

Cluster	Nr. of Outbreak	Village	Animals Present			Animals Sick		
			Bov.	S/G	Pigs	Bov.	S/G	Pigs
South-Western	96/01	Dikolla	2	65	-	-	15	-
	96/02	Makri	-	332	-	-	25	-
	96/03	Makri	-	98	-	-	45	-
	Total		2	493	0	0	85	-
South-Eastern	96/04	Evros Delta	247	-	-	45	-	-
	96/05	Evros Delta	685	-	-	60	-	-
	96/09	Alexandroupoli	-	265	-	-	11	-
	96/11	Peplos	77	-	-	5	-	-
	96/14	Ferres	-	500	-	-	40	-
	96/18	Pilea	-	235	-	-	20	-
	96/21	Ardanio	11	-	-	3	-	-
	96/27	Thymaria	-	197	-	-	30	-
	96/28	Kipi	26	-	-	5	-	-
	96/29	Gemistri	-	184	-	-	35	-
	96/30	Ardanio	-	161	-	-	15	-
	96/32	Gemistri	-	233	-	-	13	-
	96/33	Kipi	-	82	-	-	28	-
	96/34	Poros	-	179	-	-	25	-
	96/35	Vrysoula	-	78	-	-	9	-
	96/37	Ardanio	120	-	-	14	-	-
	96/38	Loutros	192	-	-	36	-	-
	96/39	Peplos	-	276	-	-	45	-
	Total			1,358	2,390	0	168	271
Northern	96/06	Thyrea	11	140	-	1	-	-
	96/07	Isaakio	-	531	-	-	120	-
	96/08	Isaakio	11	-	-	2	-	-
	96/10	Didimoticho	-	93	-	-	20	-
	96/12	Didimoticho	9	-	-	3	-	-
	96/13	Isaakio	9	375	-	-	25	-
	96/15	Thyrea	25	50	-	1	7	-
	96/16	Didimoticho	-	248	-	-	40	-
	96/17	Karoti	11	-	-	2	-	-
	96/19	Isaakio	11	-	-	5	-	-
	96/20	Isaakio	39	-	-	3	-	-
	96/22	Didimoticho	296	-	-	70	-	-
	96/23	Didimoticho	-	107	-	-	10	-
	96/24	Thyrea	9	21	30	2	5	-
	96/25	Didimoticho	40	-	-	3	-	-
	96/26	Isaakio	2	200	-	2	5	-
	96/31	Isaakio	4	-	-	3	-	-
96/36	Didimoticho	-	317	-	-	43	-	
Total			477	2,082	30	97	275	0
<b>Grand Total</b>			<b>1,837</b>	<b>4,555</b>	<b>30</b>	<b>265</b>	<b>631</b>	<b>0</b>

**Table 3 : Number and species of present and clinically sick animals in the outbreaks**

- Notes : a) In outbreak 96/01 15 sheep were reported by the farmer as dead. However, they had died over several weeks prior to infection with FMDV and their deaths can not be attributed to the disease.
- b) All present susceptible animals in the outbreaks, both clinically sick and healthy, were stamped out.

Cluster	Village	Bovines		S / G	
		Herds	Animals	Herds	Animals
South-Western	Dikella	15	50	31	808
	Makri	-	-	24	1.259
	Total	15	50	55	2.067
South-Eastern	Alexandroupolis	-	-	1	88
	Peplos	4	239	19	2.515
	Ferres	60	3.700	34	4.569
	Pilea	-	-	-	-
	Ardanio	-	-	9	629
	Thymaria	-	-	6	445
	Kipi	-	-	1	26
	Gemisti	-	-	12	722
	Poros	10	148	14	518
	Vrysoula	1	22	2	152
	Loutros	2	160	-	11
	Monastiraki	3	255	15	1.781
	Anthia	-	-	1	28
	Duriskus	4	198	7	2.926
	Kavisos	1	7	-	-
Total	85	4.729	121	14.410	
Northern	Didimoticho	2	15	15	1.051
	Thyros	-	-	4	107
	Isaakio	33	269	33	1.466
	Total	35	284	52	2.624
<b>Grand Total</b>		<b>135</b>	<b>5.063</b>	<b>228</b>	<b>19.101</b>

Table 4 : Number and species of animals in contact herds.

