Food and Agriculture Organization of the United Nations

eufmd european commission for the control of foot-and-mouth disease

Report of the First Scientific Meeting on FMD virus circulation in the region

Teheran, I.R of Iran, June 11-12th 2006

Summary

The region has been very hard hit by rapid invasion and impact of an A22 like virus (A Iran 05) in 2005-6 which continues to circulate in Turkey and I.R of Iran, and which has been detected in Pakistan and Saudi Arabia in 2006. Syria and Iraq have not reported detection of the A22 virus to date but remain at high risk. Type O remains endemic, but the risk of Asia-1 appears diminished with the last reported occurrence in Iran in August 2005. The dynamic situation requires continuous monitoring, not least because first detection of new strains in the centre of countries rather than border, and because of rapid animal trade movements, and because other antigenic variants type A variants were observed in 2005 and may continue to persist in the region and give rise to later re-emergence. Further, the type A Egypt 2006 has the potential for invasion of additional countries in the Middle East.

The meeting considered how future regional epidemics could be prevented, and developed recommendations relating to information exchange, virus isolate exchange to enable vaccine producers to respond, and the optimisation and improved monitoring of vaccination programs.

Conclusions on recent FMD control situation and virus circulation in the region of Turkey, I.R of Iran, Syria and Iraq:

1. Lack of information exchange between countries and to the international organisations has contributed to the scale of the type A epidemic experienced in the region in 2005-2006.
2. The lack of immediate vaccine against the A22-like virus contributed to the scale of the outbreaks.
3. The available A22 antigen in international vaccine banks, or held by individual countries, could not be mobilised in timely manner because of delayed reporting of the identification of the problem of the A05/A22 like virus.
4. The A22 like virus (A Iran 05) FMDV genotype has proven to be highly invasive and has caused severe disease in all ages of cattle, although this appears reduced where high levels of previous type A immunity exists.
5. The infection continues to circulate in mid 2006 in Turkey and Iran and further extension of infection to other countries or zones is likely to occur.
6. The circulation of other A types in the region is likely to continue in 2006 given the detection of A Iran 96, A Iran 87 and A Iran 99 genetic types circulating in apparently restricted locations in Turkey and/or Iran in 2005.
7. The epidemiological circumstances that enable virus persistence of the various type A virus are unclear and therefore specific attention should be continuously applied to type A outbreaks and epidemiology.
8. The location and risk from other exotic viruses, including type A Egypt 2006 should be kept under review by each country.
9. The Asia-1 situation appears favourable in Iran and the region at present, but the situation in the wider region, including Pakistan, central and south Asia be kept under

review and contingency plans; developed before decision to remove Asia-1 from vaccination programs is taken.

10. There is a need for regular regional meetings to assist risk assessment and selection of vaccination and other preventive measures based on similar or harmonised standards for virus typing and selection and monitoring of vaccination programs.

Summary of recent A22 like virus (A Iran 05) epidemiology

Outbreaks with a type A virus in Khouzestan (south-west Iran) were reported in August 2005, which subsequently spread in northwards to include east and west Azerbaijan provinces then to central Iran in autumn and winter 2005, with severe impact. Virus typing at the Razi Institute detected a virus a significant antigenic difference to A Iran 87 and the antigenic type was termed A 05; a homologous vaccine was produced, first for use in ring vaccination and later in a tetravalent (2A/o/Asia-1) formulation. In late November 2005 outbreaks with this type occurred in south-west Turkey, but back tracing suggests entry occurred in Igdir Province at an earlier point. Subsequent spread, assisted by winter conditions and animal movements for the annual kurban festival, involved up to 56 Provinces with high economic impact, from Thrace on the border with Greece/Bulgaria, to Aegean coast, central and eastern Turkey. Since vaccination was applied in late February 2006, outbreak numbers and locations have reduced, down to 70 outbreaks in May 2006 in 28 Provinces. In both Iran and Turkey, the extension of the new type A over a wide area will have resulted in high number of potential carrier animals and has apparently succeeded to replace the previous type A genotype in much of the region.

Summary of experience in A 22/A Iran 05 control by vaccination:

Each of the four countries currently utilises a different A22 component in their programs.
Turkey has applied emergency vaccination using A22 Mahmatli and A22 Iraq (EC supplied vaccine) with good success in Thrace region and Anatolia with no evidence of lack of protection against challenge when used in the face of infected populations.
Iran has applied a homologous A05 vaccine in ring vaccination and more recently in routine use. The A87 vaccine appears to cross-protect in the field. This potentially important finding requires to be confirmed through potency test A87 versus A05 challenge.
Iraq has routinely applied A22 vaccine for many years, and has not reported A22 problems in 2005-6.
Syria routinely applies A Iran 96 vaccine, and appears at present to have escaped invasion of A22 type. From experience in Turkey it is clear that the SAP Institute A Iran 96 vaccination did not protect against the invading type A strain.

