PAN AMERICAN HEALTH ORGANIZATION
WORLD HEALTH ORGANIZATION
Veterinary Public Health Program

PAN AMERICAN FOOT-AND-MOUTH DISEASE CENTER

SITUATION OF FOOT-AND-MOUTH DISEASE CONTROL PROGRAMS SOUTH AMERICA, 1991

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1.1 General situation

The official services of South American countries recorded a total of 2867 vesicular disease foci in 1991. That record was 25% below the total for the previous year and therefore, continued with the tendency started in the preceding year. In this report, foci, affected herds, and affected locations shall be considered sinonyms.

The rate of affected cattle herds totalled 0,71 per thousand, slightly lower than that for the preceding year. Also, a significant reduction in the foot-and-mouth disease diagnoses (49%) and an outstanding increase in vesicular stomatitis diagnoses (87%) have been noticed compared to 1990.

Samples for laboratory diagnoses were taken in 1687 foci (59%), out of which 1211 had the causal agent identified, representing 72% of the samples and 42% of total foci. The foot-and-mouth disease virus was identified as positive in 485 of the foci (40%). Virus type O was diagnosed in 205 foci (42%); virus type A in 214 (44%), and type C in 66 (14%). In Colombia, vesicular stomatitis was once again the most identified disease due to its epidemic proportions; they accounted for most of the diagnoses of the disease made in the South American continent. The New Jersey type was identified in 346 foci (48%) and the Indiana type in 380 (52%), which means an increase of vesicular stomatitis diagnoses from 30% in 1990 to 60% in 1991. This situation reflects a foot-and-mouth disease/vesicular stomatitis ratio of 1/1.5 inverting the ratio from the previous year i.e., the number of foot-and-mouth disease diagnoses was more than twice that for the vesicular stomatitis.

In 1991, there was a decline with respect to the previous year in the morbi-mortality indicators in recorded foci wherein cattle were the most important species: population morbility 2,0 x 10 thousand, internal morbility 10,1%, lethality 1,2%.

The occurrence of vesicular diseases recorded in pigs posted the following indicators: internal morbility rate of 18,7%; population morbility, 0,85 x 10.000; and lethality, 10.8 per a hundred thousand. This occurrence was mainly due to the greater relative weight of Colombia, Brasil, and Argentina in

the total registers. The incidence in sheep specie (populational morbility of 0,05 per 10.000) was non-significant.

The most important events observed during this period were the following:

A. FOOT-AND-MOUTH DISEASE FREE AREA

The countries of North America, Central America, and the Caribbean continued free of foot-and-mouth disease. 292 vesicular diseases foci were laboratory diagnosed in Central American countries. 123 were of the New Jersey type and 10 belonged to the Indiana type of virus. In general, the epidemiological situation of vesicular stomatitis was similar to the previous year. The most significant reduction was observed in Honduras, Nicaragua, and Panama. The largest number of foci in this subregion is still being recorded in El Salvador, Honduras, and Mexico.

In addition, South America, Chile, Guyana, French Guyana, and Suriname as well as the Argentine Patagonia , and Uruba Chocoano, in Colombia maintained their disease-free-status.

B. FOOT-AND-MOUTH DISEASE AFFECTED AREA

Taking into consideration the foot-and-mouth disease outbreak in 1991, the epidemiological picture has been favorable, since for the very first time the Continental Epidemiological Surveillance System is in effect in South America, vesicular stomatitis frequency was higher than that of foot-and-mouth disease. This was mainly due to the outstanding reduction of foot-and-mouth disease and the vesicular stomatitis number increase in Colombia.

The following situations were emphasized:

Great improvement in the situation of Uruguay and Argentina, while Bolivia, Ecuador, Peru, and Brasil had a moderate decrease in the number of foci this year. Colombia and Venezuela basically maintained the same number of foci of vesicular disease, while Paraguay recorded an increased frequency.

In the subregion of the Plata River Basin, a low frequency of the disease was recorded, and the nearly nul incidence of the problem was confirmed in areas characterized as primary endemic and rupture of the historical stability of the disease.

In Uruguay, a vesicular disease did not occur, proceeding with a very favorable situation, which started in July 1990.

In Argentina, there was an important reduction of 72% in the number of foci in relation to the preceding year.

Furthermore, there was a remarkable reduction (85%) in the disease incidence in the southern part of the country and in Rio Grande do Sul (84%), Brasil.

Paraguay, after a long period with a low number of foci experienced an outbreak of virus type O in some regions located west and north of the Eastern region.

The virus type C epidemic which started at the end of 1990, proceeded until the middle of the year in Santa Catarina, Brazil.

Despite a reduction in the frequency of foot-and-mouth disease in the Andean regions as a whole, the disease was present throughout the year and some localized epidemic situations were registered.

In short, the majority of the vesicular stomatitis foci recorded in the region corresponded to Colombia (9%), where a high incidence of foot-and-mouth disease was also maintained.

1.2 Situation by country

ARGENTINA

The total of foot-and-mouth disease foci recorded in 1991 (234) was the lowest ever observed in the past years in the country.

However, a high occurrence was noted in the province of Buenos Aires, in some geographic grid squares. The disease remained present even with a low number of foci recorded in the primary endemic region in the north of the country, and in some secondary endemic regions in the provinces of Cordoba, La Pampa, and south of Entre Rios. In contrast, foot-and-mouth disease was not recorded in Mendoza and other provinces of the Central Mountains region which borders on Chile.

Emphasis is given to an overall analysis of the epidemiological situation recorded in 1991 in which the provinces of Chaco and Formosa had critical influence over dependent areas.

Samples were collected in 164 of the recorded foci (70%),

and yielded 37 of virus type O (37%), 60 of type A (61%), and 2 of type C (2%), prevailing the type A over type O and therefore, maintaining type C at very low levels. The identified subtypes were O_1, A_{24}, A_{31}, A_{12}, and C_1.

The indicators of morbi-mortality in cattle were respectively: affected herds rate of 0,84%; internal morbility, 6.9%; population morbility was 2 per 10.000, lethality 0,5%. There was a significant drop in the population morbility regarding previous years.

BOLIVIA

Acccording to data provided by the National Foot-and-Mouth Disease, Rabies, and Brucellosis Service (SENARB), in the area under program coverage (Departments of Cochabamba, Santa Cruz, and part of Beni), 13 foci were recorded and other 3 in the Departments of Chuquisaca and La Paz, totalling 16 in 1991. This represents a decrease in disease frequency in relation to 1990. However, it was severely spread since it affected 5 out of 9 departments, which could mean a lack of sensibility of the epidemiological surveillance system.

Samples were collected in four foci (25%), and the virus type O was diagnosed in two cases in Santa Cruz and the other two were type A in Chuquisaca. The identified subtypes were A_{24} and O_1. As with the previous year, virus type C of foot-and-mouth disease was not diagnosed.

We should highlight that the disease was recorded in April (7 foci) in the region of the plains (Santa Cruz, Beni, and Chuquisaca). In the mountain region it was presented, as usual, a posteriori, between July and September.

The morbi-lethality indicators in cattle in the area under program were: internal morbility, 7.5%; population morbility, 1,1 per 10.000; and lethality, 0,3%.

BRAZIL

The occurrence of vesicular diseases in 1991 (728 foci) was the lowest recorded in the past years in the country, proceeding with the frequency reduction already noted since 1990.

Thus, of the total foci, 68% corresponded to the northeastern and southern regions of the country, totalling 247 foci each. In spite of that, a significant increase in the number of foci recorded (179%) occurred in the middle-west region.

From the total of 239 foci in which samples were collected (33%), FMD was diagnosed in 120 (50%) and 10 were vesicular stomatitis. Of the first, 38 (29%) were virus type O, 18 (14%) type A, and 64 (49%) type C. Concerning the type C, which in 1991 was only reported in Argentina and Brazil, the diagnoses corresponded to 97% of the total identified in America. All the vesicular stomatitis Indiana type identified in 10 foci, occurred in the state of Ceara.

The foot-and-mouth disease virus subtypes identified were A_{24}, C_3, and O_1.

Epidemiological situations with a marked reduction in foot-and-mouth disease were in the southeastern region and at a lower scale in the south, mainly in the states of Sao Paulo (southeast) and Rio Grande do Sul (south) as well as the epidemics in the states of Santa Catarina, detecting 206 foci with virus type C_3 (started at the end of 1990), Mato Grosso (99 foci), and Mato Grosso do Sul (27 foci). Regarding these last two, the disease was predominantly caused by virus type O. It was recorded in the west of Mato Grosso do Sul after a 12-month clinical absence.

The vesicular disease incidence rates in cattle were the following: affected herds, 0,45%; internal morbility, 19,5%; population morbility, 1,26 per 10.000; and lethality, 1,6%.

CHILE

Chile maintained its virus-free-status in 1991.

The preventive actions to avoid the reintroduction of the foot-and-mouth disease virus are contemplated in the Project for Prevention of Exotic Diseases, based on the implementation of an Epidemiological Surveillance System and controls at seaports, airports, health barriers, control of summer grazing lands and garbage dumping grounds.

The strip unpopulated by animal species foot-and-mouth disease susceptible bordering on Argentina covers an area of 1.108.544 hectares.

The country has 44 International Health Control Barriers, 18 located at seaports, 9 in airports, and 17 in borderline crossings.

For the maintenance of a virus-free-status country, the Border Agreement of the Central Region of the Andes made with Argentina is of particular significance. It allows the "enlargement" of the epidemiological border in the countryside

of Argentina and the development of coordinated animal health activities.

COLOMBIA

A total of 1475 vesicular disease foci were recorded in 1991, indicating a high level incidence similar to that of the previous year. Vesicular stomatitis was positively diagnosed in 79% of the foci, and in the remaining 21%, foot-and-mouth was detected. A strong reduction of 56% was recorded in foot-and-mouth incidence and a similar increase in vesicular stomatitis diagnoses (57%) when compared to the preceding year. The diseases records indicate the sensitivity of the epidemiological surveillance system in Colombia. Indications are that 91% of vesicular stomatitis records in South America pertain to Colombia.

Foot-and-mouth disease occurred throughout the year although the highest incidence was in January, March, and September. The highest number of records of vesicular diseases were in the departments of Antioquia and Santander in the past four years adding Cordoba. In contrast, Cundinamarca indicated a remarkable reduction in relation to previous years. Laboratory material was collected in 1.103 foci (75%). This is a very significant figure, considering the total number of episodes recorded. Virus type O was typed in 74 (8%) cases and type A in 113 (13%); the New Jersey virus was detected in 325 foci (37%) and the Indiana type in 370 (42%).

On the other hand, the northwestern region of the department of Chocó, bordering on Panama, continues free of the disease virus.

The rate of cattle herds affected by vesicular disease was 1,76%. The internal morbility rate in cattle reached 8%, overall morbility was 5,2 per 10.000, and lethality was about 0.8%.

ECUADOR

The situation observed in 1991 illustrated a decreasing incidence in relation to the preceding year, and although it was quantitatively lower, the epidemiological situation remained unchanged and continued to be unfavorable. 116 foci were recorded, or 29% less than in 1990, distributed throughout the year. Nevertheless, their highest frequency was detected in the first four months and the last three months, indicating 63 (54%) and 27 foci (23%) foci respectively. As previously observed in the past years, its behavior is associated with the management

and mobilization of the animals, typical characteristics of the beginning (October/November) and end (April/May) of winter.

Except for the insular province of Galapagos where indemnity has been maintained for several years as well as, the Amazonian provinces of Pastaza, Zamora, and Sucumbios, the rest of the country was affected, with epi-endemic characteristics particularly, in the border areas of the north and south.

Out of the 27 foci (23%) in which the virus could be identified, 19 (70%) were diagnosed as virus type O., five (19%) as virus type A_{24} and three as New Jersey vesicular stomatitis (11%).

The rates of vesicular diseases were the following: 0.46% of affected herds, 25% for internal morbility, while population morbility reached 5.4 per ten thousand, and lethality was 0.8%.

GUYANA

No vesicular diseases were reported during the period.

FRENCH GUYANA

No vesicular diseases were reported during the period.

PARAGUAY

The total number of foot-and-mouth disease foci recorded in 1991 was 57, i.e. an increase of the disease in comparison with 1990 when only 5 foci were reported.

Samples were taken for laboratory diagnosis in 37 (65%) foci and 27 were identified as virus of type O (73%), subtype O. only. 90% of the foci occurred in the second half of the year initially affecting the western region of Pte. Hayes and subsequently, the eastern region of Concepcion, San Pedro, Amambay, and Caninqeyu in the eastern region.

The incidence rates in cattle were these: affected cattle, 0.25 0/00; internal morbility was 12,4%; population morbility, 2,7 per 10.000, and lethality, 2,3%.

PERU

89 vesicular disease foci were recorded in 1991. The official services reported 79 (89%) foci of foot-and-mouth disease and 10 (11%) of vesicular stomatitis. Despite the vesicular disease records notorious decrease (49%) in relation

to the preceding year, difficulties of mainly administrative and financial nature have severely limited the Program coverage. Again, the departments of Ayacucho, Ica, and Junin were affected by foot-and-mouth disease among others.

Samples were taken in 32 foci of vesicular disease (36%), of which four were found positive (12,5%). Virus type O was typified in two and the remaining two were of the New Jersey type.

The rate of affected herds was 0,18% for cattle, internal morbility was very high, reaching 36,5%, which means an inadequate herd protection. Population morbility was 5 per 10.000 and there was no mortality.

SURINAME

No vesicular diseases were recorded during the period.

URUGUAY

In 1991, no vesicular disease was recorded in the country, totalling more than 18 months of this favorable situation.

In short, surveillance continued active, and the official services provided assistance in 27 notifications of suspected vesicular disease made by livestock raisers but all were found foot-and-mouth negative through clinic, epidemiological, and laboratory diagnoses. In addition, the official services made several seroepidemiological studies in areas having foot-and-mouth antecedents in previous years, and low viral activity indications were found, mainly if we consider that studies were directed to areas of risk.

VENEZUELA

The incidence of vesicular diseases was similar to that of 1990, with 152 recorded foci. Except for the month of June, incidence of vesicular disease was reported in the remaining months of the year. 17 out of 23 major political administrative units were affected, which reflects an important time/space distribution of the problem.

Samples were collected in 62 foci (41%). Virus type O was detected in six cases (16%), type A foot-and-mouth disease in 16 (42%), and New Jersey virus vesicular stomatitis in 16 (42%). The subtypes identified were these: foot-and-mouth disease virus type O, A24, and A_{32}.

Morbi-lethality rates of vesicular disease in bovines were the following: affected herds were 1,37%; internal morbility, 8,2%; population morbility, 2,7 per 10.000, and 3,9% for lethality.

2. SITUATION OF FOOT-AND-MOUTH DISEASE CONTROL PROGRAMS IN SOUTH AMERICA, 1991

2.1 General situation

2.1.1 Area affected by FMD

Most of South American countries underwent some structuring economic adjustments as a result of the economic crisis recorded in previous years. On this account, public expenses were cut affecting the funds assigned for the programs. Nevertheless, a larger participation of the private sector in the financing of programs in some countries and the assistance of credit agencies in others, led to reasonable advances in most of the disease control programs pertaining to:

- Development patterns of veterinary care at the local level based on the integration and co-participation of public and private sectors linked to the production, industrialization, and trading;

- Administrative selfmanagement and capture of resources required for carrying out local action plans, oriented towards foot-and-mouth disease eradication and the control of other bioproductive and health problems that limits animal production;

- Strengthening of organized community participation in the processes of programming, execution, monitoring, and evaluation of local work plans;

- Mobilization of material resources and authority that render viable the operative strategies for control and eradication;

- Linking of foot-and-mouth disease control, eradication, and prevention activities to subregional processes for economic and social integration among countries, as a means of facilitating trade interchange;

- Consolidation of coordinating actions among countries through bilateral and multilateral agreements.

In the case of the Plata River Basin Agreement, on its

third year in effect, there has been an ongoing consolidation of coordinating actions between not only the veterinary services but also participation of livestock breeders in the Directing Committee has taken place. In addition, active participation from other subsectors such as milk and meat industries has been attained.

During 1991, the countries participating in the Plata River Basin subregional plan have achieved a great participation of livestock breeders in the management of the program at local levels.

Uruguay, due to the absence of clinical cases of foot-and-mouth disease within national territory, has redefined its action strategy in terms of quality, traditionally supported by the detection and control of foci, towards an operative mode that gives priority to the prevention of disease occurrence and that has epidemiological surveillance as the articulating axis. Besides, efforts are made to know the existence of viral activity in geographic-population areas of greater risk by the execution of seroepidemiologic investigations.

In the state of Rio Grande do Sul in Brazil, foot-and-mouth disease control program has beeen strengthened due to a greater participation of the livestock sector; likewise, the states of Sao Paulo and Rio de Janeiro have been developing programs based on commitments made by official health services and representatives of livestocks raisers and the meat industry and other sectors related to animal production, for the establishment of new work ways aiming at foot-and-mouth disease eradication.

