

# pan american foot-and-mouth disease center

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## SITUATION OF THE FOOT-AND-MOUTH DISEASE CONTROL PROGRAMS SOUTH AMERICA, 1984

MARCH 1985



pan american health organization  
pan american sanitary bureau, regional office of the  
world health organization

# SITUATION OF THE FOOT-AND-MOUTH DISEASE CONTROL PROGRAMS

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### 1. SITUATION OF THE VESICULAR DISEASES

#### 1.1 GENERAL SITUATION

The average annual frequency of herds affected by vesicular diseases during the 1981-1982 two-year period was lower than the frequency recorded during the 1970's, and 51% below the average annual frequency recorded during the 1979-1980 two-year period. Likewise, in comparison with the 1981-1982 period, the average annual frequency during the 1983-1984 period dropped by 15%. These overall results reflected a downtrend in the annual frequency of affected herds during the 1980-1984 five-year period. But in the past two years those frequencies increased slightly with regard to 1982. The diagnoses of foot-and-mouth disease (FMD) have shown similar behavior during the five-year period.

Regarding the geographic distribution of the total annual frequency of affected herds in South America, some countries (Bolivia, Brazil and Colombia) maintained a level similar to the preceding year. The annual number of herds affected by vesicular diseases in Ecuador dropped substantially in comparison to 1983. On the other hand, there was an increase in Argentina, Paraguay, Peru, Uruguay and Venezuela. However, the increase was only slightly significant in both Paraguay and Uruguay, particularly in the latter, due to the fact that the annual frequency remained at very low levels. This continued the trend since 1981.

The appearance of FMD in Chile, which had been free of the disease since 1981, posed an important problem in 1984. The outbreak, which occurred on the Argentine border, was fortunately eradicated by the sacrifice of diseased and exposed animals.

The 1984 affected herds rates (1.13 per 1000) and bovine morbidity rates (7.05 per 10,000) were quite similar to the 1983 rates. Average morbidity over the 1983-1984 two-year period was 7.0 diseased bovines per 10,000, which meant a drop of 27% in comparison to the rates for 1981-1982 (9.63 per 10,000). The drop was 70% when compared to the 1979-1980 two-year period (23.53 per 10,000).

The 1984 internal morbidity and lethality rates showed no important changes when compared to 1983.

With respect to the frequency by virus type in comparison to 1983, there was an overall decline in 1984 on the South American continent; FMD virus types O and A both declined by 40% and 10%, respectively. But virus

type C increased by 67% in relation to the preceding year, due mainly to an epidemic in Argentina that impacted on several bordering countries.

Taking the South American continent as a whole, vesicular stomatitis viruses New Jersey and Indiana also posted a higher number of diagnoses in 1984, in comparison to 1983. Both types of vesicular disease viruses have shown an uptrend since 1981; during the 1983-1984 two-year period the Indiana virus showed a marked increase in reports. Also when compared to 1983 totals, the total number of recorded herds affected by vesicular stomatitis (36%) and both types of virus increased in 1984 in Mesoamerica.

Canada, USA, Mexico, countries of Central America, Panama, countries and territories of the Caribbean, Guyana, Suriname and French Guiana remained free of FMD in 1984. On August 13, 1984, Chile was again declared free of that disease virus.

Tables 1 through 16 summarize the epidemiological data.

## 1.2 COUNTRY-BY-COUNTRY SITUATION

### ARGENTINA

The total number of affected herds registered in 1984 (1541 herds) represented a 25% increase over the 1983 total. Beginning in mid-1984 the epidemiological situation in Argentina reached epidemic proportions with respect to frequency of occurrence, due to 348 foci of virus type C. That virus had already reached a high frequency of 196 outbreaks in 1983, although it accounted for only 34% of the recorded diagnoses in a year when O virus predominated. Likewise in 1983, virus type C was concentrated in the humid pampa region and, to a lesser extent, in the mesopotamian region. But in 1984 its frequency rose by 78% and its geographic distribution expanded very extensively across the entire country from the 38th parallel northward. All the provinces in that region, except Jujuy and San Juan, were affected; this meant that the disease was present in zones where it had formerly been quite sporadic. Surveillance was actively undertaken.

The 1984 bovine morbidity rate of 16.52 per 10,000 was 24% higher than the 1983 rate. The average morbidity recorded during the 1983-1984 two-year period exceeded the rate in the 1981-1982 period. Lethality remained over 2%. When analyzed via the serum protection test, the C<sub>3</sub> Resende virus strain utilized in vaccine production provided an immunological coverage to challenge by C Argentina/84 of 73% at 30 days post first vaccination and of more than 90% at 30 days post-revaccination.

The presence of both virus types O and A declined significantly in 1984 (74% for both types).

The active subtypes in 1984 were O<sub>1</sub>, A<sub>79</sub>, C<sub>3</sub> and C Argentina/84.

For the February, 1985 vaccination stage, the National Animal Health Service (SENASA) has determined that a monovalent C vaccine prepared from a C Argentina/84 field strain will be applied with the trivalent vaccine. On the other hand, SENASA in 1984 concluded the basic document of a new FMD control program aimed to eradicate the disease in the country.

### BOLIVIA

The second phase of the national foot-and-mouth disease control program, planned to extend total coverage to the country, has not yet been put into effect. Therefore, in 1984, the National Service for the Control of Foot-and-Mouth Disease, Rabies and Brucellosis (SENARB) continued to focus its activities on the departments of Cochabamba and Santa Cruz de la Sierra. The frequency of affected herds reported (30) remained at a level similar to that of the two preceding year.

In September and October the recorded frequency surpassed forecasts; this occurrence was concentrated in Cochabamba (13 herds affected). There were 5 diagnoses of virus type A. The bovine morbidity rate in 1984 was lower than in 1983. However, the internal morbidity rate of 31.3% was high. Virus types O (subtype O<sub>1</sub>) and A (subtype A<sub>24</sub>) were identified. The latter type (A) posted a higher annual frequency in comparison to the two previous years, an effect deriving from the months of August and September frequencies in the department of Cochabamba. One case of virus type C was diagnosed in the department of Beni in July.

### BRAZIL

The number of herds affected by FMD (1478) held at a level similar to the 1983 total of 1454 episodes, but declined significantly (59%) in relation to the average of the 1981-1982 two-year period. Brazil has shown a clearcut downtrend in FMD frequency over the past five years in the states having active FMD-control programs. The bovine morbidity rate in 1984 was 3.73 per 10,000, a slight drop from the 4.35/10,000 rate in 1983. Morbidity during the 1980-1984 five-year period tended to decline. Virus type A was identified with greater frequency (59%), followed by O virus (33%). A somewhat similar situation occurred in 1983. The disease showed a widespread distribution in the country, reaching a rather significant extent in Mato Grosso do Sul and Goiás. The latter state exerts an extensive and diversified influence on the nation as a whole, owing to the predominance of the extensive extractive cattle-raising methods that generate multiple, massive transit of animals toward cattle regions in Brazil's south-central region. The presence of FMD was also reported in the western portion of Brazil near

the Bolivian border in 1984. Rio Grande do Sul, a state bordering Argentina and Uruguay, maintained a very favorable epidemiological situation. In 1985 the three nations will hold a three-country meeting to draw up a mutual program aimed to eliminate the disease from a region of the Plata Basin encompassing Rio Grande do Sul, Uruguay and the Argentine Mesopotamia.

The FMD subtypes active in Brazil in 1984 were O<sub>1</sub>, A<sub>79</sub>, A<sub>24</sub>, and C<sub>3</sub>. Coinciding with the end of the long-five-year drought in the State of Sergipe, in the northeast, some cases of vesicular stomatitis in equines were reported (Indiana 3).

### CHILE

In January, 1981, Chile was declared free of FMD virus. No case had been reported since 1979. In some areas of Chile, for climatic and socioeconomic reasons, cattle are moved in the Summer up to the slopes of the Andes where Spring thaws reveal rich pastures.

During 1983 and early 1984 an epidemic of virus O<sub>1</sub> in Argentina affected cattle in Neuquén province on the Chilean border. On the Chilean side of the mountains there are summer grazing lands near the border. On March 13, 1984, FMD was clinically detected in 26 bovines smuggled into Chile in the Trapa-Trapa valley (the Andes cordillera zone bordering Argentina) in the village of Santa Barbara, province of Bio-Bio, 8th Region. On March 19th the Pan-American Foot-and-Mouth Disease Center (PAFMDC) identified virus type O<sub>1</sub>. The Center had received several samples, all positive to virus O<sub>1</sub>, with all the characteristics of the O<sub>1</sub> Campos prototype strain. A focal area was marked off in the cordillera wherein 7719 diseased and exposed animals were slaughtered. The transit of animals was prohibited in the buffer zone and check points were set up with the aid of police and military personnel. Approximately 40,000 animals were clinically examined and bovine blood samples were taken and tested for VIA antibodies.

The zone of the province of Bio-Bio, considered disease-free, was put under a sanitary alert. The animal health authorities traced and inspected more than 1000 properties totalling 70,000 animals. The last case of FMD was diagnosed on May 1st, and on the 16th the corresponding destruction and burial of diseased and exposed animals were conducted. The necessary disinfection and cleanup procedures were then applied.

No foci were reported for 89 days. On August 13th, 1984, considering that all the infected and exposed animals had been eliminated without the use of any vaccines, the Livestock Protection Division of Chile's Agriculture and Livestock Service (SAG) again declared the country officially free of FMD virus. The declaration was made in accordance with the standards of the OIE's International Zoosanitary Code.

## COLOMBIA

The total annual frequency of herds affected by vesicular disease in 1984 remained at a level similar to the preceding year. However, the mean frequency for the 1983-1984 two-year period was almost 48% above the frequency in the 1981-1982 two-year period, but lower than the 1979-1980 period. Bovine morbidity in 1984 was 3.75 per 10,000 head, below the 1983 level of 5.13 bovines per 10,000. Diagnoses of FMD (242) in 1984 exceeded the diagnoses of vesicular stomatitis (197). Virus type O was predominant (37%), followed by New Jersey (32%), A virus (18%) and Indiana (13%). With respect to FMD registered in 1983, the 1984 total was substantially higher for virus type A, while virus type O cases declined slightly. Likewise, New Jersey vesicular stomatitis virus episodes were up, whereas Indiana virus cases decreased. Geographically, the vesicular diseases in 1984 were concentrated in the departments of Antioquia, Cundinamarca, Santander, Boyacá and El César.

Virus type A was found mainly in Cundinamarca, but also in Meta, Santander and Antioquia. The subtypes active in Colombia were O<sub>1</sub> and A<sub>24</sub>. FMD in an isolated household pig was detected during the last week of October in the urban area of Bahia Solano, in the department of Chocó, the southwestern region of the disease-free area. There was no contact with the cattle on the Atlantic coast of Colombia. Special prevention programs are underway in this area through an agreement between the US Department of Agriculture (USDA) and the Colombian Agriculture and Livestock Institute (ICA). Virus type O was identified. In addition to the affected pig, ten healthy animals from two farms and 3 households were sacrificed for reasons of a possible contact with persons who had been exposed to the diseased animal. Authorities proceeded to quarantine the region, prohibit the transit and mobilization of animals, conduct disinfection and inspection of farms and houses in the urban area, and examine sentinel pigs for 30 days. Whereas no new cases occurred, the ICA again declared the ICA-USDA program area free of FMD virus.