Summary of recommendations of the meeting
The meeting recommended (Annex ...):
- procedures to increase the sensitivity of detecting new subtypes and the subsequent exchange of essential information to assist risk assessment and identification of vaccine based preventive measures. A task force was proposed to develop the procedures in full compliance with the international requirements of OIE and the specific needs of the region
- to continue regular technical meetings to improve risk assessment and harmonisation of sub typing and the monitoring of programs.

Meeting report

Introduction

The meeting was hosted by the I.R of Iran and organised by FAO under the *Central Asia FMD Surveillance Project Phase 1*, a component of the project MTF/INT/003/EEC which is supported by European Commission.

Participation in the meeting was made by FMD laboratory experts and disease combat specialists from the veterinary services of I.R of Iran, Turkey, Iraq and Syria. The participants list is given in Annex 1
The meeting was opened by Dr Hassani, Head of the Iranian Veterinary Organisation (IVO), and by Dr Mubashar Riaz Sheik, FAO/WHO representative in I R of Iran.

The Agenda of the meeting is given in Annex 2.

Virus circulation in the wider region

The meeting first considered the wider epidemiological events in central and west Asia, receiving an update provided by the FAO WRL for FMDF at Pirbright (presented by Dr Valarcher) (Annex 3). The most significant event in the region in the few years has been the rapid and devastating spread of an A22-like FMD strain in Iran and Turkey in the period, and which has also been isolated in 2006 from Saudi Arabia and Pakistan. The spread into Egypt of an unrelated type A of African origin is also of major significance, since this type is not covered by vaccines in routine use in the region and further spread in the near east is possible. He also highlighted the rapid eastwards extension of type Asia-1 into previously untouched parts of China, Russian Federation and Vietnam; the rapid movements of FMDV into new areas highlight the need for early warning of disease events.

Country situation – FMD circulation and selection and design of vaccination programs

Country presentations were then made of the situation in Iraq (Annex 4) and in Syria (Annex 5). Type A22 like viruses have not been so far recognised in 2005 or 2006 in Iraq, but for various reasons the A22 component had been retained in the vaccination program, with current use of a trivalent A22/O/Asia-1 oil adjuvanted vaccine (Raksha vaccine, Indian Immunological) (IIL)) applied with a programmed vaccination in cattle every 9 months..
In Syria, A22 like viruses have also not been recently observed, and a trivalent A Iran96/O /Asia-1 Shamir vaccine sourced from MERIAL applied in all cattle (twice year) and sheep (once a year-). Vaccine potency is tested by serology in groups of cattle (alternative potency test) with serology at WRL-Pirbright. Sero-monitoring of the program is practised, focussing on border populations, and evidence of circulating FMDV has been found in 2005 through NSP ELISA.

The situation report of Turkey and a paper on development and testing of the A22 Mahmatli vaccine were given by Dr Naci Bulut, SAP Institute (Annex 6). Detection of the A22-like virus was made in December 2005, following outbreaks in south-east Turkey in late November. Back tracing indicated that the index case may have been in Igir Province, which border Iran and Azerbaijan. Genetic analysis and vaccine cross-matching indicated that a previously used A22 Mahmatli vaccine should provide good protection, and therefore A22 production was initiated with antigen formulated and distributed (as trivalent vaccine) in mid February and used in the emergency response. However as a result of the harsh winter

conditions and the animal movements during the kurban festival, unprecedented spread of the A22 virus occurred between November and February, with a very high level of outbreaks per month recorded in January and February. Since emergency vaccination of the A22 vaccine, and of the 2.5 million doses provided by EC, outbreaks have significantly reduced in number and no case was reported where breakdown of vaccination under challenge has been seen. The recorded number of type O outbreaks is much lower in 2006 than previously seen.
He also described the three components of vaccine potency testing procedure for each batch, cattle challenge, serological potency tests in 20 animals tested 21 days post immunisation, and serology on at least 200 animals randomly sampled circa 21 days post immunisation.
The I.R of Iran presented a country situation report (Annex 7) and a report on development and testing of vaccines for use in Iran (Annex 8).

The discussion on the above presentations, and the problems faced at regional level, was Chaired by FAO. Four types of problems were identified in the control of epidemic FMD in the past years;

1. Lack of timely warning of emergence of new subtypes in the region prevents authorities from developing, acquiring or applying suitable vaccines and other preventive measures.
2. Failure to prevent transmission; gaps in the prevention and control measures which allow persistence, emergence and epizootic spread of new virus types. High risk areas of the region continue to exist where factors such as low population immunity and high animal movement and contact act to maintain infection.
3. Lack of exchange on an urgent basis of key virus isolates and seed viruses which could be used to develop vaccines in response to virus emergence.
4. The lack of rapid availability of vaccine for emergency campaigns, including non-existence of vaccine banks in the region. Only Turkey is in development of an antigen bank to enable it to deal with fluctuating demand of field programs and for emergency use.