Paraguay has officially incorporated the eastern region of the country to the Plata River Basin Agreement and put into effect the Foot-and-Mouth Disease National Eradication Plan, in which livestock breeders have played a significant role.

As to the Andean Area Subregional Eradication Project, endorsement by the member countries has been ratified and it was incorporated to Decision 55 of JUNAC, during the Ministers of Agriculture Meeting held on the 2nd and 3rd of September, 1991 in Santa Cruz de la Sierra, Bolivia. In regard to one of the resolutions, JUNAC and PANAFTOSA prepared an Agreement for the Coordination of Technical Cooperation for the Implementation of the Andean Project, to be shortly approved by the higher authorities. The Agreement on the other hand, will induce financing requests to EEC for the accomplishment of annual operating plans for technical cooperation in the subregion.

Nevertheless, the persisting lack of resources designed for the implementation of health programs affects the subregion and

consequently, the national plans of Peru and Bolivia, since like the rest of the countries, share the administration and use of the same (human, material and financial) resourcess. However, the services in all countries have made efforts oriented towards the promotion and organization of Support Committees for the Eradication of Foot-and-Mouth Disease so as to optimize the use of resources and results to obtain in a coparticipating working process between the public and private sectors.

In the Andean area, except for Colombia, the insufficiency or lack of foot-and-mouth vaccine constitutes one of the fundamental restrictions for the execution of the national plans for the control of foot-and-mouth disease, in the terms desirable to advance towards the progressive eradication (free areas) of the disease in the countries and the subregion.

As to the Subregional Project of the Amazon area, the lack of financial resources has limited its execution and in regard to this, priority has been given to the formulation of a program for the establishment of a free binational area of the disease between Roraima-Brazil and the Sabana de Rupununi-Guyana.

As to the coverage of the programs, it comprises the National Territories of Argentina, Chile, Ecuador, Paraguay, Peru, Uruguay, and Venezuela. In the case of Bolivia, the area covered is 44,4%, herds, 60%, and bovines, 48,5%. These ciphers are for the case of Brazil 45,9%, 82,1%, and 77,7% and for Colombia, 74,1%, 99,6%, 99,2% respectively.

The total production of foot-and-mouth vaccine in the region was 372.1 million doses, a lower quantity, around 35.5 millions in relation to that of the previous year (407.4 millions). The production of oil adjuvant vaccine exceeded in 114% (121.6 millions) the volume of doses produced in 1990, and decreased in 55% the production of saponin-hydroxide vaccine (144.6 millions).

Indexes of vaccine approval reached 91,2%, of which 92,1% pertained to oil-adjuvant vaccine and 89,8% to the saponin-hydroxide type.

The availability of human resources indicates an apparent increase of 26% in comparison to the preceding year, passing from 10.910 to 13.701 employees. These figures include 2.452 technical assistants eventually hired by Brazil.

A total of 3.754 vehicles were reported available, slightly higher than that for 1990 (3.734). However, the stock indicates a reduction of 245 units which is made up by an increase in motorcycles (310).

In Paraguay, the public sector contributed US$ 3.7

millions, 2.3 millions for operating expenses and 1.4 for capital expenses (figures not included in regional analysis).

This year as in 1990, Argentina and Uruguay did not include in their annual reports the figures for public and/or private funds intended to cover operating and capital expenses relative to their programs. On the other hand, Paraguay only reported their public expenses. It is very likely that in a number of cases contributions were underestimated. For instance, in the case of Brazil public sector contributions did not include state expenses for every member of the Federation. Several countries in the area alloted US$ 73.9 million for the control of the foot-and-mouth disease, US$ 10.5 millions as a public sector contribution and US$ 63.4 from private sector, the latter mainly for vaccine purchases.

As to fiscal contributions, 80% (11.5 millions) are for operating expenses which basically cover personnel wages and salaries in most countries and 20% (2.8 millions) are for capital expenses, which are very influenced by the contributions of Paraguay (US$ 1,4 millions), Brazil (US$ 960.000), and Venezuela (US$ 225.000).

2.2 Country-by-country situation

ARGENTINA

With an area of 2,779,892 km2, cattle herds total 277.269 and the bovine population is an estimated 58.2 millions. According to the 1988 census, there are approximately 22.1 million sheep, 5.4 million swine (1982) and 3.1 million horses. The foot-and-mouth disease program carried out by the National Animal Health Service (SENASA) in the Secretariat of Agriculture, Livestock, and Fisheries provides nationwide coverage.

Regarding vaccination strategies, a notable advance in the area covered by the official plans was made, which were managed by livestock raising organizations in coordination with SENASA, with the support of official personnel hired. With a total of 198 on-going programs, mostly utilizing oil-adjuvant vaccines and the remainder with saponin-hydroxide, vaccine coverage included 41.4 million cattle (71% of the stock), a higher figure than the 36% for 1990. The rest of the country continued with the traditional vaccination system using the aqueous type, administered by the breeder and controlled by the official services.

Vaccination priority on official programs was given to livestock breeding areas in which a coverage of 91% of existing

cattle was reached and also to secondary endemic areas reaching a 72% coverage.

The production of foot-and-mouth disease vaccine in 1991 indicated a profile clearly different from the previous year, totalling 68.3 million oil-adjuvant type (almost four times higher than the production in 1990) and 58.3 saponin-hydroxide (half the production in 1990).

Approval was given for field use of 58.3 million trivalent doses of oil-adjuvant vaccines and 49.4 million trivalent doses of saponinhydroxide type right after the respective official quality controls, which included footpad generalization tests (PGP) in cattle.

As to systematic vaccination programs, 20186 million cattle received three doses, 33.27 million two doses, and 306 thousand cattle one dose; in this case tactic-strategical vaccination was applied.

The program has a central office, a diagnostic and control vaccine laboratory and 298 local operating units (15 less than 1990) distributed in 18 regions. Personnel involved totalled 226 professionals, 591 and 198 technical and administrative assistants respectively. The fleet of vehicles reached 748 units.

Information on financing funds intended to cover foot-and mouth disease activities was not obtained.

International trade in animals, products and genetic material as far as imports were concerned mainly involved Canada and United States (cattle), Chile (swine), Uruguay (horses). Australia, Canada, the United States, and New Zealand (semen and embryos).

Live animal export records totalled 1.804 cattle, 50.030 swine and, 3.986 horses. Semen was exported to Bolivia, Brazil, Paraguay, and Uruguay. No information was available on meat exports but as to milk, it totalled 1.976 metric tons.

Training activities basically consisted of courses and seminars, mostly scheduled in the joint program of the Plata River Basin Program. Seminars were attended by 16 technicians and courses by 15. Technical updating meetings were also held for 50 professionals and training courses for vaccine agents. An intensive difusion work through massive means of communication and systems of meetings in the local commissions was performed where programs were introduced.

In regard to international coordination joint activities

with PAFMDC was noted mainly through the Plata Basin Agreement and the Central Mountains Program.

BOLIVIA

Bolivia has an overall area of 1.098.581 km². According to estimates by the Ministry of Agriculture and Peasant Affairs (MACA), there are 98.139 herds and the following animal population: 5.4 million cattle, 9.4 million sheep, 2.1 million swine, 1.2 million goats, 1.5 million camels, and 904 thousand horses.

The National Foot-and-Mouth Disease, Rabies and Brucellosis Service (SENARB) coverage remained invariable; the program area reaches 44% of the total area covering the departments of Cochabamba, Santa Cruz, and part of Beni (55,6% of the area, 17,8% of cattle herds, and 11,2% of cattle).

SENARB has 126 employees (7% less than 1990). Sixty (48%) are assigned to 16 operating units, 28 (22%) at the central office (Quillacollo/Cochabamba) and 38(30%) in diagnosis laboratory in Santa Cruz, La Paz and Cochabamba.

A breakdown of total of employees shows 49 (39%) professionals, 8 are distributed at the Central office (16%), 26 in the field (53%), and 15 in the laboratories (31%); 42 (33%) assistants, 29 distributed in the field (69%) and 13 in laboratories (31%); and 35 (28%) administrative assistants distributed as follows: 20 at central office (57%), 5 in the field (14%), and 10 in laboratories (29%). SENARB has a vehicle fleet of 25 (one less than in 1990), consisting of 24 cars and one motorcycle, of which two are assigned to the central office, 21 (84%) in the field and two at laboratories.

Total budget of SENARB amounts US$ 254.825, of which US$ 223.007 (87.5%) pertain to fiscal contribution (3,95 higher than the 214.6 from the preceding year) and US$ 31.818 (12,5%) to the contribution from the private sector.

Because the country does not manufacture FMD vaccine, SENARB imports it from PAFMDC. A total of 28.944 vaccinations were recorded in cattle in double dosis, 110.420 were single dose and 18.002 were administered in strategic situations.

SENARB has no records about free-importation or vaccine administration by the private sector. There are no procedures for quality control of vaccines.

International trade records reveal the importation of 10.773 cattle from Uruguay and 6000 semen flasks from the U.S.A.

of particular importance, was the export of 61.05[illegible] cattle to Brazil.

SENARB has created three Support Committees for the Control of Foot-and-Mouth Disease in Cochabamba, Santa Cruz and the Beni to improve the coverage and quality of veterinary assistance. SENARB has also made three cooperation and technical assistance agreements for training of rural workers; coordinates its actions with MACA and the Ministry of Health at the national level; at the international level, it maintains integrating relations with IICA, FAO, JICA, CIAR, BID, representatives of PAHO in Bolivia, INPPAZ, and PANAFTOSA among others.

BRAZIL

Brazil covers an area of more than 8.5 million km^2. The number of herds totals 1.935.501 and the animal population is the following: 140.8 million cattle, 20.08 million sheep, 32.1 million swine, 11.3 million goats, 9.25 million horses, and 1.18 million buffalos.

The Secretariat for Animal Health Protection (SDSA) of the National Secretariat for Agro-livestock Protection in the Ministry of Agriculture and Agrarian Reform through its operations in each state and those of State Secretariats of Agriculture are responsible for maintaining the foot-and-mouth disease control program.

In general, the personnel involved, performs also activities for other projects on animal health. The human resources from the Federal Government and the states total almost 10 (ten) thousand people; approximately one quarter (2452) of temporary hiring. A total of 1778 professional veterinarians are on field operating units and there are 1708 vehicles (1550 cars and 158 motorcycles) used for their transportation.

Health education and extension activities continued to be developed actively, as follows: 394.243 brochures, 506.047 technical sheets were issued and distributed among breeders; 911 lectures were held for them; 7094 visits were made to rural communities; 1276 radio programs were broadcasted; 6276 technical demonstrations were made; 06 visits to Livestock Breeders Associations, and 39.795 messages were released through the media.

The country has developed an intensive training activity with emphasis on field staff, and with the support of PANAFTOSA held a series of courses in several sites of the country. That means a total of 492 veterinarians and 68 field assistants

received training. In addition, through the Foot-and-Mouth Disease Control and Eradication Agreement of the Plata River Basin, 15 (fifteen) professionals were trained on diagnosis and epidemiology in the Subregion and at PANAFTOSA and two on surveillance and eradication in free areas, in Chile.

The program coverage totalled an area of 46%, 32.1% cattle herds and cattle population of 77.7%.

In some states, livestock owners and meat industries played an important role in the development of programs. The one in Mato Grosso do Sul, where an essential part of the infrastructure and operations is financed by the industry should be highlighted. In Sao Paulo, cattle raisers created funds (FUNDEPEC) for the support of official actions.

The production of trivalent vaccine totalled 105.491 million doses of the oil-adjuvant type and 84.465 million of the saponinhydroxide type; 94,39% and 93,13% were approved by official quality control testing respectively.

During this period, Brazil exported more than two million doses of bivalent vaccine type to Venezuela and 130.000 dosis of trivalent type to Bolivia (80 thousand) and Peru (50 thousand).

As part of a systematic vaccination program, 74.4 million cattle were vaccinated. Of these, 32.5 million received three doses; 23.9 million, two doses, and 18.0 million, a single dose. Moreover, strategic vaccinations were administered, covering 372.8 thousand cattle and 22.0 swine.

According to the ministry rules nº 280 (11/30/88) and 027 (01/05/90), for quality control purposes, the conventional saponinhydoxide vaccine was accepted for the last time in October. From then on the vaccines are required to provide a six-month protection.

Based on this, the country continues to support an animal health program mainly involving the foot-and-mouth disease, with financing from the BIRD in the amount of US$ 104.000.000,00 (one hundred and four million dollars) for 15 (fifteen) states of the country.

The overall budget amounts to US$ 54.4 millions. 5.4 (10%) correspond to fiscal distribution (excluding contributions from the governments of different states of the country) and 49.0 (90%) to the private sector contribution, for acquisition of vaccines. Expenses made by the states, mainly with personnel should be added to those public and private funds intended for the program. Despite the lack of information, they traditionally are much higher.

Concerning international and national coordination, the SDSA maintained close and permanent relations with various international agencies that provide technical cooperation in this area, including OIE, IICA, FAO and PAHO/WHO, as well as PANAFTOSA and CEPANZO (PAHO/WHO). Agreements were also maintained with bordering countries. Domestically speaking, the relations with research institutes, universities and several rural organizations, mainly livestock breeders are of particular note.

CHILE

The foot-and-mouth disease prevention is part of the Exotic Diseases Prevention Program of the Livestock Protection Division which covers the entire country (757.720 km^2). According to the National Institute of Statistics, there are 189.044 heads with 3.3 million cattle, 4.9 million sheep, 1.1 million swine, 1.1 million goats, 126 thousand buffalos, and 329 thousand horses.

In addition, preventive measures are applied in the thirteen regions that subdivide the country, and funds are assigned to 56 local operating units, the central office and the central laboratory. There are 106 employees involved: 41 (39%) are professionals, 51 (48%) technical assistants, and 14 (13%) administrative assistants. The vehicle fleet totals 18 cars.

In 1991, the total contribution of the program reached US$ 488 thousand, as follows: 468 (96%) correspond to fiscal contribution and 20 (4%) to private sector. A portion of the fiscal funds was provided for those of the indemnization of owners of summer grazing lands for the prohibition of using them (US$ 120 thousand) and for temporary hiring of veterinarians and agricultural technicians for the control of summer grazing lands.

Personnel involved is not exclusively dedicated to the Program since they are also involved in other activities for all the Health Programs, not only at national level(brucellosis and classical hog cholera), but also at regional level (facilities free of brucellosis, tuberculosis, leucosis, and hydatidosis), the latter having contributions from the Regional Development Funds.

The reported occurrence of foot-and-mouth disease foci in the Argentine provinces of Mendoza and Rio Negro, during the months of September and November 190, led to put the prevention and control system in the mountain fields (summer grazing lands) on the alert, with strict preventive measures. The strategy applied to prevent the introduction of the disease into

the country and to achieve its early detection basically consisted of the creation of risk zones (for maximum, average, and low risk); a strip of land unpopulated by animals parallel to the border of the Republic of Argentina; the control of bringing the herds up and down authorized summer grazing fields; periodic inspections (every 21 days) of herds on said fields, increase surveillance control of fairs and slaughternouses; installation of health barriers, and strengntening of police patrols in the unpopulated zones.

The animal-free zones covers an area of 1.108.544 km^2 and extends between the V and the IXth regions of the country. The animal population under control in the summer grazing lands reached 356.796 heads, corresponding to 3.328 owners. Inspections were made on this population during the season (between 11.15.90 and 03.30.91) and 12.838 owners were called on. Twenty-four health barriers were installed; 52 veterinarians and 90 agricultural experts on surveillance and control activities worked in the mountain fields.

Concerning the entry of animals and animal byproducts into the country is ruled by a specific legislation.

The infrastructure for control (international barriers) is adequate, having specialized personnel who receive regular training and most of tnem work exclusively in this area. There are 44 international barriers, of which 18 are located at seaports, 9 in airports, and 17 in borders, covering most of importations into the country.

As far as the control of the domestic animal transit is concerned, since the declaration of the disease-free status in the country, (January 1981) there are no longer restrictions and safe-conduct granting and transit control were terminated. In every region, the movement of herds towards the slaughternouses and fairs and from the latter to their destination are reported.

As to the international trade, Chile exported 40 cattle to Bolivia; 18 metric tons of meat to the Malvinas and 0.2 metric tons to Cuba; 832 metric tons of milk to several countries. There was no information regarding imports.

Regarding professional training, 42 veterinarians attended a three-day event on "Analysis of results of summer grazing lands"; seven on "Epidemiology course" (64 days) and 22 on a five-day course on "International Barriers". Two professionals were trained on exotic diseases areas abroad (Buenos Aires - 15 days), one on epidemiologic surveillance (Camaguey, Cuba - 15 days), and two on surveillance of exotic diseases (Brazil - 3 days).