## ECUADOR

Although the total number of vesicular episodes (199) registered in 1984 was substantially below the total (450) registered in 1983, it was still higher than the episodes recorded in each year of the 1981-1982 two-year period. In comparison to 1983, the number of FMD episodes dropped noticeably (by 63%). The recording of both A virus and O virus declined noticeably by 38% and 80%, respectively. The level of Indiana type vesicular stomatitis was the highest recorded in the past five years (14 episodes).

Bovine morbidity in 1984 was 13.7 per 10,000 head, a sharp drop from 1983 (59.6 bovines per 10,000). Most of the episodes occurred between June

and November of 1984, concentrated in the Serrana region, Pichincha, Chimborazo and in Loja, in the south. In the Coastal region, high frequency was registered in Manabi. The first months of the year saw a high frequency of vesicular episodes recorded in Zamora Chinchipe in southern Ecuador. The active subtypes were O<sub>1</sub> and A<sub>24</sub>.

#### FRENCH GUIANA

No cases of vesicular disease were reported in 1984.

#### GUYANA

No cases of vesicular disease were reported in 1984.

#### PARAGUAY

The 53 episodes recorded in 1984 comprised the highest frequency in the last five years. During the 1980-1983 period the annual average of affected herds was 25, and had remained quite stable. Compared to the 1983 figure, the total in 1984 represented a 112% increase. Of the total number of episodes whose virus type was identified, O virus predominated (22 episodes) (79%) in relation to C virus (6 episodes). Virus type A was not identified. The overall frequency of episodes, as well as the number of O and C virus cases registered, was very significant in relation to the preceding years. The annual frequency of O virus was almost twice that registered in 1983. During the past 5 years C virus has been identified in only one episode in 1982; during the other years it had not been identified. But between May and September, 1984, the recorded episodes of O virus exceeded the forecasts for some months. The same thing occurred with C virus in the months of August, September and November.

Bovine morbidity (8.88 per 10,000) was 16 times greater in 1984 than in 1983 (0.52 bovines per 10,000), and also higher than during the 1981-1982 two-year period (2.74 per 10,000). The internal morbidity rate recorded in 1984 was high (23.9%).

The geographic distribution of FMD in 1984 was quite extensive, and virus type O was especially characteristic. Although C virus was recorded in the western region (Boquerón), it was more concentrated in the eastern region near the Brazilian and Argentine borders.

The subtypes identified during 1984 were O<sub>1</sub> and C<sub>3</sub>.

### PERU

116 episodes of vesicular disease were recorded in 1984, an increase of 84% over 1983. The frequency during 1984 was the second highest in the 1980-1984 five-year period, exceeded only by the 297 cases recorded in 1980. FMD had not been reported for more than 12 months. Virus type O has not been identified in the past three years and virus type C was not identified in 1984. The presence of A virus was recorded in Lima in December.

Both New Jersey and Indiana vesicular stomatitis have shown an uptrend since 1982. Compared with 1983, episodes of New Jersey (10) and Indiana (35) vesicular diseases in 1984 doubled and almost tripled, respectively. The total episodes of Indiana in 1984 was significantly higher than the total in any single year since 1980. The outbreaks caused by this virus took on epidemic characteristics, especially because of its distribution in the mountainous eastern part of the country where it occurred in areas never before reported.

### SURINAME

No cases of vesicular disease were reported in 1984.

### URUGUAY

The country continues to show a very favorable epidemiological situation with regard to its goal of eliminating the disease. However, even though few episodes of FMD were reported in 1984, they were more than in 1982 or 1983. Of the 16 episodes reported in 1984, 10 were caused by O virus (the highest frequency since 1981) and 6 by C virus (the highest frequency in the last five years). Virus type O was present from March to May, along the coast (Rio Negro, Salto and Soriano) and in the south (Florida and San José). Virus type C was present in May, August and December, predominating in the departments of Soriano, Flores and Colonia.

Bovine morbidity (0.42 per 10,000) exceeded the 1983 total, but reflected continuation of the downtrend begun in 1980.

The subtypes identified were O<sub>1</sub> and C<sub>3</sub>.

### VENEZUELA

The 254 episodes of vesicular diseases recorded in 1984 totalled a 192% increase over the 1983 total. Nevertheless, the annual average during the 1983-1984 two-year period dropped 3% in relation to the annual average



for the 1981-1982 period. The virus type was identified in 40 episodes; FMD accounted for 63%, of which 45% was virus type 0. New Jersey vesicular disease amounted to 30% of the viruses typified. Compared to 1983, FMD and New Jersey type vesicular stomatitis remained at practically the same level of episodes recorded. Indiana virus was reported for the first time in the last five years. Geographic distribution was extensive. The subtypes identified were O<sub>1</sub> and A<sub>32</sub>.

Bovine morbidity in 1984 was 6.34 per 10,000 head, a 79% increase over 1983 (3.55 bovines per 10,000). The average morbidity for the 1983-1984 two-year period was below the figures registered in 1981-1982.

1.3 SITUATION OF VESICULAR STOMATITIS IN CENTRAL AMERICA AND PANAMA,  
1983-1984

Table 17 summarizes the number of affected herds and the frequency of New Jersey and Indiana stomatitis virus diagnoses in Panama and the Central American countries.

## 2. SITUATION OF THE FOOT-AND-MOUTH DISEASE CONTROL PROGRAMS

### 2.1 GENERAL SITUATION

The foot-and-mouth disease control programs in 1984 continued their development at levels similar to those of the previous year. The economic crisis obviously prevailed upon the pace of the programs, and it was not possible to attain significant advances. Nevertheless, the programs have maintained their basic activities of epidemiological surveillance, control of outbreaks, and vaccination with vaccines submitted to official control. The programs have therefore been able to lessen the seriousness of the disease and diminish the number of foci in comparison with preceding eras.

In 1984 the official veterinary services put forth substantial effort to restructure the national plans based on the policies and strategies formulated by the South American Commission for the Control of Foot-and-Mouth Disease (COSALFA). This process has been encouraged by the results achieved in the area of control and by the technical support available today as a product of an improved epidemiological awareness of the disease. This not only leads to the identification of areas with varying levels of risk, but also enables to programs to formulate selective regional strategies. The goals are improved effectiveness in fighting the disease and greater rationalization in the application of resources.

Argentina drafted the document for the Argentine Animal Health Plan (PLANARSA), which sets forth the sanitary guidelines for the control and eradication of FMD and other diseases during the next few years. The Plan has been submitted to the evaluation of the Ministry of Economics. Bolivia completed the final revision of the Project for the Second Stage of SENARB, which aims to extend coverage to most of the country. The document has been submitted to the consideration of the Ministry of Planning and Coordination, for review prior to submission to the Inter-American Development Bank (IDB). A project for the Control of Animal Diseases was submitted by Brazil to the World Bank. The Project includes the Second Stage of the Foot-and-Mouth Disease Control and Eradication Plan, which received cooperation from the PAFMDC/PAHO. A mission from the Center of Funding for FAO/WORLD BANK Co-operative Programs structured a general document that is the basis for the funding studies. Colombia is developing a specific program for eradication on the Atlantic Coast and has prepared a document for Stage II of a National Plan. Ecuador drafted a preliminary document also earmarked for a Stage II, which is currently undergoing revision. Paraguay drew up a Five-Year Plan for Foot-and-Mouth Disease Control; the Plan defines the eradication goals and will continue being developed with the available funding. Venezuela obtained an IDB credit for construction of the oil-adjuvanted FMD vaccine production laboratory that will be the cornerstone for a reformulation of the disease eradication program.

Of outstanding significance is the situation attained in Uruguay and Brazil's southern state of Rio Grande do Sul, which jointly encompass 400,000 farms and a population of approximately 24 million cattle and 33 million sheep. Systematic disease-control actions are underway and have substantially reduced the number of foci. This situation is the result of an increasingly more intensive application of epidemiological information, especially for the strict control of foci and of animal transit. It is worth noting that the epidemic of virus type C in Argentina has not affected this subregion.

Significant results will emerge during the next few years generated by this situation, and by the determination shown by the authorities of Argentina, Brazil and Uruguay to push ahead with an eradication program in the Plata Basin. That Program encompasses all of Uruguay, the state of Rio Grande do Sul, and the area called the Argentine Mesopotamia. Several joint activities of the plan of action were initiated during the year in review.

Of similar significance is the situation noted in the northwestern region of Colombia, encompassing one million cattle. Through the application of a systematic program based on epidemiological surveillance, prompt attention to foci, strict control of animal mobilization and transit, and high vaccination coverage, it has been possible to maintain a virus-free area within this region near the Panamanian border, plus a protection area with a low number of foci. The program's efficiency was put to the test in 1984 by an outbreak of FMD caused by virus type O, in Bahia Solano, an isolated section of the virus-free area. The fast detection of affected animals and the prompt application of the emergency plan led to immediate eradication of the focus.

Another significant factor is the Chilean animal-health authorities' determination to keep that country free of FMD. Faced with the presence of an outbreak in the high Andean slopes bordering Argentina, they applied the proper emergency measures of quarantine and slaughter of sick and exposed animals, thereby quickly eliminating the outbreak. Their action was aided by the existing studies on the risks of bringing the disease across the border; such studies were based on the detailed caracterización of the traditional cattle-raising practices in the high Andes in the summertime.

The year was characterized by significant activity in the bilateral agreements for the coordination of disease-control activities in the border areas. Except for the meeting between Bolivia and Peru, which was postponed for unexpected reasons, all the border commissions held their regular meetings.

The coverage data achieved in 1984 were similar to 1983:

Geographic coverage	60%
Coverage of cattle herds	85%
Coverage of cattle population	84%

The geographic coverage of the programs in Bolivia, Brazil and Colombia does not encompass all those countries' territory. The Amazon region, where the cattle population is extremely sparse, is excluded in the case of Brazil and Colombia. Bolivia's program includes only the departments of Santa Cruz and Cochabamba and, beginning in 1983, a pilot area in the department of Beni.

The number of field units in 1984 (2104) showed a slight increase over the 1983 total of 1977.

The programs' vaccination coverage reached 46% of the herds (1,655,545) and 69% (127,803,300) of the cattle. These numbers reflect a slight drop of 8% and 6%, respectively, in the FMD vaccination coverage levels. On the other hand, it should be remembered that some countries have adopted varying vaccination schemes according to the regions and applied selective strategies.

490.4 million doses of FMD vaccine were produced. Of the 491 million doses submitted to official control, 438.7 million (89%) were approved. Including the oil-adjuvanted FMD vaccine supplied by the PAFMDC, a total of 440.3 million doses of vaccine was made available. Thus 12% more vaccine was available in 1984 in South America than in 1983.

Available human resources in 1984 rose by 20% over the preceding year, totalling 3275 professional staff and 10,579 assistant and auxiliary personnel. The latter category also slightly expanded. The overall increase in personnel was mainly due to an expansion in Brazilian personnel.

