pakis	1	1	2	2	2	3	3	3	4	4	4
EA(TR)	2	2	2	2	2	2	2	2	3	3	3
CA(TR)		2	2	2	2	2	3	3	3	3	4
MR(TR)		2	2	3	3	3	4	4	4	4	4
Th(TR)	4(new)	4	4	4	5	5	5	5	5	5	5
Syria	1	2	2	3	3	3	4	4	4	4	5
Iraq	1	2	2	2	2	2	2	2	2	3	3
Arm	2	2	2	2	3	3	3	4	4	4	4
Azer	2(new)	2	2	2	3	3	3	3	4	4	4
Georg	1	2	2	2	2	3	3	3	4	4	5

FMD IN TURKEY

and

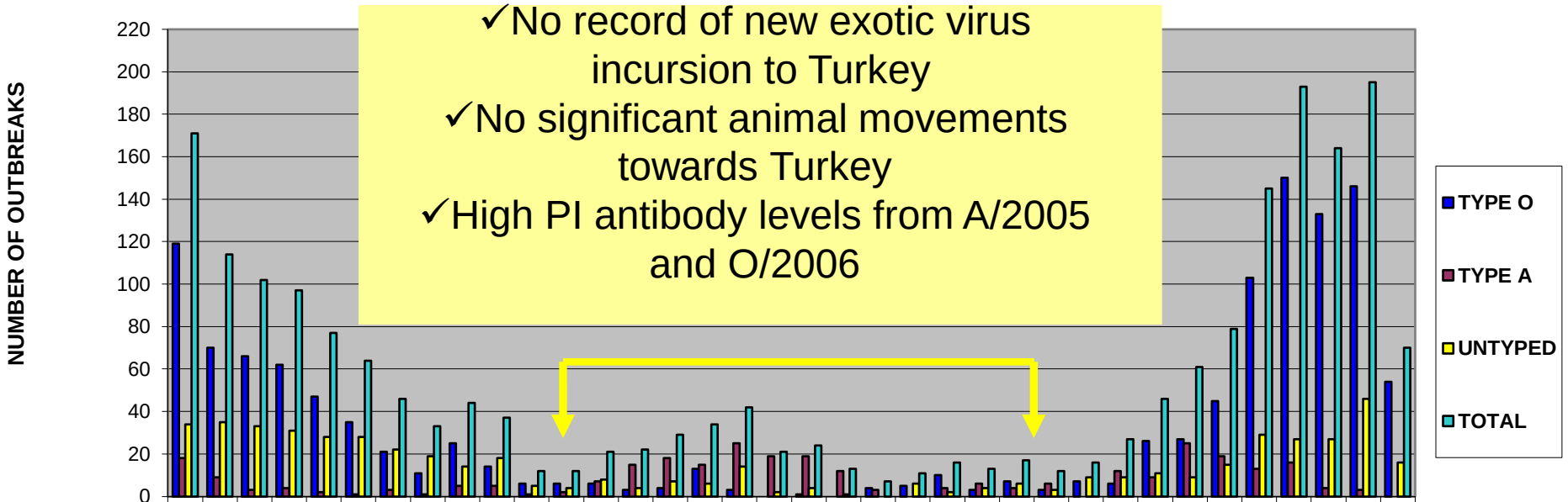
In the Region

Progressive Major Epidemic In Turkey



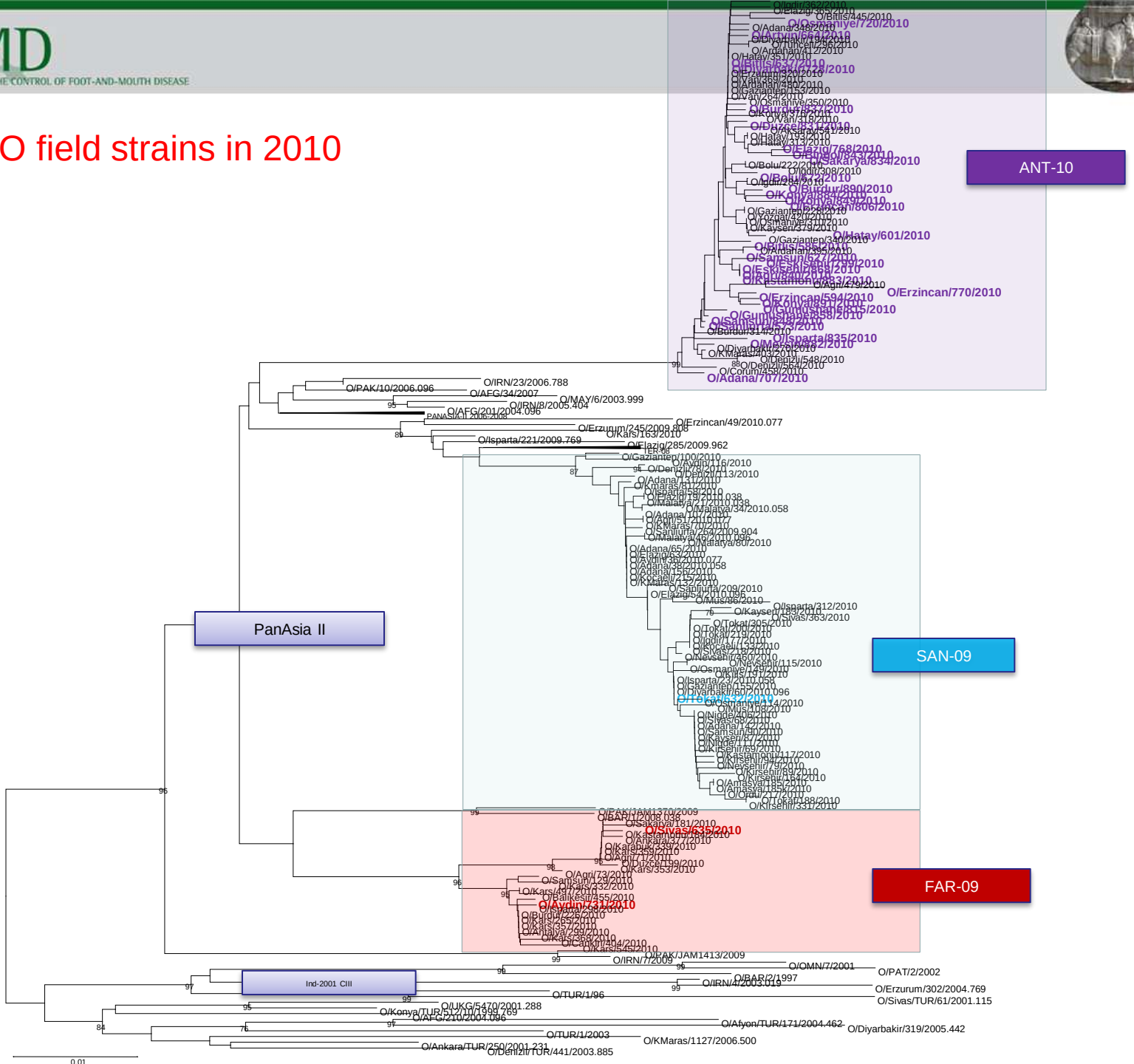
Disease Situation

FMD OUTBREAKS BETWEEN 2007- 13TH SEPT 2010 IN TURKEY

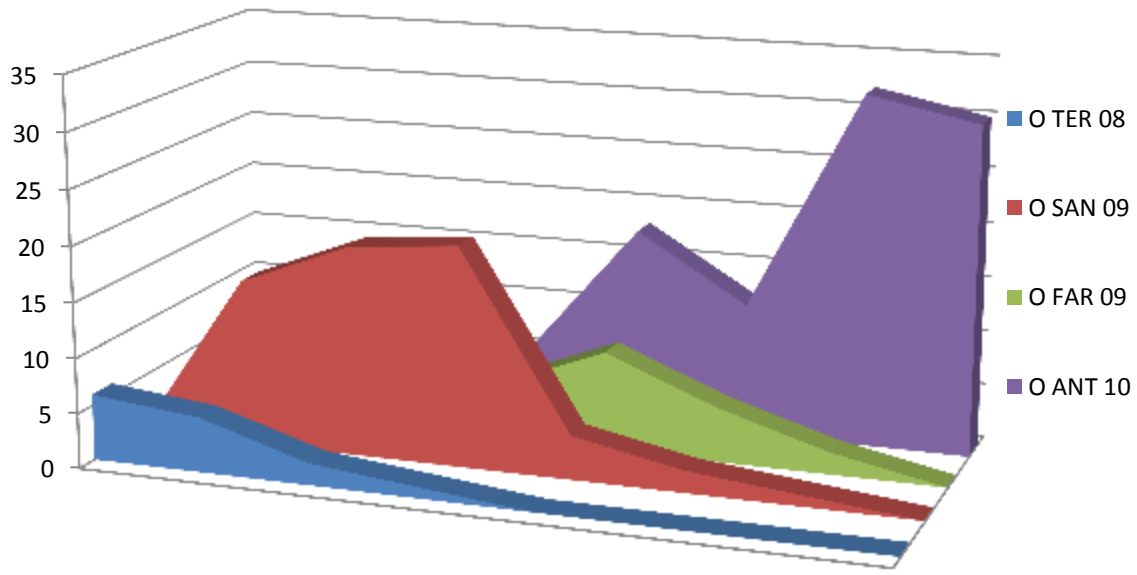


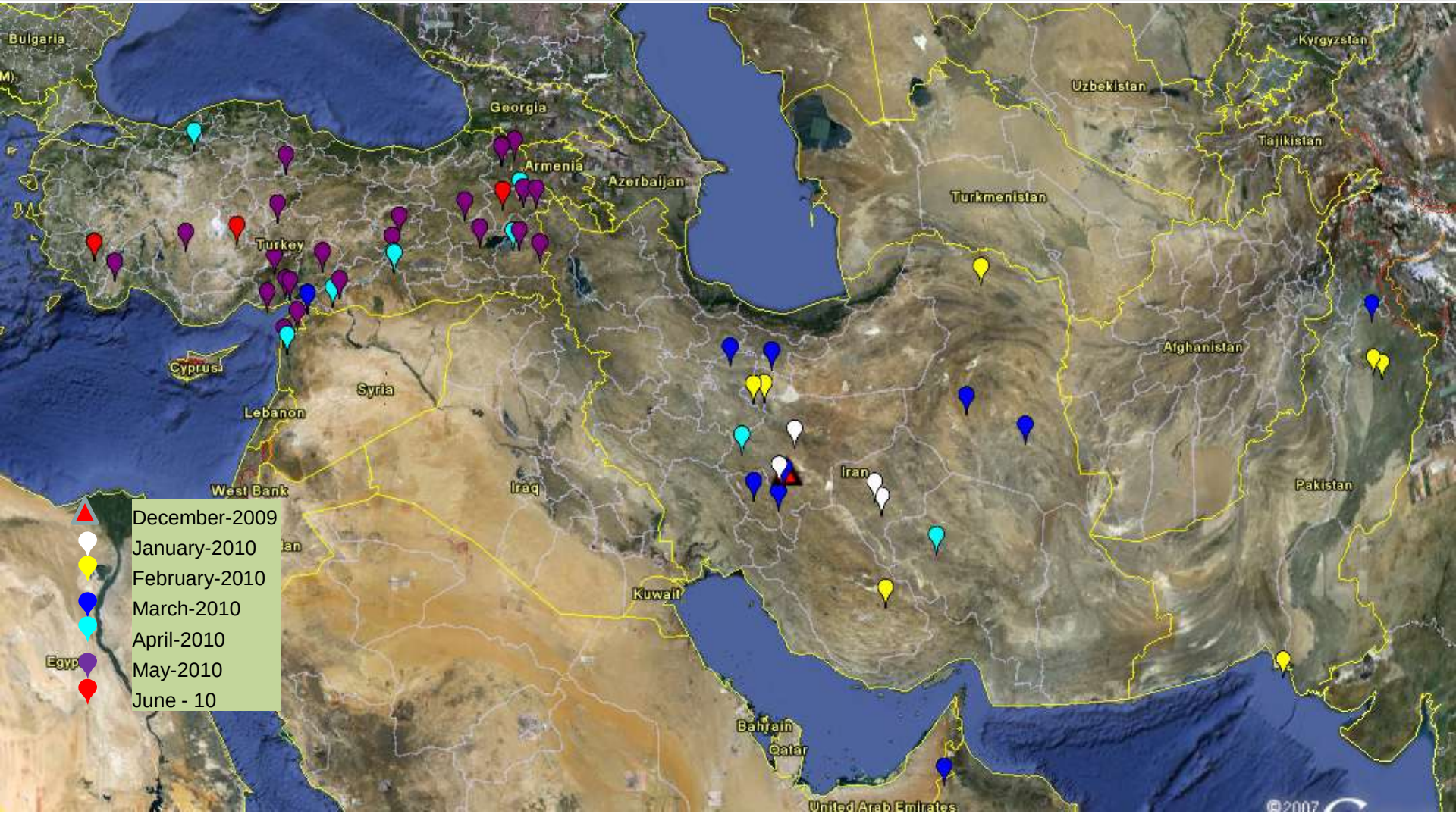
	JAN07	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN08	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN09	FEB	MAR	JAN10	FEB10	MAR10	APR10	MAY10	JUN10	JULY10	AUG10	SEPT10
TYPE O	119	70	66	62	47	35	21	11	25	14	6	6	6	3	4	13	3	0	1	0	4	5	10	3	7	3	7	6	26	27	45	103	150	133	146	54
TYPE A	18	9	3	4	2	1	3	1	5	5	1	2	7	15	18	15	25	19	19	12	3	0	4	6	4	6	0	12	9	25	19	13	16	4	3	0
UNTYPED	34	35	33	31	28	28	22	19	14	18	5	4	8	4	7	6	14	2	4	1	0	6	2	4	6	3	9	9	11	9	15	29	27	27	46	16
TOTAL	171	114	102	97	77	64	46	33	44	37	12	12	21	22	29	34	42	21	24	13	7	11	16	13	17	12	16	27	46	61	79	145	193	164	195	70