Health-education activities continued mainly towards three

groups: Carabineros of Chile, livestock owners in the pre-Andean area and students from the rural schools in the Cordillera of Regions VII and VIII, through two programs. The former began in 1984 comprising 239 educational establishments, 400 teachers, and 14 thousand students, and the latter on April 1991 in the VII region financed by the FNDR and a US$ 34.861 budget for 1991 and 1992. The program provides training for 156 teachers, 19 supervisors, and 3006 students. The first activity carried out went beyond the established goals, having trained 217 professionals among teachers and supervisors.

At the national level, coordination of actions was constantly maintained in conjunction with the Veterinary School of the Universities of Chile, Concepción and Austral; Studies and Budget Division (Ministry of Agriculture); the Ministries of Health, Foreign Affairs, Education and National Defense; Law Enforcement Agencies (Carabineros of Chile); Customs Agency; Department of Borders and Boundaries; Interior Government; National Congress; Town councils; National Institute of Statistics; Fairs and Slaughterhouses owners; Livestock Breeding Association and Cooperatives; and several others agricultural and intensive means of communication (TV, newspaper, and radio).

At the international level, permanent coordination was maintained with several agencies, such as: FAO, OIE, IICA, CEE and PAHO/WHO and the latter with the Chilean Representatives and PANAFTOSA including the Foot-and-Mouth Disease Program with Pirbright in England; Plum Island Reference Laboratories; with the Animal Health Services of Argentina, Peru, Bolivia, Colombia, Mexico, the United States, Canada, Australia, New Zealand, and Japan.

According to the current agreement, PANAFTOSA has an antigen stock named Argentina-79 and 81, for preparing the vaccines for emergency purposes and has analysed samples from Chile in accordance with New Zealand requirements for the export of buffalos (seroneutralization for foot-and-mouth disease). Likewise, antigen was furnished for VIA testing (foot-and-mouth disease) and serum and antigen for ELISA testing (vesicular stomatitis).

In regard to International Agreements during 1991, several meetings were held with Peru and Argentina.

As to Peru, the VII Border Commission Meeting was held in Arica, Chile (December 1991) where a letter of intention was signed among others for the signing of a broad Animal Health Agreement among Bolivia-Chile-Peru and PAHO/WHO.

As to Argentina, two regular meetings of the IV and V Regional Commissions were held. On the other hand, as per the Border Agreement of the Central Region of the Andean Mountains

signed in May 1988, two professionals from the Exotic Diseases Program visited the province of Mendoza, Argentina to get information on the foot-and-mouth disease situation in that area and the advancing steps of the activities accomplished in accordance with such Agreement as well as to watch the development of the actions considered on the Foot-and Mouth Disease National Control Program, Argentina 1990-1992.

COLOMBIA

Colombia has an area of 1.141.748 km^2 and nowadays, there are an estimated 726.609 farms with cattle and an animal population consisting of 22.3 million cattle, 1.5 million sheep, 2.2 million swine, 2.4 million horses, and 1.2 million goats.

Except for some marginal areas, from the livestock owners viewpoint, the Colombian Agro-livestock Institute (ICA) covers almost the entire country and it is in charge of the general health policy and of the control of foot-and-mouth disease and other vesicular diseases in particular. 74% of the total area (846.154 km^2) and 99,6% (723.756) of the cattle herds are under the program. The Foot-and-Mouth Disease National Program has its operations based on the implementation of different action strategies for every epidemiological ecosystem. In this way, the free area of the atlantic coast is object of both preservation and expansion; the disease-and virus-free areas in the departments of the Amazon (Leticia) and northwestern of the departments of Antioquia (Arboletes and San Pedro de Uraba), are elements of active epidemiological surveillance; the fattening area are characterized for the strict control of animal movements, detection, investigation, and control of foci, and high coverage vaccination; the border areas are the object of binational health actions that try to optimize, on a cooparticipation basis, the effects of common epidemiological surveillance programs, massive vaccination and animal transit controls.

The ICA establishes its actions based on the effective community participation, develops periodic events on training and transfer of technology at the level of livestock breeders and, public and private organizations.

All operations related to foot-and-mouth disease are carried out, at the national level by 891 employees including 184 (20,6%) professionals, 407 (45,7%) technical assistants, and 300 (33,7) administrative assistants. 96% of total personnel (853) are alloted into 140 local operating units in 9 services regional units, 2% at the central office (22), and 2% at the LANIP laboratories and at the Animal Health Investigation Center (CEISA).

The personnel assigned to the Foot-and-Mouth Disease

Program coordinate their functions with other health investigation operations and technology transfer.

The vehicle fleet consists of 424 automobiles, 163 (38%) campers, and 262 (62%) motorcycles. Out of the total fleet, 260 (60 campers and 200 motorcycles) are assigned to the ICA-USDA Cooperative Program (Atlantic Coast) and the remaining 164 owned by employees who participate in the Foot-and-Mouth Disease Program in the rest of the country.

The total budget for the aforementioned program amounted to US$ 12.9 million, of which 2.9 (22%) corresponded to fiscal distribution, slightly lower than the amount recorded in the previous year (1,7%), and 10.0 (78%) to the private sector contribution. The latter is contributed by the livestock breeders for payments on vaccines (US$ 0,44/dosis) and the vaccination itself (0,07/dosis).

In 1991, 19.5 million oil adjuvant foot-and-mouth disease vaccine type were administered as follows: 13.8 million on a six-month basis (95,5%), 684 thousand corresponded to tactic-strategical vaccinations (4%) and 3.286 to trivalent vaccine, A-O-C, produced by PANAFTOSA, to be administered in the Brazilian-Colombian agreement area (3%). The national foot-and-mouth disease vaccination coverage did not exceed 44% which differs from some other regional and local coverage that exceeded by 70% (Atlantic Coast, Sabana de Bogota,etc.)

Availability of oil-adjuvant foot-and-mouth disease vaccine, bivalent A-O was 21.5 million doses. 993 thousand doses were exported to Ecuador and 6.888 trivalent O-A-C type were imported from PANAFTOSA-Brazil.

The vaccine batches were submitted to the official quality control by means of protection techniques against footpac generalization (PGP) in cattle as well as sterility, innocuity, and testing for physical-chemical properties .

Epidemiological surveillance based on a national coverage system is still one of the main components of the program involving information subsystems for the bordering areas and the integration of the community in the animal disease reporting system and breeding health problems.

As to the international trade, 143.415 cattle were imported from Argentina, Canada, Germany, New Zealand and the United States; 245 horses came from several American and European countries and 85 swine from Canada. In addition to that, not only 78.055 tons of meat were imported from Ireland (0.055) and the United States (78) but also 1.439 tons of meat flour from Venezuela.

Exports from Venezuela, Ecuador and Peru recorded 89.291 cattle, which clearly translate as one of the main risk factors for the spreading of the foot-and-mouth disease in the Andean subregion.

In 1991, with the sponsoring of the PAHO-Colombia Representative, two veterinarians were sent abroad for training on epidemiological surveillance and animal health; at the national level, 27 courses were held along with 677 meetings attended by 323 and 3.869 respectively.

There was an intense production and edition of health education material and dissemination of films and audios referring to foot-and-mouth disease.

In short, as in previous years, the Foot-and-Mouth Disease Program was engaged in permanent coordination with public and private organizations involved with the livestock activities. Two Foot-and-Mouth Disease Eradication Support Committees were organized in the milk zones of Boyaca and Antioquia. Concerning the international level, the strenghtening of the Border Health Agreements contributed to the Andean subregion integration and maintains coordination linkages with PAHO/WHO and its especialized centers, including PANAFTOSA and CEPANZO, and with IICA, FAO, OIE among others.

ECUADOR

The country has an area of 274.168 km^2. The official Agriculture and Livestock Census dated 1974 reported 251.454 agricultural farms, and the National Institute of Statistics and Census (INEC) has an estimate for 1991 of 4.1 million cattle, 1.3 million sheep, 2.1 million swine, 209 thousand goats, and 427 thousand horses.

The National Animal Health Program (PNSA) of the Agro-livestock Ministry (MAG) is the official organization responsible for directioning and carrying out health policies related to the control and eradication of foot-and-mouth disease within the entire country.

Administratively speaking, the PNSA consists of a central office, six regional offices, established in accordance with the epidemiological regionalization of the country, along with 64 operating units distributed in the national territory with the exception of the Galapagos Insular province. There are 330 employees assigned, as follows: 88 (27%) professionals, 199 (60%) technical assistants, and 43 (13%) administrative assistants. The vehicle fleet numbers 32. A larger concentration of human and material resources is located along the coast and north of the Andes as well.

The total budget of PNSA amounted to US$ 909.324. The amount of 652.324 (72%) comes from fiscal contributions and 257.000 (28%) from the private sector, as a result of the money collection means for administration of foot-and-mouth disease vaccines, of which a certain amount constitutes the "Emergency Fund" of the program. In comparison with the previous year, a reduction of the fiscal contribution in 5% was noted. Also, 88% of the US$ 652.324 (572.324) are for current expenses (wages and salaries) and 12% for capital expenses.

Availability of bivalent type A-O oil-adjuvant foot-and-mouth disease vaccine, was 1.132.266 doses, as a result of the 1.006.250 doses imported from PANAFTOSA-BRAZIL, and the remaining 126.016 doses refers to imports of last year from the LAVERLAM laboratories in Colombia. In addition, 154.803 doses of saponinhydroxide vaccine were produced in-country by the Animal Health laboratories under the Ministry of Public Health.

The program requirements are that the quality control procedures on imported vaccines be applied on cattle directly (PGP). The internal production controls in domestic laboratories are made through chemical-physical, and indirect biological tests.

The average price per dosis of imported oil-adjuvant vaccine oscillates around US$ 0,30 and the local aqueous type around US$ 0,20.

Foot-and-mouth disease vaccination strategies are aimed at intensive and systematic administration of oil-adjuvant vaccine to the livestock along the coast, considered as primary endemic area and under the same plan, the cattle population in the north and central Andean regions, defined as secondary endemic: occasional vaccinations of tactic-strategical nature were extended to the rest of the country, austral and the Amazon regions.

Practically speaking, however, the aforemetioned strategies could not be applied, basically due to the lack of vaccine on time, in the quantities foreseen for the vaccination stages, the first in March and May, the second in October and September. The lack of timely vaccine, which was imported from PANAFTOSA-BRAZIL this year follows the legal dispositions that establishes a maximum of 200.000 doses per importation. There is a two or three-month gap between each importation unabling to achieve a high and homogeneous populational inmunity in order to avoid the disease occurence.

Therefore, in light of the aforemetioned, the Program administered the vaccine distribution on the basis of two main criteria: to assist the areas affected by the foot-and-mouth outbreak with perifocal vaccinations, and also to meet the

requirements of vaccine from the livestock owners organizations or individual breeders who maintain a regular vaccine administration.

Both the lack of foot-and-mouth disease vaccine and its availability on time, have determined that at the field level, the administration of a single vaccination in all cattle herds in most of the properties becomes a widespread habit.

In 1991, 1.132.266 doses of the foot-and-mouth disease vaccine from PANAFTOSA were administered in 870.972 cattle, out of which 609.678 (70%) received a single dosis and 261.294 (30%) two doses. In addition to the oil-adjuvant type, 154.808 doses of saponnidroxide type were proportionally administered in cattle.

The health control on the international trade in animals and livestock products indicates the following import figures: 13 cattle from Colombia and 75 from the United States; 19 horses from Chile, 9 from Germany, 6 from Argentina, and 1 from Costa Rica; 286 swine from the United States and 11 alpacas from Peru.

No substantial modifications were made in health control norms for transportation and trading of animals within the country; the only requirement for obtaining an animal-transport permit for breeding, fairs, and slaughtering purposes is the foot-and-mouth disease vaccination certificate. This occurs mainly in the interAndean and the Amazon regions. Under such considerations, the Program authorized the transport of 263.895 cattle. 60.000 sheep, and 75.920 swine.

With the sponsoring of PANAFTOSA-BRASIL, two professionals received training at the Center; one from the official services on a three-month course covering vesicular diseases diagnoses, which facilitated the implementation of the foot-and-mouth disease diagnosis in the Veterinary Laboratory of the Ministry of Health in Quito, and the other from the private sector in the production and control of foot-and-mouth disease vaccine, which lasted a month.

Two Regional Committees for the Support and Eradication of Foot-and-Mouth Disease were created. One in the austral and south Amazon region, and the other along the coast. Each meeting was attended by approximately 50 delegates from the official and private sectors connected with the livestock activity.

Publication material was prepared associated with the promotion and dissemination of the Hemispheric Program and Andean Subregional Program for Eradication of Foot-and-Mouth Disease. Both activities were performed with the technical cooperation of the PAHO/WHO Representatives in Ecuador.

At the national level, the program maintains permanent coordination with the Ministry of Public Health concerning the production of vaccine and vesicular disease diagnosis.

At the international level, the Border Health Agreement with Colombia and Peru is in effect; two binational meetings were held with Peru, one in Machala and the other in Macara-Ecuador and another with Colombia in Tulcan-Ecuador in order to coordinate efforts aiming at the foot-and-mouth disease prevention.

The technical cooperation commitments with PAHO/WHO including PANAFTOSA and CEPANZO, OIE, and also with IICA and FAO are still in effect.

GUYANA

The Republic of Guyana has an area of 214.969 km2 and a population of 758.619 based on the 1980 Census. According to the FAO Production Yearbook, vol.42, estimated livestock in 1988 was as follows: 210.000 cattle, 185.000 swine, 120.000 sheep, 77.000 goats, and 3.000 horses.

Guyana is a foot-and-mouth disease free country and is officially a member of COSALFA since 1979. It has participated in and actively supported the "Hemispheric Plan for the Eradication of Foot-and-Mouth Disease, and is a member of the Hemispheric Committee for Eradication of the disease (COHEFA), serving as a representative for the Caribbean countries.

The country has assigned resources for integrating a working group for formulating a program for establishing an area free from FMD in the state of Roraima, Brazil and presentation of the disease in Rupununi, Guyana.

PARAGUAY

The National Animal Health Service (SECNASA) of the Ministry of Agro-livestock is responsible for the control of the foot-and-mouth disease throughout the country with an area of 406.752 km². There are 228.042 herds with 7.5 million cattle, 456 thousand sheep, 993 thousand swine, 148 thousand goats, and 334 thousand horses.

There are 47 regional offices supporting its health activities, distributed in 16 health zones and 505 employees (six more than the previous year). 135 (27%) of the employees are professionals, 209 (41%) technical assistants and 161 (32%) are administrative assistants. 193 (38%) are assigned to the central office, 277 (55%) to the rural zones, and 35 (7%) to

the laboratory. The vehicle fleet numbers 78, with 39 (50%) automobiles and 39 (50%) motorcycles.

The total budget amounted to US$ 3.756.690 which is 39% higher than in 1990; 62% went for operating expenses (US$ 2.342.720) and 38% (1.413.970) for capital expenses.

Vaccinations are carried out regularly, based on a schedule that varies according to the type of vaccine used. Saponin-htdroxide vaccine is administered every four months and every semester (for cattle under the age of two). The oil-adjuvant type is administered every twelve months (for cattle over two years old). Effective after 1992, the oil-adjuvant type will be used exclusively in accordance with the strategic actions included in the Foot-and-Mouth Disease Eradication Program in the Plata River Basin this year.

Both the oil-adjuvant and the aqueous type have been used for the vaccination of approximately 5 million cattle, of which 1.7 millions received the three-dose scheme, 1.0 million the two-dose scheme, and 2.3 millions the single dose, and 9 thousand vaccinations of the tactic-strategical type.

The trivalent O-A-C vaccine, either the saponinhydroxide or the oil-adjuvant type is produced in the country by private laboratories. The availability of vaccine totalled 10.4 million doses: 9.4 (90%) million corresponded to the oil-adjuvant type and 1.0 (10%) million to the saponinhydroxide type. The total included 773.660 doses of oil-adjuvant vaccine exported to Uruguay, as well as 801.000 doses imported from PANAFTOSA-BRAZIL.

The vaccines are submitted to official laboratories for quality control based on serum protection techniques in suckling mice (ISP), serum neutralization indices and inocuity controls in unweaned mice and cell culture. The average price for oil-adjuvant vaccine was US$ 0,52/dosis and US$ 0,29 for the saponinhydroxide type.

SECNASA has 30 permanent control posts for the herds in transit. Under special circumstances, it also operates "mobile controls", in places where cattle are required to pass.

As to the international trade, 319 cattle were imported from Argentina (288), Brasil (29), and the United States (2); 42.245 doses of semen from Germany (7.000), Argentina (1.760), Canada (3.960), the United States (26.525), and France (3.000); embryos from the United States (301), swine from Brasil (44), and swine semen from the United States (55.070); 3.305 sheep from Argentina (321), Brasil (119) and Uruguay (2.865); 1.337 horses from Argentina (412), Brasil (80) and Uruguay (845). In

addition, regarding the exports, 11 cattle were exported to Uruguay and 1047 tons of milk to several countries.