Field units each covered an average area of 4948 km<sup>2</sup>, 1706 cattle herds and 89,584 cattle.

Intra-regional trade in 1984 involved mainly the exchange of animals on the hoof, especially cattle. There was also a significant transit of equines.

Importation from other parts of the world largely involved genetic material, especially semen and breeding stock, from Europe, North America, Australia and New Zealand.

The figures for this chapter are given in Tables 18 through 32.

## 2.2 COUNTRY-BY-COUNTRY SITUATION

### ARGENTINA

The entire national livestock population is covered by the National Animal Health Service (SENASA).

The basic FMD control strategy was unchanged in 1984: north of the Barrancas and Colorado Rivers, systematic mandatory vaccination of cattle is conducted every four months, and every six months for sheep; strategic and ring vaccination in the provinces of Rio Negro, Neuquén and Patagones in Buenos Aires; and maintenance of the free area in Chubut, Santa Cruz and Tierra del Fuego.

A FMD epidemic that began in mid-1983 affected the livestock in six departments of the province of Rio Negro and two in the province of Neuquén. An epidemiological study was conducted, including blood samples to detect antibodies. This led to the decision to undertake an official massive vaccination with oil-adjuvanted vaccine. The majority of the cattle in the summer grazing lands of Neuquén were likewise vaccinated.

Other provinces in which special effort was directed to epidemiological studies and vaccination to control epidemic situations were Buenos Aires, Catamarca, Rioja, and --to prevent the spreading of an outbreak of FMD caused by A Argentina/81 virus-- Formosa.

Private laboratories produced 167.2 million doses of aluminum-hydroxide FMD vaccine submitted to official quality controls. 156.9 million doses (94%) were approved. The PAFMDC supplies 1.4 million doses of oil-adjuvanted FMD vaccine for strategic vaccinations in areas affected by FMD outbreaks.

A variant of C<sub>3</sub> Resende virus (C Argentina 84) was detected in 1984 and immediately sent to the laboratories to be incorporated into the vaccine. In some areas a monovalent vaccine was utilized to prevent the spreading of outbreaks.

46,558,000 cattle were vaccinated, yielding a coverage of 88.4% of the cattle population and 92.7% of the herds.

The Service engaged 316 veterinarians, 820 field assistants and 315 administrative personnel in 295 field units. 1120 vehicles were available, as each field unit covered an average area of 9423 km<sup>2</sup>, 1097 herds and 178,542 cattle. Thus each veterinarian covered an average of 1078 herds and 175,567 cattle, while each field member was responsible for 289 herds and 47,027 cattle.

The year was characterized by intensified training of staff in specific subject areas: 15 veterinarians took part in international courses organized by the PAHO/PAFMD, covering administration, health education and epidemiological surveillance. Eighteen veterinarians also participated in the two-month epidemiological surveillance course sponsored by the Animal Health Training Program for Latin America (PROASA).

All the animal-health border agreements were active during 1984. Particular activity was developed along the Chilean border near the province of Neuquén in order to control the FMD outbreak that spread into that country's summer mountain pasturelands.

The PLANARSA Project Document was drafted with the active cooperation of the PAFMD. Beginning in 1985, the Project envisions a ten-year effort mainly aiming to eradicate FMD and control other economically important diseases like brucellosis, tuberculosis, mange, ticks, and diseases in horses and pigs. The plan was submitted to the livestock breeders and central governmental authorities and is currently under consideration by the Ministry of Economics.

With respect to the information system, time was rented on a national computer system to process the field information. The system comprises 170 terminals in the most important capitals and cities. Data records including 7000 FMD outbreaks from 1977 to 1984 were organized.

### BOLIVIA

The area under program, covered by the National Service for the Control of Foot-and-Mouth Disease, Rabies and Brucellosis (SENARB), encompasses the departments of Cochabamba and Santa Cruz, a jurisdiction within the department of Tarija on the Argentine border, and a pilot plan in the department of Beni. That accounts for 18.5% of the national cattle population. During 1984 the final revision was accomplished of a project document for a second stage intended to cover most of the country. The document has been submitted to the evaluation of the Ministry of Planning and Coordination.

Vaccination covered 314,000 cattle in the departments under program and 186,116 in the pilot area. Only oil-adjuvanted vaccine supplied by the PAFMD to SENARB was utilized.

The vaccination activities were complemented by health education activities, and control of animal transit and marketing centers.

The Service operated 17 field units with 48 veterinarians, 45 assistants and 26 vehicles. Each field unit covers an average area of

16,267 km<sup>2</sup>, 1375 herds and 22,529 cattle. Each veterinarian takes care of an average of 487 herds and 7979 cattle, while field staff members are responsible for 259 bovine herds averaging 4118 cattle.

During 1984 meetings were held regularly under the bilateral animal-health agreements with Argentina, Brazil and Paraguay.

### BRAZIL

The National Foot-and-Mouth Disease Control and Eradication Plan continued its coverage of 33% of the land surface, 74% of the herds and 78% of the bovine population. The land surface figure is relatively small because it excludes the extensive Amazon region where the animal population is insignificant. In relation to 1983, coverage increased in the states of Mato Grosso do Sul, Mato Grosso, Minas Gerais and Paraíba. The Plan is in progress in 20 units of the Federation, but some states in the Northeast, North and Central West have yet to be included.

239,740,520 doses of inactivated foot-and-mouth disease vaccine with aluminum hydroxide adjuvant were produced by 8 private laboratories. Official control approved 203,343,040 (85%) of the output. Official quality control tests utilized were the BPD<sub>50</sub> technique, the percentage of protection against generalized disease, and, occasionally, the guinea-pig C index.

Vaccination coverage reached 800,453 herds (52.6%) and 54.3 million cattle (68.3%). Also vaccinated were 4,042,668 sheep in the state of Rio Grande do Sul. Some areas of Brazil utilized oil-adjuvanted FMD vaccine produced by the PAFMDC and the Regional Animal Support Laboratory (LARA) in Campinas, São Paulo. Vaccinations are usually administered by the cattlemen, with supervision from official personnel.

The Plan engaged 1922 veterinarians, 4832 field assistants and 2274 administrative personnel working in 1210 field units. Each unit covered an average area of 2431 km<sup>2</sup>, 1258 herds and 65,487 cattle. Each veterinarian therefore was responsible for 805 herds totalling 41,881 cattle. Federal funds for the Plan rose to US\$ 3,264,777. This total was increased by funds from each state. The farmers paid the cost of the vaccine and its application.

Regarding international trade in animals, cattle were imported for slaughter from Bolivia and Paraguay, semen from various European countries and from the USA, horses from Argentina and Uruguay, among others. Exports included cattle shipped to Argentina, Peru and Uruguay, plus horses to several countries in the Americas and Europe.

During the year 72 veterinarians attended specific courses organized by the PAHO/PAFMDC. In this regard were held the PROASA Communication and Epidemiological Surveillance courses.

In the area of international coordination activities, meetings were held under the animal health border agreements with all neighboring countries. Several preliminary activities were initiated for a preliminary plan of action drawn up in conjunction with Argentina and Uruguay for the eradication of FMD in the Plata Basin.

The project for the second stage of the National Plan was submitted to the World Bank, which produced a revised document that will be the basis for the funding arrangements. Some activities of the strategy proposed for the Southern region were started with own resources.

### COLOMBIA

The Foot-and-Mouth Disease Control Program, which is nationwide in scope, directs priority attention to the zones of major livestock raising importance for the national development. Differential strategies continued to be applied in 1984. The virus-free zone of northern Chocó, with a bovine population of 50,000 head, is protected by a zone with a million head of cattle where strict programs emphasize attention to animal mobilization, epidemiological surveillance, prompt reaction to foci, massive and systematic vaccination covering over 90% of the animal population. The goal is to expand the virus-free area eastward to encompass the entire northern coastal area which harbors half of the nation's cattle.

In the economically important livestock areas on the North Coast, Eastern Plains and Inter-Andean valleys, vaccination cycles are conducted every 4 months. Varying levels of coverage are accomplished according to the program's progress. In areas of lesser livestock importance vaccination is conducted on an every-four-month basis, but not in cycles.

The program's geographical coverage is low because it excludes the southeastern Amazon region where the bovine population is negligible.

The only FMD vaccine-producing laboratory --VECOL-- produced 31,863,275 doses of inactivated bivalent vaccine adjuvanted with aluminum hydroxide. The antigen is produced in cell cultures. All the doses were submitted to official quality controls, which approved 27,040,100 doses (84.8%). Of the total approved, 2.5 million were exported to Ecuador and Venezuela. During the year in review VECOL produced 161,800 doses of oil-adjuvanted FMD vaccine that were accepted for use in pigs and is continuing studies evaluating this type of vaccine for use in cattle.

Cattle vaccination covered 7,440,380 animals in three cycles, 440,948 in two, and 1,869,026 in one cycle. Thus 60.8% of the population under program was vaccinated.



The program engaged 185 veterinarians, 378 field assistants and 288 administrative staff assigned to 106 field units. Each field unit covered an average area of 6384 km<sup>2</sup>, 4168 cattle herds with 151,357 cattle. The average per-veterinary coverage was 2510 herds amounting to 91,158 cattle, while each field personnel averaged 798 herds with 28,960 cattle.

On October 26, 1984, the plan of action designed to eradicate outbreaks of FMD in the virus-free area bordering Panama went into effect. All the planned activities were promptly undertaken and the focus was eradicated without the disease spreading due to a single affected animal. The risk area comprises 31 ranches with 390 cattle and 267 pigs. The operation required the preventive sacrifice of 3 cattle and 8 pigs regarded as indirect contacts. The operation cost an equivalent of US\$ 15,877.00.

The training of staff members in Program strategies and plans of action was extensive and branched out to include the farmers. 22 regional veterinarians attended a course on epidemiological surveillance, held with PAFMDC cooperation. Several professional personnel participated in PROASA courses sponsored by the IDB/PAHO. Extension and sanitary education activities were likewise intensified.

With respect to international coordination action, meetings were held regularly by the commissions of the animal-health border agreements with Brazil, Ecuador and Venezuela.

The funding of the Program's Second Stage has not yet been determined. Nevertheless, implementation of the eradication project proceeded in the department of Atlantico and in the northern section of Bolivar.

Regarding international trade in animals, cattle were imported from countries free of exotic viruses and exported to Venezuela, while horses were exported to Ecuador, Panama, Puerto Rico and the USA.

## CHILE

Chile was declared free of FMD virus in 1981. Since then the country has conducted a prevention program encompassing the entire national territory of 757,720 km<sup>2</sup> with its susceptible animal population of 3,878,682 cattle, 5,678,325 sheep, 1,134,516 goats, 890,781 pigs and 100,173 camelidae.

The program comprises a system of epidemiological surveillance and controls of incoming animals and of products and byproducts of animal-origin. A sanitary education program supports the program.

With PAFMDC cooperation, Chile conducted an assessment of the risks of introducing FMD and other exotic diseases across the border and via the

ports and airports. The data gathered throughout the 13 regions into which the nation is divided are currently being studied for subsequent usage in the exotic-diseases program.

The Program also proceeded with the activities involving population control and sampling of anti-VIA antibodies in the livestock that utilize the summer grazing lands in the Andes mountains.