Type O field strains in 2010



Distribution of Type O viruses in Turkey in 2010



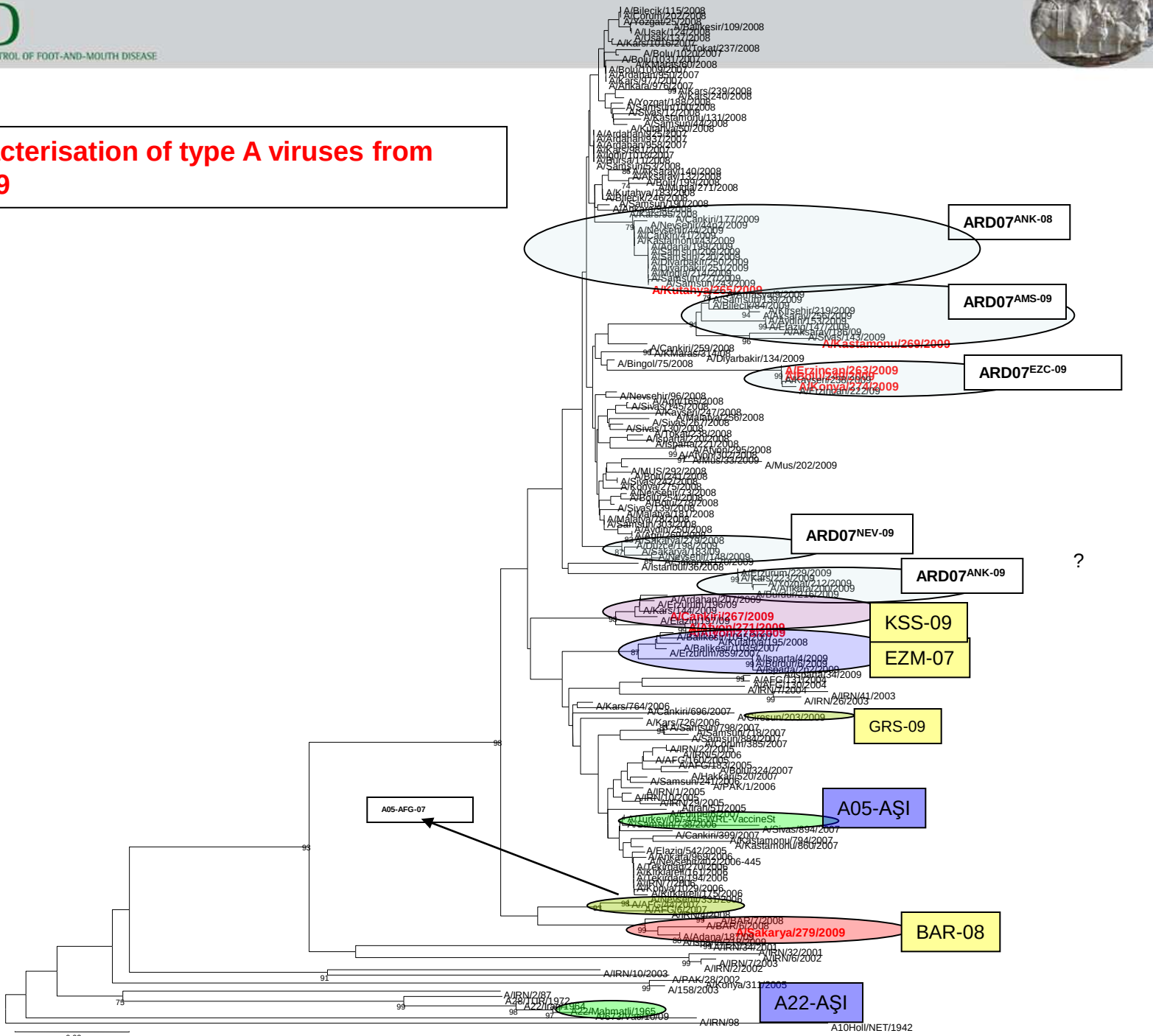


O PanAsia – II ANT-10 Distribution in West Eurasia Region

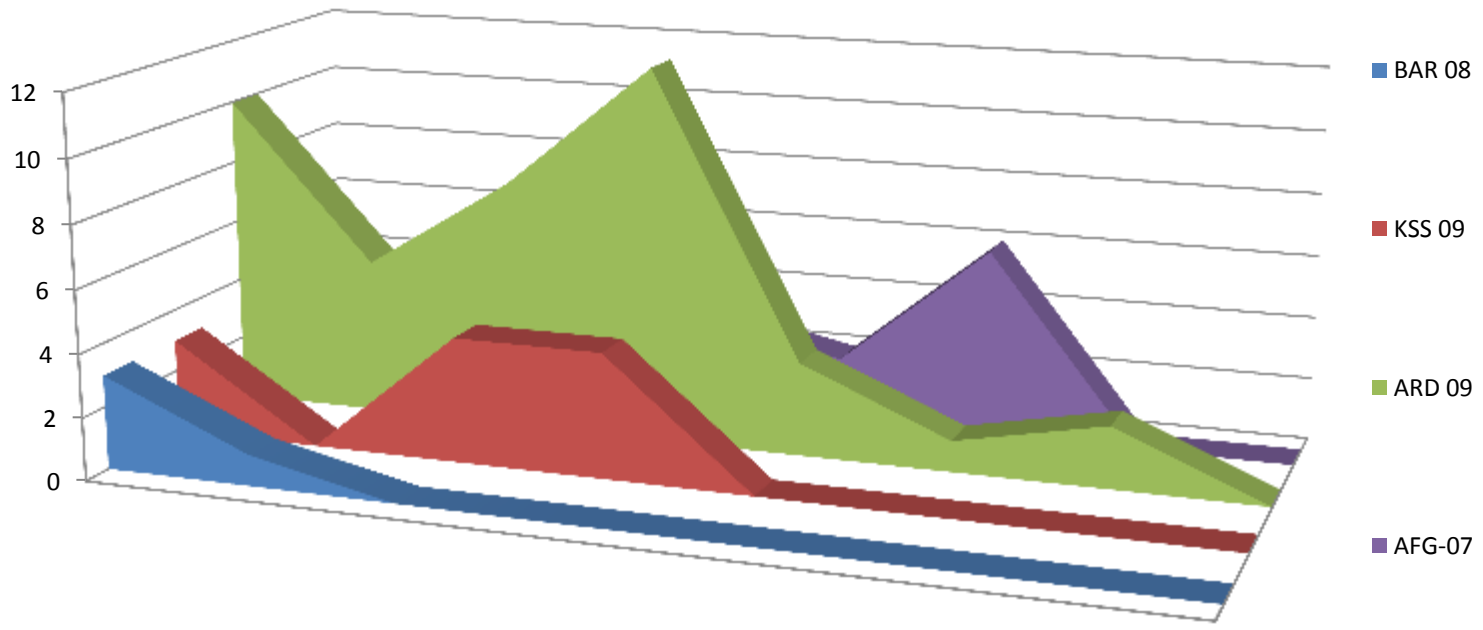
Worldwide Distribution of O Panasia II ANT-10 in 2011 (WRL)

- Afghanistan
- Pakistan
- IR Iran
- Turkey
- Bahreyn
- Israel
- Georgia
- Kuwait
- Bulgaria
- Libya

