

**HEMISPHERIC PROGRAM FOR THE ERADICATION  
OF FOOT-AND- MOUTH DISEASE  
IN SOUTH AMERICA  
PLAN OF ACTION**

**I MEETING OF THE HEMISPHERIC COMMITTEE  
FOR THE ERADICATION OF FOOT-AND- MOUTH DISEASE**

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## HEMISPHERIC PROGRAM FOR THE ERADICATION OF FOOT-AND-MOUTH DISEASE IN SOUTH AMERICA

### PLAN OF ACTION

#### INTRODUCTION

In recent years almost all the economies of the Latin American countries have been undergoing a crisis characterized by heavy external indebtedness, reduction of domestic consumption, a drop in investment, inflation, and high rates of unemployment and underemployment. The balance of trade, which is favorable and has increased since 1982, does not generate a surplus sufficient to pay debt service and prevent the outflow of profits. The lack of foreign exchange is one of the most evident manifestations of the imbalances in these economies. Other manifestations have profound social connotations, such as malnutrition, a chronic problem that has become acute in this situation.

Most of the South American countries provide ideal conditions for the breeding of livestock of very good quality and low production cost. South America consequently not only has a large bovine population in regard to its inhabitants, but is also able to continuously expand its agricultural and livestock frontiers.

However, in comparison with the developed countries, bovine productivity is low in both meat and milk. As regards the availability of specific and appropriate technology, there are also marked differences between those countries. There is no doubt that among the reasons for the low productivity are inadequate access to genetic technology, deficient management, the lack of introduction and/or improvement of pasture land, which is aggravated by mineral and nutrient deficiencies and by the interference of infectious and parasitic diseases in the bio-economic productive process.

Because of its productive, commercial, and political implications, the struggle against some diseases--foot-and-mouth disease in particular--has been an ongoing concern of the governments and of all the sectors involved in livestock production and food of animal origin. It is recognized that the damages and negative impact on livestock activity make foot-and-mouth disease the most important of communicable diseases in cattle.

The occurrence of foot-and-mouth disease has profound repercussions on world animal markets and products and by-products of animal origin. Such markets may consequently be divided into two large, clearly differentiated areas: one, made up of countries free of foot-and-mouth disease, which can provide meat and animals to the United States, Japan, and other large importing markets; and the other, in which the disease is present and that can only provide meat and animals to

countries also affected by the disease or to countries free of the disease after treatment of meats or prolonged animal quarantine, which are very costly procedures. Such restrictions are still more severe where foot-and-mouth disease is endemic, as in the case of South America. For this same reason Australia and New Zealand, as well as other countries free of foot-and-mouth disease, have obtained much higher prices for their meats, which has generated formidable development of their livestock-raising.

Finally, it should be pointed out that the countries without foot-and-mouth disease maintain free access to the various markets, while the countries with the disease constantly face new sanitary restrictions that include agricultural and livestock products, including animal species not susceptible to the disease and its consequences.

In South America annual losses from the damages produced by foot-and-mouth disease reach an optimistic estimate of US\$210 million. Public expenditure in recent years has reached US\$60-80 million a year, and livestock sector expenditure on vaccination activities represents on average US\$230 million a year. In the initial years annual economic losses from physical damage caused by the disease amounted to several times current losses. The countries of South America have suffered many other immeasurable losses from the disease, both in the economic and social field. The Food and Agriculture Organization of the United Nations (FAO) considers that diseases are responsible for losses of up to 35% of the potential livestock production of the developing countries, while in the industrialized countries they amount to only 7%.

As a consequence of the political and socioeconomic impact of the disease, in 1951 the Pan American Foot-and-Mouth Disease Center (PANAFTOSA) was established with a view to promoting, organizing, and coordinating programs for prevention and control of the disease, providing specialized technical cooperation, serving as a reference organ, and training human resources for the countries of the Americas.

The formal development of national foot-and-mouth disease control programs with the financial support of the Inter-American Development Bank (IDB) during the second half of the 1960s and the beginning of the 1970s started up regional action in South America. In most of the countries these programs constitute the basis for the organization of the structures of national animal health services, and prevention programs have constituted dynamic elements in animal health activities in Panama, Central America, and Mexico.

In 1972 the South American Foot-and-Mouth Disease Control Commission (COSALFA) was established by decision of the Ministers of Agriculture of the Americas at the V Inter-American Meeting at the Ministerial Level on the Control of Foot-and-Mouth Disease and Other Zoonoses (RICAZ V). In a resolution it requested PAHO to set up, promote, and coordinate the Commission.

Since 1973, COSALFA has held annual meetings without interruption. Its members are: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Uruguay, and Venezuela. Each country is represented by a veterinarian physician of the Ministry of Agriculture or of the agency to which it has assigned animal health activities. The objectives of COSALFA are regional coordination, promotion, and evaluation; harmonization of sanitary standards; and bilateral or multilateral agreements for the control of foot-and-mouth disease. At the request of the countries, the Pan American Foot-and-Mouth Disease Center acts as ex officio Secretary. During the IV Inter-American Meeting on Animal Health at the Ministerial Level (RIMSA IV), held in Brasilia in May 1985, the Act of Recognition of COSALFA as a Permanent Institutionalized Commission at the Regional Level was signed by decision of the South American governments through their ministries of foreign affairs.

At the present time the countries of South America possess information and epidemiological surveillance systems, laboratories for diagnosis and vaccine control, public and private laboratories for vaccine production (except Bolivia), and a field infrastructure made up of more than 2,000 operational units. More than 3,700 professionals and approximately 11,000 auxiliaries are involved in the programs. Although these resources were organized originally as part of foot-and-mouth disease control programs, at the present time they assist in animal health problems in general, mainly with regard to diseases and pests whose overall economic impact on public health calls for active state participation.

