Current situation of Foot and Mouth Disease (FMD) in the Middle East
Perspectives and risks linked to animal movement

Prepared by: OIE Regional representation for the Middle East – 28 March 2007

Summary:

FMD is endemic and widely spread among various animal species in the Middle East, but periodic devastating epidemics occur that spread rapidly across national and regional borders. In 2005 and 2006, the region has been severely affected by two separate type A epidemics: one which emerged in Iran, moved westwards into Turkey (including the European part of Thrace) and which has been detected in Pakistan and Saudi Arabia and an incursion of an African type A virus into Egypt causing widespread outbreaks in 2006.

Livestock products contribute significantly to the diets of both the rural and fast-growing urban populations of the Middle East. However, these relatively high levels of consumption are supported by import of animals and their meat from abroad. Of particular note here is the substantial import of small ruminants for the major Muslim festivals (Hajj, Ramadan and Eids).

Livestock trade in the region is driven by demand from the Gulf States, which collectively imported near 80% of the recorded 13.2 million live sheep, goats and cattle imported in 2005 in the region.

On various occasions over the past decade, diseases, such like FMD, have spread from the Greater Horn of Africa to the Arabian Peninsula and from there into the Mediterranean Basin. And, since the early sixties, whenever there was an outbreak of FMD in the Middle East, high concern was always expressed that the disease might invade Europe.

The proximity and importance of trade with countries in the Horn of Africa and in west and central Asia, has the potential to introduce exotic FMD viruses from these regions.

Much of the Middle East region is arid or semi arid, which drastically limits the potential availability of natural pasture. A wide range of traditional management systems have evolved to optimise the use of the grazing that is available. Many rely on movement – either nomadic pastoralism or seasonal transhumance – to winter and summer pastures, or less regular movements to reach the unpredictable patches of grazing characteristic of very low rainfall areas.

Such fluidity has significant consequences for the spread of animal diseases, notably FMD

This situation is all the more worrying as most countries have not the capacities to implement a coherent and reasoned strategy of prevention and anticipation face to such disease.
Indeed, regarding absence in most countries of biosecurity measures, involving strict border control, early detection program for new strains, confidence in analyses realised by the national labs, epidemiological survey, vaccination monitoring, contingency plans….are as many factors promoting the spread of the disease, notably the epidemic form.

Unfortunately, due to the importing capacity of the Middle East, the region was left behind the major international animal health programs that were elaborated for the control of major transboundary animal diseases including FMD. Countries of the Middle East were individually involved in different programs of other regions which led to more mistreatment of the region as a unique and integrated epidemiological block.

Thus, to control FMD worldwide, the situation of this disease in Middle Eastern countries should be treated as a priority.

So, the implementation of a regional project to control FMD in the Middle East is essential.

This was highlighted during the 3rd Roundtable Meeting on FMD control in the Middle East and North Africa, Damascus, Syria, November 6-7th 2006, where one of the major recommendation made is to implement such project within the OIE/FAO global framework of the progressive control of transboundary animal disease program (GF-TADs) and co-coordinated by the Regional Animal Health Centre (RAHC) established to provide expertise and assistance especially in major emergency cases in the region.

The Middle East region is acting as a mixing vessel to animals from different sources in the world. As an important importing region, the Middle East receives animals and animal products from different parts of the world and mostly from regions where FMD is endemic. The ineffective infrastructure of the veterinary quarantine bodies and the lack of appropriate diagnostic capabilities always lead to the absence of any early warning system. The number of under-trained veterinary personnel compared with the professional veterinarians in-charge of disease surveillance and monitoring of animal diseases especially FMD makes it difficult to achieve proper control of the disease.

The lack of information exchange among countries of the regions and the uncontrolled importation of veterinary biologicals and vaccines as well as the absence of proper quality control add to the risk factors of more introduction of the disease to the region and more threat to the neighboring ones.

As an air-borne disease, the potential of the spread of the disease to adjacent regions is increasingly considered considering the geographical location of the Middle East and the increasing traffic and transportation of people and goods to and from the region. The ports of the Middle East and escalating volume of shipments and transit sector are other indirect and unforeseen threats.

Unfortunately, due to the importing capacity of the Middle East, the region was left behind the major international animal health programs that were elaborated for the control of major transboundary animal diseases including FMD. Countries of the Middle East were individually involved in different programs of other regions which led to more mistreatment of the region as a unique and integrated epidemiological block.
The last epidemics of FMD in Europe suggest that the disease may take a sudden and a strong comeback in any region. The effective control or eradication of the disease cannot be achieved with isolated country efforts, especially in those having common borders with several countries and in which veterinary practices differ. Concreted efforts of countries in the region are, therefore, required to curb such an important disease. This stems from the fact that the spread of this disease in the region negatively affects the Inter-Arab agricultural trade because of the stringent measures enforced by several countries. The situation becomes more critical after the recent establishment of the World Trade Organization (WTO) and the necessity of implementation of the guidelines and standards of the OIE.