Authorities were successful in their effort to eliminate the outbreak caused by the illegal entry of livestock into the province of Bio-Bio in the 8th Region, in the zone bordering Argentina. The prevention program included the participation of 25 veterinarians, 15 agricultural engineers (logistical support), 34 technical staff, 11 administrative personnel and 3 assistants. Additionally, support was rendered by the military and public organs directly related to the regions in question.

Considering the cost of operations and the cost of replacing the 7719 animals sacrificed, the outbreak amounted to losses of approximately US\$ 2 million.

Chile does not manufacture FMD vaccines, but maintains a reserve of 50,000 doses of emergency vaccine at the PAFMDC in Rio de Janeiro.

The Program engaged 67 veterinarians, 54 field assistants and 53 administrative personnel assigned to 64 field units. Each field unit covered an average area of 11,839 km<sup>2</sup>, including 2954 cattle herds totalling 59,667 heads of cattle. The average veterinarian provided coverage to 2821 herds totalling 56,995 cattle, and the average field personnel's coverage was 1562 herds totalling 31,560 cattle. The FMD program's specific regular budget amounted to US\$ 128,571.00.

The Exotic Diseases Prevention and Emergency Program of the Livestock Protection Division of the National Agriculture and Livestock Service (SAG) intensified its professional training activities. Special emphasis was directed to epidemiological surveillance and sanitary education and extension. An emergency training program envisioning involvement of all the community groups has been drafted. The material drawn up and the methodology are being assessed in the 8th Region.

The border commissions of the bilateral animal-health agreements with Argentina and Peru held their regular meetings. Following the outbreak of FMD in Trapa-Trapa, contacts were intensified with the Argentine border commission.

## ECUADOR

The National Animal Health Program encompasses the entire country and its estimated livestock population of 3,200,000 cattle, 3,520,000 pigs, 1,259,000 sheep and 268,000 goats.

The predominant risk factors in the spreading of FMD in 1983 were the clandestine mobilization of animals and the low coverage of FMD vaccination. Faced with that situation, the strategic FMD control plan was modified, intensifying control of livestock mobilization in the affected areas. The areas were declared temporarily under quarantine and the movement of livestock was restricted to animals bound to the slaughterhouse, after prior veterinary inspection.

Of the 1,178,170 doses of vaccine available to the Program, 339,970 were imported from Colombia because the national laboratory ceased producing vaccine in May. The PAFMDC also supplied 250,000 doses of oil-adjuvanted vaccine. The vaccination coverage of the cattle population under program amounted to 40.13%.

The oil-adjuvanted vaccine was utilized to initiate the immunization project in the cantons of Santo Domingo de los Colorados, in the province of Pichincha, and in the northern sector of the province of Manabi, which is considered a primary endemic area. 209,000 doses were administered in two phases.

The Program engaged 93 professional staff members and 242 assistants in 55 field units, which covered an average area of 5156 km<sup>2</sup> with 58,189 cattle in 4490 herds.

Regarding training of staff and personnel, a PROASA Epidemiological Surveillance course was conducted for 25 veterinarians. 13 professional personnel also attended courses outside Ecuador.

The border sanitary agreement with Colombia pursued its activities regularly, while activities under the agreement with Peru were started.

During 1984 a preliminary document was drafted for the Second Stage of the Foot-and-Mouth Disease Control Program. It is currently being reviewed.

## PARAGUAY

The FMD control program of the National Animal Health Service (SENACSA) covers the entire nation, encompassing 57.8% of the cattle population estimated at 6,890,500 heads.

The control strategy consists of massive immunization, sanitary control of animal mobilization and active epidemiological surveillance. Utilization of oil-adjuvanted vaccine has begun in some regions having endemic characteristics.

Two private laboratories produced 12,438,480 doses of vaccine submitted to official control through SPI and SNI tests; all the doses were approved. The Program likewise imported 500,000 doses of oil-adjuvanted FMD vaccine. 3,870,700 cattle were vaccinated in three cycles, yielding a coverage of 53.9% of the population.

The oil-adjuvanted vaccine was administered in the pilot project of Caapucú and Quyquyhó in the Mennonite Colonies, Eastern Region, and in the Mennonite Colonies, Western Region, as well as in the dairy areas near Assunción and around the Central Laboratory.

The Program engaged 123 veterinarians, 210 field assistants and 172 administrative personnel in 43 field units. Average coverage per unit yielded 9459 km<sup>2</sup> and 167,121 cattle in 4585 herds. Coverage per veterinarian averaged 1603 herds with 58,424 cattle. The 1984 budget amounted to US\$ 1.26 million.

Extensive personnel training activities were conducted at the national level during the year, and 12 veterinarians participated in courses outside Paraguay. Extension and sanitary education activities were also intensive.

Activities related to the animal health border agreements with Brazil proceeded with the exchange of information gathered along the border, a meeting of epidemiologists, and the regular meeting of the Joint Border Commission. Meetings were also held with the Argentine and Bolivian border commissions.

A five-year FMD control program was drafted to define the eradication goals to be accomplished in the next few years.

In compliance with recommendations issued by COSALFA, animal health standards have been implemented for the various livestock-expansion programs currently underway.

International trade records showed significant importation of cattle from Brazil, Uruguay and the USA, and of equines from Argentina and Uruguay.

## PERU

The Foot-and-Mouth Disease Control Program encompasses the entire nation.

The official laboratory produced 1,657,360 doses of FMD vaccine, of which 98.8% was approved for use through the officially monitored C index test. 225,300 doses were exported to Bolivia and 45,000 doses of oil-adjuvanted vaccine were provided by the PAFMDC.

Vaccination is limited to cattle and is administered in three cycles in the departments having the greatest risk of FMD --the border with Ecuador, Bolivia, Costa Norte, Lima and Arequipa-- and two cycles in southern Peru, the jungle and northern and central sierra. Vaccination is not given on a regular basis in the departments of Ayacucho, Huancavelica, Apurimac, Cuzco and Madre de Dios, where only livestock in transit is vaccinated. The populational coverage was 12.8%.

The Program staff totalled 91 veterinarians, 370 field assistants and 26 administrative personnel. The 144 field offices operated 36 pickups and 140 motorcycles. The material and human resources also pursued other animal-health activities. The local units' covered an area of 8359 km<sup>2</sup>, 3223 herds and 23,552 cattle. The average coverage per veterinarian was 5101 herds and 37,269 cattle.

International trade records showed imports of cattle from Canada, USA, Panama and Uruguay; buffalo from Brazil; equines from Argentina, Brazil, Chile, Colombia, Ecuador, USA and England; swine from Belgium and Canada, and sheep from Germany, Barbados, Brazil, USA and New Zealand.

## URUGUAY

The General Board of Veterinary Services continued to conduct the FMD control program throughout Uruguay. 100% of the cattle and sheep populations of 11,236,600 and 20,447,250, respectively, was covered (Permanent Official Record, National Board of Animal Census - DINACOSE).

The animal health control policy is based on massive immunization, prompt attention to foci and epidemiological surveillance. The target is to proceed within a short time to stages that lead to the eradication of the disease.

The total annual output of 30,643,840 doses of vaccine was submitted to official controls and approved for use. 610,000 doses were exported to the Philippines. The population coverage in two vaccination stages and one dedicated specifically to calves was 72.34%. It should be noted

that the periods of vaccination were altered nationally: two general vaccinations of the cattle population are now conducted in the first two weeks of May and November, while only calves are vaccinated in March. The massive vaccination of sheep is still done annually in December and January.

The Program pursued its activities with 40 veterinarians, 63 specialized field assistants, 23 administrative personnel and 34 general services staff. The 40 field units utilized 38 vehicles and were allocated a budget totalling US\$ 109,555.00. Each field unit and veterinarian covered an average of 280,915 cattle distributed in 1623 herds ranging over an area of 4062 km<sup>2</sup>.

By order of the Minister, the Animal Health field personnel act in conjunction with DILFA, which adds 66 veterinarians and 254 assistants to the total number of personnel engaged in the FMD control effort.

During 1984 meetings were held with animal health personnel from Argentina and Brazil within the framework of the border sanitary agreements. Review and approval in 1985 of the "Manual of Procedures for Joint Action in the Area of Agreement" was undertaken. Working groups met to draw up a plan of action to eradicate FMD in the Plata Basin. In conjunction with this plan, a sampling of anti-VIA antibodies was taken from a population of 43,224 bovines to detect viral activity in bovines along the border area. Samples were taken from 1990 animals in three age groups.

Regarding international trade in animals, cattle were exported to Argentina and semen was imported from Canada, USA and France.

### VENEZUELA

The Animal Health Division conducts its Foot-and-Mouth Disease Control Program throughout the entire country. The Program is based on epidemiological surveillance, prompt attention to outbreaks and vaccination with modified-live-virus vaccine produced by the Ministry of Agriculture and Livestock.

Production of modified-live-virus vaccine in 1984 amounted to 6,283,900 doses. Additionally, 1,750,000 doses of inactivated vaccine were imported from Colombia and 300,000 doses of oil-adjuvanted inactivated vaccine were supplied by the PAFMDC. Vaccine coverage reached only 30.92% of the population, a substantial drop due to the shortage of vaccines caused by difficulties in acquiring the raw material for vaccine production. Vaccination is conducted by official personnel and authorized private veterinarians. The inactivated vaccine is utilized in areas where FMD presence is sporadic.

The Program continues strict quarantine control at 11 international airports, 23 international seaports, 8 border stations and 11 postal customs offices.

The Animal Health Division operates through 130 field offices engaging 360 veterinarians, 200 field assistants, and 121 administrative personnel. Each field unit covers an average area of 7015 km<sup>2</sup>, with 87,015 cattle in 888 herds. Each veterinarian covered an average of 31,422 cattle and 321 herds. The animal health personnel encompass all the sanitary aspects of the livestock sector. The 1984 operating budget amounted to US\$ 1.7 million.

The bilateral commissions of the border animal health agreements held their regular meetings with the Brazilian and Colombian commissions.

Planning advanced on the inactivated vaccine production laboratory that will be the cornerstone for reformulation of the disease-control program.

### 3. CONTINENTAL VESICULAR DISEASE SURVEILLANCE AND INFORMATION SYSTEM: RESULTS AND PERFORMANCE

#### 3.1. RESULTS

As in previous years, the behavior of the vesicular diseases in the South American countries in 1984 was continuously monitored by means of a system of indicators that permit the characterization and interpretation of their levels of occurrence and the behavior of the virus types. The important history of vesicular disease occurrences stored in the PAFMDC computer has been utilized to interpret the significance of the frequencies of affected herds, according to the type of virus, each country's political and administrative subdivision, and total.

Monthly occurrence is ranked according to the code utilized by the FAO/OIE, showing levels forecast for 1984 as based on a 12-year history of occurrences.

The total frequency of affected herds is denoted by the following key:

+ low frequency  
++ moderate frequency  
+++ high frequency

The virus type is indicated when its frequency exceeds the median during the respective month.

#### 3.2 PERFORMANCE

This chapter evaluates the operating performance of the communications transmitted within the Continental Epidemiological Information System, especially in terms of the regular flow of information between the national animal-health services in South America and the PAFMDC.