As a direct consequence of these programs, foot-and-mouth disease was eradicated in Chile, and Argentine Patagonia, Guyana, French Guiana and Suriname have been kept free of the disease. In the areas where public programs were initiated the annual incidence of the disease of 13-20 herds affected out of 1,000 was reduced in the first years to approximately one herd affected out of 1,000 in more recent years, which is a reduction of more than 90%. Morbidity declined from more than 200-300 cases per 10,000 head of cattle each year to approximately 7-8 per 10,000 at the present time.

Protection from foot-and-mouth disease has been maintained in Panama, Central America, the Caribbean, and North America. Foot-and-mouth disease has never been diagnosed in Central America and Panama. The Caribbean islands have suffered only sporadic outbreaks, as occurred in Aruba and Curacao in 1957 and 1970, Martinique and Guadeloupe in 1952, and Jamaica in 1922. These outbreaks were rapidly eliminated. The disease was once diagnosed in French Guiana (1953), and in Guyana outbreaks occurred in the southern plains in 1961, 1969, 1974, and 1978. The disease has never been detected in Suriname. In the three countries of North America, the United States, Canada, and Mexico, outbreaks of foot-and-mouth disease have occurred in the past that were eradicated.

In South America, except in the disease-free areas, achievements have remained stationary during the last four to five years. The programs require constant investment that has not succeeded in modifying the situation or in eliminating physical herd losses or sanitary restrictions to national and international trade of livestock and its products. The eradication of foot-and-mouth disease as a consequence of homogeneous, repetitive, and burdensome actions, has led to debilitation and consequent deterioration of the programs--intensified by the economic crisis--loss of credibility, and frustration of the expectations of technicians, livestock owners, and the authorities.

In such circumstances, attempts to modify the policy and strategies of eradication plans is well justified economically and socially and is technically supported by specific regional control strategies in accordance with the ecological, socioeconomic, and epidemiological characteristics of the animal population.

In justifying this proposed change it is necessary to take into account an analysis of the public and private costs of current activities. From the social point of view, it is necessary to bear in mind the opportunity cost that the annual allocation of considerable resources for the control of foot-and-mouth disease represents for the governments, which is significant, since it means that other alternatives for investment of such resources are sacrificed, at least in the field of animal health. In the livestock sector foot-and-mouth disease lowers income and increases production costs, all of which result in a reduction of profitability. In studies carried out in Argentina it was confirmed that 40% of the expenditures of livestock owners on veterinary drugs is for foot-and-mouth vaccine, which accounts for 90% of veterinary biologicals purchased.

In addition, for the livestock sector this expenditure should be analyzed from the point of view of the value of other alternatives that are sacrificed in the improvement of animal production, since this money, if it were not for foot-and-mouth disease, could be allocated to other activities to improve livestock-raising. From the standpoint of the profitability of public and private investment in livestock raising, foot-and-mouth disease represents a significantly limiting factor for the productive potential of these investments.

Implementation of an eradication policy should also produce an effect on commercial trade between the countries. It provides countries with exportable surpluses with negotiating power for trade of animals and animal products they do not have when foot-and-mouth disease is present, especially with respect to bilateral trade agreements. Also of great importance is the contribution that the eradication project will have for the economic and trade integration of the countries of the Region.

In view of the situation described, the Ministers of Agriculture, in the Hemispheric Meeting on Foot-and-Mouth Disease and International Trade of Animals and Animal Products, convened by the Organization of American States (OAS), held in Buenos Aires, Argentina, 1-7 November 1978, declared the establishment of areas free of disease in the countries of South America as a strategy to achieve eradication of foot-and-mouth disease in the medium term as being of the highest priority. For its part, the VII Regular Meeting of the South American Foot-and-Mouth Disease Control Commission (COSALFA VII), held in 1980, assumed the commitment of developing programs whose short-term objective was to achieve eradication of the disease in large areas as part of a process that should be directed toward eradication of foot-and-mouth disease in the Hemisphere, in accordance with the political decision of the Ministers.

For the purpose of implementing this resolution, COSALFA IX approved, on 12 March 1982, the document "Foot-and-mouth disease policy and strategies in South America for the decade 1981-1990," which establishes general action guidelines to achieve elimination of the disease in major livestock areas in the Hemisphere.

In April 1987, the V Inter-American Meeting on Animal Health at the Ministerial Level (RIMSA V), in Resolution XIII, requested PAHO and COSALFA to prepare a hemispheric program for eradication of foot-and-mouth disease, including mechanisms for its implementation.

A resolution from the meeting called for the establishment of a Hemispheric Committee for the Eradication of Foot-and-Mouth Disease made up of a representative of the governments of each of the following subregions: Southern Cone, Andean Subregion, Amazonian Subregion, Mesoamerica and the Caribbean, and North America, and specified that a representative of the producers of each of these subregions be invited to form part of the Committee (Resolution XIII).

Division into subregions takes into account not only the existence of large ecological, cultural, and socioeconomic macroregions but also the existence at the continental level of two large areas: one with foot-and-mouth disease (South America) and the other without the disease (Middle America, North America, and the Caribbean).

For the second area RIMSA V approved establishment of a Commission of American and Caribbean Countries Free of Foot-and-Mouth Disease with a view to joining efforts to protect livestock in that area from this disease (Resolution VI).

The foregoing serves as a framework for the Continental Plan of Action's emphasis on the approach of preventing and maintaining the countries of Middle America, North America, and the Caribbean free of the disease and eradicating it throughout South America.

In this last case, the variety of epidemiological situations between and within the countries constitutes one of the facts of greatest importance in defining and selecting the strategies proposed.

A concrete manifestation of this proposal is the signing of the subregional project for the eradication of foot-and-mouth disease in the southeastern River Plate basin, which includes Argentine Mesopotamia, the entire territory of Uruguay, and the State of Rio Grande do Sul, in Brazil. In June 1987, in Porto Alegre, Brazil, these countries signed Technical Cooperation Agreement with PAHO making it possible to implement the project.

As may be seen, political and strategic definitions exist for carrying out programs for eradication of the disease at the regional level. In addition, in order to develop such programs, technological and methodological advances are available for planning, based on epidemiological elements such as selective regional strategies appropriate for each of the foot-and-mouth disease ecosystems.

