Appendix 8

A Review of the Foot-and Mouth Disease Situation in Turkey during the Last Decade, including a Critical Assessment of Past National and International Control Programmes, and with Recommendations for Future Control

by AJM Garland, Independent Consultant.

1. Preamble

This paper was prepared in accordance with the decision taken at the 65th Session of the Executive Committee of the European Commission for the Control of Foot-and-Mouth Disease in November 2000, calling for the preparation of a critical review of the control programmes for foot-and-mouth disease in Turkey, together with recommendations for improved control in the future.

2. Summary

Despite the national efforts of Turkey and the technical and financial assistance provided by international organisations, the attempts made to control foot-and-mouth Disease (FMD) in Turkey over many years have met with only limited success. Notable freedom has been achieved for significant periods in the geographically isolated region of Thrace, but elsewhere throughout the Anatolian peninsula the disease remains endemic and new types and strains of virus continue to gain access, principally from the East. The disease has serious economic effects for Turkey and also constitutes a persistent danger of infection to the entirely susceptible livestock population of the European Union. The movement toward Turkish membership of the European Union gives increased emphasis to the need for more effective control of the disease in the region.

There is little in the way of strategy or tactics that can be recommended to strengthen the control of FMD in Turkey which has not been recommended in the past or already adopted, at least in principle.

What is now needed is the necessary political commitment, from both Turkey and the International Organisations, together with the provision of all the resources essential to implement fully the existing strategies. These are prerequisites in order to achieve the medium term objective of control and to move towards the longer-term objective of eradication.

Further timely support from the international community, including the EC, FAO, OIE and other organisations would be extremely valuable in the expeditious achievement of these objectives.

Recommendations are given and priorities ascribed for the future control of the disease in Turkey.
3. The Importance of FMD to Turkey and to the European Union

There are three principal reasons why the control of FMD in Turkey is important.

3.1. The first reason is that FMD is a persistent drain on the overall Turkish economy. The disease has particularly severe socio-economic consequences for the farming community in a country where around half of the population is directly dependent upon agriculture. In 1998 a study on the direct and indirect losses attributable to FMD estimated that the disease was costing the country between 6 to 7 million US dollars every year [1]. The review included the cost of the partial vaccination policy then (and now) practised, but also estimated that the cost of comprehensive annual vaccination would be in the region of 16 million US dollars.

3.2. The second reason is that many of the measures required for the effective control of FMD are equally relevant to the control of other important infections of livestock currently present in Turkey, such as Peste des Petits Ruminants, Sheep Pox, Bluetongue, Tuberculosis and Brucellosis, as well as in preventing the possible reintroduction of Rinderpest.

3.3. The third reason concerns the protection of Europe from the threat of spread of FMD from Turkey. This threat has long been recognised (see Section 4), but was markedly increased following the eradication of FMD and the cessation and prohibition of FMD vaccination throughout the European Union (EU) in 1991. Since then the dense cattle, sheep and pig populations of the EU have become completely susceptible to infection. The threat has in fact been realised on a number of occasions during the last decade. Thus FMD has occurred in Greece (type O in 1994 and 1996 and type Asia 1 in 2000) and in Bulgaria (type O in 1991, 1993 and 1996). These outbreaks all occurred close to the respective borders with Turkey. The origins of these outbreaks have not been definitively determined, however, evidence from molecular epidemiology strongly suggests that the disease originated in Turkey. Fortunately, the incursions have to date been limited to the periphery of the EU, thanks to early recognition and the prompt application of control measures in Bulgaria and Greece. Emergency measures were also applied in Turkish Thrace.

The financial costs of a potential European FMD epidemic or pandemic are not readily calculable. Some indication is given by the cost of the devastating 1967/68 outbreak in the United Kingdom at £177 million, equivalent today to around £1.75 billion.