The economics of the epidemic amount to considerable direct and indirect financial losses both to local and national industry with disproportional effects compared to the duration, magnitude and localised character of the epidemic.

The direct expenditures incurred for control and eradication of the disease, including compensation of farmers, destruction of products and feedingstuffs, transport, slaughter and burial of animals, disinfection of premises and materials, purchase of permanent and disposable materials and laboratory examinations, amount to approximately 3.25 billion GDR (1 ECU=300 GDR) and have been paid in full from national funds

Indirect and marketing losses are even grater and further reaching and are mainly due to unilateral, excessive and scietificly unjustified restrictive measures imposed by third countries on exports of products of both animal and vegetable origin from the entire territory of Greece.

Such measures are still in place and have considerably disrupted trade and delivered a severe blow to Greek exports.

The indexes of the epidemic are calculated on the basis of morbidity presented in Table 3 and the average population-at-risk (=PAR) during the epidemic. The latter is presented in Table 5 and defined as follows :

Cluster	B <sub>o</sub>		S G	
	Herds	Animals	Herds	Animals
S-West	143	785	282	43.238
S-East	110	838	93	18.869
North	263	1.975	324	14.388
Total	516	3.598	699	76.495

PAR = Average population of susceptible animals present in the infected areas during the epidemic

Table 5 : Animal population at risk

■ Prevalence, as determined by clinical signs of disease, is :

$$a) \text{ Among-Herd-Prevalence} = \frac{\text{affected herds}}{\text{herds in PAR}} \times 100 = 3,2 \%$$

$$b) \text{ Within-Herd-Prevalence} = \frac{\text{sick animals}}{\text{animals in affected herds}} \times 100 = 14\%$$

■ Monthly incidence, as determined by clinical signs of disease, stipulates from Diagram 3 and Tables 3 and 5 and is :

$$\text{Among-Herd-Incidence} = \frac{\text{No. of new outbreaks}}{\text{Herds in average PAR}} \times 100 = \begin{matrix} \text{JUL} = 0,8\% \\ \text{AUG} = 1,5\% \\ \text{SEP} = 0,9\% \end{matrix} \quad \text{Mean} = 1,0\%$$

$$\text{Within-Herd-Incidence} = \frac{\text{No. of sick animals}}{\text{animals in affected herds}} \times 100 = \begin{matrix} \text{JUL} = 13,9\% \\ \text{AUG} = 11,4\% \\ \text{SEP} = 17,5\% \end{matrix} \quad \text{Mean} = 13,8\%$$

All calculations above give a crude estimation of prevalence and incidence during the entire epidemic, irrespective of possible fluctuation in clusters of outbreaks or in different animal species.

This generalised approach may be acceptable from an administrative point of view because measures and actions for surveillance and eradication of FMD apply in a uniform manner in all affected areas without fine distinctions.

Besides, due to the administrative structure of the Greek Veterinary Service and as an additional precautionary measure, the Prefecture of Evros is considered as one epidemiological unit in its trade relations with the rest of Greece.

## 2.2 Clinical and laboratory aspects

In the epidemic of 1996 it was confirmed, once again, that FMD is essentially a clinical disease, even if symptoms are mild, inconclusive or transitory, particularly in sheep.

In fact, it was because of knowledge of and awareness for clinical symptoms that the first primary outbreak (96/01) was reported as suspect, confirmed and acted upon. Thereafter, an enhanced clinical surveillance scheme was implemented throughout Evros calling for field investigations of all holdings of susceptible animals twice a week and aiming to detect disease at the earliest possible stage. This scheme was carried out by official veterinarians and comprised:

- Clinical inspections of herds targeted on gathering information concerning the general condition of the herd (e.g. drop in milk yield, loss of body condition, inappetence, lameness, interview of the farmer etc), and
- Detailed clinical examination of individual animals, randomly selected, for early signs of disease.

It was through this clinical surveillance that all outbreaks were detected and dealt with, with laboratory confirmation following several days later. In this way clinical surveillance proved to be an important tool for the control of FMD.