Knowledge available today on regional behavior of the disease and its relation to the productive and economic organization of livestock-raising makes it possible to subdivide South America into three regional macrosystems:

a) River Plate Basin - Southern Cone

- Chile
- Argentina
- Uruguay
- Paraguay
- Brazil - Rio Grande do Sul
- Santa Catarina

b) Andean Area

- Bolivia (\*)
- Peru (\*)
- Ecuador
- Colombia (\*)
- Venezuela (\*)

(\*)Sectors of these countries are included in the Amazonian Area.

c) Amazonian Area and Brazil

- Guyana



- French Guiana
- Suriname
- Bolivia - Pando
- Peru - Loreto
  - Madre de Diós
- Colombia - Amazonas
  - Vaupes
  - Guainia
- Venezuela - Bolívar
  - Amazonas
- Amazonian Brazil - Acre
  - Amazonas
  - Roraima
  - Para
  - Amapa
  - Rondonia
  - Mato Grosso
- Non-Amazonian Brazil
  - Maranhao
  - Piaui
  - Ceara
  - Rio Grande do Norte
  - Paraiba
  - Pernambuco
  - Sergipe
  - Alagoas
  - Bahia
  - Espírito Santo
  - Minas Gerais
  - Rio de Janeiro
  - Sao Paulo
  - Paraná
  - Goias
  - Mato Grosso do Sul

## 2. CURRENT LIMITATIONS OF THE PROGRAMS

In several countries of South America there has been deterioration in the operation of the executing services of the programs in recent years, a fact that may be ascribed to the internal economic crisis the countries are undergoing and to natural debilitation of the programs. We are consequently obliged to face reality in the years to come with creative and imaginative alternatives that will make it possible to organize the programs differently from current programs so as

to achieve the established goals within a situation of economic crisis and the resulting limitation of resources.

Among the factors that should be identified because of their significant influence on the development of foot-and-mouth disease control programs are the following:

- a) the lack of formal implementation of the approach of specific and selective regional strategies for each foot-and-mouth disease ecosystem in most of the countries.
- b) debilitation of the programs, after more than a decade of repetitious and expensive actions, that succeeded in reducing the disease significantly but not eradicating it.
- c) reduction of staff, partial utilization of specialized personnel, and routinization of control measures in view of the lack of material incentives for an operation that requires exclusive dedication.
- d) disarticulation of the administrative structures of the animal health services and losses of administrative hierarchy in the decision-making process. The lack of administrative strength to overcome external interference and maintain continuity in health management in order to attain the objectives of the programs.
- e) the lack of coordination and inter-institutional collaboration of animal health services with other services in the agricultural and livestock sector whose integrated actions would be of great mutual benefit. The same is true intersectorally, as is the case of universities, agricultural schools, private veterinarians, rural schools, and public health organs.
- f) the lack of active participation in foot-and-mouth disease programs of community groups directly linked to animal health programs, such as livestock owners; rural inhabitants; meat, milk, and biologicals industrialists; livestock merchants; and organized consumers.
- g) the lack of awareness on the part of large community sectors of the scope of foot-and-mouth disease programs in terms of the country's own interests, which brings about overemphasis of isolated interests that do not contribute to the effectiveness of foot-and-mouth disease programs.
- h) deficiencies in the public and private sectors in biological safety procedures in laboratories in which foot-and-mouth disease viruses are handled, thereby facilitating escape and possible risks to health.

### 3. PURPOSES AND OBJECTIVES

#### 3.1 Purposes

- 3.1.1 Increase in the availability of meat and milk for the inhabitants of the region.
- 3.1.2 Improvement of the socioeconomic efficiency of livestock activity through:
  - a) improvement of the opportunity cost of public investment in animal health and of private investment in livestock-raising.
  - b) elimination of an important limiting factor in the potential effect of technological investment (genetics, feeding, management).
  - c) expansion of negotiating power for livestock products on the international market.

#### 3.2 Specific objectives

- a) eradication of foot-and-mouth disease from the South American Hemisphere.
- b) prevention of its introduction into free areas.
- c) settlement of new livestock areas, especially the Amazonian Subregion, thereby preventing the introduction of foot-and-mouth disease and other alien pathogenic agents and at the same time respecting the ecological integrity of these areas.

#### 3.3 Intermediate objectives

- a) protection of already existing free areas.
- b) creation of new free areas.
- c) settlement of new livestock areas with livestock from free areas or with uninfected livestock.
- d) advanced control in order to achieve epidemiological conditions for eradication in the following stage.
- e) formation of animal health infrastructure in regions with insufficiently developed programs.
- f) elimination of endemic foci.

OBJECTIVES BY STAGES AND REGIONS

SUBREGION	AREAS OF SUBREGIONS	STAGES / TIME PERIODS		
		1st. STAGE	2d. STAGE	3d. STAGE
		6 years	6 years	8 years
		1989-1994	1995-2000	2001-2009
PLATE RIVER BASIN SOUTHERN CONE	- Chile, Patagonia, Argentina	A	A	A
	- Argentine Mesopotamia, Uruguay	B	A	A
	- Rio Grande do Sul-Brazil			
	- Rest of Argentina, Paraguay, and Santa Catarina-Brazil	D	B	A
ANDEAN	- Jungle with incipient livestock-raising and NE of Colombia	A	A	A
	- Peru and Atlantic Coast of Col.	B	A	A
	- Venezuela, Colombia, Ecuador & Bolivia, except plains	D	B	A
	- Plains of Venezuela, Colombia, and Bolivia	E	D	F - A
AMAZONIAN AND BRAZIL	- Guyana, Fr. Guiana, & Suriname	A	A	A
	- Amazonian areas of Bolivia, Peru, and Colombia	C	B	A
	- Amazonian states of Brazil and Venezuela	E	D	F - A
	- Non-Amazonian Brazil	D	B	A

A = Protection of already existing free areas  
 B = Creation of new free areas  
 C = Repopulation of new free areas with uninfected livestock  
 D = Advanced Control  
 E = Enhancement of animal health infrastructure  
 F = Elimination of endemic foci

These objectives will be attained through actions that will be carried out in three different stages in order to obtain consistent results gradually. It is necessary to point out the fundamental role of national foot-and-mouth disease programs in the development of subregional projects and consequently for the achievement of those objectives.