The risk of spread of FMD is mainly attributable to the movement of infected animals and animal products and contaminated persons and fomites, while airborne spread can also be a factor. The export of animals and their products from Turkey into mainland Europe is officially prohibited and controlled, but illegal movements have been detected. Control in border areas is problematical, since the geographical barriers are but partial (particularly in the case of the Meric/Evros river at the border between Greece and Turkey), ethnic groups and families are divided across the borders, and communal grazing is practised. There is also large scale, cross border movement of people, both into and out of Turkey, legally and illegally. Official figures for 1995 supplied by the National Office of Statistics in Turkey show that 129,938 persons entered Turkey from Greece and 86,000 from Bulgaria while 20,870 from Turkey
entered Greece and 166,977 entered Bulgaria. Some 1.5 million Turks work in Europe, principally in Germany. It is to be anticipated that overall movement would increase should Turkey becomes a member of the EU.

4. An Outline History of the Epidemiology of FMD in Turkey

Epidemics of FMD were first reported in Turkey in 1914 and 1923, although at that time the virus type was undetermined. Typing was effected at Pirbright until 1952 when the capability was installed nationally. Routine typing is now effected at the SAP Institute. Since typing began type O has predominated, being recorded every year and showing a wide geographical distribution. The type O virus has remained antigenically constant. Type A is the next most commonly recorded, although generally at a lesser frequency and distribution than type O, and there have been years when it was not recorded. In contrast to type O, the type A viruses have shown marked antigenic differences. Analysis at Pirbright of Turkish type A viruses isolated between 1964 and 1998 detected 6 distinct genetic lineages, each successively and completely replacing the earlier virus [2]. Type A22 was introduced in 1965 and was predominant until the most recent outbreaks caused by the Eastward spread of the genomically and antigenically distinct A Iran 96 and A Iran 99 related viruses into Turkey. The continuing emergence of new type A viruses has created serious difficulties for vaccine production and vaccination (see Section 6.4). It is to be noted that the current emergence of viruses related to the type A22 topotype in Iran constitute a new threat to Turkey.

Type C virus has not been recorded since 1969.

There have also been epidemics due to virus types considered to be exotic to Turkey as follows:

Type SAT 1 between 1962-65;
Type A 22 between 1965-98 (subsequently the virus became endemic)
Type Asia 1 between 1973 -76 and between 1999-2000.

It is important to note that on several occasions when these viruses penetrated into Anatolia they also spread across the Bosphorous into Thrace. The rapidity of spread of exotic viruses constitutes a further risk factor for both Turkey and neighbouring European countries. Taking the most recent type Asia 1 epidemic as an example: Iran had been free of Asia 1 since 1991 until infection was reported from the Central and North-eastern Provinces in September 1999. This virus had been circulating in Pakistan. By October it had spread to Tokat Province in eastern Turkey and by November to Ankara Province. Asia 1 outbreaks were subsequently reported throughout Anatolia. Turkish Thrace apparently escaped any clinical disease, but in July and August 2000 outbreaks were reported from the Evros Province of Greece adjacent to the Turkish border with Thrace. Type Asia 1 had last been recorded in Greece in 1961. Nucleotide sequencing demonstrated that the virus samples isolated from all of these outbreaks were virtually identical.

The number and serotype of outbreaks officially reported during the period 1990 to 2000 are shown in Table 1. It is noteworthy that the annual incidence of reported
outbreaks has diminished significantly over this period, from over a thousand to around a hundred or less per year. However, FMD remains endemic in Anatolia.


<table>
<thead>
<tr>
<th>YEAR</th>
<th>Number of Reported Outbreaks</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type O</td>
<td>Type A</td>
</tr>
<tr>
<td>1990</td>
<td>474</td>
<td>698</td>
</tr>
<tr>
<td>1991</td>
<td>16</td>
<td>70</td>
</tr>
<tr>
<td>1992</td>
<td>248</td>
<td>30</td>
</tr>
<tr>
<td>1993</td>
<td>217</td>
<td>4</td>
</tr>
<tr>
<td>1994</td>
<td>158</td>
<td>-</td>
</tr>
<tr>
<td>1995</td>
<td>96</td>
<td>11</td>
</tr>
<tr>
<td>1996</td>
<td>132</td>
<td>1</td>
</tr>
<tr>
<td>1997</td>
<td>51</td>
<td>3</td>
</tr>
<tr>
<td>1998</td>
<td>34</td>
<td>13</td>
</tr>
<tr>
<td>1999</td>
<td>42</td>
<td>6</td>
</tr>
<tr>
<td>2000</td>
<td>43</td>
<td>4</td>
</tr>
</tbody>
</table>

