PAN AMERICAN HEALTH ORGANIZATION

WORLD HEALTH ORGANIZATION

VII INTER-AMERICAN MEETING AT THE MINISTERIAL LEVEL ON FOOT-AND-MOUTH DISEASE AND ZOONOSES CONTROL

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EPIDEMIOLOGICAL SURVEILLANCE OF RABIES, EQUINE ENCEPHALITIS, FOOT-AND-MOUTH DISEASE AND OTHER VESICULAR DISEASES

STATUS OF FOOT-AND-MOUTH DISEASE AND OTHER VESICULAR DISEASES OF CATTLE IN THE AMERICAS: PREVENTION AND CONTROL PROGRAMS

1973

C O N T E N T

GENERAL SITUATION

I. EVOLUTION OF FOOT-AND-MOUTH DISEASE

According to the information supplied by the countries for the Second Meeting of the South American Commission for the Control of Foot-and-Mouth Disease (COSALFA), and transcribed after the present summary, the changes that were observed in the behavior of the disease during 1973 were as follows:

1. Free area

Argentina's southernmost territory, which is formed by the provinces of Chubut, Santa Cruz and Tierra del Fuego, continued to be free from vesicular diseases, and no occurrences took place in the course of the year.

In Colombia, the northwestern region of the department of Chocó, at the frontier with Panama, retained its status as an area free from vesicular diseases through 1973. However, as this report is being written (March, 1974), mention must be made of an outbreak of foot-and-mouth disease caused by virus subtype A_{27}, confirmed on 31 January, 1974, and which was eradicated by means of stamping out policy. The disease affected one ranch only, isolated by the jungle from any other livestock establishment, with a cattle population of 689, and 11 swine; all the animals were destroyed.

In Curaçao, as in 1972, several vesicular disease episodes were registered in cattle imported from Colombia for slaughter. Vesicular stomatitis virus was typed: New Jersey type four times, and Indiana type twice. Five samples were negative.

As of January 1973, Chile expanded by 15,000 Km^2 its foot-and-mouth disease free area, incorporating the continental portion of the Chiloé province to the already free provinces of Aysén and Magallanes, thus totalling an area of 250,000 Km^2 free of disease. This represents about 30% of the country's territory, and 10% of its cattle population.

In Venezuela, the area of the Federal Territory of Delta Amacuro and the Sotillo district in the State of Monagas ceased to be free from the disease, as they were first affected by virus A, and afterwards by virus C.

In Guyana, an outbreak of foot-and-mouth disease was registered during August in the Rupununi savanna, caused by virus subtype A_{24}, probably due to the

dissemination of similar episodes observed at the frontier with the Territory of Roraima, Brazil. Animal Health Service authorities placed the affected area under quarantine and proceeded to carry out ring vaccination with monovalent vaccine supplied by the Pan American Foot-and-Mouth Disease Center. The outbreak was eliminated by such means.

2. Endemic area

Within the characteristics of the disease which are specific to each country, the situation observed in Chile is worthy to be singled out, where only sporadic outbreaks occurred and affected 13 livestock establishments located in 4 out of the 20 provinces which constitute its endemic area. Only viruses type O and A were diagnosed, and there was no evidence of virus type C throughout the year.

In Argentina, a substantial increase in the number of foci was registered in the country's main livestock provinces that constitute the so-called "humid pampa", where viruses type O and A were clearly predominant over virus C which was rarely diagnosed. In the remaining provinces the disease was observed only sporadically.

With respect to Bolivia, the only known fact is that an epidemic outbreak occurred at Reyes, in the department of Beni, which spread toward the provinces of Moxos and Marbán. No typing of the causing virus was carried out.

The picture in Brazil was similar as in the preceding year, the disease continuing to be present in all the southern zone of the country, where virus subtype C_3 exhibit much activity.

Colombia, Ecuador and Peru also maintained a similar situation as that of 1972, with occurrence of a few epidemic episodes. In Colombia, the disease was registered in the departments of Antioquia, Cundinamarca, Valle, Tolima, César, Guajira, Cauca and Córdoba. In Ecuador, in the provinces of Carchi, Pichincha, Cotopaxi, Loja, El Oro, Los Ríos and Manabí. In these two countries the epidemic outbreaks were caused by virus O_1. In Peru, an epidemic took place at Bellavista, in the department of San Martín, where virus A_{24} was identified.

In Paraguay, in the area in which the official service is implementing the foot-and-mouth disease campaign, the epizootiological situation was favorable except for an epidemic outbreak registered during the first four-month period of the year, produced by virus subtype A_{24}, which affected part of the departments

of Caazapá, Guairá and Itapúa, in a zone where the disease had not been registered for 2 years.

The situation in Uruguay can be considered to have deteriorated when compared to previous years, with a substantial increase in the number and distribution of affected livestock establishments. During the months from April to June an epidemic wave was registered caused by virus type O, which extended alongside the western and southern frontier limits, on the borders of the Uruguay and Plate rivers, comprising a strip of from 50 to 150 Km in width. In the rest of the country, other foot-and-mouth disease episodes, although of less intensity, were also noted.

In Venezuela, two important changes occurred in the endemic area of the disease: first, with respect to the limits of said area, inasmuch as there was an invasion of the Federal Territory of Delta Amacuro and the Sotillo district in the state of Monagas; and second, the presence of virus type O in the northern portion of the state of Bolívar, where only outbreaks caused by virus A had been registered.

In maps 1 and 2 the geographic situation of foot-and-mouth disease in 1972 and 1973 is presented in a comparative form, while in tables 1 and 2 the figures for the last 7 years are presented.

II. SITUATION OF THE FOOT-AND-MOUTH DISEASE COMBAT

1. Coverage

In the South American countries, the area covered by foot-and-mouth disease combat programs continued to expand.

Brazil incorporated the southern part of the state of Espírito Santo, thus achieving total coverage. This in addition to the already existing situation in the states of Rio Grande do Sul and Santa Catarina. The campaign also expanded the scope of its action to other states that are under the national plan, achieving a 10% increase in the area at work and of 8% of the vaccinated cattle population.

In view of the presence of epidemic outbreaks in the department of Beni, Bolivia gave special attention to this problem carrying out periodic vaccinations in the area.

In Chile, after one year of vaccinating every 6 months in Region I, serological studies were initiated for the purpose of determining the degree of immunity

of the cattle population, which in addition to the significant reduction of the disease incidence, may result in extending the 6 months vaccination policy to other regions of the country.

Colombia incorporated the area No. 3 (department of Córdoba) and area No. 6 (departments of César and Guajira), which are included in zone No. 1, located on the Atlantic coast, to the regime of active combat, by establishing systematic vaccination in said areas.

In Ecuador, the National Foot-and-Mouth Disease Control Program, created by National Decree of July 1972, started operations in January 1973. The most immediate task was to stop the epidemic wave which, at that time, was affecting the country's livestock, and therefore divided the country into regions, incorporating technical, auxiliary and administrative staff, and vaccine was imported in order to increase the availability of local production. In November, the Inter-American Development Bank gave its approval for a loan of US$ 5,570,400, to finance the foot-and-mouth disease combat and which with the addition of the national counterpart totals US$ 8,473,000.

Paraguay maintained its coverage of 71% of the country's total area. An evaluation of the results obtained from the Paraguayan Chaco pilot plan is now under way, for eventual incorporation of the Western Zone which, in view of its specific characteristics, should have a combat strategy in accordance with its own ecology.

Venezuela expanded its foot-and-mouth disease combat campaign to the Federal Territory of Delta Amacuro and the Sotillo district of the state of Monagas, that were invaded by the disease in 1973.

Map 3 shows the coverage of foot-and-mouth disease campaigns in South America during 1972 and 1973, and tables 3 and 4 indicate the pertinent figures, expressed in Km^2 and cattle population, under that coverage, by countries.

2. Foot-and-mouth disease vaccine

Table 5 presents data on the production of foot-and-mouth disease vaccine during the last 7 years in the countries of South America. It can be noted that the progression that had been kept was interrupted in 1973, and that a substantial decline ensued. This decrease in the availability of vaccine caused some difficulties, chiefly in Argentina and Brazil, in carrying out the compulsory vaccination within the time scheduled, which had to be lengthened.

The causes for this lesser production of vaccine, in some cases, were due to problems in obtaining raw material for preparing the vaccine, and also because of more rigorous quality controls that were imposed by official authorities. It is hoped that these shortcomings shall soon be overcome by the producing laboratories, and that a vaccine meeting all requirements shall become available and in sufficient quantity to supply the demand.

On the other hand, the production of vaccine increased substantially in Paraguay and Uruguay, thus making it possible to satisfy the requirements of Chile, a country where production figures experienced a substantial decline.

3. International collaboration

Both the Pan American Health Organization, through the Pan American Foot-and-Mouth Disease Center, and the United Nations Food and Agriculture Organization (FAO) continued to give technical assistance to all the countries in their foot-and-mouth disease combat and prevention programs. The Inter-American Development Bank (IDB), during 1973, expanded its financial cooperation to the countries affected by foot-and-mouth disease, and granted to Ecuador a loan equivalent to US$ 5,570,400, and to the Peruvian Government, a loan in the amount of US$ 6,000,000 for the same purpose.

Venezuela is awaiting final approval by the National Venezuelan Congress in order to carry out a financial operation with the IDB.

Bolivia has just submitted to the IDB, for consideration, a draft program to fight foot-and-mouth disease, brucellosis and rabies.

In regard to other aspects, international cooperation is also carried out through the implementation of bilateral or multilateral agreements between countries. In this respect it must be mentioned the activity being developed by the Brazilian-Paraguayan Frontier Commission which carries out a common plan of foot-and-mouth disease combat, as well as the work which is being done by the authorities of the Brazil-Guyana-Venezuela agreement, who carried out the eradication of the outbreak that occurred in the Rupununi savanna.

In August 1973, an agreement between the Ministry of Agriculture of Colombia and the United States Department of Agriculture was signed, whereby the two signatory parties agree to develop joint action toward keeping free from foot-and-mouth disease the Colombian area of Chocó, thus preventing the risk of introduction of

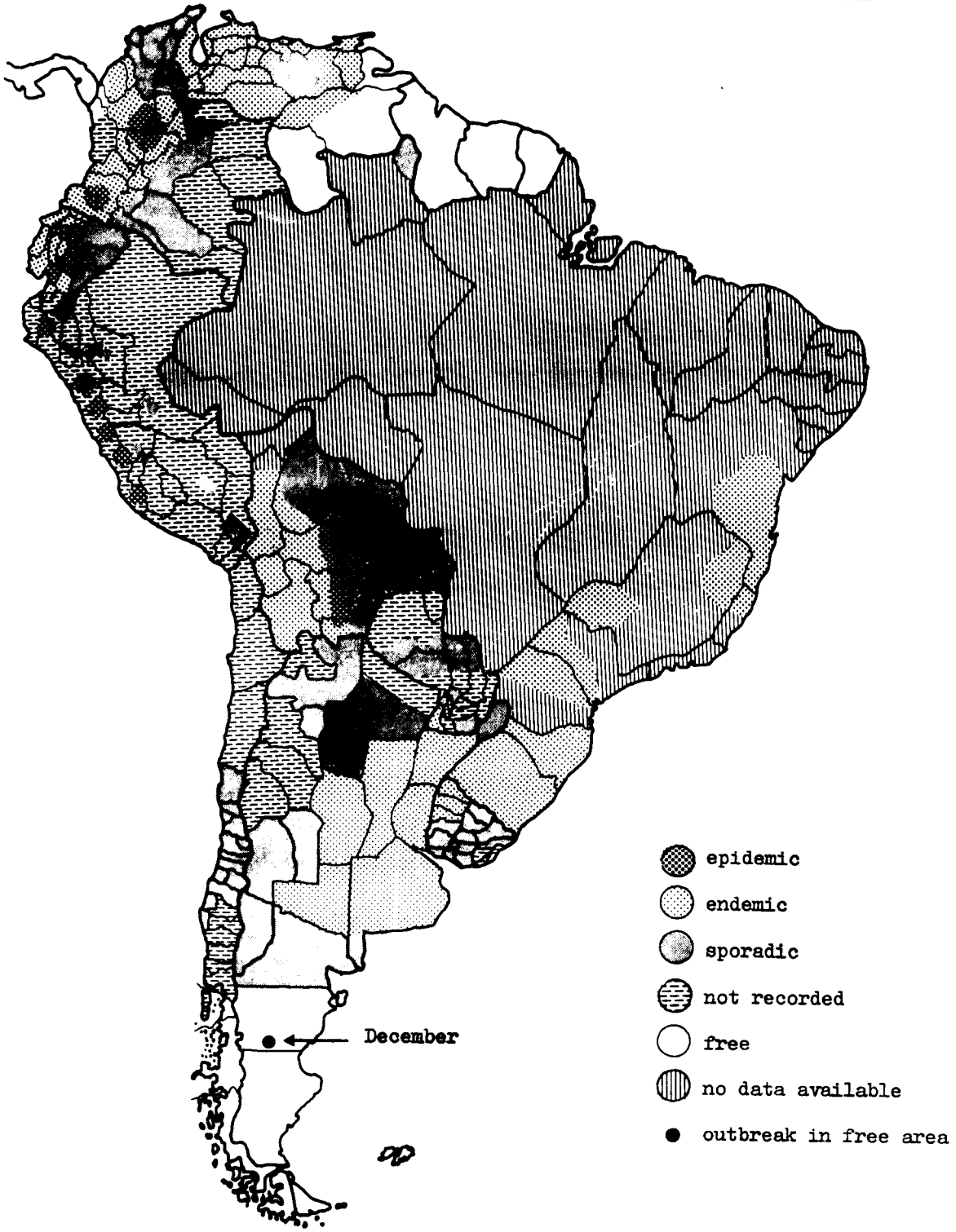
the disease in foot-and-mouth disease free areas, such as Panama, Central America and North America.

4. Resources used

Tables 6 and 7 show in detail the human resources that have been utilized by the countries in the foot-and-mouth disease combat, and the capital invested during the years 1967-1973.

MAP 1

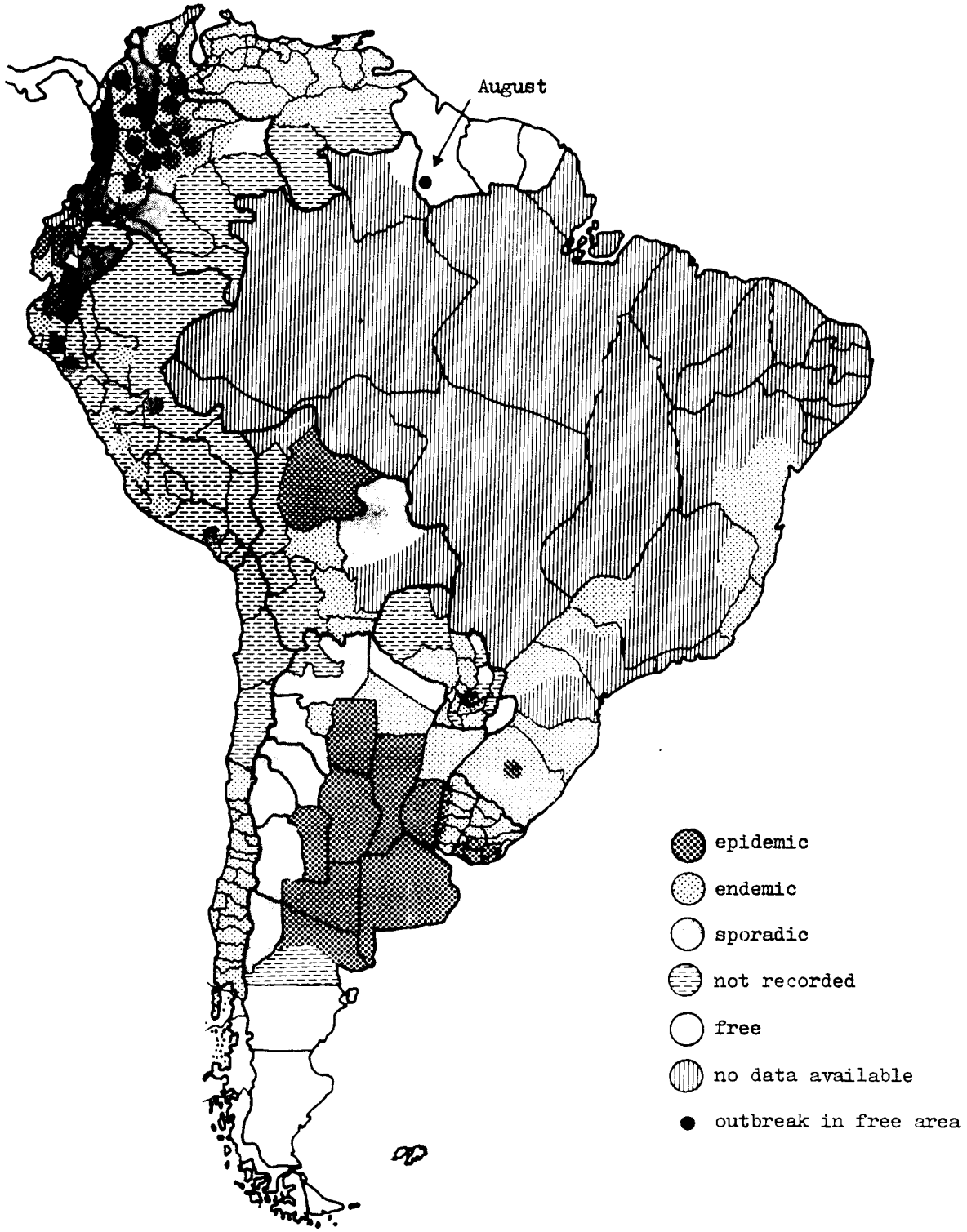
Geographical situation of foot-and-mouth disease according to records of occurrence of the disease - SOUTH AMERICA - 1972.



SOURCE: Reports of the countries presented at the constitutive meeting of the South American Commission for the Control of Foot-and-Mouth Disease, held in Rio de Janeiro, February 26-28, 1973.

MAP 2

Geographical situation of foot-and-mouth disease according to records of occurrence of the disease - SOUTH AMERICA - 1973.



SOURCE: Reports of the countries presented at the II Meeting of the South American Commission for the Control of Foot-and-Mouth Disease, held in Rio de Janeiro, March 11-13, 1974.

MAP 3

Areas covered by foot-and-mouth disease control and prevention programs.

SOUTH AMERICA - 1973.

SOURCE: Reports of the countries presented at the II Meeting of the South American Commission for the Control of Foot-and-Mouth Disease, held in Rio de Janeiro, March 11-13, 1974.

TABLE 1

Affected farms and FMD sick animals by country and year. South America. 1967 - 1973.

Country	1967		1968		1969		1970		1971		1972		1973	
	Affected farms	Sick cattle	Affected farms	Sick cattle	Affected farms	Sick cattle	Affected farms	Sick cattle	Affected farms	Sick cattle	Affected farms	Sick cattle	Affected farms	Sick cattle
Argentina	4 634	265 701	1 392	76 551	1 952	160 354	832	54 829	1 984	124 338	1 594	109 317	2 349	147 753
Bolivia	...	...	...	...	...	...	...	...	196	4 536	...	1 221	...	...
Brazil	...	8 615 a/	...	20 863 a/	2 843	90 220	2 529	74 485	8 678	385 292	7 091	297 615	8 546	293 336 c/
Colombia b/	419	7 630	362	4 850	284	7 483	223	5 260	400	12 933	458	10 438	420	7 082
Chile	508	16 167	1 811	36 333	1 209	27 181	1 061	21 553	281	6 086	29	392	13	156
Ecuador b/	...	...	...	...	721	28 790	368	7 898	361	30 151	821	8 255	321	7 065
Paraguay	...	...	75	6 274	268	14 763	64	4 209	87	3 425	45	2 193	52	3 080
Peru b/	...	...	...	...	44	4 814	315	5 791	134	8 278	62	2 132	80	3 795
Uruguay	52	...	20	...	52	...	208	8 939	375	12 604	129	6 661	297	25 876
Venezuela b/	67	...	68	2 238	70	1 840	99	4 415	103	3 608	190	3 490	165	1 861

a/ Correspond to the state of Rio Grande do Sul.

b/ Include vesicular stomatitis.

c/ Partial datum.

... No data available.

TABLE 2

Foot-and-mouth disease affected herds according to virus type, by country and year. South America. 1967 - 1973.

Country	Virus type	1967	1968	1969	1970	1971	1972	1973
Argentina	O	869	329	235	110	1031	637	819
	A	116	1078	1145	530	860	849	966
	C	34	20	577	195	78	108	14
Bolivia	O	6	11	6	19	13	33	2
	A	-	20	1	14	-	14	3
	C	2	6	-	4	2	-	1
Brazil	O	147	189	145	462	376	485	593
	A	57	83	72	203	161	542	571
	C	26	40	76	173	74	763	1121
Colombia	O	38	117	123	53	83	82	87
	A	183	71	131	92	116	181	109
	C	2	-	-	1	-	-	-
Chile	O	98	55	124	56	11	2	4
	A	38	193	53	132	64	6	2
	C	7	2	7	6	11	1	-
Ecuador	O	74	34	194	88	74	125	72
	A	7	69	53	6	15	8	6
	C	-	-	-	-	-	-	-
Paraguay	O	-	19	31	15	28	10	4
	A	-	3	36	37	4	2	6
	C	-	31	28	-	10	5	3
Peru	O	7	6	16	22	26	16	17
	A	14	33	26	33	72	29	12
	C	2	-	36	12	7	1	-
Uruguay	O	9	1	4	81	102	17	153
	A	-	8	29	36	24	30	29
	C	-	-	11	5	3	8	10
Venezuela	O	46	62	40	55	58	42	59
	A	22	5	60	42	41	25	11
	C	-	-	-	-	-	-	-

TABLE 3

Geographic coverage of foot-and-mouth disease program by country and year. South America. 1967 - 1973. (In thousands Km^2).

Country	Total area	1967	1968	1969	1970	1971	1972	1973
Argentina a/	2 791	2 791	2 791	2 791	2 791	2 791	2 791	2 791
Bolivia	1 099	-	-	-	-	-	-	-
Brazil	8 511	202	301	351	559	673	890	982
Colombia	1 139	-	-	-	-	-	174	216
Chile	757	-	-	-	58	113	260	260
Ecuador	272	-	-	-	-	-	7	10
Paraguay	407	-	26	46	102	129	160	289
Peru	1 285	1 285	1 285	1 285	1 285	1 285	1 285	1 285
Uruguay	187	-	-	187	187	187	187	187
Venezuela	912	912	912	912	912	912	912	912
Total	17 360	5 190	5 315	5 572	5 894	6 090	6 666	6 932

a/ Do not include Antártida and the South Atlantic islands.

TABLE 4

Cattle population covered by foot-and-mouth disease programs, by country and year. South America. 1967 - 1973. (In thousands).

Country	1967	1968	1969	1970	1971	1972	1973
Argentina	51 227	51 465	48 271	48 271	48 190	52 000	54 700
Bolivia	-	-	-	-	-	-	-
Brazil	9 300	12 026	15 578	23 647	19 917	32 473	37 160
Colombia	-	-	-	-	-	253	4 127
Chile	-	-	-	933	1 750	2 880	2 880
Ecuador	-	-	-	-	-	1 000	2 000
Paraguay	-	437	1 184	1 703	2 235	2 556	2 648
Peru	3 710	3 810	4 060	4 130	...	1 542	1 653
Uruguay	-	...	8 188	8 188	8 500	9 309	10 000
Venezuela	6 900	-	-	-	8 800	9 084	8 810
Total	71 137	67 738	77 281	86 872	89 392	111 097	123 978

... No data available.

TABLE 5

Production of foot-and-mouth disease vaccine, by country and year. South America. 1967 - 1973. (In thousand doses).

Country	1967	1968	1969	1970	1971	1972	1973
Argentina	166 089	189 975	146 298	168 610	175 173	146 800	125 301
Bolivia	295	498	200	282	220	174	...
Brazil	60 900	80 000	91 524	113 100	127 326	184 634	139 835
Colombia	9 985	10 018	14 347	12 407	15 549	17 272	15 004
Chile	5 500	4 521	7 818	5 200	981	498	244
Ecuador	700	690	500	227	968	1 400	1 357
Paraguay	-	-	-	700	7 033	9 648	10 723
Perú	2 901	2 256	1 942	2 873	3 630	3 126	3 569
Uruguay	10 123	14 937	26 043	27 868	30 060	28 627	34 674
Venezuela	9 529	8 500	8 369	5 946	9 572	8 024	6 146
Total	266 022	311 395	297 041	337 213	370 512	400 203	336 853

... No data available.

TABLE 6

Personnel working in the programs of vesicular diseases, by country and year. South America. 1967 - 1973.

Country	Professional technical personnel			Auxiliary and administrative personnel		
	1971	1972	1973	1971	1972	1973
Argentina [a]	269	286	250	2 646 [b]	2 900 [b]	1 050
Bolivia	40	51	52	400	...	...
Brazil	482	681	717	6 194	6 111	8 424
Colombia [c]	175	223	223	294	466	466
Chile	42	31	34	385	381	385
Ecuador [a]	38	78	77	96	344	245
Paraguay	50	57	69	60	64	208
Peru [a]	84	89	89	267	2 573	377
Uruguay	29	30	31	76	64	100
Venezuela	17	9	9	384	492	485

a/ Animal health in general.

b/ Includes approximately 2,400 officials working "ad-honorem" - as local field clerks.

c/ Foot-and-mouth disease and brucellosis.

... No data available.

TABLE 7

Total budget of foot-and-mouth disease programs, by country and year. South America. 1967 - 1973. (In thousand dollars).

Country	1967	1968	1969	1970	1971	1972	1973
Argentina	1 938	3 968	4 904	11 216	6 809	...	10 000
Bolivia	35	50	382 a/	185 a/	696 a/	100	100
Brazil	815 b/	879 b/	140 b/	1 301 b/	10 573	11 445	12 967 c/
Colombia	400 c/	554 a/	2 353 a/	1 488 a/	2 629 a/	4 320	...
Chile	d/	d/	133	3 194	8 928	1 870	2 844 e/
Ecuador	470	571	581 c/	500	260	275	700
Paraguay	d/	168	1 090	2 087	529	2 900	2 075
Peru	475	200	202	255 c/	92	...	...
Uruguay	d/	432	312	132	238	110	390
Venezuela	2 133	1 948	2 085	2 250	...	2 860	2 863

a/ Not only for vesicular diseases.

b/ Ministry of Agriculture.

c/ Approximated.

d/ Without specific budget.

e/ Corresponds to the first semester.

... No data available.

Remarks for 1972: The amounts of Brazil, Chile, Paraguay, Uruguay and Venezuela are exclusively for foot-and-mouth disease. The ones related to the first three mentioned countries include financial aid from the IDB. The amount of Argentina, Bolivia, Ecuador and Peru are for animal health in general.

The budget of Colombia refers to the Foot-and-Mouth Disease and Brucellosis Project and includes financial aid from the IDB.

SITUATION BY COUNTRIES

A R G E N T I N A

The information herein submitted is only that which is contained in the Health Combat Service's (SELSA) records and it is admitted that it does not exactly match the real situation.

This is due to the fact that, up to now, the Service can not rely on an efficient and well-organized system for recording and handling the data, and that the origin of the information can only be obtained through the producers'spontaneous notification, a fact that makes, up to the present, that only partial information is supplied. There will be a description, under II.8, of the measures which are now being implemented, so that the information for the year 1974 may be more exact.

I. EVOLUTION OF FOOT-AND-MOUTH DISEASE

1. Geographic distribution of the disease

See map 4 and graphs 1 and 2.

2. Virus diagnosis

See map 5 and graph 3.

3. Epidemics

The considerable number of outbreaks which were observed in the epidemic zone, as well as in the rest of the country, has made it impossible to correctly report the foci, and also to adopt preventive or control measures.

4. Factors related to the disease

We deem the main conditioning factor for the behavior of the disease to have been the poor quality of the vaccine that was used.

5. Rates

The large amount of foci produced in the course of the year hindered

adequate recording. Therefore, the data on rates is not reliable. In regard to cattle, the morbidity rate in 1973 was 12.65%, a figure which was obtained from 2,349 establishments sampled for virus typing.

6. Trend

The only interpretation that could be advanced in relation to the general trend of the disease during 1973 is that apparently the final months of the period mark the beginning of an inter-epidemical period (graph 2).

II. DEVELOPMENT OF THE FOOT-AND-MOUTH DISEASE COMBAT

1. Coverage

The coverage of the Combat Program during 1973 comprised the country's entire continental area, 2,791,810 square kilometers.

2. Administrative organization

The State Secretariat for Agriculture and Livestock ("Secretaría de Estado de Agricultura y Ganadería") comprises a Sub-secretariat of Livestock ("Subsecretaría de Ganadería"), from which depends the National Animal Health Service ("Servicio Nacional de Sanidad Animal - SENASA") which is responsible for combatting foot-and-mouth disease through one of its three services, the Health Combat Service ("Servicio de Luchas Sanitarias - SELSA").

During 1973, SELSA used the following resources:

Human resources:	Veterinarians	250
	Paratechnicians	750
	Administrative personnel	300
Material resources:	No detailed listing thereof, except for the number of vehicles ascribed to the Service, which adds up to approximately 1,000 units.	
Financial resources:	$ 100 000 000, nationally originated.	

This agency develops parallel combat activities against other diseases, 66% of the time and resources was estimated to be earmarked for the foot-and-mouth disease combat during the year 1973.

3. Changes made in 1973

Starting in the month of June, the Health Combat Service (SELSA) was put under intervention by the Government's Executive Power, the agency presently maintaining the duties and tasks which were assigned to it by existing regulations.

In the course of the year the Service's activities for the three-year period 1974/1976 were planned, and a strategy based on regional combat operations was established, aimed at controlling the disease in order to create appropriate conditions for its eradication. This includes the preparation of a plan, divided into six subplans, in which all pertinent questions are spelled out in detail.

4. Problems

The main problem that came up in the course of the year was the need for having a vaccine fit for the combat campaign which is based on vaccination. Starting in the month of June, control of the vaccine showed significant differences in regard to the percentage of batches which did not meet with the required protective doses (graphs 4 and 5).

As a result, the lesser amount of vaccines approved for the third period of compulsory vaccination (October) led to the adoption of the following measures:

a) Requirement of a 2 cattle protective dose 50% minimum, which means in present testing conditions, 70% protection. This was a temporary measure adopted through a resolution to be operative until the industry may be in the position of producing all doses in that minimum threshold, at which moment it will be progressively increased.

b) To extend the third vaccination period, traditionally to be performed in October, for the duration of the month of November.

c) Establishment of the following priorities regarding vaccination of different types of cattle:

First: live animals for export and herds bound for Patagonia.

Second: herds to be slaughtered, and the meat exported.

Third: calves starting with six-month old animals.

Fourth: breeding stock.

Fifth: merchandising stock.

5. Results

Even though the activity which was developed aimed primarily at the programming for 1974 and the ensuing years, one positive fact emerging from the measures which were taken with the particular end, has been the producer's attitude in sharing the criteria adopted in regard to vaccine control, the goal of having them put their trust in the vaccine which they are presently applying was reached.

In relation to the indicators which explain the behavior of the disease and the factors which condition said bahavior, the time period of application of the new policy is still too brief to permit defining any noticeable results as yet.

6. International collaboration

Actions related to international collaboration were limited to participation at the meeting of COTERSA (Santa Cruz de la Sierra, Bolivia), and to establishing contacts with the Pan-American Foot-and-Mouth Disease Center and the Pan-American Zoonosis Center, to provide for training and instruction of the personnel.

7. Research

With respect to research, it is not a task for the agency but for the National Institute of Agriculture and Livestock Technology (INTA), with which ccoperation agreements have been established.

8. Plans and targets for 1974

Planning for 1974 foresees:

a) Establishment of a new information system.

b) Control of all vaccine batches produced, in their 3 valencies, through cattle protective dose 50% in one of them, at random; sero-neutralization and guinea-pig protective dose 50% for all valencies.

c) Re-activation of the Combat Campaign through regional division, and achieving the targets foreseen within the following triennial objectives:

c.1) To declare that Patagonia, South of the Barrancas and Colorado Rivers, is a zone free from foot-and-mouth disease.

c.2) To achieve a sporadic foci zone at the borders of the livestock area.

c.3) To achieve that the region comprised by the provinces of Corrientes and Entre Ríos become a zone of controlled foci.

c.4) To carry out a pilot plan in the municipality ("partido") of Hipólito Irigoyen (Province of Buenos Aires).

c.5) To reduce the number of foci in the humid"pampa".

c.6) To have available an official installation for the production of antigen.

III. FOOT-AND-MOUTH DISEASE NOTIFICATION - 1973

No. of affected farms	7 038
No. of sick cattle (in 2 349 farms)	147 753
No. of sick sheep	-
No. of sick swine	-
No. of farms with samples sent for virus typing	2 349
No. of farms with FMDV type O diagnosis	819
No. of farms with FMDV type A diagnosis	966
No. of farms with FMDV type C diagnosis	14
No. of farms with VSV type New Jersey diagnosis	-
No. of farms with VSV type Indiana diagnosis	-
No. of farms with negative diagnosis	550

IV. COVERAGE SITUATION OF THE FOOT-AND-MOUTH DISEASE COMBAT IN 1973

Area in Km^2 (continental Argentina) a/	2 791 810
Livestock farms a/	333 694
Cattle population a/	54 700 000
Sheep population a/	44 200 000
Goat population a/	5 200 000
Total doses of vaccine prepared	171 472 230
Total doses of vaccine controlled (141 batches)	171 472 230
Total doses of vaccine approved	125 301 310
Doses of vaccine exported b/	42 500
Doses of vaccine imported	-
Doses applied in cattle (Zone compulsory vaccination every 4 months)	48 300 000
Doses applied in sheep (" " " " 6 ")	10 800 000

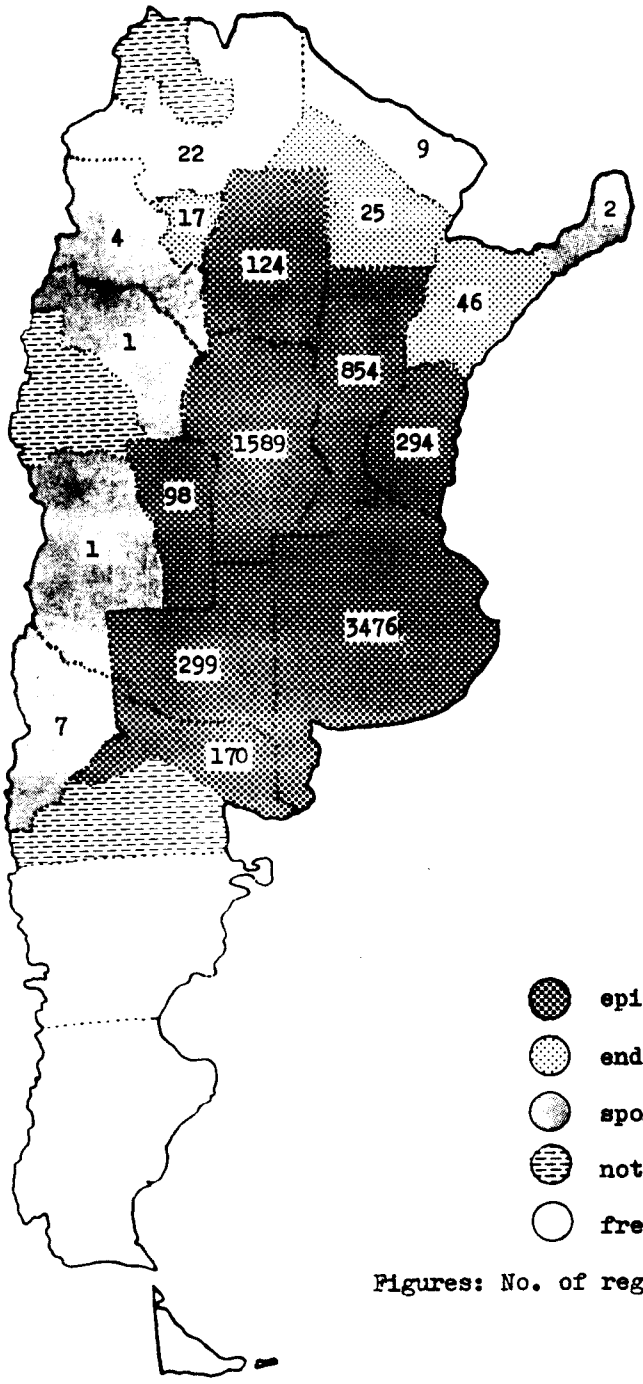
---

a/ Implementation area.

b/ Destination: La Paz (Bolivia).

MAP 4

Geographic distribution of foot-and-mouth disease in cattle.
ARGENTINA - 1973

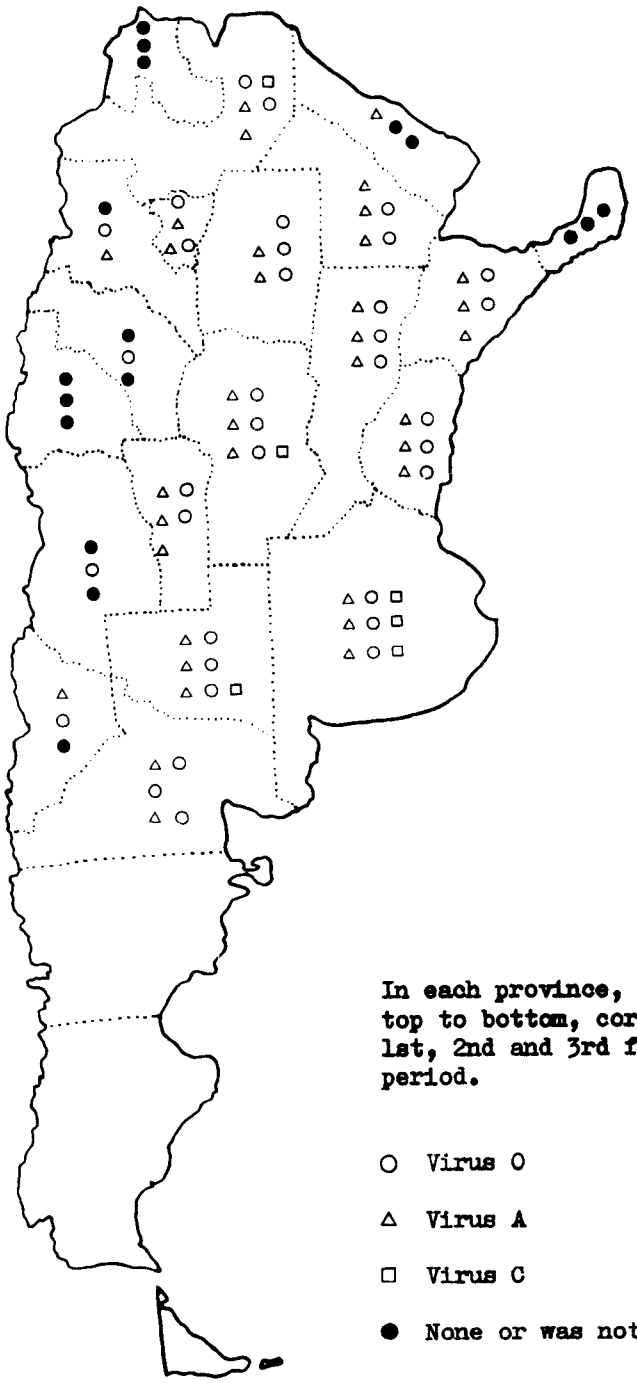


MAP 5

Foot-and-mouth disease in cattle.