##### 3.2.1 Communications of Alert

Reports of alert were frequently telegraphed in 1984 to several countries of the region to warn them of the appearance of vesicular diseases in neighboring countries near their borders. Such communications of alert were sent to Chile, Peru, Bolivia, Uruguay and Panama. Alerts were also transmitted to the USA and to the PAHO Central Office in Washington, DC, as well as to organizations like the OIE, OIRSA, FAO, IICA, the EEC veterinary services and the World Reference Laboratory in Pirbright, England.



### 3.2.2 Weekly transmittal of information on the presence of vesicular disease, by grid squares

All personnel engaged in the programs are aware that the map of each South American country has been subdivided into a grid map based on geographic coordinates. The grid map serves as a guide for a weekly telex communication of the presence of vesicular disease (regardless of the number of episodes). A numerical code is employed to indicate both the week reported and the grid squares affected. The PAFMDC prepares the code annually and distributes it to the countries at the beginning of each year. The telexed notice serves as data input for the PAFMDC's epidemiological file stored in a Digital 1134 computer. The Center issues a weekly printout named the Weekly Epidemiological Report for distribution to the countries in South America and elsewhere.

#### *a) - Reporting level*

The reporting level of the weekly communications from the South American countries in 1984 reached 98%, an intermediary level in relation to the preceding years: 1983 (99.6%), 1982 (97%), 1981 (96%), 1980 (99%) and 1979 (97%). The receiving of weekly communications averaged 51 out of the 52 calendar weeks.

Compared to 1983, some countries (Argentina, Brazil, Colombia, Paraguay, Peru, Venezuela) improved their levels of reporting efficiency (Table 33), while others (Bolivia, Ecuador and Uruguay) declined.

#### *b) - Publishing level*

Considering the data received by the PAFMDC, almost all the weekly reports (97%) were published although the total was less than the 99.7% attained in 1983.

#### *c) - Prompt transmittal of weekly communications*

Brazil, Colombia, Ecuador and Peru transmitted their weekly reports more promptly than in 1983. Argentina and Uruguay were slightly less prompt, and Bolivia's delays were significant.

### 3.2.3 Monthly information on vesicular disease episodes and their laboratory diagnosis

This information reports the number of herds affected, according to each country's political and administrative divisions, and the number of affected herds from which specimens were collected, according to the virus types identified.

a) - Reporting and publishing levels

In general, both the reporting and publishing levels showed improvement when compared to 1983 (Table 34).

Argentina, Brazil, Colombia, Paraguay, Peru and Venezuela maintained their good reporting and publishing levels. Bolivia and Ecuador also improved, but Uruguay's performance slipped.

The overall publishing level in 1984 showed ongoing improvement in comparison with previous years, due to the PAFMDC's policy of including the overdue months in any of the numbers of Volume 16 of the Monthly Epidemiological Report.

b) - Monthly reporting delays

The countries performed as follows in 1984, with respect to prompt and punctual transmission of their monthly reports to the PAFMDC (Table 35):

Were more punctual: Brazil, Ecuador, Peru, Uruguay and Venezuela.

Were less punctual: Argentina, Bolivia, Colombia and Paraguay.

In general, the monthly reporting system continues to suffer from the shortcomings noted in previous evaluations. The countries' delayed transmission of data to the PAFMDC is particularly evident. The failure to provide sufficiently detailed epidemiological comments to facilitate interpretation of the data likewise persisted.

3.2.4 Surveillance activities: laboratory confirmation

In 1984 sample specimens were collected for laboratory diagnosis from 39% of the South American herds with animals that showed clinical symptoms of vesicular disease. Argentina, Colombia, Paraguay, Peru and Uruguay recorded favorable performance in this field work. On the other hand, Bolivia, Brazil and Venezuela posted low levels of specimen collection. In general, the level of specimen collection is low (Table 36).

Regarding the identification of virus types, this was accomplished in less than one out of three episodes having clinical signs of vesicular disease (29%). This result by itself reflects a situation of concern with respect to a very important aspect of epidemiological surveillance. In this regard Uruguay's performance may be considered good, while Brazil and Venezuela present very low levels.

It is necessary to improve the monthly communication of information on the active virus subtypes, an important requirement for information supplied to the COSALFA countries, international bodies and other countries.

### 3.2.5 Expansion of procedures in the foot-and-mouth disease-free area of the American Continent

Since 1984 the Continental Vesicular Disease Epidemiological Surveillance and Information System has included Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama --where vesicular stomatitis is endemic-- in the system of weekly telexed communications based on grid maps. The Vesicular Disease Laboratory (LADIVES) in Panama is operating normally. Every month it sends to the PAFMDC the results of virus typification, geographically referring only to the country without indicating the department or province wherein occurred the episode that provided the typified virus. This procedure restricts the efficiency of the epidemiological surveillance system. Furthermore, it disrupts a historical series of information on the occurrence of vesicular diseases that the PAFMDC --as the Continental Reference Agency for the Vesicular Diseases-- has maintained for several decades by order of the countries.

### 3.3 RECOMMENDATIONS

Continue to emphasize the following:

- a) - Carefully maintain and improve the epidemiological information system that is a valuable working asset for all the countries of the continent, a precious mechanism of support to the programs and one of the most important animal-health accomplishments in South America. Every possible effort must be made to prevent deterioration of the system and its performance.
- b) - Transmit the weekly and monthly epidemiological data punctually to the PAFMDC.
- c) - Take care to ensure that the information generated by the system is timely, reliable, up-to-date and transmitted in accordance with the prescribed formal and standards.
- d) - Focus greater attention on the use of the information as an objective base for the epidemiological characterization of FMD and subsequent readaptation of the overall objectives and control strategies.
- e) - Include monthly information on identified subtypes.
- f) - Request that the results of the virus identifications produced by LADIVES, Panama, also indicate the department or province in which occurred the corresponding episode.

TABLE 1. Number of herds affected by vesicular disease,  
and causal agent. South America, 1984

Country	Affected herds	Affected herds with samples collected	D i a g n o s i s				
			Foot-and-mouth disease		Vesicular stomatitis		
			O	A	C	New Jersey	Indiana
Argentina	1 541	1 043	90	6	348	0	0
Bolivia	30	12	3	8	1	0	0
Brazil	1 478	516	82	144	19	0	<sup>1</sup>
Chile <sup>2</sup>	13	13	13	0	0	0	0
Colombia	991	649	164	78	0	142	55
Ecuador	199	91	13	29	0	4	14
Paraguay	53	35	22	0	6	0	0
Peru	116	69	0	4	0	10	35
Uruguay	16	16	10	0	6	0	0
Venezuela	254	112	18	7	0	12	3
Total	4 691	2 556	415	276	380	168	107

<sup>1</sup>102 foci of vesicular stomatitis were also registered. Indiana III type was identified.

<sup>2</sup>There was an outbreak of FMD virus type O<sub>1</sub> in Chile which was eliminated by slaughter of diseased and exposed animals.

SOURCE: Country reports to COSALFA XII

TABLE 2. Herds affected by foot-and-mouth disease according to type of virus,  
by country and year. South America, 1978-1984

Country	Type of virus	1978	1979	1980	1981	1982	1983	1984
Argentina	O	40	64	44	64	13	351	90
	A	114	178	339	429	39	23	6
	C	88	91	37	22	4	196	348
Bolivia	O	5	59	9	2	0	1	3
	A	4	2	5	3	3	1	8
	C	0	0	2	7	7	3	1
Brazil	O	752	775	645	218	85	61	82
	A	692	402	410	731	589	190	144
	C	32	22	9	18	13	22	19
Colombia	O	190	445	263	87	50	192	164
	A	118	87	76	99	79	32	78
	C	0	0	0	0	0	0	0
Chile <sup>1</sup>	O	0	0	0	0	0	0	13
	A	0	0	0	0	0	0	0
	C	1	0	0	0	0	0	0
Ecuador	O	37	64	23	12	9	66	13
	A	9	16	31	35	35	47	29
	C	0	0	0	0	0	0	0
Paraguay	O	8	77	3	5	6	11	22
	A	0	1	0	1	13	1	0
	C	2	11	0	0	1	0	6
Peru	O	0	4	0	4	0	0	0
	A	9	30	24	2	6	1	4
	C	0	0	49	1	7	3	0
Uruguay	O	7	91	127	4	1	0	10
	A	9	7	6	14	2	1	0
	C	1	0	0	0	0	4	6
Venezuela	O	31	38	19	29	28	13	18
	A	17	23	18	22	13	10	7
	C	0	0	0	0	0	0	0

<sup>1</sup> There was an outbreak of FMD virus type O<sub>1</sub> which was eliminated by slaughter of diseased and exposed animals.

SOURCE: Country reports to COSALFA XII

TABLE 3. Foot-and-mouth disease virus subtypes identified  
by country. South America, 1984

Argentina	O <sub>1</sub>	A <sub>79</sub>	C <sub>3</sub> , C Argentina/84
Bolivia	O <sub>1</sub>	A <sub>24</sub>	C <sub>3</sub>
Brazil	O <sub>1</sub>	A <sub>24</sub> , A Brasil/79	C <sub>3</sub>
Colombia	O <sub>1</sub>	A <sub>24</sub>	-
Ecuador	O <sub>1</sub>	A <sub>24</sub>	-
Paraguay	O <sub>1</sub>	-	C <sub>3</sub>
Peru	-	A <sub>24</sub>	-
Uruguay	O <sub>1</sub>	-	C <sub>3</sub>
Venezuela	O <sub>1</sub>	A <sub>32</sub>	-

SOURCE: PAFMDC Diagnosis and Reference Laboratory and  
reports sent by the countries.

TABLE 4. Strains used for the production of foot-and-mouth disease vaccine. South America, 1984

Country	S t r a i n s		
	O	A	C
Argentina	O <sub>1</sub> Caseros o	A Arg/79 y A Arg/81	C <sub>3</sub> Resende
Brazil	O <sub>1</sub> Campos	A <sub>24</sub> Cruzeiro y A Venceslau	C <sub>3</sub> Indaial
Colombia	O <sub>1</sub> Campos	A <sub>24</sub> Cruzeiro	-
Ecuador	O <sub>1</sub> Urubamba	A <sub>24</sub> Cruzeiro	-
Paraguay	O <sub>1</sub> Campos	A <sub>24</sub> Cruzeiro	C <sub>3</sub> Resende
Peru	O <sub>1</sub> Urubamba	A <sub>24</sub> Cruzeiro	C <sub>3</sub> Resende
Uruguay	O <sub>1</sub> Campos	A <sub>24</sub> Cruzeiro	C <sub>3</sub> Resende
Venezuela <sup>1</sup>	O <sub>1</sub> Campos	A <sub>32</sub> Venezuela	-

<sup>1</sup>The only country which produces attenuated-live-virus vaccine.

SOURCE: PAFMDC Diagnosis and Reference Laboratory and reports sent by the countries.