Sources for Table 1:
The Ministry of Rural Affairs (MARA), Ankara, Turkey; The Office International des Epizooties, (OIE), Paris, France; The European Commission for the Control of FMD (EUFMD), FAO, Rome Italy; The World Reference Laboratory for FMD (WRL-FMD), Pirbright, United Kingdom.

Notes for Table 1:
- Some minor discrepancies are apparent in the annual statistics from the different sources.
- The number of outbreaks which were untyped is not always readily apparent.
- The figures for 2000 are provisional.
The SAP Institute in Ankara serves as the main centre for epidemiology and vaccine production in Turkey. Production capacity was greatly expanded during 1984/86 with assistance from Italy, with plant designed for a maximum output of 36 million monovalent cattle doses per annum. Both complement fixation and ELISA testing are used for diagnosis and the latter technology is also used for the estimation of antigen concentration and for neutralising antibody assay. The intention is to extend the application of ELISA to the measurement of antibodies to the non-structural proteins of FMD virus to differentiate between responses due to either infection or vaccination and to incorporate this in the ongoing programme of serological surveillance. Reagents and training will be funded by the EUFMD. This programme should be progressed as soon as possible.

The overall capability of the SAP Institute has been greatly strengthened by the provision in 1997 of a laboratory for molecular epidemiology with staff trained at Pirbright and Brescia. It is to be hoped that this laboratory will soon be fully operational and that, importantly, every field outbreak will be fully investigated, including both the forward and backward tracing of animal movement.

5. The Evolution of FMD Control Strategies in Turkey

National efforts to control FMD in Turkey have been augmented by the international community for the past 40 years, providing personnel, technical and scientific advice, vaccines, equipment, materials, training and funding. Assistance has been co-ordinated by the Tripartite Committee - comprising the European Economic Community (latterly the European Commission), the Office International des Epizooties (OIE), the Food and Agriculture Organisation (FAO) of the United Nations and its European Commission for the Control of FMD (EUFMD). At least 18 countries, 7 national research institutes and several vaccine companies have also given assistance. The input between 1963 and 1975 has been detailed by Boldrini [3], including the financial provision amounting to US $ 7 million.

Details of developments since 1975 are available in the annual reports from Turkey to the OIE, in the reports of the EUFMD (including the General Sessions, the Executive Committee Meetings and the Research Group Meetings) and in the reports of meetings of the Tripartite Committee [4, 5, 6, 7].

An epidemiological unit was established within the GDPC with assistance from the German GTZ organisation in the late 1980s, equipped with computerised information systems for the recording and analysis of field data and giving a clearer picture of the disease situation as a basis for the application of control measures.

In 1996 a joint EC-EUFMD-Turkey mission delivered a detailed report on the FMD situation in Turkey with many recommendations for improvement [8]. These included inter alia the topics of: vaccine production, testing and vaccination; control of animal movement; animal identification and recording; cleaning and disinfection of vehicles; contingency planning; education and training; research and development; and options
for the control of FMD in Turkey together with cost-benefit analyses. Following lengthy evaluation, a three-year programme of aid was agreed in 1998 with EC funding in the sum of US$ 230,000 for the first year to implement a number of recommendations. These included the strengthening of border posts and highway checkpoints, improved means of disinfection, animal identification, training, and an element of independent vaccine testing. Unfortunately there were bureaucratic delays and failures to meet some preconditions so that the programme could not be completed.

Following limited success in an initial Turkish project for ear tagging of animals in 1994, international methods for animal identification and recording were investigated by means of a workshop and an overseas study tour in 1998. Pilot schemes were organised and the tagging of cattle in Thrace completed. The scheme has now been extended to include some of the eastern provinces with the eventual objective of comprehensive tagging throughout Turkey.