#### 4. STRATEGY

The prerequisite for achieving the objectives established in the Hemispheric Program is the political decision-making of the countries of the Region.

The strategy for execution of the program at the hemispheric level should be directed toward three levels: a regional plan, subregional projects, and national animal health programs.

##### 4.1 Global strategy

The strategy for the eradication of foot-and-mouth disease in South America is based on four elements.

##### 4.1.1 Regionalization of the Hemisphere and of health actions on the basis of characterization of the disease.

- a) identification of livestock macrosystems in accordance with ecological, social, economic, political, and cultural characteristics.
- b) selection of areas for eradication projects in accordance with political, administrative, technical, social and economic characteristics within each macrosystem.
- c) characterization of ecosystems in accordance with the endemicity of the foot-and-mouth disease agent as defined in national plans in these selected areas.

##### 4.1.2 Gradual emergence of new free areas over time.

- a) creation of new free areas in regions in which that is the immediate objective, beginning with modification of the epidemiological structure of ecosystems.
- b) protection, support, and expansion of existing free areas.

##### 4.1.3 Technical and administrative coordination of programs.

The activities and goals of foot-and-mouth disease control programs should in all cases be integrated into the

national animal health programs of each country, supplementing their actions and thereby maximizing the utilization of available human and material resources.

This integrating vision of the programs within each country should be supplemented by continued coordination between the countries and subregions, inasmuch as the eradication of foot-and-mouth disease on a continental scale requires the efforts and support of all.

Accordingly, it is essential that at the national level coordination mechanisms operate within the programs themselves, between services in the same sector, and intersectorally by establishing or supporting organizations for this purpose. The same occurs in bilateral and multilateral relations between the countries of the same subregion and between the subregions in the Hemisphere.

Coordination should not be restricted solely to the specific technical aspect of the disease, but should on the contrary encompass public and private, national and international technical, financial, political, and trade industry associations.

Subregional projects require specific organizational structuring for their respective proposals. Such organization should be part of national animal health plans, and each of the countries participating in the projects should develop its actions through its respective national services with technical cooperation provided by PANAFTOSA.

In order to guarantee the subregional character of such projects, multilateral bodies have been proposed that include already existing border sanitary agreements and the establishment of two subregional levels: the first, technical, made up of the national delegates to COSALFA; and the second, political, made up of the highest ministerial authorities in RIMSA. In the latter the official representation of each of the Subregions in the Hemispheric Committee will be designated .

#### 4.1.4 Community incorporation and participation.

Various sectors of the community should perform a dynamic and decisive role in eradication programs. Because of the nature of their activities and since they are the beneficiaries of these programs, the incorporation and active participation of livestock owners organized into

various groups is of fundamental importance in implementing these proposals and achieving the objectives sought. Other sectors whose participation is of great importance are the meat industry, private veterinarians, companies manufacturing biologicals, and other socioeconomic sectors in each subregion that carry out activities in the agricultural and livestock field that can become important players in implementing and fulfilling the goals of these programs.

4.2 Selective regional eradication strategies for each foot-and-mouth disease ecosystem.

4.2.1 For primary endemic breeding ecosystems

- a) breaking of the cycle of endemic support through the achievement of continuous (without temporal accumulations of susceptibles) and widespread immunity (without pockets of susceptibility) in the animal population for a period of three to five years.
- b) interruption of the cycle of transmission to secondary endemic ecosystems, thereby ensuring confinement of acute sources of infection or susceptible animals in pens and revaccination of young cattle that leave.

4.2.2 For secondary endemic fattening ecosystems

This ecosystem depends epidemiologically on a primary ecosystem, and consequently its situation is related to the measures applied in the latter.

Sanitary intervention in secondary endemic ecosystems should be oriented toward:

- a) reducing vulnerability (entry of infection) through rationalized control of entry of animals into the region and of movements to and from fairs.
- b) reducing the risk of internal transmission (receptivity) through total coverage vaccination at a frequency consistent with the time of entry of animals into the region, early detection of foci, and establishment of wide area quarantine when they occur.

4.2.3 For paraendemic dairy and family production ecosystems

- a) rigorous control of entry of sources of infection.

- b) early detection of foci, extinction and control of their spread.

#### 4.2.4 For unaffected or free ecosystems

- a) establishment of sanitary barriers in order to avoid the introduction of the agent of foot-and-mouth disease.
- b) creation of buffer areas.
- c) strict sanitary control of regions of potential livestock influence.
- d) strengthening of programs for protection of countries free of foot-and-mouth disease.

### 5. PROGRAMMING COMPONENTS

#### 5.1 Epidemiological control of foci and of transit of animals.

All eradication programs should carry out actions to interrupt the transmission cycle of the virus at any point, either in production of the agent (foci) or in its spread (movement of animals). For this reason the early detection of foci and in-depth research on the sequence of transmission (primary focus, evolution of the detected focus, and possible spread starting from the focus) should ensure nonoccurrence of secondary foci through prompt extinction of open foci. In each process of foci control adequate tactical procedures should be defined that take into account the ecosystem in which the focus is occurring and the relations with other ecosystems. Widespread area quarantine and possible ring vaccination are tactical measures that may be adopted to reduce the risk of spread of the virus, depending on the circumstances. Hence, the importance of community collaboration and of flexibility in the animal health service.