Genetic Characterisation of type A viruses from Turkey in 2009

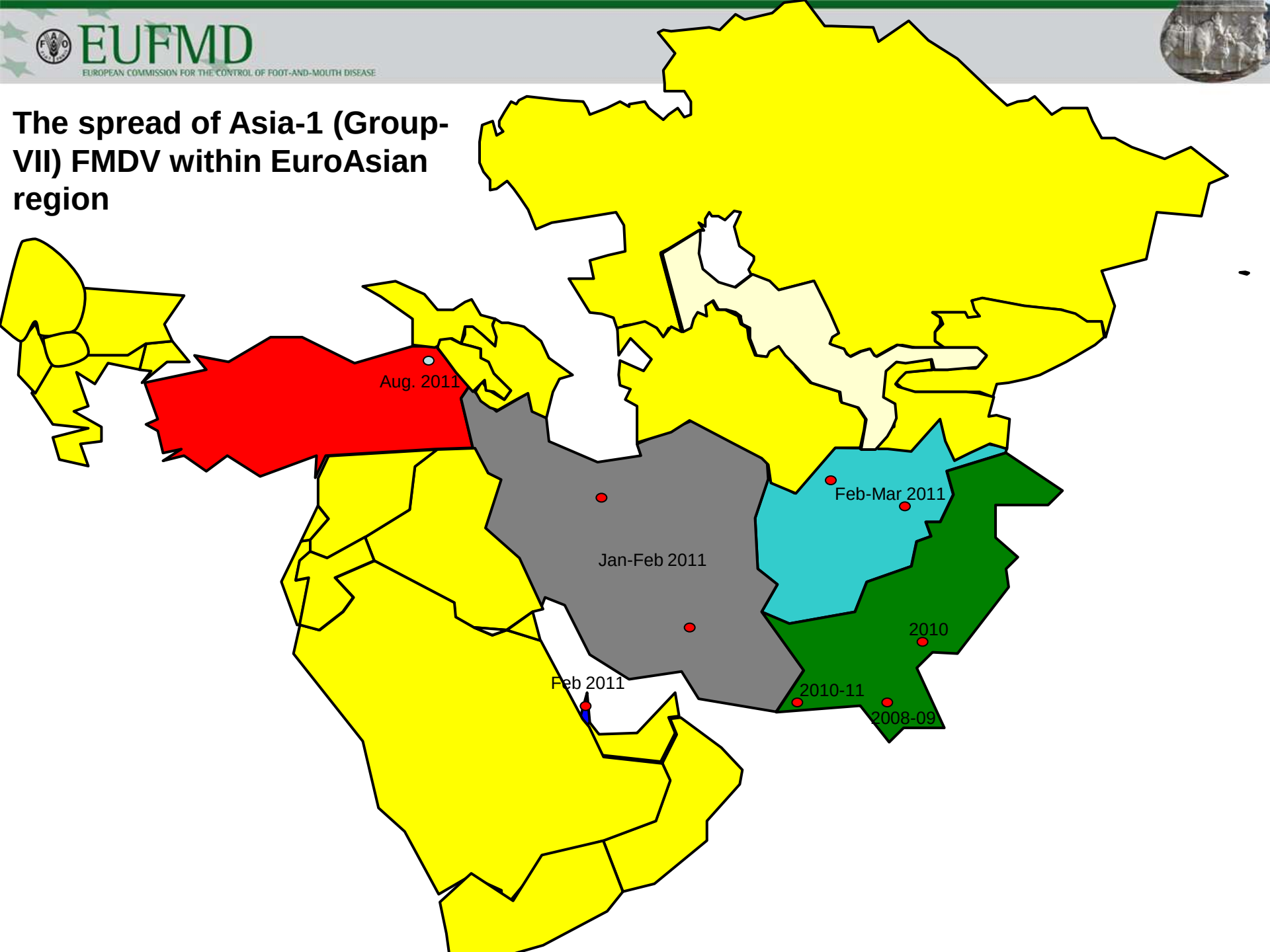


Distribution of Type A viruses in Turkey in 2010



FMDV A A/IRN/05 SIS-10
April 2010 - October 2011

The spread of Asia-1 (Group-VII) FMDV within EuroAsian region



FMDV Asia 1 Group 1 December 2010 – October 2011

Genetic characterisation of FMD Viruses in Turkey (2011)

Genotypes	SEROTYPES			Total
	A (IRN 05)	O (PanAsia 2)	Asia 1	
AFG-07	7			7
HER-10	7			7
SIS-10	230			230
ANT-10		46		46
BAL-10		8		8
PanAsia 1		1		1
New Group			36	36
TOTAL	**244**	**55**	**36**	**335**