FMD training was also provided for Turkish personnel during the 1980s and 1990s, at a number of overseas centres of excellence, including the World Reference Laboratory at Pirbright in the UK and at Brescia in Italy. Training was given in the application of molecular biology methods, monoclonal antibody production and use, ELISA technology and epidemiology.

In 1998, at the suggestion of Greece, a regional workshop was held on aspects of FMD for laboratory staff from Greece, Bulgaria and Turkey, together with international experts. This is to be followed by a second workshop on the use of assays for antibodies to the non-structural proteins of FMD in 2001.

Following the emergence of A Iran 96 throughout Iran and its spread into Turkey in 1997 an EUFMD mission visited these countries in 1998. A Technical Co-operation Project (TCP) was proposed, funded by FAO, to include the reciprocal visits of laboratory staff between Iran and Turkey, exchange of viruses and antisera, overseas training in vaccine production and testing and in Good Manufacturing Practice, and also the supply of equipment and materials. Bureaucratic delays within FAO resulted in an interval of two years between the delivery of this proposal and its implementation, but the TCP is now in progress. The indicative budget for this TCP is $US 360,000.

It is to be hoped that such scientific and technical meetings will be held regularly and that regional co-ordination can be developed in controlling FMD and other diseases by means of co-ordinated border controls, surveillance programmes and other appropriate measures. Consideration should be given to the extension of regional co-ordination to include those countries to the east of Turkey which are not yet involved.

The national strategy for the control of FMD in Turkey has been evolving since the early 1960s. Until recently the country was divided into three zones for the purposes of control: Thrace; the Western Buffer Zone (WBZ); and Residual Anatolia. The evolution of the control measures in the original 3 zones may be briefly summarised as follows:-
Thrace: comprises the 5 provinces situated in the European part of Turkey and that part of the two provinces which also lie on the Asiatic side of the Bosphorus. It has a current population of 498,478 large and 1,397,216 small ruminants. The region is geographically separated from Asiatic Turkey and occupies a crucial position for the protection of Europe.

In 1963, following the penetration of type SAT 1 virus into Thrace, the threat to Europe catalysed the formation of the Tripartite Committee working in collaboration with Bulgaria, Greece and Turkey. A buffer zone of vaccination was then created in Thrace and in the border areas of Bulgaria and Greece. By 1969 the responsibility for vaccination in this zone passed to the three countries directly involved, although the international community continued to collaborate and to fund emergency vaccination, especially against exotic viruses, including types A22 in 1964, type C in 1969 and Asia 1 in the early 1970s. A favourable FMD situation ensued from 1978 onwards and mass, compulsory vaccination was officially discontinued in Thrace in 1989. At the same time the Western Buffer Zone of vaccination was established on the other side of the Bosphorous.

Following the official cessation of mass vaccination in Thrace, limited vaccination was applied in 1999 - along the border with Bulgaria - and some vaccine was also applied in 1993.

Thrace remained free of FMD until type O outbreaks occurred in 1995 and 1996. Ring vaccination was applied around the outbreaks. Compulsory mass vaccination was reintroduced in 1997. Since the 1996 outbreaks the area has remained free of clinical disease.

All large ruminants in Thrace are to be routinely vaccinated twice a year and small ruminants once a year against FMD. Bivalent type O and A22 vaccination has been practised since 1997 and was supplemented with EU funded vaccine in 1998 (1.3 million doses of monovalent type A Iran 96 vaccine) and with an equal number of trivalent doses (O1/A22/Asia 1) in 1999. Movement of animals into this area is prohibited unless they have been vaccinated, maintained in the Western Buffer Zone for at least 3 months and have the necessary permits. However, as the events of 1995 demonstrated, movement control has not been consistently effective.

The buffer vaccination of Thrace has played a major role in the protection of Europe since 1963. However, several Tripartite evaluation missions to the area, including the most recent in October 2000, have recommended further improvements to the control programme.