SECNASA organized, through the Health Education Division, 16 events on community training as well as a seminar and a course for 80 professionals. In addition, the participation of a veterinarian in the International Seminar on "Use of Information at the Local Level on Epidemiological Surveillance and Community Participation", held by PANAFTOSA in Rio de Janeiro, Brasil. Also, under the same topic 26 veterinarians attended a seminar in the Ciudad del Este and in the zone offices of SECNASA; a professional on exotic diseases course in Buenos Aires, Argentina; a professional on microbiology in England (PHD), and a veterinarian on cattle tuberculosis and brucelosis epidemiology in Chile.

Prior to each vaccination stage and throughout its execution, promotional campaign messages were broadcasted in 10 radios and some TV channels sponsored by the vaccine production laboratories, the Paraguayan Meat Chamber, and Fair Organizations. Furthemore, there was also the visit of 3.300 livestock breeders for delivering technical material on foot-and-mouth disease eradication program. Strenghtering of the organization of public and private sectors, Zone Commissions for jointly carrying out the program at the local level continued.

SECNASA maintains close coordination with other agencies of the Ministry of Agriculture and Livestock, the Ministries of Health, National Defense and Social Welfare, the Livestock Fund, Cattlemen and Meat Industry Fair Organizations, the Veterinary School, and professional organizations as well. At the international level, there was close relationship with PAHO/WHO and their specialized centers, such as PANAFTOSA and CEPANZO, and with IICA, OIE, and GTZ.

PERU

The country has an area of 1.283.215 km^2 and 463.182 heras. The animal population consists of the following: 4.1 million cattle, 12.3 million sheep, 2,4 million swine, 1.7 million goats, 2.3 million South American camelidae, and 1.3 million horses.

The political administrative division of the country comprises 11 regions and their corresponding regional governments; having each four regional secretariats, one of which is that of Extractive Productive Matters which involves the agriculture and livestock activity. The Office of Livestock Health, adivision of the General Livestock Office under the Ministry of Agriculture is responsible for the normative

functions of health nature covering the Foot-and-Mouth Disease Control and Eradication Program .

The program which is nationwide in coverage integrates its actions with the Regional Secretariats operating plans, carried out by 163 existing Local Operating Units in the country, which administratively depend on Regional Governments.

In many cases, the actions aimed at the prevention and control of the foot-and-mouth disease are subject to work priorities related to other problems at both local and regional levels, and unfortunately, lacking proper coordination with the national policies and regional strategies of disease eradication. Under such consideration, 426 employees (521 in 1990) merge their functions with those of the Foot-and-Mouth Disease Program activities. Eighty (17%) are professionals, 325 (76%) technical assistants, and 21 (5%) administrative assistants.

In order to carry out the agriculture activities, including the foot-and-mouth disease control, the vehicle fleet numbers 288 including 60 (21%) automobiles and 288 (79%) motorcycles.

The fiscal budget for the Foot-and-Mouth Disease Program amounts to US$ 345.077 (90%) which is four times higher than the amount alloted in 1990 (US$ 85.577). The private sector

contributed US$ 37.000 (10%), similar to the previous year, for acquiring the vaccine.

Fiscal funds are to cover the operating expenses (basically wages and salaries), mostly at the regional level, i.e. 337.000 (98%) and the balance of US$ 8.077 (2%) for activities at the central level. Such budget allows the financing of activities carried out in health areas in general, and its increase is related to the increase in costs.

Availability of oil-adjuvant foot-and-mouth-disease vaccine consisted of 591.120 doses, as follows: 444.120 doses (75%) were from domestic production and 150.000 (25%) were imported i.e., 50.000 (23%) from PANAFTOSA-BRAZIL, and 100.000 (67%) from Uruguay. During 1991, there were 583.355 vaccinations administered in a similar number of cattle (once a year) and distributed in all regional units and throughout the year. Most vaccinations were towards avoiding the spreading risk from affected areas. In the department of Lima, 35.850 swine were vaccinated in the garbage dumps with the oil-adjuvant type surplus of an import made in 1990 from PANAFTOSA-BRAZIL. The lack of specific human, material, and financing operating resources is still the main restriction to improvement of the vaccination coverage. Consequently, the livestock raisers are

the ones who either individually or through their organizations are beginning to take over this function.

Health education and extension activities were carried out by the Agrarian Regions, involving aspects related to the prevention and control of the foot-and-mouth disease. Yet, these activities together with the technical training are still extremely limited due to financial reasons.

As to the international trade in animals and animal-made products 7.493 cattle were imported from several countries: the United States (3.070), Ecuador (3.024), Bolivia (1.000), Brazil (360), and Colombia (39); 1.430 tons of meat were also imported as follows: 1428 from Argentina, 0,6 from Chile, 0,5 from Paraguay, 0,2 from Bolivia, 0,2 from Colombia, 0,08 from Brazil, 0,2 from Belgic, and 0,2 from Poland. In addition, 31.412 tons of milk from several American and European countries. Exports involved 178 horses to Latin America.

The national program has maintained coordination with the Agrarian Regions, the National Institute of Health in aspects related to the production of vaccines and vesicular disease diagnoses, Livestock Raisers Associations (FONGALES), Schools of Veterinary Medicine, Professional Organizations, and Non-government Organizations for Agriculture and Livestock Development.

During 1991, the Ministry of Agriculture with the technical cooperation from PANAFTOSA, began to carry out a program for the creation of a free area in the provinces of Arequipa, Maquegua, and Tacna. The livestock breeders play an important role on this activities through their class organs (Fongales), as well as the official regional structures.

There was international coordination with the PAHO/WHO, CEPANZO, JUNAC, OIE, FAO, and IICA.

Also, border health agreements were in force. The following events were held in 1991 with the sponsoring and cooperation of the PAHO/WHO: August 14-16, the V Peru-Ecuador Border Health Agreement in the city of Machala-Ecuador; September 4-6, the VII Bolivia-Peru Cooperative Agreement Meeting in the city of La Paz, Bolivia; December 3-5, the VII Peru-Chile Border Commission Meeting in Arica-Chile, in which a Triparty (Peru/Chile/Bolivia) Agreement covering Animal Health was signed.

URUGUAY

The National Animal Health Service, a division of the General Offices of Veterinary Services under the Ministry of Agriculture and Fishing (MGAP), is responsible for the control

and eradication of the foot-and-mouth disease nationwide. The country has an area of 160.737 km² and there are approximately 48.290 herds with 8.5 million cattle, 25.9 million sheep, 230 thousand swine, and 437 thousand horses.

The Service has 44 operating units totalling 496 employees. Ninety-six (21%) are professionals: 16 (17%) located at the central office, 71 (74%) in the field, and 9 (9%) in the laboratory; 291 (62%) technical assistants and 109 (23%) administrative assistants. The vehicle fleet totals 236, which includes 97 (41%) automobiles and 139 (59%) motorcycles.

No information was sent regarding the budgetary aspects.

With resources from the 840-BID Program and due to the foot-and-mouth disease eradication policies and strategies in the Plata River Basin, the domestic program has established vaccination calendars for all domestic cattle, with a duration of 45-days each, as well as the special vaccination stage for calves born during the year; has determined a work methodology indicating the "low risk areas" mainly in the international border regions (Brazil-Argentina); a similar effort was made regarding "lowrisk properties" based on historical antecedents of the disease occurrence; vaccination records and explotation characteristics. Videos and tapes have been prepared for the spreading and promotion of either the program or the community education and technical training; has revitalized the functioning of the Animal Health Department Commissions (CODESA) with the joint participation of the breeders and the official services which constitute the operating support of the program.

As a result of the aforementioned actions, the program achieved the absence of clinical cases during the year. This situation had been maintained for a 21-month period until the elaboration of this report. The aforementioned actions are associated with the implementation of the Indemnization Funds for foot-and-mouth disease and other exotic diseases which amounted US$ 1.500.000.00 at the end of 1991.

With regard to this epidemiological situation and the need to strenghten the epidemiological surveillance actions, the third sero epidemiologic research study was carried out in the pilot zones of Rivera, Soriano, and Flores involving 3.744 cattle and sheep; another study was made in the zones of Canelones, Cerro Largo, Florida, Maldonado, Paysandu, Rio Negro, Rocha, San Jose, and part of Soriano with 3040 cattle and sheep, right after the last foot-and-mouth disease foci occurrence. The percentage of VIA reactors in both cases was below 10%.

Vaccination coverage, with the support of CONASA and the CODESAS, reached 93% in the first phase (February/March) and 95% in the second one (May/June). Cattle vaccinated totalled

8.231.700, of which 7.3 (93%) millions received two doses and 600 thousand (7%) one dosis.

Available foot-and-mouth disease vaccine, trivalent type O-A-C totalled 22.7 million doses. Of these, 22.5 (99%) corresponded to the oil-adjuvant type and 199 (1%) to saponin-hydroxide. 95% doses of produced vaccine underwent quality control tests in official laboratories. Two millions doses were imported from PANAFTOSA-BRAZIL and 810 thousand from Paraguay and 1.3 million were exported. According to foot-and-mouth disease control and eradication laws, the only vaccine manufacturing laboratory located in the rural area was discontinued last October.

Regarding international trade, Uruguay recorded the imports of 863 cattle. 93% (804) from Argentina; 47.005 doses of semen from Argentina (3.560), Canada (13.090), the United States (28.355), and New Zealand (2.000); 39 embryos from Canada (8) and the United States (31); 42 sheep from Argentina (39) and Brazil (3); 82 goats from Argentina (70) and Brazil (11); 199 horses from several american and european countries. Exports totalled 2.914 cattle, 66% (1.934) to Brazil and 23% (680) to Paraguay; 128.495.600 tons of meat to several American, European and Asian countries, and 38.4 million liters of milk to Argentina and 17,9 tons of milk products to Argentina and Cuba.

Finally, training activities involved a great number of national professionals and consultant support for the Plata River Basin Programs and 840 from MGAP-BID Animal Health, both with technical cooperation from PANAFTOSA. Also, an intense promoting campaign has been released through assorted means of communication (radio, TV, and newspapers) using the funds from the Project with the BID, as well as printed matter as a support for the foot-and-mouth disease control and eradication program. The National Program is included in the Foot-and-Mouth Disease Eradication Program in the Plata River Basin and consequently, maintains coordination with those member countries (Argentina, Brazil, and Paraguay), and several technical cooperation organs as well as international financial cooperation, such as PANAFTOSA, BID, OIE. At national level, there is permanent coordination with the Uruguay Rural Society, Society of Veterinary Medicine , and other official services linked to the agriculture and livestock activity.

VENEZUELA

The country has an area of 912.050 km^2. There are 106.535 livestock owners with 10.8 million cattle, 364 thousand sheep, 2.6 million swine, 1.3 million goats, and 572 thousand horses.

The Directorate of Animal Health, which is under the

Autonomous Agriculture and Livestock Health Service of the Ministry of Agriculture and Livestock (MAC) is responsible for carrying out the health policies and the foot-and-mouth disease control at the national level.

The animal health directorate has 398 employees. Of these, 188 (47%) are professionals, and 177 work at the operational level (94%); 56 are technical assistants (14%), and 156 are administrative assistants (39%). Except for the personnel at the central office (6%) the remainder is distributed in the 150 existing Local Operating Units in the State Agro-livestock Development Units (UEDA).

To carry out health operations, there is a fleet of 314 automobiles, all assigned to field work. Compared to the previous year, there were no significant modifications concerning both human and material (vehicles) resources.

The fiscal contribution to the budget totalled US$ 539 thousand,which was 9,6% higher than that of the preceding year (US 487.100). Of those, 284 thousand (53%) were alloted for operating expenses and 255 thousand (47%) for capital expenses; private contribution amounted to US$ 4.0 million (3.2 in 1991) due to the sale of foot-and-mouth disease vaccines to livestock breeders (83%) and to administration of vaccines (17%).

Availability of bivalent A-O type oil-adjuvant foot-and-mouth disease vaccine mostly imported from Colombia and Brazil totalled 7.8 million doses. Of these, 7.5 millions were administered on a semester basis, in 3.7 million cattle. The National Federation of Livestock Breeders based on an agreement made with the Ministry of Agriculture imported 1.070.000 doses from PANAFTOSA-BRAZIL.

The revision of the new protocol for the quality control of foot-and-mouth disease vaccine is in progress. The official national laboratory regularly carries out these control tests.

Regarding the international trade in animals, livestock products, and genetics material, imports records which ought to be highlighted include 66.570 (99,8%) cattle and 14.006 tons of meat from Colombia; and also of 50.579 tons of milk, of which 532 were from Argentina and 50.047 from several European countries. Semen imports were from Canada, the United States, and England. Quantitatively speaking, exports were of small significance and were mainly associated with Aruba and Curacao.

The US$ 20 million financing, for carrying out the Foot-and-Mouth Disease Eradication Project is still pending. This project was prepared with the technical cooperation of PANAFTOSA and despite all efforts, it has not been implemented to date.

During the month of September 1991, the Directorate held the International Seminar on "Past, Present, and Future of Foot-and-Mouth Disease in Venezuela" with the participation of delegates from the most important livestock breeders, industry, commerce and research organizations, professional veterinary associations, Veterinary Schools, and representatives of the producers and the aninal health services of Argentina, Paraguay and, Uruguay, as well as from PANAFTOSA. An analysis was made regarding the possibility of importing meat into Venezuela from countries affected by other types of the foot-and-mouth disease virus in the south of the Continent.

As to personnel training and in accordance with cooperation commitments made between PAHO/WHO and the University of Zulia, six specialists in Epidemiology and two in Preventive Veterinary Medicine (Masters) received training to meet the demands of the Services.

The course on "The use of oil-adjuvant foot-and-mouth disease vaccine in Eradication Programs" was postponed to 1992.It will be held with the cooperation of PANAFTOSA.

Both national and international coordination procedures have been maintained. Domestically, this mostly involved different Central Government State Bureaux, Agricultural Research Centers, and several of higher education Centers. At the international level, there was coordination with PAHO/WHO and its specialized center, PANAFTOSA, and INPPAZ, as well as with IICA, FAO, and OIE. Workshops have been maintained with border countries continuously in order to coordinate binational operations. During 1991, annual regular meetings were held with Brazil and Colombia.

3. INFORMATION SYSTEM AND CONTINENTAL SURVEILLANCE FOR VESICULAR DISEASES: RESULTS AND PERFORMANCE

3.1 Introduction

As in previous years, the behavior of vesicular diseases in South American countries was continuously monitored through a set of indicators that enable to interpret and characterize the levels of occurrence and the behavior of virus types. The historical series of vesicular disease occurrence stored in the PAFMDC data base has been used to interpret the significance of weekly occurrences in terms of affected quadrants and the frequency of affected herds, with totals and by virus types, according to the political and administrative subdivision of each country.

On the other hand, Table 5 indicates for each country of this part of the continent, the months in which the recorded frequency of herds affected by some type of virus clearly surpassed the expected frequencies. It deals with situations that may be considered as epidemiologically significant, or openly epidemic.

3.2 Performance in South America

This chapter involves the evaluation of the operational performance of communications within the Continental Epidemiological Data System, mainly in regard to regular information flows between the animal national health services in South America and PAFMDC.

3.2.1 Alert Warnings

During 1991, 168 warnings were sent by telex to various countries in the area, warning them of the appearance of vesicular episodes in border areas of neighboring countries and also due to the appearance of the disease in areas previously unaffected. The breakdown was as follows: Argentina (24); Bolivia (13); Brazil (18); Colombia (23); Ecuador (11); Paraguay (24); Peru (14); Uruguay (7), and Venezuela (34).

3.2.2 Weekly information on the presence of vesicular diseases by quadrant

Personnel engaged in national programs is aware that the map of each South American country has been divided into quadrants based on geographical coordinates. This map serves as a base for weekly telex reports of the presence of vesicular diseases (regardless of the number of episodes). A numerical code is used to indicate not only the week involved but also affected quadrants where clinical cases of these diseases have been observed.

