Introduction

Foot-and-Mouth Disease (FMD) is endemic in the Anatolia Region of Turkey, due to two serotypes. Types O and A have been circulating in the region and cause big economic losses and negative impact on livestock. Outbreaks due to type Asia 1 have not been reported since April 2002 in Turkey. There is no outbreak recorded in Thrace region since October 2007.

Due to the incursion of the virus from outside of the country, two big endemics have been experienced since 2005, which were new genotypes of type A and O viruses, A Iran 2005 and O Pan-Asia II respectively. The former was introduced into the country at the end of the 2005, and resulted in over 1500 outbreaks during 2006. Later, the devastating epidemic was taken under control. The latter was followed end of the year which was also continued occurrence of new outbreaks during the 2007 resulted over the 800 cases all over the country.

This report is looked over impact of those two endemic originated during the last two years and emphasized control measures and activities during the period and next two years.

I. OUTBREAK SITUATION

1.1. FMD situation in 2007

Turkey was got under the high risk with circulating a severe virulent new O subtype, O Pan-Asia strain, because of up-surging this new sub-strain from outside of the country. Epidemiological investigation and molecular epidemiologic studies were indicated that O Pan-Asia sub-strain was introduced to Turkey up to October 2006, beside existed domestic strains O Manisa/ O Alfa 05 topotype, which were caused a few outbreaks before the October 2006. Outbreaks were recorded mostly with type O, a total of 809 outbreaks were detected, 482 of by type O, 56 of by type A and 271 not typed in 2007 (fig.1; Map.1,2 and 3).

Although it was recorded 52 outbreaks with type O in 2006 and those isolates were dropped in O Alfa 05 lineage genetically, the numbers of type O outbreaks were increased at beginning of October 2006. Because of the effects of animals movements during the Kurban Festival (end of the year), viruses were spread all over the country and numbers of outbreaks were reached on pick (119 outbreaks due to the type O) on January 2007. According to genetic analysis of isolates, a new type O Pan-Asia II sub-strain was detected first time at Selvioglu village in Usak on 8th October 2006. The sequence data which was obtained in Ankara FMD Institute showed that this virus was closely matched with viruses isolated in Iran in 2006. It is uncertain that whether this was index case or not for the new sub-strain. Since Usak province is located west of Turkey, in Aegean Region, it was probable that it might be occurred another case in East Region of Anatolia, close to Iran border. It is probable that the disease with type O Pan-Asia sub-strain was occurred in another place where is near to border after the entrance into the country. However, it is clear that this was available first evidence indicated genetic changing of circulating viruses. Many further sequence data which was made in Ankara FMD Institute on between October 2006 and March 2007 also supported that O Pan-Asia strain was circulated all over the country. Those studies indicated that the isolates were not only close to Iran isolates but also they were close to isolates of Middle East Region, particularly of Jordan. The recent data made on March showed that isolates collected from Şırnak Province in southeast region of Turkey, near to Iraq/Syria border were close to these lineages.

Although it was detected genetically differences of O virus as Pan-Asia and affected severe clinically on animals, recent available antigenic studies, R Value ELISA, show that there has been no changing antigenically, which O1 Manisa vaccine strain has been covered both sub-strains. The data for type A 05 Iran outbreaks which detected as limited number in 2007 show that it has been closed to their genetic lineages and given high protection well antigenically.

Since it was existed high level immunity by post infection originated latest two endemics and massive vaccination, the disease was gradually decreased end of the year. In addition of these facts, effective control measures during the whole year and particular control measures before
and during the Kurban Festival were also implemented in order to detain transmission of existed virus sources. In favour of all those facts, disease was get under the control end of the year.

In 2007, four outbreaks were detected in Thrace Region, because of uncontrolled animal movements after the Kurban Festival. Outbreaks occurred in this region were limited within the village, majority of them within the premises where disease occurred. All cases were controlled successfully without spread the extent of the region by effective measures including stamping out and no outbreaks were recorded within the last trimester of the year.