Geographic distribution of FMDV types by provinces.

ARGENTINA - 1973



In each province, starting from top to bottom, correspond to the 1st, 2nd and 3rd four months period.

○ Virus O

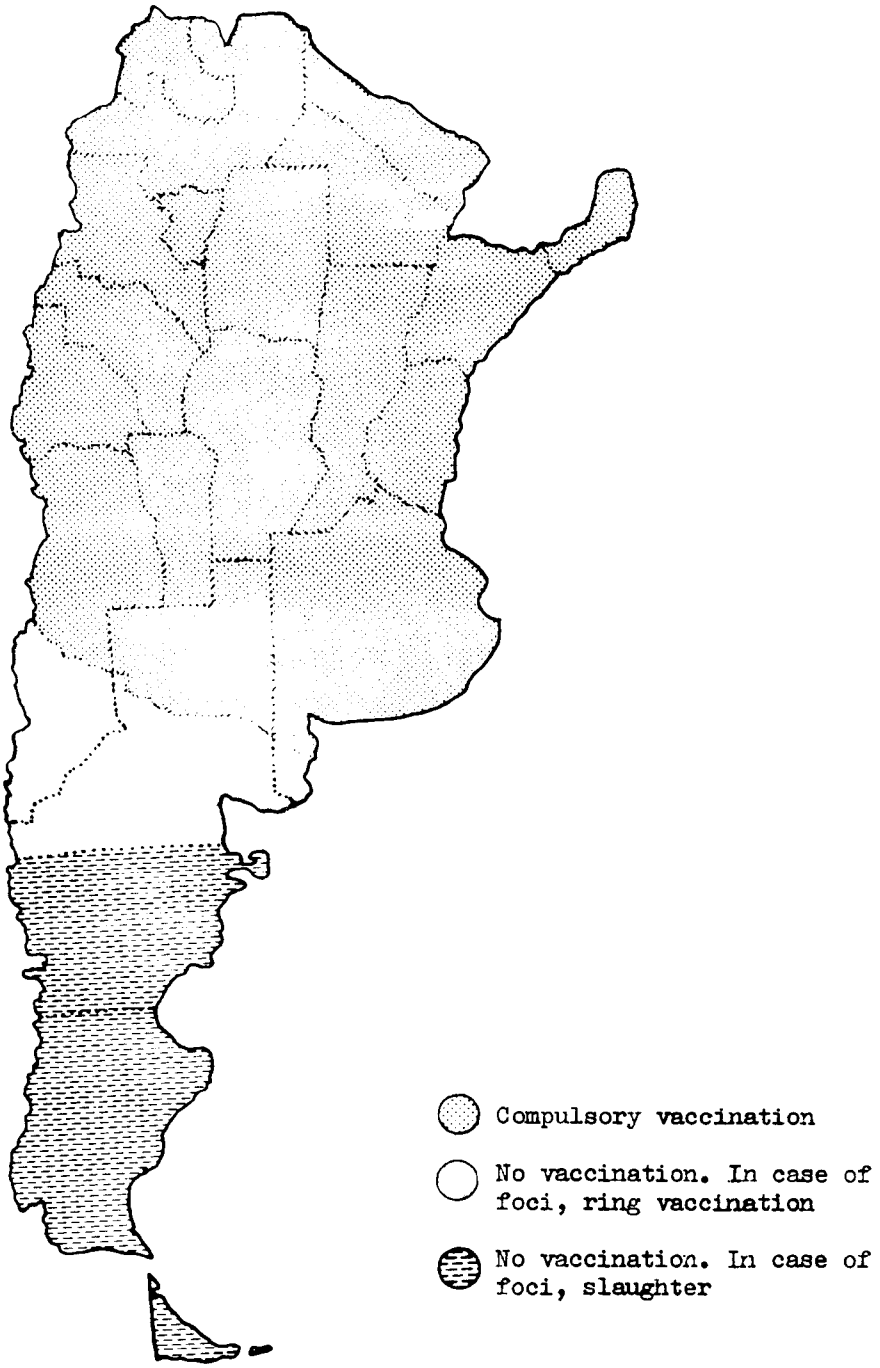
△ Virus A

□ Virus C

● None or was not typed

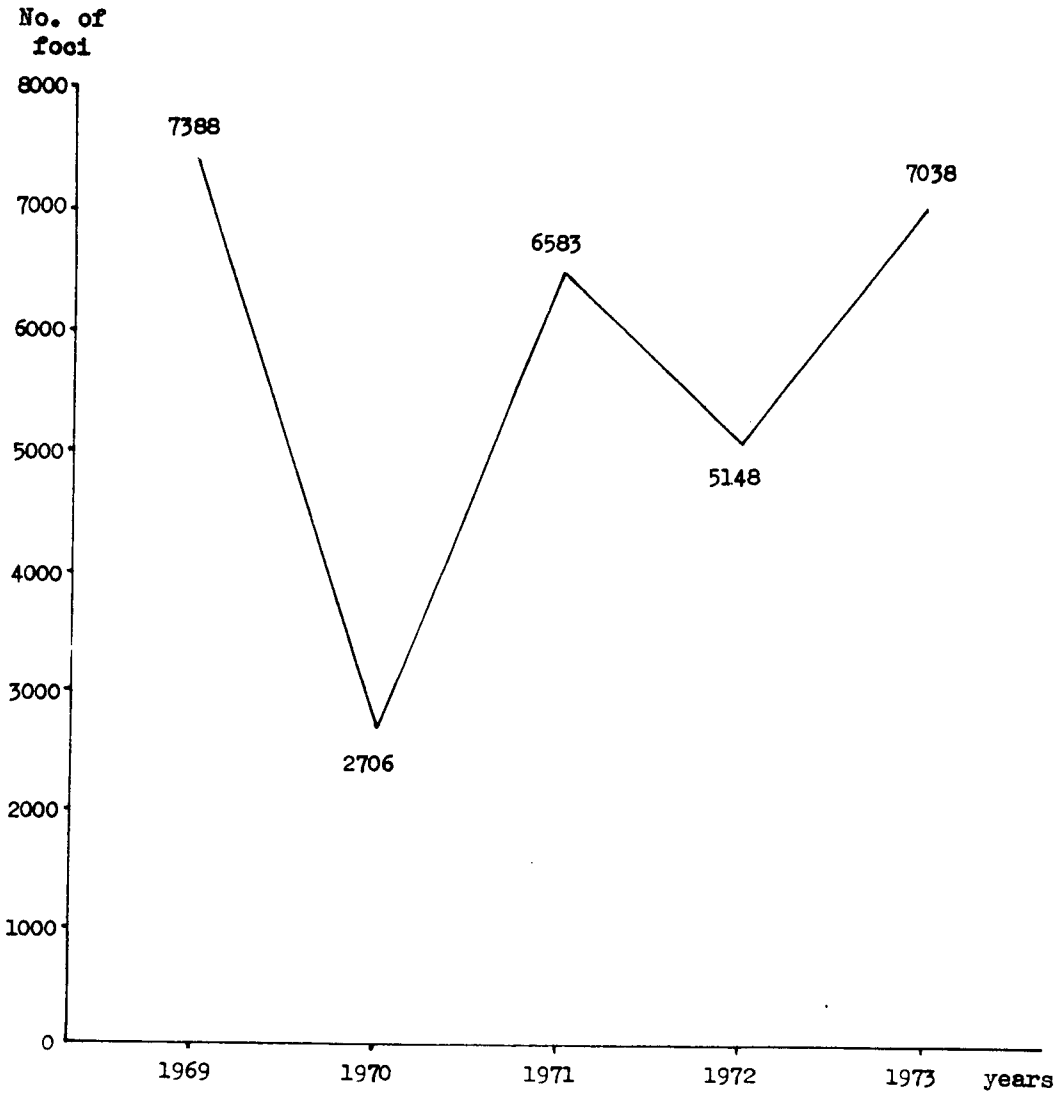
MAP 6

Foot-and-mouth disease combat situation.
(Vaccination of cattle and sheep) - ARGENTINA - 1973



GRAPH 1

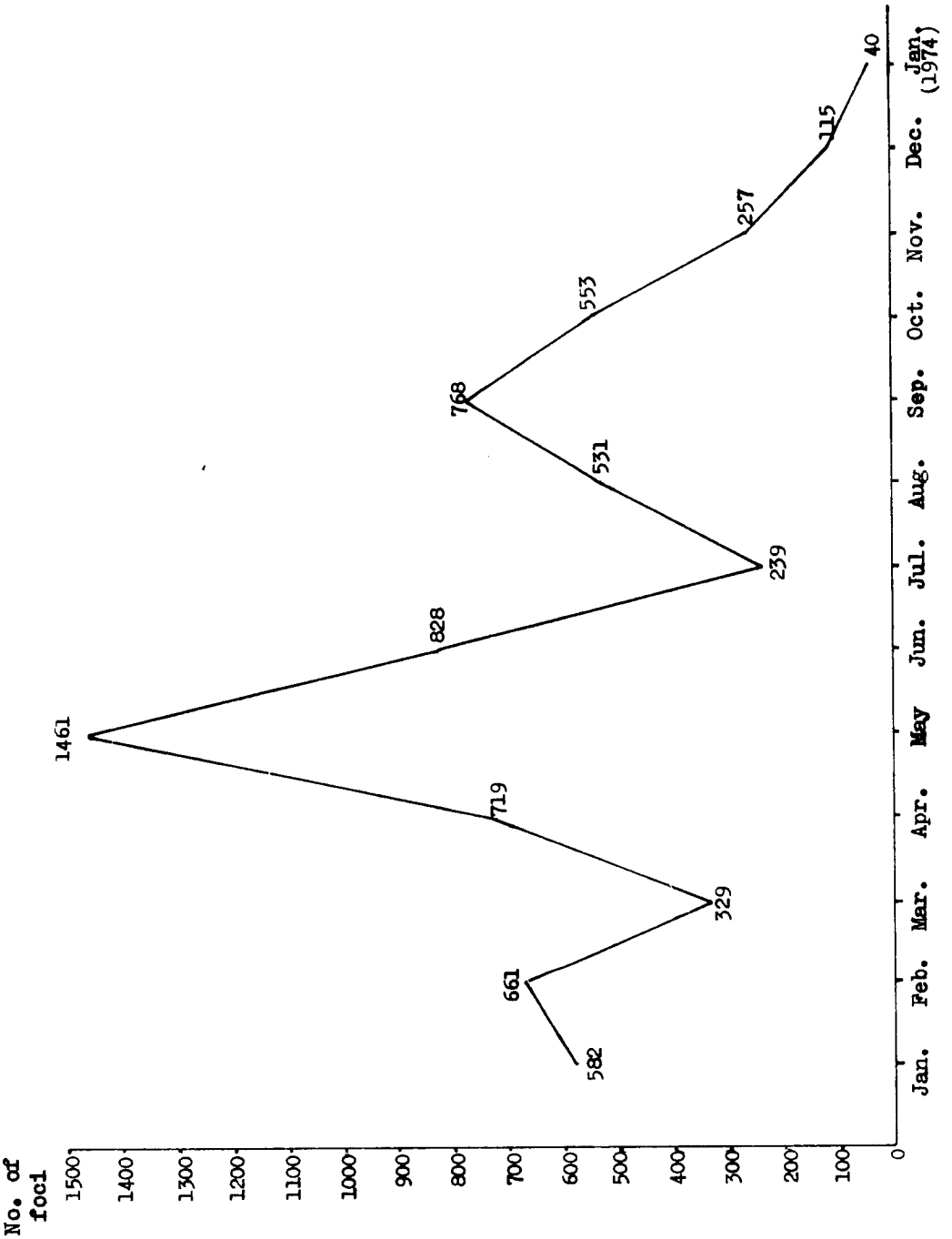
Foot-and-mouth disease evaluation in cattle.
Number of foci registered by year - ARGENTINA - 1969/1973.



GRAPH 2

Evolution of foot-and-mouth disease in cattle.

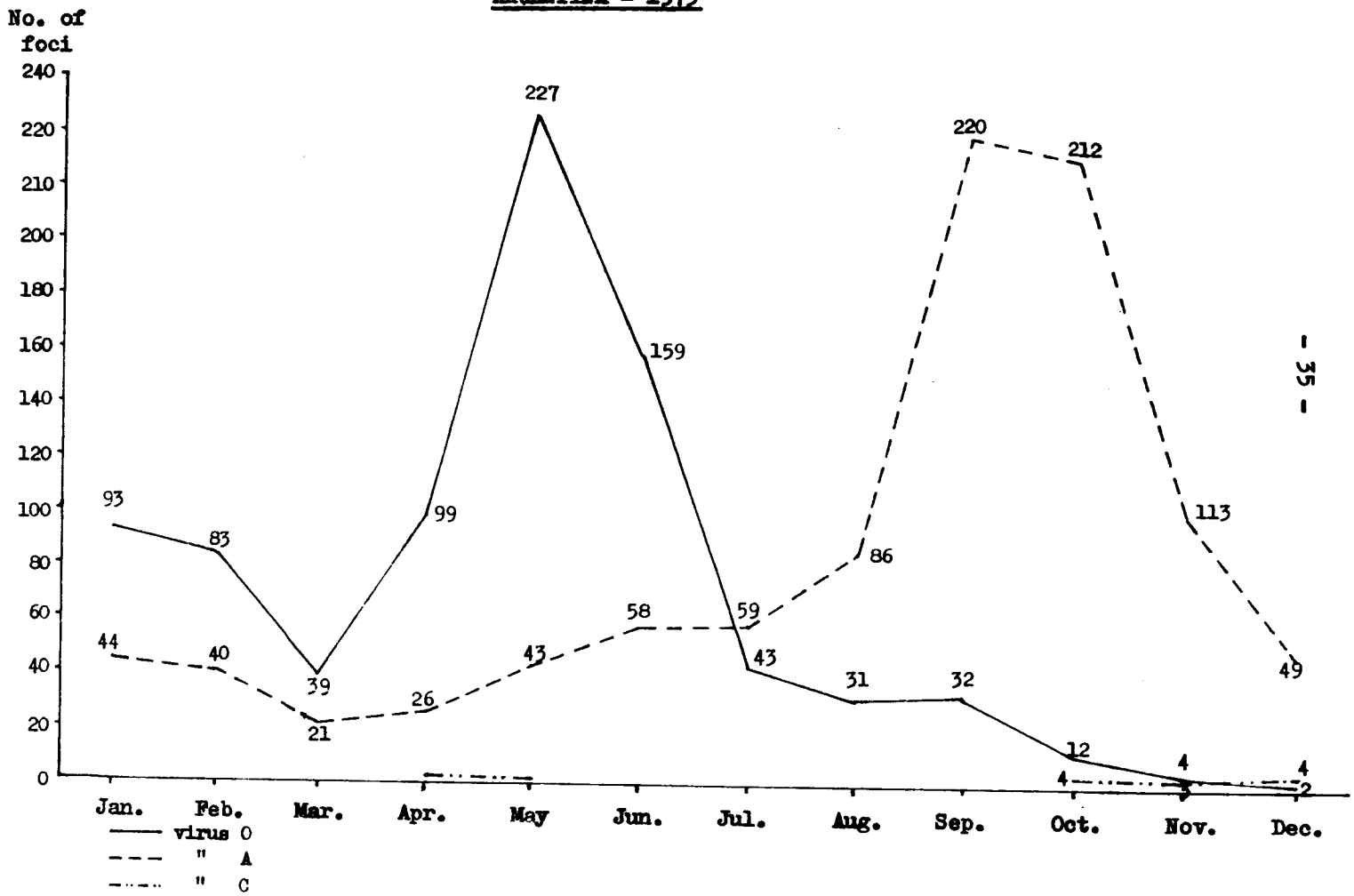
Number of foci registered by month - ARGENTINA - 1973



GRAPH 3

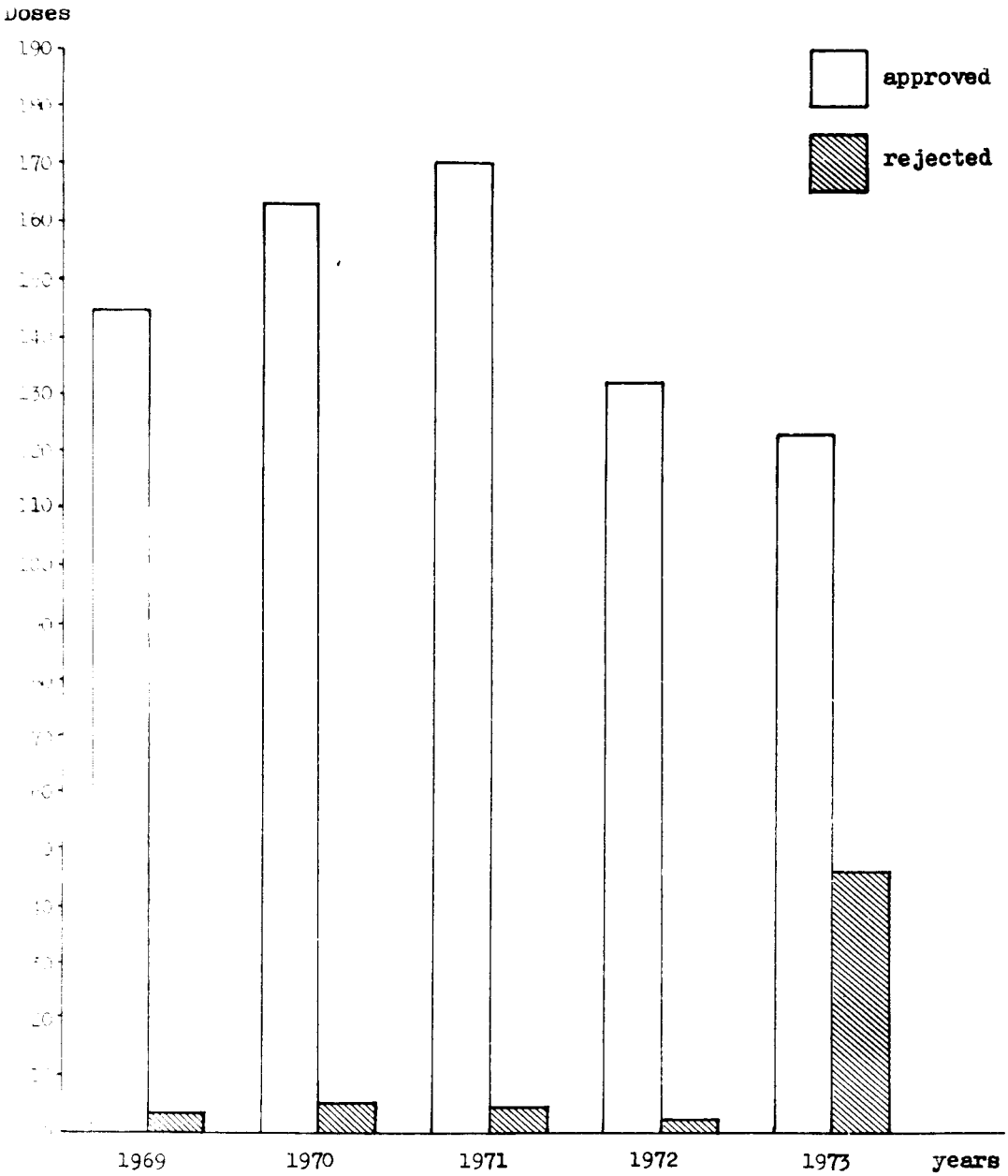
Foot-and-mouth disease in cattle. Virus frequency by type and month.

ARGENTINA - 1973



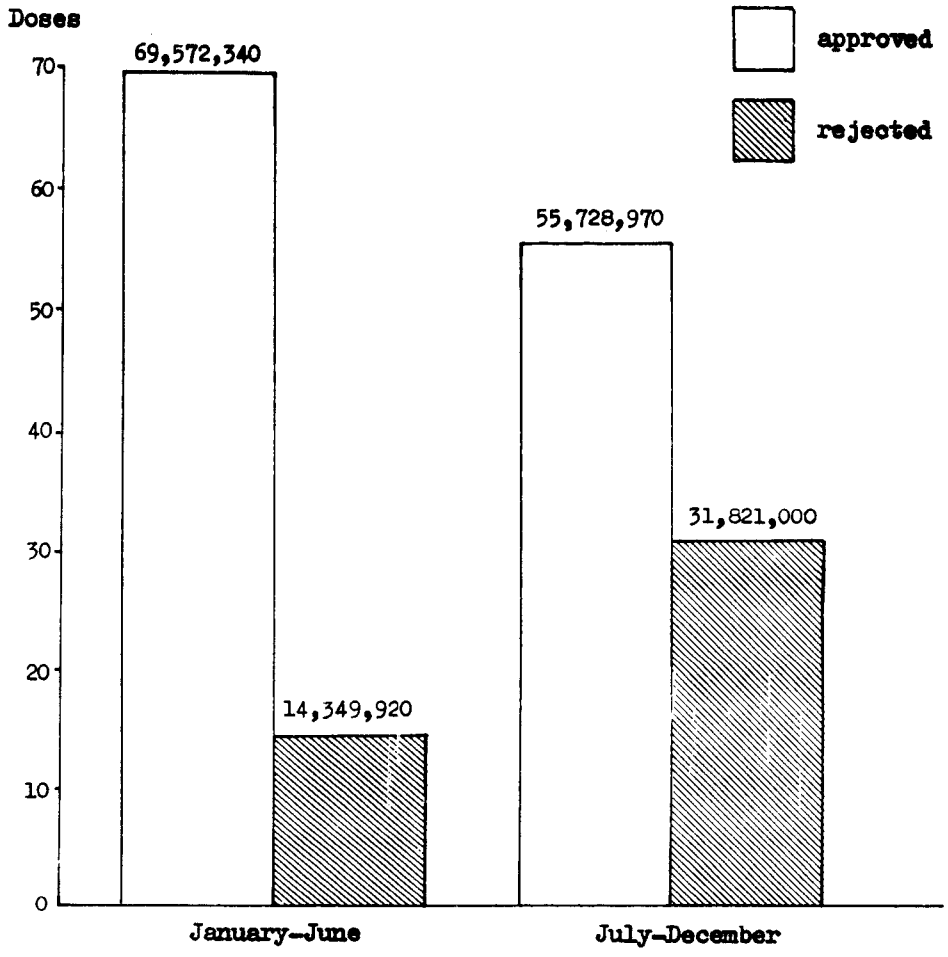
GRAPH 4

Foot-and-mouth disease vaccine approved and rejected (in millions).
ARGENTINA - 1969/1973



GRAPH 5

Foot-and-mouth disease vaccine doses approved and rejected by semester (in millions) - ARGENTINA - 1973



B O L I V I A

I. EVOLUTION OF FOOT-AND-MOUTH DISEASE

1. Geographic distribution of the disease

In the course of 1973 the zone of the High Plateau (regions of La Paz, Oruro and Potosí) does not register any notification of foot-and-mouth disease, and is therefore considered to be outbreak-free.

The department of Santa Cruz de la Sierra registers outbreaks in the provinces of Sara, Cercado, Velasco and Ñuflo de Chávez; in view of its characteristics this area can be considered an area of sporadic foot-and-mouth disease.

This year the department of Cochabamba, a large portion of Chuquisaca and Tarija are considered to be a zone of endemic foot-and-mouth disease.

An outbreak occurred in September at Reyes, in the department of Beni, presenting a high degree of morbidity and mortality. Notwithstanding the control measures which were adopted, the outbreak spread through Santa Ana, Riberalta, Magdalena, province of Moxos and Marbán, whereby the area is to be considered a zone of epidemic foot-and-mouth disease.

2. Virus diagnosis

Eleven samples were received at Ovejuyo Laboratory (INBA-I) in La Paz, and the results were as follows:

Date	Origin	Diagnosis			
		O_1	A_{24}	C_3	Neg.
23/ 2/73	Farm Montecristo Warnes-Santa Cruz	-	-	-	x
30/ 3/73	Farm Nueva Esperanza-A. de Ibánez-Santa Cruz	x	-	-	-
8/ 5/73	Slaughterhouse La Paz	-	-	-	x
14/ 5/73	" " "	-	x	-	-
23/ 5/73	Ovejuyo-La Paz	-	x	-	-
24/ 5/73	Slaughterhouse La Paz (4 samples)	-	x	-	-
29/11/73	Callaychulpa-Quillacollo-Cochabamba	-	-	x	-
18/12/73	Farm Las Brechas-Santa Cruz	x	-	-	-

3. Epidemics

As indicated above, the most worrysome outbreak during the year occurred at Reyes. Unfortunately, at that time the laboratory did not have available the required amount of vaccines for preventing the spread of the disease to other localities, and therefore had to approach the Argentine Government in order to obtain 20,000 doses.

No virus typing was performed due to the fact that no samples were received. In regard to morbidity, 500 sick animals were reported at Magdalena; this information is from one ranch only.

4. Factors related to the disease

As mentioned before, in a previous report, the factors causing the spread of the disease are:open fairs, movements of livestock,weather changes, etc.,may be added regarding the outbreak which occurred at Reyes the inadequate use and handling of vaccines, lack of fast means of communication, and the shortage of sufficient number of technical personnel in the zone.

5. Rates

The scarce information received does not permit establishing morbidity rates.

6. Trends

According to official reports that were received, the trend of the disease is to decrease, as compared with 1971 and 1972.

II. DEVELOPMENT OF THE FIGHT AGAINST FOOT-AND-MOUTH DISEASE

1. Coverage

In the course of 1973 regular vaccinations were performed in the department of Beni, which at present is considered to be a zone program implementation. This change of status was due to the occurrence of outbreaks and to a more active participation of the ranchers in facing the problem. Other districts remain unaltered, and zoning continues to be the same as was established in 1972.

2. Administrative organization

The Animal Health Division maintains the same number of personnel as in 1972, to which have only been added a veterinarian in the department of Potosí (Tupiza), and a vaccinator in Reyes (Beni).

Financial resources were reduced; notwithstanding the fact that a larger amount had been budgeted, the General Direction of Livestock was alloted only 1,500,000 $bs. (US$ 75,000) for operating expenses and 500,00 $bs. (US$ 25,000) as counterpart to the FAO agreement.

The FAO Animal Health and Production Program in the Oriente region, operated during 1973 in the zones of Santa Cruz, some of the Chaco provinces such as O'Connor and Gran Chaco, in Tarija, and Hernando Siles and Luis Calvo, in Chuquisaca. The program's activities in Beni comprised several provinces.

No field personnel from the animal production service was available in the region where the project operated. The animal health service had one chief and 12 subordinates in the department of Santa Cruz, one chief and subordinates in Chuquisaca and Beni, with whom the project had limited contact. With respect to laboratories, the project had one chief and three veterinarians, both in the laboratory at Santa Cruz and at Beni; in addition to which the Monteagudo laboratory, managed by the Chuquisaca Development Committee, received some assistance from the project.

The group of FAO experts consisted of a chief (bacteriologist), an epizootiologist and a pathologist.

The contribution budgeted by the United Nations Development Project amounted to US$ 189,500.

3. Changes made in 1973

Within the service, the item concerning one veterinarian for Tupiza (Potosí) and a vaccinator in Reyes (Beni), was added.

4. Problems

A constant struggle of the service had to do with the financial aspect; the bureaucratic set-up does not allow for swift and timely action, and this is also true in regard to lack of equipment and human resources.

5. Results

No outbreaks of foot-and-mouth disease were registered in the region of the High Plateau, due to the more strict control that was exercised.

Mention must be made that there is a rigorous program of controlled vaccination being applied in the dairy basin of La Paz, through the delivery of purchasing orders for bran upon presentation of the vaccination certificates.

6. International collaboration

The permanent collaboration supplied by the Pan American Foot-and-Mouth Disease Center should be stressed, in providing strains for the preparation of vaccines.

The presence of PAHO/WHO technical advisors for revision of the Feasibility Study on the control of foot-and-mouth disease, of rabies and brucellosis, as well as of experts on vampire control and on the production of anti-rabies vaccine.

The cooperation of the Government of the Argentine Republic, in supplying 20,000 doses of foot-and-mouth disease vaccine.

Bolivia was host to the XVII Meeting of the Regional Technical Committee on Animal Health (COTERSA), in which the situation and the programs being carried out in the neighboring countries regarding foot-and-mouth disease were analyzed, and other joint actions regarding animal health were agreed upon.

Two Bolivian professionals took part in the course on dissemination and communication of health campaigns for the control of foot-and-mouth disease, which has held in Colombia under IDB sponsorship.

7. Research

Experiments are being carried out at the laboratory of Ovejuyo-La Paz on the production of foot-and-mouth disease vaccine through cell culture (BHK), and it has proven to be difficult to adapt virus A, whereas adaptability of virus O and C has been achieved.

There is need for adoption of a series of monthly report forms, in order that the central level may be able to prepare statistical tables and evaluation reports concerning morbidity and mortality.

8. Plans and targets for 1974

The feasibility study for the control of foot-and-mouth disease, rabies and brucellosis had been submitted; and it is foreseen that the Bolivian Government still report at the next Inter-American Meeting of Ministers on Foot-and-Mouth Disease and Zoonoses Control, that this study was presented to the IDB with a loan application estimated in about US$ 6,000,000.

A health agreement for the Oriente Region has been signed with the United Nations Food and Agriculture Organization (FAO) to be carried out in thirty-five months and to begin February first, 1974, with headquarters in the city of Santa Cruz de La Sierra and a field of coverage which will comprise the departments of Santa Cruz, Beni, and the provinces of Andrés O'Connor and Gran Chaco, in Tarija, and Hernando Siles and Luis Calvo, in Chuquisaca.

The project's objectives are:

a) Long term objectives - To create an efficient animal health service in the Eastern region of Bolivia, particularly in regard to direct services to ranchers.

b) Short term objectives

1. To improve field veterinary service, regarding discipline, training and movement of personnel.

2. To prepare the service personnel and the public involved in livestock operations for the compulsory vaccination campaign against foot-and-mouth disease, and for the more intensive control of other diseases which have strong economic relevance.

3. To organize and carry out a pilot program for the control of foot-and-mouth disease as a preparatory step for the large scale campaigns which will be implemented with IDB financial support.

4. To continue reinforcing diagnosis facilities in the laboratories division of the Ministry of Agriculture and Livestock, through technical assistance and training of personnel in the regional laboratories at Santa Cruz, Trinidad and Monteagudo.

5. To establish solid links between the laboratories and the field personnel.

6. To establish a new section of the INBA-I laboratory with the specific function of controlling the quality and efficacy of the vaccines used in the country, and to prepare the draft projects for legislation regarding this issue.

7. To consolidate the progress achieved with the immunization project against piroplasmosis and anaplasmosis, in order to be able to offer a permanent immunization service to the ranchers.

On the other hand, several programs are intended to become effective, such as the creation of zootechnical centers at La Paz, Beni, Santa Cruz and Chuquisaca, the dairy school at Pucarani-La Paz, a zootechnical swine center (Cabaña) at Alto Beni-La Paz, short courses on livestock in all livestock areas in the High Plateau, Valley and Tropical regions of the country, and also to seek the required financial resources to increase the production of foot-and-mouth disease and rabies vaccines at the laboratory of Ovejuyo-La Paz, until the Government should issue calls for bids for the installation and operation of a private laboratory.

III. FOOT-AND-MOUTH DISEASE NOTIFICATION - 1973

No. of affected farms	31
No. of sick cattle	-
No. of sick sheep	-
No. of sick swine	-
No. of farms with samples sent for virus typing	8
No. of farms with FMDV type O diagnosis	2
No. of farms with FMDV type A diagnosis	3
No. of farms with FMDV type C diagnosis	1
No. of farms with VSV type New Jersey diagnosis	-
No. of farms with VSV type Indiana diagnosis	-
No. of farms with negative diagnosis	2

IV. COVERAGE SITUATION OF THE FOOT-AND-MOUTH DISEASE COMBAT IN 1973

Area in Km^2 a/	-
Livestock farms a/	-
Cattle population a/	-
Sheep population a/	-
Goat population a/	-
Total doses of vaccine prepared	-
Total doses of vaccine controlled	-
Total doses of vaccine approved	-
Doses of vaccine exported	-
Doses of vaccine imported b/	20 000
Doses applied in cattle	85 000
Doses applied in sheep	73 700

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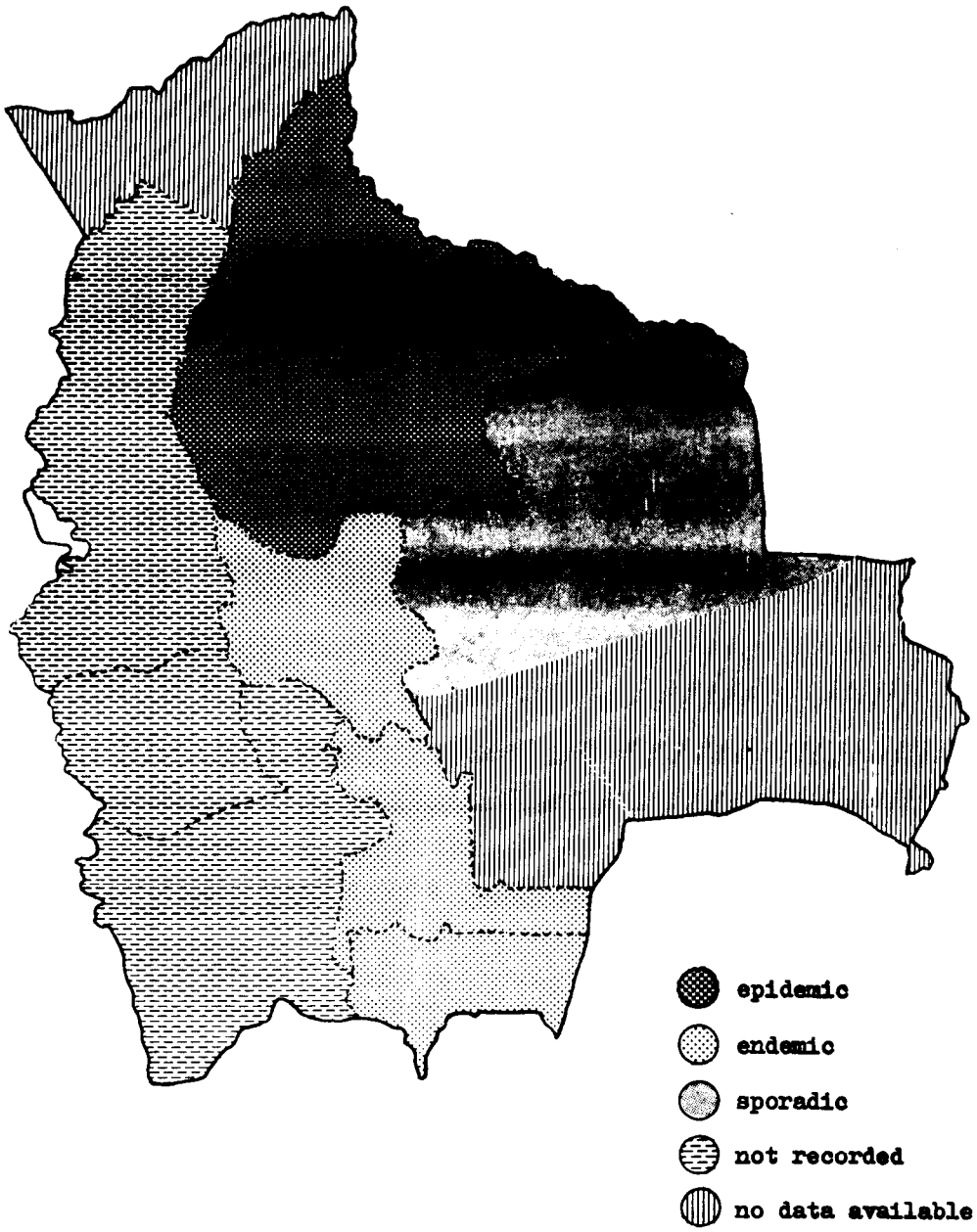
a/ Implementation area.

b/ Origin: Colombia.

MAP 7

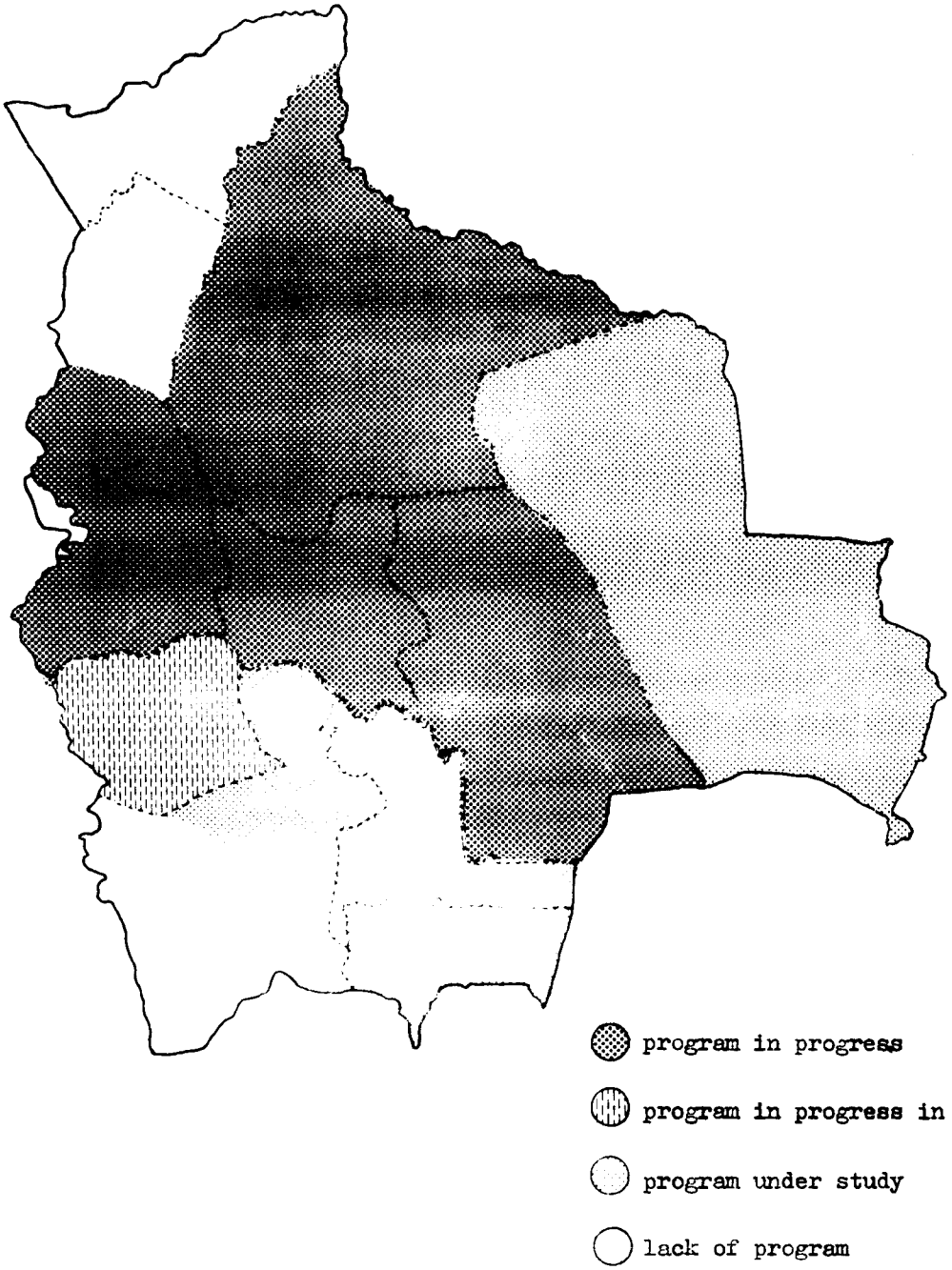
Foot-and-mouth disease geographic situation
BOLIVIA - 1973



MAP 8

Foot-and-mouth disease combat situation.