1. Summary of the Foot and Mouth Disease in the Middle East

1.1. Current situation

FMD remains a significant drain on the budgets of the national veterinary services of the Middle East countries and on the livelihoods of livestock owners across the region. As from a national point of view, where control measures are rigorously applied, the disease involves heavy expenditure on diagnostic services, campaign of vaccination, stamping out policy, quarantine and carcass disposal measures. The disease is endemic, but periodic devastating epidemics occur that spread rapidly across national and regional borders.

FMD continues to limit the development of dairy industry in most of the Middle East countries, causing economic losses through decrease of milk and beef cattle production, and high mortality in young ruminants.

Although not quantified, the incidence and importance of FMD in small ruminants in the region is on the rise. Indirectly, FMD may be a predisposing factor to other microbial and/or nutritional diseases that lead to economic losses in these species.

In 2005 and 2006, the Middle East has been severely affected by two separate type A epidemics, one which emerged in Iran (A Iran 05) in 2005-2006, and an incursion of an African type A virus into Egypt causing widespread outbreaks in January-July 2006 (map n°1).

The new serotype A virus (A Iran 2005) was first observed in Iran and moved westwards into Turkey (including the European part of Thrace). It has continued to spread in 2006, circulating in Turkey and Iran, and which has been detected in Pakistan and Saudi Arabia.

In Turkey and Iran, the type A vaccines in routine use did not prevent the new strain from spreading.

Phylogenetic analyses revealed that the strain A Iran 2005 isolates from Iran, Turkey, Pakistan and Saudi Arabia formed a single genetic lineage distinct from previous virus strains present in the region, including A-Iran-96 and A-Iran-99. Vaccine matching tests revealed this new lineage to be antigenically more like A22.

The type A which affected Egypt, was diagnosed in 8 governorates in this country. Genetically, this new serotype A differs considerably from the Middle Eastern viruses and
was closely related to FMD viruses from East Africa. Antigenically, a vaccine incorporating A-Eritrea-98 would be expected to afford protection.

The lack of immediate vaccines against the A Iran 05 and A Egypt 06 viruses contributed to the large scale of the outbreaks.

In both of these events, the virus behaved essentially as if it were entering a naïve population with no immunity, and in both Turkey and Egypt, within 2 or 3 months of the index case, had spread almost of the extent of the cattle distribution.

In both case, the majority of geographical spread within the countries had occurred before notification of the index case to the OIE.

Type O remains endemic, but the risk of Asia-1 appears diminished with the last reported occurrence in Iran in August 2005. SAT viruses have not been reported in the region since 2003 (SAT-1 in Libya), but serological evidence of SAT infection in Sudan was presented.

Almost all countries operate vaccination programs in large ruminants, some in all ruminant species. These vaccination programs utilise vaccines from a wide variety of sources, including producers based within the region and international suppliers from Europe and India. The lack of standardisation may be a factor affecting control.
The table below summarize the FMD situation in the Middle Eastern countries, according to countries reports presented at the 3rd Roundtable Meeting on FMD control in the Middle East and North Africa, Damascus, Syria, November 6-7th 2006.

<table>
<thead>
<tr>
<th>Country</th>
<th>Bahrain</th>
<th>Cyprus</th>
<th>Djibouti</th>
<th>Egypt</th>
<th>Iran</th>
<th>Iraq</th>
<th>Jordan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statut</td>
<td>+</td>
<td>1964</td>
<td>2001</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>1999</td>
</tr>
<tr>
<td>Type</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>A</td>
<td>A, O, Asia 1</td>
<td>A, O</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Kuwait</th>
<th>Lebanon</th>
<th>Libya</th>
<th>Oman</th>
<th>Palestinian Territories</th>
<th>Qatar</th>
<th>Saudi Arabia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statut</td>
<td>+</td>
<td>+</td>
<td>2003</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Type</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>A, O</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Sudan</th>
<th>Syria</th>
<th>Turkey</th>
<th>United Arab Emirates</th>
<th>Yemen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statut</td>
<td>2005 (?)</td>
<td>2002</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Type</td>
<td>-</td>
<td>-</td>
<td>A, O, Asia 1</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

+ : presence  
- : not detected  
1994 : last outbreak occurrence

1.2. FMD hazards identified in the Region

The major routes of the FMD infection in the region are:

- From outside the Middle East Region:

The Middle East is surrounded by some other FMD infected areas such as Caucasian countries, Eastern and Western Africa and South Asia. The region is an important livestock import market without effective pre-import and quarantine measures. The second reason is the uncontrolled movement of animals across borders.