1.2. Disease situation in 2008

In this year, there was a gradually decreasing the number of the outbreaks and severity of clinical signs. It was not observed shift of outbreaks after the Kurban Festival as usual before, because of effectiveness control measures taken place before and after festival. Overall 253 outbreaks were occurred in Anatolia region of Turkey; 52 of by type O, 143 of by type A and 58 not typed in 2008 (fig.2 and map.4). Although there was significant decreasing of number of outbreaks when compared with 2007, it was observed differences regarding to epidemiological event. While dominating circulated virus type was type O in 2007, majority of outbreaks were recorded due to the type A in 2008. Outbreaks with type O were commonly circulated in limited area, on the contrary type A was dispersed almost all over the region. Because of natural immunity raised from highly common type O outbreaks occurred in previous year, high level protection by effective vaccination and sufficient control measures, type O virus was suppressed which was resulted occurrence limited number of type O outbreaks. After the occurrence 29 outbreaks d to the type O up to June 2008, it was occurred rarely in the summer time with the same type. However, totally not eliminated, rare maintained type A virus was found host receptor availability this time in the same population which was resulted increasing of number of outbreaks by type A during the this year. Genetic and antigenic evolution mainly played a part in this changing. Starting the beginning of the year it was observed gradually genetic diversity and finally detected antigenic changing on July 2008. Since vaccine strain, A22 Iraq, was not protected current circulated field isolates by proofed antigenic characterization study, it was decided changing with A Turkey 2006. However because of limitation of time for adaptation a new strain, autumn vaccination campaign was conducted with old partially protective vaccine strain, A22 Iraq. It was probable that this epidemiological change affected the increasing number of outbreaks.

1.3. Current disease situation

In this year (up to 10\textsuperscript{th} April), it has been recorded as a total 45 outbreaks in Turkey; 17 of due to type O, 10 of due to type A and 18 of due to not typed (fig.2 and map.5).

When it has been look over this year situation, it seems number of outbreaks have been decrease sharply and clinical signs in affected population was observed very mild. Disease is not spread all over the premises and all population, only it was limited in young primo-vaccinated population. That observed also a good progress regarding to risk assessment is recorded a few outbreaks the first time after the Kurban festival which were limited in exact area in which Erzurum, Erzincan and some provinces in Inner Anatolia. On the other hand, it seems that there has been a shift on recorded outbreaks in March when compared with previous two months. When it makes a risk assessment given the facts of the country dynamics of disease pattern, the shift observed on March can be turned to account as usual in spring time of year. Movement of animal to pasture from inside of barn starts this session which causes such a virus transmission. Because of hard climate condition, virus can be maintained easily its live life cycle in such a long winter condition and spread easily by such a movement. Since the time also coincides end of vaccination campaign interval, it is normal to get naïve animals regarding to protection, particularly in young primo-vaccinated animals. These two epidemiological events are help to be formed shift of number of outbreaks in this period of year.

It is considered that since vaccination campaign has been started beginning of March, in a short period this shift can be easily suppressed by effective vaccination.

Evaluation of disease situation in this period

1. A good trend was observed in 2009 compared two years. Numbers of outbreaks gradually were decrease. This decline was also observed on number of affected animals. It was observed that disease was not spread to good vaccinated population, particularly in the
west region. There was no outbreak in Thrace region during the period and also serosurveillance conducted in this region straighten out this observation;
2. Severity of clinical sign was got mild and disease was not extended to all ages of population, generally only observed young primo-vaccinated animals by effective vaccination;
3. There was no indication straighten out by molecular analysis and epidemiological investigation on the new incursion from the outside of the country. However there was a genetic evolution for the circulation of the virus within the country. Both virus types, type O Pan-Asia II and A Iran 05 have been parted sub-lineages as genetically;
4. Antigenic characterization studies showed that A22 Iraq vaccine strain was covered to new introduced type A Iran 05 end of the 2005 (When the virus first time introduced the country). However the type A field isolates were develop evolution in the course of time and it finally was detected antigenic difference on July 2008 which resulted changing the vaccine strain with suitable one, A Turkey 2006.