Either telex or fax communications sent by various countries serve as data input for the PAFMDC's epidemiological file. PAFMDC issues the Weekly Epidemiological Report that provides every country on the continent with timely information making it possible to increase epidemiolcgical surveillance in the area. This Report is distributed to countries and international agencies, both in America and elsewhere.

a) Reception level

During 1991, the reception level of weekly communications sent by South American countries was 99.8% due to a non-reception week from Venezuela. The reception levels for previous years were as follows: 1990 (100%), 1989 (99%), 1988 (98%), 1987 (98,8%), 1986 (98,7%), 1985 (99,8%), 1984 (98%), 1983 (99,6%), 1982 (97%), 1981 (96%), and 1980 (99%). Nevertheless, it should be considered that in certain countries in the region, as pointed out in previous years, a somewhat unadequate situation is taking place. This consists in that information is not sistematic, but several weekly reports are compiled into one, with the consequent repercussions on their timeliness and subsequent publication. On the other hand, its usefulness as a tool that permits decision-making in a timely manner, is also affected.

b) Publishing level

The Weekly Epidemiological Reports publisned by PAFMDC included 100% of the epidemiological weeks received. Nevertheless, beginning with the first weekly bulletin of 1991 on the occurrence of vesicular diseases, PAFMDC has decided to publish every report received regardless of its timeliness and therefore, the publication of data has been favored.

c) Timeliness weekly communications

In 1991, the average lapse (expressed in days) for reception by PAFMDC of communications containing weekly data on

the presence or absence of vesicular disease episodes was extremely high (Table 42) except for Colombia, Ecuador, Paraguay, and Uruguay.

Nevertheless, from an overall standpoint, the average time of timely communications, i.e., the lapse in days between the closing of the epidemiological week and of publication data was 14 days. This interval is incompatible with handling the epidemiological information in a fast, simple and periodic way, as required for monitoring and surveillance of the behaviour of an acute disease that spreads easily. This limitation becomes even more critical when one bears in mind the time delay before the countries receive the Epidemiological Report.

3.2.3 Monthly information on vesicular disease episodes and their laboratory diagnosis

This information refers to the number of nexus affected according to each country's political and administrative divisions, as well as episodes in which specimens were gathered to carry out laboratory diagnosis.

a) Reception and publishing levels

For 1991, the reception level was the lowest ever observed in preceding years and it reached 79%. It was due essentially to the non receipt of all monthly reports from Peru and 9 from Bolivia. On the other hand, publication levels reached 100%, as in the previous year. Nevertheless, it should be taken into account that PAFMDC published as additional information, delayed monthly reports received from countries after the Vesicular Epidemiological Report for the respective month of the information had been issued. Accordingly, the monthly publishing of the information provided by Colombia was achieved throughout the year by including it in the Monthly Report on Vesicular Diseases issued by PANAFTOSA. Regarding other countries, the following was observed: 11 out of 12 reports received from Argentina and Paraguay published in the Monthly Report on Vesiculars for the respective month, 2 out of 3 to Bolivia, 11 out of 11 to Brazil, 10 out of 12 to Ecuador, 4 out of 12 to Uruguay, and 3 out of 11 to Venezuela.

On the other hand, there have been fewer delays in receiving data in comparison to the preceding year. Yet, the delay levels from Bolivia and Ecuador may still be improved, and the ones from Venezuela, although undoubtely lower than those from the previous year, are still high (Table 44). Also, for several months, the growing delay in receiving monthly reports from the countries lengthened the amount of time between the closing out of the month and the publication of the respective monthly report. In addition, at these times, the PAFMDC was

forced to delay the publication of the Monthly Report on Vesiculars to enable the inclusion of information coming from a larger number of countries. In other words, this means that the countries should still attempt to improve sending in their information, so that it is not postponed, jeopardizing the continental foot-and-mouth disease surveillance system.

b) Monthly report delays

In 1991, the period of delays in forwarding the Monthly Epidemiological Report from each country to PAFMDC (Table 44), except for the case of Venezuela, showed acceptable delays in most months, and in general, dropped the levels in relation to the previous year. On the other hand, Venezuela which undoubtedly improved its situation in relation to 1990, presented excessive delays in agreement with the expected objectives for this type of data.

In general, the monthly information system continues to undergo the same shortcomings noted in previous years. In some cases, the problem of delays in sending material to PAFMDC have become more acute, since lapses of more than 30 days should be considered as inappropriate. Countries are in most of the months presenting higher delay rates. Also, they are repeatedly failing to provide the epidemiological comments required for interpretation of data, as well as indicating the location of virus types on the grip map. In some countries, the format of their monthly communications has been altered, rendering it difficult to compile information due to the lack of standardization required for the monthly report on vesicular diseases.

3.2.4 Surveillance activities: laboratory confirmation

In South America in 1991, specimens for laboratory diagnosis were collected from 59% of herds with animals showing clinical signs of vesicular disease. Argentina, Colombia, and Paraguay were above average. In general, the rate of specimen collection improved in comparison to 1990 for all countries except Bolivia (Table 45).

Virus type was identified in only 45% of herds presenting clinical signs of vesicular disease, meaning that there was no significant improvements with regard to previous years. Generally speaking, rates are low in some countries, meaning that the identification opportunities of active virus are very small. On the other hand, it was possible to identify the causative agent in 72% of episodes in which samples were collected, a figure that ranged from 13% to 100% depending on the country.

As previously pointed out, it is necessary to improve the monthly information regarding the subtypes of active virus, as it is an important epidemiological datum to be provided to the member countries of (South American Commission for the Control of Foot-and-Mouth Disease) COSALFA, international agencies and to other countries. This information is constantly required by the EEC as well.

3.3 Performance in Central America and Mexico

This section contains an evaluation of the operational performance of communications of the Continental System of Epidemiologic Information among the national animal health services for Central America and Mexico, as well as PAFMDC, which is the organization responsible for coordinating this system.

3.3.1 Weekly communication on the presence of vesicular disease by quadrants

The map of each country in this region of the American continent has also been divided into quadrants based on geographical coordinates. These maps serve as a basis for the weekly telexed reports on the presence of vesicular disease (regardless of the number of episodes). A numerical code is used to indicate both the week reported and affected quadrants, as done in South America.

a) Reception level

During 1991, the reception level regarding the weekly reports received from Central America and Mexico (excluding Belize and Honduras, which sent no reports) dropped to 78% showing a significant decrease compared to 1990 (98%). Among reporting countries, El Salvador and Nicaragua indicated the lowest levels. The average of weekly information received by the six countries submitting weekly reports was 42 weeks (Table 46).

b) Publishing level

Considering the data received by PAFMDC, all epidemiological weekly reports were published, once PAFMDC published weekly reports that were received late (Table 46).

c) Timeliness of Weekly Communications

In general, the delay in submitting weekly communications increased in comparison to 1990. With the exception of Panama and Nicaragua, all reporting countries increased their delays in sending in their weekly reports to PAFMDC. Nevertheless,

Nicaragua still maintains long delays with an average of approximately 74 days (Table 46).

3.3.2 Monthly information on vesicular disease episodes and their laboratory diagnosis

This information reports the number of [illegible] affected according to each country's political and administrative division, as well as the heros affected from wh[illegible] specimens were collected, according to the virus type identified. In 1991, with the exception of Mexico, basic information to prepare the monthly report published by PAFMDC, has been taken from monthly reports on results issued by LADIVES, located in Panama. The same reports were received at PAFMDC headquarters between 25 and 43 days from the end of the month to which data pertain, with an average delay of 34 days. The variation for Mexico was 18 to 42 days, or an average of 19 days. Eleven reports with results were received from LADIVES as well as from Mexico. Every report was published.

3.3.3. Surveillance activities: laboratory confirmation

The following is a summary of the diagnostic results from LADIVES during 1991. For that period, the laboratory analysed samples from 236 episodes or vesicular occurrences in which it was possible to collect one or two samples (Table 24). LADIVES managed to identify the virus type in 49% of the episodes.

On the other hand, Mexico was successful in identifying the agent in 32% of vesicular episodes in which samples were collected (Table 24).

3.3.4 Support from the Vesicular Diseases Diagnostic Laboratory (LADIVES), in Panama

The Panamanian Vesicular Disease Diagnostic Laboratory (LADIVES) continues to operate normally. Every month, the results of virus typing are sent to PAFMDC, referring them geographically to the department or province in which the episode has occurred.

3.4 Utilization of Continental Information and Vesicular Disease Epidemiological Surveillance System for other diseases

During recent years, the Continental Information and Vesicular Disease Epidemiological Surveillance System coordinated by PAFMDC, has the participation of most of Latin

American countries in the mechanism of weekly telexed reports based on grid maps for suspected cholera-like swine diseases and syndromes compatible with Equine Encephalomyelitis (EE) in horses.

3.4.1 Notification System for suspected diseases clinically similar to Swine cholera: PAFMDC/PAHO/IICA

This is a joint project between the PAHO/PAFMDC and the Interamerican Institute for Agriculture Cooperation (IICA), involving the gathering and dissemination of information relative to swine cholera. This operation of system has gradually been improved, mainly as national programs are properly developed and data sources are implemented, using the existing mechanisms from their experience with vesicular diseases. The IICA publishes an annual report containing this information.

3.4.2 Notification System for syndromes compatible with Equine Encephalomyelitis (EE) in horses: CEPANZO/PAFMDC/PAHO

This is a joint project between the Pan American Foot-and-Mouth Disease and Zoonoses Centers (CEPANZO), involving the dissemination of information regarding equine encephalomyelitis in horses through PAFMDC's Weekly Epidemiological Report on the presence of vesicular diseases. In addition, on its third year of activity, countries have been including in their weekly communication sent to PAFMDC information regarding the quadrants where horses have been observed with neurological syndromes compatible with EE. Due to the fact that most countries do not have specific projects for surveillance and control of equine encephalomyelitis, the volume of data published is low. On the other hand, this situation will tend to improve as national programs are developed and current data sources for vesicular diseases are used.

3.5 Recommendations

The following points should continue to be emphasized:

a) The epidemiological information system should be maintained and improved, since it is an asset for all countries in the continent, as well as a valuable support mechanism for programs. It is also one of the most important animal health accomplishments in South America. Every possible effort must be made to keep it operating efficiently.

b) Reduce delays in sending weekly and monthly reports to PAFMDC.

c) Ensure that information generated by the system is timely and reliable and that communications follow standardized procedures.

d) Closer attention to the use of information not only as an objective basis for the epidemiological characterization of foot-and-mouth disease and readjustments of control goals and strategies but also in the forecasting, recognition, and follow-up of epidemic situations and their solutions.

e) Include monthly information on virus subtypes identified and their location on the map. That requires permanent integration between field and laboratory.

f) In the case of epidemic situations, keep PAFMDC permanently informed since it is the reference agency for consultation by neighboring countries and international organizations. Complete information should be submitted at least weekly, indicating not only the affected quadrants but also the number of foci and their type, by quadrants. Should a variant appear, indicate the quadrants where it has been identified. Omitting information regarding proven foci is a serious mistake that diminishes reliability and credibility of veterinarian services.

g) Encourage increased integration of laboratories and central and field level epidemiologists so that accurate information may be furnished regarding types and subtypes and their repercussion in foot-and-mouth disease epidemiology.

h) Use epidemiological information in operating field units. Field veterinarians will therefore, be able to act based upon knowledge of the behavior of disease in their region and its relationship with other areas of the country, making disease prevention and control more effective and efficient.

i) Forward regularly to PAFMDC field samples for the reference laboratory.

j) Put seroepidemiological data to timely use, applying corrective and suitable measures, which will make it possible to detect serologic and immunologic variations in active strains in the field.

k) Closer attention must be paid to the preparation of data sent in every year for use in the report on "the situation of foot-and-mouth disease and its prevention in the countries". Based on problems noted in reports, most countries sending information to COSALFA fail to make the necessary efforts and therefore, preparation has been reduced to a routine procedure. On the other hand, some countries have significantly improved their reports in comparison to the previous year.

FIGURE 1. DISTRIBUTION OF THE NUMBER OF WEEKS WITH OCCURRENCE OF VESICULAR DISEASES, BY COORDINATES SOUTH AMERICA - 1991

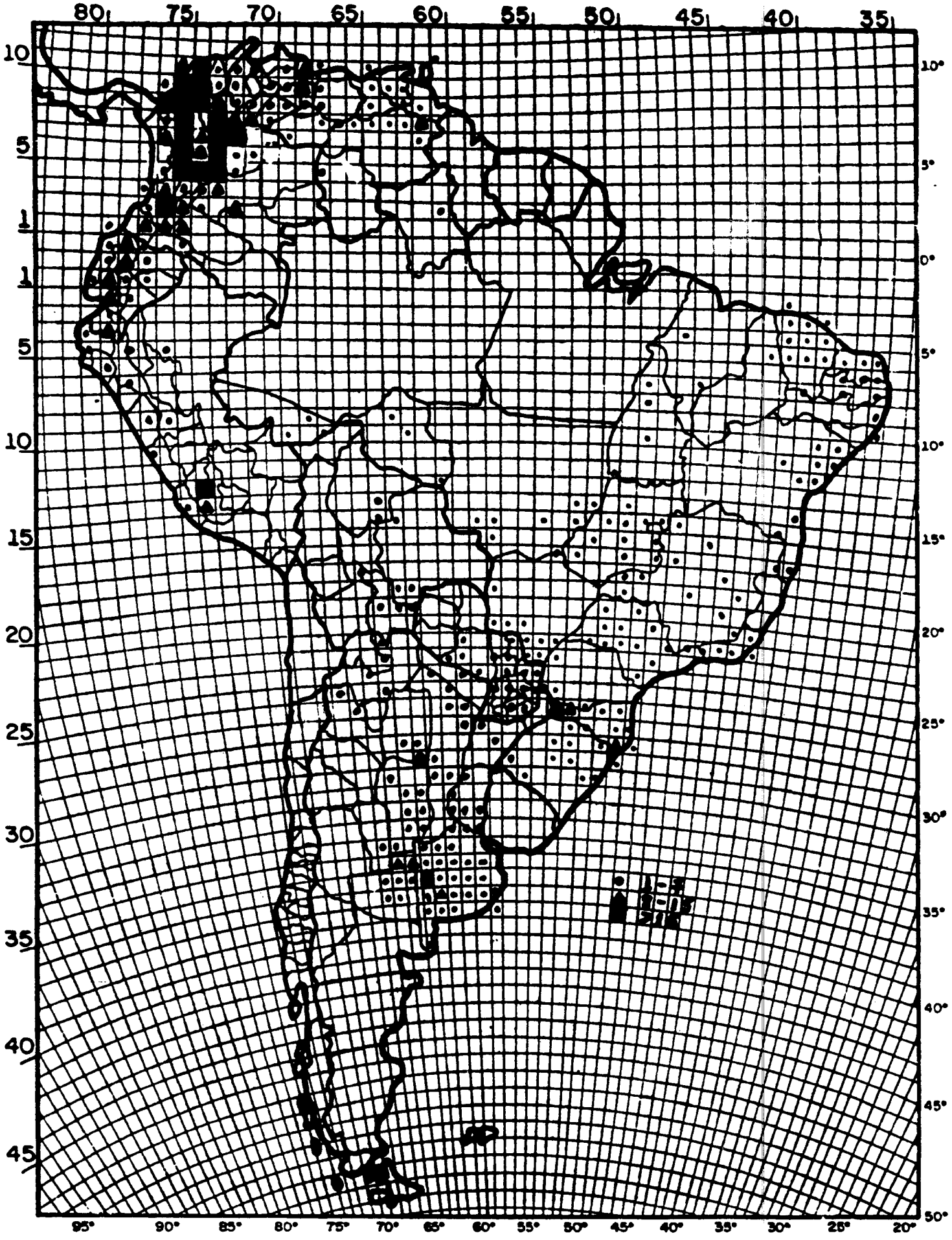

TABLE 1. Number of affected herds by vesicular disease and causal agent. South America, 1991.

Country	Affected Herds	Affected Herds Sampled	Diagnosis				
			Foot-and-Mouth			Vesicular Stomatitis	
			O	A	C	New Jersey	Indiana
Arçentina	234	164	37	60	2	0	0
Bolivia /1	16	4	2	2	0	0	0
Brazil	728	239	38	18	64	0	10
Colombia /2	1,475	1,103	74	113	0	325 /a	370
Ecuador	116	46	19	5	0	3	0
Paraguay	57	37	27	0	0	0	0
Peru	89	32	2	0	0	2	0
Uruguay	0	0	0	0	0	0	0
Venezuela	152	62	6	16	0	16	0
Total	2,867	1,687	205	214	66	346	380

Notes: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.
/1 BOL - Includes 5 outbreaks without epidemiological information; three occurred in the area not covered by the official program.
/2 COL - Includes 143 outbreaks without identification of affected herds.
/a COL - Includes 1 outbreak in which different samples were identified as the New Jersey and Indiana viruses.

TABLE 2. Affected herds by foot-and-mouth disease based on virus type by country and year. South America, 1985/1991.