The Western Buffer Zone of Anatolia (WBZ): was instituted in 1989 and originally comprised the 15 most westerly provinces of Asiatic Turkey with a current population of 2,062,000 large and 5,608,000 small ruminants. In 1999 the zone was reduced to the 7 Provinces providing a buffer around the Bosphorous and Marmara areas in the hope that the zone could be made more effective by improving the previous low level of vaccination cover and
reducing the frequency of FMD outbreaks. Cattle in this region are to be routinely vaccinated against FMD biannually and sheep and goats annually. Animals may not officially move into this area unless accompanied by the required vaccination and health certificates.

**Residual Anatolia:** comprises the other 62 provinces of Asiatic Turkey to the east of the WBZ with a current population of 8,622,000 large and 32,817,000 small ruminants. Government vaccination in this region is focused strategically along the principal highways and in certain projects while ring vaccination is applied around outbreaks. Farmers may also have their animals vaccinated privately. Animals may not legally move westwards from this zone unless they are clinically inspected and have the necessary vaccination and health certificates.

In 1999, following the appointment of a National FMD Control Commission in Turkey, the zoning policy was modified. In addition to Thrace and the reduced WBZ the rest of Anatolia was subdivided into 3 additional zones covering the central, northeastern and southeastern Regions. Appropriate control strategies are to be developed for each of these.

### 6. Analysis of the Principal Challenges in the Control of FMD in Turkey

#### 6.1. Geographical, Socio-Political and Economic Considerations:

Turkey faces formidable challenges in the control of FMD. Some are inherent in the size of the country with an area of 780,580 square km and in the inaccessible nature of much of the terrain, particularly in the winter. Turkey also has extensive land borders with eight neighbouring countries, running for 2,181 km in the east and southeast with Georgia, Armenia, Azerbaijan, Iran, Iraq and Syria and for 446 km in the west with Bulgaria and Greece. In many countries to the east animal diseases, including FMD, are endemic. Moreover, in several of these countries the epidemiological information is incomplete, disease control is limited and there is political instability.

Turkey has many competing priorities for her resources, notable among which have been the long running civil disturbances in the eastern provinces and the aftermath of natural disasters such as the recent earthquakes. In these circumstances it is unsurprising that the General Department of Protection and Control (GDPC), responsible for animal health within the Turkish Ministry of Agriculture and Rural Affairs (MARA), considers that the efficient discharge of its responsibilities is seriously constrained by lack of physical and financial resources.

Many of the above difficulties are not susceptible to easy or early amelioration, although it is important to try to do so. However, there are a series of other factors which are vital to the control of FMD and which are more readily open to improvement, as detailed below.
6.2. Transboundary Animal Movement

The movement of animals into and out of Turkey is officially subject to government control. There are controls at the western borders, at the Bosphorous, and at the chain of highway checkpoints surrounding the WBZ and also across the centre of the country. Recently the Turkish authorities have increasingly attempted to minimise the introduction of FMD from the east and south east, where the greatest focus of risk resides and where, as the result of market forces, there is extensive transboundary movement of live animals. The price of meat increases around 6 times between Pakistan and Afghanistan, through Iran to the major markets in Western Turkey.

Renewed efforts have been made to minimise the illegal transborder movement of animals in these regions and collaborative agreements exist with Iran and Syria in this respect. Nevertheless, such movements continue and the extent of the problem is exemplified by the seizure of 500 cattle and 49,000 sheep and goats during the year 2000 in the border province of Hakkiri at the south-eastern border of Turkey. These animals were unmarked and their ownership could not be established. The dealers involved were taken to court.

It should be recognised that, despite ongoing determined efforts, the full control of the movement of people, animals and animal products eastwards into Turkey may well be unattainable at the present time.

A recent Turkish initiative has been to provide financial incentives for the slaughter of animals in the east of Turkey to encourage the transport of meat, rather than live animals, to the west. This is an especially welcome development, deserving of support from the international community.