TABLE 5. Situation of vesicular diseases and foot-and-mouth disease virus types  
in South American countries, 1984

Month	Argentina	Bolivia	Brazil	Colombia	Ecuador	Paraguay	Peru	Uruguay	Venezuela
January	O/*	/*	/*	O/***	A/***	-	/***	-	/**
February	O/*	A/*	/*	O/***	A/***	-	/***	-	/***
March	/*	/*	/*	O/***	O/*	-	/***	/*	/***
April	OC/***	O/*	/*	OA/***	O/**	O/*	/***	O/**	/***
May	OC/***	-	/*	O/***	A/**	O/***	/**	OC/*	/***
June	OC/***	-	/*	O/***	O/***	O/*	-	-	O/**
July	C/**	C/*	/*	/***	A/***	O/**	/*	-	/***
August	C/***	A/**	/*	O/***	A/***	OC/**	/*	C/*	/***
September	C/***	OA/***	/*	O/***	A/***	OC/**	/**	-	/***
October	C/***	O/***	/*	/***	OA/***	C/**	/*	-	O/***
November	C/***	-	C/*	/***	O/***	C/**	/***	-	O/***
December	C/***	-	C/*	/***	A/**	O/**	A/***	C/*	O/***

Monthly frequency of vesicular diseases based on clinical diagnosis:

\*low    \*\*moderate    \*\*\*high    - absence

Foot-and-mouth disease virus types: O, A and C (frequency higher than the median).

SOURCE: Country's monthly epidemiological reports.



TABLE 6. Vesicular disease morbidity in cattle. South America, 1984

Country	H e r d s		P o p u l a t i o n				R a t e s			
	Total	Affected	Total (x 1000)	in affected herds	diseased	deaths	Herds affected (%)	Population morbidity (‰)	Internal morbidity (%)	Lethality (%)
Argentina	323 495	1 541	52 670.0	891 820	87 026	1 856	4.76	16.52	9.76	2.13
Bolivia <sup>1</sup>	48 902	28	1 570.5	623	195	1	0.57	1.24	31.30	0.51
Brazil	2 095 554 <sup>2</sup>	1 478	101 769.4 <sup>2</sup>	295 073	37 966	686	0.71	3.73	12.87	1.81
Colombia	498 679 <sup>3</sup>	948	25 529.4	82 364	9 569	180	1.90	3.75	11.62	1.88
Ecuador	246 958	196	3 200.4	27 508	4 383	31	0.79	13.70	16.93	0.71
Paraguay	197 164 <sup>4</sup>	53	7 186.2	26 690	6 384	29	0.27	8.88	23.92	0.45
Peru	464 182	116	3 391.5	2 600	340	0	0.25	1.00	13.08	-
Uruguay	64 929	16	11 236.6	9 582	475	0	0.25	0.42	4.96	-
Venezuela	115 404	194	11 312.0	71 018	7 174	70	1.68	6.34	10.10	0.98
Total	4 055 267	4 570	217 866.0	1 407 278	153 512	2 853	1.13	7.05	10.91	1.86

<sup>1</sup> Cochabamba and Santa Cruz Departments only.<sup>2</sup> Does not include figures for: Amazonas, Pará, Maranhão, Piauí, Amapá and Rondonia.<sup>3</sup> Does not include figures for: Caquetá, Chocó, Arauca, Putumayo, Amazonas, Guainía, Guaviare and Vaupés.<sup>4</sup> Figure taken from number of vaccinated herds and total population for 1984.

SOURCE: Country reports to COSALFA XII

TABLE 7. Vesicular disease morbidity in swine. South America, 1984

Country	No. of herds affected	P o p u l a t i o n			R a t e s		
		total (x 1000)	in affected herds	diseased	deaths	Morbidity population (%/1000)	Lethality internal (%)
Argentina	...	3 800.0	16 778	3 465	574	9.12	20.65
Bolivia	2	297.4	12	5	0	0.17	41.67
Brazil	...	35 695.0	10 628	4 455	889	1.25	41.92
Colombia	41	2 078.3 <sup>1</sup>	12 560	6 660	1 396	32.05	53.03
Ecuador	3	3 520.0	95	28	7	0.08	29.47
Paraguay	26 <sup>2</sup>	1 349.0 <sup>3</sup>	589	130	12	0.96	22.07
Peru	...	2 141.9	213	5	0	0.02	2.35
Uruguay	2	199.0	41	37	0	1.86	90.24
Venezuela	32	2 532.8	28 788	4 618	574	18.23	16.04
Total	106	51 613.4	69 704	19 403	3 452	3.76	27.84
							17.37

<sup>1</sup>Figure taken from country report to COSALFA XI.

<sup>2</sup>Affected bovine herds.

<sup>3</sup>FAO Production Yearbook, Vol. 36, 1982.

... No information.

SOURCE: Country reports to COSALFA XII

TABLE 8. Vesicular disease morbidity in sheep. South America, 1984

Country	P o p u l a t i o n			R a t e s		
	total (x 1000)	in affected herds	diseased deaths	Morbidity population (‰)	internal (%)	Lethal- ity (%)
Argentina	30 939.0	82 795	3 112	131	1.01	3.76
Bolivia <sup>1</sup>	145.0 <sup>2</sup>	640	20	0	1.38	3.13
Brazil	17 805.0	40 374	258	23	0.14	0.64
Colombia	1 920.8 <sup>2</sup>	350	23	1	0.12	6.57
Ecuador	1 259.0	0	0	0	-	-
Paraguay	430.0 <sup>3</sup>	651	48	1	1.12	7.37
Peru	15 294.2	0	0	0	-	-
Uruguay	20 447.2	750	25	0	0.01	3.33
Venezuela	309.5	25	5	3	0.16	20.00
Total	88 549.7	125 585	3 491	159	0.39	2.78
						4.55

<sup>1</sup>Area under program, Cochabamba and Santa Cruz Departments.

<sup>2</sup>Figure taken from country report to COSALFA XI.

<sup>3</sup>FAO Production Yearbook, Vol. 36, 1982.

SOURCE: Country reports to COSALFA XII

TABLE 9. Vesicular disease morbidity in goats. South America, 1984

Country	P o p u l a t i o n				R a t e s		
	total (x 1000)	in affected herds	diseased	deaths	Morbidity population ( $\frac{\circ}{1000}$ )	internal ( $\frac{\circ}{10}$ )	Lethal- ity ( $\frac{\circ}{10}$ )
Argentina	4 580.0	11 327	2 321	402	5.07	20.49	17.32
Bolivia <sup>1</sup>	88.5 <sup>2</sup>	0	0	0	-	-	-
Brazil	8 071.0	1 259	158	50	0.20	12.55	31.65
Colombia	626.1 <sup>2</sup>	170	22	1	0.35	12.94	4.55
Ecuador	268.0	0	0	0	-	-	-
Paraguay	144.0 <sup>3</sup>	175	51	2	3.54	29.14	3.92
Peru	2 021.4	0	0	0	-	-	-
Uruguay	12.0 <sup>3</sup>	0	0	0	-	-	-
Venezuela	1 057.4	82	4	0	0.04	4.88	-
Total	16 868.4	13 013	2 556	455	1.52	19.64	17.80

<sup>1</sup>Area under program, Cochabamba and Santa Cruz Departments.

<sup>2</sup>Figure taken from country report to COSALFA XI.

<sup>3</sup>FAO Production Yearbook, Vol. 36, 1982.

SOURCE: Country reports to COSALFA XII

TABLE 10. Vesicular stomatitis morbidity in horses. South America, 1984

Country	P o p u l a t i o n			R a t e s		
	total (x 1000)	in affected herds	diseased deaths	Morbilidad population ( $\frac{\%}{1000}$ )	internal ( $\frac{\%}{100}$ )	Lethal- ity ( $\frac{\%}{100}$ )
Argentina	3 255.0 <sup>1</sup>	0	0	-	-	-
Bolivia	1 294.0 <sup>1</sup>	0	0	-	-	-
Brazil <sup>2</sup>	4 927.0	...	120	0.24	-	-
Colombia	2 559.9 <sup>3</sup>	846	24	0.09	2.84	-
Ecuador	322.0	0	0	-	-	-
Paraguay	373.0 <sup>1</sup>	0	0	-	-	-
Peru	1 326.6	88	7	0.05	7.95	-
Uruguay	453.2	0	0	-	-	-
Venezuela	452.8	0	0	-	-	-
Total	14 963.5	934	151	0.10	16.17	-

<sup>1</sup>FAO Production Yearbook, Vol. 36, 1982.

<sup>2</sup>Vesicular stomatitis type Indiana III.

<sup>3</sup>Figure taken from country reports to COSALFA XI.

SOURCE: Country reports to COSALFA XII

TABLE 11. Monthly distribution of bovine herds affected by vesicular diseases.  
South America, 1984

Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Argentina	37	20	3	76	155	164	87	168	197	305	111	218	1 541
Bolivia	1	1	1	1	0	0	1	3	14	6	0	0	28
Brazil	133	83	101	103	139	260	159	85	63	116	144	92	1 478
Colombia	125	78	76	102	64	52	104	128	70	68	56	25	948
Chile <sup>1</sup>	0	0	3	6	4	0	0	0	0	0	0	0	13
Ecuador	21	14	5	7	10	17	27	24	28	20	17	6	196
Paraguay	0	0	0	3	10	3	4	6	8	7	6	6	53
Peru	8	23	31	18	5	0	1	2	5	1	10	12	116
Uruguay	0	0	1	6	6	0	0	2	0	0	0	1	16
Venezuela	7	10	9	6	5	10	38	31	30	22	19	7	194
Total	332	229	230	328	398	506	421	449	415	545	363	367	4 583

<sup>1</sup>There was an outbreak of FMD virus type O<sub>1</sub> in Chile which was eliminated by slaughter of diseased and exposed animals.

SOURCE: Country reports to COSALFA XII

TABLE 12. Monthly distribution of bovine herds affected by FMD virus type O.

South America, 1984

Month Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Argentina	3	5	1	4	44	23	4	3	2	-	1	-	90
Bolivia	0	0	0	1	0	0	0	0	1	1	0	0	3
Brazil	5	2	3	9	12	14	11	6	3	7	5	5	82
Colombia	12	6	18	31	19	13	11	13	8	3	3	1	138
Chile <sup>1</sup>	0	0	3	6	4	0	0	0	0	0	0	0	13
Ecuador	0	0	2	1	1	2	0	1	1	3	2	0	13
Paraguay	0	0	0	1	7	2	2	3	4	0	0	3	22
Peru	0	0	0	0	0	0	0	0	0	0	0	0	0
Uruguay	0	0	1	6	3	0	0	0	0	0	0	0	10
Venezuela	2	1	0	0	0	2	-	2	1	3	5	2	18
Total	22	14	28	59	90	56	28	28	20	17	16	11	389

<sup>1</sup>There was an outbreak of virus type O<sub>1</sub> in Chile which was eliminated by slaughter of diseased and exposed animals.