FMD Viruses Circulating in Turkey in 2012

- Type A : 17 (A Iran 05 SIS-10)
- Type Asia 1 : 49 (New Group)
- No type O viruses detected so far

Recent FMD Vaccine Strains used in Turkey

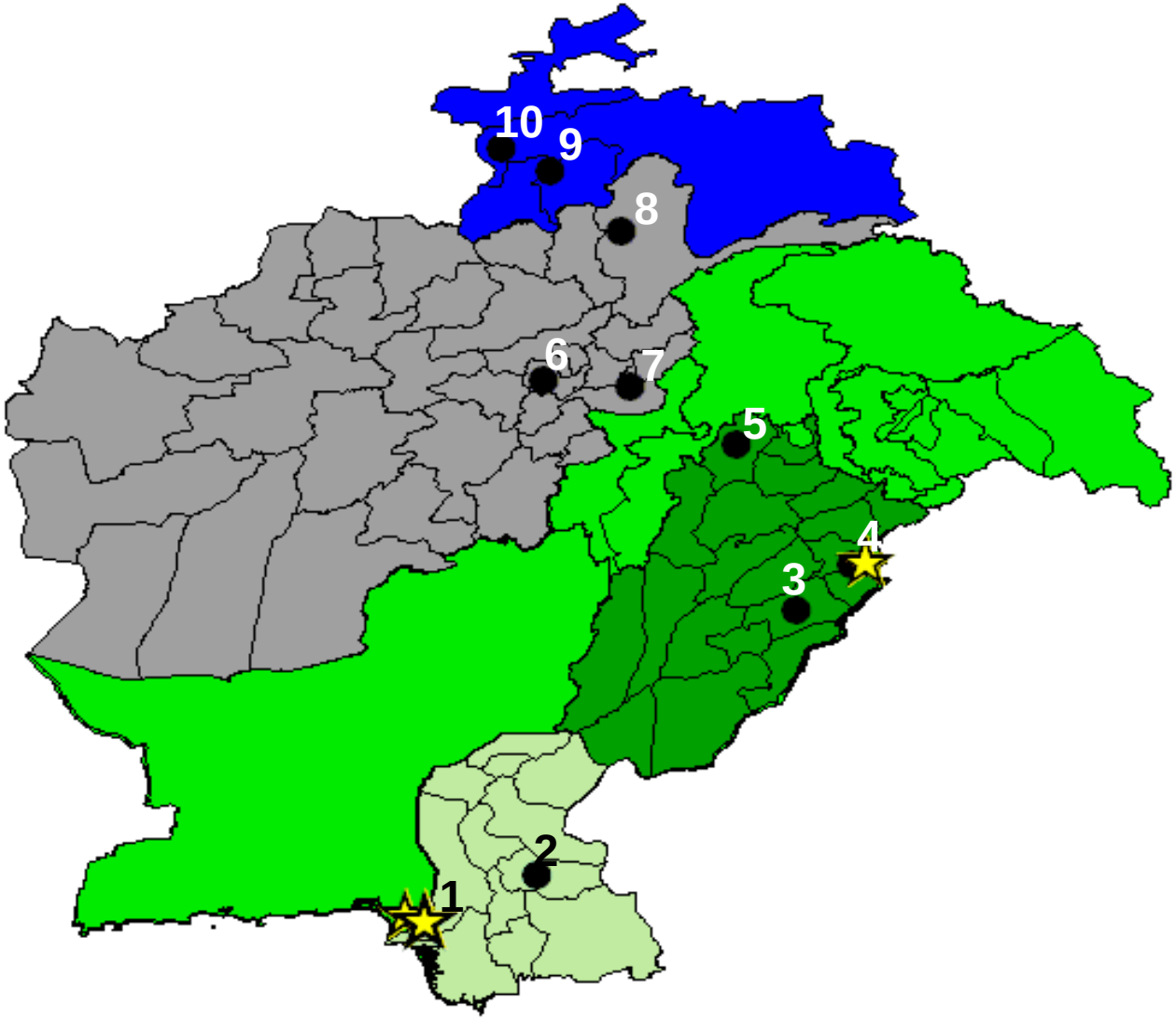
Vaccine Strain	Genotype	Started to be used	End of use
O Manisa	?		07/2011
O TUR 07	O PanAsia II	01/2011	Current
A 22 Mahmatli	?		1998
A Aydin 98	A Iran 96	1998	02/2006
A Nevsehir	A Iran 05	02/2006	03/2007
A 22 Iraq 24/64	?	03/2007	11/2008
A TUR 06	A Iran 05	11/2008	Current
Asia 1 Shamir	?	2008	08/2011
Asia 1 TUR 11	Not Named	08/2011	Current