The spread of FMD strains exotic to the Middle East Region has been identified:

- East Africa.  
- Asian strains.  
- South America due to imports.  
- Other regions due to means of transportation and trade routes passing through the Middle east due to its geographic location at the cross-roads of the old world.
• From inside the Middle East Region:

Movement of animals within the Region is mainly governed by the characteristics of the animal population. The Middle East Region is characterized by the quasi-absence of pigs and the importance of small ruminants (443 million vs. 137 million cattle and buffaloes). The agro-pastoral system is predominant, which implies much livestock movement due to transhumance, drought or attraction of markets. Religious festivals and Islamic charity are also favoring livestock movement.

2. Livestock population in the Middle Eastern countries

Many countries in the Middle East have huge ruminant livestock resources, providing livelihood and employment to a high proportion of their populations and earn valuable foreign exchanger to the nation.

The Middle Eastern countries have considerable animal populations. The livestock sector, in particular sheep and goats, plays an important role in the national economy of the Region countries. The percentage of the Gross National Product (GNP) generated from agriculture in the high-income countries of the Region varies from 1 to 4 percent and in the low-income countries varies from 23 to 55 percent1.

The table below reports the animal population in the Middle Eastern countries sensible to FMD, in 2006, according to countries reports presented at the 3rd Roundtable Meeting on FMD control in the Middle East and North Africa.

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http://ergodd.zoo.ox.ac.uk/download/index.htm
The study of country declaration on their national livestock population\(^2\) shows stability from the last 5 years, and this tendency could be extrapolated for the next 5 years.

### 3. Livestock movement in the Middle Eastern countries

Most countries do not have an appropriate system to collect, analyse and notify statistical data on livestock and agricultural in general. Information on livestock available resources is often not complete or reliable.

#### 3.1. Import and export

Livestock products contribute significantly to the diets of both the rural and fast-growing urban populations. However, these relatively high levels of consumption are supported by import of animals and their meat from abroad. Of particular note here is the substantial import of small ruminants for the major Muslim festivals (Hajj, Ramadan and Eids).

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<table>
<thead>
<tr>
<th>Country</th>
<th>Cattles</th>
<th>Sheeps</th>
<th>Goats</th>
<th>Camels</th>
<th>Buffaloes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahrain</td>
<td>16 450</td>
<td>27 800</td>
<td>17 500</td>
<td>2 200</td>
<td>/</td>
</tr>
<tr>
<td>Djibouti</td>
<td>55 000</td>
<td>400 000</td>
<td>550 000</td>
<td>30 000</td>
<td>/</td>
</tr>
<tr>
<td>Egypt</td>
<td>2 531 200</td>
<td>2 602 650</td>
<td>1 329 500</td>
<td>149 500</td>
<td>2 234 000</td>
</tr>
<tr>
<td>Jordan</td>
<td>59 750</td>
<td>1 933 400</td>
<td>461 400</td>
<td>19 000</td>
<td>/</td>
</tr>
<tr>
<td>Kingdom of Saudi Arabia</td>
<td>300 000</td>
<td>1 300 000</td>
<td>6 300 000</td>
<td>800 000</td>
<td>/</td>
</tr>
<tr>
<td>Kuwait</td>
<td>14 000</td>
<td>1 000 000</td>
<td>100 000</td>
<td>100 000</td>
<td>/</td>
</tr>
<tr>
<td>Lebanon</td>
<td>85 000</td>
<td>350 000</td>
<td>450 000</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Oman</td>
<td>230 640</td>
<td>233 000</td>
<td>882 600</td>
<td>104 700</td>
<td>/</td>
</tr>
<tr>
<td>Palestinian Authorities</td>
<td>11 200</td>
<td>540 000</td>
<td>248 500</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Qatar</td>
<td>14 800</td>
<td>214 530</td>
<td>178 500</td>
<td>50 800</td>
<td>/</td>
</tr>
<tr>
<td>Sudan</td>
<td>33 103 000</td>
<td>39 835 000</td>
<td>36 087 000</td>
<td>2 936 000</td>
<td>/</td>
</tr>
<tr>
<td>Syria</td>
<td>930 000</td>
<td>13 800 000</td>
<td>1 100 000</td>
<td>8 800</td>
<td>1 300</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>68 900</td>
<td>450 000</td>
<td>120 000</td>
<td>200 000</td>
<td>/</td>
</tr>
<tr>
<td>Yemen</td>
<td>1 400 500</td>
<td>5 029 000</td>
<td>4 452 500</td>
<td>198 500</td>
<td>/</td>
</tr>
</tbody>
</table>
Many millions of live ruminants are imported into the Middle Eastern countries each year from around the world, including especially greater Horn of Africa countries, East Asia, Iran, Turkey, Europe, South America, Australia, and New Zealand (Map n° 2). On various occasions over the past decade, diseases, such like FMD, have spread from the Greater Horn of Africa to the Arabian Peninsula and from there into the Mediterranean Basin.