II. CURRENT CONTROL POLICY

Objective of the current control policy

That the main objective is to get under control endemic disease situation in order to stop spread of virus and to be ready to implement individual case study which each new outbreak can be investigated and potential source identified.

Elements of control measures

1. Surveillance for borderline: In order to prevent entrance of new virus types into Turkey, a surveillance program has been introduced in the East and the South Eastern border regions;
2. Active and passive surveillance: To identify FMD transmission, active clinical surveillance in case areas and passive surveillance for collection required information and identification of disease pattern is conducted;
3. Diagnosis activities and research: FMD (Sap) Institute, National Reference Laboratory, conducts all research activities regarding to FMD control:
   a. Diagnosis;
   b. Molecular (genetic) analysis;
   c. Antigenic characterization for vaccine matching;
   d. Epidemiological investigation for support identification of disease pattern.
4. Serosurveillance activities:

Two main serosurveillance have been implemented:
   a. Thrace Serosurveillance
      Objective:
      1. To gain free state of FMD in the region, it has been conducted a three years serosurveillance program (2008-2010).
   b. Anatolia Serosurveillance
      Objectives:
      1. To provide an estimate of the proportion of seropositivity to non-structural FMD proteins in cattle Anatolia;
      2. To assess vaccine efficacy in selected provinces by measuring antibody levels to structural FMD proteins at day 30 post-vaccination in cattle;
3. Vaccination:

Mass vaccination policy is the main element of the control program against FMD. Vaccination Program has been implemented by framework of the European Aid Project (to be described in further chapter) in three years periods, 2008-2010. Objective of the vaccination is reach to 100% coverage of whole ruminant population. However, because of shortage of the vaccine supply, small ruminants were vaccinated partially in 2008.

- Vaccination strategy
  o Large Ruminant:
    Application of routine mass vaccination twice a year all large ruminants;
Small Ruminant:
Application of routine mass vaccination **once a year** all small ruminants.

### 2009 Spring Vaccination Campaign

Spring vaccination campaign for 2009 has been started 1st of March and finalized end of the April. It has been planned vaccination for all Large Ruminants population, because of tender schedule, vaccination for small ruminants was postponed to Autumn campaign. Data for vaccination coverage will be submitted the end of the campaign.

4. **Control of Animal Movements**
   - Through an Acting Order, Provincial Agriculture Directorates have been instructed on the vaccination of at least 85% of the bovine population against FMD to maintain herd immunity;
   - The same Acting Order states that animal movements will not be allowed from provinces in which less than 85% of the bovine population has been vaccinated against FMD;
   - Pursuant to Circular Orders numbered 2009/10 and 2009/11, the entry and exit of live ruminants and animal products are prohibited in outbreak areas;
   - Furthermore, according to the Circular Orders indicated above, the entry into Thrace region of bovine, ovine and caprine animals, other than those destined for slaughter, is not allowed.

5. **Outbreak Investigation and case study:**

   To stop the virus circulation
   - Restriction of animal and animal products movements;
   - Quarantine;
   - Ring vaccination;
   - Sampling for type identification and molecular and antigenic characterization;
   - Data collection and reporting.

have been implemented.

### Changing of the control policy during the two years:

According to objectives of Europe Aid FMD project, some new changing on control measures has been implemented:

a. Up to 2008, vaccination mainly was focused on large ruminants, vaccination of small ruminants was not compulsory and only was applicable on demand in the Anatolia; vaccination has been targeted to cover whole ruminants population since 2008;

b. In this new period, vaccination has been implemented as charge of free;

b. Pursuant to Cabinet Decision 2009/14850 on the Subvention of the Livestock Breeding Sector, for the purpose of combat with animal diseases, private veterinary practitioners are also appointed in vaccination campaigns;

d. Pursuant to the Cabinet Decision indicated above, the subvention of breeder animals is conditional on their being vaccinated against FMD;

e. A serosurveillance was implemented first time in Anatolia region in 2008 in order to estimate of the proportion of sero-positivity to non-structural FMD proteins and also this will be continued;

f. To prevent virus circulation and eliminate transmission risk, a specific control measures was initiated before and after Kurban festival, particularly design on impermanent animal market, animal movement for festival to big cities and movement of unsold animal. This measures help to reduce the risk for disease transmission particularly to Thrace region.