Vaccine Effectiveness Study for Asia 1 TUR 2011

- Unadjusted vaccine effectiveness of the new Asia-1 vaccine was estimated to be 73% [95%CI=54%-84%]

  - 44 % vaccination coverage
  - Animals were vaccinated only once or none
  - Outbreak two months pv

FMD IN PAKISTAN AND AFGHANISTAN



The locations of the live animal markets (marked with circles) and dairy colonies (marked with stars) from where clinically healthy animals were sampled

Oral swab samples collected and tested from live markets and dairy colonies (July 08 to Aug. 2009)

Species	Live Markets			Dairy Colonies (Pakistan)	Total
	Pakistan	Afghanistan	Tajikistan		
Cattle	3/210	18/180	0/120	12/202	33/412
Buffaloes	10/287	0	0	29/502	39/789
Total	13/497	18/180	0/120	41/704	72/1501

Higher number of animals positive for FMDV RNA in live animal markets as compared to dairy colonies

Genetic Diversity of FMDV Serotype O in Pakistan and Afghanistan, 1997-2009

- Pakistan 98 (1998 and 2003)
- Iran 2001 (2001-2004, also seen in Iran and Turkey)
- PanAsia
  - PanAsia I (1999-2006)
  - PanAsia II (2003-2009)
  - PanAsia III (2005-2009)

Genetic Diversity of FMDV Serotype O in Pakistan and Afghanistan, 2010-2011

- O PanAsia II
  - ANT-10
  - PUN-10
  - BAL-09
- In 2011 O ANT-10 has become the dominant lineage in Afghanistan, İran, Pakistan and Turkey

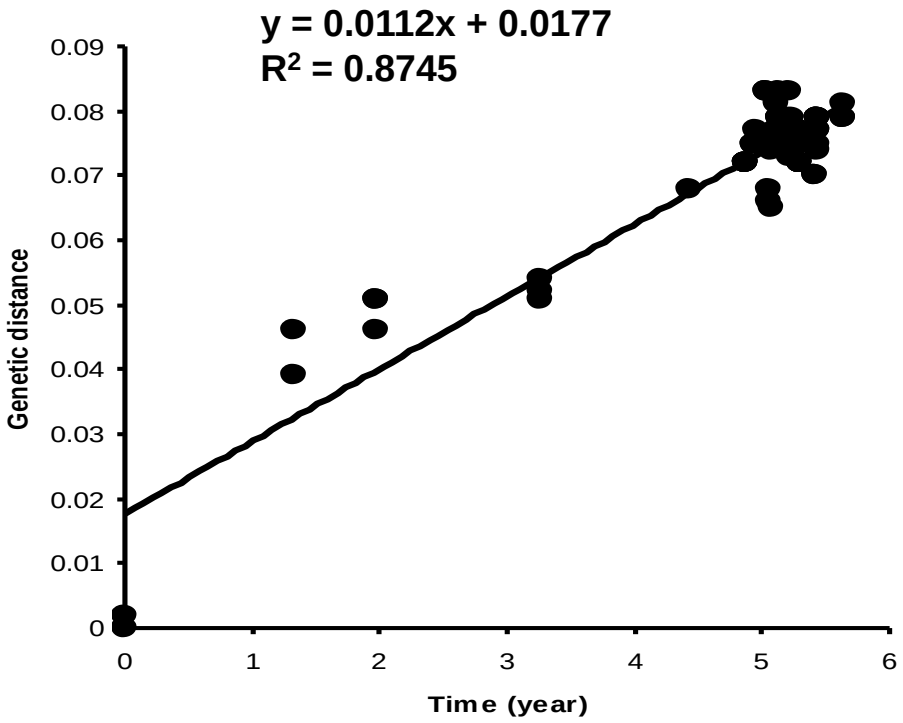
Genetic Diversity of FMDV Serotype A in Pakistan and Afghanistan, 2002-2009