BOLIVIA - 1973



B R A Z I L

I. EVOLUTION OF FOOT-AND-MOUTH DISEASE

1. Geographic distribution of the disease

During 1973, the epidemiological panorama of foot-and-mouth disease appeared to be favorable in the seven Federal units that are incorporated within the National Foot-and-Mouth Disease Combat Plan. Occurrence of the disease was registered in its endemic form, and again a more pronounced incidence in the southern states of Brazil was observed, probably due to ecological conditions favorable to the disease (map 9).

The subareas of Mostardas and Santa Vitória do Palmar, in Rio Grande do Sul, continued to be areas of sporadic incidence of foot-and-mouth disease, and have become reserve areas for cattle sensitive to vaccine efficacy tests. Other areas of sporadic incidence are located in the northeastern part of the Federal Territory of Roraima, as well as in the subarea of Mantenópolis, in the state of Espírito Santo.

There was a high incidence of the disease, during the year, in the area of Estrela (Rio Grande do Sul), characterized by 1,216 foci that were confirmed and causing 36.42% of the total number of foci that occurred in the state, with predominance in mixed breeding establishments (cattle and pigs), resulting from unsanitary conditions arising from the inadequate use of residuals of the industries.

2. Virus diagnosis

As in 1972, again virus type C was predominant in the three southern states (Rio Grande do Sul, Santa Catarina and Paraná). In 900 out of 1,121 confirmed foci, said virus was present, making up for 80.29% of the C virus cases diagnosed in the seven states.

Virus O was more frequently present in São Paulo and Espírito Santo, although in the latter state only 17 diagnosis of that virus were effected.

In the state of Bahia, notwithstanding the low incidence of the disease, the largest number of diagnosis corresponds to virus A.

Table 8 presents the epidemiological outlook in the areas in which the National Foot-and-Mouth Disease Combat Plan is active, and the analysis of the

data contained therein reflects the favorable aspects of the program, taking into consideration its projections for 1973, with increased areas of sanitation and of the cattle population under control.

Subtyping of the collected samples revealed the presence of subtypes O_1, A_{24} and C_3.

No vesicular stomatitis was identified.

3. Epidemics

As mentioned under item 1, only in the area of Estrela (Rio Grande do Sul) foot-and-mouth disease appeared with epidemical characteristics, predominantly on pigs, with typing of virus C, subtype C_3.

4. Factors related to the disease

In the area of the National Foot-and-Mouth Disease Combat Plan, it has been observed that the disease presents a rather similar distribution pattern, with some seasonal variations which are more pronounced during the harvesting period, particularly in Rio Grande do Sul. The type of livestock activity in small ranches which include cattle and pigs is quite characteristic of the region, whereby it becomes difficult to adopt sanitary measures and consequently to control the disease.

It was noticed that the incidence of the disease increases during the period nearing vaccination, and it was also proved that the most sensitive age bracket to FMD is between 1 and 2 years of age.

5. Rates

Comparative table 9, containing data collected in 1971, 1972 and 1973, indicates the positive results that can be seen from the panorama of the disease in the areas of the National Foot-and-Mouth Disease Combat Plan. Morbidity rates have favorable decreased from 193.45 to 91.65, down to 77.99 per 10,000 during the three years that have been mentioned. The rates of attack presented small oscillations, while the rates of mortality manifested a decreasing trend.

In the states of Santa Catarina and Paraná higher morbity rates were registered, attributed to virus C_3.

Again, a higher incidence of the disease was corroborated in the southern states (Rio Grande do Sul, Santa Catarina and Paraná), with 5,306 confirmed foci

that correspond to 62.09% of the number of foci in the working area. Swine actively participated in disseminating the disease in that same area, with 22,886 sick pigs. Sheep, which exist in great number in the state of Rio Grande do Sul, concurred with a total of 9,753 sick animals (item III).

During 1973, foot-and-mouth disease affected 8,546 breeding farms out of a total number of 921,711 owners registered in the National Program (item IV).

6. Trend

For 1974, balance in the epidemiological picture of the southern states with respect to the incidence of virus C_3, is anticipated. There are precedents that suggest that special attention be given to epidemiological surveillance, mainly with respect to virus O, and second in regard to virus A, in said states.

In the remaining states the trend of the disease may duplicate the favorable events occurred in recent years. In general, it is hoped that there will be a decline of the disease in the working area, resulting from the constant improvement of the vaccine's immunogenic quality and from complementary prophylactic activities which are being increasingly applied, mainly in such sectors as sanitary education, movement of animals, assistance to affected establishments, and epidemiological surveillance.

II. DEVELOPMENT OF FOOT-AND-MOUTH DISEASE COMBAT

1. Coverage

The establishment of the National Foot-and-Mouth Disease Combat Plan in the whole country is programmed for 4 successive quadrenniums. In the present first stage of the work, foot-and-mouth disease combat activities are developed chiefly in the 7 Federal units which are linked to the program, i.e.:

Rio Grande do Sul (100% of the geographic are covered), Santa Catarina (100%), Paraná (45.88%), São Paulo (44.17%), Minas Gerais (30.73%), Bahia (34,69%), and Espírito Santo (100%).

2. Administrative organization

An amount of Cr$ 54,584,826.25 was assigned in 1971 to the National Foot-and-Mouth Disease Combat Plan, to be applied on expenditures for technical and auxiliary personnel, purchase of vehicles and equipments, and for perishable as well.

In 1972, said investments added up to Cr$ 81,704,006.73.

During 1973, there was an increase in the financial support of 1.90%, which corresponded to an investment of Cr$ 83,253,327.79 (incomplete data).

Resources of the order of Cr$ 176,851,948.00 have been programmed for 1974, which is an increase of 124.26% over 1973.

3. Changes made in 1973

The decrease in local production of vaccines, in 1973, caused some difficulty in meeting the requirements for vaccinating the herds in the states in which the National Foot-and-Mouth Disease Combat Plan operates, as well as in the Federal units where this activity is carried out, although not as systematically as in the former states.

In order to prevent problems in view of this situation, the Office of Foot-and-Mouth Disease Combat Coordination, after studies and meetings for elucidation of the question, established a strategy which insured vaccination of animals in the age-bracket as they are more exposed to the risk of the disease, and such strategy also included and took into account the international aggreements on exports of cattle and/or of animal products and by-products.

For the purpose of supporting that strategy, the following procedures were adopted:

a) Health education - promotion and dissemination

Health education measures aimed at the participation and support of the interested community, were intensified, and use was made of the diverse educational media and/or processes, adapting same to the different population strata, according to the social levels: educational, beliefs, purchasing power, etc.

b) Control of animal movements and disinfection

A study on the distribution of fixed and mobile health surveillance posts was prepared in accordance with the projections that were established for the seven states, and aimed at the flux (interstate, intermunicipal and intramunicipal) of cattle. In view of the importance of susceptible animal transit control and disinfection of vehicles, as regards foot-and-mouth disease, the Office of Foot-and-Mouth Disease Combat Coordination is adopting measures in order that such posts can work more objectively and rapidly, thus becoming truly a system for stopping the shifts of the infection sources of the disease.

c) Assistance to affected livestock establishments and epidemiological surveillance

Through the new system of epidemiological information that has been established at subarea, area and central levels, in the states, this sector has taken impetus to have at hand all needed information for immediate action at the opportune time in order to close in and smother the foci and also to establish timely perifocal vaccination plans and other pertinent measures.

d) Control of vaccine marketing and handling

A rigorous control of vaccine sales and stocks is kept on the dealers in the states, and also periodic visits of inspection are carried out in order to verify the state of conservation of the product. Dealers are also controlled at the time they receive the product, which can only be sold within the sanitation area to those who are intitled to purchase it by permit of the National Foot-and-Mouth Disease Combat Plan.

4. Problems

Limitations observed through 1973, dealing with vaccine production, are enumerated hereunder:

a) Lack of raw material which is suckling rabbits. On the basis of experimental studies carried out in the Vaccine Control Units, minimum conditions were established concerning the amount of raw material required for preparation of rabbit-produced vaccine, which provoked a considerable increase in consumption.

b) Production of suckling rabbits is based upon small breeding establishments, many of which lack even minimal sanitary conditions, and are subject to fluctuations which greatly contribute to the lack of vaccine on the market.

c) The increase in the demand of newborn rabbits brought chaos to the trade, provoking inflation in the market and an increase in the cost.

d) The laboratory using the BHK technique, and which during the first semester of 1972 accounted for 40% of the national production, was stopped during a certain time because of mechanical problems in the equipment.

e) Lastly, there was also a reduction in the offer of the product due to the rejection of several batches of vaccines, after official efficacy tests were performed.

5. Results

The establishment in the states of direct supervision over subprojects prepared at central level, has permitted to arrive at a more speedly identification of the problems that restrain actions related to the logistics of the National Foot-and-Mouth Disease Combat Plan in said states.

The results achieved by means of the information obtained through the dynamics of this close supervision, permitted, although as yeat only partially, since the innovation was recently introduced, to take timely decisions aimed at solving the problem of the "periphery", which by virtue of the vastness of the country, requires special and/or specific policies.

In regard to 1973, the development of the Plan presented a 10.14% increase in areas being worked on, and 8.63% in vaccinated cattle, while human and financial resources went up 34.58% and 1.90%, respectively.

An intensive training program was carried out, which increased the proficiency of 172 technicians in laboratory activities, project administration, epidemiology, field work and animal health planning.

In addition to this training at national and international levels, a series of courses under the sponsorship of the Secretariat of Agriculture and the Executive State Groups for Foot-and-Mouth Disease Combat (GECOFA), were proffered, on such matters as training in foot-and-mouth disease, updating of FMD campaigns, vaccine control, serology, breeding of laboratory animals, courses for field assistants, etc. A total number of 622 technicians, 2,936 technical assistants, and 107 administrative personnel, attended such courses.

The industrial plant that produces foot-and-mouth disease vaccines, and which is made up of 11 laboratories, produced 139,835,880 doses of trivalent vaccine in 1973, in other words 23.85% less than the 1972 production. Of the total number of vaccines that was produced, 136.879,200 doses were released for use.

Estimated production for 1973 was 238,333,600 doses of trivalent vaccines, but production barely reached 58.67% of what had been estimated.

6. International collaboration

There was an intensive collaboration during 1973 with Latin-American countries and with the Pan American Health Organization, particularly in regard to training of personnel assigned to the program, exchange of epidemiological data of common interest, meetings, seminars and lectures, for the purpose of

promoting the standardization of procedures for improved action in the combat against foot-and-mouth disease in the Continent, as follows:

a) I Meeting of the South American Commission for the Control of Foot-and-Mouth Disease, held in Rio de Janeiro, 26-28 February.

b) VI International Meeting on Foot-and-Mouth Disease and Other Zoonoses Control, held in Medellín, Colombia, 9-12 April.

c) VIII Anti-Foot-and-Mouth Disease Meeting - Brazil-Venezuela-Guyana, held in Medellín, Colombia, 10-11 April.

d) I Seminar on Animal Health Planning, held in Medellín, Colombia, 16-21 July.

e) I Seminar on Communication Techniques, held in Bogotá, Colombia, 2-21 July.

f) Meetings of the Animal Health Program Coordinating Committee for the State of Rio Grande do Sul.

g) Regional Seminar on Surveillance of Communicable Diseases and Zoonoses held in Rio de Janeiro, 2-8 December.

h) Extraordinary Meeting of the Joint Committee of the Paraguayan-Brazilian Cooperation Agreement to the Foot-and-Mouth Disease Combat, held in Curitiba, Paraná, 19-20 March.

i) Extraordinary Meeting of the Joint Committee of the Paraguayan-Brazilian Cooperation Agreement to the Foot-and-Mouth Disease Combat, held in Puerto Presidente Stroessner, Paraguay, 28-29 June.

j) III Course on Animal Health Planning, held at the Pan American Zoonoses Center, Buenos Aires, during the period 14 May-14 December, and in which 5 Brazilian veterinarians participated.

k) III, IV and V Courses of the Training Unit on Foot-and-Mouth Disease of Rio Grande Do Sul, created by agreement between the Ministry of Agriculture, the Pan American Health Organization and the Secretariat of Agriculture of Rio Grande do Sul. Fifty six veterinarians took part.

l) III and IV Specialization Courses on Epidemiology and Prophylaxis, held under the agreement signed between the Ministry of Agriculture, the University of São Paulo and the Pan American Health Organization. Forty

veterinarians were trained in the 2 courses, which were carried out at the University of São Paulo.

m) I Course on Implementation and Evaluation of Animal Health Projects, held in cooperation with the Inter-American Public Administration School of the Getúlio Vargas Foundation, in Brasília, from 21 May to 31 June, with participation of 25 professionals, among veterinarians and economists.

n) VI Course on Projects Administration, promoted by the Inter-American Public Administration School of the Getúlio Vargas Foundation, held in Guanabara, during the period 20 June to 18 September, one economist participating.

o) Course on Supervision and Operation of Specialized Laboratories in Vaccine Production and Control, held at the Pan American Foot-and-Mouth Disease Center during the period 2 July 1973 to 2 April 1974, under the sponsorship of the Ministry of Agriculture, the Pan American Health Organization and the Inter-American Development Bank; three veterinarians participated in this course.

p) Training in tissue culture, serology, seroprotection and breeding and handling of laboratory animals, held at the Pan American Foot-and-Mouth Disease Center, with 11 professionals participating.

7. Research

The 1973 foot-and-mouth disease research program includes topics on epidemiology, diagnosis and vaccine production, and field activities as well.

Many works with similar objectives are being carried out in the states which participate in the National Foot-and-Mouth Disease Combat Plan, and which in addition to seeking to know more about the disease, endeavor to exhibit the regional influences which originate from ecological factors in each of the Federal units.

The works that had been programmed, and that were completed, are now being written up; these works were carried out at the vaccine control unit, in Rio Grande do Sul.

- Serological and immunological study of two foot-and-mouth disease virus type C Waldmann strains.
- Validation and comparison of serological spectra and immunogenic ability of two virus C Waldmann strains.

- Immunological value of foot-and-mouth vaccines produced in Brazil.
- Preparation of rabbit-produced antigen. Production of foot-and-mouth disease vaccines and determination of their immunological value.

Works that were started in 1973:

Vaccine Control Unit of Rio Grande do Sul

- Foot-and-mouth disease immunity in cattle vaccinated for the first time and revaccinated with commercial rabbit-produced vaccines.
- Control of the wholesomeness of commercial rabbit-produced vaccine in cells. Relationship to the test with suckling mice.
- Anti-VIA control for the selection of cattle used for testing vaccine efficacy.
- Study of foot-and-mouth disease antigen produced in suckling rabbits for industrial vaccine production.
- Dietary regimes and handling systems in breeding guinea pigs.

Diagnosis Laboratory at São José and epidemiological sector of Santa Catarina

- Behavior of the sample C_3 Indaial in the state of Santa Catarina.
- Occurrence and distribution of foot-and-mouth disease virus in the state of Santa Catarina.
- Incidence of foot-and-mouth disease in swine, as related to the occurrence of the disease in cattle.

Institute of Biology and Technological Research of Paraná and Division of Diagnosis and Epidemiological Observations

- Occurrence of foot-and-mouth disease virus in the cattle herd of the state of Paraná, and relationship thereof with the samples used in the vaccines.
- Immunological stimulus of foot-and-mouth disease in buffaloes.

Vaccine Control Unit of Minas Gerais and GECOFA-MG

- Study of virus occurred in cattle at the Mid-Jequitinhonha region of Minas Gerais, and relationship of same to samples used in the vaccine.

- Curve of circulating antibodies induced by rabbit-produced foot-and-mouth disease vaccine.
- Undesirable reactions of foot-and-mouth disease vaccine.

Diagnosis Laboratory and GECOFA-ES

- Foot-and-mouth disease ethiology and dynamics in cattle in the state of Espírito Santo.
- Undesirable reactions provoked by foot-and-mouth disease vaccine.
- Behavior of foot-and-mouth disease in cattle.
- Occurrence of foot-and-mouth disease in swine, and relationship with its occurrence in cattle.

8. Plans and targets for 1974

The national outlook has determined, among other activities, the following targets:

a) Training of 541 professionals and 2,046 assistants.
b) Vaccination of 46,442,268 cattle.
c) Efficacy control of 50% of locally produced vaccines.
d) Incentive to the work being carried out in the central- western and northeastern regions.
e) More dynamics in controlling frontier regions.
f) Implementation of the operational plan, and preparation of an integrated project jointly with Venezuela and Guyana, in the Territory of Roraima.

III. FOOT-AND-MOUTH DISEASE NOTIFICATION - 1973 a/

No. of affected farms	8 546
No. of sick cattle	293 336
No. of sick sheep	9 753
No. of sick swine	22 886
No. of farms with samples sent for virus typing	3 939
No. of farms with FMDV type O diagnosis	593
No. of farms with FMDV type A diagnosis	571
No. of farms with FMDV type C diagnosis	1 121
No. of farms with negative diagnosis	1 654

---

a/ Incomplete data: some figures for December are pending.

IV. COVERAGE SITUATION OF THE FOOT-AND-MOUTH DISEASE COMBAT IN 1973

Area in Km^2 a/	982 269
Livestock farms a/	921 711
Cattle population a/	37 159 918
Sheep population a/	13 574 000 b/
Goat population a/	609 000 b/
Total doses of vaccine prepared	139 835 880
Total doses of vaccine controlled	139 835 880
Total doses of vaccine approved	136 879 200
Doses of vaccine exported	-
Doses of vaccine imported	-
Doses applied in cattle	97 256 151
Doses applied in sheep (in Mostardas, R. G. do Sul)	59 830

---

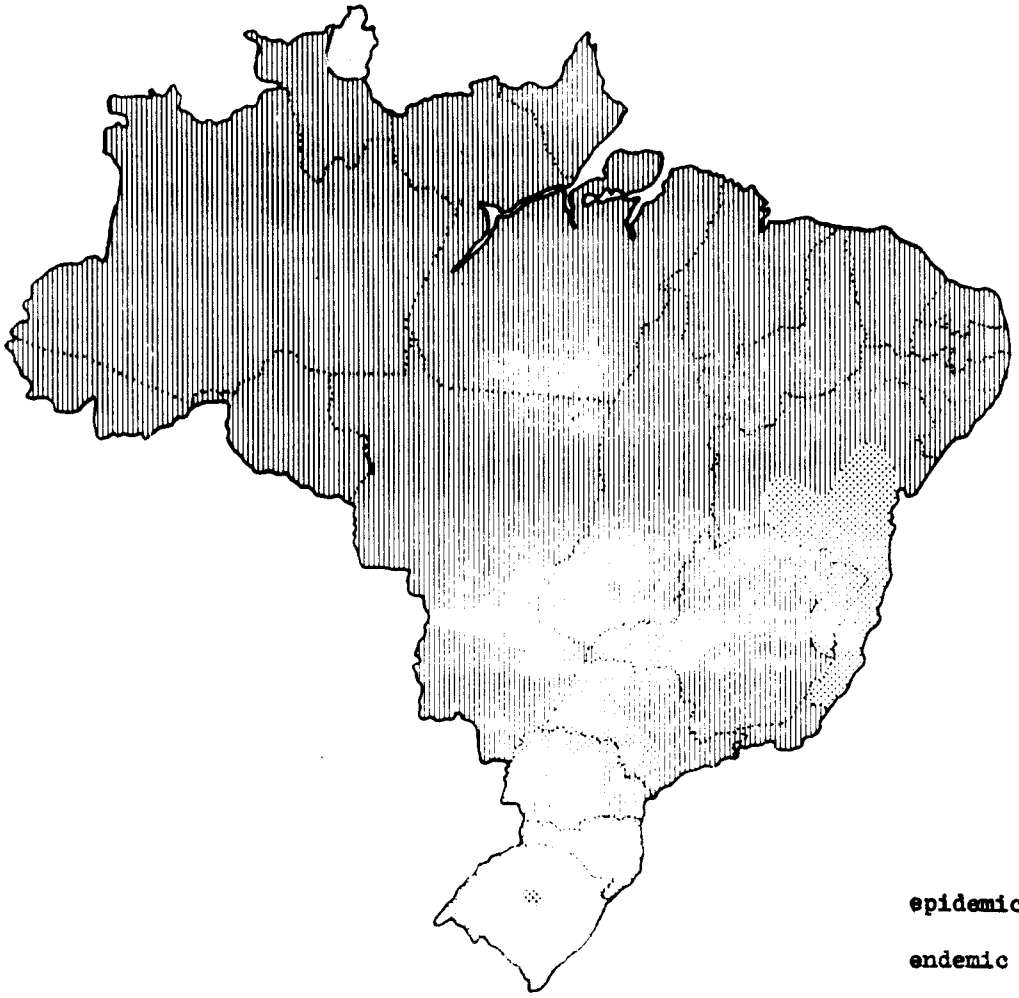
a/ Implementation area.

b/ IBGE data, 1972 (Rio Grande do Sul, Santa Catarina and Espírito Santo).

MAP 9

Foot-and-mouth disease geographic situation.

BRAZIL - 1973



epidemic+

endemic

sporadic

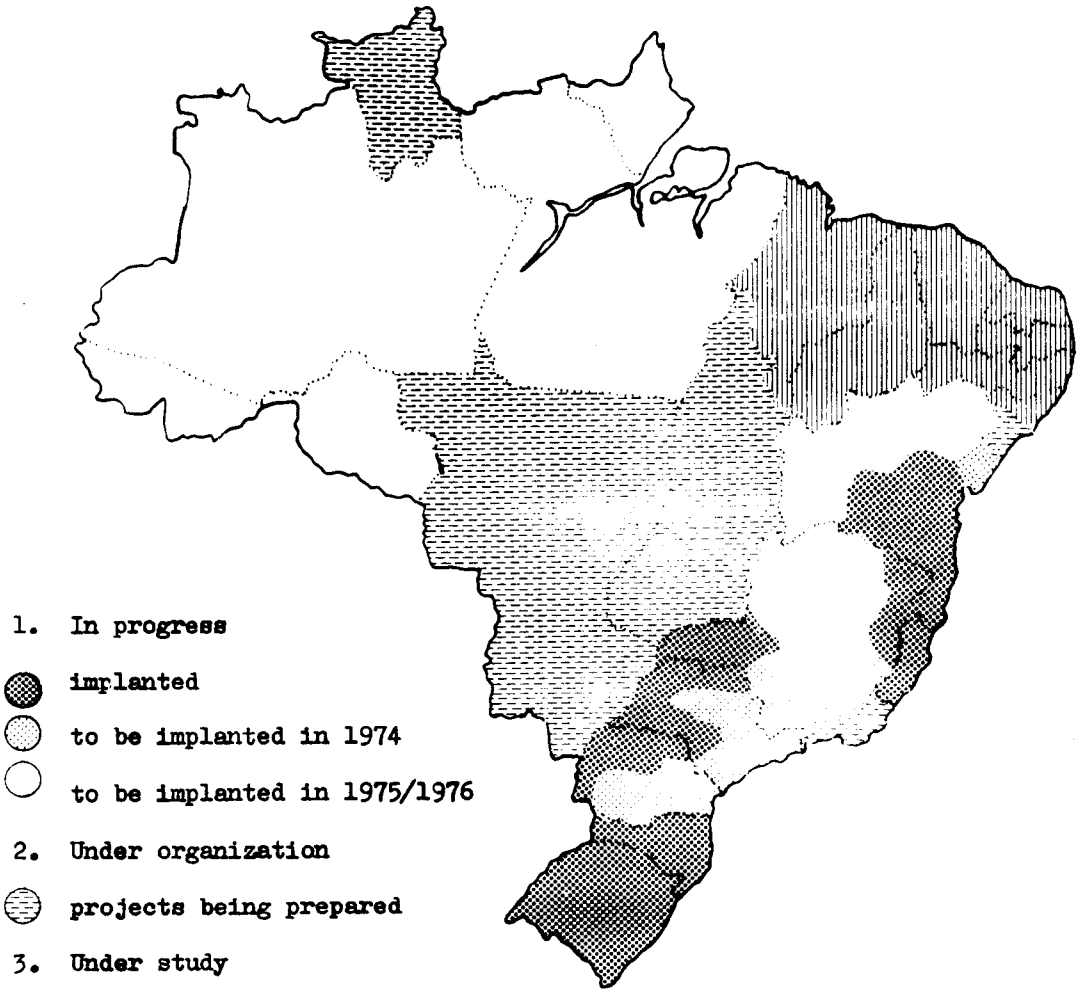
no data available

+ In swine, region of Estrela

MAP 10

Foot-and-mouth disease combat situation.

BRAZIL - 1973



1. In progress
   - implanted
   - to be implanted in 1974
   - to be implanted in 1975/1976
2. Under organization
   - projects being prepared
3. Under study
   - for 1980
   - for 1984

TABLE 8

Evolution of foot-and-mouth disease - BRAZIL - 1973

Years	Confirmed foci	Collected foci		Foci with diagnosis		No. of foci as related to virus type					
						O		A		C	
		No.	%	No.	%	No.	%	No.	%	No.	%
1971	8 598	1 469	17.08	967	11.24	554	57.29	238	24.61	175	18.09
1972	7 191	3 021	42.01	1 670	23.22	435	26.04	504	30.17	731	43.77
1973	8 546	3 939	46.09	2 285	26.74	593	25,95	571	24,99	1 121	49.06
Variation 1971-1972	- 1 407	+ 1 552	+24,93	+ 703	+11.98	- 119	-31.25	+ 266	+ 5.56	+ 556	+25.68
Variation 1972-1973	+ 1 355	+ 918	+ 4.08	+ 615	+ 3.52	+ 158	- 0.09	+ 67	- 5.18	+ 390	+ 5,29

TABLE

Morbidity, attack, lethality and mortality ratios in the different states covered by the National Foot-and-Mouth Disease Combat Plan

BRAZIL - 1971/1972/1973

States	Mortality x 10^3			Attack x 10^2			Lethality x 10^3			Mortality x 10^3		
	1971	1972	1973[a]	1971	1972	1973[a]	1971	1972	1973[a]	1971	1972	1973[a]
Rio G. do Sul	271.22	144.13	95.27	12.50	15.62	22.02	10.76	8.82	13.51	29.18	12.71	12.37
S. Catarina	14.50	35.69	65.63	40.86	24.59	29.87	21.68	7.32	23.14	[illegible]	2.61	15.14
Paraná	112.21	79.65	108.84	22.67	20.92	15.59	8.18	5.50	5.78	9.18	4.38	6.29
São Paulo	83.51	67.05	66.82	10.75	12.72	11.88	50.74	9.41	8.62	44.91	6.31	5.76
Minas Gerais	28.12	36.65	54.92	24.58	16.88	13.22	-	8.71	5.03	-	3.19	2.76
Bahia	155.73	106.69	71.91	8.17	8.95	8.86	0.97	2.62	2.58	1.51	2.79	1.86
E. Santo	55.75	59.93	48.84	13.26	15.49	12.86	9.80	9.65	3.83	5.46	5.78	1.87
T o t a l	155.45	91.65	77.99	12.13	14.58	15.41	11.93	7.75	9.50	23.08	7.10	6.88

a/ Incomplete data.

TABLA 10

Global outlook

BRAZIL - 1971/1972/1973

Specification	Years		
	1971	1972	1973
1) Area in Km^2 (thousand)			
Total area of the country	8 511	8 511	8 511
Area subject to the program	629	892	982
2) Animal population (1,000 heads)			
cattle a/	80 911	83 654	86 490
goats b/	12 906	12 835	14 002
swine b/	45 817	43 536	53 982
sheep b/	22 610	22 627	24 640
cattle in the program	19 917	32 473	37 160
3) Notification of foot-and-mouth disease			
No. of animals in the foci	3 177 573	2 041 543	1 903 799 c/
No. of sick animals	385 292	297 615	293 336 c/
No. of affected farms	8 598	7 191	8 546
4) Foot-and-mouth disease diagnosis			
Foci with collected material	1 469	3 021	3 939
Virus 0	554	435	593
Virus A	238	504	571
Virus C	175	731	1 121
Negative	502	1 199	1 654
5) Foot-and-mouth disease vaccine (in 1000)			
Doses produced	138 737	183 634	139 835
Doses applied	53 262	79 306	97 315
Vaccinated cattle	19 917	30 124	30 724
6) Human resources			
Number of veterinarians	482	681	691
Other technicians of university level	5	12	26
Number of assistants	5 707	6 099	8 424
7) Financial resources			
Total budget	54,384,826.25 d/	81,704,006.73 d/	83,253,327.79 e/

a/ Projection based on geometrical growth rate of the herd (3.393%) obtained from the results of the Census taken in 1960 and 1970 - IBGE.

b/ Basic data 1962-1972 IBGE; and adjusted projection for 1973 (Office of Agriculture Statistics - SUPLAN - Ministry of Agriculture).

c/ Incomplete data.

d/ Opinion issued by the Independent Auditors (London Blom quist).

e/ Incomplete data.

C O L O M B I A

I. EVOLUTION OF FOOT-AND-MOUTH DISEASE

1. Geographic distribution of the disease

During 1973, Colombia evidenced well-defined zones of occurrence of the disease, with the following characteristics: (map 11).

a) Free zone

The Northwestern region of the department of Chocó continued free of foot-and-mouth disease and of vesicular diseases. This region corresponds to Area No, 1 in the ICA-IDB project.

b) Not registered

No cases of vesicular diseases were registered in the zone of Leticia, at the frontier with Brazil and Peru, during 1973. The program of epidemiological surveillance, sanitary control, and periodic compulsory and massive vaccination of livestock by official personnel continue to be implemented.

c) Epidemic zone

The disease in its epidemic form was evidenced in some of the municipalities of the departments of Antioquia, Cundinamarca, Valle, Córdoba, El César, Tolima, Norte de Santander, Santander, Meta, Cauca, Huila and Boyacá.

d) Endemic zone

Outbreaks were evidenced in the departments of Caldas, La Guajira (Eastern portion), Meta (in the region of the Eastern Plains), Cundinamarca (in the Western region), Cauca, Tolima, Huila, Norte de Santander, Santander y César.

e) Sporadic zone

This characteristic was present in the Urabá regions Northwest of Antioquia, in the departments of Sucre, Atlántico, Nariño, and the intendancies of Caquetá, Putumayo, Vichada and Mid-Magdalena region.

2. Diagnóstico del virus

During 1973, virus A, subtype A_{27}, did not present the dominant features it had exhibited in 1972. Type O, subtype O_1, occurred more frequently, specially in the country's Southern and Central zones (Antioquia, Cundinamarca and Valle).

Vesicular stomatitis caused by types New Jersey and Indiana was present with similar intensity as in the preceding year; the affected regions were the coffee-producing zones with moderate climate, and the rice-producing zones.

Distribution of foci of vesicular diseases (foot-and-mouth disease and vesicular stomatitis) was as follows, by types of virus:

Foot-and-mouth disease virus type A	109
Foot-and-mouth disease virus type O	87
Vesicular stomatitis virus type New Jersey	98
Vesicular stomatitis virus type Indiana	28
Foci with negative results	63
TOTAL	385

As compared with the preceding year, the situation was the same. A total of 458 vesicular foci were present in 1972, distributed by type of virus in the following manner:

Foot-and-mouth disease virus type A	181
Foot-and-mouth disease virus type O	82
Vesicular stomatitis virus New Jersey	105
Vesicular stomatitis virus Indiana	36
Negative tests	54
TOTAL	458

3. Epidemics

During the favorable panorama that was observed during 1973, the outbreaks that affected the municipalities of the following departments, were quite noticeable:

Department	Municipality
Antioquia	Don Matías, Entrerríos, Yarumal, Santa Rosa de Osos and Belmira.
Cundinamarca	Ubaté, Subachoque.
Valle	Palmira, Buga and Sevilla
Tolima	Guamo and Saldaña
Cesar	Chiriguaná, Río de Oro and Valledupar
Guajira	San Juan del César

Cauca	Santander de Quilichao
Córdoba	Montería, Los Córdobas and Río de Oro

Severe quarantine measures and intense activity developed by ICA's Health services were applied in order to control these outbreaks and avoid dissemination of the disease.

4. Factors related to the disease

The most influential factors for the occurrence of numerous outbreaks of the disease presenting epidemic characteristics, were:

a) Massive movements of livestock due to severe drought season that struck the Atlantic Coast regions for almost 8 months, compelling ranchers to transfer their cattle to strips of land bordering the Magdalena River. Then followed a rainy season that flooded those areas, and almost one million heads of livestock had to be speedily removed to high altitude, the originating region, with no time left for revaccination.

b) Insufficient vaccine, covering only 30% of the requirements of the susceptible animal population, in regions not subject to a campaign including sistematic vaccination.

c) Control of livestock movements within the country continues to be inadequate, and in more than one occasion has favoured the dissemination of the disease.

5. Rates

Cattle population - 21,691,689 (1970 DANE Census and 1973 ICA estimate).

Detected foci with laboratory diagnosis	391	
Population at risk	75,276	cattle
	1,951	swine
Affected population	7,082	cattle
	808	swine
Rate of attack	9,41%	cattle
	41,41%	swine
Morbidity	3,26	per 10,000

6. Trend of the disease

The global epidemiological picture registered shows a slight decrease in

the disease as compared to previous years. However, a trend toward accumulation of the highest number of cases in the last three months has been observed (see graphs 6, 7, 8 and 9).

II. DEVELOPMENT OF THE FOOT-AND-MOUTH DISEASE COMBAT

1. Coverage

For campaign implementation purposes, the country has been divided into five zones. In Zone No. 1, Atlantic Coast, the campaign was totally implemented in three pilot areas. In the remaining zones of the country, Nos. 2, 3, 4 and 5 (map 12), the campaign was carried out in part, as follows:

a) Implementation areas

Campaign coverage is indicated in map 12 and in the table under item IV, with inclusion in 1973 of two additional areas - No. 3 (department of Córdoba) and area No. 6 (departments César and Guajira), in which set vaccination schedules were established. These areas are under the care of official personnel made of veterinarians and helpers, that survey and supervise the implementation of programmed activities at national and regional levels, in coordination with other agencies linked to the livestock sector and private technical assistance veterinarians.

b) Organization areas

Infrastructural activities continue to be developed in areas Nos. 4, 5, 7 and 8, with a view toward incorporation of said areas in 1975.

c) Under study

In the remaining portion of the country, corresponding to zones Nos. 2, 3, 4 and 5, the campaign is carried out only in part, not subject to time-schedules, and depending from the results obtained in the pilot zone they would be incorporated every five years.

2. Administrative organization

Sub-Project on Animal Health of the ICA-IDB Project

The Sub-Management of Livestock Production, Division of Animal Sanitation is in charge.

The following administrative structure has been established for the purpose of carrying out the project:

a) At National Level

1) The National Council on Foot-and-Mouth Disease and Brucellosis Campaigns (CONAB), created by Resolution No. 431, of 1971.

2) Office of Specific Projects: National Foot-and-Mouth Disease Program.
National Brucellosis Program.

3) Division - Animal Health Division.

4) National Technical Supervision (FMD and Brucellosis Program).

5) Evaluation and Biostatistics Unit.

6) Technical Advisory Committee of the Campaigns, created by Resolution No. 1185, of 1971.

b) At Regional Level

1) Campaign Regional Chief.

2) Animal Health Regional Supervisors.

3) Chief Veterinarian of the Sector.

4) Sectorial Assistant Veterinarian (to be appointed only for certain sectors, that in view of their area and livestock population require more than one veterinarian).

5) Sectorial inspectors.

Administrative supervision at national level is to be exercised by the Technical Council (CONAB), the General Manager, and the National Director of the Campaign and of the Planning Directorship.

At regional level, by the Regional Manager and Regional Chief of the Campaign. Regional Management Offices, which are the primary executive units of ICA activities, and are distributed over the country (totalling 9), will have administrative jurisdiction over campaign personnel at regional level.

Technical directorship shall be exercised by the central agencies, the structure of which has already been described.

Technical directorship at national level shall be exercised by the National Director of specific projects and by his advisors (as previously indicated).

By mid-1973, the ICA-IDB pro[illegible] had the following staff:

209 veterinarians, 14 bacteriologists, 264 technician assistants, 136 secretaries, 10 skilled workers, and 56 miscellaneous asistants, totalling 689 individuals.

3. Changes made in 1973

In regard to organization, it is well to point out the creation of the Sub-Managership of Livestock Production, and of the Animal Health Division, which began operations January 1st, 1974.

The "Agreement between the Ministry of Agriculture of the Government of Colombia and the United States Department of Agriculture" was signed August 18, 1973.

The purpose of this agreement is to establish the terms under which the Ministry of Agriculture of Colombia and the United States Department of Agriculture cooperate in a program aimed at the control and eradication of foot-and-mouth disease in the Urabá region in Chocó, at the frontier with Panama, and prevent dissemination of this disease from Colombia to the free areas, as a result of the Darien Highway that is under construction. This program is also an effort to assist the campaign which are carried out in this area under the ICA-IDB project.

Training - The first "Seminar on Techniques of Dissemination and Education for Foot-and-Mouth Disease Control and Prevention Programs" was held in Bogotá, from 2 to 20 July, 1973. The seminar was sponsored by the "Colombian Plant and Animal Institute - ICA", the Inter-American Development Bank - IDB, the Pan American Health Organization and the Inter-American Institute of Agricultural Sciences of the OAS. A total of 21 fellows attended from the following countries: Bolivia 2, Brazil 2, Colombia 4, Chile 2, Ecuador 2, Nicaragua 1, Panama 2, Paraguay 2, Uruguay 2 and Venezuela 2.