### III. CHANGING IN CAPACITY FOR CONTROL POLICY

Ramping up capacity to implement the control policy for FMD in the past 2 years is as follow:

a. Vaccination coverage has been reached 90% (as overall) from 72% in cattle population campaign in 2008. This is targeted to 100% for 2009 (map 6 and fig. 3);

b. 1/3 population of small ruminants was vaccinated (because of vaccine shortage, not realized the objective, 100%). It will be expected when vaccine for small ruminants will be supplied fully this year, it will be try to realize whole coverage;
c. Serosurveillance capacity has been reached to at least 60,000 sera once a year from 15,000 sera;

d. A new diagnostic method as alternative to conventional methods, multiplex PCR to allow typing of FMDV was launched at NRL in order to early detection. This method identifies the virus earlier than antigen detection ELISA/VI methods and also reduces negative results from epithelium samples;

e. Over the 1500 new veterinarians were designated for field veterinarian service which helps to achieve more vaccination coverage and the others relevant services.

IV. SUPPORTS PROVIDED BY EuFMD OR EU HAVE ASSISTED THE NATIONAL CONTROL POLICY IN THIS PERIOD.

A. Supports by EU
   a. Starting in 2008 a new control project (Europe Aid Project for control of Foot and Mouth Disease, Project no: TR 060302) with a budget of 64,692,332 million Euros was initiated for three years.
      Objectives of project:
      Control of FMD in Turkey by mass vaccination policy in accordance with other EU control measures such as animal identification, movement and market.
      Activities:
      Vaccination, Sero-surveillance and Cleaning and Disinfection.

B. Supports by EuFMD
   a. Thrace region serosurveillance activities: Financial and technical supports were donated for realization surveillance activities; such as donated serosurveillance materials and technical assistance for design and analysis of surveillance;
   b. Anatolia Animal market and Slaughterhouses Serosurveillance: Materials were donated by EuFMD for this study;
   c. Outbreak Investigation: To understand and identify the disease spread dynamics and train field vets on the outbreak investigation, a project was conducted by assistance of EuFMD;
   d. Epidemiological training course: To develop epidemiological skill and knowledge at General directorate of Control and Protection (GDCP) and Sap Institute, it has been initiated a epidemiology training course.

V. VISIONS ON THE CONTROL POLICY FOR NEXT 2 YEARS

1. Application to the OIE for the declaration of Thrace as free from FMD with vaccination: It is foreseen that freedom from FMD with vaccination will be attained with the final serosurveillance results obtained, in the General Session of the OIE in May 2010;

2. Further Eradication of FMD in Defined Zones: Based on the reports and conclusions of the EU-funded technical assistance to be received for the OIE application for Thrace, new zones will be determined for the further eradication of FMD in Turkey;

3. Gradual decrease in the number of FMD outbreaks: At the moment it was observed gradual decrease in the number of outbreaks and severity of pathogenicity. Within the next two years, it will be reached the next disease stage described by OIE standards which each new outbreak can be investigated individually and potential source identified. When it will be reached this stage of disease situation, it will be feasible to conduct stamping out on outbreak area;

4. Number of vaccinated animals: Vaccination coverage will be fully achieved a hundred percent in both ruminant populations the end of the 2010;

5. Number of protected animals: Using high potency vaccine supplied by the project, percentage of protected animals will be realized more than 85 and tried to solve boost vaccination problem in the young cattle population end of the 2010;