The movement of animals is a livestock process that has great influence on the spreading of diseases. In the case of foot-and-mouth disease this is very significant, all the more so in view of the extensive forms of production in which the livestock development cycle takes place in different regions. From the epidemiological standpoint, therefore, dependency exists between regional ecosystems. For this reason strict control is required of exit of livestock from primary endemic livestock breeding ecosystems and epidemiological control of the entry of animals into secondary endemic fattening ecosystems. Consequently, vaccination should not be the only requirement for authorization of movement; rather, the purpose of movement should also be analyzed, together with the production cycle and the particular epidemiological situation, which leads to the application of other measures to lower the risk of spread. Another element that should be required is the cleaning and disinfection of vehicles that transport livestock, in addition to animal concentration and work sites.



## 5.2 Immunization and vaccine quality

Differentiated vaccination tactics should be employed in accordance with the epidemiological situation prevalent in the disease ecosystems and the respective regional control strategies. The vaccines required for immunization of herds should be produced in accordance with these tactics and the requirements of the technology and the official quality parameters required for the objectives of the plan.

In this regard it should be noted that the success or failure of the proposal for eradication of foot-and-mouth disease in areas in which the strategy includes vaccination is directly related to the quality of the vaccines. Quality control should be a constant concern of the official services responsible for this activity and must at no time be relaxed, thereby endangering the program's efficiency and, consequently, its credibility. High quality vaccines are presently available in several countries in South America, the result of the joint efforts of the official services and of the biologicals manufacturing industry.

Current production fulfills the demand for national programs. Almost all vaccines contain inactivated virus (except in Venezuela), contain mostly aluminum hydroxide as an adjuvant, and provide immunity for four months, which requires four-month vaccination cycles. A still minor portion is produced with oil as an adjuvant, which provides immunity for six months for young animals and one year for adults.

Because of the high antigenic variability of the foot-and-mouth disease virus--especially of the type A virus--variations occur at times in field strains with respect to the strains used in the vaccine. This occurs because of low vaccination coverage in the population, either because the animals are poorly vaccinated or because the product administered is not of good quality. This favors the selection of strains by immunological pressure. In accordance with the existence of immunological deviations, epidemiological importance, and vaccinal antecedents, it sometimes becomes necessary to strengthen the antigenic profile of the vaccine by incorporating the new strain without removing the existing one. In special cases a monovalent vaccine may be prepared with the field strain.

Strategic reserves of vaccine should be maintained for emergency situations. In this regard, by mandate from the countries, PANAFTOSA maintains a bank of antigens and vaccines for strategic use in accordance with the epidemiological requirements of the various regions in the plan.

## 5.3 Preservation and distribution of vaccines

Efficiency in distribution systems is essential in order to ensure that vaccines arrive on time at their destination under proper preservation conditions. National projects must give special importance in this process to the role of the cold chain, including cooperation of industrialists in matters relating to the purchase and maintenance of equipment for the chain. Vaccine

manufacturers should also participate actively in obtaining the conditions required for handling and administering the biological.

#### 5.4 Control of vaccination in the field

A serious problem currently present in programs is the reduction in the real vaccination coverage of the bovine population, which is often associated with deficiencies in administering the vaccines. A drastic change in this regard is of great importance for national programs in South America. Rigorous control is required of the management and administration of foot-and-mouth vaccine. Otherwise, all present and future efforts made at the level of manufacture and control of vaccine may be endangered by insufficient and inadequate vaccination. Active control should be planned by area in relation to risks and prior history of livestock owners.

Rigorous control procedures should be under the responsibility and regulation of the governments; however, their implementation should be shared with the private sector: private veterinarians, the biologicals manufacturing industry, organizations of livestock owners, and so forth. Eventual participation of the universities in these matters should not be excluded.

#### 5.5 Epidemiological Surveillance

Surveillance should be aimed at making use of situational epidemiological knowledge in order to make the process of eradication of the disease more effective.

The exchange of epidemiological information between epidemiologically related regions, between countries, and between subregions must be strengthened. This exchange of information should be complete, truthful, and timely. At the same time utilization of information at all service levels should be encouraged, thereby improving decision-making and assisting in orienting sanitary measures objectively. Surveillance system procedures should be adjusted to change in the status of ecosystems. The use of seroepidemiologic techniques should be intensified in paraendemic and unaffected free ecosystems and there should be regularity in the dissemination of epidemiological reports in the field.

#### 5.6 Diagnostic laboratory

Participation of the network of diagnostic laboratories in South America is decisive in the process of epidemiological surveillance. Participation of laboratory personnel together with epidemiologists and field staff should be intensified.

Confirmation and follow-up of field occurrences by the laboratory constitutes an important element in the control process. For this purpose a sufficient number of specimens and adequate coverage of land in relation to foci are required for isolation, identification, and characterization of the agent, including the tracking of strains present in the field.

The appearance of viral strains with small or significant differences and sometimes even subtypes is frequent. Viral variations in the field depend on the immunity status of the bovine population. All national services at the present time are capable of early detection of any deviation of field strains with respect to vaccine strains. This activity is very important for effective control of the disease.

#### 5.7 Care of other species

The control and/or eradication measures described in the plan of action refer to the bovine species owing to the preponderant role it plays as the principal host in the maintenance and spread of foot-and-mouth disease. The populations composed of other susceptible species, such as bubalines, porcines, ovines, caprines, and American camelidae will be the object of strategic actions and control tactics in the event they are involved in situational risks.

#### 5.8 Applied research to the programs

The lines of applied research will include the establishment and/or expansion of studies related to:

- a) identification of epidemiological determinants of risk.
- b) implementation of procedures derived from biotechnology.
- c) strengthening of patterns technical applications of diagnosis, production, and control of vaccines.
- d) development of administrative and operational methods and procedures.
- e) basic research derived from the detection of needs of national programs.

In this regard collaboration of the universities in the fields of interest of the programs can be very important .

#### 5.9 Manpower training

Ongoing training of personnel in all matters concerned with technical-administrative and operational disciplines involved in the work is of great importance for the success of the plan, . In this particular, PAHO, in collaboration with the universities, can develop training programs for personnel of national services. The administrative component of the programs will receive special attention.

#### 5.10 Health Education

Health education should be oriented to achieving the participation of various sectors of society in relation to the objectives, activities, and organization of the program for eradication of foot-and-mouth disease. In this regard special emphasis should be given to the participation of livestock owners.

