

**The  
PAN AMERICAN  
HEALTH ORGANIZATION**



**P R E S E N T S**

**The  
PAN AMERICAN  
FOOT AND MOUTH  
DISEASE CENTER**

**ANNUAL REPORT**

**1959**

**T**HE PAN AMERICAN FOOT-AND-MOUTH DISEASE CENTER was established in 1951 as an international service operated by the Pan American Sanitary Bureau and financed under the Program of Technical Cooperation of the Organization of American States. The Center is located in São Bento, near Rio de Janeiro, on a site and in buildings provided by the Government of Brazil, which also defrays certain operating and maintenance costs.

The Center furnishes advisory services for the prevention, control, and eradication of foot-and-mouth disease (aftosa) in the countries and territories of the Americas. It conducts training courses and provides diagnostic and consultant services to governments. It is also engaged in research on the nature of aftosa and allied viruses and studies the development and improvement of diagnostic techniques and preparation of vaccines against this disease, which is an important obstacle to the progress of the livestock industry of many countries. The Center maintains liaison and collaboration with other agencies, institutes, or laboratories — national and international — such as FAO, OIRSA, ICA, etc., interested in the development of animal husbandry in Latin America.

The advice and assistance of the Center may be obtained through the offices of the Pan American Sanitary Bureau or requests may be addressed directly to:

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**THE PAN AMERICAN HEALTH ORGANIZATION**  
**PRESENTS THE**  
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**OF THE**  
**PAN AMERICAN**  
**FOOT-AND-MOUTH DISEASE CENTER**

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To the Member States of the Pan American Health Organization

The Pan American Sanitary Bureau has the honor of presenting a descriptive report of the activities carried out and services rendered during 1959 by the Pan American Foot-and-Mouth Disease Center, which is a project operated by the Bureau as a participating agency in the Program of Technical Cooperation of the Organization of American States.

Respectfully yours,

ABRAHAM HORWITZ  
Director



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## I. INTRODUCTION

This report presents a summary of the activities of the Pan American Foot-and-Mouth Disease Center for 1959, a year in which considerable progress was made and also one in which there was further delay in the provision of cattle isolation stables and of adequate laboratory accomodation.

The situation in the Hemisphere with respect to foot-and-mouth disease (aftosa) at the end of 1959 was little changed in broad outline from that of 1958; in detail, there were some improvements and only one set-back.

North America, Central America, and the countries and islands of the Caribbean remained free of the disease.

In South America, the disease remained enzootic, but nowhere did it assume epizootic proportions. The number of outbreaks recorded in Venezuela was less than in 1958, and the distribution of the disease in Colombia appeared to be less widespread. Unfortunately, new isolations of the virus were made in Ecuador toward the end of the year, after a period in which it had appeared that any infection remaining from the outbreaks of 1956 and early 1957 was, at least, quiescent. British Guiana and Surinam remained free of the disease, and there were no further cases in French Guiana after one focus of infection had been eliminated by slaughter in 1958. In the remainder of South America the incidence of the disease was little changed, but progress was made in a number of countries in providing facilities for vaccine production, in the organization of field programs, and in research.

The "Conferencia Internacional Antiaftosa" (International Anti-aftosa Conference) sponsored by the Center in Bogotá, Colombia, in April 1959 and attended by veterinarians from Colombia, Ecuador, Panama, and Venezuela, marked a great advance in intercountry collaboration in the fight against the disease in South America.

## II. OPERATIONAL FACILITIES

### A. Funds

As in previous years, the operation of the Center was dependent on two sources of funds. The principal one is the contribution of the Technical Cooperation Program of the Organization of American States. In 1959 this amounted to US\$323,119, as compared with US\$278,308 in 1958.

The other source of funds is the annual grant from the Ministry of Agriculture of Brazil, the host country to the project. This grant is for the provision of utility services and for the maintenance of the buildings furnished by the Ministry for the use of the Center at São Bento, Rio de Janeiro. In 1959 the sum received was Cr\$ 1,181,568.40 (approximately US\$ 6,200).

During 1959, the Pan American Sanitary Bureau and the Organization of American States gave careful consideration to the possibility of expanding the work of the Center and to the scale on which the Center should be financed annually. Recommendations for a considerable expansion of the Center's program over a ten-year period were approved at the Buenos Aires meeting of the "Committee of 21" of the Organization of American States (April-May 1959) and the details for an expanded program for 1960 were approved by the Committee on Technical Cooperation. The implementation of the whole of this expanded program is dependent upon the receipt of special contributions from member countries for the work of the Center and these, to some extent, are dependent upon the provision of adequate facilities by the host country.

## **B. Buildings**

The existing facilities have been fully described in previous reports. The accommodation is similar to that found in most institutes conducting research on infectious diseases of animals, with the exception that there are as yet no stables in which cattle can be kept under the conditions of isolation necessary when working with *altosa*.