With regard to observed symptoms, the overwhelming majority of outbreaks was detected 2-3 days after the onset of symptoms. At this stage the disease manifests itself with:

Naturally enough, the first outbreaks (96/01-02-03) were confirmed 5-6 after the onset of symptoms. At this stage:

It is worth mentioning that typical clinical signs were consistently observed and readily recognised, both in sheep and bovines, throughout the epidemic while the disease was never observed or suspected in pigs.

With regard to laboratory findings, the following points are of interest:

- Virus was isolated from approximately half of the outbreaks and in all cases it was FMDV type O<sub>1</sub>, antigenically similar to the O Manisa vaccine strain.
- Molecular analysis indicated that the «Greek» strain was genomically related to outbreak isolates from European Turkey in 1996, but not related to the strain isolated from Greece in 1994.  
The % nucleotide difference of type O strains isolated in the region between 1993 and 1996 is shown in Figure 2.

It should be noted that isolation and characterisation of outbreak strains of FMDV was carried out by the World Reference Laboratory for FMD, Institute for Animal Health, Pirbright, whose great contribution in understanding and combatting the disease is hereby gratefully acknowledged.



### 2.3 Disease control and safeguard measures

At community level specific measures for the control and eradication of FMD are laid down in Council Directive 85/511/EEC, as amended by Council Directive 90/423/EEC. These measures are transpositioned into Greek national legislation by Presidential Decree 36/1987, as amended by Presidential Decree 49/1992.

However, control and safeguard measures applied in Greece in 1996 went far beyond the minimum measures prescribed in relevant legislation and are briefly recapitulated below.

In addition to measures specified in legislation, control measures included :

- Intensive epidemiological investigations and preventive stamping-out of all in contact herds.
- Complete standstill of all movements of animals and products of animal origin inside the entire territory of Evros. In fact the whole of Evros became a huge surveillance zone and the police was actively involved in the enforcement of restrictions.
- Systematic and regular clinical, epidemiological and, where necessary, serological surveillance of all susceptible animal herds in Evros twice a week in order to achieve close monitoring and early warning of new outbreaks.
- Ban on restocking of depopulated premises within four months after the last outbreak and before completion of sero-survey in Evros.
- Setting up of road blocks and disinfection points throughout the road network of Evros.
- Setting up of road block and disinfection point at the Evros-Rodopi border, manned by police and army and operating round the clock.
- Prompt compensation of farmers at full market prices, payed within 30 days after stamping out, to encourage cooperation with the authorities and prompt reporting of suspect cases.
- Extensive information campaign through the local and national media to stimulate vigilance and awareness of the agricultural community.

The control measures in Evros were inspected closely by several EU missions which concluded that the measures were effective, the procedures sound and the enforcement satisfactory (Docs. VI/5863/96 and VI/5884/96).

With regard to safeguard measures, a surveillance programme for FMD was launched in the Prefecture of Rodopi, west of Evros, which was designed to confirm, in the first instance, freedom of Rodopi from FMD and, subsequently, give early warning against possible spread of disease from Evros.

This programme employed statistically sound methodology and comprised clinical inspection, serological surveillance and epidemiological investigation of a randomly collected and statistically selected number of herds scattered in the whole of Rodopi.

The programme was approved and financed by the community and its results were presented at the Standing Veterinary Committee on 4-5 December 1996.

### 3. ERADICATION OF THE DISEASE

Four months after the last outbreak of FMD a surveillance programme was launched in Evros with a view to establish freedom of disease there and validate the claim of the Greek Authorities that the disease had been eradicated.

#### 3.1 General considerations

In designing this programme the following facts and guidelines were taken into consideration :