Livestock trade in the region is driven by demand from the Gulf States (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and UAE), which collectively imported near 80 % of the recorded 13.2 million live sheep, goats and cattle imported in 2005 in the region.

The table below reports the livestock imports (cattle, sheep, and goats) in 2005 in the Middle Eastern countries. 

<table>
<thead>
<tr>
<th>Country</th>
<th>Cattles</th>
<th>Sheeps</th>
<th>Goats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahrain</td>
<td>748</td>
<td>98 258</td>
<td>6 510</td>
</tr>
<tr>
<td>Djibouti</td>
<td>No data</td>
<td>No data</td>
<td>450</td>
</tr>
<tr>
<td>Egypt</td>
<td>18 571</td>
<td>2 294</td>
<td>No data</td>
</tr>
<tr>
<td>Jordan</td>
<td>20 886</td>
<td>571 551</td>
<td>100 760</td>
</tr>
<tr>
<td>Kingdom of Saudi Arabia</td>
<td>26 998</td>
<td>6 042 607</td>
<td>502 038</td>
</tr>
<tr>
<td>Kuwait</td>
<td>4 908</td>
<td>1 898 399</td>
<td>32 455</td>
</tr>
<tr>
<td>Lebanon</td>
<td>203 531</td>
<td>64 428</td>
<td>3 182</td>
</tr>
<tr>
<td>Libya</td>
<td>2 013</td>
<td>10 592</td>
<td>25</td>
</tr>
<tr>
<td>Oman</td>
<td>39</td>
<td>395 638</td>
<td>160 180</td>
</tr>
<tr>
<td>Palestinian Authorities</td>
<td>9 411</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Qatar</td>
<td>829</td>
<td>559 546</td>
<td>45 334</td>
</tr>
<tr>
<td>Sudan</td>
<td>2</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Syria</td>
<td>8 230</td>
<td>34 907</td>
<td>No data</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>3 518</td>
<td>522 540</td>
<td>516 714</td>
</tr>
<tr>
<td>Yemen</td>
<td>172 354</td>
<td>7 467</td>
<td>1 164 117</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>472 038</strong></td>
<td><strong>10 208 227</strong></td>
<td><strong>2 531 765</strong></td>
</tr>
</tbody>
</table>

For all countries and species, imports far exceed exports, except for sheep exports from Syria (2 821 145 in 2005) and Sudan (1 147 028 in 2005), and there is, therefore, a major net inflow of livestock into the region.

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3 source FAOSTAT : http://faostat.fao.org
In 2005, Kingdom of Saudi Arabia was by far the largest importer of live animals, with 6.04 million sheep and 500,000 goats. Kuwait was the next largest sheep importer, followed by Jordan, Oman, UAE, Qatar and Bahrain.

Sudan (122,000) and Oman (103,385) were the main exporter of live goats with 855,000 recorded exports in 2005.

More and more the supply from free FMD countries, notably for the Arabic Peninsula countries needs, is difficult linked to the cost of animals and transport (Australia, South America) and to the incapacity to those countries to respond to such a demand. Thus, the importation flow involve the African Horn countries (Somalia, Sudan), where FMD is uncontrolled but where the production is sufficient with a competitive cost. Turkey and Iran represent also a significant source of sheep and goats for Middle Eastern countries.

Omniscient of the risk of such trade, the Arabic Peninsula countries, wish to collaborate with the African Horn countries to implement the security of such trade, notably with the building of Pre Export Quarantine Station and upon sanitary certification elaborated in the respect of the OIE’s recommendations.
3.2. livestock movement involved by specific production systems

The Middle East has long been a focus of attention for animal health professionals because it supports very large numbers of ruminant livestock – especially sheep. Much of the region is arid or semi-arid, which drastically limits the potential availability of natural pasture. Much of the area cannot support grazing for large parts of the year – because it is too dry, too cold, or is covered in deep snow.