In compliance with the program for training abroad, through agreements with the Pan American Foot-and-Mouth Disease Center and the Pan American Zoonosis Center, 12 professionals were granted fellowships.

In compliance with the programs for internal training, the following courses for the personnel of the health campaigns of the ICA-IDB project, were proffered:

Courses for veterinarians: 68 professionals participated

Course for technician assistants: 43 participated

Course for livestock operators: 100 participated

International meetings

I Extraordinary Meeting of COSALFA

The first extraordinary meeting of the "South American Commission for the Control of Foot-and-Mouth Disease - COSALFA" was held in Bogotá, on 20 and 21 July, 1973, attended by delegates from Bolivia, Brazil, Colombia, Chile, Ecuador, Paraguay, Uruguay, Venezuela, the World Reference Laboratory at Pirbright, England, the British Ministry of Food and Agriculture, the Pan American Health Organisation, and observers from FAO, IDB, OIRSA and the Plum Island Animal Disease Laboratory, USA.

During this meeting there was a discussion of the topic on "Epidemiological Surveillance of types and subtypes of Foot-and-Mouth Disease", a matter of tremendous importance for countries exporting meat, animals and products.

Bolivarian Meeting on Agriculture and Livestock Health - OBSA

This meeting was held in Bogotá, from 24 to 26 July, 1973, with the participation of delegations from Colombia, Ecuador, Venezuela, and invited delegates from Bolivia, Chile, Panama, Peru, Pan American Health Organization, OIRSA and FAO.

The purpose of the meeting was to comply with the previsions of the Bolivarian Agreement on Agriculture and Livestock Health, to set up the machinery for internal cooperation in order to achieve an operative scheme to facilitate action at ministerial level; and to implement animal and agricultural sanitary agreements and cooperation at Bolivarian and Andean group levels.

General Strategy of the Campaign and Combat Targets

It continued within the general scheme begun in 1972 (periodic vaccinations every 4 months in the campaign's pilot areas). But the fact that must be

emphasized is that the campaign was developed in compliance with a detailed program based upon the following 11 subprojects:

I - Legal and regulatory implementation
II - Training of personnel
III - Extension and dissemination
IV - Establishment of a system of biostatistics
V - Community organization
VI - Epidemiological surveillance
VII - Research
VIII - Vaccine control
IX - Marketing and handling of vaccines
X - Vaccination
XI - Control of livestock movements

This orderly programming of activities has permitted to achieve a rational use of available resources and a better distribution of the time. There is hope for obtaining reliable information on the results that were achieved, periodic evaluation of the campaign and to make appropriate adjustments for whatever errors that may have been committed.

4. Problems presented

The main problem had its origin in the shortage of foot-and-mouth disease vaccine, due to production limitations for lack of tongue epithelia, a deficiency which will be corrected in the course of the present year with the conclusion and setting in motion of the producing laboratory using the BHK cells system.

5. International cooperation

The ICA receives full cooperation from the Pan American Health Organization through the Pan American Foot-and-Mouth Disease Center and the Pan American Zoonosis Center.

Through the courses on Animal Health Planning that are organized every year by the Pan American Health Organization, the ICA is preparing trained veterinarians who are contributing, with their specialization in these disciplines, new and valuable results to the health campaigns. Under section 3, mention has been made of the cooperation with the Government of the United States of America in the area of Chocó that borders with Panama.

Colombian-Ecuadorean-PAHO Agreement

This agreement continue in operation and is being implemented by the "Colombian Plant and Animal Institute - ICA" in all the items regarding the frontier area between Colombia and Ecuador.

6. Research

The foot-and-mouth disease research plan that has to be carried is contained in the document which was forwarded to the Scientific Committee of COSALFA.

III. FOOT-AND-MOUTH DISEASE REGISTRY - 1973

No. of affected farms	420
No. of sick cattle	7 082
No. of sick sheep	1
No. of sick swine	808
No. of farms with samples sent for virus typing	391[a/]
No. of farms with FMDV type O diagnosis	87
No. of farms with FMDV type A diagnosis	109
No. of farms with VSV type New Jersey diagnosis	98
No. of farms with VSV type Indiana diagnosis	28
No. of farms with negative diagnosis	63

---

a/ Six inadequate samples.

IV. COVERAGE SITUATION OF THE FOOT-AND-MOUTH DISEASE COMBAT IN 1973

(Pilot areas No. 1, 2, 3, and 6 of the ICA-IDB project - map 13)

Area in Km^2 a/	72 109
Livestock farms a/	16 508
Cattle population a/ (estimated)	4 127 000
Sheep population a/	90 910
Goat population a/	46 300
Total doses of vaccine prepared	16 350 000
Total doses of vaccine controlled	15 004 450
Total doses of vaccine approved	15 004 450
Doses of vaccine exported b/	5 000
Doses of vaccine imported	-
Doses applied in cattle	16 323 000
Doses applied in sheep (No vaccination of sheep is in prospect)	

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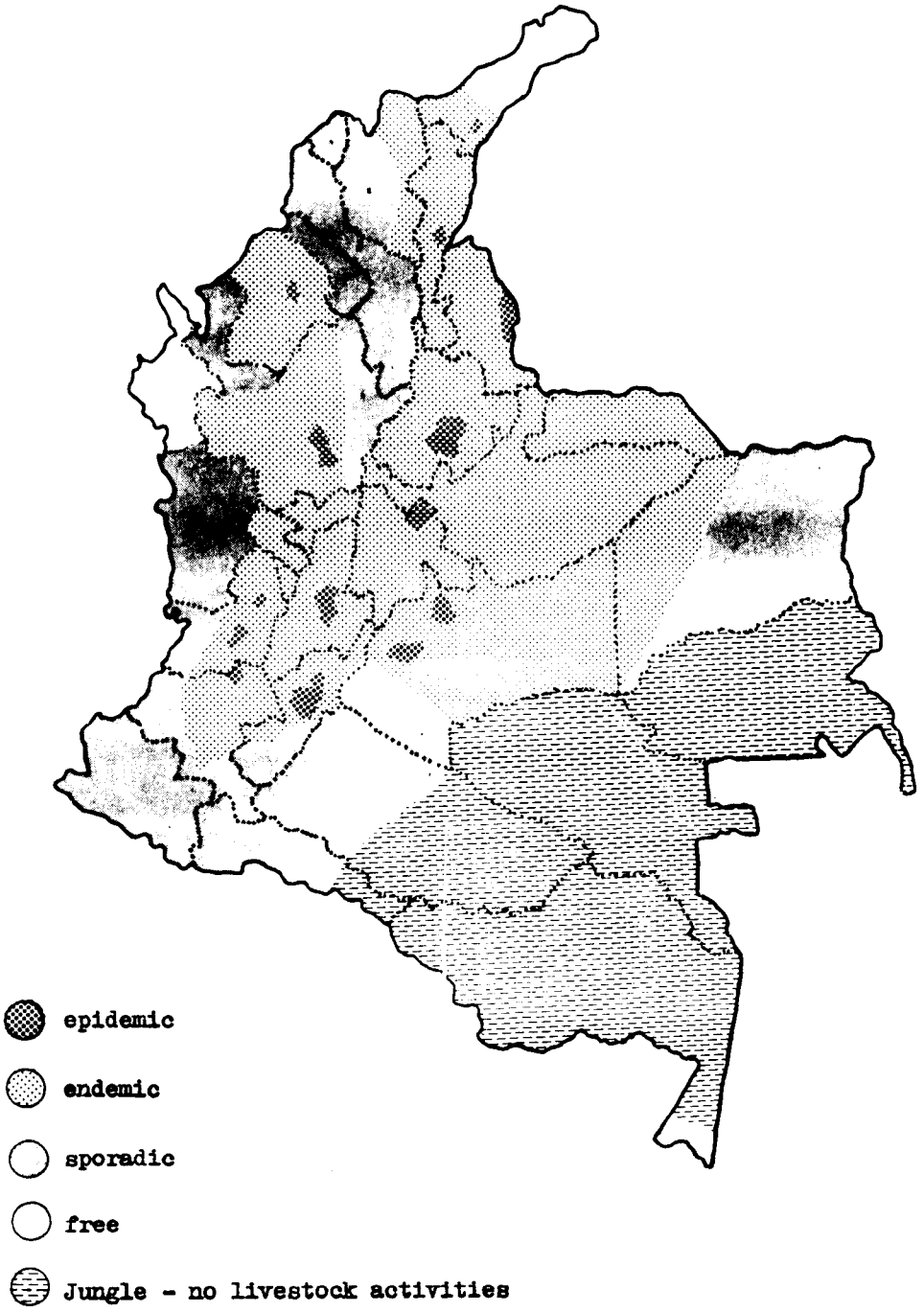
a/ Implementation area.

b/ Destination: Venezuela.

MAP 11

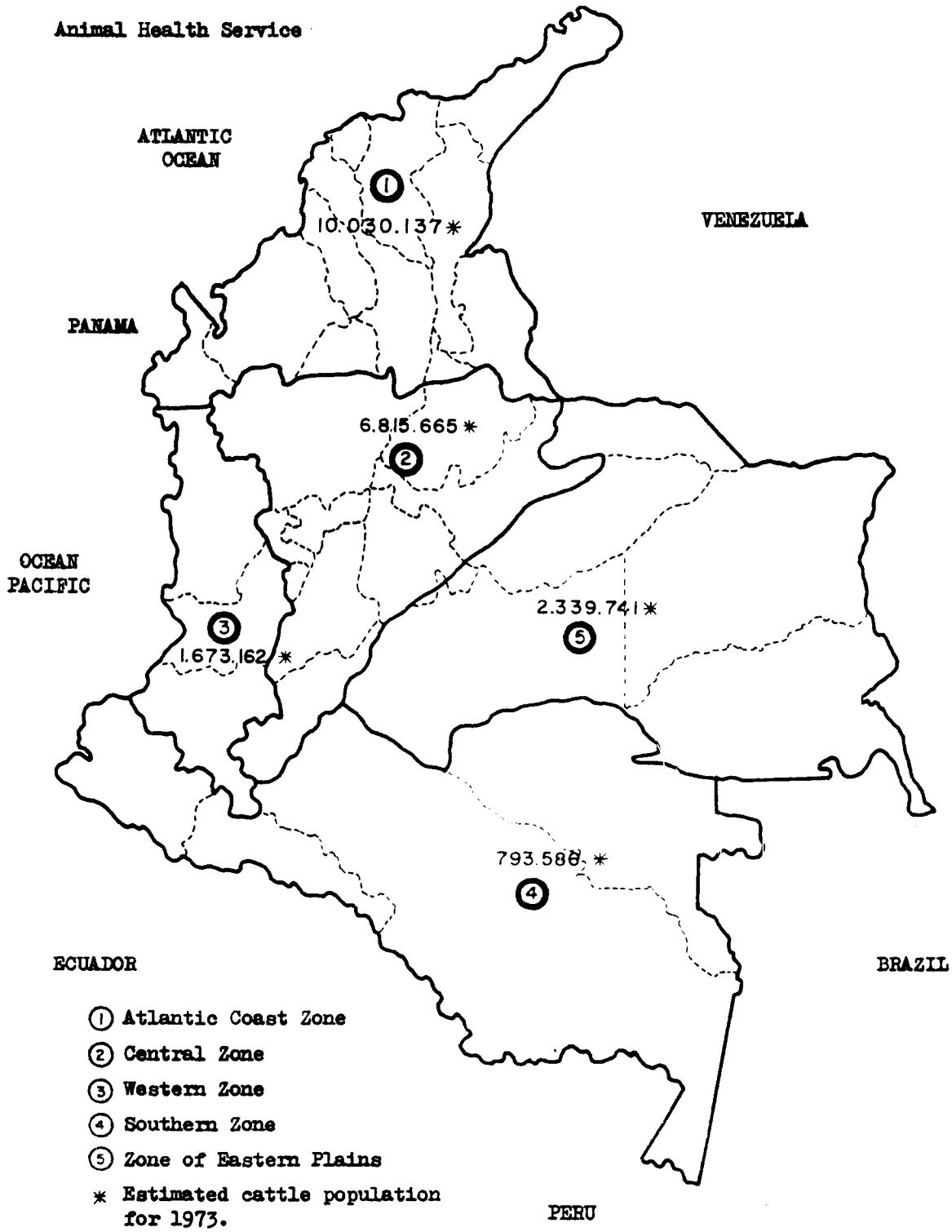
Foot-and-mouth disease geographic situation.

COLOMBIA - 1973



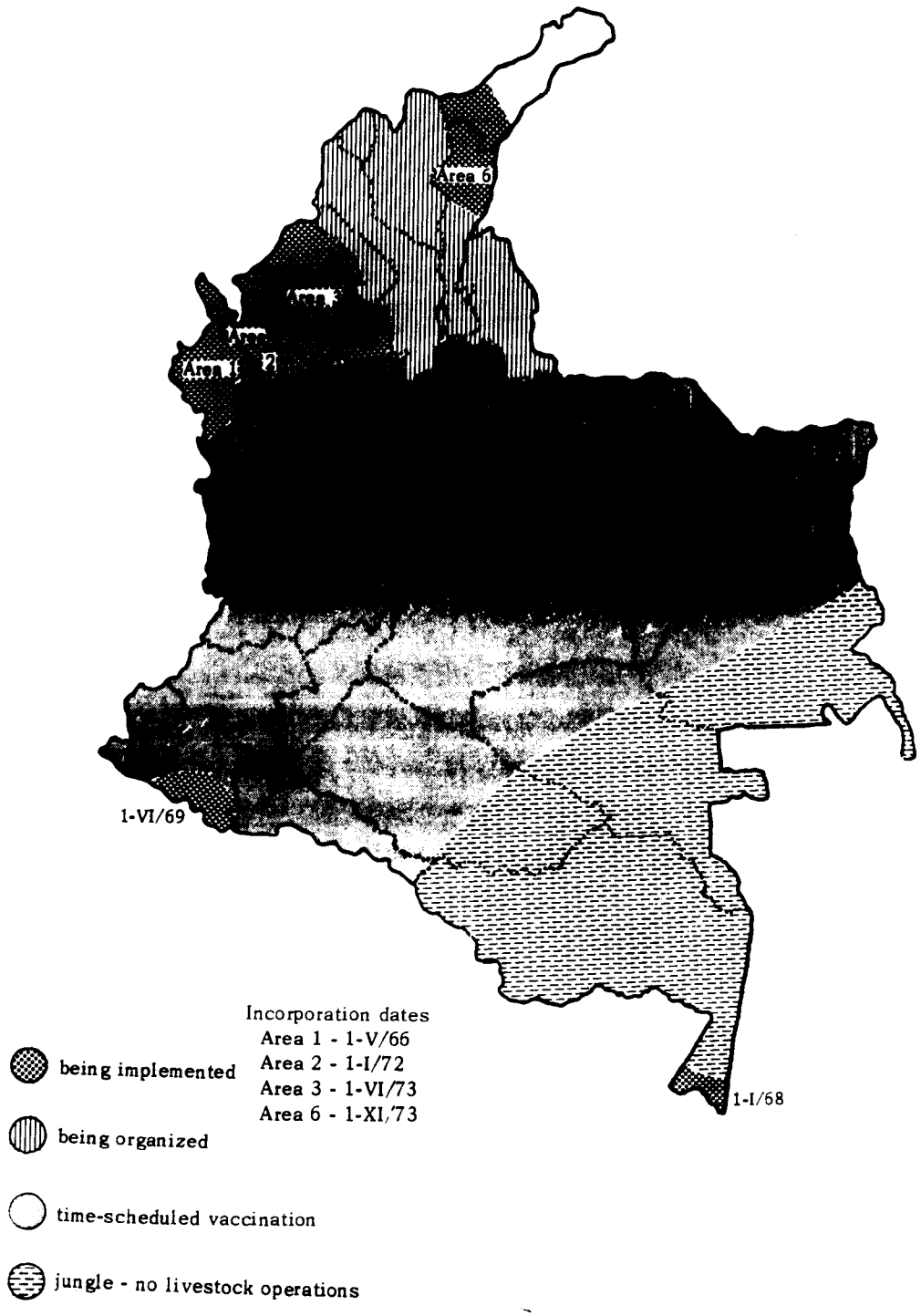
MAP 12

Livestock zones - COLOMBIA - 1973



MAP 13

Development of the foot-and-mouth disease campaign - COLOMBIA - 1973



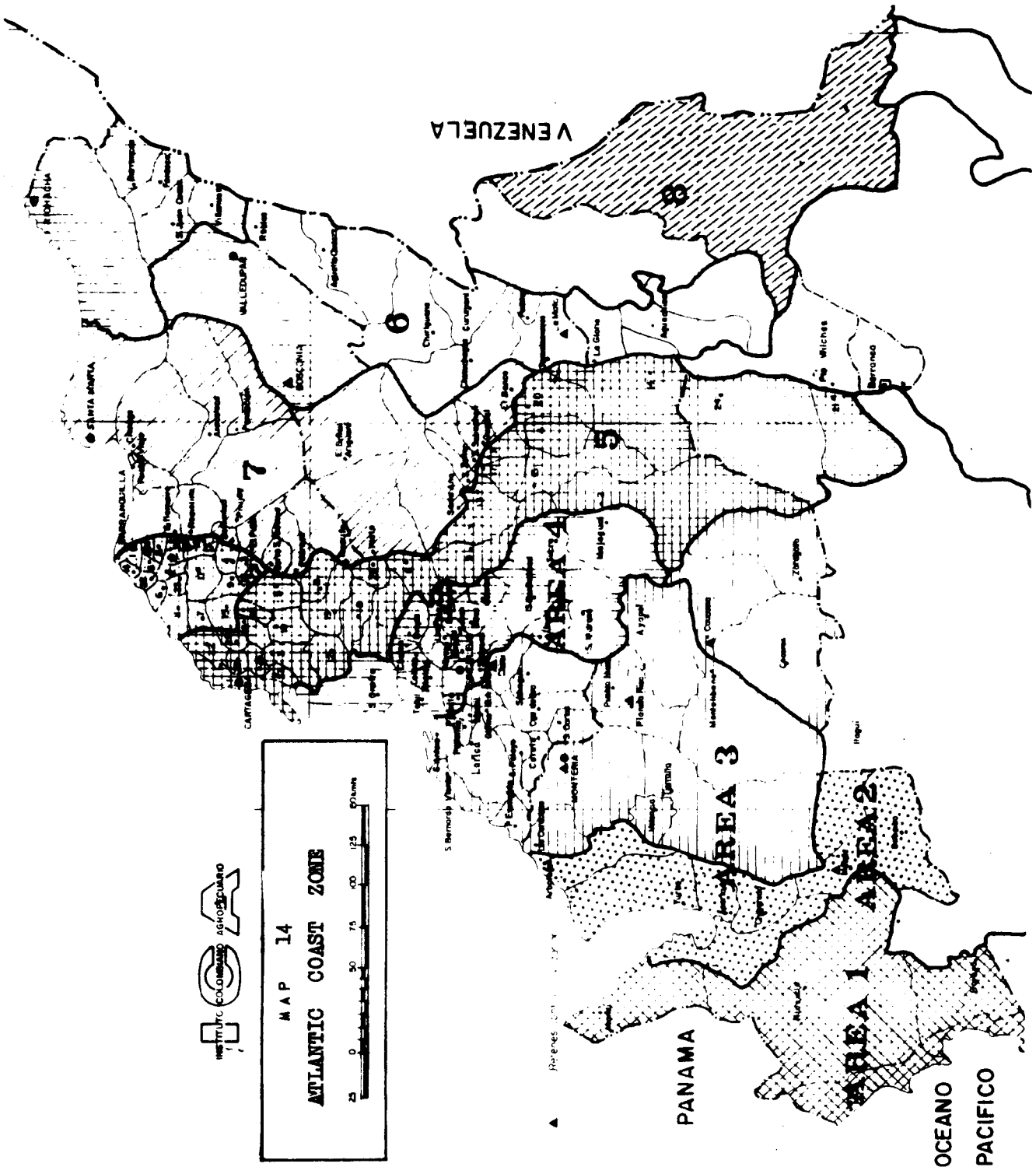

MAP 14
ATLANTIC COAST ZONE
VENEZUELA
PANAMA
AREA 1
AREA 2
AREA 3
AREA 4
OCEANO
PACIFICO
INSTITUTO COLOMBIANO AGROPECUARIO

TABLE 11

Occurrence of vesicular diseases outbreaks by departments, from January to December 1973

Territorial divisions of the country	No. of affected farms	Cattle		Swine		Laboratory Results				
		Total No. of animals in affected farms	No. of sick animals	Total No. of animals in affected farms	No. of sick animals	FMD		VSV		Negative
						A	O	N. J.	Indiana	
Antioquia	69	7 209	1 058	439	280	19	20	13	7	8
Atlántico	1	143	7	-	-	-	-	-	1	-
Bolívar	-	-	-	-	-	-	-	-	-	-
Boyacá	11	1 592	227	-	-	2	2	5	1	1
Caldas	10	1 059	102	-	-	2	1	4	1	2
Cauca	18	1 624	164	6	6	2	9	5	1	1
Córdoba	33	15 041	847	2	2	12	2	8	3	8
Cundinamarca	44	3 803	655	12	8	20	10	9	-	5
El Cesar	30	15 139	1 004	8	2	20	2	5	-	3
Huila	18	2 349	238	-	-	2	7	5	3	1
Guajira	6	1 793	360	-	-	4	-	-	-	2
Magdalena	7	798	54	-	-	2	1	2	1	1
Meta	19	2 311	362	-	-	6	3	5	-	5
Nariño	9	183	66	-	-	-	7	2	-	-
N. de Santander	18	891	132	-	-	1	4	7	1	3
Quindio	2	72	22	-	-	2	-	-	-	-
Risaralda	-	-	-	-	-	-	-	-	-	-
Santander	19	3 895	170	2	1	4	4	3	1	7
Sucre	6	2 085	71	-	-	-	-	3	2	1
Tolima	24	3 640	245	-	-	5	-	10	5	4
Valle	39	10 613	1 101	1 480	507	4	15	12	1	7
Arauca	1	27	-	-	-	-	-	-	-	1
Caqueta	5	339	47	2	2	1	-	-	-	2
Putumayo	1	250	130	-	-	-	-	-	-	1
Vichada	1	420	20	-	-	1	-	-	-	-
T O T A L	391 a/	75 276	7 082	1 951	808	109	87	98	28	63

a/ Six inadequate samples.

TABLE 12

Monthly incidence of outbreaks of vesicular diseases

COLOMBIA - 1973

Months	Nº of affected farms	Laboratory results				
		FMD		VSV		Negative
		O	A	N. Jersey	Indiana	
January	45	15	12	8	7	3
February	37	8	2	17	6	4
March	26	3	10	11	1	1
April	15	5	2	5	1	2
May	6	-	2	3	-	1
June	27	3	5	9	1	9
July	26	1	6	13	-	6
August	21	2	8	8	-	3
September	24	8	2	5	5	4
October	47	27	2	6	-	8
November	73	30	22	9	3	7
December	44	7	14	4	4	15
T O T A L	391[a]	109	87	98	28	63

a/ Six inadequate samples.

TABLE 13

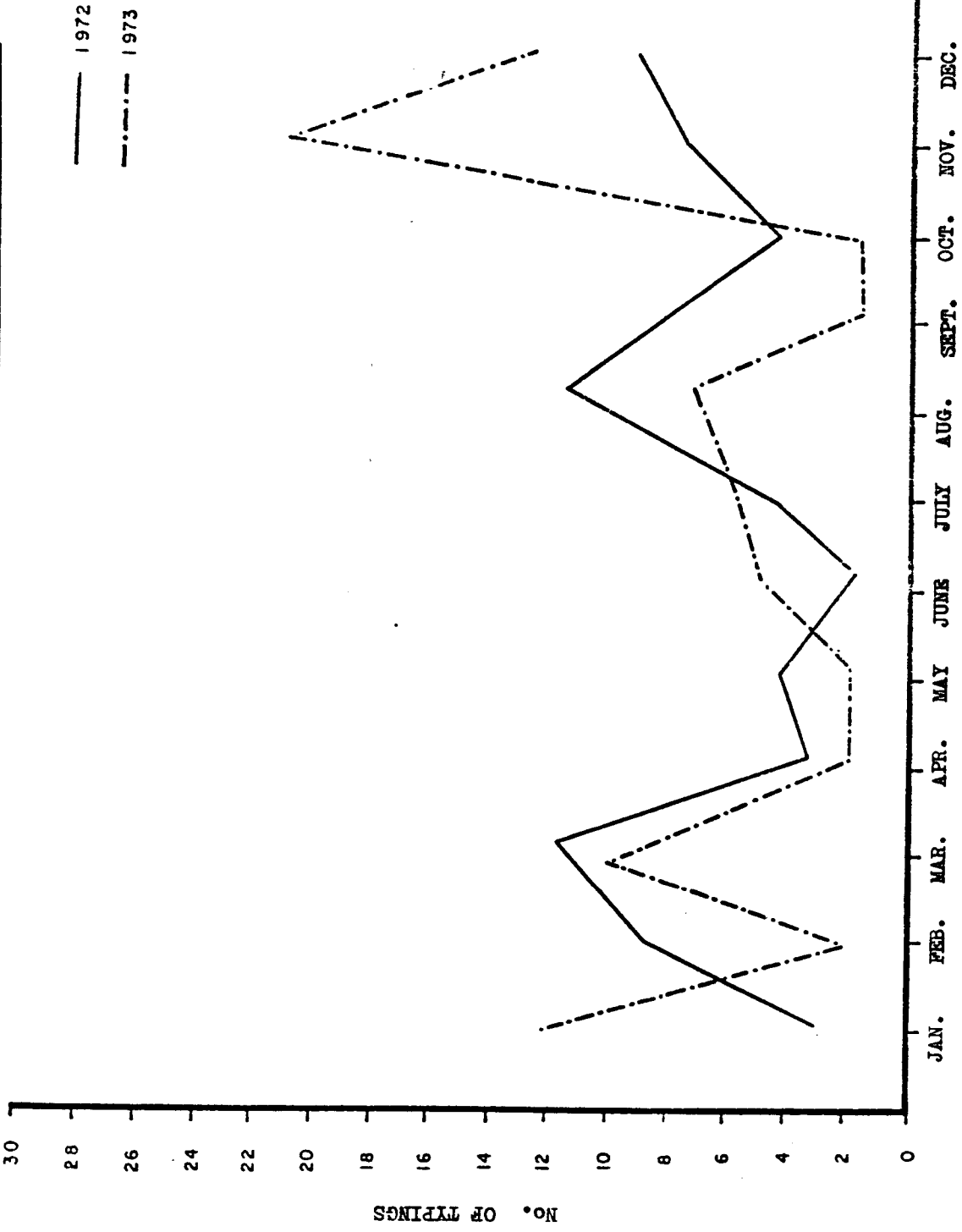
Progress of the foot-and-mouth disease vaccination campaign.

COLOMBIA - 1973

Livestock Zones	Nº of cattle in existence	Doses applied
1) Atlantic Coast	9 737 999	7 916 775
2) Central	6 617 150	5 564 358
3) Western	1 624 429	1 012 247
4) Southern	770 472	387 186
5) Eastern Plains	2 194 776	1 442 434
T O T A L	20 944 826	16 323 000

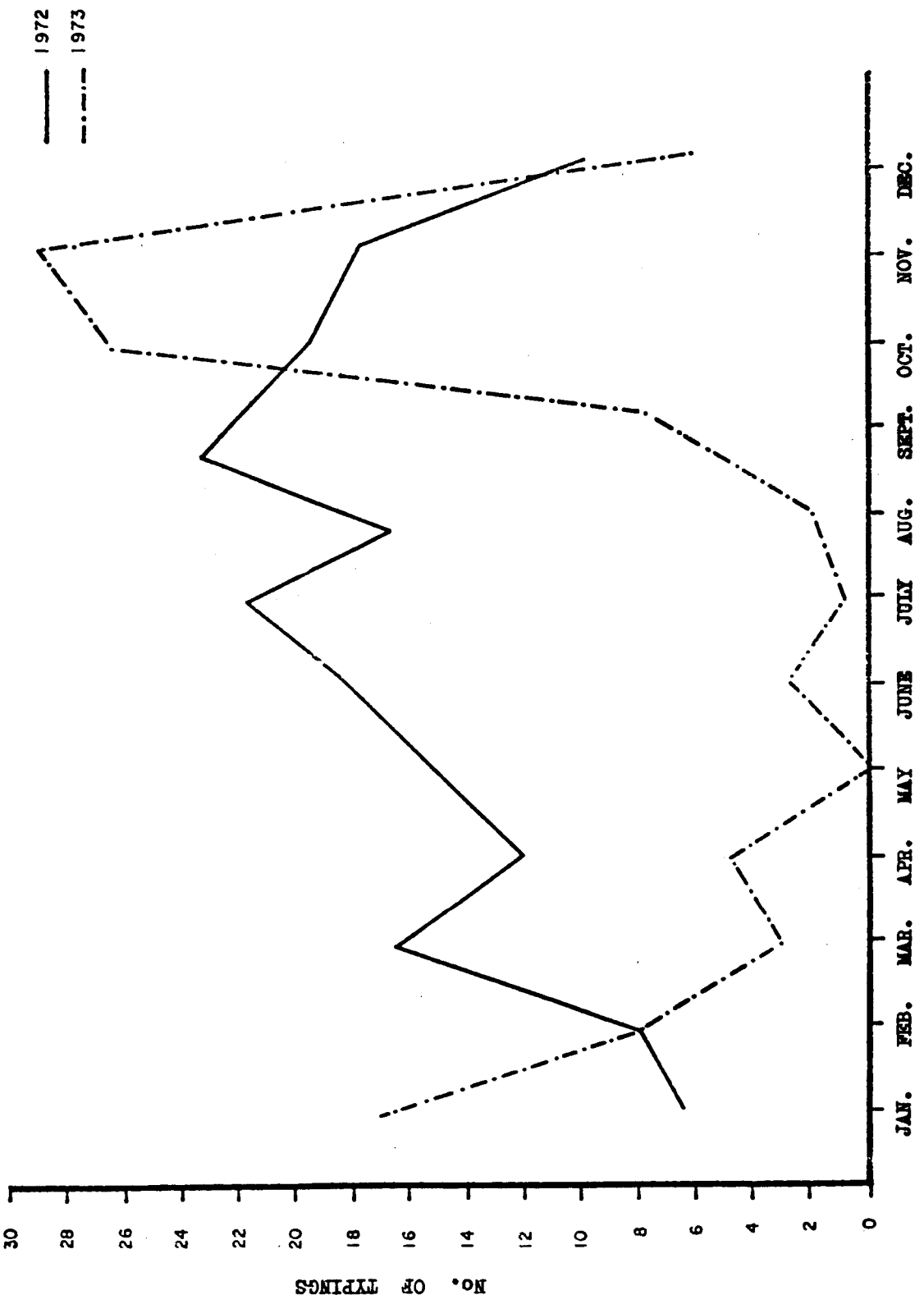
GRAPH 6

Comparison of monthly incidence of foot-and-mouth disease virus type O in 1972 and 1973



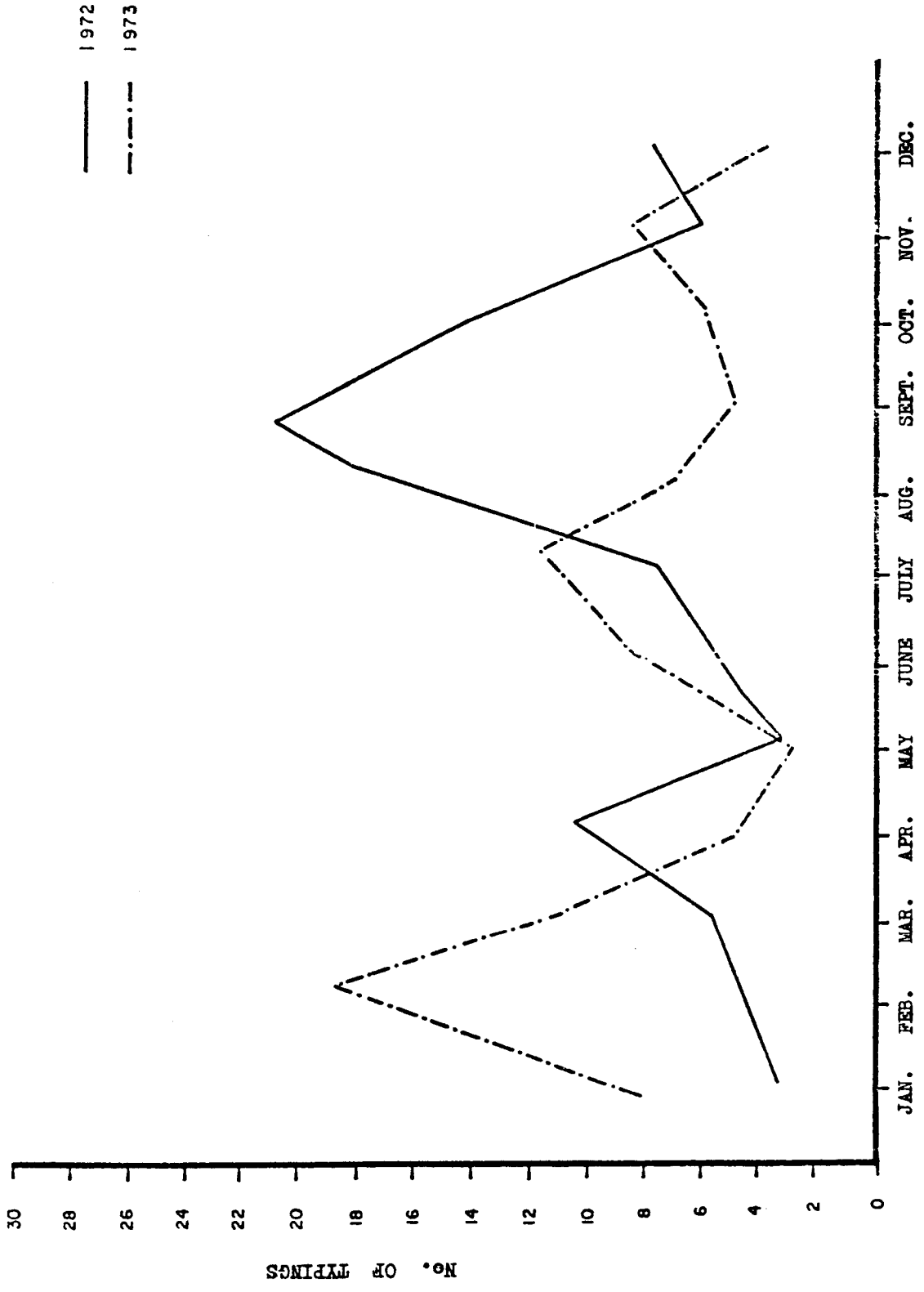
GRAPH 7

Comparison of monthly incidence of foot-and-mouth disease virus type A in 1972 and 1973



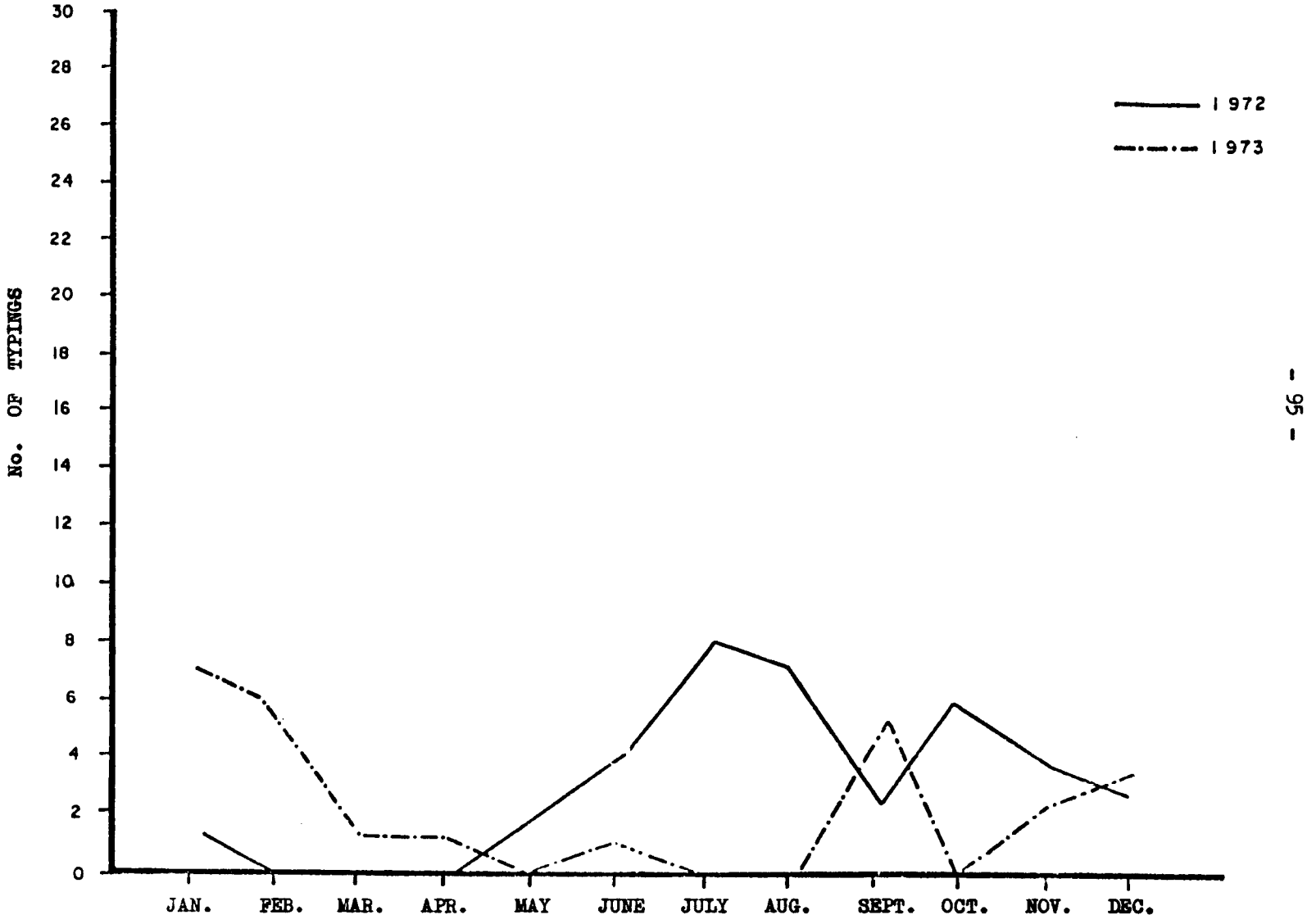
GRAPH 8

Comparison of monthly incidence of vesicular stomatitis New Jersey in 1972 and 1973



GRAPH 9

Comparison of monthly incidence of vesicular stomatitis Indiana in 1972 and 1973



C H I L E

I. EVOLUTION OF FOOT-AND-MOUTH DISEASE

1. Geographic distribution of the disease

From the point of view of the characteristics of the disease, the country may be divided in:

a) Zone of sporadic outbreaks

Located between parallels 18 and 29 south latitude, and containing the northernmost provinces of the country: Tarapacá, Antofagasta and Atacama. With an area of 261,645,5 square kilometers, most of it a desert, harboring a cattle population of 8,306 animals, chiefly concentrated in small isolated valleys. Routine sanitary controls are performed there.

b) Endemic zone

Extending between parallels 29 and 44 south latitude, and comprising the provinces of Coquimbo, Aconcagua, Valparaíso, Santiago, O'Higgins, Colchagua, Curicó, Talca, Linares, Maule, Ñuble, Concepción, Arauco, Bio-Bio, Malleco, Cautín, Valdivia, Osorno, Llanquihue, and the Island of Chiloé. This is the zone in which the main activities of the National Foot-and-Mouth Disease Control Plan are concentrated.

c) Free Zone (Decree No. 86, March 1970, Decree No. 72, March 1972, and Resolution 14-E, January 1973).