#### 5.11 Comprehensive Programs

In vast regions of the Hemisphere, mainly in the Andean area, livestock production is basically of a subsistence nature. Consequently, the foot-and-mouth disease component should be integrated into the context of local production development plans, especially with regard to livestock and food production programs. The same is valid for the Amazonian Region, where forms of production are pre-commercial and very extensive. In both situations the eradication of foot-and-mouth disease should be associated with animal health and agricultural programs and, if possible, with public health programs for the purpose of utilizing personnel structure more efficiently and putting operational costs on a sound basis. Environmental protection should be a compulsory component of such comprehensive programs.

#### 5.12 Prevention in countries or free regions

This plan basically envisages eradication actions in South America. However, the plan as a whole includes programs for prevention in disease-free regions and countries.

Prevention programs require as a fundamental basis the operation of diagnostic laboratories, of information and epidemiological surveillance systems, and ongoing training of personnel in prevention. It is also essential to have intercountry coordination through existing international organizations and the establishment of a commission of countries free of foot-and-mouth disease, as recommended by RIMSA V. The OIRSA and the bilateral agreements with the Department of Agriculture of the United States fulfill an important function in with regard to prevention.

#### 5.13 Border Agreements

The establishment of animal health organizations such as COSALFA on the South American continent has determined the need to draw up and strengthen bilateral animal health agreements as a regional integration mechanism to support the effectiveness of the control measures applied by each country. This approach has been being developed with the collaboration and assistance of the Pan American Foot-and-Mouth Disease Center and has permitted the establishment of a uniform methodology responsible for the operation of 17 border agreements in South America.

#### 5.14 Evaluation

Evaluation of the plan will be carried out at two levels: technical and political. The technical level refers to national and subregional programs, with emphasis on the common areas of the agreements. In both situations the evaluations will be made through interdisciplinary groups. At the political and continental level the evaluation will be the responsibility of COSALFA and the results will be presented to the Hemispheric Committee.

The service of special commissions composed of representatives of all the sectors involved should be utilized and their reports widely distributed after discussion with the various sectors interested in the plan. Both the technical and administrative actions of the programs will be the object of evaluation .

### 6. ORGANIZATION AND ADMINISTRATION

#### 6.1 Subregional projects

Achievement of the specific objectives presented in this Plan of Action requires incorporation of the strategies and activities of each national project. In addition, actions will be necessary to obtain close programming coordination between the countries and adequate technical cooperation. In order to facilitate obtaining these objectives, the area has been divided into three projects.

Each of the subregional projects will remain under the general regulatory direction of a Committee for Control and Eradication of Foot-and-Mouth Disease, made up of the directors of the veterinary or animal health services of the participating countries and the Director of PANAFTOSA.

The secretariat for the technical cooperation agreements mentioned will be located in PANAFTOSA/PAHO, Rio de Janeiro, Brazil. The duration of the agreements will be compatible with the stages presented in the preceding chapters.

##### a) Plate River Basin Southern Cone

In this subregion actions are initiated in the southeast.

This project establishes eradication of foot-and-mouth disease in the area included in Argentine Mesopotamia, composed of the Provinces of Corrientes, Entre Ríos, and Misiones; the entire territory of the Republic of Uruguay; and the State of Rio Grande do Sul in Brazil, in the first stage. Subsequently, the program will be extended to the rest of the Subregion, beginning with the Provinces of Chaco and Formosa, in Argentina, the State of Santo Catarina in Brazil, and the southeastern region of Paraguay.

The essence of the project is the creation of a foot-and-mouth disease-free area in a region of high livestock production with repercussions on international trade.

Operationally, the project for eradication of foot-and-mouth disease in the Subregion of the the River Plate Basin has been divided into three subprojects:

Subproject 1 Mesopotamian Region, Republic of Argentina

Subproject 2 State of Rio Grande do Sul, Brazil

Subproject 3 Uruguay

In order to unify the procedures and make the coordination viable with a view to achieving the proposed objectives, a Technical Cooperation Agreement has been subscribed to by Argentina, Brazil, Uruguay, and PAHO that provides for integrated action by the three countries.

Beginning with this project actions will gradually be extended to oth areas of the subregion

b) Andean Area

This project includes the countries of the Andean Pact with a view to utilizing control measures and eradication of foot-and-mouth disease as central axis for the support and strengthening of future actions aimed at increasing livestock production and productivity in a context of overall development with repercussions on the supply of food of animal origin.

The Subregional Project to Control Foot-and-mouth Disease in the Countries of the Andean Pact begins with six subprojects:

Subproject 1 - component A - Atlantic Coast of Colombia

component B - Basin of Lake Maracaibo

Subproject 2 - component A - Preservation and expansion of unaffected areas in Peru

component B - Bolivia-Peru Border

component C - Ecuador-Peru Border

Subproject 3 - Colombia-Peru Border

Subproject 4 - Beni, Bolivia

Subproject 5 - Colombian-Venezuelan Plains

Subproject 6 - Ecuadorian Coast

Beginning in this project actions will gradually be extended to other areas of the subregion.

c) Amazonian Basin, Brazil, Guyana, and French Guiana

In this subregion activities are differentiated according to whether they involve livestock border regions, in which it is proposed directly to achieve foot-and-mouth disease-free areas, or affected regions, in which programs should be strengthened in order to produce favorable conditions for eradication in the following stage. The situation of Brazil and of Guyana and French Guiana is defined in the section on specific objectives.

With respect to the directly Amazonian areas of this subregion, because they have not yet been included in national plans, their organization has still not been defined. Border agreements exist with the coordination of PANAFTOSA/PAHO.

The project aims at implementing the policy lines of agricultural and livestock development so that settlement efforts will envisage the preservation of regional ecological conditions, prevent the introduction of the foot-and-mouth disease virus and other pathogenic agents, and protect and expand already existing disease-free areas.