- Genotype II
  - A IRAN 05
    - AFG- 07
    - BAR- 08
    - BAD-09
    - KUN-09
  - A-PAK-09
- Genotype I

Genetic Diversity of FMDV Serotype A in Pakistan and Afghanistan, 2010-2011

- A IRAN 05
  - AFG- 07
  - BAR- 08
  - New lineage in Afghanistan
- In 2011 AFG-07 has become the dominant lineage in Pakistan, Afghanistan, Iran and Turkey

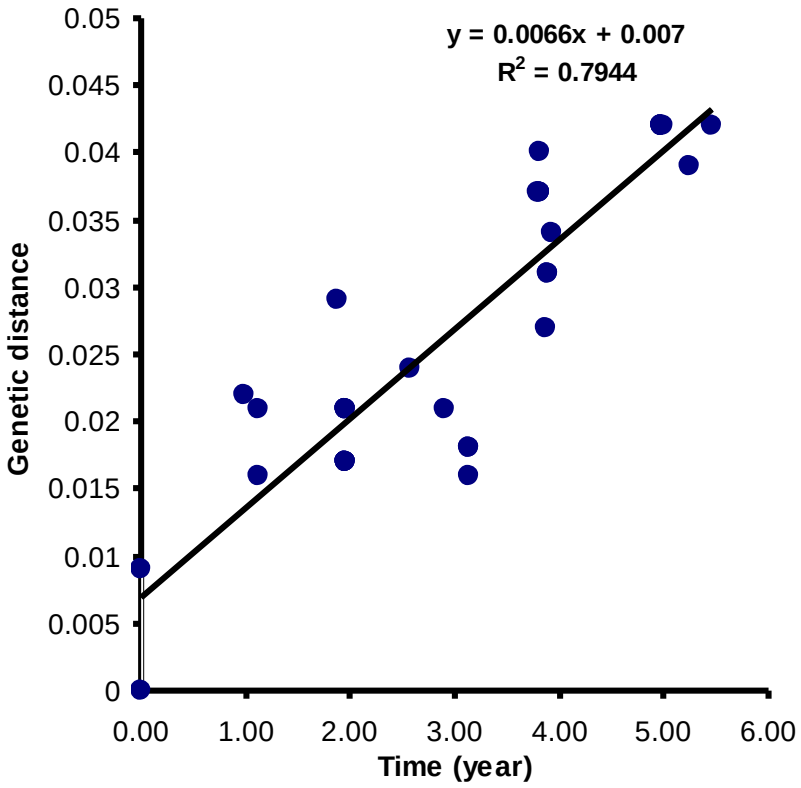
Rate of evolution of A-Iran-05 lineage

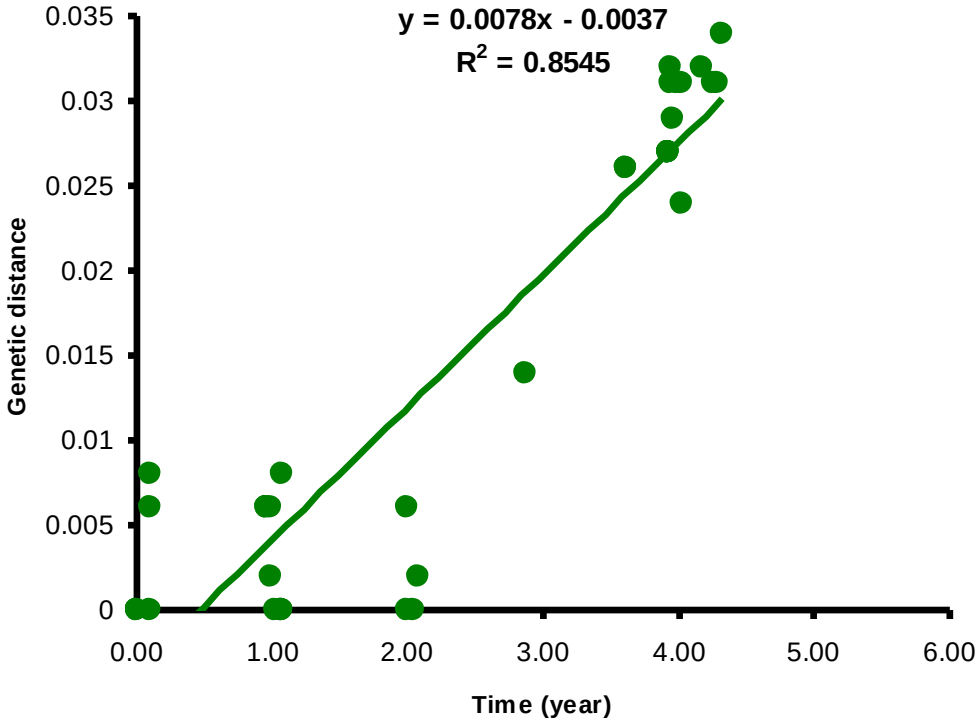


1.12×10^{-2} (1.02 to 1.22 $\times 10^{-2}$) s/nt/yr

New sub-lineage in A-Iran05 arises within 3 years!