Spreading between parallels 42 and 56 south latitude, and comprising the southernmost provinces: Continental Chiloé, Aysén and Magallanes. It extends for 250,379, 1 square kilometers, and has a cattle population of 261,693 heads. The program which is applied to free zones, in accordance with the standards set out by international agencies, is being applied in this zone.

2. Virus diagnosis

All foci registered during the year 1973 were located in the endemic zone. Proceeding from north to south, they were as follows:

Province	No.of foci	O	A	C	A_{24}	A_{26}	O_1	Neg.	Inadeq. sample	Not sampled
Coquimbo	2	-	-	-	-	-	-	-	-	2
Aconcagua	3	-	-	-	-	2	-	-	1	-
Santiago	6	4	-	-	-	-	-	-	1	1
Talca	2	-	-	-	-	-	-	-	1	1
Concepción	-	-	-	-	-	-	-	1	-	-
Aysén	-	-	-	-	-	-	-	1	-	-
Total	13	4	-	-	-	2	-	2	3	4

3. Epidemics

No epidemic outbreaks were recorded in Chile.

4. Factors related to the disease

Cattle concentration and movements, either for furthering national or international livestock trade, migrations due to weather conditions, or mere shifts of the herds, can be considered as factors bearing major influence upon the behavior of the disease.

5. Rates

During 1972, foot-and-mouth disease was registered in 32 livestock establishments, summing up 409 sick cattle, which represents a rate of 1.31 per 10,000. Data for 1973 is as follows:

Affected establishments	13
Sick cattle	156
Morbidity rate	0.5 per 10,000

The data regarding morbidity rates in the country during 1969, 1970 and 1971 were: 92.01; 71.79 and 18.84.

6. Trends

The information concerning the year 1972 reveals a considerable decrease in the number of affected establishments, as well as in the number of sick heads of cattle.

The outlook during the year 1973 shows a remarkable decrease. During this period, the disease was absent from vast zones of the country, such as:

I Region: (Chiloé, Llanquihue, Osorno and Valdivia).

II Region: (Cautín, Malleco, Bio-Bio, Arauco and Concepción).

III Region: a large portion of the region (O'Higgins, Colchagua, Curicó, Maule, Linares and Ñuble) except the province of Talca.

IV Region: no outbreaks since the month of June except in the province of Santiago, in which the disease was detected in December.

Among the variables affecting the disease in Chile, during the year under study, first priority is to be given to the paralysis that struck the country's livestock activities, particularly in regard to merchandising.

Morbidity figures eloquently show the improvements which have been achieved.

Analysis of the information and the data permits to arrive at the conclusion that during the year 1973 foot-and-mouth disease in Chile was in a state of evident regression.

II. DEVELOPMENT OF THE FOOT-AND-MOUTH DISEASE COMBAT

1. Coverage

The strategy of the National Foot-and-Mouth Disease Control Plan is based upon zoning the country and sectoring the different regions, which allows for coverage of the program of vaccination and control of the population dynamics, and for the epidemiological surveillance of the disease as well.

I Region: Comprises the provinces of Chiloé, Llanquihue, Osorno and Valdivia, with an area of 72,508,7 square kilometers and a cattle population of 1,005,110 heads. Activities were started in 20 April 1970.

II Region: Comprises the provinces of Cantín, Malleco, Bio-Bio, Concepción and Arauco, with an area of 54,587 square kilometers and a cattle population of 987,150 animals. Activities began 8 June 1971.

III Region: Comprises the provinces of Ñuble, Linares, Maule, Talca, Curicó, Colchagua, O'Higgins, with an area of 59,901,7 square kilometers and a cattle population of 580,210 heads. Activities were initiated 5 June 1972.

IV Region: Comprises the provinces of Santiago, Valparaíso, Aconcagua and Coquimbo, with an area of 72,324 square kilometers and a cattle population of 307,830 animals. Activities commenced 5 June 1972.

2. Administrative organization

The National Foot-and-Mouth Disease Control Plan is a program which is dependent from the Agriculture and Stockraising Service (Servicio Agrícola y Ganadero - SAG) of the Ministry of Agriculture, and carried out by the Animal Health Division.

a) Human resources

	Required	Existing	Needed
Head of the Plan	1	1	-
Coordinators	4	4	-
Laboratorians	4	4	-
Field (provincial) personnel	20	17	3
Free zones veterinarians	3	2	1
Total veterinarians	32	28	4
Biostatisticians	5	3	2
Health educators	5	3	2
Statistics assitants and secretaries	30	30	-
Inspectors	120	117	3
Vaccinators	228	228	-
Audiovisual operators	5	5	-
Draftsmen	1	-	1
Mechanics	4	4	-
Photographer	1	1	-

b) Material resources

Field	Existing
Vehicles (trucks)	138
Audiovisual vehicles	4
Refrigerated trucks	2
Transport trucks	2
Motor pump 200 litres	38
Motor pump 400 litres	2
High pressure motor pump	2
Portable pumps	108
Refrigerators	82
Cold storage chambers	1
Electric goads	67
Syringes	1,202
Sterilizers	3
Mimeographs	12
Slide projectors	11
Movie projectors	10
Screens	10
Tape recorders	5
Photograph cameras	5
Calculating machines	24
Typewriters	25
Sleeping bags	104
Sector furniture	100 sets

The free zones are equipped with appropriate means to take care of any emergency that might occur.

Miscellaneous tools for the field brigades, in sufficient quantities for each region.

c) Financial resources for 1973

Items	1972 II Semester BID	1972 II Semester SAG	1973 I Semester a/ BID	1973 I Semester a/ SAG
Equipments and materials	6,893	24,310		
Vaccination		4,477		4,278
Vaccines	60,000	311,952	44,547	521,632
Chemical products		694		220
Wages and salaries		1,227,112		2,010,481
Travelling expenses		140,214		99,696
Vehicle maintenance		43,425		94,228
Rentals		2,150		123
Office equipment		9,044		6,779
Vaccination service		54,927		62,417
Totals US$	66,893	1,818,305	44,547	2,799,854

a/ Information on the budgetary movement for the second semester will be prepared in March 1974.

3. Changes made in 1973

Free zone - Resolution 14-E, of January 1973, incorporated the continental portion of the Province of Chiloé to the zone free from foot-and-mouth disease.

Change in strategy - The epidemiological characteristics obtaining in Region I (absence of foot-and-mouth disease foci since October 1971), confirmed by two serological samplings carried out in different areas within Region I aimed at detecting the immunity of the herds, allowed for a change in vaccination policy, from 4 down to 6 months, as authorized by the proper authorities of the Division of Animal Health.

Organization - No changes were effected, and none are deemed necessary. During the year 1973, the National Foot-and-Mouth Disease Control Plan,

organization wise, had at its disposal the appropriate resources required for carrying out the program as related to the availabilities which existed in 1972.

Construction - With respect to this item, several activities were carried out during the year toward the erection of the National Foot-and-Mouth Disease Laboratory. Sixty hectares were purchased at "La Dehesa", in the commune of Las Condes, in the city of Santiago, wherein the central diagnosis laboratory is to be built.

Building plans for the Central Foot-and-Mouth Disease Laboratory were approved by the Pan American Foot-and-Mouth Disease Center.

Open bids were invited for the construction of the building.

Building by delegation of administration was approved.

National counterpart for the construction of the central diagnosis laboratory is provided for.

Study on the relocation of facilities for carrying out efficacy tests on foot-and-mouth disease vaccines, is started.

Training - Continuing the methodology applied by the National Foot-and-Mouth Disease Control Plan, refresher short courses are proffered, for the professional and technical staffs, as well as for the administrative staff.

Training of 3 professionals in Rio Grande do Sul (Brazil) on the implementation of campaigns had been programmed, but only one officer of the Plan was able to attend the course.

Vaccine production

Laboratory	No. of doses	Approved	Rejected
INTERIFA	185,000	100,000	85,000
BACTECHILE	144,000	144,000	-
Total	329,000	244,000	85,000

Imported vaccines - Vaccines imported by Chile are accepted after previous official information from the country of origin that said lots have been approved.

Laboratory	No. of doses	Approved	Rejected
Cooper Paraguay	2,242,460	2,242,460	-
Cooper Uruguay	493,800	493,800	-
Interifa Uruguay	1,750,210	1,750,210	-
Total	4,486,470	4,486,470	-

Vaccine control - All batches nationally produced are submitted to efficacy test control, as provided by existing regulations on the control of foot-and-mouth disease vaccine (Decree No. 57, 22 May 1973). In regard to imported vaccine, it must be accompanied by the pertinent official certificate of approval.

Merchandising - The Agriculture and Stockraising Service, through the Animal Health Division, is charged with distributing and applying anti foot-and-mouth disease vaccines in the endemic zone as well as in the one of sporadic outbreaks, as provided for by Decree No. 168 of 20 May 1970, which stipulates that the SAG is responsible for distributing, handling and applying foot-and-mouth disease vaccine.

4. Problems

Resources

Human resources - There is need for adding to the National Plan 3 field (provincial) veterinarians, 1 veterinarian for the free zone, 2 biostatisticians, 3 health educators and 3 inspectors.

Financial resources - Although adequate financial resources were budgeted, these funds were not available at the opportune time in order to meet the requirements of the Plan.

Material resources - Undoubtedly the acute problem in relation to material resources had to do with the Plan's vehicles inasmuch as after three years of intensive use of such vehicles spare parts were much needed and no provision was made to purchase them in due time. This situation was the cause of the stoppage of some 20% of the program's vehicles. Import of needed spare parts is now being processed through the appropriate channels.

In addition to this, and because of the instability of internal conditions experienced by the country, said material resources were used in activities other than those programmed under the Plan and alien to it.

Production of foot-and-mouth disease vaccine

This item continues to be one of the program's major problems although adequate provision was made to import needed foot-and-mouth vaccine at the appropriate time, the program was faced with a new problem in regard to the delivery of the vaccine by the exporting country, for internal events which occurred in that country. This resulted in a diminished coverage of vaccination during the second semester (Table 14).

5. Results

In order to point out the appreciable results of the foot-and-mouth combat and have a better understanding thereof, the following tables are submitted: Table 14 - Stages and Vaccinations performed under the National Foot-and-Mouth Control Plan - Chile 1970-1973; Table 15 - Reported Foot-and-Mouth Disease Foci and Morbidity Rates in Cattle - Chile 1969 - 1973.

Table 14 is a panoramic view of the development of the program and different vaccination stages performed by region, between April 1970 and December 1973.

As shown in Table 15 one can appreciate the remarkable decrease in foot-and-mouth disease foci in cattle, and the big drop in morbidity rates, from which the achievements obtained through systematic implementation of activities carried out under the National Foot-and-Mouth Disease Control Plan can be deducted.

In regard to the Plan's influence, mention is made of the fact that a technical and administrative infra-structure has been created and which has served for setting up the Animal Health Service throughout the country.

These research activities were carried out having as a goal the change in vaccination policies for Region I. In view of the results which were obtained, this region was put, starting in 1973, under the new policy calling for vaccination every 6 months, a step which we consider to be of the utmost importance since it practically points the way to be followed in the remaining regions which are covered by the Program and presenting epidemiological characteristics which are similar to those obtaining in Region I.

8. Plans and targets for 1974

Endemic zone - Massive vaccination

I Region: vaccination every 6 months
II Region: vaccination every 4 months
III Region: vaccination every 4 months
IV Region: vaccination every 4 months

It is hoped that 100% vaccination coverage of cattle will be attained.

Zone of sporadic outbreaks - Sanitary control. Directed vaccination. Compliance with existing sanitary regulations and vaccine coverage in the areas which presented more epidemiological risk.

Free zone - Sanitary control. Faithful observance of existing sanitary regulations regarding free zones.

Epidemiological surveillance - A system of epidemiological surveillance shall be set up in conformity with what was agreed at the Regional Seminar on Systems of Epidemiological Surveillance of Communicable Diseases and Zoonoses, held in Rio de Janeiro, Brazil, from 2 to 8 December 1973.

Control of livestock movements and study of cattle population dynamics - Implementation of fixed control points and mobile equipment for said purpose.

With respect to the study on population dynamics, it is to follow specific directives through the use of regional maps and appropriate forms.

Livestock fairs.

Points of embarkation and disembarkation of livestock.

Quarantine enclosures.

Slaughterhouses.

Sanitary education - To be carried out in accordance with the geographic distribution of the disease.

Efficiency control tests of the vaccine - Handling and distribution of the vaccine. These two aspects fall within the purview of existing legislation and consequently are the responsibility of the National Foot-and-Mouth Disease Control Plan.

Campaign evaluation

Reformulation of the National Foot-and-Mouth Disease Control Plan

Commencement of construction work on the new Foot-and-Mouth Disease Diagnosis Laboratory

Relocation of the laboratory for controlling the efficiency of foot-and-mouth disease vaccine

Meetings at frontier level

III. FOOT-AND-MOUTH DISEASE NOTIFICATION - 1973

No. of affected farms	13
No. of sick cattle	156
No. of sick sheep	-
No. of sick swine	94
No. of sick goats	30
No. of farms with samples sent for virus typing	11
No. of farms with FMDV type O diagnosis	4
No. of farms with FMDV type A diagnosis	2
No. of farms with FMDV type C diagnosis	-
No. of farms with VSV type New Jersey diagnosis	-
No. of farms with VSV type Indiana diagnosis	-
No. of farms with negative diagnosis and/or inadequated samples	5

IV. COVERAGE SITUATION OF THE FOOT-AND-MOUTH DISEASE COMBAT IN 1973

Area in Km^2 [a]	259 722,4
Livestock farms [a]	248 956 [c]
Cattle population [a]	2 880 300 [d]
Sheep population [a]	3 040 545 [e]
Goat population [a]	876 173 [c]
Total doses of vaccine prepared	329 000
Total doses of vaccine controlled	329 000
Total doses of vaccine approved	244 000
Doses of vaccine exported	-
Doses of vaccine imported [b]	4 486 470
Doses applied in cattle	4 671 038 [f]

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a/ Implementation area.

b/ Origin: 2 242 460 doses from Paraguay and 2 244 010 from Uruguay.

c/ 1965 - IV Crop and Livestock National Census.

d/ INES, 1972.

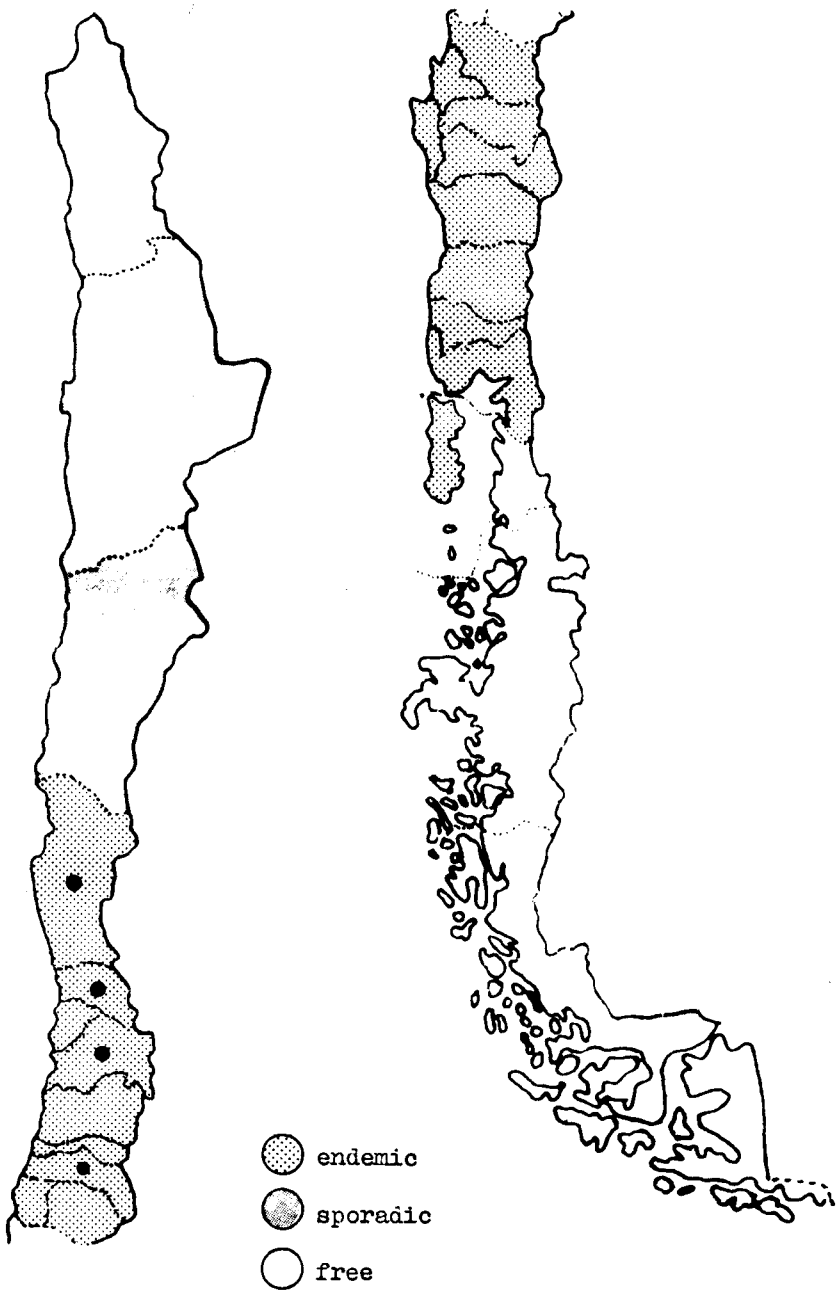
e/ OFESA 1968. The data refer to the provinces from Coquimbo to Chiloé, inclusive.

f/ Include two periods of vaccination in the Region I and three vaccination periods in Regions II, III and IV.

MAP 15

Foot-and-mouth disease geographic situation.

CHILE - 1973

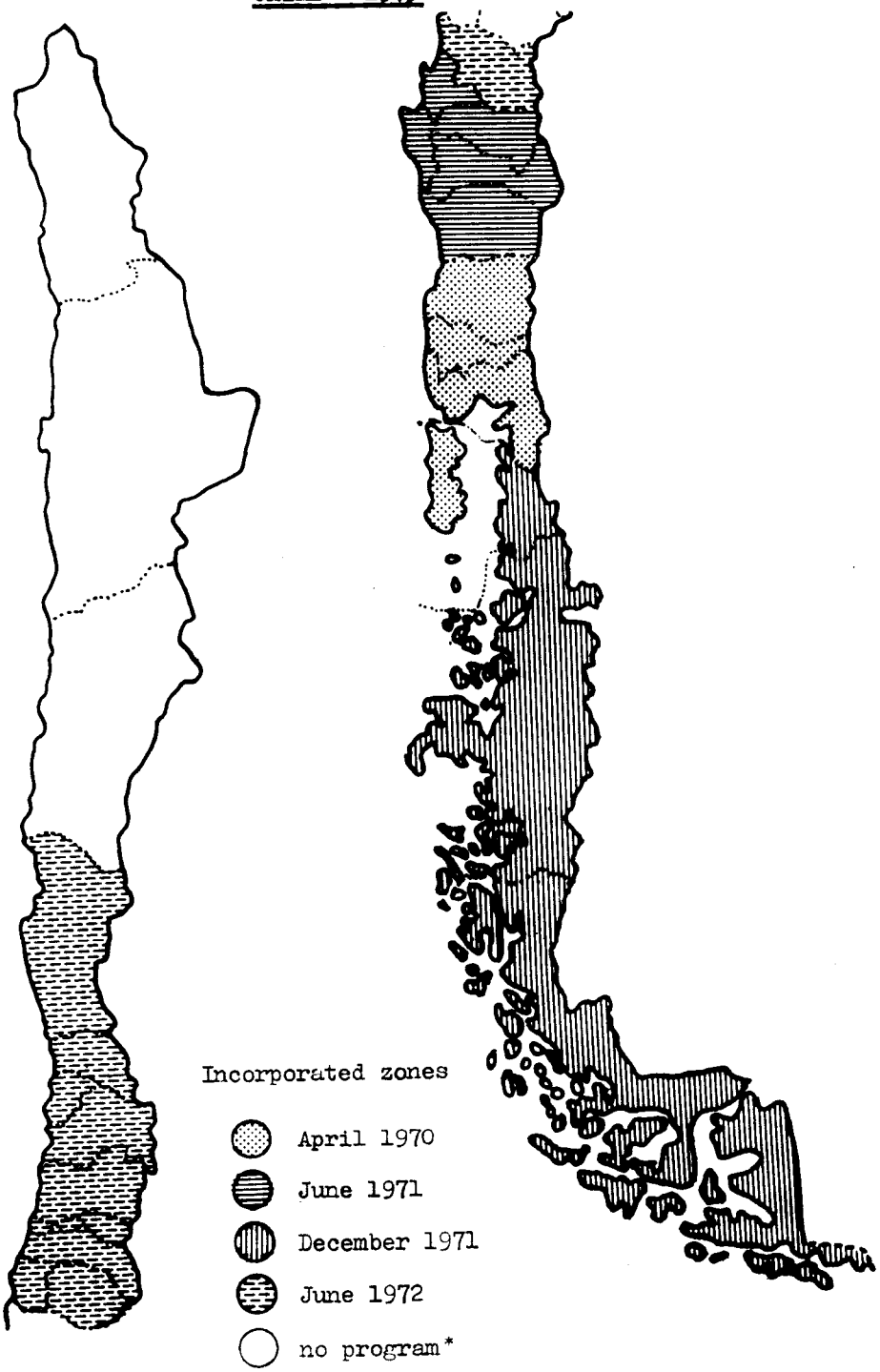


• During the year, only in these provinces the disease was recorded.

MAP 16

Foot-and-mouth disease combat situation.

CHILE - 1973



* There is an official veterinarian service in charge of any FMD problem.

TABLE 14

Stages and Vaccinations performed under the National Foot-and-Mouth Disease Control Plan

CHILE - 1970 - 1973

Regions	1970 Stages		1971 Stages			1972 Stages		1972-1973 Stages		
I Region	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Nineth	
Valdivia	April	Sept.	Jan.	May	Sept.	Jan.	June	Jan.	Oct.	
Osorno	May	Oct.	Feb.	June	Oct.	Feb.	July	Feb.	Nov.	
Llanquihue	June	Nov.	March	July	Nov.	March	August	March	Dec.	
Chiloé	July							April		
No. vaccinated cattle	535 476	187 522	789 785	725 752	790 725	817 560	700 881	872 813	473 665	

II Region	First	Second	Third	Fourth	Fifth	Sixth	Seventh
Cautín	June	Oct.	Feb.	May	Dec.	April	Oct.
Malleco	July	Nov.	March	June	Jan.	May	Nov.
Bio-Bio	August	Dec.	April	July	Feb.	June	Dec.
Arauco							
Concepción							
No. vaccinated cattle	655 623	798 336	853 717	711 673	769 196	716 435	427 583

III Region	First	Second	Third	Fourth
Ñuble	June	Dec.	April	Oct.
Maule	July	Jan.	May	Nov.
Linares	Aug.	Feb.	June	Dec.
Talca				
Curicó				
Colchagua				
O'Higgins				
No. vaccinated cattle	351 057	391 969	341 088	307 505

IV Region	First	Second	Third	Fourth
Santiago	June	Dec.	April	Oct.
Valparaíso	July	Jan.	May	Nov.
Aconcagua	August	Feb.	June	Dec.
Coquimbo				
No. vaccinated cattle	207 973	241 948	241 263	205 867

TABLE 15

Reported Foot-and-Mouth Disease foci and morbidity rates in cattle

CHILE - 1969 - 1973

	1969	1970	1971	1972	1973
Foci	1,209	1,071	515	32	13
Sick cattle	27,181	21,553	5,726	409	156
Morbidity rates 1 x 10,000	92,01	71,79	18,84	1,31	0,50

E C U A D O R

I. EVOLUTION OF FOOT-AND-MOUTH DISEASE

1. Geographic distribution of the disease

Same as in 1972, the occurrence of foot-and-mouth disease in Ecuador was observed in the country's different provinces with diverse characteristics:

a) Epidemic zone

Carchi, Pichincha, Cotopaxi, Loja, El Oro, Los Ríos and Manabí.

b) Endemic zone

Chimborazo, Guayas and Napo.

c) Zone of sporadic outbreaks

Azuay, Cañar, Bolívar, Pastaza, Zamora and Morona Santiago.

d) Free zone

The province of Galápagos remains free from foot-and-mouth disease.

e) Zone of not registered outbreaks

Esmeraldas, Imbabura and Tungurahua.

2. Virus diagnosis

From tests made in the diagnosis laboratory of vesicular diseases, of the Ministry of Public Health, from samples forwarded from the country's different provinces, the results were as follows:

Virus O Vallée	Subtype O_1	72
Virus A Vallée	Subtype A_{24}	6
Vesicular stomatitis	New Jersey	9
Vesicular stomatitis	Indiana	1
Negative		30

3. Epidemics

During the months of January, February and March, occurrences of foot-and-mouth disease virus O Vallée subtype O_1 were registered in the

mountain provinces: Carchi, Pichincha and Azuay; in the coastal provinces: Manabí, El Oro and Guayas; in the east: provinces of Morona Santiago and Napo. Foot-and-mouth disease outbreaks or cases within the epizootic wave that affected livestock establishments throughout the country since August 1972. In the remaining months of the year, the disease is only sporadically registered in consequence of the sanitary measures which were adopted by the Plan for the purpose of controlling its dissemination.

4. Factors related to the disease

The factors which influenced the presence of foot-and-mouth disease in Ecuador during the year 1973 can be summarized as follows:

a) Low vaccination coverage in provinces having areas with small operating ranchers and native population.

b) International movement of livestock through the northern frontier eluding the sanitary control.

c) Indiscriminate international movement of livestock not subjected to sanitary control as provided by Regulation No. 948-A of the Ministry of Agriculture and Livestock implementing the Supreme Decree that established the National Foot-and-Mouth Disease Control Program.

d) The intense traffic of cattle through numerous highways and side roads, particularly in the inter-Andean zone, for the purpose of trade in weekly livestock fairs, which are carried out often without adequate sanitary control.

5. Rates

Not enough statistical information is as yet available to permit an accurate estimate of the morbidity rate; however, it can be stated that in the 312 affected establishments, 7,065 cattle were sick, out of a total number of 40,786 existing in the outbreaks areas, thus resulting an index rate of 17,32%.

More reliable date regarding mortality and morbidity shall certainly become available next year because an appropriate Section of Biostatistics is presently being organized.

6. Trends

As compared with the preceding years 1969, 1970, 1971 and 1972 the disease has decreased in the country; cases produced by virus O are predominant.

In 1972, 3,312 foot-and-mouth disease foci occurred which evidences that the disseminating strength of the disease was truly alarming, more so than it had been in previous years.

That year an epizootic wave started in the month of April, in the frontier province of Carchi, spreading to other provinces in the sierra and the coast; this epizootic wave continued until the month of December, affected 812 establishments and resulting in 8,255 sick cattle out of a population of 27,325 animals.

In 1973, foot-and-mouth disease occurred in its endemic, epidemic and sporadic forms.

In the months of January, February and March foci of virus O were registered in several provinces in the sierra, the coast and the east, which is a continuation of the epizootic wave which struck almost all parts of the country until December 1972. Starting in the month of March, the disease occurs sporadically.

Three hundred and twelve establishments were registered as having been affected, with 7,065 sick cattle out of 40,786 animals.

II. DEVELOPMENT OF THE FOOT-AND-MOUTH DISEASE COMBAT

1. Coverage

For the purposes of the foot-and-mouth disease campaign, the country continues to be use the division that was established in 1972, with regions, sub-regions, localities and sub-localities.

Region 1 - comprises

Carchi	Campaign being implemented
Imbabura	Campaign being implemented
Pichincha	Campaign being implemented

Cotopaxi	Campaign being implemented
Tungurahua	Campaign being implemented
Chimborazo	Campaign being implemented
Bolívar	Campaign being implemented
Napo	Campaign being implemented
Pastaza	Campaign being implemented

Region 2 - comprises

Esmeraldas	Campaign being implemented
Manabí	Campaign being implemented
Guayas	Campaign being implemented
El Oro	Campaign being implemented

Region 3 - comprises

Cañar	Campaign being implemented
Azuay	Campaign being implemented
Loja	Campaign being implemented
Morona Santiago	Campaign being implemented
Zamora Chinchipe	Campaign being implemented

3. Administrative organization

The National Foot-and-Mouth Disease Control Program was established by Supreme Decree No. 671, of 24 July 1972; and Accord No. 948-A, of 30 October 1972 has fixed, among other particulars, the Program's administrative organization, which is as follows:

a) The central level is composed of:

1. The directorship of the project.
2. A technical department in charge of planning, evaluation and biostatistics.
3. A field-work department.
4. An administrative and financial department.
5. A legal advisory service.

b) The executive level, which is made up of regions, sub-regions, localities and sub-localities.

To direct the program, the Ministry of Agriculture and Livestock has appointed and experienced veterinarian, who is the Executive Director of the

National Foot-and-Mouth Disease Control Program.

The technical department in charge of planning, evaluation and biostatistics is headed by a veterinarian who has specialized at the Pan American Zoonosis Center's course on planning of animal health; he is responsible for the collection, tabulation and analysis of the statistical data that is of interest to the program, and for planning and evaluating the campaign's field activities.

The filed-work department is also headed by a veterinarian, who is responsible for supervising and implementing the campaign at field level.

The financial department functions as secretariat, auditing, disbursing and stockroom offices, in charge of the program's properties and buildings, and is also charged with storage and distribution of vaccines.

The legal advisory service supervises the functioning of animal health courts, as well as the formulation of draft internal regulations.

The program has been assigned the amount of S/ 29,600,000,distributed as follows:

1º	Ordinary expenses	23,273,200
2º	Investment expenditures	3,220,000
3º	Unclassified	3,106,800

Human resources:

1.	Directors	1
2.	Professionals	76
3.	Technicians	102
4.	Administrative	37
5.	Service personnel	25
6.	Wage-earners - full-time	81

In addition, the program has the support of the veterinarian laboratories of the National Institute of Hygiene of the Ministry of Health, which is the agency charged with preparing the vaccine, and with the diagnosis of field samples of vesicular diseases.

3. Changes made in 1973

Notwithstanding the creation of the National Foot-and-Mouth Disease

Control Program by Decree No. 671, of July 24, 1972, and regulations of October of that year establishing the administrative structure and campaign technique, it was only in January 1973 that the program's executive Director was appointed, and until July of that year that the technical and administrative structure began to take shape, and new designation made with the respective appointments, as specified hereunder:

Executive Director	1
Professionals	53
Assistants	86
Administrative	33
Wage-earners	81
Service personnel	9

Financial resources: - S/ 17,300,000 were assigned for the year 1973, which made possible a substantial increase in campaign activities.

At the beginning of the year local laboratories were unable to produce the required number of vaccines; this fact, allied to the occurrence of numerous foci of the disease, required that 150,000 doses of inactivated bi-valent vaccine OA be imported from Colombia. An additional amount of 35,000 doses, from that same origin, were imported by the Asociación de Ganaderos de la Sierra.

The laboratories expanded their installations and equipment, aiming at increasing production to 2,226,056 doses of foot-and-mouth disease bi-valent OA vaccine by the Frenkel method.

Beginning in July, with the zoning of the Program and the increase in the number of the professional, auxiliary and administrative personnel, the foci were controlled and 1,501,015 doses of vaccine applied on cattle through the entire country.

Land was purchased to serve as a Quarantine Station, located in the Island of La Burrera, in the province of Esmeraldas, canton of Esmeraldas, with an area of 223 hectares.

Steps are being taken to purchase land to install fixed control posts in frontier areas and in the eastern region of the country.

Two short courses for professionals were carried out: one in Guayaquil, that was attended by 41 veterinarians, and the other one in Cuenca, attended by 25 veterinarians; 3 other training short courses were given to the Program's auxiliary personnel: the first was held in Portoviejo, attended by 37 assistants, the second in Ibarra, attended by 57 assistants, and the third was held in Cuenca, with 34 assistants in attendance.

The draft request for a loan submitted to the IDB for the control of foot-and-mouth disease was changed in respect to its financial aspect; the original project called for an estimated cost of US$ 7,800,000, with a national contribution of US$ 5,000,000, and an IDB contribution of US$ 2,800,000. The project that has been finally approved calls of a total cost of US$ 8,473,000; the national contribution is to be US$ 2,473,100, the IDB is to contribute US$ 5,355,800, and the Ministry of Health US$ 644,100.00. The change was made in view of the readjustments made necessary by the inflationary process which the country must bear, the rise in the cost of inputs, manpower, etc.

The loan agreement submitted to the IDB was approved November 8,1973, and was assigned Number 380/SF-EC.

4. Problems presented

The continuation of the epizootic wave during the early months of the year and the national laboratories lag in the production of a sufficient number of foot-and-mouth disease vaccine, were met by importing the vaccine from Colombia.

Still, during the first months of the year there was the problem of the lack of administrative autonomy, because - as has been previously indicated - it was only during the month of July that the Program's structure was shaped.

A decisive factor which limited field activities was the lack of vehicles, since the existing units were in a poor state of repair.

The information campaign at national level has not been started as yet in an appropriately planned manner, because there is still resistence on the parts of different livestock sectors and chiefly from native communities.

5. Results

A general decrease, in regard to the distribution, incidence, morbidity and even virulence of the disease as compared with the previous years, can be noticed. During the first months of the year dairy and meat products continued to be in short supply, together with a trend toward an increase in prices, which is explainable in view of the occurrence of numerous foci of the disease.

6. International collaboration

The Advisor for Ecuador of the Pan American Foot-and-Mouth Disease Center, repeatedly visited and assisted the Program, which was highly beneficial for the control of the disease in the country.

Two fellowships were granted by PAHO on training and implementation of sanitary campaigns, in Porto Alegre (Brazil); two fellowships were granted by IDB to attend the Seminar on Community Information and Education Techniques in foot-and-mouth disease prevention and control programs, held in Bogotá, in July 1973. And one additional PAHO fellow for the third course on Animal Health Planning at the Pan American Zoonoses Center, in Buenos Aires (Argentina).

The Foot-and-Mouth Disease Control Agreement between Ecuador, Colombia and PAHO is still in effect; some amendments have been suggested and a draft for expanding the agreement has been prepared according to which Ecuador will participate through the Department of Animal Health, on one part, and the Foot-and-Mouth Disease Control Program, on another part. This document will be submitted for approval at the VII Inter American Meeting at Ministerial Level on Control of Foot-and-Mouth Disease and other Zoonoses to be held in Port-of-Spain, Trinidad and Tobago, 17-20 April, 1974.

The South American Comission for the Control of Foot-and-Mouth Disease (Comisión Sudamericana para la Lucha contra la Fiebre Aftosa - COSALFA) was set up in February 1973, at a meeting in Rio de Janeiro (Brazil). The Commission held an extraordinary meeting in Bogotá (Colombia) in July of that same year.

7. Plans and targets for 1974

Field activities

a) A plan of vaccination will be carried out during 1974, by the owners of livestock establishments and by the official services, taking into account the increase in the numbers of the livestock population, and with the coverage which is specified in Table 16.

b) To reduce the risk of expansion of the disease through detection and typing of foot-and-mouth disease outbreaks, in order that control measure be applied immediately.

c) To hinder the introduction of exotic virus in the country, and to counteract the dissemination of the disease.

d) To improve the quality of the epidemiological studies on the disease, the statistical system and the evaluation system of the campaign.

e) To provide for multinational cooperation in controlling the disease, specially at the frontier level.

To adequately expand and equip the structures for storage, transportation and distribution of the vaccine that is to be utilized in the campaign.

Laboratory activities

a) To expand research activities in laboratories for vesicular diesesses, as related to production, control and diagnosis.

b) To build and equip the different units for quality control of the vaccine prepared by the production unit.

c) To train the required personnel for laboratory and field action.

d) To secure the required amount of vaccine for carrying out the campaign, by raising national production to 2 million doses.