The document presented at RIMSA V, "Situation Diagnosis and Strategy to Control Foot-and-Mouth Disease in the Amazonian Region of South America and the Midwest of Brazil," essentially seeks to direct attention to the political, socioeconomic, ecological, and cultural repercussions that this program should have in the countries that have access to the Amazonian areas of this subregion.

6.2 Hemispheric Committee for the Eradication of Foot-and-Mouth Disease

Resolution XIII of the V Inter-American Meeting on Animal Health at the Ministerial Level--RIMSA V--held in Washington, D.C, 27-30 April 1987, requested the Director of PAHO to constitute a Hemispheric Committee for the Eradication of Foot-and-Mouth Disease. It is composed of a representative of each of the subregions: Plate River Basin, Andean, Amazonian, and Middle America-Caribbean-and North America. Representatives of producers will also form part of the Committee. PAHO/PANAFTOSA will act as Secretariat of the Committee

The functions of this Committee are related to the achievement and support of the political will to eradicate the disease through the acquisition of resources and with the orientation and evaluation of the progress of the continental eradication program.

6.3 Participation of PAHO

PAHO, through PANAFTOSA, will continue to provide essential technical cooperation for the achievement of the objectives of the Hemispheric Plan of Eradication.

Given the magnitude of this Plan it is essential to strengthen the structure of PANAFTOSA at Headquarters and in the countries.

## 7. FINANCING

In a time of generalized budgetary reductions, the result of policies restricting public spending that reduce financing capacity, it is increasingly difficult to cover additional costs that do not produce a clear return for the socioeconomic development of the countries. These difficulties not only affect expansion of activities for the protection and promotion of health and productivity of livestock, but also support of the infrastructure of the services existing at the present time.

A constant concern regarding livestock on the continent is the importance of the economic repercussions of foot-and-mouth disease on livestock productivity and the financial limitations that so often hinder the provision of health care to eliminate this negative factor in the development of livestock-raising and the socioeconomic development of the countries.

With a view to achieving the general objectives established for the beginning of the next century, provisions have been made at the outset to create large foot-and-mouth disease-free areas and eliminate the disease from livestock regions that are epidemiologically and economically important on the continent within a period of five to six years starting from the formal initiation of specific actions. At the same time systematic and continued activities in other regions should reduce the levels of the disease during that period so that transformation of these areas into disease-free areas can be achieved in a second stage.

Achievement of shorter-term objectives should take place with elimination of the disease in the southeastern region of the Plate River basin and in two areas of the Andean Subregion. The cost of this undertaking has been estimated at approximately US\$95 million, of which US\$50.44 million correspond to the southeastern project of the Plate River basin, financed by the regular budget of the countries and by already approved loans from the IDB and the IBRD.

The cost of the Andean subprojects is US\$46.95 million, requiring financing of US\$13.7 million.

The costs of activities to protect existing free areas, in addition to those regarding advanced control in other regions, care with livestock settlement in new areas, and formation of sanitary infrastructure in those areas with underdeveloped programs with reference to the first stage, have not been detailed in this document. Part of the resources to carry out these actions must be financed, and therefore it will be necessary to make a specific financial analysis for preparation of the corresponding budget. It is obvious that during the course of the first stage, programming of the second stage and the general guidelines for the third stage should be formulated, and the costs for these two stages should be approximated.

In keeping with the sequence of three stages and the three macro-regions, the present status of the financing of the plan for the eradication of foot-and-mouth disease follows.



Table 1 presents a projection for the first stage (1989-1994) of the project for the eradication of foot-and-mouth disease in South America. There are three complementary aspects: a) the Regular Budget, which includes appropriations consonant with the budgets of recent years. The regular budgets of Peru and Uruguay are completely contained under the heading of Subregional Projects because the two countries are entirely incorporated into specific regional subprojects; b) the Strengthening of National Programs, which includes regular and special budgetary items for the intensification of advanced control operations. This heading covers the processes needed to attain, in the areas not included in the regional subprojects of the first phase, an epidemiological situation compatible with eradication in the second stage. This reinforcement of programs is regarded as crucial to the continuity of advances in subsequent stages of the Hemisphere-wide project; c) Subregional Projects, which include specific areas of the following three macroregions<sup>1</sup> on the continent:

1. Plate Basin-Southern Cone Macroregion (Table 2). The program for eradication in the Southeastern part of the Plate Basin will cost, over the next five years, a total of US\$55.6 million in local funds and specific loans already granted (by the IDB to Uruguay and by the IBRD to Brazil). Another component of this macroregion is the project of the Argentine-Chile cordillera region, with an anticipated US\$5 million to be financed.
2. Andean Pact Macroregion (Table 3). To the components of this subproject must be added US\$2 million in technical cooperation, which raises the amount to be financed to US\$14.6 million and the grand total for the project to US\$47.0 million.
3. Amazon Macroregion, including Brazil and the Guyanas (Table 4). The projects presented here are the very first phases of the entire Hemispheric Program for the Continental Eradication of Foot-and-Mouth Disease. The proposed investments would be made essentially to generate the basic animal health infrastructure along borders in livestock production areas. The US\$2.5 million assigned to the Guyanas are a nonreimbursable fund for the chief purpose of strengthening and extending prevention operations in border areas against the foreseeable enlargement of the livestock-growing area in adjacent countries.

The figures shown in Table 1, under the item "National Reinforcement Programs" and "Subregional Programs" are estimates, as proposed by PAHO, and subject to review and for confirmation by the interested countries. It is understood that those resources will be to improve and intensify the countries' initiatives for the goal of eradication of foot-and-mouth disease.

To summarize, the major subtotals are US\$236.4 million in the regular budgets, US\$121.5 million for the strengthening of national programs, and US\$117.4 million for the subregional projects. To this last subtotal must be added US\$2.2 million in technical assistance. Thus, the total to be financed would come to US\$92.1 million. In addition to these budgets there is the agreement between Colombia and the

United States of America for the protection and extension of the FMD-free area in the northwestern region of Colombia, with funding of US\$2.0 million a year. It should also be noted that, with financing of US\$2 million from the Inter-American Development Bank and an equivalent counterpart contribution from the Government of Venezuela, a laboratory is being built and equipped for the production of foot-and-mouth disease vaccine.