- Previous experience gained by the clinical and serological monitoring carried out after the 1994 epizootic of FMD in Greece. Provisional findings of that exercise indicated that :
  - i) some herds remained seropositive at a low level for several months even when individual seropositive animals were eliminated ,
  - ii) there is an important difference between subclinically infected and carrier small ruminants and a far greater potential for transmission by the former,
  - iii) all attempts to isolate FMDV from tonsils of low titre seropositive animals failed ,
  - iv) maintenance of seropositive animals within the herd for long periods of time invariably failed to produce disease, either to sheep or bovines kept in the same holding.
- Cattle may be included in a sero-survey when a strain of low virulence for this species has been circulating without overt signs of disease. However, this was not the case during the recent epidemic.
- Animal husbandry and breeding conditions practiced in Greece whereupon a village may be considered as one epidemiological unit in so far as sheep and goats are concerned, while cattle herds must be considered individually.
- The disease was never reported or suspected in pigs clinically, virologically or serologically. Besides, no carrier stage occurs in pigs. η δόξα είναι  
κατά την εξέταση
- During the epidemic there was a low prevalence among potentially exposed herds and a considerably higher prevalence within herds actually exposed.
- At the time of implementation local restrictive measures were still in place in Evros including a ban of movements of animals and a prohibition of restocking of depopulated premises.
- Laboratory investigations must not preclude or diminish the basic necessity for a thorough clinical examination and consideration of the epidemiological situation in the field.

In the light of the above guidelines above, the surveillance programme applied in Evros comprised serological screening, clinical examinations / inspections and epidemiological inquiries. Conclusions with regard to appropriate follow up actions were based on co-assessment of all available elements and data.

Finally, it should be noted that EU member states were given due notice of the objectives and the methods of the programme prior to its commencement (Doc. VI/1853/97).

### 3.2 Serological surveillance

The objective of the sero-survey was to detect prevalence at 5% with a 95% level of confidence.

The method was random sampling of 10% of the animals in all sheep and goat herds situated within the protection zones established around FMD outbreaks, with a minimum number of 66 samples per village, and testing for antibodies to FMDV with ELISA. Serology was performed in the Athens FMD Institute. Sampled animals were individually identified by ear tags.

The results of the sero-survey are summarised in Table 6 below.

Cluster	Village	S/G		1 <sup>st</sup> Test			2 <sup>nd</sup> Test		
		Herds	Animals	Samples	Negat.	Inconcl.	Samples	Negat.	Positive
South-western	Dikella	-	-	-	-	-	-	-	-
	Makri	1	522	66	66	0	-	-	-
	Mesim.	13	1.102	133	133	0	-	-	-
	<b>Total</b>	<b>14</b>	<b>1.624</b>	<b>199</b>	<b>199</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	<b>%</b>				<b>100.0</b>	<b>0</b>			<b>0</b>
South-eastern	Alexan.	24	4.580	461	454	7	7	7	0
	Ferres	19	1.907	210	205	5	5	5	0
	Ardanio	3	59	59	59	0	-	-	-
	Pilea	8	2.010	231	229	2	2	2	0
	Kipi	4	454	62	59	3	3	3	0
	Vrys.	2	116	34	34	0	-	-	-
	Peplos	6	667	80	78	2	2	2	0
	Tichero	7	1.420	141	136	5	5	5	0
	Ferres	12	1.380	150	113	37	37	25	12(*)
	<b>Total</b>	<b>85</b>	<b>12.593</b>	<b>1.448</b>	<b>1.387</b>	<b>61</b>	<b>61</b>	<b>49</b>	<b>12</b>
<b>%</b>				<b>95.8</b>	<b>4.2</b>			<b>0.8</b>	
North	Didimo	8	200	70	65	5	13	2	11(*)
	Isaklio	1	41	10	5	5	41	24	17(*)
	Praggi	15	188	65	58	7	7	7	0
	Karoti	9	442	66	62	4	4	4	0
	Thyrea	14	1.053	113	105	8	8	7	1
	Mani	16	958	94	94	0	-	-	-
	<b>Total</b>	<b>63</b>	<b>2.882</b>	<b>418</b>	<b>389</b>	<b>29</b>	<b>73</b>	<b>44</b>	<b>29</b>
<b>%</b>				<b>93.0</b>	<b>7.0</b>			<b>7.0</b>	
<b>Grand Total</b>	<b>162</b>	<b>17.099</b>	<b>2.065</b>	<b>1.975</b>	<b>90</b>	<b>134</b>	<b>93</b>	<b>41</b>	
<b>%</b>				<b>95.6</b>	<b>4.5</b>			<b>2.0</b>	

Table 6 : Summary of serology results

(\*) All seropositive animals belonged to the same herd

By way of discussing the results of serological surveillance, it is noted that :