In an area that has been settled for longer than most other parts of the world, it is to be expected that a wide range of traditional management systems have evolved to optimise the use of the grazing that is available. Many rely on movement – either nomadic pastoralism or seasonal transhumance – to winter and summer pastures, or less regular movements to reach the unpredictable patches of grazing characteristic of very low rainfall areas. Though these are slowly giving way to more intensive husbandry techniques that rely on supplementary or stall feeding, opportunism is still a widely practiced strategy.

The Middle East thus supports an unusually mobile livestock population (map n° 3), in areas with particularly variable grazing distribution patterns. Add to this the fact that there is a very large volume of international trading, driven to a great extent by the demand for small ruminant meat from the Gulf States, and from the pilgrims to the annual religious season in Mecca. This draws animals from all the Middle Eastern states, many getting there by foot rather than mechanised transport.

Such fluidity has significant consequences for the spread of animal diseases, both infectious and vector borne. Though rather poorly understood, at least in quantitative terms, it is widely assumed that such pronounced mobility magnifies the risk of an outbreak spreading extensively over large areas.

The fact that the animal populations are densely concentrated in rather limited areas, and often to smaller areas of suitable grazing for parts of the year, or kept in stalls and feedlots for considerable periods, is likely to exacerbate the potential for disease transmission. There is thus a real possibility of, for example, Foot and Mouth Disease originating in Pakistan reaching the Gulf and Turkey in a relatively short period. The potential threat to the highly developed European agricultural industries should not be ignored.

This is highlighted by geographical studies on livestock movement in the region, which establish links between Europe and South Asia threw the “Eurasian Ruminant Street” involving Pakistan, Afghanistan, Iran and Turkey, and where Iran take up a central position.

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5 Jan Slingenbergh, 2003, Clarifying diseases spread in the Eurasian Ruminant Street, Report of the 35th Session of EUFMD, Rome, App.10
Indirect movement

Intercountries movement

Map n° 3: inter-country movement of animals especially small ruminants

4. Actual surveillance and control of FMD disease in the Middle Eastern countries

These critical points have been highlighted during the 3rd Roundtable Meeting on FMD control in the Middle East and North Africa:

- Most countries have limited capacities in the early detection of new strains;
- The lack of information exchange between countries and to the international organisations has contributed to the scale of the type A epidemics experienced in the region in 2005-6;
- The monitoring of the circulating strains of FMDV, through reference labs, is inefficient. In 2005-2006, the lack of sample submission to reference labs had contributed to a lack of early warning and contingency planning for virus type to which type A vaccination programmes were not adapted;
• Only a few countries in the region have developed and formalised their contingency planning against FMD;
• With few exceptions, vaccination strategy is either poorly planned or entirely lacking in most of countries;
• Most of the vaccine serotypes used in the region are not matching with the local serotypes;
• Live animals and animal products are largely imported from regions and countries that have been practicing vaccination against the disease, within the entire country or parts of it or FMD free with vaccination with no previous assessment of the vaccination programs in the exporting countries and/or their national surveillance plans.
• No country in the region currently maintains an antigen bank;
• The diagnosis facilities for FMD are not well developed, thus, in 2005-2006, there have been serious delays in diagnosis of the new type A viruses because diagnostic tests were not optimised for the type A infections;
• There is a need to build confidence in laboratory capacity in the region for early detection of new strains, and for monitoring of vaccination programs and sero-surveillance;
• Most Middle Eastern countries have a national reference laboratory for FMD, but that there is significant variation in capacity, in bio-safety, and in standardisation of FMD tests, leading to lack of confidence in laboratory results, which affects trade prospects;
• Many countries lack the experience in design of surveillance in potential export or FMD free zones, or following FMD outbreaks;
• Some countries, which are not meat exporter, don’t identify FMD control as a priority for their own country or don’t have sufficient and effective resources to be involved in such control.

5. Short term perspectives and risk transmission to neighbouring regions

The new serotype A virus (A Iran 2005) has continued to spread in 2006, circulating in Turkey and Iran. The Egyptian new serotype A still affects this country, representing a threat for the neighbouring countries.

The detection of the A-Iran-05 in Pakistan and Saudi Arabia in 2006 produces the proof.

Further spread of the A- Iran- 2005 and possibly A- Egypt- 2006 viruses to countries in the Near-East is likely to occur unless effective preventive measures are taken and so their uncontrolled spread represents a high risk of transmission to neighbouring countries.

The presence of the A-Iran-2005 in Thrace, at the borders from Greece and Bulgaria, is also an important threat of virus introduction into the European Union countries.