SOURCE: Country reports to COSALFA XII

TABLE 13. Monthly distribution of bovine herds affected by FMD virus type A.  
South America, 1984

Month Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Argentina	2	4	0	0	0	0	0	0	0	0	0	0	6
Bolivia	0	1	0	0	0	0	0	2	5	0	0	0	8
Brazil	12	10	11	8	11	14	10	1	3	18	29	17	144
Colombia	17	4	5	7	3	1	7	6	5	5	8	5	73
Chile	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecuador	5	4	0	0	2	0	4	3	5	5	0	1	29
Paraguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Peru	0	0	0	0	0	0	0	0	0	0	0	4	4
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	2	0	0	0	0	0	1	1	1	1	1	0	7
Total	38	23	16	15	16	15	22	13	19	29	38	27	271

SOURCE: Country reports to COSALFA XII



TABLE 14. Monthly distribution of bovine herds affected by FMD virus type C.  
South America, 1984

Month Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Argentina	0	1	0	12	32	30	20	56	77	73	26	21	348
Bolivia	0	0	0	0	0	0	1	0	0	0	0	0	1
Brazil	2	2	1	0	0	3	0	0	0	1	5	5	19
Colombia	0	0	0	0	0	0	0	0	0	0	0	0	0
Chile	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecuador	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraguay	0	0	0	0	0	0	0	2	1	2	1	0	6
Peru	0	0	0	0	0	0	0	0	0	0	0	0	0
Uruguay	0	0	0	0	3	0	0	2	0	0	0	1	6
Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	3	1	12	35	33	21	60	78	76	32	27	380

SOURCE: Country reports to COSALFA XII

TABLE 15. Monthly distribution of bovine herds affected by vesicular stomatitis, New Jersey type.  
South America, 1984

Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0
Bolivia	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0
Colombia	16	19	12	10	4	4	15	23	10	12	9	3	137
Chile	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecuador	0	0	0	1	0	0	0	0	0	1	2	0	4
Paraguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Peru	0	0	1	0	2	0	0	0	1	1	3	2	10
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	0	1	0	0	0	4	1	0	3	3	0	0	12
Total	16	20	13	11	6	8	16	23	14	17	14	5	163

SOURCE: Country reports to COSALFA XII

TABLE 16. Monthly distribution of bovine herds affected by vesicular stomatitis, Indiana type.  
South America, 1984

<del>Month</del> Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0
Bolivia	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0
Colombia	2	6	6	3	3	0	7	4	8	10	3	1	53
Chile	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecuador	2	1	0	0	2	3	1	1	0	3	1	0	14
Paraguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Peru	7	11	9	1	2	0	1	0	3	0	0	1	35
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	1	0	1	0	0	0	0	0	1	0	3
Total	11	18	16	4	8	3	9	5	11	13	5	2	105

SOURCE: Country reports to COSALFA XII

TABLE 17. Number of herds affected by vesicular stomatitis, according to virus type. Central America and Panama. 1983 and 1984

Country	Total of affected herds		New Jersey		Indiana	
	1984	1983	1984	1983	1984	1983
Belize	1	-	1	-	-	-
Costa Rica	61	26	33	14	9	3
El Salvador	17	8	11	3	2	2
Guatemala	40	23	24	14	-	-
Honduras	116	74	52	20	7	8
Nicaragua	32	64	20	44	-	-
Panama	25	19	4	9	4	1
Total	292	214	145	104	22	14

SOURCE: Laboratory of the Regional Vesicular Disease Epidemiological Surveillance Project for Central America and Panama.

TABLE 18. Coverage by programs for the prevention of FMD. South America, 1984

Country	Area (km <sup>2</sup> )		Bovine herds		Bovine population (x 1000)	
	total	program	total	program	total	program
Argentina	2 779 892	2 779 892	323 495	323 495	52 670.0	52 670.0
Bolivia	1 098 581	276 550 <sup>1</sup>	48 902 <sup>1</sup>	23 380 <sup>1</sup>	4 335.4	383.0 <sup>1</sup>
Brazil	8 511 970	2 941 100 <sup>2</sup>	2 095 554 <sup>2</sup>	1 522 690 <sup>2</sup>	101 769.4 <sup>2</sup>	79 239.7 <sup>2</sup>
Colombia	1 141 748	686 743	498 679 <sup>3</sup>	441 818 <sup>3</sup>	25 529.4	16 043.8
Chile	757 720	757 720	189 044	189 044	3 818.7	3 818.7
Ecuador	283 560	283 560	246 958	246 958	3 200.4	3 200.4
Paraguay	406 756	406 756	197 164 <sup>4</sup>	197 164 <sup>4</sup>	7 186.2	7 186.2
Peru	1 203 718	1 203 718	464 182	464 182	3 391.5	3 391.5
Uruguay	162 500	162 500	64 929	64 929	11 236.6	11 236.6
Venezuela	911 930	911 930	115 404	115 404	11 312.0	11 312.0
Total	17 258 375	10 410 469	4 244 311	3 589 064	224 449.6	188 481.9

<sup>1</sup>Data for departments under program (Cochabamba and Santa Cruz). Does not include figure for Beni Pilot Plan (total population = 978,250, under program = 420,000).

<sup>2</sup>Does not include figures for: Amazonas, Pará, Maranhão, Piauí, Amapá and Rondonia.

<sup>3</sup>Does not include figures for: Caquetá, Chocó, Arauca, Putumayo, Amazonas, Guainía, Vaupés, Vichada and San Andrés Islands.

<sup>4</sup>Estimated figures as per number of vaccinated bovine herds and total population for 1984.

SOURCE: Country reports to COSALFA XII

TABLE 19. Vaccination coverage of cattle against foot-and-mouth disease. South America, 1984

Country	H e r d s		P o p u l a t i o n	
	program vaccinated	coverage (%)	program vaccinated (x 1000)	coverage (%)
Argentina	323 495	300 019	52 670.0	46 558.0
Bolivia <sup>1</sup>	23 380	2 804	383.0	157.2
Brazil <sup>2</sup>	1 522 690	800 453	79 239.7	54 134.3
Colombia	441 818 <sup>3</sup>	268 507 <sup>4</sup>	16 043.8	9 750.4 <sup>4</sup>
Ecuador	246 958	66 404	3 200.4	1 284.2
Paraguay	197 164 <sup>5</sup>	106 199 <sup>6</sup>	7 186.2	3 870.7 <sup>6</sup>
Peru	464 182 <sup>7</sup>	44 197	3 391.5	432.3 <sup>7</sup>
Uruguay	64 929	45 405 <sup>8</sup>	11 236.6	8 129.0 <sup>8</sup>
Venezuela	115 404	21 557	11 312.0	3 497.2
Total	3 400 020	1 655 545	184 663.2	127 813.3

<sup>1</sup>Two annual vaccinations in Cochabamba and Santa Cruz Departments. Does not include 186,116 vaccinated bovines from Beni Pilot Plan area.

<sup>2</sup>Does not include figures for: Amazonas, Pará, Maranhão, Piauí, Amapá and Rondonia.

<sup>3</sup>Does not include figures for: Caquetá, Chocó, Arauca, Putumayo, Amazonas, Guainía, Vichada and San Andrés Islands.

<sup>4</sup>Estimated figures as per number of doses injected.

<sup>5</sup>Data estimated by the PAFMDC.

<sup>6</sup>Mean of vaccination stages.

<sup>7</sup>No information from several departments.

<sup>8</sup>Mean of two vaccination stages.

SOURCE: Country reports to COSALFA XII

TABLE 20. Production, control, international marketing and availability of FMD vaccines.  
South America, 1984

Country	D o s e s					v a c c i n e		
	produced	controlled	approved	exported	imported	available		
Argentina	167 294 530	167 294 530	156 945 620	-	1 400 620 <sup>1</sup>	158 346 240		
Bolivia	-	-	-	-	423 000 <sup>1</sup>	423 000		
Brazil	239 740 520	239 740 520	203 342 040	-	-	203 342 040		
Colombia <sup>2</sup>	31 863 275	31 863 275	27 040 100	2 480 000	-	24 560 100		
Chile	-	-	-	-	-	50 000 <sup>3</sup>		
Ecuador	528 200	528 200	528 200	-	649 970 <sup>4</sup>	1 178 170		
Paraguay	12 438 480	12 438 480	12 438 480	165 120	500 000 <sup>1</sup>	12 773 360		
Peru	1 657 360	1 657 360	1 637 472	225 300	45 000 <sup>1</sup>	1 457 172		
Uruguay	30 643 840 <sup>5</sup>	31 202 310 <sup>6</sup>	30 483 354	610 000	-	29 873 354		
Venezuela	6 283 900	6 283 900	6 283 900	-	2 050 000 <sup>7</sup>	8 333 900		
Total	490 450 105	491 008 575	438 699 166	3 480 420	5 068 590	440 337 336		

<sup>1</sup>Oil-adjuvanted vaccine from the PAFMDC.

<sup>2</sup>161,800 doses of oil-adjuvanted vaccine were also produced experimentally and tested for control in Colombia.

<sup>3</sup>The PAFMDC keeps a stock of antigen A Argentina/79 and A Argentina/81, and can also supply monovalent vaccines with viruses O<sub>1</sub> or C<sub>3</sub> when necessary.

<sup>4</sup>Includes 250,000 doses of oil-adjuvanted vaccine produce by the PAFMDC and 399,970 doses imported from Colombia.

<sup>5</sup>4,028,800 doses will be controlled in 1985.

<sup>6</sup>Includes 4,832,056 doses produced in 1983.

<sup>7</sup>Includes 300,000 doses of oil-adjuvanted vaccine provided by the PAFMDC.

SOURCE: Country reports to COSALFA XII

TABLE 21. Resources of foot-and-mouth disease prevention and control programs. South America, 1984

Country	R e s o u r c e s			
	human		material	
	professional	other	field operating units	vehicles
Argentina	316	1 135	295	1 120
Bolivia	61	104	17	26
Brazil	1 922	7 106	1 210	1 210 <sup>1</sup>
Colombia	185	666	106	321
Chile	73	107	64	67
Ecuador	93	242	55	67
Paraguay	133	382	43	65
Peru	91	396	144	176
Uruguay	41	120	40	38
Venezuela	360	321	130	355
Total	3 275	10 579	2 104	3 445

<sup>1</sup>Estimated.

SOURCE: Country reports to COSALFA XII



TABLE 22. Indicators of application of field resources.  
South America, 1984

Country	Per			Per		Per	
	Veterinary Local Unit Km <sup>2</sup>	Herds	Cattle	Veterinarian Herds	Cattle	Field staff <sup>1</sup> Herds	Cattle
Argentina	9 423	1 097	178 542	1 078	175 567	289	47 027
Bolivia	16 267	1 375	22 529	487	7 979	251	4 118
Brazil	2 431	1 258	65 487	805	41 881	226	11 785
Colombia	6 384	4 168	151 357	2 510	91 158	798	28 960
Chile	11 839	2 954	59 667	2 821	56 995	1 562	31 560
Ecuador	5 156	4 490	58 189	2 872	37 213	901	11 680
Paraguay	9 459	4 585	167 121	1 603	58 424	592	21 580
Peru	8 359	3 223	23 552	5 101	37 269	1 007	7 357
Uruguay	4 062	1 623	280 915	1 623	280 915	519	89 892
Venezuela	7 015	888	87 015	321	31 422	206	20 200
Total	4 948	1 706	89 584	1 128	59 216	346	18 184

<sup>1</sup>Veterinarians + Field Assistants.