6. Number of NSP (+) animals: The results of 2008 Anatolian Serosurveillance showed that overall NSP prevalence was 8.27 and regional distribution were 1.15, 3.47, 4.82, 6.81, 8.40, 10.37 and 17.84 for Marmara, Aegean, Black Sea, the Mediterranean, Inner Anatolia, Southeast Anatolia and East Anatolia Regions respectively. Same surveillance will be repeated for three years. Considering achievement of indicators mentioned above item.2, 3 and 4 in this chapter, it is nature that these prevalence points will be decreased gradually within the next two years. To achieve this, it will be launched a new control
strategies particularly in the east, inner and southeast regions in order to stop virus circulation caused this high prevalence;

6. A new project: It will be planned to develop and implement a new project. Objectives and activities of the new project are going to identify by taking into the consideration indicators, outputs and experiences of current applied project.

Vision for next 2-5 years; taking account West Eurasia Roadmap

Visions foreseen by expert in the West Eurasia Roadmap Workshop, in Shiraz, Iran November, 2008, for current and future disease situation (estimation made by referenced with description of OIE standards) were as follow:

It was made evaluation by zone for Turkey; Thrace and Anatolia regions:
   a. Thrace region: Current level was determined as stage 3 and planned to be gained free status with vaccination end of the 2010;
   b. Anatolia region: Existed disease situation was defined as level 1 or possibly level 2 and planned to be passed through the next levels 2 and 3, end of 2010 and 2014 respectively.

According to latest disease risk analysis, vision made in the workshop is still valid.

VI. RISK ASSESSMENT

1. According to international epidemiological risk analysis, the new virus incursion is standstill a high risk for Turkey. Since high rate incidence and uncertainty on the diversity of the type A virus have been still existed in the east region and being probability exposures of those sources by dynamic animal movement pattern from the area, it considered that the risk is high;

2. Poor disease awareness and notification existed in the East and southeast Anatolia regions can be assessing another risk assessment for disease control policy;

3. Hard and long winter condition existed in the east of the country help on the maintenance live virus circulation. Already existed virus keeps life cycle without developing infection as a infection source throughout 8 months and finally in the spring time, the virus source causes a new infection by animals moved to pasture and high land;

   In addition to such a climate condition, current socio-economic structure and animal husbandry system in the east region are played part in negative impacts on the disease control policy.

VII. EUROPE AID PROJECT and WORKPLAN FOR NEXT 6 MONTH

a. As mentioned in Chapter IV, subtitle B, a new project, Europe Aid Project for control of Foot and Mouth Disease, Project no: TR 060302, was initiated for three years. Project details are follow:

   **Budget:**
   65,000 Euro; 75% of the budget was donated by EU and remained by M.A.R.A

   **Objectives of project:**
   Control of FMD in Turkey by mass vaccination policy in accordance with other EU control measures such as animal identification, movement and market.

   **Activities:**
   Vaccination, Sero-surveillance and Cleaning and Disinfection.

   **Outputs of Project:**
   Details gave in Chapter. V. In addition to those, it will be gained more valuable information and experiences by conducting serosurveillance which light the way on further strategies and new projects for disease control

Workplan for next six months:

- Two vaccination campaigns will be realized;
- 2009 Thrace and Anatolia serosurveillance will be finalized;
- Training course for vet service will conducted;
- Project interim reports will be produced after the task force and steering meeting;
- Laboratory test results and field report for disease situation will be gained.
MAPS AND FIGURES

FMD Outbreaks in 2007 in Turkey

Fig. 1: Distribution of numbers of outbreaks by months.

Map 1: Distribution of FMD Type A Outbreaks in 2007.
Map 2: Distribution of FMD Type O Outbreaks in 2007.

Map 3: Distribution of total (Type A, Type O and untyped) FMD Outbreaks in 2007.
Map 4: Distribution of the 2008 outbreaks by province.

Fig. 2: Distribution of number of outbreaks in 2008 and 2009 (up to April).
Map 5: Map distribution of number of outbreaks in 2009, up to April.

Map 6: 2007 Autumn Vaccination Coverage Rate (Cattle) in Turkey.
VACCINATION COVERAGE FOR AUTUMN 2008

Fig. 3: Vaccination coverage for Autumn 2008.