III. FOOT-AND-MOUTH DISEASE NOTIFICATION - 1973

No. of affected farms	321
No. of sick cattle	7 065
No. of sick sheep	240
No. of sick swine	236
No. of farms with samples sent for virus typing	118
No. of farms with FMDV type O diagnosis	72
No. of farms with FMDV type A diagnosis	6
No. of farms with FMDV type C diagnosis	-
No. of farms with VSV type New Jersey diagnosis	9
No. of farms with VSV type Indiana diagnosis	1
No. of farms with negative diagnosis	30

IV. COVERAGE SITUATION OF THE FOOT-AND-MOUTH DISEASE COMBAT IN 1973

Area in Km^2 a/	10 000
Livestock farms a/	150 000
Cattle population a/	2 000 000
Sheep population a/	-
Goat population a/	-
Total doses of vaccine prepared	1 357 580
Total doses of vaccine controlled	1 344 500
Total doses of vaccine approved	1 357 180
Doses of vaccine exported	-
Doses of vaccine imported b/	187 000
Doses applied in cattle	1 501 015
Doses applied in sheep	-

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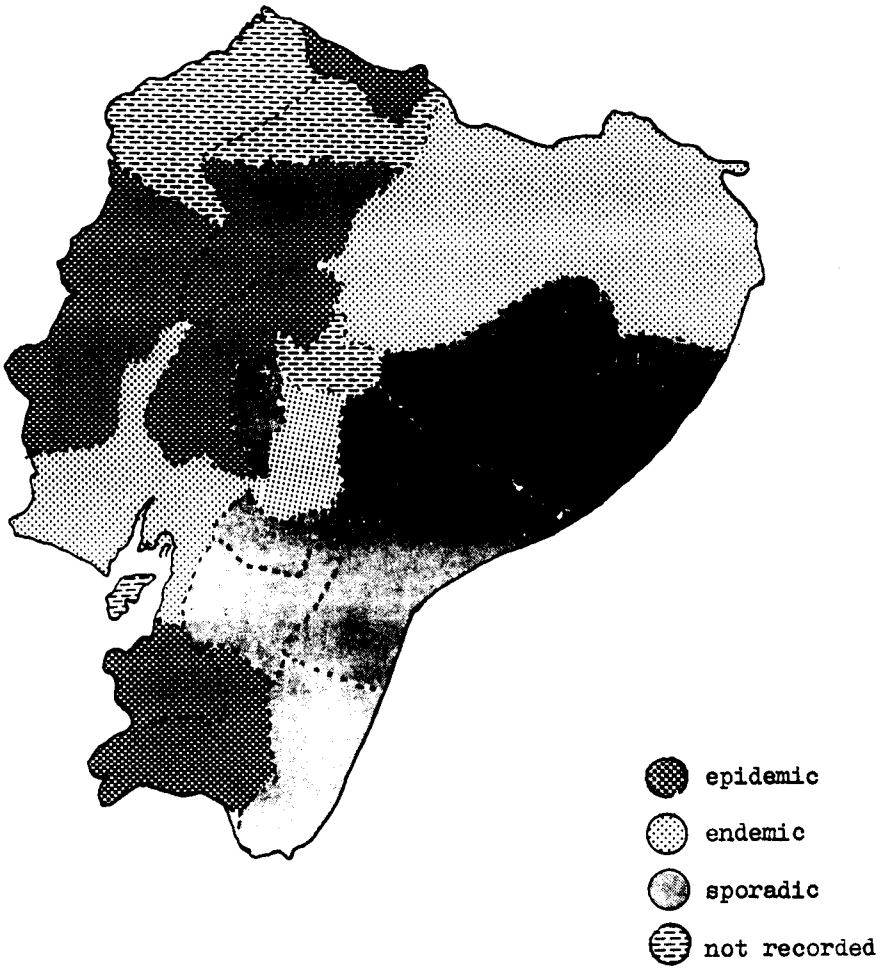
a/ Implementation area.

b/ Origin: Colombia.

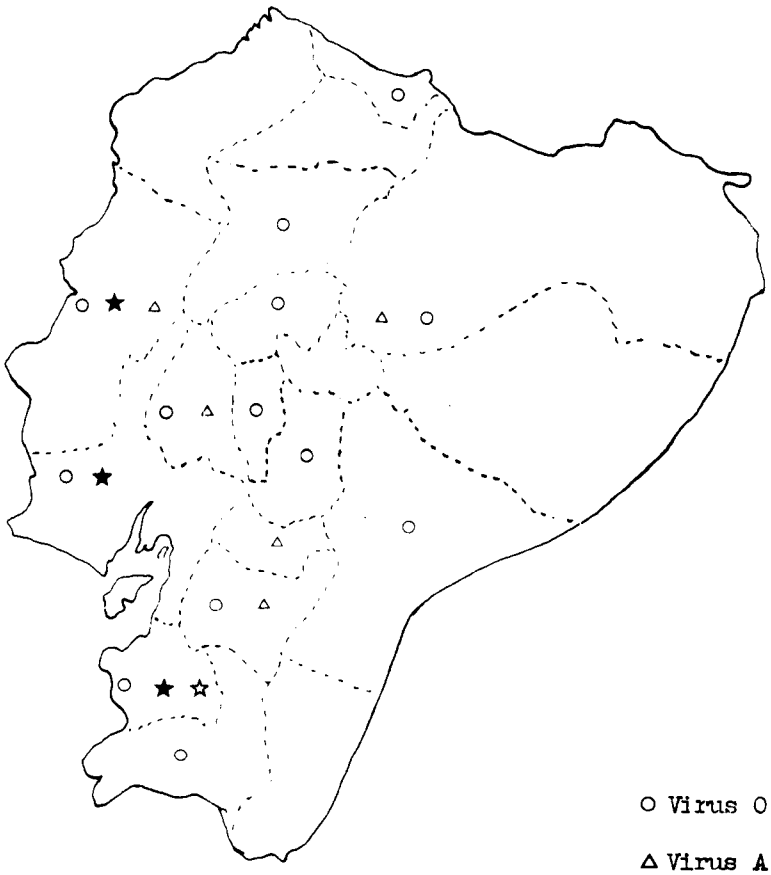
MAP 17

Foot-and-mouth disease geographic situation.
ECUADOR - 1973



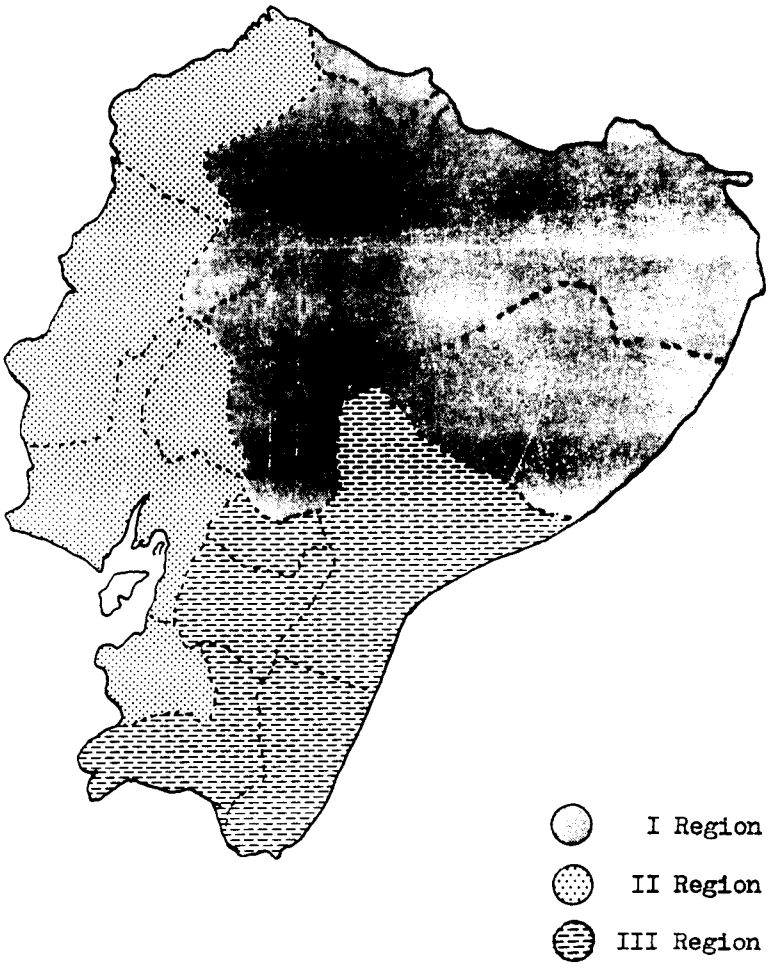
MAP 18

Foot-and-mouth disease and vesicular stomatitis.
Viruses typed according to provinces - ECUADOR - 1973.



MAP 19

Division in regions for the foot-and-mouth disease campaign.
ECUADOR - 1973



MAP 20

Foot-and-mouth disease combat situation.

ECUADOR - 1973

program in progress

program under study

TABLE 16

Vaccination program. Estimated number of vaccinations to be carried out by owners of livestock establisments and by the official service. Coverage includes livestock population growth.

ECUADOR - 1973

Region and province	Cattle population	1st. period		2nd. period		3rd. period	
		Owners	Offic. Serv.	Owners	Offic. Serv.	Owners	Offic. Serv.
FIRST (Sierra)							
Carchi	87.4	15.0	18.2	15.0	18.2	16.0	21.4
Imbabura	105.6	18.1	27.1	18.1	27.1	18.0	27.1
Esmeraldas	153.8	----	----	----	----	7.3	29.2
Pichincha	281.3	73.5	73.6	73.5	73.6	73.5	73.5
Cotopaxi	149.6	46.9	31.2	46.9	31.2	46.9	31.3
Tungurahua	58.9	-4.2	23.7	4.2	23.7	3.6	24.4
Chimborazo	118.4	----	----	----	----	10.7	45.6
Bolivar	66.4	----	----	----	----	2.8	28.9
Pastaza	14.7	----	----	----	----	----	----
Napo	19.7	----	----	----	----	----	----
Subtotal Region	1.056.0	157.7	173.8	157.7	173.8	178.0	281.4
SECOND (Coast)							
Guayas	341.2	77.8	116.9	77.8	116.9	77.8	116.9
Los Ríos	123.2	25.5	38.4	25.5	38.4	25.4	38.5
El Oro	74.9	----	----	----	----	7.0	28.5
Galápagos	7.6	----	----	----	----	----	----
Manabí	457.5	54.4	163.1	54.4	163.1	59.5	179.5
Subtotal Region	1.004.4	157.7	318.4	157.7	318.4	170.7	362.6
THIRD (East)							
Cañar	156.3	7.3	67.0	7.3	67.0	7.3	67.0
Azuay	176.3	7.4	67.9	7.4	67.9	7.4	67.8
Morona Santiago	45.9	----	----	----	----	----	----
Loja	224.8	9.51	86.7	9.5	86.7	9.5	86.7
Zamora Chinchipe	30.6	------	----	----	----	------	----
Subtotal Region	633.9	24.2	221.6	24.2	221.6	24.2	221.6

P A R A G U A Y

I. EVOLUTION OF FOOT-AND-MOUTH DISEASE

1. Geographic distribution of the disease

The National Service of Foot-and-Mouth Disease Combat (Servicio Nacional de Lucha contra la Fiebre Aftosa - SENALFA) registered 52 foci which occurred in the country during 1973; all the cases were visited. For a better specification of the problem, Table 17 shows the evolution of the foci in the course of the year, arranged by departments, and a percentage index of the number of foci over the total number of existing livestock establishments.

It is important to point out that the epidemic outbreak which occurred in the departments of Caazapá and Guairá and in a region of the department of Itapúa, summed up to 23 foci (44.2%), in zones which in the last years had been considered to be disease free.

a) Free zones

No information on foci exist from certain zones, however, such zones cannot be considered free from the disease in view of the lack of adequate and timely reporting, in some cases, and lack of laboratory tests in other cases. These zones include the departments of Misiones, Alto Paraná, Boquerón and Olimpo. The department of Boquerón, which in a large part was incorporated to the Pilot Plan of Chaco, was free from foot-and-mouth disease throughout the year.

b) Sporadic zones

The departments of Caaguazú and Amambay registered sporadic foci at the beginning and end of the year. The focus detected in the department of Amabay occurred at Bella Vista, and this fact was considered to be significant in view of its proximity to Brazil, where constant passing through of cattle takes place. Affected livestock establishments are located by the Apa River, that marks the frontier line between the two countries. The outbreak in the department of Caaguazú was centered in the district of Ipé Jhú, restricted to one isolated ranch and presenting a

a relatively low rate of attack.

c) Endemic zones

The departments of Presidente Hayes, Concepción, San Pedro, Itapúa, Cordillera, Paraguarí and Ñeembucú are considered to be endemic zones, with a relatively low incidence of the disease.

d) Epidemic zones

A wide region comprised within the departments of Caazapá, Guairá and a part of Itapúa, was affected by an epidemic between February and April.

2. Virus diagnosis

It was possible to obtain material throughout the country to carry out laboratory tests for 32 out of the 52 foci that were visited. From that number, the laboratory through serological and biological tests was able to identify virus in 13 samples and the remaining 19 were negative. The remaining 20 foci were confirmed after clinical diagnosis.

The predominant agent was virus type A, subtype A_{24}, chiefly in the epidemic outbreak which occurred in Zone IV. Virus type O, subtype O_1, was isolated in the foci from Concepción, Itapúa and Paraguarí. In the department of Amambay, as well as in the foci which occurred in the department of Presidente Hayes (Chaco), virus type C, subtypes C_2 and C_3, were detected. In the district of Areguá, central department, this virus was also diagnosed.

The existence of virus type A, subtype A_{24}, strain Brasil 70, as evidenced in the epidemics of Caazapá, Guairá and a neighboring zone of Itapúa, is a matter worthy of notice since it signifies an important prevalence of this type in that particular epidemic. No epidemiological investigation has been carried out to determine the origin of this strain. Table 18shows the monthly distribution of viruses typed. The geographic distribution is presented in the map 21.

3. Epidemics

Initially, the focus was located at Compañía Paso Yobay, in the district of Villarrica, department of Guairá. Subsequent investigations

established that this focus had originated from animals brought from Compañía San Francisco, district of San Juan Nepomuceno, department of Caazapá. Studies on the general characteristics of the possible factors which determined the appearance of other foci in the above mentioned location, were carried out in loco. Mention must be made that the focus had its source in another company in the same district, where the disease was detected one month before the investigation, in addition to the fact that some foci had appeared in geographically isolated places and therefore permitted perfect control of possible spread of the disease.

As can be seen from graph 10 the epidemic registered the highest number of foci during the first months of the year, and then declined. Again in December a focus in the district of Buena Vista of Caazapá was confirmed. The focus in Yuty, in July, originated in a herd coming from Taba-i (Caazapá). This focus was put under control.

All the outbreaks in April, in the department of Guairá (Villarrica) also had their origin in San Juan Nepomuceno, where the epidemic was at its peak and transit of livestock was continuous from that place toward Villarrica. Up to the present date, it has not been possible to achieve total control of this situation.

The affected animals were chiefly swine, but also cattle became sick. At that location 2 foci were detected in February, and 8 out of the 9 foci which occurred in March.

Total affected animals:	2,025
Total cattle population in affected zones:	524,200 (population in risk)
Attack rate:	48.94 per hundred
Morbidity rate:	38.63 per ten thousand

Type of virus - According to the laboratory diagnosis of the samples that could be examined, the causing agent of this focus was virus A_{24}, strain Brazil 70.

Causes - Non supervised vaccination was one of the main causes that produced the epidemic. A large nucleus of small producers, who had not experienced the disease for several years, did not carry out the vaccination in due time and in the proper manner, possibly because of excessive

confidence. A proof of this is the fact that ranchers owning more than 100 animals and who strictly implemented the vaccination plan, their farms were free from the disease during the epidemic outbreak.

Spreading - Spreading of the disease was made possible by animals proceeding from the first affected establishments. Being a region which by nature is isolated, no sanitary control posts had been installed.

Consequences - The department of Caazapá, which was considered to be free and with no record of foot-and-mouth disease foci, is invaded by this epidemic affecting a vast livestock area. One positive aspect is the intensification of activities of the combat plan now being put to effect in the district of San Juan Nepomuceno and surrounding area. The most important target is setting up a regional office in the district in 1974.

Measures adopted - Identification of the foci detected in Villarrica.
Investigation of the origin of focus.
Isolation of affected areas.
Revaccinations.
Quarantines.
Study of the causing agent.
Expansion of the agency's operations.

Results obtained - Even though by mid-year it was possible to control the epidemic, a focus in the district of Buena Vista, neighboring San Juan Nepomuceno (department of Caazapá), was again corroborated in December, and the origin thereof has not been as yet determined. Nevertheless, it is quite possible that the origin can be traced to San Juan Nepomuceno.

4. Factors related to the disease

Within the last six years SENALFA has registered the foci that were notified, the occurrence of which has been slowly diminishing. However, it is possible that figures regarding such occurrences may be excessive, the foot-and-mouth disease campaign is clearly showing the good effects that have been achieved.

Improvements made in regard to notification through the statistic service have produced satisfactory results and may afford better indicators on the evolution of the disease. This circumstance does permit an approach

to other measures aiming at the control of this disease.

Some of the major factors are herein listed:

- Merchandising of animals, and a larger movement of the herds, and consequently, the negative aspects involved therein.

- Non-vaccination in many of the small livestock establishments located in far away places not always permitting direct inspection by SENALFA.

- The fact that a large part of the Chaco region remains outside the foot-and-mouth disease combat campaign, thus permitting the entry of animals from zones which are considered to be endemic.

- Movements within the ranches, which are beyond the official control of the frontier region.

- Climatic phenomena which negatively affected the vaccination periods.

- Absence of epidemiological service, that will be installed in 1974 with specific activities aimed at investigating the occurrence of foci within the country.

5. Rates

See table 22.

II. DEVELOPMENT OF FOOT-AND-MOUTH DISEASE COMBAT

1. Coverage

a) Being carried out - The National Foot-and-Mouth Disease Campaign has at present a geographic coverage of 71% over the total area of the country.

The Paraguay river divides the country into two important natural regions: the eastern region and the western region or Paraguayan Chaco.

The eastern region, which was the basis for the first stages of the Combat Plan is presently included in SENALFA's activities. The program to be developed in the western zone is one of the most important short term objectives within the foot-and-mouth disease combat program. A pilot plan

has already been established in a zone that presents characteristics offering favorable technical and administrative conditions for foot-and-mouth disease combat, and which at the moment presents results that permit to project the campaign in other zones, including coverage of the entire Chaco region.

b) Being organized - The Chaco, or western region, is a zone that requires adequate make-up and an appropriate general diagnosis for applying sanitary measures.

Setting up the pilot plan has produced previously results, since in two years it has made available information for a future campaign in the Chaco. On the basis of this information, the first studies permitting a methodological design for the total incorporation of the western region have already been made.

Those preliminary studies are still being analyzed, mainly in regard to the availability of human and material resources.

The first steps for the second stage have already been taken. Incorporation of important places such as: General Díaz, General Bruguez and Villa Hayes, with large concentrations of herds from the Pilcomayo Sector, is a good start.

SENALFA has already established auxiliary offices in the above mentioned places, with technical personnel serving in an advisory capacity in the zone. Control of animal transit and of foot-and-mouth disease foci, and supervision of vaccination spontaneously carried out by ranchers, are being performed.

c) Under study - The areas in which the foot-and-mouth disease combat campaign will be continued comprise approximately 28% of the total area of the country (116,995 Km^2). The dates of incorporation have not been set as yet.

d) Absence - There is practically no area in which the Service is not present. Even though there are still several zones in which no specific activities are being performed, such areas are now under scrutiny for their possible incorporation.

2. Administrative organization

SENALFA, in its present structure, is now being studied for the

possibility of carrying out the Animal Health Project which, at the moment, is in preparation. The data contributed by the agency permitted to diagnose the present animal health situation in Paraguay.

Resources

a) Human resources: during 1973 SENALFA employed a total of 69 veterinarians, 50 sanitary inspectors, 28 official vaccinators, 102 administrative employees, and 28 helpers.

b) Financial resources (in Guaranís):

National contribution	- Ordinary budget (expenses). .	92,920,600
	Capital budget (purchase of land, office equipment, furniture, buildings)	13,356,743
International contribution	- Inter-American Development Bank (technical assistance, training fellowships, construction, vehicles, laboratory equipment, vaccination and sanitation teams, sanitary education and information teams	151,068,132
T o t a l $		257,345,475

3. Changes made in 1973

During 1973 several of the targets that had been programmed were accomplished, and produced significant administrative as well as technical and financial postivie changes, during the development of the foot-and-mouth disease combat campaign. These can be summarized in the following aspects:

An important point to be mentioned is that the rules on administrative reorganization prepared by Price Waterhouse Peat & Co., hired for that purpose, have been put into effect.

The reorganization and urgent requirements of the system of statistics unity.

Training of technical officers in animal health planning, ecology and epidemiology.

Auxiliary offices in important locations in the western region (Chaco) were incorporated, for the purpose of applying the regulations aimed at controlling foot-and-mouth disease foci. These locations are: General Díaz, General Bruguez and Villa Hayes, in the Presidente Hayes department.

New public cattle chutes were put in operation, in addition to those already existing in the eastern region.

A new regional office was inaugurated at Ypacaraí, in the central department, in charge of the III zone of operations. This is a strategic location from the point of view of a better control of livestock movement and also there is a large amount of small owners in that area, and it is an important zone of the country's dairy basin.

It became possible, in the course of the year, to build up the equipment of sanitary education and information service, by incorporating audio-visual educational material, that allowed a step forward in the program, mainly for the purpose of persuading the ranchers of the importance of the problem related to foot-and-mouth disease.

For the evaluation of the progress made in the foot-and-mouth disease combat since the beginning of the campaign until 1973, a special adviser from PAHMDC assisted in carrying out this task.

Construction of the building of the central laboratory of SENALFA is 98% complete, and the isolation station (at Caapucú) by the end of the year has achieved 76% of its facilities' capacity.

Turnover of the vaccine for the year 1973 can be expressed as follows:

National production total doses	No. of laboratories		No. of doses		
	Official	Private	Imported	Exported	Used in the combat zones
10,723,230	-	2	-	2,437,500[a]	7,459,463

a/ Includes 937,500 doses of monovalent vaccine
Rejected vaccines: 760,000 trivalent doses.

Total amount of vaccines produced was controlled by SENALFA (as to innocuity and efficacy).

4. Results obtained

In short, the National Campaign of Foot-and-Mouth Disease Combat, covering three fourths of the country's area, attained the targets which had been programmed, in the course of the year 1973:

Operation of statistic unit service.
Proper equipment of sanitary education and information service.
Studies in Chaco, for the purpose of incorporating the total area of that zone.
Administrative reorganization.

5. International collaboration

It should be mentioned that in the course of the year a number of meetings at international level with bordering countries (Brazil and Argentina) were held, for the purpose of implementing multinational programs in the combat against foot-and-mouth disease, and to establish appropriate regulations to be observed at the frontiers.

Advisors are actively cooperating in the following activities:

Information systems.
Epidemiology.
Planning.
Laboratory.

6. Research

A research study was carried out in the western region for the purpose of determining positive reactions to VIA, with technical advice from the Pan American Foot-and-Mouth Disease Center. This study revealed important results which will serve as a tool for projecting the foot-and-mouth disease campaign through the entire Chaco.

7. Plans and targets for 1974

The plans and targets foreseen for 1974 are presently under consideration at SENALFA's planning unit, and adequate indicators for eventual evaluation are being prepared. This system will make possible to

attain concrete results that could be quantified, in order to evaluate the progress of the campaign.

In brief, some of the objectives for 1974 include the following:

- Operation of the isolation station at Caapucú.
- To prepare the regional offices at San Juan Nepomuceno, Saltos del Guairá and Olimpo (Chaco).
- Expansion of sanitary control posts.

III. FOOT-AND-MOUTH DISEASE NOTIFICATION - 1973

No. of affected farms	52
No. of sick cattle	3 080
No. of sick sheep	200
No. of sick swine	787
No. of farms with samples sent for virus typing	29
No. of farms with FMDV type O diagnosis	4
No. of farms with FMDV type A diagnosis	6
No. of farms with FMDV type C diagnosis	3
No. of farms with negative diagnosis	16

IV. COVERAGE SITUATION OF THE FOOT-AND-MOUTH DISEASE COMBAT IN 1973

Area in Km^2:	Eastern region	159 827
	Western region (Pilot Plan)	130 000
Cattle owners:	Eastern region	83 717[a]
	Pilot Plan	1 700[b]
Vaccinated cattle:	Eastern region	2 547 156[a]
	Pilot Plan	101 472[b]
Sheep population:	Eastern region	340 600[c]
	Pilot Plan	2 116[e]
Goat population:	Eastern region	86 600[e]
	Pilot Plan	420[e]
Total doses of vaccine produced		10 723 230
Total doses of vaccine exported		2 437 500[d]
Total doses of vaccine imported		-
Total doses of vaccine applied in cattle		7 459 463

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a/ Vaccination report - May/73.

b/ Vaccination report - December/73.

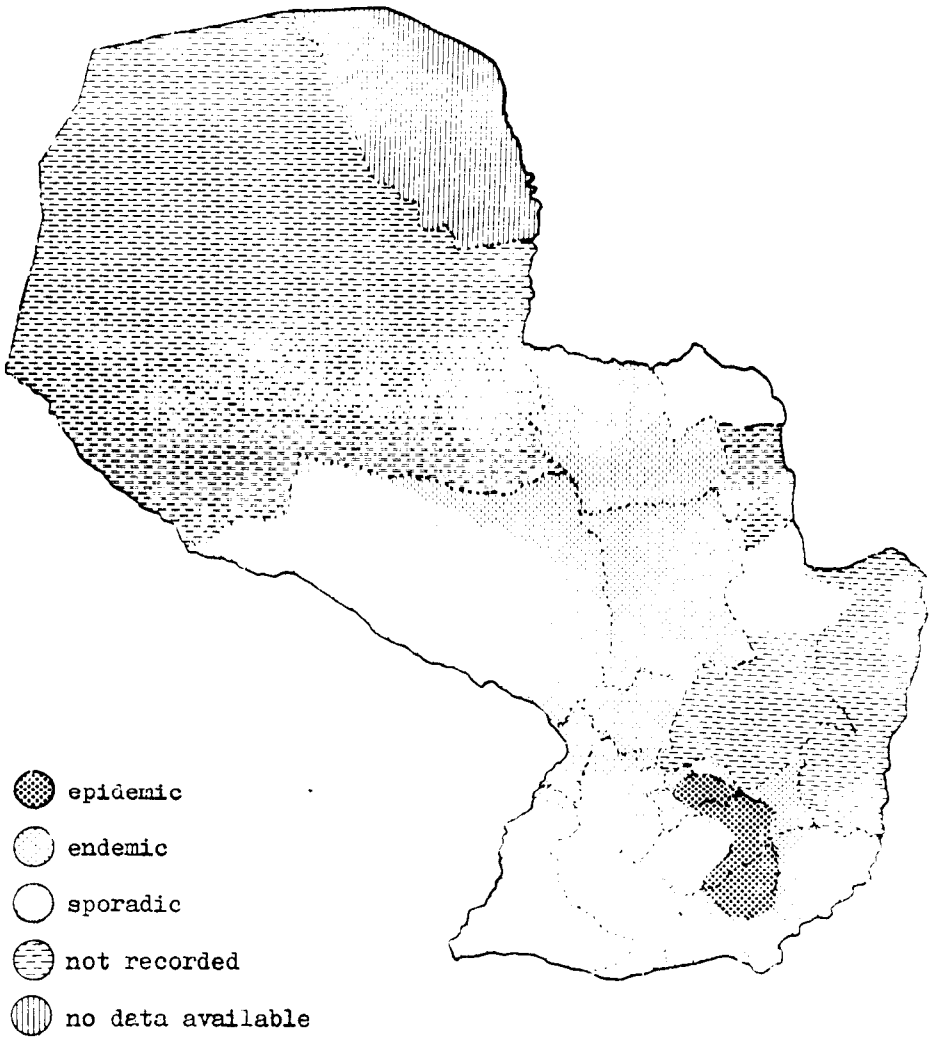
c/ Agriculture and Livestock census by sampling in 1972

d/ Includes 937 500 doses of monovalent vaccines.

e/ Vaccination Report - July/72

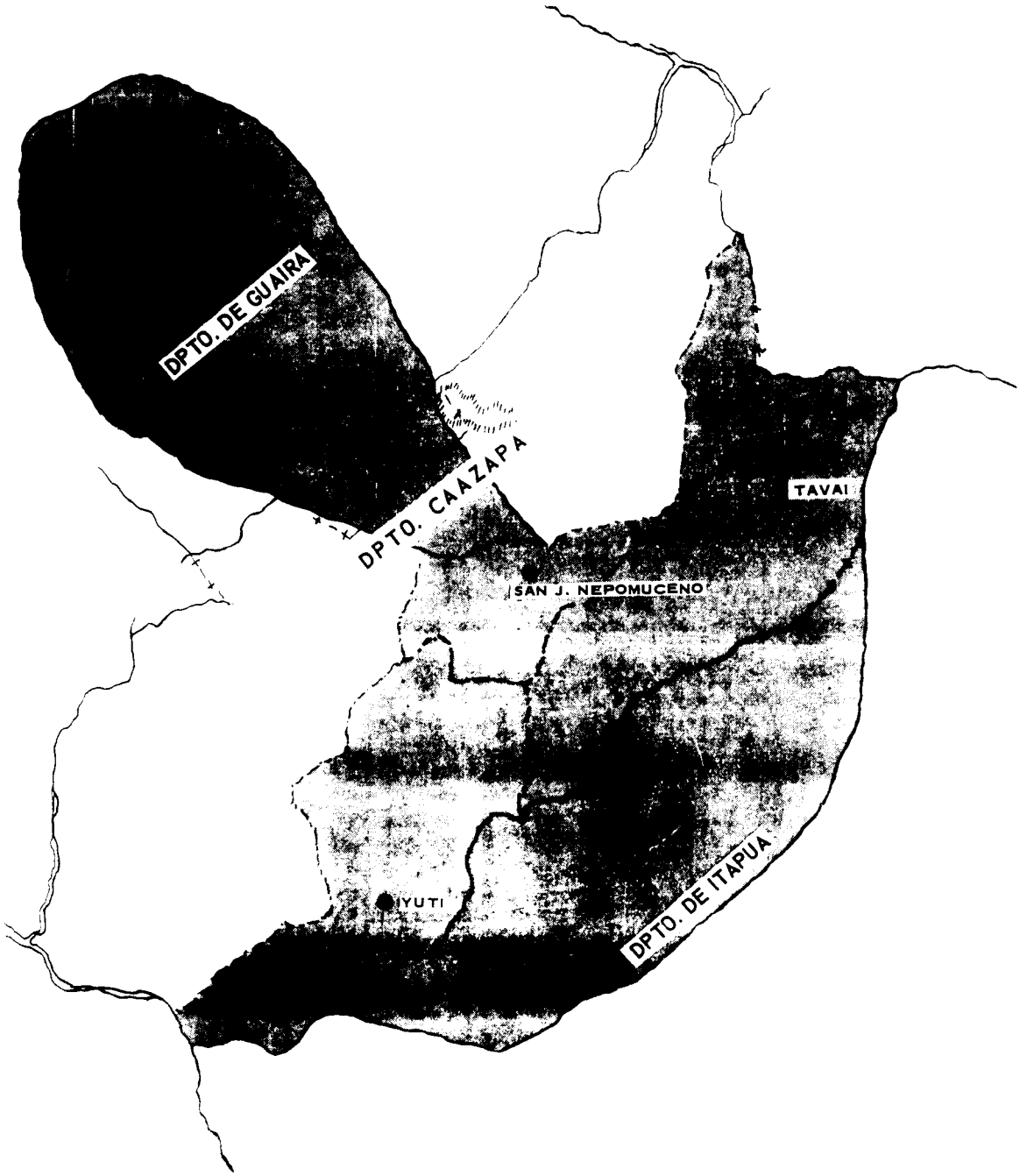
MAP 21

Foot-and-mouth disease geographic situation.
PARAGUAY - 1973



MAP 22

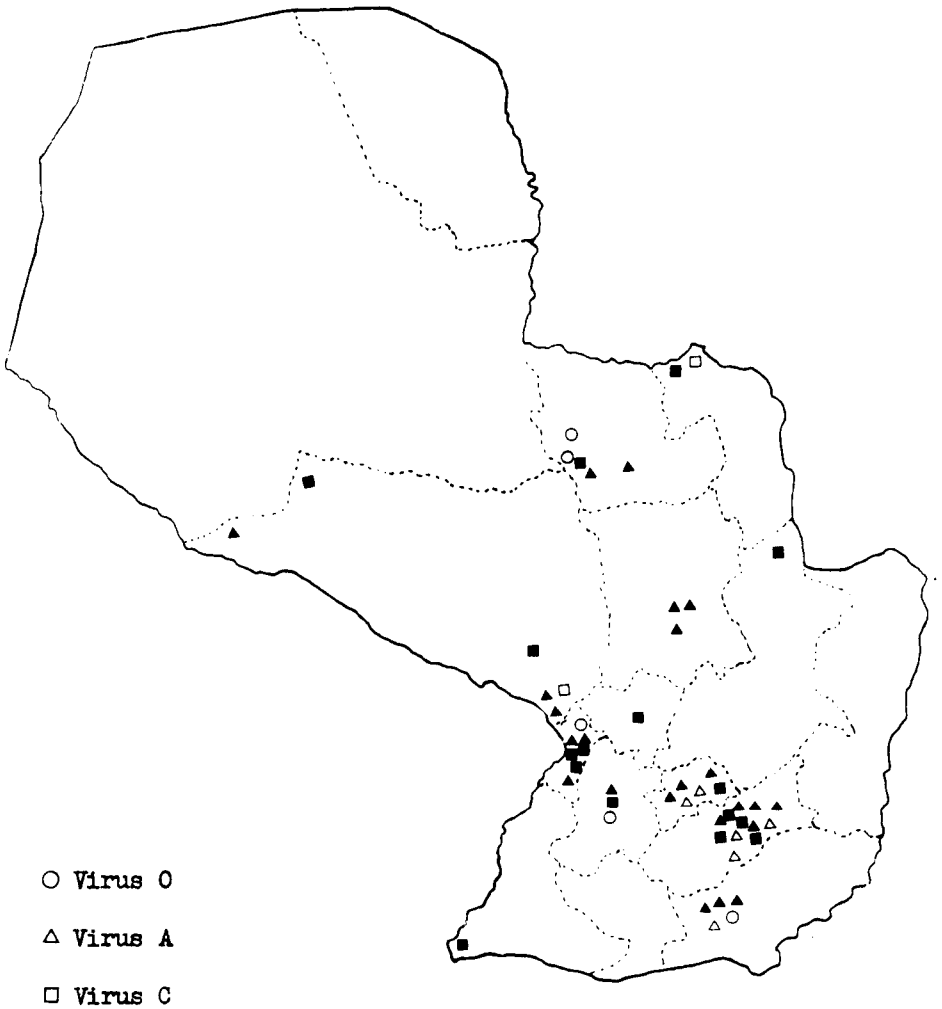
Epidemic zone - PARAGUAY - 1973



MAP 23

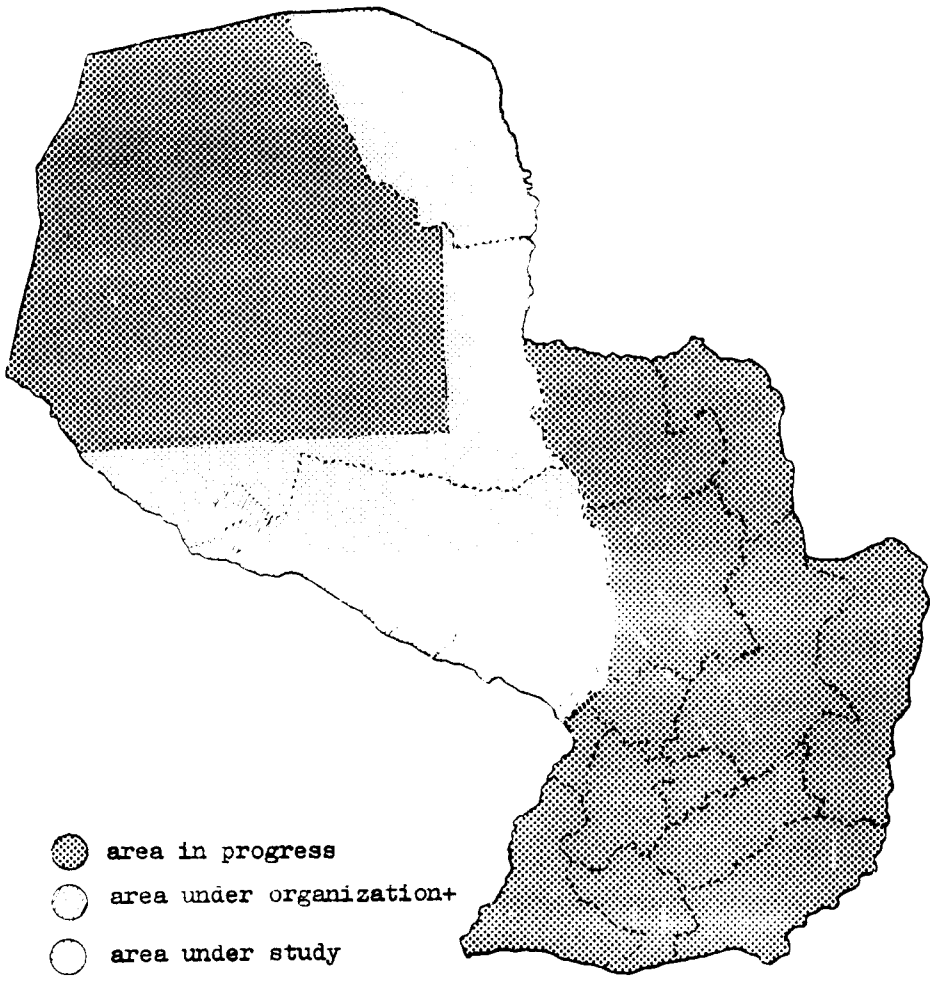
Geographic distribution of FMD foci diagnosed and typed.

PARAGUAY - 1973



MAP 24

Division by zones according to geographic coverage.
PARAGUAY - 1973

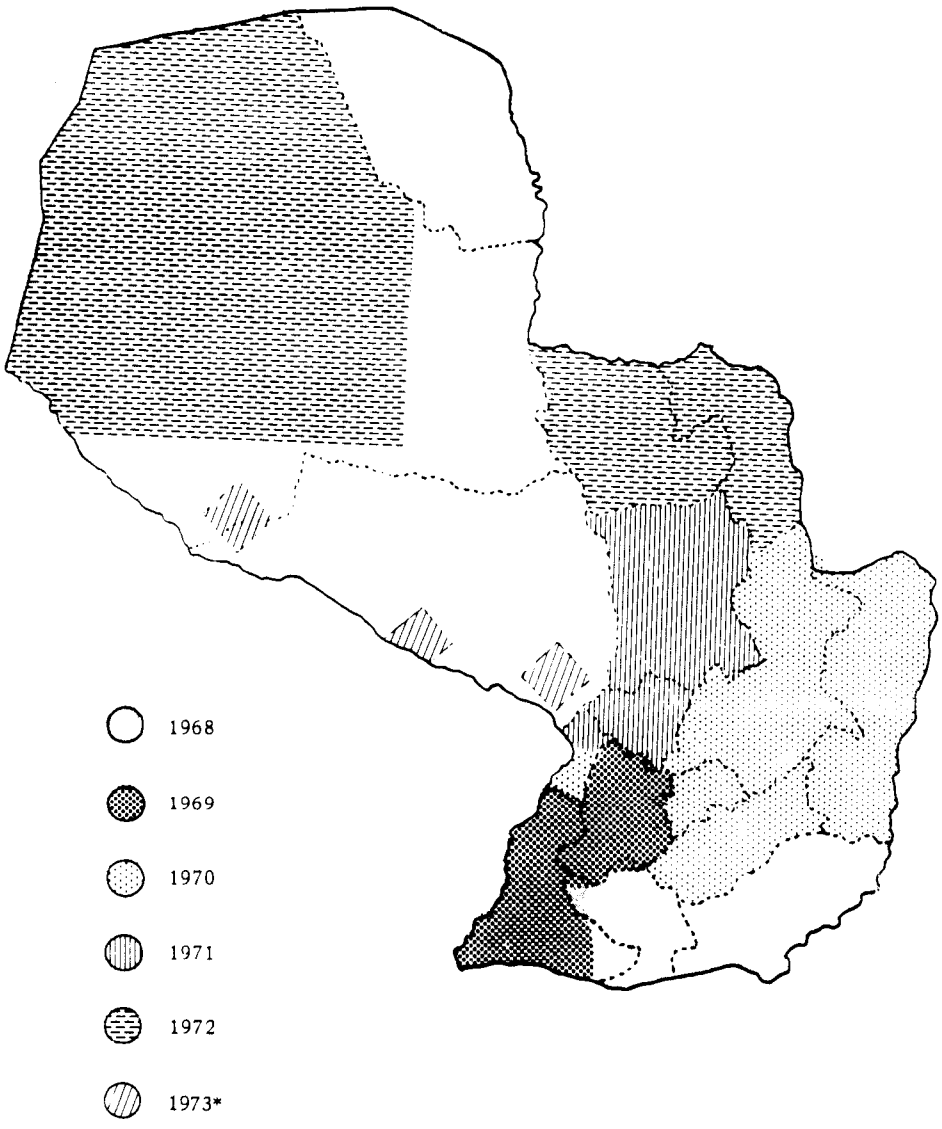


+ Activities in progress. Without official qualification.