Country	Virus Types	1985	1986	1987	1988	1989	1990	1991
Argentina	O	10	30	23	95	103	196	37
	A	5	11	486	35	39	115	60
	C	288	315	27	5	4	5	2
Bolivia	O	6	3	0	0	2	13 /1	2
	A	0	11	12	13 /1	0	4	2
	C	3	0	1	4 /2	4	0	
Brazil	O	127	126	94	92	71	43	38
	A	113	102	161	91	72	43	18
	C	25	17	13	19	28	91	64
Colombia	O	98	167	100	268	280	83	74
	A	402	276	73	153	542	250	113
	C	0	0	0	0	0	0	0
Ecuador	O	5	6	2	2	23	29	19
	A	16	19	11	15	9	5	5
	C	0	0	0	0	0	0	0
Paraguay	O	1	4	3	2	30	2	27
	A	0	0	0	0	0	0	0
	C	7	0	0	0	0	0	0
Peru	O	7	0	0	1	0	32	2
	A	11	17	10	6	2	0	0
	C	0	0	0	0	0	0	0
Uruguay	O	15	2	2	2	17	13	0
	A	0	1	115	0	0	11	0
	C	3	28	5	6	24	1	0
Venezuela		31	13	20	6	9	3	6
	A	16	8	6	10	34	16	16
	C	0	0	0	0	0	0	0

Notes: /1 BOL - Includes 3 outbreaks (88), 1 outbreak (90), and 2 in 1991, in Chuquisaca, not covered by SENARB.

/2 BOL - Includes 1 outbreak in the department of Beni, not covered by SENARB.

TABLE 3. Foot-and-Mouth Disease Virus Subtypes identified in South America, 1991.

Argentina	O_1	A_{79}, A_{81}, A_{24}	C_3
Bolivia	O_1	A_{24}	-
Brazil	O_1	A_{24}	C_3
Colombia	O_1	A_{24}, A_{27}	-
Ecuador	O_1	A_{24}	-
Paraguay	O_1	-	-
Peru	O_1	-	-
Uruguay	-	-	-
Venezuela	O_1	A_{24}, A_{32}	-

Note: Chile, Suriname, Guyana and French Guyana are Vesicular Disease free countries.

TABLE 4. Strains used for production of foot-and-mouth disease vaccines. South America, 1990.

Countries	Virus Strains		
	O	A	C
Argentina	O_1 Caseros-Arg/67 O_1 Campos-Br/58	A_{79}-Arg/79 A_{81}-Arg/87	C_3 Arg/85
Brazil	O_1 Campos-Br/58	A_{24} Cruzeiro-Br/55 A_{79} Venceslau-Br/76	C_3 Indaial-Br/71
Colombia	O_1 Campos-Br/58	A_{24} Cruzeiro-Br/55	-
Ecuador	O_1 Campos-Br/58	A_{24} Cruzeiro-Br/55	-
Paraguay	O_1 Campos-Br/58	A_{24} Cruzeiro-Br/55	C_3 Resende-Br/55
Peru	O_1 Urubamba-Peru/63	A_{24} Cruzeiro-Br/55	C_3 Resende-Br/55
Uruguay	O_1 Campos-Br/58	A_{24} Cruzeiro-Br/55	C_3 Resende-Br/55
Venezuela	O_1 Campos-Br/58	A_{24} Cruzeiro-Br/55	-

Source: Data from National Veterinary Services and Laboratory of Reference.

Note: Chile, Surinam, Guyana and French Guyana are Vesicular Disease free countries.

TABLE 5. Virus types whose monthly frequency, regregistered by affected herds and by vesicular disease, was markedly greater than the expected frequencies.
South America, 1990.

Month	Argentina	Bolivia	Brazil	Colombia	Ecuador	Paraguay	Peru/b	Uruguay	Venezuela
January	A		C	O,A,NJ,I	O,A	O			O,A,NJ
February			I	O,A,NJ,I	O				A
March	O		C,I	O,A,NJ,I	O,NJ				
April	O,A	O,A	C,I	O,A,NJ,I	O				O,A
May	O		C,I	O,A,NJ,I					
June			C	A,NJ,I	O,NJ				
July			C	A,NJ,I	O,A	O			A,NJ
August	A			NJ,I	O	O			A,NJ
September	O			O,NJ,I	O	O			O,A,NJ
October	O			O,NJ,I	O,A	O			A,NJ
November			O	O,NJ,I	O,A,NJ	O			A,NJ
December	O,A		O	O,NJ,I		O			NJ

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Diseasesse-free-countries.
/b PER - No information on monthly distribution.

TABLE 6. Vesicular disease morbidity in cattle.
South America, 1991.

Country	Herds/a		Population /a				Rates			
	Total	Affected	Total (x 1000)	In affected herds	Diseased	Deaths	Affected Herds (0/00)	Population Morbidity (0/000)	Internal Morbidity (0/0)	Lethality (0/0)
Argentina	277,269	233	58,184.0	164,666	11,369	61	0.84	1.95	6.90	0.54
Bolivia	50,021	15	2,656.7	3,951	298	1	0.30	1.12	7.54	0.34
Brazil	1,589,415	720	109,487.6	70,836	13,838	223	0.45	1.26	19.54	1.61
Colombia	723,753	1,272	22,141.9	149,881	11,532	96	1.76	5.21	7.69	0.83
Ecuador	251,445	115	4,114.0	9,076	2,225	18	0.46	5.41	24.52	0.81
Paraguay	228,042	56	7,449.0	16,032	1,996	46	0.25	2.68	12.45	2.30
Peru	463,182	83	3,998.3	5,820	2,128	0	0.18	5.32	36.56	0.00 ????
Uruguay	48,920	0	8,507.5	0	0	0	0.00	0.00	-	-
Venezuela	106,535	146	10,831.0	34,978	2,881	113	1.37	2.66	8.24	3.92
Total	3,738,582	2,640	227,370.0	455,240	46,267	558	0.71	2.03	10.16	1.21

Notes: /a - Covered by program.
Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.

TABLE 7. Vesicular disease morbidity in swine.
South America, 1991.

Country	Population				Rates		
	Total (x 1000)	In affected herds	Diseased	Deaths	Population morbidity (0/000)	Internal morbidity (0/0)	Lethality (0/0)
Argentina	5,374.5	1,966	134	22	0.25	6.82	16.42
Bolivia	2,126.5	400	400	0	1.88	100.00	0.00
Brazil	32,120.9	10,380	2,744	241	0.85	26.44	8.78
Colombia	2,187.0	5,153	756	103	3.46	14.67	13.62
Ecuador	2,092.1	121	36	2	0.17	29.75	5.56
Paraguay	993.0	147	42	16	0.42	28.57	38.10
Peru	2,400.1	197	29	12	0.12	14.72	41.38
Uruguay	230.0	0	0	0	0.00	-	-
Venezuela	2,639.5	4,493	127	66	0.48	2.83	51.97
Total	50,163.6	22,857	4,268	462	0.85	18.67	10.82

Notes: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.

TABLE 8. Vesicular disease morbidity in sheep.
South America, 1991.

Country	Population				Rates		
	Total (x 1000)	In affected herds	Diseased	Deaths	Population Morbidity (0/000)	Internal Morbidity (0/0)	Lethality (0/0)
Argentina	22,096.0	17,048	174	4	0.08	1.02	2.30
Bolivia	9,413.1	40	0	0	0.00	0.00	-
Brazil	20,084.9	3,384	185	36	0.09	5.47	19.46
Colombia	1,527.9	1,590	61	3	0.40	3.84	4.92
Ecuador	1,329.0	4	4	0	0.03	100.00	0.00
Paraguay	456.0	2	2	0	0.04	100.00	0.00
Peru	12,256.9	0	0	0	0.00	-	-
Uruguay	25,941.0	0	0	0	0.00	-	-
Venezuela	363.8	0	0	0	0.00	-	-
Total	93,468.6	22,068	426	43	0.05	1.93	10.09

Notes: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.

TABLE 9. Vesicular disease morbidity in goats.
South America, 1991.

Country	Population				Rates		
	Total (x 1000)	In affected herds	Diseased	Deaths	Population Morbidity (0/000)	Internal Morbidity (0/0)	Lethality (0/0)
Argentina	3,100.0 /1	681	22	2	0.07	3.23	9.09
Bolivia	1,226.7	25	0	0	0.00	-	-
Brazil	11,312.7	132	78	8	0.07	59.09	10.26
Colombia	1,237.3	318	11	0	0.09	3.46	0.00
Ecuador	298.0	20	12	6	0.40	60.00	50.00
Paraguay	148.0	0	0	0	0.00	-	-
Peru	1,721.7	0	0	0	0.00	-	-
Uruguay	12.0 /1	0	0	0	0.00	-	-
Venezuela	1,285.4	45	13	0	0.10	28.89	0.00
Total	20,341.8	1,221	136	16	0.07	11.14	11.76

Notes: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.
/1 ARG,URU - Figures taken from the country's report to COSALFA, XV.

TABLE 10. Vesicular disease morbidity in horses.
South America, 1991.

Country	Population				Rates		
	Total (x 1000)	In affected herds	Diseased	Deaths	Populational Morbidity (0/000)	Internal Morbidity (0/0)	Lethality (0/0)
Argentina	3,071.0	0	0	0	0.00	-	-
Bolivia	904.1	0	0	0	0.00	-	-
Brazil	9,259.3	19	3	0	0.00	15.79	0.00
Colombia	2,365.0	4,916	223	0	0.94	4.54	0.00
Ecuador	427.0	123	8	0	0.19	6.50	0.00
Paraguay	334.0	0	0	0	0.00	-	-
Peru	1,325.0	132	52	0	0.39	39.39	0.00
Uruguay	437.0	0	0	0	0.00	-	-
Venezuela	571.7	0	0	0	0.00	-	-
Total	18,694.1	5,190	286	0	0.15	5.51	0.00

Notes: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.

TABLE 11. Monthly distribution of Vesicular Disease affected herds. South America, 1991.

Country	Months												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total
Argentina	33	18	16	14	20	20	19	18	21	34	5	16	234
Bolivia /1	0	0	0	7	0	0	5	3	1	0	0	0	16
Brazil	52	27	14	100	147	87	51	29	40	30	75	76	728
Colombia /2	348	212	135	63	53	64	91	95	84	82	148	100	1,475
Ecuador	26	18	10	9	3	4	11	3	5	9	9	9	116
Paraguay	1	0	0	1	3	1	8	7	16	8	6	6	57
Peru	11	7	16	6	4	21	0	0	0	0	24	0	89
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	20	10	8	14	1	0	18	19	14	19	23	6	152
Total	491	292	199	214	231	197	203	174	181	182	290	213	2,867

Notes: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.
culares.
/1 BOL -Includes 5 outbreaks without epidemiological information, of which three occurred in the area not covered by the official program.
/2 COL -Includes 143 outbreaks without identification of affected species.

TABLE 12. Monthly distribution of FMD affected herds. Virus type "O".
South America, 1991.

	Months												
Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total
Argentina	1	0	2	7	3	3	3	1	8	7	0	2	37
Bolivia	0	0	0	2 /a	0	0	0	0	0	0	0	0	2
Brasil	0	1	1	2	0	2	1	2	0	0	15	14	38
Colombia	14	8	5	2	3	4	1	8	11	7	8	3	74
Ecuador	3	2	1	2	0	1	5	2	1	1	1	0	19
Paraguay	1	0	0	0	0	0	5	5	8	3	4	1	27
Peru	...	...	...	...	...	...	...	...	...	...	...	...	2
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	0	1	0	0	1	1	1	1	1	0	6
Total	19	11	9	16	6	10	16	19	29	19	29	20	203

Notes: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.

/a BOL -Samples for diagnosis only. Without epidemiological information.
/b PER -No information on monthly distribution.

TABLE 13. Monthly distribution of FMD affected herds. Virus type "A". South America, 1991.

Country	Months												
	Jan	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total
Argentina	2	3	1	3	7	6	8	10	2	11	1	6	60
Bolivia	0	0	0	2 /a	0	0	0	0	0	0	0	0	2
Brazil	0	0	0	4	3	1	2	1	4	2	1	0	18
Colombia	33	9	23	11	3	11	7	3	4	3	5	1	113
Ecuador	1	0	0	0	0	0	1	0	0	1	2	0	5
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	0	0
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	5	2	0	2	0	0	2	2	1	1	1	0	16
Total	41	14	24	22	13	18	20	16	11	18	10	7	214

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.
/a BOL -Samples for diagnosis only. Without epidemiological information.

TABLE 14. Monthly distribution of FMD affected herds. Virus type "C". South America, 1991.

Country	Months												
	Jan	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total
Argentina	0	0	1	0	1	0	0	0	0	0	0	0	[illegible]
Bolivia	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	6	1	3	14	26	12	2	0	0	0	0	0	64
Colombia	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	0	0	0	0	0	0
Peru	0	0	0	0	0	0	0	0	0	0	0	0	0
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	6	1	4	14	27	12	2	0	0	0	0	0	66

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.

TABLE 15 Monthly distribution of Vesicular Stomatitis affected herds. New Jersey type. South America, 1991.

Country	Months												
	Jan	Feb	Mar	Abr	May	Jun	Jul	Ago	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	63	44	25	13	10	19	26 /a	20	13	23	50	19	325
Ecuador	0	0	1	0	0	1	0	0	0	0	1	0	3
Paraguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Peru	...	...	...	...	...	...	...	...	...	...	...	...	2
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	1	0	0	0	0	0	1	1	1	1	9	2	16
Total	64	44	26	13	10	20	27	21	14	24	60	21	344

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Diseases-free countries
/a COL -Includes 1 outbreak in which different samples were identified as the New Jersey and Indiana viruses.
/b PER -No information on monthly distribution.

TABLE 16. Monthly distribution of Vesicular Stomatitis affected herds. Indiana type. South America, 1991.

Country	Months												
	Jan	Feb	Mar	Abr	May	Jun	Jul	Ago	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	3	1	5	1	0	0	0	0	0	0	0	10
Colombia	82	95	40	10	6	3	20	9	10	22	37	36	370
Ecuador	0	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	82	98	41	15	7	3	20	9	10	22	37	36	380

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.

TABLE 17. Monthly distribution of cattle herds affected by Vesicular Diseases South America, 1991.

Country	Months												
	Jan	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total
Argentina	33	18	15	14	20	20	19	18	21	34	5	16	233
Bolivia /1	0	0	0	7	0	0	5	3	0	0	0	0	15
Brazil	52	27	14	100	147	87	43	29	40	30	75	76	720
Colombia	283	199	119	50	38	60	84	89	76	70	128	76	1,272
Ecuador	26	18	10	9	3	3	11	3	5	9	9	9	115
Paraguay	1	0	0	1	3	1	8	6	16	8	6	6	56
Peru	9	7	16	6	4	17	0	0	0	0	24	0	83
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	19	10	7	14	1	0	18	18	13	18	22	6	146
Total	423	279	181	201	216	188	188	166	171	169	269	189	2,640

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.
/1 BOL -Includes 5 outbreaks without epidemiological information; three occurred in the area not covered by the official program.

TABLE 18. Monthly distribution of cattle herds affected by FMD.
Virus type "O". South America, 1991.

Country	Months												
	Jan	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total
Argentina	1	0	2	7	3	3	3	1	8	7	0	2	37
Bolivia	0	0	0	2 /a	0	0	0	0	0	0	0	0	2
Brazil	0	1	1	2	0	2	1	2	0	0	15	14	[illegible]
Colombia	12	8	5	2	2	4	1	8	10	7	8	3	70
Ecuador	3	2	1	2	0	1	5	2	1	1	1	0	19
Paraguay	1	0	0	0	0	0	5	4	8	3	4	1	26
Peru	...	...	...	...	...	...	...	...	...	...	...	...	[illegible]
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	5	2	0	2	0	0	2	1	1	1	1	0	15
Total	22	13	9	17	5	10	17	18	28	19	29	20	207

Notes: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.
/a BOL -Samples for diagnosis only. Without epidemiological information.
/b PER -No information on monthly distribution.

TABLE 19.Monthly distribution of cattle herds affected by FMD.
Virus type "A". South America, 1991.

Country	Months												
	Jan	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total
Argentina	2	3	1	3	7	6	8	10	2	11	1	6	60
Bolivia	0	0	0	2 /a	0	0	0	0	0	0	0	0	2
Brazil	0	0	0	4	3	1	2	1	4	2	1	0	19
Colombia	33	9	22	11	3	10	7	3	4	3	5	1	111
Ecuador	1	0	0	0	0	0	1	0	0	1	2	0	5
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	0	0
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	5	2	0	2	0	0	2	1	1	1	1	0	15
Total	41	14	23	22	13	17	20	15	11	18	10	7	211

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.
/A BCL - Samples for diagnosis only. No epidemiological information.

TABLE 20. Monthly distribution of cattle herds affected by FMD. Virus type "C". South America, 1991.

Country	Months												
	Jan	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total
Argentina	0	0	1	0	1	0	0	0	0	0	0	0	2
Bolivia	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	6	1	3	14	26	12	2	0	0	0	0	0	64
Colombia	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	0	0	0	0	0	0
Peru	0	0	0	0	0	0	0	0	0	0	0	0	0
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	6	1	4	14	27	12	2	0	0	0	0	0	66

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.