6.3. Animal Movement Control within Turkey

The movement of infected animals is by far the most important cause of the spread of FMD in Turkey. In addition to direct contact between infected and non-infected animals, indirect contact via contaminated animal transport vehicles is also an important factor. Movement for breeding and slaughter is overwhelmingly from east to west, following traditional practices and seasonal transhumance, accentuated by trade differentials. Animal movements peak at the time of religious festivals involving the ritual slaughter of thousands of animals. Moreover, the principal highway network has been developed to the point where vehicular traffic can traverse the country from east to west within 24 hours. Two land bridges in Istanbul and the ferry at Cannakale connect Asia to Europe. Vehicle checkpoints exist at these crossings and there are also 6 checkpoints on the main highways across the middle of Anatolia between Girsun in the north and Gaziantep in the south. The functionality of these checkpoints has been questioned [8].

Turkey has recently initiated a programme for the identification and recording of individual cattle. Commendable progress has been made in that animals have been ear tagged throughout Thrace and the scheme is also in progress in the eastern provinces. The eventual intention is to cover all large ruminants throughout the
country. The completion of this objective of national identification should greatly facilitate the effective control of animal movement. However the facts that small ruminants are not included in the tagging scheme and, most importantly, the lack of a comprehensive system of recording – strongly linked to movement control and vaccination - remain as weaknesses.

6.4. Legislation

By and large the existing Turkish legal framework is adequate for the control of animal diseases, including FMD. Legislation exists to control animal movement, including legal procedures to deal with transgressions. However, prosecutions are few and existing penalties do not appear to be an effective deterrent. It is recommended that the law be strengthened to make it effective in this respect and then rigorously enforced with the assistance of the police and armed forces.

Legislation is in place authorising the slaughter of animals with compensation to control FMD. However, the application of this measure has been very limited due to financial constraints. Means should be investigated to increase the funding of this measure.

6.5. Disinfection

The routine disinfection of animal transport vehicles and premises such as animal markets, abattoirs and border inspection points is an important control measure. Turkey has been making efforts to strengthen this aspect, but much remains to be done in providing sufficient disinfectants and disinfection equipment throughout the country.

6.6. Vaccination

Vaccination is a vitally important element in the control of FMD. Its importance is especially crucial where the disease is endemic and where the control of animal movement into and within a country cannot be guaranteed, as is the case in Turkey. The efficiency of vaccination depends on the incorporation of appropriate virus types and strains, the quantity and quality of the vaccines, proper conservation during storage, transport and application, and adequate levels of coverage in vaccination and revaccination.

Turkey produces vaccine at the governmental SAP Institute with a maximum annual capacity of some 60 million monovalent cattle doses and also has one private manufacturer, Vetal, with a maximum annual capacity of around 10 million monovalent cattle doses. The maximum theoretical capacity has rarely been attained. Turkey has around 11 million large and 39 million small ruminants. With the need to produce type O, one or more type A and now type Asia 1 antigens - plus the requirement to vaccinate at least twice annually - the total national capacity is insufficient to allow comprehensive vaccination.

The supply situation has recently been exacerbated by the recent temporary closure of production at the SAP Institute during refurbishment and the installation of air filtration and also by difficulties in producing vaccines against the new type A
viruses. Thus SAP output was limited to around 15 million monovalent doses as mono, bi or trivalent vaccine in 2000.

The importation of vaccine is also permitted under government control and previous restrictions on the level of importation have recently been lifted. However, choices have had to made in deploying the available vaccine and a combination of vaccine shortage plus epidemiological considerations lead to the recent policy of maintaining bivalent type O and A (and now Asia 1) vaccination in Thrace but only vaccinating against type O in Anatolia, with type A and Asia 1 vaccines being deployed there only in the face of outbreaks. This policy clearly carries a risk.