SOURCE: Country reports to COSALFA XII

TABLE 23. Cattle and bovine semen imports. South America, 1984

Importing country	Country of origin	Number	
		Bovines	Semen(doses)
Argentina <sup>1</sup>			
Bolivia <sup>1</sup>			
Brazil	Argentina	-	2 800
	Bolivia	21 774	-
	Paraguay	5 500	-
	Uruguay	53	-
	Germany	-	1 460
	France	4	5 450
	England	-	3 090
	Italy	-	4 000
	Switzerland	-	50
	USA	9	117 152
	Canada	15	1 350
Colombia	Canada, Ecuador, Panama		
	Venezuela	2 463 <sup>2</sup>	-
	Austria, France, USA	-	x
Chile	Canada, USA, England and		
	New Zealand	-	x
Ecuador	Canada	11	-
	USA	253	54 041
	New Zealand	980	-
Paraguay	Argentina	50	-
	Brazil	902	-
	Uruguay	2 842	-
	USA	106	-
	France	-	110
Peru	Brazil	825 <sup>3</sup>	-
	Uruguay	1 000	-
	Panama	942	-
	Spain	2	-
	Austria	-	x
	USA	725	x
	Canada	85	x
Uruguay	France	-	28
	USA	1	7 450
	Canada	-	225
Venezuela	Colombia	13	x
	Costa Rica	83	-
	USA	3 500	x
	Canada	768	x
	Cuba	1 480	-
	Bulgaria	395 <sup>3</sup>	x
	New Zealand	935	-

<sup>1</sup>No information.

<sup>2</sup>Quantities per country unspecified.

<sup>3</sup>Bufaloes.

xQuantities not reported.

SOURCE: Country reports to COSALFA XII

TABLE 24. Imports of swine. South America, 1984

Importing country	Country of origin	No. of heads
Argentina <sup>1</sup>		
Bolivia <sup>1</sup>		
Brazil	France	4
Chile	USA	375
Peru	Canada	70
	Belgium	59
Venezuela	England	19
	USA	129

<sup>1</sup>No information.

SOURCE: Country reports to COSALFA XII

TABLE 25. Imports of sheep. South America, 1984

Importing country	Country of origin	No. of heads
Argentina <sup>1</sup>		
Bolivia <sup>1</sup>		
Brazil	Argentina	5
	France	150
	Uruguay	21
	England	45
Peru	Brazil	50
	Barbados	100
	Germany	10
	New Zealand	12
	USA	50

<sup>1</sup>No information.

SOURCE: Country reports to COSALFA XII

TABLE 26. Imports of goats. South America, 1984

Importing country	Country of origin	No. of heads
Argentina <sup>1</sup>		
Bolivia <sup>1</sup>		
Brazil	Uruguay	3
	England	6
	Canada	semen (2 210 dosis)
	France	6

<sup>1</sup>No information.

Source: Country reports to COSALFA XII

TABLE 27. Imports of horses, South America, 1984

Importing country	Country of origin	No. of heads
Argentina <sup>1</sup>		
Bolivia <sup>1</sup>		
Brazil <sup>2</sup>	Argentina	90
	Chile	12
	Paraguay	5
	Uruguay	563
	Germany	13
	Belgium	11
	France	13
	England	7
	Italy	1
	Poland	1
	USA	122
Colombia <sup>3</sup>	England, Canada,	
	France & USA	44
Chile	Argentina	47
	Brazil	9
	Uruguay	8
	Federal Germany	1
Paraguay	Argentina	68
	Brazil	9
	Uruguay	260
	Germany	4
	USA	17
Peru	Argentina	439
	Brazil	49
	Colombia	11
	Chile	14
	Ecuador	2
	England	15
	USA	12
Venezuela	Argentina	24
	Uruguay	14
	Bulgaria	3
	Holland	5
	France	3
	England	7
	USA	123

<sup>1</sup>No information.

<sup>2</sup>Includes 137 race animals imported temporarily from Germany (3), Argentina (44), Belgium (6), Chile (7), USA (17), France (2) and Uruguay (89), also 450 animals imported from Uruguay for slaughtering.

<sup>3</sup>Quantities per country unspecified.

SOURCE: Country reports to COSALFA XII

TABLE 28. Imports of bovine embryos  
South America, 1984

Importing country	Country of origin
Argentina <sup>1</sup>	
Bolivia <sup>1</sup>	
Colombia	USA
Peru	USA and Canada

<sup>1</sup>No information

SOURCE: Country reports to COSALFA XII

TABLE 29. Exports of cattle and bovine semen  
South America, 1984

Exporting country	Importing country	Number	
		Bovines	Semen (doses)
Argentina <sup>1</sup>			
Bolivia <sup>1</sup>			
Brazil	Argentina	72 <sup>2</sup>	-
	Peru	902 <sup>3</sup>	-
	Uruguay	32	-
Colombia	Venezuela	1 142	-
Chile	Colombia	132	-
Paraguay	Brazil	18	-
Uruguay	Argentina	2 458	1 000
Venezuela	Colombia	15	-

<sup>1</sup>No information

<sup>2</sup>Includes 71 bufaloes

<sup>3</sup>Bufaloes

SOURCE: Country reports to COSALFA XII

TABLE 30. Exports of sheep. South America, 1984

Exporting country	Importing country	No. of heads
Argentina <sup>1</sup>		
Bolivia <sup>1</sup>		
Brazil	Argentina	5
	Uruguay	21
Chile	Argentina	6 009

<sup>1</sup>No information

SOURCE: Country reports to COSALFA XII

TABLE 31. Exports of horses. South America, 1984

Exporting country	Importing country	No. of heads
Argentina <sup>1</sup>		
Bolivia <sup>1</sup>		
Brazil <sup>2</sup>	Africa	1
	Argentina	15
	Chile	12
	Paraguay	3
	Uruguay	113
	Guiana	19
	Germany	5
	Belgium	23
	England	20
	France	6
	USA	84
Colombia <sup>3</sup>	Ecuador, Panama, Puerto Rico and USA	234
Chile <sup>3</sup>	Argentina, Brazil, Ecuador, Peru, Panama, Spain, USA and England	207
Paraguay	Argentina	5
	Brazil	18
Venezuela	Aruba	3
	Curaçao	1
	USA	13

<sup>1</sup>No information.

<sup>2</sup>Includes 185 race animals exported temporarily to Germany (2), Argentina (9), Belgium (23), Chile (6), France (2), USA (56), Paraguay (3) and Uruguay (84).

<sup>3</sup>Quantities per country unspecified.

SOURCE: Country reports to COSALFA XII

TABLE 32. Other exports, South America 1984

Exporting country	Species or products	Quantity	Importing country
Chile	Camels	583	USA
Venezuela	Pigs	4 235	Colombia

SOURCE: Country reports to COSALFA XII

CUADRO 33. Continental Information and Epidemiological Surveillance System for Vesicular Diseases  
in cattle. Reception level and delays of transmission of weekly reports.  
South America, 1984

Countries <sup>1</sup>	Weekly communiqués				Number of days of delay											
	Received		Published <sup>2</sup>		Until receipt <sup>3</sup>				Receipt-publication				Total			
	Nº	%	Nº	%	Md	Mx		Mn <sup>4</sup>	Md	Mx		Mn	Md	Mx		Mn
Argentina	52	100	52	100	7	21	4		3	7	0		12	21	6	
Bolivia	50	96	43	86	11	59	3		2	7	0		14	59	3	
Brazil	52	100	52	100	7	12	6		6	14	0		14	21	7	
Colombia	52	100	52	100	7	18	6		1	11	0		7	20	7	
Ecuador	50	96	50	100	6	15	5		3	10	0		10	24	7	
Paraguay	52	100	52	100	4	12	3		3	7	0		7	21	6	
Peru	51	98	44	86	12	54	1		2	15	0		14	41	6	
Uruguay	48	92	48	100	6	21	4		2	21	0		7	27	7	
Venezuela	52	100	52	100	11	24	8		3	8	3		14	28	12	

<sup>1</sup>Chile was not included because it has eradicated FMD. In 1984 there was an outbreak of FMD which was immediately communicated to the PAFMDC and eliminated by slaughter of diseased and exposed animals.

<sup>2</sup>Number of weekly reports published in proportion to those received.

<sup>3</sup>Time elapsed between the last day of the week covered by the report and receipt thereof by the PAFMDC.

<sup>4</sup>Md = Median; Mx = Maximum; Mn = Minimum (figures represent the number of days).

SOURCE: PAFMDC, Biostatistics Section.



TABLE 34. Continental Information and Epidemiological Surveillance  
System for Vesicular Diseases in cattle.

Reception and publication levels of monthly reports on affected herds  
and diagnosis, by political division. South America, 1984

Countries <sup>1</sup>	No. received	No. published	Months not received
Argentina	12	12	-
Bolivia	12	12	-
Brazil	12	12	-
Colombia	12	12	-
Ecuador	12	12	-
Paraguay	12	12	-
Peru	12	12	-
Uruguay	10	10	2 (jun. jul.)
Venezuela	12	12	-

<sup>1</sup>Chile was not included because it has eradicated FMD. In 1984 there was an outbreak of FMD which was immediately communicated to the PAFMDC and eliminated by slaughter of diseased and exposed animals.

SOURCE: PAFMDC, Biostatistics Section.

TABLE 35. Continental Information and Epidemiological Surveillance Systems for Vesicular Diseases in cattle. Number of days delay in receipt of monthly reports. South America, 1984

Countries <sup>1</sup>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Median
Argentina	92	63	32	69	84	54	23	12	12	28	70	39	46.5
Bolivia	42	28	30	44	13	37	6	25	44	99	23	38	33.5
Brazil	30	27	33	30	28	27	31	28	32	29	34	31	30
Colombia	28	37	37	31	41	27	37	33	30	35	68	30	34
Ecuador	105	229	55	25	38	30	31	45	26	37	38	22	37.5
Paraguay	37	33	44	29	46	20	27	32	26	27	33	42	32.5
Perú	55	26	45	57	43	41	48	96	66	35	89	58	51.5
Uruguay	55	84	53	80	16	NR	NR	26	36	76	46	20	49.5
Venezuela	45	16	10	32	11	12	23	66	36	71	17	20	21.5
Median	45	33	37	32	38	28	29	32	32	35	38	31	

<sup>1</sup>Chile was not included because it has eradicated FMD and is free of vesicular diseases. Any suspected cases will be immediately reported to the PAFMDC.  
NR = Not received.

SOURCE: PAFMDC, Biostatistics Section.

TABLE 36. Epidemiological surveillance activities: Indicators of laboratory confirmation of herds affected by vesicular diseases.  
South America, 1984

Country	Affected herds			Percentage	
	Total	sampled	positive diagnosis	sampled	positive diagnosis
Argentina	1 541	1 043	444	68	29
Bolivia	30	12	12	40	40
Brazil	1 478	516	245	35	17
Colombia	991	649	439	65	44
Ecuador	199	91	60	46	30
Paraguay	53	35	28	66	53
Peru	116	69	49	71	42
Uruguay	16	16	16	100	100
Venezuela	254	112	40	36	16
Total	4 678	2 543	1 333	54	28

SOURCE: Country reports to COSALFA XII