The international financial cooperation agencies, and the IDB and the World Bank (IBRD) in particular, could plan a central part in the financing of national programs and subregional projects.

Although these agencies are putting up only part of the financing for the projects, their presence will provide discipline in the use of the available resources and favor intercountry coordination, which is reinforced by the participation of the technical cooperation agencies. Concrete examples of this have been the participation of the IDB and PAHO in the first stage of the national foot-and-mouth disease programs of most South American countries and those for animal health of Mesoamerica and Mexico since the sixties.

#### 8. INTERNATIONAL TECHNICAL COOPERATION

Technical cooperation agencies other than PAHO, whether operating on the subregional, regional or world scale, must be called upon to participate in and contribute to attainment of the goal of eradication. This participation requires concerted action among the different agencies, and the Interagency Coordinating Committee in the Area of Technical Cooperation in Animal Health and Veterinary Public Health has an important part to play in the promotion of this project for the eradication of foot-and-mouth disease from the Americas. These agencies include IICA, OIRSA, AID, IOE, FAO and JUNAC. This does not relieve PAHO of its unquestionable leading role through PANAFOTSA in every part of the Hemispheric effort for the prevention, control and eradication of foot-and-mouth disease.

Table 1

## SOUTH AMERICA

Budget for the First Stage of the Eradication of Foot-and-Mouth Disease  
(1989-1994) (US\$ millions)

	ARG.	BOL.	BRA.	CHILE	COL.	ECU.	PAR.	PERU	URU.	VEN.	GUY.	TOTAL
Regular Budget	80.0	3.5	108.0	2.5	16.0	5.1	16.3	0.0	0.0	5.0	0.0	236.4
Subtotal	80.0	3.5	108.0	2.5	16.0	5.1	16.3	0.0	0.0	5.0	0.0	236.4
National Reinforce- ment Programs												
a) Internal Resources	20.0	2.0	20.0	0.0	10.0	0.0	6.0	0.0	0.0	3.0	0.0	61.0
b) Budget to be Financed	20.0	9.0	20.0	0.0	6.0	2.5	0.0	0.0	0.0	3.0	0.0	60.5
Subtotal	40.0	11.0	40.0	0.0	16.0	2.5	6.0	0.0	0.0	6.0	0.0	121.5
Subregional Programs												
a) Internal Resources	12.4	1.0	30.8	0.0	14.9	2.4	0.0	11.1	12.4	3.0	0.0	88.0
b) Budget to be Financed	2.5	1.6	5.0	2.5	6.8	1.6	0.0	4.0	0.0	2.9	2.5	29.4
Subtotal	14.9	2.6	35.8	2.5	21.7	4.0	0.0	15.1	12.4	5.9	2.5	117.4
General Total												
	134.9	17.1	183.8	5.0	53.7	11.6	22.3	15.1	12.4	16.9	2.5	475.3
Total to be Financed												
	22.5	10.6	25.0	2.5	12.8	4.1	0.0	4.0	0.0	5.9	2.5	89.9

Table 2

PLATE BASIN MACROREGION

Budget for the First Stage of the Eradication of  
Foot-and-Mouth Disease  
(1989-1994) (US\$ millions)

	ARGENTINA	BRAZIL*	CHILE	PARAGUAY	URUGUAY	TOTAL
1. Subregional Projects	14.9	30.8			12.4	58.1
Southeast Plate Basin Project	12.4	30.8			12.4	55.6
Argentine-Chile Cordillera Project	2.5 (2.5)**		2.5 (2.5)**			5.0
Total	14.9	30.8	2.5		12.4	60.6
Total to be Financed	2.5		2.5			5.0
=====						

\* Rio Grande do Sul and Santa Catarina States

\*\* To be financed

Table 3

ANDEAN PACT MACROREGION

Budget for the First Stage of  
the Eradication of Foot-and-Mouth Disease  
(1989-1994) (US\$ millions)

	BOLIVIA	COLOMBIA	ECUADOR	PERU	VENEZUELA	TOTAL
1. Subregional Projects	2.6	20.2	4.0	13.6	4.4	44.8
Atlantic Coast Colombia		18.1 (4.5)*				18.1
Lake Maracaibo Basin					4.1 (1.3)*	4.1
Disease-free areas Peru				13.6 (2.5)*		13.6
Bolivia-Peru Border	0.4 (0.2)*					0.4
Ecuador-Peru Border			0.8 (0.4)*			0.8
Colombia-Ecuador Border		1.2 (0.7)*	0.5 (0.2)*			1.7
Beni, Bolivia	2.2 (1.4)*					2.2
Llanos of Colombia and Venezuela		0.9 (0.1)*			0.3 (0.1)*	1.2
Ecuadorian Coast			2.7 (1.0)			2.7
Total	2.6	20.2	4.6	13.6	4.4	44.8
Total to be Financed	1.6	5.3	1.6	2.5	1.4	12.4

\* To be financed

Table 4

ANDEAN PACT MACROREGION

Budget for the First Stage of  
the Eradication of Foot-and-Mouth Disease  
(1984-1994) (US\$ millions)

	BOLIVIA	BRAZIL	COLOMBIA	PERU	VENEZUELA	GUYANA	TOTAL
1. SUBREGIONAL PROJECTS		5.0	1.5	1.5	1.5	2.5	12.0
Guyanas Region						2.5 (2.5)*	2.5
Amazon Region Bolivia, Peru, Colombia Maracaibo			1.5 (1.5)*	1.5 (1.5)*			3.0
Amazon States of Brazil, Venezuela		5.0 (5.0)*			1.5 (1.5)*		6.5
TOTAL		5.0	1.5	1.5	1.5	2.5	12.0
Total to be Financed		5.0	1.5	1.5	1.5	2.5	12.0

\* To be financed