In the past, exotic strains of FMD virus were involved in panzootics, covering large areas in the region, extending as far as the frontiers of Europe. Such panzootics included outbreaks of FMDV types Asia 1 (1957-1964, 2000), SAT 1 (1962-1964), and A22 (1964-1965, 1996). The recurrence of such situations is not a remote possibility, due mainly to the continuous influx of live sheep for slaughter, principally into the Arabian Peninsula. Animals from Africa and Asia can readily introduce strains of FMDV which then spread among the local ruminants, particularly nomadic sheep and goats. These animals may then further disseminate the virus into large-scale, commercial dairy farms.
Serotype SAT 2 was introduced into Saudi Arabia as recently as 2000, later appearing in Kuwait (2001) and Libya (2003). It appears that the recent spread tracks are similar to those described in the past; namely, that FMDV was probably introduced into the Arabian Peninsula from the Horn of Africa, and then spread from the Gulf States in a north-westerly direction.

Then, the Middle East region is much more complex than other regions, regarding its geographical location, at the crossing of three continents, and due to the specificity on animal trade.

The Middle East has also become the largest importer of food and animal feed in the developing world, due to a rapidly growing population. Imports, principally of live sheep (an annual figure of more than 10 million, almost 64% of the global trade in live sheep) and animal products, now account for more than 25% of the total import bill for the region.

Special events or occasions, such as the Hajj season, may involve the ritual slaughter of millions of animals. The meat of all those animals slaughtered during the day of Hajj is also distributed charity wise to 52 Muslim countries worldwide. This could be also an important source of contagion, considering that the conditions of slaughter and meat conservation are not often offering all the guarantees regarding FMD virus.

The proximity and importance of trade with countries in the Horn of Africa (Somalia, Djibouti, Ethiopia, Sudan notably), and in west and central Asia, has the potential to introduce exotic FMD viruses from these regions.

In Africa, the epidemiological information is scarce and insufficient samples are received each year to determine major trends, although types A, O and SAT 1, 2 and 3 have been detected from outbreaks in 2006. In Asia, the circulation of several genetic types of FMDV serotype Asia-1 is a concern, highlighting the fact that at any time multiple virus strains are simultaneously circulating, and which may be a risk to the Middle East where vaccine against Asia-1 is not used in all countries.

As a large part of the trade is realised in illegal ways or without the relevant sanitary certification, the control of the virus spread at a national or regional level is excessively problematic.

This situation is all the more worrying as most countries have not the capacities to implement a coherent and reasoned strategy of prevention and anticipation face to such disease.

Indeed, regarding absence in most countries of biosecurity measures, including strict border control, early detection program for new strains, confidence in analyses realised by the national labs, epidemiological survey, vaccination monitoring, contingency plans….are as many factors promoting the spread of the disease, notably the epidemic form.
6. Conclusion

FMD is an endemic and widely spread among various animal species in the region. It is, therefore, very difficult to control the disease at a single country level.

The increase of animal movement between neighboring countries in the region, where FMD is uncontrolled, makes the disease control even more difficult.

The presence of different strains and variants of the FMD virus in different countries makes the correct diagnosis and development of specific vaccines a crucial task.

FMD in the Region is perceived differently according to the type of farming system. In the intensified livestock sector (modern dairy cattle farms), the economic consequences are important. Farmers who are interested in extending their market face sanitary barriers either under informal intra-regional trade restriction or under the WTO and SPS Agreement. For the farmers from the traditional sector, FMD infection is often mild with a low mortality rate and consequences are perceived only when a new strain is involved. This the actual trend on handling the disease issue in the region.

As a consequence, the control of external and internal sources of FMD is not systematically addressed in the Region. At the national and regional levels, systems for early detection of the disease or of the emergence of new strains are needed. Furthermore, implementation of adapted control strategies has to be strengthened.

Since the early sixties, whenever there was an outbreak of FMD in the Middle East, high concern was always expressed that the disease might invade Europe.

Thus, to control FMD worldwide, the situation of this disease in Middle Eastern countries should be treated as a priority.

So, the implementation of a regional project to control FMD in the Middle East is essential. It is also political wise to increase the scientific and technical cooperation with the region during this very important political transition which will have a very positive impact relevant to the historical and long term relationships with the people of these significantly important countries.

This was highlighted during the 3rd Roundtable Meeting on FMD control in the Middle East and North Africa, Damascus, Syria, November 6-7th 2006, where one of the major recommendation made is to implement such project within the OIE/FAO global framework of the progressive control of transboundary animal disease program (GF-TADs) and co-coordinated by the Regional Animal Health Centre (RAHC) established to provide expertise and assistance especially in major emergency cases in the region.