MAP 25

Stages of foot-and-mouth disease combat zones incorporation.

PARAGUAY - 1973



* Activities in progress - not compulsory.

TABLE 18

Monthly distribution of herds affected by FMD, according to diagnosis

PARAGUAY - 1973

Month	Laboratory diagnosis				Clinical diagnosis only	T o t a l
	O	A	C	Neg.		
January	2	-	1	-	4	7
February	-	-	-	3	2	5
March	-	3	-	3	5	11
April	-	2	-	1	2	5
May	1	-	-	2	-	3
June	-	1	-	2	-	3
July	-	-	-	-	3	3
August	-	-	1	-	3	4
September	-	-	1	-	-	1
October	-	-	-	1	2	3
November	1	-	-	-	-	1
December	-	-	-	4	2	6
Total	4	6	3	16	23	52

TABLE 17

Evolution of FMD foci

% over the total of existing farms/department

PARAGUAY - 1973

Department	No. farms[a]	December 1972		Situation during I-XI-73		December 1973	
		No. foci	%	No. foci	%	No. foci	%
Concepción	5 910	1	0.02	5	0.08	-	-
San Pedro	5 244	-	-	3	0.05	-	-
Cordillera	7 736	-	-	1	0.01	-	-
Guairá	8 170	-	-	6	0.07	-	-
Caaguazú	10 401	-	-	1	0.01	-	-
Caazapá	3 751	-	-	11	0.29	1	0.03
Itapúa	5 976	-	-	5	0.08	-	-
Misiones	3 977	-	-	-	-	-	-
Paraguarí	16 667	-	-	2	0.01	1	0.006
Alto Paraná	2 449	-	-	-	-	-	-
Central	4 288	-	-	6	0.14	1	0.02
Ñeembucú	7 347	2	0.03	1	0.01	-	-
Amambay	801	-	-	1	0.12	1	0.12
Pte. Hayes	798[b]	-	-	4	0.50	2	0.25
Boquerón	-	-	-	-	-	-	-
Olimpo	-	-	-	-	-	-	-
Total		3	0.02	46	0.06	6	0.02

a/ Vaccination data - May 1973.

b/ Agriculture and Livestock census by sampling, 1972.

Distribution and frequency of EEEV types and subtypes

PARAGUAY - 1973

Department	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Concepción	1 O_1	-	-	-	1 neg.	-	-	2 cl.	-	-	1 O_1	-
San Pedro	-	-	-	-	-	-	2 cl.	1 cl.	-	-	-	-
Cordillera	-	-	-	-	-	-	-	-	-	1 neg.	-	-
Guairá	-	1 neg. 1 cl.	1 cl.	2 A_{24} 1 cl.	-	-	-	-	-	-	-	-
Caaguazú	-	1 neg.	-	-	-	-	-	-	-	-	-	-
Caazapá	3 cl.	1 neg. 1 cl.	1 cl. 2 A_{24} 2 neg.	-	-	1 A_{24}	-	-	-	-	-	1 neg.
Itapúa	1 O_1 1 cl.	-	1 A_{24} 2 cl.	-	-	-	-	-	-	-	-	-
Paraguarí	-	-	-	-	1 O_1 1 neg.	-	-	-	-	-	-	1 neg.
Central	-	-	-	1 neg.	-	1 neg.	1 cl.	1 C_2	-	2 cl.	-	1 neg.
Ñeembucú	-	-	-	-	-	1 neg.	-	-	-	-	-	-
Amambay	1 C-69	-	-	-	-	-	-	-	-	-	-	1 neg.
Pte. Hayes	-	-	1 cl. 1 neg.	1 cl.	-	-	-	-	1 C-69	-	-	1 neg. 1 cl.

cl. = clinical diagnosis
neg. = negative

TABLE 19

Monthly geographi distribution herds affected by FMD

PARAGUAY - 1973

Department	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dez	Total
Concepción	1	-	-	-	1	-	-	2	-	-	1	-	5
San Pedro	-	-	-	-	-	-	2	1	-	-	-	-	3
Cordillera	-	-	-	-	-	-	-	-	-	1	-	-	1
Guairá	-	2	1	3	-	-	-	-	-	-	-	-	6
Caaguazú	-	1	-	-	-	-	-	-	-	-	-	-	1
Caazapá	3	2	5	-	-	1	-	-	-	-	-	1	12
Itapúa	2	-	3	-	-	-	-	-	-	-	-	-	5
Paraguarí	-	-	-	-	2	-	-	-	-	-	-	1	3
Central	-	-	-	1	-	1	1	1	-	2	-	1	7
Ñeembucú	-	-	-	-	-	1	-	-	-	-	-	-	1
Amambay	1	-	-	-	-	-	-	-	-	-	-	1	2
Pte. Hayes	-	-	2	1	-	-	-	-	1	-	-	2	6
Total	7	5	11	5	3	3	3	4	1	3	1	6	52

Attack and morbidity rates - PARAGUAY - 1973

Species	Total outbreaks	Total sick animals	Total animals in farms	Total livestock farms	Animal population	Attack rate %	Morbidity rate 0/000	Farms affected over the total in country
Cattle	52	3 080	19 778	150 000 a/	4 548 900 b/	15.6	6.8	0.03
Sheep	4 c/	200	1 367	-	340 600 b/	14.6	5.9	-
Swine	16 d/	787	1 047	-	617 500 b/	75.2	12.7	-

a/ Estimated

b/ Agriculture and Livestock census by sampling in 1972

c/ Included in outbreaks in cattle

d/ 13 outbreaks included in cattle

Attack and specified morbidity rates - 1973

Virus type	Total outbreaks	Total sick cattle	Total existing cattle in the farms	Attack rate %	Morbidity rate 0/100
O	4	523	5 012	10.4	1.1
A	6	47	119	39.5	0.1
C	3	41	1 713	2.4	0.1

TABLE 21

Vaccinations performed (by periods)

PARAGUAY - 1973

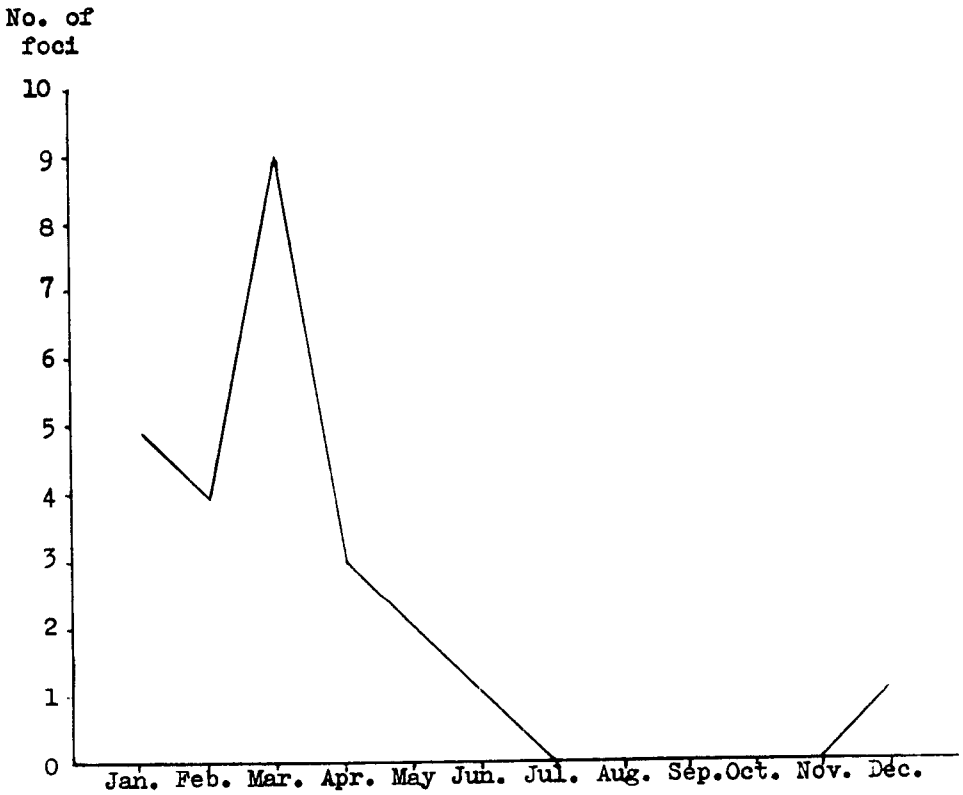
Year	Vaccination periods	No of owners attended	No. of vaccinated cattle
1968	-	-	-
	-	-	-
	October	15 217	437 156
1969	February	19 444	722 680
	June	19 607	772 230
	October	37 272	1 184 942
1970	February	34 001	1 157 985
	June	58 074	1 580 758
	October	65 753	1 703 214
1971	February	58 758	1 593 386
	May	86 032	2 187 805
	September	84 252	2 184 973
1972	January	82 711	2 320 133
	May	82 553	2 440 598
	September	82 392	2 448 360
1973	January	84 383	2 502 779
	May	83 717	2 547 156
	September a/	77 448	2 308 056

a/ Corresponds to figures for the districts of Alberdi, Villa Oliva, Villa Franca and Yabebyry of the department of Ñeembucú.

GRAPH 10

Evolution of foci in epidemic area.

PARAGUAY - 1973



Note: No disease was detected in Agrarian Zones III, VII, X, XI and XII.

2. Virus diagnosis

The diagnosis laboratory for vesicular diseases of the Institute of Zoonosis and Livestock Research ("Instituto de Zoonosis e Investigación Pecuaria") of the National Health Institutes, Ministry of Health, has performed the analysis of field samples, with the following results:

Nº of farms with diagnosis of virus O Vallée subtype O_1 in cattle	17
Nº of farms with diagnosis of Virus O Vallée subtype O_1 in swine	5
Nº of farms with diagnosis of virus O Vallée subtype A_{24} in cattle	12
Nº of farms with diagnosis of virus O Vallée subtype A_{24} in swine	2
Nº of farms with diagnosis of negative virus in cattle	8
Nº of farms with diagnosis of negative virus in other species	-
Nº of farms with diagnosis of vesicular stomatitis virus type Indiana	-
Nº of farms with diagnosis of vesicular stomatitis virus type New Jersey	1

3. Epidemics

Agrarian Zone IX

On 9 October 1973, an outbreak occurred at the Bellavista farm, in the province of Bellavista, department of San Martín; virus subtype A_{24} was isolated.

Notwithstanding vaccination and the measures that were taken to isolate the infection, the disease spreads to neighboring ranches located on both sides of the road going from the Bellavista farm to the city of Bellavista, approximately 20 kilometers long, and up December 40 establishments had been affected, having a population of 1,215 animals, of which 786 became sick, representing a morbidity rate of 64.7%.

Endemic

Agrarian Zone I

On 23 March 1973, an outbreak was diagnosed in a dairy herd located at La Zapata; virus A_{24} was isolated. Beginning on 7 April 1973 and coinciding with the incoming of beef cattle, the first cases were detected in the fattening pens at Irrigación de San Lorenzo, spreading over to Sullana, Marcavelica, Catacaos, Castilla and Ayabaca.

P E R U

I. EVOLUTION OF FOOT-AND-MOUTH DISEASE

1. Geographic distribution of the disease

Foot-and-mouth disease was present in few places in Peru, with the following characteristics:

Epidemic

Agrarian Zone IX: In breeding herds at Bellavista, department of San Martín, having had contact with personnel that managed or was in contact with imported breeding stock for the zone of Pucallpa, department of Loreto.

Endemic

Agrarian Zone I: In pens and places where the fattening stock was interned, at Morropón, San Lorenzo, Marcavelica, Ayabaca and Catacaos, department of Piura.

Agrarian Zone IV: In beef cattle at the following locations: Callao, Lurín, Chorrillos, San Martín de Porres and Santa Clara, in the department of Lima.

In swine , but limited to some farms at Puente Piedra at Callao.

Agrarian Zone V: In a grouping of livestock at a place in Llauta, department of Ayacucho, at Santiago and Nazca, department of Ica, and Santiago de Chocorgos, in the department of Huancavelica.

Sporadic

Agrarian Zone I: In one dairy herd in the province of Morropón, in the department of Piura.

Agrarian Zone II: In one dairy herd at Batan Grande, in the province of Chiclayo, department of Lambayeque.

Agrarian Zone VI: In a fattening center at Socabaya, department of Arequipa.

Agrarian Zone VIII: In imported breeding stock, at San Jorge and Tournavista farms located at Pucallpa Coronel Portillo province, department of Loreto.

In 1970, the disease was detected in 315 herds with a population of 33,350 cattle, of which only 5,791 animals were sick, a morbidity rate of 17.36% in the affected farms.

In the year 1971, 134 affected establishments were diagnosed, with a population of 39,314 cattle, of which 8,278 animals fell sick. Morbidity rate was 21%.

In 1972 the disease affected only 48 farms, 2,132 animals were sick out of a total cattle population of 11,147 animals in the affected premises. Thus, in the few number of affected herds the morbidity rate was 19%

In 1973, the disease was registered in 80 farms having a cattle population of 35,113 animals of which 3,795 were sick, representing 10.8% of morbidity. Regarding swine, 11 farms were affected, having a population of 1,234 animals, of which 749 were sick, representing a morbidity rate of 60.7%

6. Trend

Foot-and-mouth disease continued to decline in 1973.

Types and subtypes of foot-and-mouth disease diagnosed in foci 1969 - 1973

In 1969, 20 foci were notified as caused by virus subtype O_1; 10 foci each for subtypes A_{26} and A_{27}; 4 foci for each of subtypes A_{24} and A_{29}; 36 foci of subtype C_3, and one focus only caused by subtype C_5.

In 1970, 19 foci were detected of virus subtype O_1; subtype C_3 in 32 foci, and subtype C_5 in only one focus.

In 1971, virus subtype O_1 was typified in 14 foci; subtype A_{24} in 21 foci; subtype A_{27} in 30 foci, and subtype C_3 in 4 foci. Vesicular stomatitis type Indiana was detected in 3 foci, and type New Jersey in 6 outbreaks.

In 1972, the disease was registered in only 48 foci; virus subtype O_1 was identified in 11 foci; subtype A_{24} in 14 foci; subtype A_{27} in 11 foci; and subtype C_3 in only one focus.

With regard to bovines, the disease was registered in 18 foci affecting 80 establishments; 17 with virus O_1 and 12 with virus A_{24}. Regarding swine, the disease was registered in 8 foci affecting 11 establishments; 5 of them with virus O_1 and 2 with virus A_{24}.

The causing agent of foot-and-mouth disease was virus subtype O_1. Only the fattening pens where imported livestock had been placed were affected.

The disease was originated by the internment and traditional marketing of fattened cattle and consumption in areas adjacent to the international frontier.

Control was based upon slaughtering, which was done at the local slaughterhouse, of the animals from the infected pens, disinfection of the premises before allowing the re-entry of animals, revaccination of livestock in the surrounding areas, and an improved sanitary control of the movement animals coming from places located near the border.

Agrarian Zone IV

Since the middle of January 1973 and until the end of February, there were outbreaks in some fattening centers at Santa Clara and Lima. At the last week in July, at Callao, a new outbreak occurred among fattening cattle in the places which have already been mentioned. Early in June the disease struck at Lurín, and during the second week in September at Santa Clara.

The ethiological agents that were isolated were subtypes O_1 and A_{24}. The origin of the foci was related to the movement of cattle and of people. The disease was controlled through measures of temporary quarentine applied to the affected premises, transit control and revaccination with triple vaccine.

4. Factors related to the disease

a) Traditional marketing of live fattening and beef cattle in areas located near the international border at the North Coast and the Southeastern Sierra.

b) Transportation of beef cattle to the slaughterhouse, within the country, from ranches to the fattening center, and toward the consumption markets.

5. Morbidity

The data of morbidity which is given refers only to the affected herds.

In the year 1969, epizootic outbreaks occurred in the South and Southeast of Peru, caused by subtypes A_{26}, A_{27}, and A_{29}, and there were 4,814 sick animals out of a cattle population of 70,885 animals in the affected premises.

The budget of the laboratory for vesicular diseases, which is a part of the Institute of Zoonosis and Livestock Research of the National Health Institutes of the Ministry of Health, amounts to 11,500,000 Soles per annum, and this budget is also biennally prepared.

Human resources

Human resources for the campaign also belong to the Agriculture Sector and to the Health Sector.

In the Ministry of Agriculture	veterinarians	84
	technicians of intermediate level	354

Note - All the above mentioned personnel devote a part of their time to animal health activities; the campaign against foot-and-mouth disease is considered to be within such activities.

In the Ministry of Health (laboratory)	veterinarians	4
	technicians of intermediate level	25
	administrative	2

Note - This personnel works full-time

Changes made since 1973

27,745 breeding cattle were imported from Central America and Brazil for the purpose of developing livestock in the North coast. All livestock has been specially protected agains foot-and-mouth disease, and no outbreak has occurred up to the present. However, there was an outbreak of the disease among the animals that had been introduced in the San Jorge and Tournavista farms, located at Pucallpa, Coronel Portillo province, department of Loreto.

36 agriculture and livestock fairs have been held in different agrarian zones, under appropriate sanitary control. No case of foot-and-mouth disease has been registered.

An inactivation tank has been installed in the laboratory of the Institute of Zoonosis and Livestok Research. Also the services of one additional veterinarian have been obtained, in order to improve and increase production of foot-and-mouth disease vaccine.

II. DEVELOPMENT OF THE FOOT-AND-MOUTH DISEASE COMBAT

1. Coverage

From the point of view of agrarian programs, Peru is divided into 12 agrarian zones, and each zone is headed by a Zone Director.

The vaccination campaign against foot-and-mouth disease is being implemented in the whole country, i.e. in the 12 agrarian zones, since the year 1964.

The campaign against foot-and-mouth disease is based upon preventing the introduction of the disease from abroad, early detection and confinement through the application of temporary quarentine in every case of vesicular disease, and immunization through vaccination of cattle, and in certain cases of other species as well.

Vaccination tends to be developed in such a manner that livestock in all coastal valleys and inter-Andean valleys are submitted to vaccination every four months; and for the livestock that is dispersed in the highest mountain peaks and in the jungle, every six months.

2. Administrative organization

The responsible agency for the fight against foot-and-mouth disease, at national level, is the "Dirección de Promoción Pecuaria" (Directorship for Livestock Promotion) within the "Dirección General de Producción Agraria" (General Directorship for Agrarian Production) of the Ministry of Agriculture, through its specialized agencies, exercising regulatory and supervisory functions regarding the completion of the campaign and technical assistance. And at the zonal level, the heads of each agrarian zone are responsible for carrying out the campaign.

Financial resources

The budget of the public sector is biennial, and the expenses of the foot-and-mouth disease campaign are included under the appropriate headings of the agriculture sector and the health sector.

The expenses at national level in the Ministry of Agriculture are included in the budget of the "Dirección General de Producción Agraria" and in each of the 12 Agrarian Zones, within their operative budgets, including all campaigns of animal sanitation.

IV. COVERAGE SITUATION OF THE FOOT-AND-MOUTH DISEASE COMBAT IN 1973

Area in Km^2	1,285,215
Livestock farms	650,000
Cattle population	1 653 000
Sheep population	870,000
Goat population	147,738
Total doses of vaccine prepared	3,569,600
Doses applied in cattle	3,186,040
Doses applied in cattle by owners	126,200
Doses applied in sheep and other species	157,072

4. Problems

No significant problems concerning the development of control activities that had been programed occurred during the year 1973.

5. Results

The disease was kept under reasonable control; 80 establishments were notified, having a population of 35,113 cattle, out of which 3,795 animals fell sick; a morbidity rate of 10.8% in the affected premises.

Virus subtype O_1 was diagnosed in 17 farms; and subtype A_{24} in 14.

The disease was also detected in 11 farms holding 1,212 swine; 749 animals sickened, with a morbidity rate of 70.7% in the infected pigsties.

The harmful effects of the disease on the marketing of livestock and livestock products have been considerably reduced.

The movement of internal trade of livestock, chiefly for purposes of fattening and consumption, has met with some limitations due to the quarentines applied in the areas affected by the disease.

6. International cooperation

The Pan-American Foot-and-Mouth Disease Center supplied the Institute of Zoonosis and Livestock Research of the National Institutes of Health of the Ministry of Health, with hiper-immune sera and virus strain for serological work and vaccine production. The Center also cooperates through the services of the advisor, with headquarters in Lima, on problems of foot-and-nouth disease, and the control thereof.

In order to implement the first phase of the national campaign on foot-and-mouth disease, a loan agreement was signed with the Inter American Development Bank for the amount of US$ 6,000,000, and the peruvian government has agreed to supply the national counterpart to meet the requirements during 4 years and to continue the campaign for 10 years further.

Two draft international cooperation agreements to carry out a preventive and control program on foot-and-mouth disease in the Peruvian-Bolivian and Peruvian-Ecuadorean frontier lines, with participation of the Pan American Sanitary Bureau are pending of approval by the participating countries.

7. Targets and plans for 1974

The targets and plans of the foot-and-mouth disease 1974 campaign are the following:

Structure of the foot-and-mouth disease control unit

In accordance with the Inter American Development Bank loan contract Nº 358/SF-PE, the Subdirectorship of the Foot-and-Mouth Disease Control Unit has been set up within the Directorship of Livestock Production, the Unit's structure has been provided for and is now being reviewed by the Legal Advisory Service for approval.

Vaccination regulations

The vaccination regulations approved by Supreme Resolution Nº 311, on 5 July 1965, are now being ammended.

Vaccinations

Coverage of 44% of the country's cattle population should be attained.

Construction work

With funds provided under Inter American Development Bank loan for the National Foot-and-Mouth Disease Combat Program the following construction work will be carried out:

- Foot-and-mouth disease laboratory: construction of this laboratory, to be concluded in 1976, and with a cost of US$ 650,000 shall be started.

- Quarentine stations and internal control posts: construction of 5 quarentine stations, 8 internal control posts, and 2 frontier control posts, shall be started; total investment will amount to US$ 2,583,000

Equipment and vehicles

US$ 2,154,000 worth of equipment, material and vehicles will be purchased.

Vaccine production

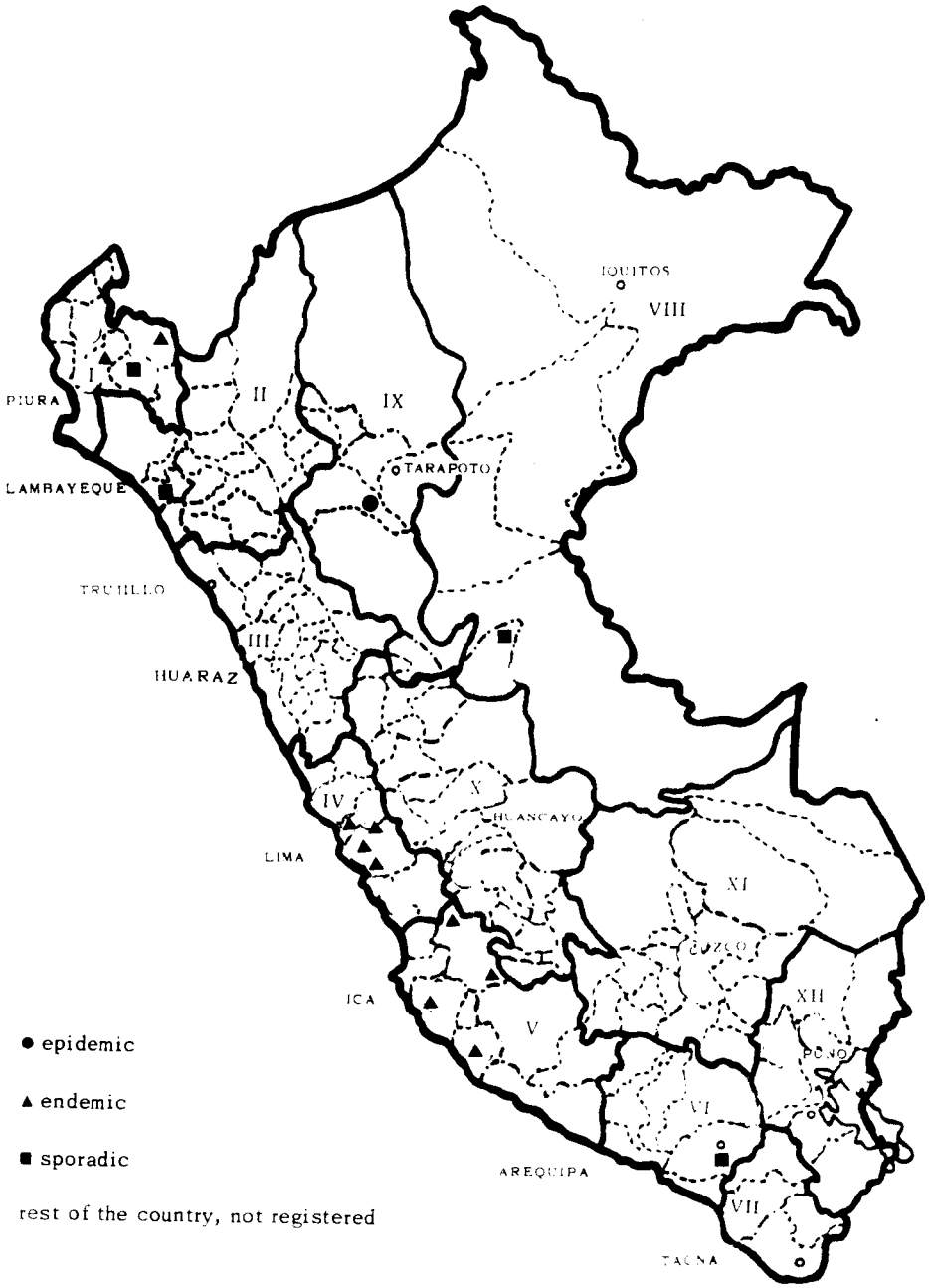
Estimated vaccine production will be 3,600,000 doses.

Budget

The budget for the Foot-and-Mouth Disease Control Unit for 1974 is S/ 116,433,000 (IDB contribution: S/ 64,103,000; and national counterpart: S/ 52,330,000).

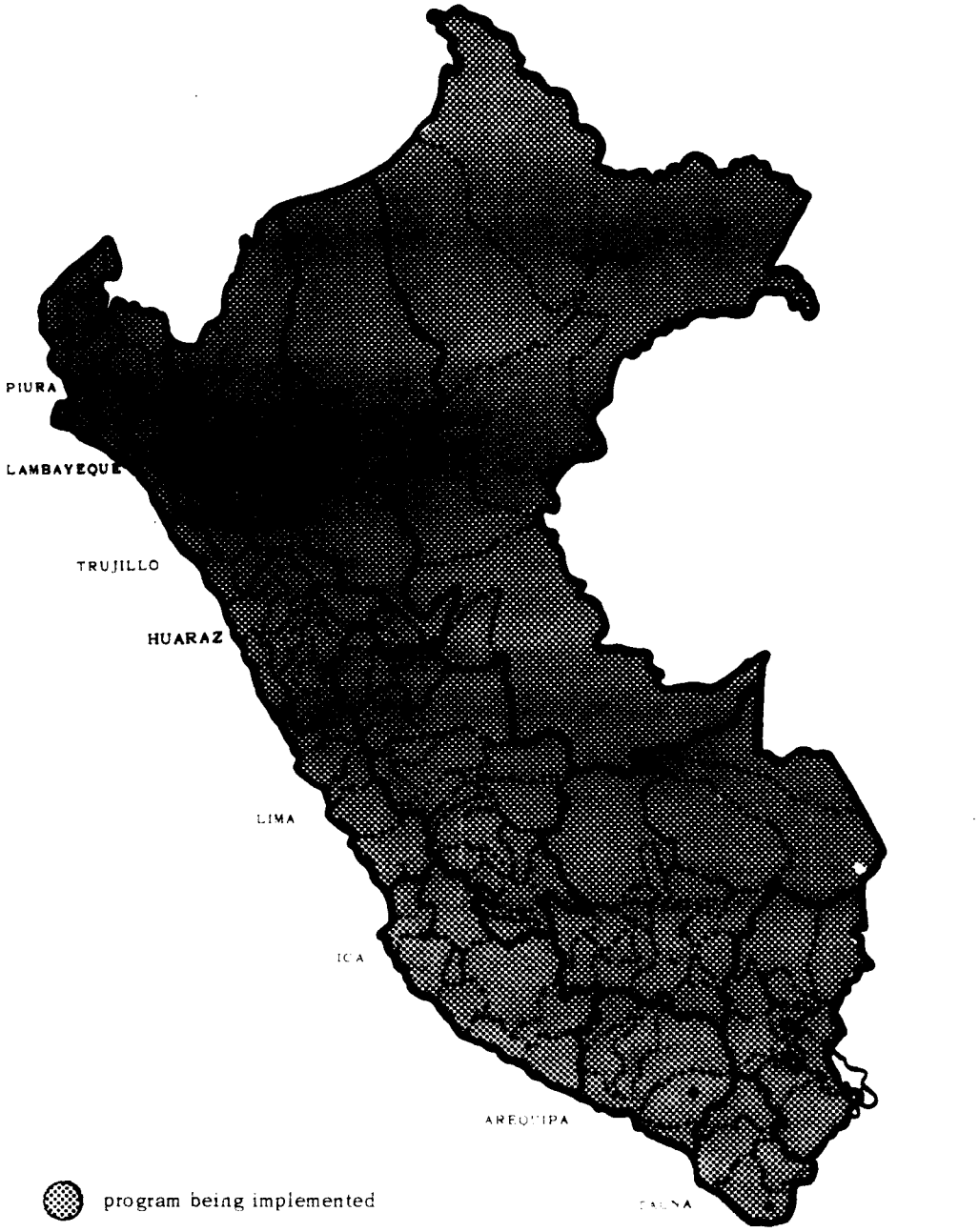
MAP 26

Foot-and-mouth disease geographic situation.
PERU - 1973



MAP 27

Foot-and-mouth disease combat situation.
PERU - 1973



U R U G U A Y

I. EVOLUTION OF FOOT-AND-MOUTH DISEASE

1. Geographic distribution of the disease

A wave of virus O prevailed from March till June 1973, and then decreased and disappeared during the month of July.

Similar to the one that occurred in 1971, this wave presented, however, particular characteristics of its own.

The 1971 wave had a perfectly identifiable origin. It entered through the frontier with Brazil, proceeded toward the center and the south and later on spread over the entire country.

In 1973, the disease started in the coastal and southern departments, but its origin was not clearly detectable.

The agricultural and livestock peculiarities of several of the departments (San José, Colonia, Florida - with small establishments, dairy zones, many places where fairs are held, etc. - contributed to a greater incidence and dissemination of the disease.

The causing virus was O Vallée, subtype O_1, with characteristics similar to O_1 (2386, year 1971), but with the particular feature of shifting, from the serological and immunological point of view, from subtype O_1 Pacheco.

Notwithstanding the impossibility of making at the present time a thorough study of the outbreaks, the differences can be rather neatly established taking into account the dates of appearance and permanence of the virus in the different areas, which were two zones in which the progress of the virus O was evidently epidemic.

One of the three zones (coastal outbreak) is located at the extreme west, departments of Salto, Paysandú, Río Negro and Soriano, on a strip of from 50 to 150 kilometers from the Uruguay river. In that strip the wave lasted for 12 weeks (April - June) with peak frequency of occurrence in the month of May.

The other zone is in the south of the country, comprising the departments of Colonia (NE), Soriano (SE), Flores (half of it in the SE), Durazno (SW), Florida (SW) Lavalleja (S) and the strip of some 20 kilometers west of Rocha, and the departments of San José, Canelones, Montevideo and Maldonado in their entirety.

It spread over some 320 kilometers on the River Plate, with a variable width between 80 and 160 kilometers. The wave lasted for a period approximately similar as in the previous zone.

During almost all of 1973, small foci of virus A, subtype A_{24} occurred, uniformly distributed over all parts of the country, except in the departments of Flores, Lavalleja, Rivera and Maldonado. Persistence of virus A, subtype A_{24}, led to an adjustment of the situation regarding production and control of the vaccine, as will be indicated in due course.

The foci of the disease in the border department of Cerro Largo were caused by virus type C Waldmann. Other parts of the country remained free from this type.

2. Virus diagnosis

During the year 1973, 297 samples were forwarded to the laboratory for study and identification.

Diagnosis was made upon 192 materials, resulting in a percentage of 64.6% positive, a figure slightly less than last year's, which was 73.6%.

With respect to the types of viruses, and as indicated in another section of this report, type O Vallée was predominant, totalling 153 diagnoses, 29 were virus A Vallée, and 10 were type C Waldmann.

Concurrently with the unfolding of the disease in the country since several years, the diagnoses of virus O repeat exactly the frequency of the foci in the course of the 12 months. It can be stated that the causing virus presented similar serological features as those of O_1 (2386 Uruguay 71) but shifting - from serological point of view - from the O_1 Pacheco strain.

The 29 cases of virus A that were diagnosed also give an idea of their low incidence and uniform distribution throughout the months of the year. It can be stated that the characteristics of the previous years are maintained, with a clear predominance of subtype A_{24}, although shifting, from the serological point of view, a fact which is quite natural, from the A_{24} Cruzeiro strain.

Virus C also exhibited the same characteristics of previous years. Foci are confined to a frontier line with Brazil, in the department of Cerro Largo. Serological studies continue to indicate onve virus subtype C_3, although it is also closely related to C_2, strain 25, very frequently used in Uruguay.

3. Factors related to the disease

In the preceding report mention was made that the geographic areas in which the disease appears and propagates are chiefly conditioned by the movements and concentrations of livestock and by other less relevant factors such as the appearance of virus variants, defective application of sanitary measures, etc. It could be added, as yet another predisposing factor, the high rate of humidity of the air, salubrious temperature and moderate winds. These environmental conditions may occur precisely during the Fall, in the months of April, May, June.

The disease was a cause of major concern to the sanitary authorities in several zones of the country; other factors contributing to this situation, in addition to those of a more general character, can be pointed out:

a) The fact that the disease first appeared in the dairy basin, where cattle are herder within rather small premises, where there are cattle concentrations, and where all levels of the foot-and-mouth disease vaccination are reduced, due to the rarefaction of the disease in the zone. It appears to be a fact that people belonging to the lowest socio-economic strata are those more inclined to take for granted that the disease has disappeared.

b) The disease increased in the sheep, which in previous years had experienced in general a very low incidence of the disease, indicating that this may be accounted for as the initial cause, in many cases, of the presence of a focus of foot-and-mouth disease.

c) The apsurge of one or more variants of the virus in the field, immunologically distinct from the productive strains, and therefore capable of producing the disease in such cattle that were specially subject to risk conditions.

4. Morbidity and trend

As shown in the attached tables, and considering the country's total area, information for 1973 is as follows: 11,091 sick cattle from a total number of 150,000 animals at risk. The rate of attack was 7.2%, and general morbidity was 11.0 x 10,000.

As to sheep, 4,461 animals fell sick, from a total number of 170,000 at risk. The rate of attack was 2.6%, and the general morbidity rate was 3.3 x 10,000.

Eight hundred and seventeen pigs were sick out of a total of 5,175 animals at risk. The rate of attack was 24.4%. Morbidity was 19.4 x 10,000.

Comparing present-day information with that of 1971, the similar characteristics of both can be appreciated. The disease surged in its mild form but with a pronounced power of dissemination and a greater number of foci. The characteristics of the causing virus were those observed in subtype O_1. The highest occurrence of the disease also took place in the Fall months - April, May and June-although the duration was shorter than in 1971, when it lasted for a longer period of time.

II. DEVELOPMENT OF THE FOOT-AND-MOUTH DISEASE COMBAT

1. Coverage

It is a matter of common knowledge that the combat area comprises the entire area of the country, and cattle vaccination is compulsory 3 times e year, in the last 15 days of the months of April, August and December.

This vaccination campaign, besides other health measures, is the hard core of the campaign and began to be performed in 1968, spreading shouthwards in three successive stages until the whole of the country was covered.

2. Administrative organization

The agency responsible for the campaign is the Foot-and-Mouth Disease Combat Directorate (DILFA), belonging to the Ministry of Livestock and Agriculture.

At the present time, the resources are distributed as follows:

University graduates [a]	31
Administrative personnel [b]	15
Specialized assistants [b]	62
General workers [b]	23
Total staff [c]	131

a/ The professionals who are university graduates work full time on the basis of a 44-hour week.
b/ 44-hour working week.
c/ There are a number of persons engaged on a jobbing basis.

DILFA's main spheres of action are the Field and the Laboratory, both of which also have an organization with logistic backing.

A. The Laboratory Sector has the following organization:

1. Coordination
2. Subcoordination
   a) Diagnosis service
   b) Seroprotection service
   c) Cell culture service
   d) Vaccine control service
   e) Experimental vaccine production service
   f) Material sterilization and preparation sector

Attached to the laboratory are the accomodation for experimental animals (mice and guinea pigs), test sheds for cattle and sheep, and a slaughterhouse.

B. The Field Sector, in turn, has the following organization.

1. Coordination
2. Subcoordination

C. The Biostatistics and Information Sector (in development).

D. The "Experimental Station of Islands and Peninsulas and Aguas Blancas".

E. General administration.

DILFA is administered financially on a fiscal basis. There is a tax of two Uruguayan pesos on each dose of vaccine marketed, which yields 80% of the resources of the Directorate. Duty or fees are charged on operations of control, sales of livestock, certificates, etc. This means that the health campaing is entirely financed by the Uruguayan nation.

3. Changes made in 1973

Within the budgetary limitations of DILFA and in consonance with the recommendations of the South American Commission for the Control of Foot-and-Mouth Disease (COSALFA), special efforts were made to develop the service of biostatistics.

With this objective in view, the plan prepared by the Pan American Foot-and-Mouth Disease Center and entitled "Epidemiological Surveillance Service", was put in operation with the help of field-technicians and in accordance with COSALFA Resolution II.