Rate of Evolution





O-PanAsia-II

6.65×10^{-3} (5.49 to 7.80×10^{-3}) s/nt/yr

O-PanAsia-III

7.80×10^{-3} (6.72 to 8.89×10^{-3}) s/nt/yr

New sublineage in O-PanAsia arises within 6 years

Vaccine Matching Studies for FMDVs isolated from Eurasia in 2010

Vaccine Strain	Total Tested 2dmVNT	Total Matched	% Matched
O Manisa	30	13	43
O Ind R2/75	30	30	100
A TUR 06	10	10	100
A 22 Iraq	10	3	30

Vaccine Matching Studies for FMDVs isolated from Eurasia in 2011

Vaccine Strain	Total Tested 2dmVNT	Total Matched	% Matched
O Manisa	29	22	76
O TUR 09	29	29	100
A TUR 06	15	12	80
A 22 Iraq	15	5	33
A Iran 2005	15	7	46

Conclusions

- A higher proportion of oral swab samples collected from apparently healthy animals in live animal markets were positive for FMDV RNA compared to those collected from dairy colonies.

- Marketing and farming systems characterized by high turn-over of the animals appear to create suitable conditions for FMDV to be maintained and it is likely that they play an important role in the chain of transmission of the disease.

- Collection and testing of swab samples may be an important component of a surveillance program in endemic settings. In this regard, animal live markets have proved to be a good collection point from which FMDV RNA can be detected in healthy animals.

Conclusions (cont)

- LDC, Karachi is not only the reservoir of FMDV, entry of replacement animals into the colony is also a source of maintaining the infection there.

- Multiple sub-types within serotypes O, A and Asia-1 are in circulation in the area, which are evolving with time.

- Serotype Asia-1 virus detected in Pakistan, Afghanistan, Iran, Bahrain & Turkey belongs to a new Group and requires attention to identify an efficient vaccine.

West Eurasia FMD Laboratory Network: WELNET-FMD

- **In the 1st Regional Workshop (Istanbul, October 2009):**

it was recommended to establish a laboratory network under the West Eurasia Roadmap Organization.

- **Objective:**

promote better communication, improvement early detection, diagnostic capacity and performance of laboratories and also implementing a system for proficiency testing

WEST EURASIA FMD LAB NETWORK-WELNET FMD

Activity plan:

a. Setting up website
b. Organization of lab proficiency test scheme
c. Organization regular quarterly evaluation meeting
d. Training on Laboratory Diagnostic Methods of FMDV
e. Technology transfer for the diagnostic methods of the PCP member laboratories
f. Providing services on laboratory tests for early detection of the disease
g. Workshop for Quality Assurance (QA) for laboratory test and laboratory

Organisation of a laboratory PTS

- The objective is to establish a well organised simple Proficiency Test Scheme for the member laboratories in order to provide harmonised and more reliable testing methods for typing and serology of FMD
- This study will be conducted together with French National Reference Laboratory
- First a pilot study will be conducted in Turkish Regional Laboratories for evaluation and later will be implemented throughout the region

Organisation of regular quarterly meetings

- One teleconference meeting with the participation of Iran, Turkey, Pakistan, WRL and FAO/EUFMD was already held in 2010.
- The aim of such meetings will be to discuss the current disease situation and results of epidemiological and diagnostic studies.
- Within this context annual face to face meetings can also be organised.

Training on Laboratory Diagnosis of FMD

- First a comprehensive training needs plan should be prepared for the members.
- Such trainings are important for harmonisation of diagnostic methods and sharing of experiences.
- Training programmes can be organised on:
  - Typing of FMDV (ELISA, PCR)
  - Serology of FMDV (LPBE, NSP, VNT)
  - Methods for virus characterisation
  - Methods for molecular epidemiology
  - Vaccine matching

Provision of Diagnostic Services

- Molecular and antigenic characterization of viruses can be provided for the viruses from the region
- The aim is to understand the disease situation and to contribute for the development of control strategies
- Genetic characterisation of the viruses can be finalised within 15 days
- At least 10 samples from each of the FMD endemic network countries can be received by the leader laboratory in Turkey

Conclusions

A-IRAN-05, PanAsia-2 and New Asia 1

- ✓ wide-spread in most of the Eurasian countries
- ✓ new sub-lineages appearing
- ✓ O Panasia-2 seems to complete its cycle (at least in Turkey) and a new epidemic wave may be expected following the introduction of a new lineage (O India 2001 detected in Bhutan and Nepal ?)
- ✓ Potential threat for other countries of Europe and Asia

Conclusions

- ✓ The activities implemented since the 2008 meeting in Shiraz (Iran) have allowed to detect the occurence of three epidemics of regional significance in the past three years;
  - A Iran-05 (BAR-08) in 2008
  - O Panasia-2 (ANT-10) in 2010-2011
  - New type Asia 1 in 2011-2012
- ✓ All of the epidemics travelled from east to west and to some extent involved Central Asian countries (Tajikistan, Kyrgyzstan and Kazakhstan)

Conclusions

- ✓ The FAO projects through supporting virological surveillance, assisted identifying in Pakistan the Asia-1 strain not matched to the Shamir vaccine.

- ✓ The early warning to WELNET assisted when the first evidence of spread to the west was detected, and willingness to share isolates assisted in vaccine development (FMD Institute, Ankara, Turkey) for local use.

Conclusions

- ✓ The Roadmap assessment and peer review system has encouraged reporting of serological findings but FMD remains highly sensitive and the move towards open and transparent reporting of findings across the region is still a challenge.

Conclusions

- ✓ Although the activities within the framework of Roadmap and WELNET made the early detection of new epidemics possible, the rapidity for spread of FMDV across borders of the region highlight some difficult issues for FMD control suc as;
  - ✓ The limited use or impact of effective quarantine measures,
  - ✓ The lack of control at animal exchanges/markets,
  - ✓ Achievement of effective immunity in animals before short or long distance trade
  - ✓ Long delays in the detection of new strains and the production of vaccines against these strains (e.g. Panasia-2 and New Asia-1).

Conclusions

- ✓ The recent epidemic waves illustrate that early warning is not enogh, effective preventive measures must be in place, and regional actions should continue to be essential to 2020 and possibly beyond.

Acknowledgements

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