Appendix: Recommendations of the 3rd Roundtable Meeting on FMD control in the Middle East and North Africa, Damascus, Syria, November 6-7th 2006
Appendix: Recommendations of the 3rd Roundtable Meeting on FMD control in the Middle East and North Africa, Damascus, Syria, November 6-7th 2006

Considering that:

1. FMD remains a constant drain on the budget of veterinary services across the region, and that periodic devastating epidemics occur that spread rapidly across national and regional borders;
2. Live animal movement, through regulated trade or by illegal movement, from regions not free of FMD is a feature of livestock trading patterns in the region, and contributes to the risk of FMD entry, and can be expected to continue in the future;
3. West Asia, and East Africa remain potential threats for countries in the eastern and central parts of the MENA region, and that virus submission to Reference Laboratories from these regions remains inadequate;
4. Lack of information exchange between countries and to the international organisations has contributed to the scale of the type A epidemics experienced in the region in 2005-6.
5. The lack of immediate vaccines against the A Iran 05 and A Egypt 06 viruses contributed to the scale of the outbreaks.
6. The new serotype A virus (A Iran 2005) has continued to spread in 2006, circulating in Turkey and I.R. of Iran, and which has been detected in Pakistan and Saudi Arabia in 2006;
7. That further spread of the A Iran 2005 and possibly A Egypt 2006 viruses to countries in the Near-East is likely to occur unless effective preventive measures are taken;
8. The location and risk from other exotic viruses, should be kept under review by each country, including the continuous circulation of Asia-1 in south and east Asia;
9. The Type O remains endemic in the Near-East;
10. The dynamic disease situation requires continuous monitoring, not least because of first detection of new strains in the centre of countries rather than at the borders, and because of rapid animal trade movements;
11. That FMD vaccines can rarely contain all the required antigens to protect against the diversity of viruses expected in the region, and that priorities for each species are needed to reduce cost;
12. That antigen banks are an option for countries to hold sufficient stocks of antigen for immediate formulation in emergency situations, and which can reduce the need to vaccinate against some virus types;
13. That no country in the region currently maintains an antigen bank, and that only a few countries in the region have developed and formalised their contingency planning against FMD;
14. That there have been serious delays in diagnosis of the new type A viruses because diagnostic tests were not optimised for the type A infections;
15. That there is a need to build confidence in laboratory capacity in the region for early detection of new strains, and for monitoring of vaccination programs and sero-surveillance;
16. That most MENA countries have a national reference laboratory for FMD, but that there is significant variation in capacity, in bio-safety, and in standardisation of FMD tests, leading to lack of confidence in laboratory results, which affects trade prospects;
17. Progress has been made in the validation of NSP (non-structural protein) antibody tests for the major species, but that many countries lack the experience in design of surveillance in potential export or FMD free zones, or following FMD outbreaks,
Recommends that:

**Relating to control of FMD in MENA region:**

1. The whole of the Middle East and North Africa areas should be considered as one FMD epidemiological region, but with possible subregions reflecting different ecosystems for circulation of FMDV strains, requiring a set of co-coordinated prevention, control and eradication programs to be elaborated covering the entire region at risk;
2. Transparency in notification of FMD outbreaks should be strongly implemented within the region to assist an effective response and control of FMD;
3. FMD suspected samples to be sent to the international reference laboratories should be accompanied a comprehensive epidemiological report, including the geo-reference, to assist early warning and tracing the likely pattern of disease spread;
4. Coordinated action across borders and sanitary measures should be strengthened by imposing appropriate quarantine measures on animal movements whenever the disease is reported;
5. Systematic vaccination campaigns of ruminants should be encouraged in all areas at risk, especially in border areas, that are designed to reach a population immunity that will effectively prevent FMD spread, using appropriate vaccines that meet international standards; Procurement of vaccines should consider the recent FMDV antigenic subtypes in the countries of the region as well as the antigenic relationships to the virus isolates circulating in neighboring countries;
6. A strategy to achieve international recognized disease free zones or FMD free country status must be developed in the region, within the framework of the progressive control of transboundary animal disease program (GF-TADs);
7. in support of the above, each country is encouraged to “map” their ruminant livestock population in the country, and consideration should be given to developing a standard format for livestock population mapping that is applicable across the region, and which will assist each country in planning disease control measures;
8. The countries of the region establish an FMDV network, co-coordinated by the Regional Animal Health Center (RAHC), to facilitate exchange of information and to respond rapidly to a emergence of any new serotype in the region;
9. Member Countries of the Middle East region are urged to develop, test and keep a regularly updated national foot and mouth disease preparedness plan that will assist them to ensure a rapid and effective response to new epidemic events;