The meeting then elected reporting groups which provided recommendations to address the first three problems. Development of vaccine/antigen banks was proposed (by Syrian representative) to address the fourth problem.

The recommendations of the working groups were discussed on the 12th, and are provided in Annex 9.

Vaccine performance and quality, and monitoring of vaccination programs.

A presentation on the development and application of international standards for vaccine potency, quality and safety, was presented by Dr Valarcher (Annex 10). He provided a historical review of the development of the standards and on the OIE and European Pharmacopoeia requirements. The presentation was significant interest and stimulated many questions which could not be answered in the time available. The high interest of regulatory authorities indicated this topic is important for those funding and evaluating programs. Several participants called for higher standardization between countries of vaccine potency testing in line with the OIE. This topic should be a regular Agenda item for future meetings.

Sero-monitoring and the evaluation of vaccination programs

The system applied in each country for monitoring of vaccine quality, both locally produced and imported, and of vaccination program performance was summarised (Annex...) and discussed.
There was a wide variation in use of sero-monitoring in each country; randomised sero-survey for population immunity was only described in Thrace region of Turkey. Syria applies sero-monitoring in selected border provinces but not in a way that enables the average population immunity to be determined. The difference between monitoring of vaccine inputs (vaccine supplied, vials returned empty, spot checks on cold chain and audit of records), of population immunity, or of outcome (impact on FMDV incidence in an area) was discussed.
Optimisation of programs was discussed, and the issue of sheep vaccination. It was generally agreed that optimising programs will require monitoring of FMD incidence (evidence of outbreaks and of new sero-conversions) in relation to population immunity in an area, and other epidemiological circumstances. A specific, integrated approach will be needed to determine is sheep required to be vaccinated to prevent their playing a role in maintaining infection.
Only Turkey (Thrace region), and Syria (in border regions) have regular (Thrace) or recent (Syria) sero-monitoring for virus circulation.
Harmonisation of vaccine monitoring between countries was proposed as a way to increase trust in the preventive measures being applied across boundaries.

Closure of meeting

Dr Sumption expressed his appreciation and that of FAO for the excellent arrangements made to host the meeting by staff of the IVO and of the Central Veterinary Laboratory, Karaj, Tehran, especially the Director of the CVL and staff responsible for liaison, the meeting room and interpretation. The meeting had been arranged at short notice and he thanked Dr Gieiger and the FAO Office in Iran for their hard work, and thanked the participants for their efforts to attend despite long and arduous travel schedules.

Annex (not final version)

Country	FMDV – 2006	Vaccination program -2006	Monitoring Program	Notes
I.R Iran	A 05, A87, type O (Asia-1; 2005, 2 outbreak)	Cattle: programs reaching 60-70% population; - 3 x per year (Merial A87/O Manisa/Asia-1Shamir) **or** Razi tri- (A05/O shabestan/Iran /Asia-1 Iran) or tetravalent A05/A87/O/Asia-1) Sheep: 1x/year, Razi , reaching 30% population	Vaccine: QC ar Razi Inst, no independent testing. Safety and sterility tested on Merial vacc. Program: Vaccine use recorded and analysed using GIS. Some sero-monitoring began 2005; limited program. Program to be designed for 2006-	Homologous A05 vaccine first produced by Razi Institute on emergency basis for ring vaccination in 2005.
Iraq	No virus typing presented. Sporadic cases	Cattle: Trivalent (A22/O/Asia-1) oil adjuvanted vaccine, Raksha; Indian Immunologicals). Program: every 9 months plus emergency ring vac. Sheep: some	Vaccine: no independent testing. Program: CVL undertakes some sero-monitoring post vaccination	
Syria	FMD outbreaks not reported in 2006. In 2005, NSP positivity (10-12%) indicated virus circulation.	Cattle: Trivalent A Iran96/O Indian 53/78/Asia-1 Shamir (Merial), applied twice per year Sheep: 1x year, all population merial	Vaccine: each batch tested in Syria (alternative potency test, serology at Pirbright) prior to application. Program: once a year sero-survey in cattle, 3 months post-vaccination, conducted at 6 locations close to borders across the country. (immunity and NSP)	
Turkey	A22 like (A Iran 05), type O	Two programs, one for Thrace region (2 x cattle, 1 x sheep) and Anatolian program (2 x cattle,	Vaccine: 3 component testing of each batch (challenge, serology on 20 animals,	A22 Mahmatli component revived and replaces A Iran 96 in emergency and

		sheep only on demand). Vaccine: SAP Institute oil adjubvated A22 Mahmatli, O Manisa, Asia-1; additional 2.5 million doses from EC of A22 Iraq/O/Asia-1.	immunity rate in >200 field vaccinated animals 30-60 days post vacc). Program: Recording of vaccine application. Sero-monitoring for immunity and NSP: - in Thrace, annual program designed Turkey/FAO/EC. - not yet official program in Anatolia but some applied to pvp program	routine vaccine used in 2006.