The SAP Institute overcame earlier production problems with the quality of water and also improved the safety of the vaccine by the substitution of formalin by aziridine for vaccine inactivation. In respect of potency, the SAP Institute is responsible not only for the manufacture of vaccine, but also for the assessment of the quality of its own vaccines and also those of Vetal and of imported vaccines. Difficulty in providing sufficient numbers of susceptible cattle, together with their cost, has meant that very few batches have been able to be fully tested according to internationally recognised pharmacopoeial criteria. Thus the potency of the vaccines is largely unknown. The government has recognised the desirability of independent testing and a separate disease-secure animal facility has recently been constructed at the National Veterinary Quality Control Laboratory in Bornova, in which it is proposed to carry out independent vaccine control. The EC with the agreement of the Turkish authorities has also pledged to fund limited testing of Turkish vaccines in a European laboratory (EC Decision 98/64/EC). Regrettably, there have been long delays in implementing both the operation of the Bornova laboratory and the EU testing of vaccines, first mooted in 1996.

The level of vaccination coverage in Turkey has long been a cause for concern, since it has often fallen well short of the recommended minimum level of 80%. As an example the levels achieved in the first half of 1999 are shown in Table 2.

Table 2: Vaccination coverage in Turkey during the first half of 1999.

<table>
<thead>
<tr>
<th>REGION</th>
<th>% Large Ruminants Vaccinated</th>
<th>% Small Ruminants Vaccinated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrace</td>
<td>68</td>
<td>25</td>
</tr>
<tr>
<td>Western Buffer Zone</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>Residual Anatolia</td>
<td>31</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>38</td>
<td>6</td>
</tr>
</tbody>
</table>

It is important to note that some of these animals would have been vaccinated previously, and also that another round of vaccination was still to come in the second half of the year. Nevertheless, the levels achieved would not have engendered effective herd immunity.

Higher vaccination coverage has been reported on occasions, particularly from Thrace. Thus coverage in the 1998 campaign was reported as 99.5% for large ruminants. Figures for the latest campaign in 2000 were 85% and 82%. These figures illustrate that better levels can be achieved. However, in Asiatic Turkey the situation remains much less favourable. For example, the coverage reported for the Spring 2000 campaign in Anatolia was 51% of large and 8% of small ruminants. The importance of consistently achieving at least the minimum required level of coverage throughout the entire country cannot be overemphasized.

The majority of FMD vaccine produced in Turkey is formulated using alhydrogel-saponin adjuvant. Recommendations for the adoption of oil-adjuvanted FMD vaccine date back to at least 1996, such vaccine having been associated with successful control in other countries, particularly in South America. The Vetal Company now uses this technology. It is also partly installed at the SAP Institute with technical assistance from Brazil. Equipment is needed for the large-scale concentration of viral antigen. This should be installed and oil vaccine production initiated at the SAP Institute as soon as possible.

7. Recommendations for Future Control Programmes

There is little in the way of strategy or tactics that can be recommended to strengthen the control of FMD in Turkey which has not already been recommended in the past, or already adopted, at least in principle.

What is now needed is the necessary political commitment, from both Turkey and the International Organisations, together with the provision of all the resources essential to implement fully the existing strategies. These are prerequisites in order to achieve the medium term objective of control and to move towards the longer-term objective of eradication.

The immediate priorities are listed below. Items considered to be of prime importance are emphasised by the use of bold type.

7.1. In Thrace:

7.1.1. Maintain freedom from FMD by continued, prophylactic, biannual vaccination of cattle and annual vaccination of sheep and goats with appropriate valencies at a minimum of 80% coverage.
7.1.2 Vaccination campaigns should be completed in the shortest possible time, ideally within two months.

7.1.3. Institute routine, statistically based, serological surveillance for vaccinal immunity levels and the possible presence of subclinical infection.

7.1.4. Maintain the identification and recording of animals.

7.1.5. Reinforce the rigorous control of movement of animals, animal products, people and suspect fomites into Thrace.

7.1.6. The vaccination policy should be kept under continuous review, but should, in any event, be continued until the WBZ can be shown to be reliably free of FMD.

7.2. In the Western Buffer Zone:

7.2.1. Determined application of all the control measures recommended in Section 7.1 in the WBZ, including vaccination, animal identification, recording and surveillance as in above.