**Relating to early warning of FMD risk in the MENA region:**

1. the information flow to MENA countries on the change in FMD risk should be improved, with regular summaries of the situation and alerts with follow ups when major events occur that threaten parts of the region;
2. each country ensures that epidemiologically significant events are detected, acted upon and reported without delay; early recognition of these events can be helped by using DEFINITIONS of abnormal field and laboratory findings, such as increased incidence of FMD, the detection of a new subtype, or possible breakthrough of FMD in well vaccinated herds;
3. when threatening events of regional significance are identified, emergency meetings be rapidly convened by the RSC to assess the risk and necessary international response;
4. the Regional Steering Committee of GF-TADS organise regular roundtable meetings on FMD prevention and control, at least at yearly basis;
5. each country re-assesses the risk of entry of the prevalent epidemic viruses in the region, including the A Iran 05 virus type, and takes appropriate actions, including vaccination, to reduce risk of introduction and spread;
6. increased effort to collect and submit samples for virus typing is made by countries which have an epidemiological importance in the region, particularly Iran (as indicator for west Asia), Yemen (as an indicator for the Horn of Africa), and Sudan. For the Maghreb countries (North Africa), increased effort is mainly needed in the West African countries to the south of this region. International support from the FAO and/or OIE should be requested to reduce the cost of submission of samples that are of regional importance.

Relating to improved control of epidemic FMD:

7. that each country develops and formalises a contingency plan for FMD that addresses the particular problem of entry of an exotic type of FMD virus to which the regular vaccination programs do not protect (see no. 11 above);
8. that each importing country that imports live animals from countries not free of FMD has in place a contingency plan to address the risk of virus entry from that region, that will assist to build confidence in animal trade with such countries and reduce restrictions, in full compliance with the OIE Animal Health Code
9. that each country considers establishing a national antigen bank to ensure rapid availability of potent FMD vaccines for use in emergencies;

Relating to priorities for inclusion in vaccination programs and in antigen banks:

10. each country re-examines its selection of FMD vaccines to ensure that the purchased vaccines meet or exceed OIE standards and the antigens are appropriate to the international risk situation;
11. that the WRL, through the OIE and FAO, is requested to produce a list of priority antigens for inclusion in vaccination schedules in the MENA countries on a regular basis; the list should be reviewed by the RSC or a task force nominated by this group, before being made publically available;
12. that the recommendations of the WRL to the 3rd Roundtable are noted by MENA countries, who should be aware of the elevated importance of A22 Iraq antigen (to protect against A Iran 05), and A Eritrea 98 (to protect against the A Egypt 06);
13. that efforts be made to address gaps in knowledge of vaccines to be used against the circulating virus types in parts of sub-Saharan Africa which provide a source of exotic FMD viruses to the MENA countries; the international organisations should provide support if the countries themselves are unable to do so;

14. that the RSC or a nominated task force develops guidance on the subjects
   a. harmonisation of vaccination in the MENA region to ensure coverage against the most prevalent (priority) viruses;
   b. vaccination of small ruminants;
Improving laboratory capacity and harmonisation of FMD laboratory test performance in the region

15. that member countries ensure that their national laboratories re-assess their methods and reagents to ensure that diagnostic tests are appropriate for detection of the current A (including A Iran 05, A Egypt 06), O, Asia-1 and SAT types expected in the MENA region;

16. that NRLs in the MENA region be encouraged by their national authorities to participate in the international FMD laboratory standardisation exercises organised by FAO through the WRL at Pirbright;

17. that participants in the Roundtable encourage or organise assessment missions to their NRLs for evaluation, and which will guide the potential establishment of a regional reference laboratory (RRL);

18. the RSC develop guidelines for biosecurity of laboratories that will assist compliance with OIE and are feasible throughout the region;

Epidemiological support for planning of FMD preventive and control measures;

19. that the RSC establish an epidemiology advisory group to assist in response to request from countries for technical support, for example

   a. in the design of surveillance programs for establishment of export zones in the MENA region

   b. in the design of sero-monitoring programs post-vaccination

20. that the RSC consider nominating one or more centres of expertise in the region to promote the application of modern epidemiological tools and methods to improve planning of FMD control measures; one such centre could be in Iran, making use of epidemiological capacity of the Iranian Veterinary Organisation and the support received from the FAO/EC and another one elsewhere in the MENA region, with the help of the international organisations.