In this respect, it is believed that the kind of information and coverage that can be supplied by the present structure of DILFA during periods of normalcy, is adequate. Nevertheless, such information and coverage may not be so adequate in times of higer incidence of the disease, and then it becomes necessary, therefore, without increasing the number of personnel, to seek a closer relationship and cooperation with other animal health services and in general with the Ministry of Livestock and Agriculture, in order to reduce the above mentioned gap.

With respect to the laboratory sector, there was an increase in the general working techniques of all services thereof.

Improvements have been achieved in regard to the professional staff and to laboratory assistants as well, resulting in the formulation of a highly specialized team. Overall renovation of the building has to be postponed for economic reasons, and so it became necessary to fit what had already been built. Accordingly, new space became available for vaccine control tests performed in mice, antigen titling and typing by complement fixation.

In this way, new techniques could be adapted and important original contributions made regarding vaccine wholesomeness, impoving routine diagnosis at 50%, subtyping and titling the virus provided by the producing laboratories. Improvements made in the techniques, in addition to the immunological tests that were performed, have permitted to establish with ease the differences between known virus O strains, and even with respect to more recent ones. Thus, serological differences between field active virus and vaccine produced virus were substantiated, and these observations were later corroborated by immunological tests on cattle.

With respect to the control service, after a series of comparative experiences, the test on guinea pigs was carried out 15 days post vaccination, thus measuring more accurately the antibodies of long duration.

Different comparative values support the increase that was mentioned previously. For example: in 1968, work was carried out on 5,000 mice, and on 80,000 in 1973, at the seroprotection service.

With respect to cell culture, 320 were prepared in 1969; 1,370 in 1972, and 2,930 in 1973. In 1972, 8,000 cell tubes were prepared, and 1973, 28,200 tubes were used.

Vaccine production

Following the systems and methods that have been described in previous occasions, DILFA controlled, through its different laboratory services, all vaccine series produced in the country by the 4 producing laboratories.

Efforts made in 1972 to improve and increase production in Uruguay, permitted achieving appropriate techniques at the beginning of 1973. As was previously mentioned, particularly in relation to the production of good quality antigen O, adequate to the situation obtaining in the field, locally produced vaccine improved substantially, attaining a record figure for the country, 36,271,000 trivalent doses, presented in 75 series. 34,570,000 doses were approved, which is indicative of the comparative increase in production, and what is even more important, of a similar increase in the number of doses released by the official control.

Having overcome the disadvantages that were mentioned, vaccine exports were regularized in the course of the year, and attained the quantity of 3,103,000 doses forwarded chiefly to Chile and a lesser quantity to Bolivia.

Data supplied by the vaccine distribution and sales sector indicate that during the 1973 period, 27,016,854[a/] doses were sold within the country. Taking into consideration that presently, and according to the latest livestock sampling, the cattle population is more that 10 million heads, the general average of vaccinated animal can be estimated at 90%, which is a highly satisfactory figure.

4. Problems and results obtained in 1973

Mention has been made of the virus O wave, that presented special characteristics, and of the probable causes for its occurrence.

The authorities of the Ministry of Livestock and Agriculture, the General Directorate of the Veterinarian Services, and particularly DILFA, adopted the following measures:

a) With respect to the virus variant, vaccines were immediately concentrated not less than 50% in their value O. As a second step, and with appropriate urgency as circumstances required, field strain O was adapted and included a posteriori in the production of the vaccine.

---

a/ Representing the period. from December 1972 to November 1973.
During 1973, more than 28,000,000 doses were sold.

b) As regards the disease in sheep, vaccination of the species as a general prophylactic measure was recommended. At the same time, DILFA financed and performed demonstrations, for the benefit of the producers, on large scale vaccination procedures in sheep, utilizing those zones in which the introduction of the virus would be most dangerous.

c) All the classical means were put into operation: quarantine, ring vaccination, revaccination, movements of livestock were prohibited, sanitary barriers, etc.

Another problem about which the Pan American Foot-and-Mouth Disease Center was consulted, was in regard to confirmation of the occurrence of the first cases of delated allergic accidents as a consequence of anti foot-and-mouth disease vaccination.

The situation was a cause for concern at its inception but the seriousness thereof rapidly diminished by virtue of the opportune measures which were adopted by DILFA, chiefly those regarding vaccine purification; in this manner the allergic elements of the vaccine were eliminated.

Field results obtained after the December 1973 vaccination period seem to confirm this.

5. Research

Insofar as financial resources permitted, all research work was essentially applied work aimed at solving field problems, in vaccine control and production.

Thus, the following works can be listed:

a) Adjustment of different parameters of vaccine efficacy tests in guinea pigs.

b) Study of one A_{24} field strain in serological and cross immunity tests in guinea pigs.

c) Serological studies of O_1 field strain as related to strain O_1 Pacheco.

d) Evaluation of commercial vaccines in different concentrations (1x, 2x, and 4x) vis-a-vis homologous virus O_1, and heterologous O_1 field variant.

e) Evaluation of commercial vaccines in cross immunity tests with A_{38} and A_{22} discharge (Uruguay 72).

f) Determination of sensitivity of different methods in virus detection, in finished vaccines.

g) Vaccination of animals with allergic post-vaccinal background, done at laboratory and field level with different commercial vaccines.

In resumé: The year 1973 was characterized by the occurrence of an epizootic wave of virus O_1 (April - May - June).

The disease was observed to affect mainly establishements located in the dairy zone, and with less than 200 hectares.

Notwithstanding the high dissemination force of the disease, according to the registry of motified foci, its duration was ephemeral when compared to a similar situation that occurred in 1971.

The general rate of attack on cattle remained equal to that of previous years. In comparison, a higher incidence of the disease in sheep was observed.

Recommended sanitary measures were efficiently implemented, and the situation became normal from July on.

6. Targets and plans for 1974

a) Vaccination of the ovine species shall take place after having garnered sufficient field experience and biostatistical data, and particularly when vaccine in sufficient quantity becomes available.

b) Appropriate measures shall also be taken to subscribe a sanitary agreement on foot-and-mouth disease with the Federal Republic of Brazil, with particular attention given to "frontier safeguard".

III. FOOT-AND-MOUTH DISEASE NOTIFICATION - 1973

No. of affected farms	350
No. of sick cattle	11 091
No. of sick sheep	4 461
No. of sick swine	817
No. of farms with samples sent for virus typing	297
No. of farms with FMDV type O diagnosis	153
No. of farms with FMDV type A diagnosis	29
No. of farms with FMDV type C diagnosis	10
No. of farms with VSV type New Jersey diagnosis	-
No. of farms with VSV type Indiana diagnosis	-
No. of farms with negative diagnosis	105

Rate of attack on cattle	7.2%
Rate of attack on sheep	2.6%
Rate of attack on swine	24.4%
Morbidity in cattle	11 x 10,000
Morbidity in sheep	3.3 x 10,000
Morbidity in swine	19.4 x 10,000

IV. COVERAGE SITUATION OF THE FOOT-AND-MOUTH DISEASE COMBAT IN 1973

Area in Km^2 a/	187 000
Livestock farms a/	77 463 b/
Cattle population a/	10 000 000 c/
Sheep population a/	14 600 000 c/
Swine population a/	418 000 c/
Goat population a/	10 000
Total doses of vaccine prepared	36 271 000
Total doses of vaccine controlled	36 271 000
Total doses of vaccine approved	34 570 000
Doses of vaccine exported d/	3 103 000
Doses of vaccine imported	-
Doses applied in cattle	27 017 554

Doses applied in sheep: unaccountable up to the present, although application is common.

---

a/ Implementation area.

b/ Agriculture and Livestock General Census, year 1970: with cattle - 68 681
with sheep - 37 357

c/ Agricultural and Livestock Sampling for the year 1973.

d/ Destination: Chile and Bolivia.

MAP 28

Foot-and-mouth disease geographic situation.
URUGUAY - 1973.

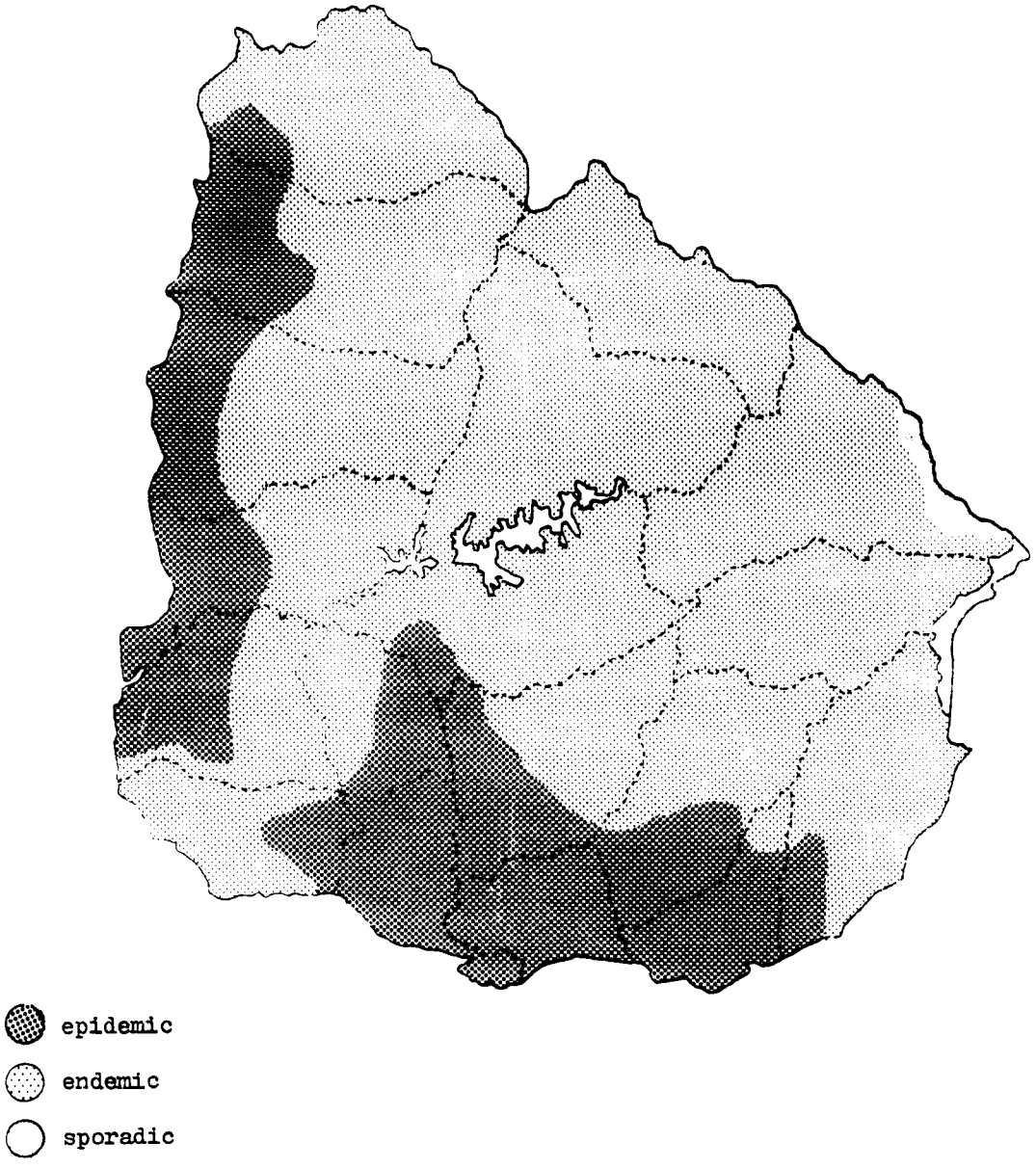


TABLE 23

Foot-and-mouth disease virus samples typed.

Distribution by d tments - January through December[a]

Department	1971			1972			1973		
	O	A	C	O	A	C	O	A	C
Artigas	3	-	-	3	9	-	-	1	-
Canelones	16	2	-	2	3	1	39	6	-
Cerro Largo	13	-	-	-	-	7	5	3	7
Colonia	6	2	-	-	-	-	5	3	-
Durazno	3	-	-	-	2	-	5	-	-
Flores	3	1	-	-	-	-	8	-	-
Florida	11	3	-	-	-	-	10	1	-
Lavalleja	3	3	-	-	-	-	6	-	-
Maldonado	1	-	-	-	-	-	9	-	-
Montevideo	-	-	-	-	-	-	2	2	-
Paysandú	6	1	-	4	5	-	7	3	-
Río Negro	13	1	-	1	-	-	10	3	-
Rivera	6	3	-	-	4	-	3	-	1
Rocha	7	-	-	-	-	-	6	1	1
Salto	3	5	-	6	2	-	8	2	-
San José	2	4	1	-	2	-	11	-	-
Soriano	-	-	2	-	3	-	6	1	-
Tacuarembó	2	-	-	1	-	-	3	1	-
Treinta y Tres	4	-	-	-	-	-	5	1	1
Total	102	25	3	17	30	8	148	28	10

[a] The data presented corresponds to the sum of all bulletins on typing that are published monthly. Materials that were diagnosed after prolonged studies and the results of which were obtained after each monthly publication, are not included.

TABLE 24

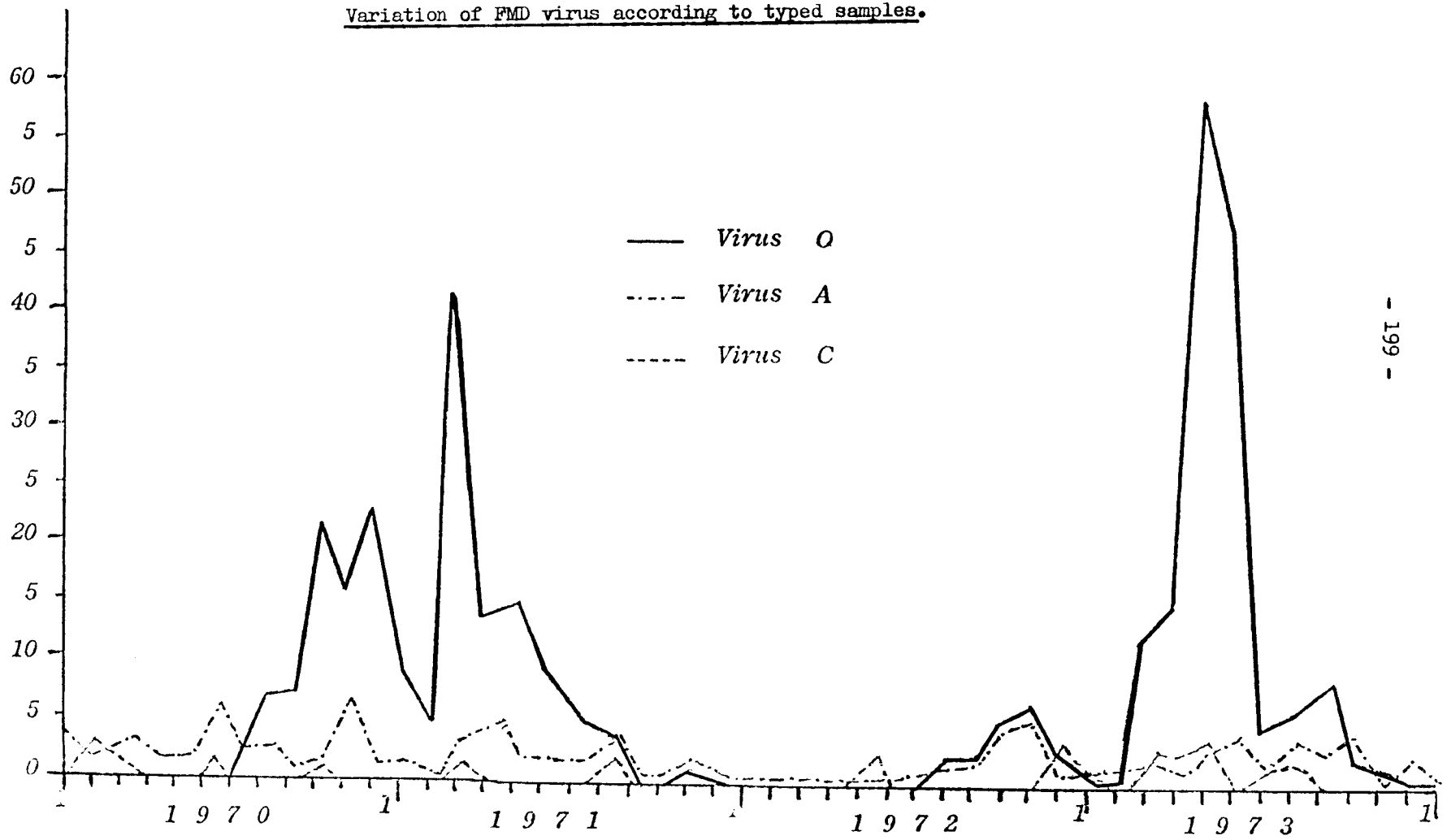
Monthly distribution of FMD virus samples typed[a/]

Mes	1971			1972			1973		
	O	A	C	O	A	C	O	A	C
January	9	1	-	-	1	-	-	-	1
February	4	-	-	-	-	-	1	2	-
March	42	4	1	-	-	-	18	2	2
April	14	5	-	-	2	-	7	-	3
May	15	2	-	-	-	2	57	2	3
June	8	2	-	-	3	-	46	4	-
July	5	2	-	-	5	-	3	1	-
August	4	4	2	2	3	-	4	4	1
September	-	-	-	2	3	-	9	3	-
October	-	-	-	5	3	-	2	4	-
November	1	2	-	6	7	-	1	3	-
December	-	3	-	2	3	6	-	3	-
Total	102	25	3	17	30	8	148	28	10

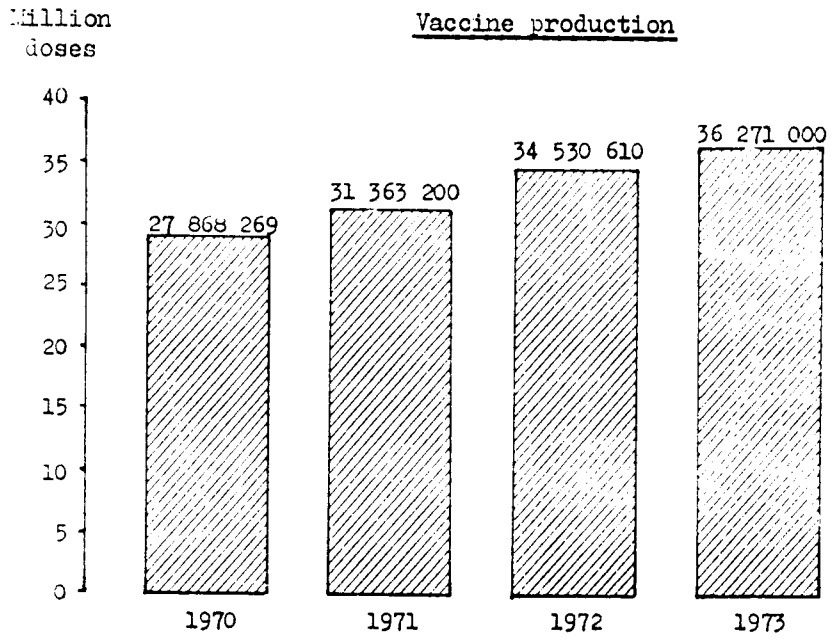
a/ The data presented corresponds to the sum of all bulletins on typing that are published monthly. Materials that were diagnosed after prolonged studies and the results of chich were obtained after each monthly publication, are not included.

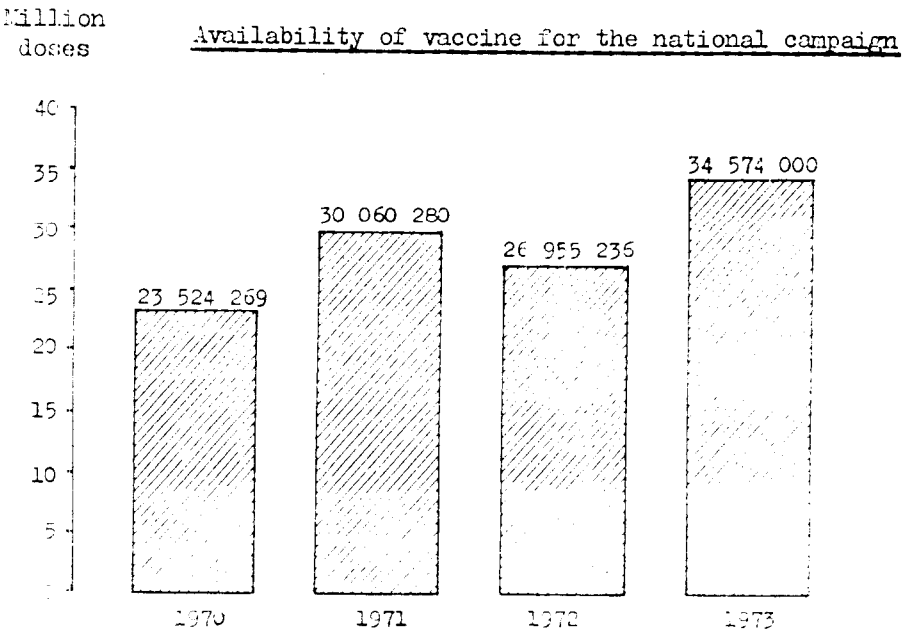
GRAPH 11

Variation of FMD virus according to typed samples.



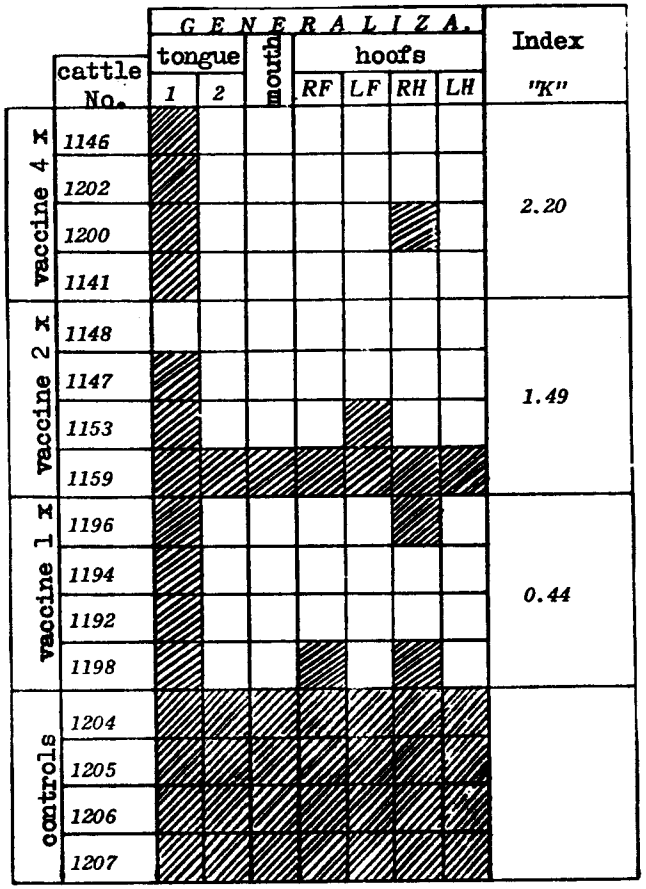
GRAPH 12


Million doses
Vaccine production
40
35
30
25
20
15
10
5
0
27 868 269
31 363 200
34 530 610
36 271 000
1970
1971
1972
1973

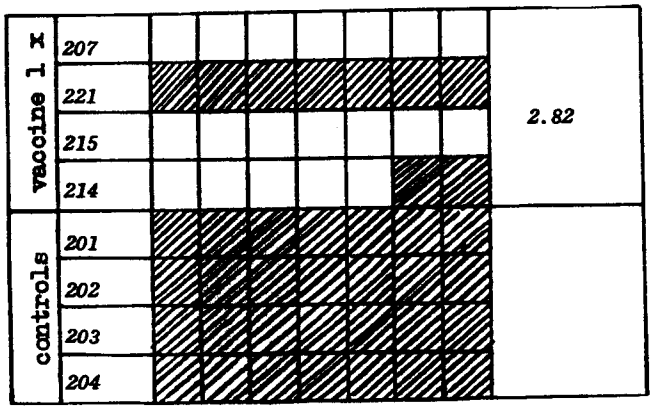

Million doses
Availability of vaccine for the national campaign
40
35
30
25
20
15
10
5
23 524 269
30 060 280
26 955 235
34 574 000
1970
1971
1972
1973

GRAPH 13

Generalizations and values of Index K of one vaccine for commercial use at different concentrations, challenged to an O_1 field strain, serologically different from the one used in making the vaccine.



Generalizations and value of Index K of one commercial vaccined, challenged to an O_1 strain, serologically similar to the one used in making the vaccine.



V E N E Z U E L A

I. EVOLUTION OF FOOT-AND-MOUTH DISEASE

1. Geographic distribution of the disease

For the purpose of dealing with foot-and-mouth disease, the country is divided in two areas:

a) an area where the disease is endemic with virus A and O;

b) a disease-free area.

As compared to the previous year, when there was an area affected only by virus A, there was an invasion of this area by virus O, and so now there are two areas, as mentioned above (map 29).

2. Virus diagnosis

Types A and O were detected in 1973, and the presence of the following subtypes was confirmed - of virus A: A_{27} and A_{32}, and of virus O: O_1, and one sample taken in the Federal Territory of Delta Amacuro, called O Manamito, the the serological behavior of which should be communicated to the Pan-American Foot-and-Mouth Disease Center for subtyping it.

3. Epidemics

There was an increase of the disease during 1973, wihtout becoming epizootic waves, but the disease has invaded the free areas in the Federal Territory of Delta Amacuro, the Sotillo District in the state of Monagas, at first by virus A and later on by virus O, and the result has been that at present there are only two well-defined areas: one free, and the other affected by virus A and O.

4. Factors related to the disease

The factors that have influenced the expansion of the disease are the following:

a) The small amount of vaccine which was produced (6,000,000) allowing only coverage of about 20% of the population, if it is taken into account the fact that often these doses are used for the revaccination of the same herds.

b) The protection granted by the vaccine has deteriorated since the appearance of subtypes A_{32}, O_1 (Cura), and it has also been proven that the

immunity granted is relatively short, adding to it that the pathogenic character of the vaccine incides over animals that are vaccinated for the first time.

c) Climatic factors: Venezuela suffered the scourge of a long and bitter period of drought which compelled ranchers to move large numbers of livestock to distant regions in search of water and feed, mixing up with coming from other regions. The stress produced by the lack of feed, the long migrations and the agglomeration of livestock in confined places, have contributed to create favorable conditions for an increase in the incidence of the disease. This situation became worse at the end of the drought period; torrential rains then set in on a vast extension of the territory, provoking floods that further complicated this sanitary situation.

5. Trend

Due to the previously mentioned factors, a clear trend toward the expansion of the disease becomes evident, and the fact of a greater incidence occurring toward the final months of the year is noticeable, all of which being the consequence of the climatic changes previously reffered to.

II. DEVELOPMENT OF THE FOOT-AND-MOUTH DISEASE COMBAT

1. Coverage

The area of implementation of the campaign is shown in map 30, the remaining portion in white, is the area free from the disease; when compared with the map which was submitted last year, the expansion of the coverage to include the region north of the mouth of the Orinoco river, can be noticed.

The area that remains free is a zone of jungle regions, with a moderate amouth of cattle on the rim of the area.

2. Administravie organization

The foot-and-mouth disease combat in Venezuela is a responsability of the Ministry of Agriculture and Livestock, which implements a campaign for controlling the disease through a department which is under the Direction of Livestock, as shown in the attached chart (graph 14).

At present it carries out its tasks with the following personnel:

Veterinarians	9
Full-time helpers	428
Part-time helpers	56
Administrative	1

and an annual budget of about Bs. 12,600,000.00.

3. Problems presented

The previous data is indicative that the problem of foot-and-mouth disease in Venezuela deteriorated during 1973, a situation which was aggravated by the fact that a project prepared in 1971, financed by the Ministry of Agriculture and Livestock and the Inter-American Development Bank, including a program of foot-and-mouth disease control, eradication of brucellosis, and creation of a network of Regional Diagnosis Laboratories, was not started. Said project needs only to be approved by the legislative houses, and possibly this may take place at the next period of sessions to begin in March.

In order to overcome the crisis, the following measures have been taken:

With respect to vaccine preparation, the following action is now being carried out:

a) Reconditioning and endowment of a laboratory to prepare live virus vaccines with a yearly production capacity of 15 million doses.

b) Reconditioning and endowment of a laboratory to produce inactivated vaccine by the Frenkel and tissue culture methods, with a yearly capacity of 7 million doses.

c) Reconditioning the bioterio in order to increase its production of suckling mice, which is the raw material used in producing live virus vaccine.

d) Construction of a bioterio to breed guinea-pigs for the control tests of the vaccines which are produced.

4. Research

Ancillary measures tending to overcome the problem caused by the vaccine's low antigenicity and high pathogenicity, a project has been programmed with the collaboration of the Pan-American Foot-and-Mouth Disease Center for testing modified clones of virus A_{32} and O Cura, to be used in the preparation of vaccines, and should this endeavor be successful, a quality vaccine will become available in quantities which will permit a more efficient action against the disease.

III. FOOT-AND-MOUTH DISEASE NOTIFICATION - 1973

No. of affected farms	165
No. of sick cattle	1 861
No. of sick sheep	-
No. of sick swine	4 413
No. of farms with samples sent for virus typing	165
No. of farms with FMDV type O diagnosis	59
No. of farms with FMDV type A diagnosis	11
No. of farms with FMDV type C diagnosis	-
No. of farms with VSV type New Jersey diagnosis	28
No. of farms with VSV type Indiana diagnosis	15
No. of farms with negative diagnosis	52

IV. COVERAGE SITUATION OF THE FOOT-AND-MOUTH DISEASE COMBAT IN 1973

Area in Km^2 a/	912 050
Livestock farms a/	-
Cattle population a/	8 810 634
Sheep population a/	99 240
Goat population a/	1 413 248
Total doses of vaccine prepared	6 146 270
Total doses of vaccine controlled	6 146 270
Total doses of vaccine approved	6 146 270
Doses of vaccine exported	-
Doses of vaccine imported b/	225 400
Doses applied in cattle	7 894 536
Doses applied in sheep	-

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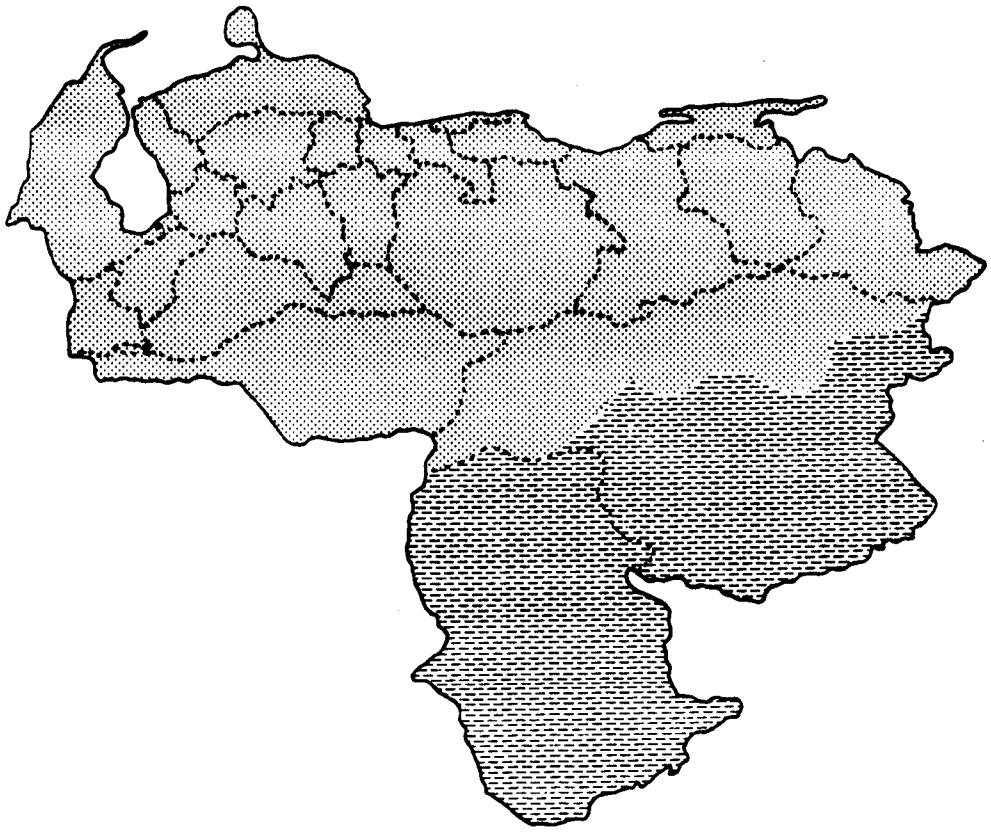
a/ Implementation area.

b/ Origin: Colombia.

MAP 29

Foot-and-mouth disease geographic situation.
VENEZUELA - 1973.

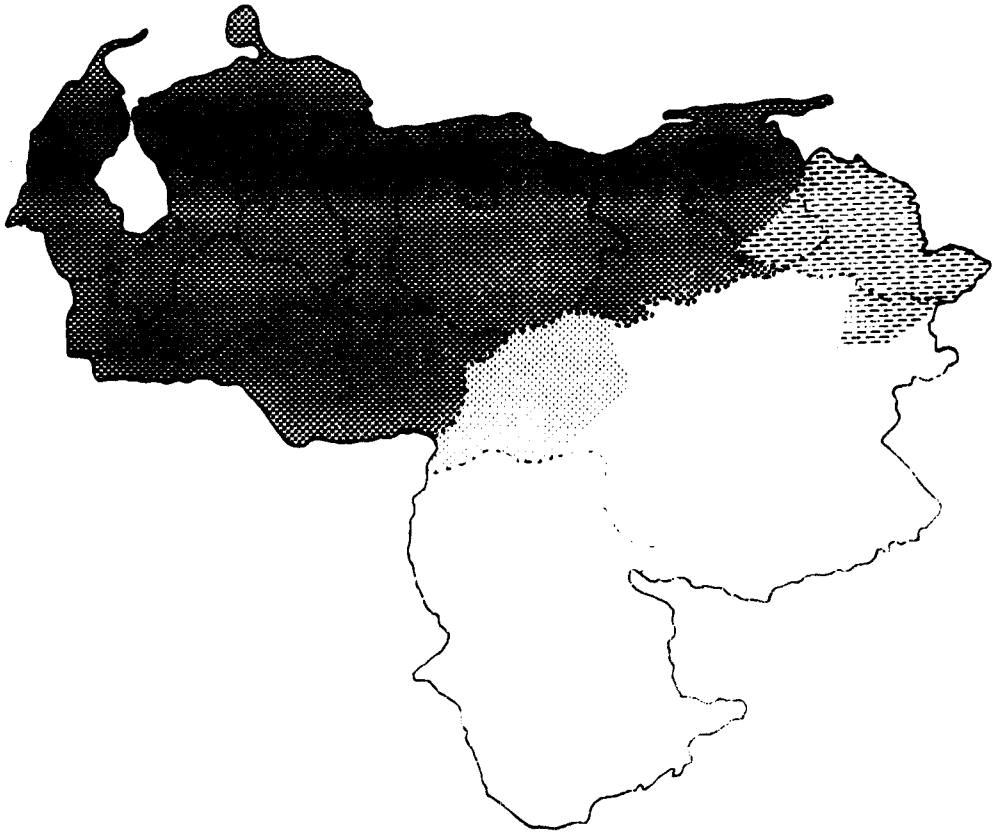


endemic (viruses O and A)

not registered

MAP 30

Foot-and-mouth disease combat situation.
VENEZUELA - 1973.



program being implemented since 1956

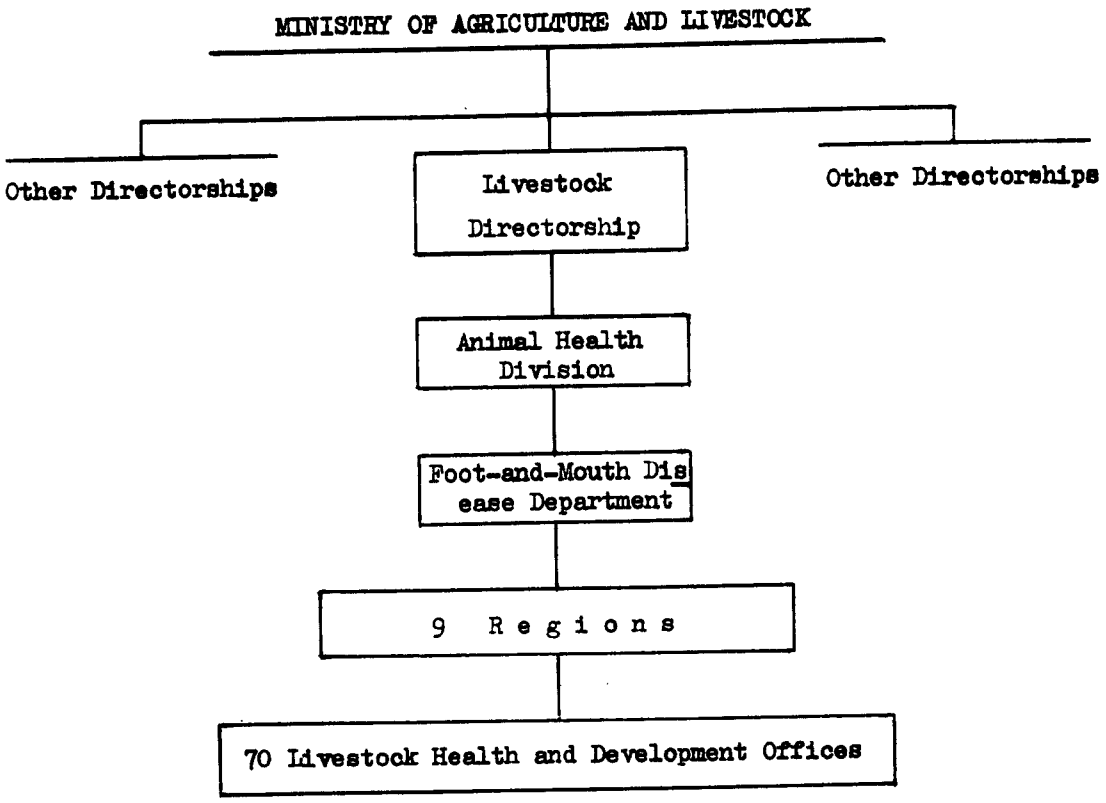
incorporated in 1970

incorporated in 1971

incorporated in 1973

preventive activities

GRAPH 14


MINISTRY OF AGRICULTURE AND LIVESTOCK
Other Directorships
Livestock Directorship
Other Directorships
Animal Health Division
Foot-and-Mouth Disease Department
9 Regions
70 Livestock Health and Development Offices