TABLE 21. Monthly distribution of cattle herds affected by Vesicular Stomatitis. New Jersey type. South America, 1991.

Country	Months												
	Jan	Feb	Mar	Abr	May	Jun	Jul	Ago	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	60	42	25	13	9	19	24 /a	20	12	17	49	16	306
Ecuador	0	0	1	0	0	1	0	0	0	0	1	0	3
Paraguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Peru	...	...	...	...	...	...	...	...	...	...	...	...	2
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	0	0	0	0	1	1	1	0	9	2	14
Total	60	42	26	13	9	20	25	21	13	17	59	18	323

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.
/a COL -Includes 1 outbreak in which different samples were identified as New Jersey and Indiana viruses.
/b PER -No information on monthly distribution.

TABLE 22. Monthly distribution of cattle herds affected by Vesicular Stomatitis. Indiana type. South America, 1991.

Country	Months												
	Jan	Feb	Mar	Abr	May	Jun	Jul	Ago	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
Brasil	0	3	1	5	1	0	0	0	0	0	0	0	10
Colombia	80	93	39	10	6	3	19	9	10	21	37	36	363
Ecuador	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Perú	0	0	0	0	0	0	0	0	0	0	0	0	0
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	80	96	40	15	7	3	19	9	10	21	37	36	373

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.

TABLE 23. Monthly distribution of affected cattle by vesicular diseases. South America, 1991.

	Months												
Country	Jan	Feb	Mar	Abr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Total
Argentina	2,200	1,338	384	539	829	1,069	712	718	651	2,400	86	443	11,369
Bolivia	0	0	0	266	0	0	21	11	0	0	0	0	298
Brazil	1,427	754	1,423	1,695	1,766	1,502	1,268	362	487	153	2,992	9	13,838
Colombia	2,127	723	1,126	489	486	940	883	942	1,480	645	1,134	557	11,532
Ecuador	764	243	89	260	61	86	327	32	38	122	167	36	2,225
Paraguay	147	0	0	15	112	10	430	396	324	246	52	264	1,996
Peru	350	124	400	231	82	352	0	0	0	0	589	0	2,128
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	126	74	58	105	0	0	904	167	639	728	65	15	2,881
Total	7,141	3,256	3,480	3,600	3,336	3,959	4,545	2,628	3,619	4,294	5,085	1,324	46,267

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Disease-free countries.

TABLE 24. Number of Vesicular Stomatitis affected herds by country and virus type. Central America and Mexico, 1991.

Country	Vesicular Stomatitis		No Diagnosis (a)	Total
	New Jersey	Indiana		
Belice	0	0	2	2
Costa Rica	12	2	14	28
El Salvador	47	8	53	108
Guatemala	11	0	10	21
Honduras	23	0	32	55
Mexico	18	0	38	56
Nicaragua	9	0	5	14
Panama	3	0	5	8
Total	123	10	159	292

Notes: a - With clinical-epidemiological and/or NEGATIVE result.

TABLE 25. Coverage of FMD control programs.
South America, 1991.

Country	Area (Km2)		Cattle Herds		Cattle Population (x 1000)	
	Total	Under Program	Total	Under Program	Total	Under Program
Argentina	2,779,892	2,779,892	277,269	277,269	58,184.0	58,184.0
Bolivia	1,098,581	487,266	98,139	50,021	5,475.9	2,656.7
Brazil	8,508,832	3,910,709	1,935,501	1,589,415	140,846.0	109,487.6
Chile	757,720	757,720	189,044	189,044	3,336.2	3,336.2
Colombia	1,141,748	846,154	726,609	723,753	22,301.7	22,141.9
Ecuador	274,168	274,168	251,445	251,445	4,114.0	4,114.0
Paraguay	406,752	406,752	228,042	228,042	7,449.0	7,449.0
Peru	1,285,215	1,285,215	463,182	463,182	4,102.3	4,102.3
Uruguay	160,737	160,737	48,290	48,290	8,507.5	8,507.5
Venezuela	912,050	912,050	106,535	106,535	10,831.0	10,831.0
Total	17,325,695	11,820,663	4,324,056	3,926,996	265,147.6	230,810.2

TABLE 26. Foot-and-mouth disease vaccination. Number of vaccinated animals. South America, 1991.

Country	Systematic Vaccination					Strategical-tactical Vaccinations		
	Cattle (x 1000)			Sheep/Goats				
	3 Doses	2 Doses	1 Dosis	Nº of Animals (x 1000)	Fraction of dosis	Cattle	Swine	Sheep/ /Goats
Argentina	20,865.0	33,273.0	0.0	1,480.5	...	306,000	300	33,300
Bolivia	0.0	28.9	110.4	0.0	-	18,002	0	0
Brazil	32,515.0	23,889.2	17,969.0	32.1	...	372,861	22,000	0
Colombia	0.0	18,789.0	3.8	0.0	-	684,862	0	0
Ecuador	154.8	261.3	609.7	0.0	-	0	0	0
Paraguay	1,715.4	1,006.2	2,285.3	0.0	-	9,647	0	0
Peru	0.0	0.0	0.0	0.0	-	583,355	35,850	0
Uruguay	0.0	7,612.9	618.8	...	...	0	0	...
Venezuela	0.0	3,738.0	0.0	0.0	-	0	0	0

Note: Chile, Surinam, Guyana, and French Guyana are Vesicular Diseases-free countries.
... Data not available.

TABLE 27. Production, control, international commercialization and availability of FMD vaccine in dose x 1000 by country. South America, 1991.

Country	Type of Vaccine	Produced	Controlled	Approved	Exported	Imported	Available
Argentina	Oil	68,291.1	68,291.1	58,344.3	0.0	0.0	58,344.3
	Saponin	58,293.5	58,293.5	49,421.4	0.0	0.0	49,421.4
	Total	126,584.6	126,584.6	107,765.7	0.0	0.0	107,765.7
Bolivia	Oil	0.0	0.0	0.0	0.0	...	...
	Saponin	0.0	0.0	0.0	0.0	...	...
	Total	0.0	0.0	0.0	0.0	...	...
Brazil	Oil	105,490.9	105,490.9	99,572.5	130.0	0.0	117,702.4 *
	Saponin	84,469.6	84,469.6	78,662.5	2,026.9	0.0	78,708.3 *
	Total	189,960.5	189,960.5	178,235.0	2,156.9	0.0	196,410.7
Colombia	Oil	19,256.9	24,068.8 **	22,463.8 /a	993.0	6.9	21,477.7
	Saponin	0.0	0.0	0.0	0.0	0.0	0.0
	Total	19,256.9	24,068.8	22,463.8	993.0	6.9	21,477.7
Ecuador	Oil	0.0	0.0	0.0	0.0	1,006.2	1,132.3 *
	Saponin	154.8	154.8	154.8	0.0	0.0	154.8
	Total	154.8	154.8	154.8	0.0	1,006.2	1,287.1
Paraguay	Oil	9,409.1	9,409.1	9,381.7	773.7	801.0 /b	9,409.0
	Saponin	1,030.0	1,030.0	1,029.0	0.0	0.0	1,029.0
	Total	10,439.1	10,439.1	10,410.7	773.7	801.0	10,438.0
Perú	Oil	444.1	444.1	444.1	0.0	150.0	594.1
	Saponin	0.0	0.0	0.0	0.0	0.0	0.0
	Total	444.1	444.1	444.1	0.0	150.0	594.1
Uruguay	Oil	21,574.6	21,574.6	20,525.0	862.1	2,810.4	22,473.3
	Saponin	647.2	647.2	644.0	445.0	0.0	199.0
	Total	22,221.8	22,221.8	21,169.0	1,307.1	2,810.4	22,672.3
Venezuela	Oil	3,000.0	3,000.0	3,000.0	0.0	4,800.0	7,800.0
	Saponin	0.0	0.0	0.0	0.0	0.0	0.0
	Total	3,000.0	3,000.0	3,000.0	0.0	4,800.0	7,800.0
Total		227,466.7	232,278.6	213,731.4	2,758.8	9,574.5	238,983.1 /1
	Saponin	144,595.1	144,595.1	129,911.7	2,471.9	0.0	129,512.5
	Total	372,061.8	376,873.7	343,643.1	5,230.7	9,574.5	368,495.6

Notes: * Includes vaccine stocks as of 31 December 1990.
** Includes vaccine batches produced in 1990 and controlled in 1991.
/a There are also 1,605.000 doses pending on results.
/b Includes 1.000 doses to be administered in swine.
/1 Includes 50,000 vaccine doses in stock at the PAFMDC for use in the event that an emergency situation may occur in CHILE.
... Data not available.

TABLE 28. Inventory of human resources/a. Foot-and-mouth disease program. South America, 1990-1991.

Countries	1990				1991			
	Total	Central	Laboratory	Field	Total	Central	Laboratory	Field
Argentina	1,409	57	35	1,317 /1	1,012	45	32	935
Bolivia	135	26	45	64	126	28	38	60
Brazil	6,190	55	155	5,980	9,403	51	114	9238 /2
Chile /3	115	4	5	106	112	4	5	103
Colombia	891	22 /4	16 /5	853 /6	891	22 /4	16 /5	853 /6
Ecuador	334	35	...	299	330	35	...	295
Paraguay	499	175	43	281	505	193	35	277
Peru	520	2	...	518	426	3	...	423
Uruguay	417	11	60	346	496	22	35	439
Venezuela	400	15	...	385	400	15	...	385
Total	10,910	402	359	10,149	13,701	418	275	13,008

Notes: a/ In some countries, personnel does not work exclusively in FMD programs

/1 ARG - Does not include 1,499 vaccination agents and 389 Veterinarians contracted specifically to work in official vaccination programs.

/2 Includes 2,452 Technical Assistants on part-time basis.

/3 CHI - Includes Veterinarians and Agricultural Technicians contracted for service in control of summer grazing lands. Does not include technical assistants carrying out inspection duties on imports at seaports, airports, and frontier posts.

/4 COL - Six staff members work full time; the remaining 40% of the time for FMD programs.

/5 COL - LANIP and CEISA staff working full time in the programs.

/6 COL - Includes Animal Health staff participating at least 30% of the time in specific FMD activities.

...Data not available.

TABLE 29. Foot-and-mouth disease control program resources/a.
South America, 1991.

Country	Operating field units	Human Resources					
		Professionals			Others		
		Central	Lab.	Field	Central	Lab.	Field
Argentina	298	18	9	199	27	23	736
Bolivia	16	8	15	26	20	23	34
Brazil	1,780	24	27	1,778	27	87	7,460 /1
Chile /2	56	2	2	39	2	3	64
Colombia /3	140 *	10	7	167	12	9	686
Ecuador	64	10	...	78	25	...	217
Paraguay	47 /4	47	21	67	146	14	210
Peru	163	1	...	79	2	...	344
Uruguay	44	16	9	71	6	26	368
Venezuela	150	11	...	177	4	...	208
Total	2,758	147	90	2,681	271	185	10,327

Notes: /a In some countries, staff are not assigned exclusively to FMD programs.
/* Refers to offices reporting on animal health events.
/1 Includes 2,452 Technical Assistants on part-time basis.
/2 Includes Veterinarians and Agricultural technicians contracted for inspection duties of imports at seaports, airports, and frontier posts.
/3 As to human resources at headquarters, six staff members work full-time with the FMD programs while the rest dedicated approximately 40% of their time. In the field Animal Health staff dedicate 30% of their time to specific FMD activities. Laboratory staff were from LANIP and CEISA, working full-time with the FMD programs.
/4 Data obtained from the report of the country to COSALFA XVIII.

... Data not available.

TABLE 30. Vehicle inventories. FMD Control Programs.
South America, 1990-1991.

Country	1990				1991			
	Total Area Km2	Total	Cars	Motorcycles	Total Area Km2	Total	Cars	Motorcycles
Argentina	2,779,896	748	748	0	2,779,892	631	631	0
Bolivia	487,266	25	24	1	487,266	25	24	1
Brazil	4,019,501	1,726	1,698	28	3,910,709	1,708	1550	158
Chile	757,820	18	18	0	757,120	18	18	0
Colombia	846,154	404 /1	162	242	846,154	424 /2	162	262
Ecuador	267,000	32	...	...	274,168	32	...	...
Paraguay	406,752	71	27	44	406,752	78	39	39
Peru	1,282,120	240	62	178	1,285,215	288	60	228
Uruguay	160,737	156	87	69	160,737	236	97	139
Venezuela	912,050	314	314	0	912,050	314	314	0
Total	11,919,206	3,734	3,140	562	11,820,063	3,754	2,895	827

Notes: /1 COL - 60 pick-up trucks and 180 motorcycles were assigned to the ICA-USDA Cooperative Programs. The rest of vehicles were privately-owned by FMD program staff.
/2 COL - 60 pick-up and 200 motorcycles are assigned to the ICA-USDA Cooperative Program. The rest of vehicles were privately-owned by FMD program staff.

TABLE 31. Private and public expenditures (000 Us$). FMD Program. South America, 1991.

Country	Total	Public			Private
		Operating	Capital	Total	
Argentina	...	...	...	...	...
Bolivia	254.8	223.0	0.0	223.0	31.8
Brazil	54,377.4	4,429.0	960.1 /1	5,389.1 /2	48,988.3 /#
Chile	488.1	446.0 /3	22.1	468.1	20.0 /4
Colombia	12,953.4	2,828.6	83.3	2,911.9	10,041.5 /*
Ecuador	909.3	572.3	80.0	652.3	257.0 /#
Paraguay	...	2,342.7	1,414.0	3,756.7	...
Peru	382.0	345.0	0.0	345.0	37.0 /#
Uruguay	...	...	...	...	...
Venezuela	4,576.1	284.0	255.0	539.0	4,037.1 /*
Total	73,941.1	11,470.6	2,814.5	14,285.1	63,412.7

Notes: /* Refers to expenses associated with the purchase and administering of vaccines.

/# Purchase of vaccine. Does not include the cost of administering vaccines.

/1 BRA - Expenditures by the Central Government. There is no information on state expenditures.

/2 - Partial data for some states.

/3 CHI - Include US$ 120,000 costs for the indemnization of summer grazing land owners due to their prohibition for using it and also for salary payment to veterinarians and agricultural technicians temporarily hired for the control of summer grazing lands.

/4 CHI - Payment for 50.000 monovalent FMD 01 doses maintained at PAFMDC for emergency situations.

...Data not available.

TABLE 32. Cattle, meat, milk, semen and embryos imports. South America, 1991.

Importing Country	Country of Origin	Number of cattle	Semen (doses)	Embryos	Meat (m.t.)	Milk (m.t.)
Argentina	CANADA	35	20,044	226	-	-
	USA	18	88,726	66	-	-
Bolivia	USA	-	6,000	-	-	-
	URUGUAY	10,773	-	-	-	-
Brazil	GERMANY	335	58,778	1,628	-	-
	ARGENTINA	2,223	3,100	72	-	-
	AUSTRIA	-	-	86	-	-
	AUSTRALIA	-	1,000	-	-	-
	BOLIVIA	27,540	-	-	-	-
	CANADA	474	88,529	836	-	-
	USA	1,063	511,020	2,453	-	-
	FRANCE	-	59,520	317	-	-
	GUYANA	500	-	-	-	-
	ITALY	16	49,600	-	-	-
	NEW ZEALAND	-	500	-	-	-
	PARAGUAY	37,200	-	-	-	-
	SWIZTERLAND	-	12,135	-	-	-
	URUGUAY	3,631	-	-	-	-
Chile	...	...	...	...	...	...
Colombia	GERMANY, ARGENTINA, USA & CANADA,	291	-	-	-	-
	GERMANY, ARGENTINA, CANADA, USA & NEW ZEALAND	143,124	-	-	-	-
	USA	-	-	-	78.0	-
	IRELAND	-	-	-	0.1	-
	VENEZUELA	-	-	-	1,439.0 /1	-
Ecuador	CANADA	-	690	-	-	-
	COLOMBIA	13	200	-	-	-
	CUBA	-	-	100	-	-
	USA	75	38,870	-	-	-
	FRANCE	-	2,000	-	-	-

continues

TABLE 32. Cattle, meat, milk, semen and embryos imports.
South America, 1991.

continuation

Importing Country	Country of Origin	Number of cattle	Semen (doses)	Embryos	Meat (m.t.)	Milk (m.t.)
Paraguay	GERMANY	-	7,000	-	-	-
	ARGENTINA	288	1,760	-	-	-
	BRAZIL	29	-	-	-	-
	CANADA	-	3,960	-	-	-
	USA	2	26,525	301	-	-
	FRANCE	-	3,000	-	-	-
Peru	GERMANY	-	164	-	-	1,893.0
	ARGENTINA	-	-	-	1,428.7	2,846.0
	AUSTRALIA	-	-	-	-	853.0
	BELGIUM	-	-	-	197.0	-
	BOLIVIA	1,000	-	-	240.0	-
	BRAZIL	360	-	-	76.0	-
	CANADA	-	-	-	-	6,021.0
	COLOMBIA	39	-	-	228.0	320.0
	CHILE	-	-	-	642.5	1,193.0
	DENMARK	-	-	-	-	30.0
	ECUADOR	3,024	-	-	-	-
	USA	3,070	-	-	-	-
	SPAIN	-	-	-	-	4.7
	FRANCE	-	-	-	-	1,509.0
	NETHERLANDS	-	-	-	-	2,229.0
	ENGLAND	-	-	-	-	1,574.0
	IRELAND	-	-	-	-	932.0
	ITALY	-	-	-	-	125.0
	NEW ZEALAND	-	-	-	-	9,845.0
	PARAGUAY	-	-	-	507.2	-
	PORTUGAL	-	-	-	-	250.0
	POLAND	-	-	-	-	369.0
	URUGUAY	-	-	-	156.8	1,419.0
Uruguay	ARGENTINA	804	3,560	-	-	-
	BRAZIL	26	-	-	-	-
	CANADA	19	13,090	8	-	-
	USA	3	28,355	31	-	-
	PARAGUAY	11	-	-	-	-
	NEW ZEALAND	-	2,000	-	-	-

continues

TABLE 32. Cattle, meat, milk, semen and embryos imports.
South America, 1991.

continuation

Importing Country	Country of Origin	Number of cattle	Semen (doses)	Embryos	Meat (m.t.)	Milk (m.t.)
Venezuela	GERMANY	-				
	ARGENTINA	-				
	BELGIUM	-	-	-	-	5,090.0
	CANADA	-	1,520	-	-	-
	COLOMBIA	66,570	-	-	-	-
	DENMARK	-	-	-	-	12,111.0
	USA	161	67,806	-	-	-
	FRANCE	-	-	-	-	2,558.0
	UNITED KINGDOM	-	-	-	-	520.0
	NETHERLANDS	-	-	-	-	12,349.0
	ENGLAND	-	-	-	-	3,198.0
	IRELAND	-	-	-	-	4,024.0
	NEW ZEALAND	-	-	-	-	10,000.0

Notes: /1 COL - Meat flour

TABLE 33. Swine, semen and meat imports.
South America, 1991.