- Serological surveillance was carried out with a view to preclude the risk from seropositive animals potentially acting as disease carriers and, mainly, to eliminate seropositive animals from trade irrespective of their epidemiological significance.
- Serology results obtained in the 1<sup>st</sup> Test were assessed in conjunction with clinical and epidemiological evidence on a risk analysis basis. These results were examined, in particular, for level of titres and percentage of seropositive animals within the same herd. On the basis of the overall assessment, three options were available :
  - i) Elimination of seropositive animal(s) and no further action .
  - ii) Resampling of the individual animals and testing for possible raise of titres ,
  - iii) Sampling of all animals in the herd, while movement restrictions were in place.
- Titres < 1:100 in the 1<sup>st</sup> Test were followed up by Option (ii), while titres > 1:100 were followed up by Option (iii) above. In both cases, results of the 1<sup>st</sup> Test were referred to as *inconclusive*.
- In the 2<sup>nd</sup> Test, sporadic titres < 1:100 invoked Option (i), while persisting titres > 1:100 led to the slaughter of the entire flock. The latter results were referred to as *positive*, irrespective of the clinical picture or the epidemiological findings in the flock. This policy was applied in three (3) herds, as indicated in Table 6 .
- Titres measured either in the 1<sup>st</sup> or 2<sup>nd</sup> Test fluctuated between 1: 40 - 1: 400.
- Regardless of the serological reactions observed throughout the exercise, seropositive herds were never considered as outbreaks because they were observed at a period when no active infection was confirmed by laboratory investigation and/or clinical symptoms of disease.

The information concerning sampled herds and individual animals for serology, as well as the results of serological examinations of these animals, were recorded in a purpose designed report form conforming to Annex B.

### 3.3 Clinical inspections / examinations

The objective was to carry out an updated and systematic clinical inspection of all herds of susceptible animals for signs of FMD at a chronic or sub-clinical stage.

The method was general clinical inspection of all sheep, goat and cattle herds situated inside the protection zones established around FMD outbreaks.

In addition, all bovines present and 10% of the animals present in sheep and goat herds, with a minimum of 66 animals per village, were individually examined for symptoms or signs of FMD.

The results of clinical inspections / examinations were recorded, on the spot, in a purpose designed report form conforming to Annex A and correlated with the serological results of the respective herd.

The sheep, goat and bovine herds subjected to clinical inspections / examinations are summarised in Table 7 below:

Cluster	Village	S/G		Bovines	
		Herds	Animals	Herds	Animals

South-western	Dikella	-	-	-	-
	Makri	1	522	1	4
	Mesimvria	13	1.102	18	65
	<b>Total</b>	<b>14</b>	<b>1.624</b>	<b>19</b>	<b>69</b>

South-eastern	Alexandroupoli	24	4.580	5	26
	Ferres	19	1.907	30	313
	Ardanio	3	59	18	192
	Pilea	8	2.010	6	70
	Kipi	4	454	2	11
	Monastiraki	-	-	7	45
	Peplos	6	667	3	77
	Tichero	7	1.420	-	-
<b>Total</b>	<b>71</b>	<b>11.097</b>	<b>71</b>	<b>736</b>	

North	Didimoticho	8	200	97	914
	Isakio	1	41	86	587
	Praggi	15	188	9	81
	Karoti	9	442	15	122
	Thyrea	14	1.053	35	192
	Mani	16	958	21	61
	<b>Total</b>	<b>63</b>	<b>2.882</b>	<b>263</b>	<b>1.957</b>

**Table 7 : Herds and animals subjected to clinical inspections / examinations**

The results and findings of clinical surveillance were as follows :

- Recent or older lesions of FMD in the process of healing were not observed in any of the examined animals.
- Clinical inspection failed to raise suspicions of sub-clinical infection in any of the inspected herds.
- No complaints were voiced by the farmers concerning the performance and overall productivity of their herds.
- Lambing season proceeded smoothly in all visited herds and the incidence of abortions and stillborn animals was no higher than usual.
- Although many seropositive sheep were housed together with bovines, no clinical signs of disease were observed in either species.
- Where seropositive sheep were resampled and stayed with the herd pending the results of the 2<sup>nd</sup> test, no clinical suspicion of disease was raised in the herd during the entire waiting period.
- Finally, all animals in the three sheep herds slaughtered because of serology results were clinically healthy.