7.2.2. In particular, strengthen the control of animal movement from the rest of Anatolia into the WBZ.

7.2.3. Consider the total prohibition of the movement of all susceptible animals from the WBZ (and all of Anatolia) into Thrace.

7.3. In the Eastern Provinces:

7.3.1. Continue the efforts to prevent the illegal movement of animals into Turkey.

7.3.2. Complete and maintain the ear tagging of cattle together with comprehensive registration and recording.

7.3.3. Maintain vaccination and surveillance as above.

7.3.4. Increase the use of financial incentives for the slaughter of animals in the border area to encourage the westward movement of meat rather than live animals.

7.4. In all Turkey:

7.4.1 Increase vaccination cover throughout the rest of the country.

7.4.2. Strengthen the legal provisions against illegal animal movement.

7.4.3. Further strengthen Border and Road Inspection Posts.
7.4.4. Strictly enforce movement controls with the assistance of the police and the armed forces.

7.4.5. Consider the feasibility of the registration of animal dealers and transporters.

7.4.6. Complete and maintain the identification of individual animals, together with comprehensive recording. Computerised record keeping would facilitate the process and the linkage between identification, vaccination and movement control.

7.4.7. Increase the budget allocation for the slaughter of animals with compensation.

7.4.8. Continue education in the importance of FMD and the measures for its control for veterinarians and auxiliary staff in the private public sector, for the farming community and those in allied occupations, and for police, army and customs personnel.

7.5. For Vaccines and Vaccination:

7.5.1. Provide equipment for the large-scale concentration of viral antigen and introduce the production of oil vaccine at the SAP Institute as soon as possible.

7.5.2. Expedite the independent testing of FMD vaccine at the Bornova facility. Consider the importation of susceptible cattle for this purpose.

7.5.3. Implement the EU decision for the potency testing of selected Turkish FMD vaccines.

7.5.4. Continue to give freedom for the import of FMD vaccine tested to EU standards from commercial sources into Turkey.

7.5.5. Investigate means by which the international community might further assist Turkey in the early purchase/supply of inactivated antigen and/or finished vaccine to offset current vaccine shortages and to increase vaccine coverage. As a short-term measure the supply of materials from existing vaccine banks could be useful in this context. However, it will be vital to avoid the stopgap nature of some previous supplies of this sort, and to define a consistent strategy to ensure adequate yearly supply of vaccine.

7.5.4. Expedite the proposed privatisation of vaccine production at the SAP Institute.

7.6. For Disinfection:

7.6.1. Strengthen the provision of facilities, materials and equipment for disinfection and enforce its routine use for the disinfection of animal premises
and animal transport vehicles (particularly the interior compartment of such vehicles).

7.7. For International Collaboration:

7.7.1. Continue and strengthen existing International Collaborative Control Schemes between Greece, Bulgaria and Turkey and between Iran, Syria and Turkey.

7.7.2. Consider the extension of international collaboration to other neighbouring countries, particularly those to the east of Turkey.

7.7.3. Harmonise control measures, including vaccination and surveillance, in border areas.

7.7.4. Continue scientific and technical exchanges between Turkey and neighbouring countries on a regular basis.

7.7.5. Continue participation and collaboration with International Animal Health Agencies, including EC, OIE, FAO, EUFMD, the World Reference Laboratory for FMD and other centres of scientific and technical excellence.

7.7.6. Seek to minimise bureaucratic delays in any future provision of aid from international organisations, such as the EC and FAO, which have on occasions impeded the timely provision of aid for the control of FMD in Turkey.

7.7.7. Consider the appointment of permanent EC observers to monitor and assist in the control of FMD in Turkey.

7.7.8. Consider the participation of EU state veterinarians in the actual control of outbreaks and in simulation exercises in Turkey.

Note: Of the above recommendations, special priority should be accorded to the provision and application of sufficient vaccine of appropriate strain composition and potency, the control of animal movement and the subsidisation of animal slaughter in the east of Turkey.
8. References