Importing Country	Country of Origin	Number of Pigs	Semen (doses)	Meat (m.t.)
Argentina	CHILE	42	-	-
Bolivia	-	-	-	-
Brazil	GERMANY	82	1,010	-
	CANADA	-	100	-
	USA	45	-	-
	UNITED KINGDOM	37	-	-
	URUGUAY	7	-	-
Chile	...	...	...	...
Colombia	CANADA	85	-	-
Ecuador	USA	286	-	-
Paraguay	BRAZIL	44	-	-
Peru	USA	20	55,070	-
Uruguay	BRAZIL	71	-	-
Venezuela	CANADA	80	-	-
	USA	798		

TABLE 34. Sheep, semen and embryos imports.
South America, 1991.

Importing Country	Country of Origin	Number of Sheeps	Semen (doses)	Embryos
Argentina	AUSTRALIA	1	3,100	18
	CHILE	23,400	-	-
	NEW ZEALAND	4	1,000	-
Bolivia	-	-	-	-
Brazil	ARGENTINA	10	-	-
	AUSTRALIA	1	-	-
	FRANCE	28	-	-
	CANADA	135	-	-
	USA	80	-	-
	GUYANA	250	-	-
	NEW ZEALAND	54	-	-
		3,986	-	-
Chile	...	...	...	...
Colombia	-	-	-	-
Ecuador	-	-	-	-
Paraguay	ARGENTINA	321	-	-
	BRAZIL	119	-	-
	URUGUAY	2,865	-	-
Peru	-	-	-	-
Uruguay	ARGENTINA	39	-	-
	AUSTRALIA	-	1,200	-
	BRAZIL	3	-	-
Venezuela	-	-	-	-

TABLE 35. Goats and semen imports.
South America, 1991.

Importing Country	Country of Origin	Number of Goats	Semen (doses)
Argentina	-	-	-
Bolivia	-	-	-
Brazil	GERMANY	19	-
	UNITED KINGDOM	3	
	SWITZERLAND	2	-
Chile	-	-	-
Colombia	-	-	-
Ecuador	-	-	-
Paraguay	-	-	-
Peru	CANADA	11	1,925
Uruguay	ARGENTINA	70	-
	BRAZIL	11	-
Venezuela	-	-	-

TABLE 36. Horses, semen and meat imports.
South America, 1991.

Importing Country	Country of Origin	Number of Horses	Semen (doses)	Meat (m.t.)
Argentina	GERMANY	16	-	-
	BELGIUM	2	-	-
	BOLIVIA	2	-	-
	BRAZIL	25	-	-
	CHILE	13	-	-
	CUBA	5	-	-
	USA	74	-	-
	FRANCE	11	-	-
	ENGLAND	3		
	URUGUAY	2,106	-	-
Bolivia	ARGENTINA	-	-	-
Brazil	GERMANY	23	-	-
	ARGENTINA	143	-	-
	BELGIUM	14	-	-
	CHILE	30	-	-
	DENMARK	14	-	-
	USA	428	-	-
	FRANCE	9	-	-
	PERU	2	-	-
	POLAND	3	-	-
	UNITED KINGDOM	18	-	-
	URUGUAY	1,917	-	-
	VENEZUELA	7	-	-
Chile	...	...	...	...
Colombia	GERMANY, ARGENTINA, CHILE, CUBA, ECUADOR, USA, MEXICO, PERU & VENEZUELA	245	-	-
Ecuador	GERMANY	9	-	-
	ARGENTINA	6	-	-
	CHILE	19	-	-
	COSTA RICA	1	-	-

continues

TABLE 36. Horses, semen and meat imports.
South America, 1991.

continuation

Importing Country	Country of Origin	Number of Horses	Semen (doses)	Meat (m.t.)
Paraguay	ARGENTINA	412	-	-
	BRAZIL	80	-	-
	URUGUAY	845	-	-
Peru	-	-	-	-
Uruguay	ARGENTINA	111	-	-
	BRAZIL	67	-	-
	USA	1	-	-
	FRANCE	2	-	-
	ENGLAND	1	-	-
	PARAGUAY	11	-	-
	VENEZUELA	6	-	-
Venezuela	ARGENTINA	78	-	-
	COLOMBIA	83	-	14,006
	USA	369	-	-
	ENGLAND	12	3,090	-

TABLE 37. Cattle, meat, milk, semen and embryos exports.
South America, 1991.

Exporting Country	Importing Country	Number of Cattle	Semen (doses)	Embryos	Meat (m.t.)	Milk (m.t.)
	ARGELIA	-	-	-	-	
Argentina	BOLIVIA	255	2,600	32	-	-
	BRAZIL	1,549	100	-	-	-
	CHILE	-	-	-	-	510
	PARAGUAY	443	1,000	-	-	-
	PERU	-	-	-	-	9,965
	URUGUAY	794	2560	-	-	-
	VENEZUELA	-	-	-	-	500
Bolivia	BRAZIL	61,051	-	-	-	-
Brazil	...	...	...	...	...	...
Chile	ARGENTINA	-	-	-	-	298.0
	BOLIVIA	40	-	-	-	84.0
	CUBA	-	-	-	0.2	-
	FALKLANDS/MALVINAS	-	-	-	18.0	-
	PARAGUAY	-	-	-	-	8.0
	PERU	-	-	-	-	436.0
	SWEDEN	-	-	-	-	3.0
	TAHITI	-	-	-	*	-
	URUGUAY	-	-	-	-	3.0
Colombia	NETHERLANDS ANTILLES	-	22	-	30.0	-
	ARUBA	-	-	-	131.0	-
	CURACAO	-	-	-	1,470.0	-
	ECUADOR, PERU AND VENEZUELA	89,291	-	-	-	-
	PERU	-	-	-	5,385.0	-
	VENEZUELA	18,737	-	-	-	-
Ecuador	PERU	9	-	-	-	-

continues

TABLE 37. Cattle, meat, milk, semen and embryos exports.
South America, 1991. continuation

Exporting Country	Importing Country	Number of Cattle	Semen (doses)	Embryos	Meat (m.t.)	Milk (m.t.)
Paraguay	NETHERLANDS ANTILLES	-	-	-	-	19.1
	SAUDI ARABIA	-	-	-	-	33.8
	BENIN	-	-	-	-	16.7
	CHINA	-	-	-	-	40.0
	CONGO	-	-	-	-	40.8
	DUBAY	-	-	-	-	33.4
	EGYPT	-	-	-	-	51.4
	FRANCE	-	-	-	-	3.0
	GHANA	-	-	-	-	*
	ISRAEL	-	-	-	-	80.0
	JORDAN	-	-	-	-	0.1
	LEBANON	-	-	-	-	234.2
	NIGER	-	-	-	-	16.7
	SWITZERLAND	-	-	-	-	51.0
	TRINIDAD	-	-	-	-	16.7
	URUGUAY	11	-	-	-	328.0
	ZAIRE	-	-	-	-	82
Peru	-	-	-	-	-	-
Uruguay	ANGOLA	-	-	-	530.2	-
	ANTIGUA	-	-	-	53.9	-
	SAUDI ARABIA	-	-	-	3,886.3	-
	ARGEL	-	-	-	1.1	-
	ARGENTINA	22	-	-	61.8	13.3
	NETHERLANDS ANTILLES	-	-	-	49.5	-
	BARBADOS	-	-	-	580.8	-
	BELIZE	-	-	-	39.6	-
	BOLIVIA	186	-	-	23.1	-
	BRAZIL	1,934	-	-	20,486.4	-
	CANADA	-	-	-	763.4	-
	CHILE	-	-	-	3,765.3	-
	CHIPRE	-	-	-	7.7	-

continues

TABLE 37. Cattle, meat, milk, semen and embryos exports.
South America, 1991. continuation

Exporting Country	Importing Country	Number of Cattle	Semen (doses)	Embryos	Meat (m.t.)	Milk (m.t.)
Uruguay	COLOMBIA	-	-	-	85.8	-
	CUBA	-	-	-	-	4,601.3
	E.E.C.	-	-	-	35,572.9	-
	DOMINICA	-	-	-	53.9	-
	USA	-	-	-	16,539.6	-
	ECUADOR	92	-	-	-	-
	EGYPT	-	-	-	215.6	-
	FINLAND	-	-	-	35.2	-
	GABON	-	-	-	3.3	-
	GRENADA	-	-	-	39.6	-
	HONG-KONG	-	-	-	2,614.7	-
	BAHAMAS	-	-	-	323.4	-
	CAYMAN	-	-	-	107.8	-
	CANARY ISLANDS	-	-	-	5,335.0	-
	FALKLANDS	-	-	-	25.3	-
	SAINT VINCENT IS.	-	-	-	53.9	-
	ISRAEL	-	-	-	27,359.2	-
	JAMAICA	-	-	-	269.5	-
	JAPAN	-	-	-	312.4	-
	MALAYSIA	-	-	-	133.1	-
	MALTA	-	-	-	1,332.1	-
	MARTINICA	-	-	-	48.4	-
	PARAGUAY	680	-	-	-	-
	PERU	-	-	-	660.0	-
	PUERTO RICO	-	-	-	849.2	-
	SANTA ELENA	-	-	-	5.5	-
	SINGAPORE	-	-	-	3,533.2	-
	SWITZERLAND	-	-	-	411.4	-
	SURINAM	-	-	-	18.7	-
	TRINIDAD AND TOBAGO	-	-	-	254.1	-
	SHIP SUPPLIES	-	-	-	2,053.7	-
Venezuela	CURACAO	62	-	-	41.4	-

Notes: *Less than 0,1 m.t.
/1 More ' 38.410.000 liters of milk

TABLE 38. Swine exports.
South America, 1991.

Exporting Country	Importing Country	Number of Swine	Meat (m.t.)
Argentina	-	-	-
Bolivia	-	-	-
Brazil	...	...	...
Chile	ARGENTINA	43	4,386.0
	SPAIN	-	122.0
	PERU	-	192.0
	MALVINAS/FALKANDS	-	0.9
	TAHITI	-	124.0
	URUGUAY	-	71.0
Colombia	ECUADOR	60	-
Ecuador	...	...	...
Paraguay	-	-	-
Peru	-	-	-
Uruguay	ARGENTINA	160	-
	BRAZIL	14	-
	PARAGUAY	4	-
Venezuela	-	-	-

TABLE 39. Sheep, meat, and milk exports.
South America, 1991.

Exporting Country	Importing Country	Number of Sheeps	Meat (m.t.)
Argentina	SAUDI ARABIA	47,513	-
	BRAZIL	3	-
	CHILE	2,514	-
	PARAGUAY	181	-
Bolivia	-	-	-
Brazil	...	...	...
Chile	WEST GERMANY	-	276.0
	SAUDI ARABIA	-	2,085.0
	ARGENTINA	121	460.0
	SPAIN	-	1,061.0
	FRANCE	-	17.0
	HOLLAND	-	147.0
	ENGLAND	-	85.0
	ITALY	-	51.0
	PERU	-	1,792.0
	URUGUAY	-	33.0
Colombia	NETHERLANDS ANTILLES	-	13.0
	CURACAO	-	359.0
Ecuador	-	-	-
Paraguay	PERU	35	347.1
Peru	-	-	-
Uruguay	SAUDI ARABIA	347,920	3522.2
	ARGEL	-	3589.3
	ARGENTINA	38	1,068.1
	BARBADOS	-	31.9
	BRAZIL	2	2,009.7
	E.E.C.	-	6,056.6
	CONGO	-	80.3
	USA	-	31.9
	GABON	-	684.2
	GRENADA	-	3.3
	CANARY IS.	-	4.4
	PARAGUAY	1,777	-
	PERU	-	69.3
	SURINAM	-	42.9
	ZAIRE	-	23.1
	PROVEED. MARITIMA	-	149.6

TABLE 40. Goat exports.
South America, 1991.

Exporting Country	Importing Country	Number of Goats
Argentina	URUGUAY	47
Bolivia	-	-
Brazil	...	...
Chile	-	-
Colombia	-	-
Ecuador	-	-
Paraguay	-	-
Peru	-	-
Uruguay	-	-
Venezuela	CURACAO	695

TABLE 41. Horse and embryo exports.
South America, 1991.

Exporting Country	Importing Country	Number of Horses	Embryos
Argentina	GERMANY		-
	BELGIUM	19	-
	BOLIVIA	18	-
	BRAZIL	144	-
	BRUNEI	129	-
	CHILE	188	-
	COLOMBIA	71	-
	CUBA	5	-
	ECUADOR	11	-
	USA	404	-
	SPAIN	61	-
	FRANCE	231	-
	NETHERLANDS	30	-
	ENGLAND	225	15
	IRELAND	28	-
	ITALY	2,296	-
	JAPAN	13	-
	MALAYSIA	124	-
	MEXICO	23	-
	NIGER	72	-
	PARAGUAY	33	-
	PERU	33	-
	PORTUGAL	50	-
	SOUTH AFRICA	14	-
	SWITZERLAN	17	-
	URUGUAY	63	-
	VENEZUELA	52	-
			-
Bolivia	-	-	-
			-
Brazil	...	...	...

continues

TABLE 41. Horse and embryo exports.
South America, 1991.

continuation

Exporting Country	Importing Country	Number of Horses	Embryos
Chile	WEST GERMANY	8	-
	ARGENTINA	2	-
	BRAZIL	10	-
	COLOMBIA	6	-
	ECUADOR	10	-
	USA	18	-
	FRANCE	1	-
	ENGLAND	4	-
	PANAMA	2	-
	PERU	10	-
	VENEZUELA	6	-
			-
Colombia	CUBA, USA, ECUADOR,		-
	DOMINICAN REPUBLIC &		-
	VENEZUELA	3.144	-
			-
			-
Ecuador	COLOMBIA	25	-
			-
Paraguay	ARGENTINA	8	-
	BOLIVIA	15	-
	URUGUAY	6	-
			-
Peru	ARGENTINA	28	-
	BRAZIL	2	-
	CHILE	3	-
	COLOMBIA	4	-
	CUBA	1	-
	ECUADOR	42	-
	USA	42	-
	HONDURAS	1	-
	PARAGUAY	42	-
	PANAMA	10	-
	VENEZUELA	3	-

continues

TABLE 41. Horse and embryo exports.
South America, 1991.

continuation

Exporting Country	Importing Country	Number of Horses	Embryos
Uruguay	GERMANY	4	-
	ARGENTINA	7,376	-
	BELGIUM	4	-
	BRAZIL	823	-
	CHILE	1	-
	SPAIN	20	-
	USA	4	-
	ITALY	547	-
	PARAGUAY	517	-
			-
Venezuela	CURACAO	18	-
	USA	6	-
	PUERTO RICO	4	-
	DOMINICAN REPUBLIC	5	-
			-