### 3.4 Epidemiological inquiries

On the occasion of clinical inspections provided for in par.3.3, an epidemiological inquiry was conducted in all sheep, goat and bovine herds inside the protection zones established around the outbreaks of FMD.

The inquiry focused, in particular, on dead or sick animals due to undetermined causes, drop in milk yield, animals husbandry conditions and practices, grazing area possible problems in lambing and movements of animals on and off the premises during the past few weeks.

The findings of epidemiological inquiry for each herd were recorded in a special part of the report form laid down in Annex A.

Intensive follow-up epidemiological investigations were carried out in herds with seropositive animals in order to assess the likelihood of presence and/or the risk of transmission of infection.

The findings of the epidemiological inquiry confirm that there have been no hazardous contacts or relations which might have spread the disease or harbor it under disguise in the area. It was also confirmed that movement restrictions in the affected areas had been observed and herds were grazing in specifically designated pastures avoiding contacts with contiguous herds.

With regard to the two seropositive herds which were slaughtered in the course of sero-survey, it was found out that they had only recently been re-constituted with animals originating from a neighboring village where serological screening had been completed with negative results. Following stamping out a thorough clinical and serological investigation of both the parent herd and other herds in the vicinity of seropositive ones failed to raise any suspicion of active or sub-clinical infection.

It is difficult, therefore, to explain the cause of serological reaction in these two herds or determine their epidemiological significance, if any.

After nine months of intensive efforts and in the light of serological, clinical and epidemiological evidence presented above the prevailing feeling in Greece, both in the Veterinary Service and in the agricultural community, is that FMD has been eradicated and there is no further need to apply restrictions of any kind, either in national or in intra-community trade.

It is hoped that the European Commission and EU member states will share this feeling and recognise the efforts of the Greek State Veterinary Service by consenting to the repealing of Commission Decision 96/526/EC.

**Annex A : Report form for clinical inspection and examination**

Prefecture of  
 Veterinary Service  
 LVC of .....

Date of Insp. Exam .....  
 Ref.No:.....

**1. Information concerning the farmer**

Village : .....  
 Name of farmer : .....  
 Address of farmer : .....  
 Location of herd (if different) : .....

**2. Information concerning the herd**

Species of animals	Bovines	Sheep	Goats	Pigs
Number of present				
Number of insp. exam.				

**3. Results of clinical inspection/examination**

Clinical symptoms  YES  NO If YES.nr.of animals .....

Collection of samples  YES  NO If YES.nr.of samples .....

**4. Epidemiological information**

4.1 Deaths of animals during last 14 days  YES  NO

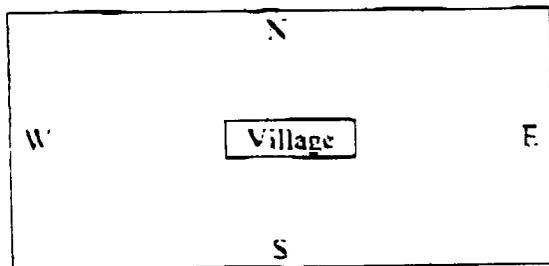
4.2 Drop in milk production during last 14 days  YES  NO

4.3 Purchase of animals during last 14 days  YES  NO

4.4 Sales of animals during last 14 days  YES  NO

4.5 Comments (free text).....  
 .....  
 .....

**5. Approximate location of grazing**



(Name and signature of veterinarian)

**Annex B : Report form for sample collection for serology**

Prefecture of  
 Veterinary Service  
 L.V.U. of .....

Date of sampling.....  
 Ref.No.....

**1. Information concerning the farmer**

Village : .....  
 Name of farmer : .....  
 Address of farmer : .....  
 Location of herd (if different) : .....

**2. Information concerning the herd**

Species of animals : .....  
 Number of present : .....  
 Number of sampled : .....

Bovines	Sheep	Goats	Pigs

**3. Description of samples**

	Ear-tag number
1.	
2.	
3.	
4.	
5.	
6.	
7.	

	Sample number
1.	
2.	
3.	
4.	
5.	
6.	
7.	

Date of dispatch .....

(Name and signature of veterinarian)