Construction of two cattle stables and new laboratory buildings was begun in July 1958, and by the beginning of 1959 the stables and a small section of the laboratory had been completed to roof height. Unfortunately, certain difficulties then arose and construction was suspended. No work took place on the building site during the last eleven months of 1959, but a resumption of construction in 1960 is anticipated.

In order to overcome this severe handicap to the proper development of a research program dedicated principally to the finding of improved methods of immunizing cattle, recourse has been had to taking some of the Center's work to other institutes. Programs of collaborative work of common interest have been discussed with the directors of other institutes, and during 1959 this new feature of the Center's activities was begun in the Biological Institute of the Board of Agriculture of the State of São Paulo, and in the "Desidério Finamor" Institute of Veterinary Investigations of the Board of Agriculture, Industry and Commerce, State of Rio Grande do Sul, Brazil. Plans were also completed at the end of the year for the start of similar collaborative work with the Division of Veterinary Investigations of the Ministry of Agriculture, Maracay, Venezuela.

### C. Staff

In 1959 the professional staff of the Center was increased by the appointment of Dr. Roberto Goic M. to a newly established post of Field Officer. A second new professional post of Research Officer was approved toward the end of the year and recruitment was begun immediately.

#### 1. *Professional staff*

Director	International staff
Chief of Laboratories	"    "
Chief of Field Services	"    "
Senior Virologist	"    "
Field Officer	"    "
Virologist	"    "
Research Officer	"    "
Serologist	"    "
Assistant Serologist	"    "
Senior Veterinarian	Local staff
Junior Veterinarian	"    "
Research Assistant	"    "

#### 2. *Administrative, laboratory, and maintenance staff*

Administrative Officer	International staff
Assistant Administrative Officer	Local staff
Accountant	"    "
Librarian	"    "
Secretaries, Bilingual (4)	"    "
Personnel Clerk	"    "
Property and Supply Clerk	"    "
Senior Clerk	"    "
Clerk-Typist	"    "
Auxiliary Clerk (temporary)	"    "
Storekeeper	"    "
Laboratory Technicians (3)	"    "
Laboratory Assistants (5)	"    "
Laboratory Assistant (temporary)	"    "
Laboratory Aides (8)	"    "
Field Aides (2)	"    "
Laborer/Cattle Attendants, Senior (3)	"    "
Laborer/Cattle Attendants (4)	"    "
Laborers (10)	"    "
General Maintenance Officer	"    "
Assistant Maintenance Officer	"    "
Plumber/Fitter	"    "
Electrician	"    "

Carpenter	Local staff
Mason/Painter	" "
Chauffeurs (3)	" "
Laundry Operator	" "
Janitor	" "
Guards (7)	" "
Maintenance Laborers (13)	" "

In addition, the budget of the Center provides for the salary of two administrative staff members, one located in the Zone V Office in Rio de Janeiro and the other in the Washington Office of the Pan American Sanitary Bureau.

#### D. Equipment and Supplies

Major items of equipment purchased during the year included glass-ware-sterilization equipment, bacteriological filters for the preparation of culture media, photomicrographic equipment, and an ultraviolet irradiating apparatus. Supplies were maintained at a level adequate for the program undertaken.

#### E. Laboratory Animals

Cattle, horses, sheep, goats, pigs, rabbits, guinea-pigs, mice, chickens, and chick-embryos were all used in the Center's program of diagnosis and research.

There was a considerable increase in the number of mice used during the year. All were bred in the Center's colony. Small foundation stocks of mice were supplied to a number of other institutes to enable them to start their own breeding colonies.

An enlarged breeding house for guinea-pigs was constructed during the year in order to permit an increase in the size of the breeding colony and thus meet the need for many more guinea-pigs in connection with the examination of subtypes of the aftosa virus.

The following statistics are for the animals most frequently used in 1959:

Unweaned mice	114,320
Adult female mice	14,290
Adult male mice	13,842
Guinea-pigs	1,923
Day-old chicks	1,458
Fertile hen eggs	1,356
Rabbits	303
Cattle	193

The number of cattle does not include the animals used in field trials of modified live virus vaccine. The very large number of

unweaned mice used yearly are required, for the most part, in testing the sera of cattle for the presence of antibodies against aftosa. This is an essential test throughout the experiments on all cattle in a country where the disease is enzootic, as in Brazil. Nearly 3,700 samples of sera were examined in such tests during 1959.

Unweaned mice are simply indicators of the presence of virus and, for some purposes, cultures of susceptible cells from the kidneys of cattle and pigs can be used equally well. During 1959 some five to six thousand culture tubes were used in this way.

### III. OPERATIONS

The program of the Center in its service to the countries of the Americas includes:

1. Provision of training for field and laboratory personnel who are responsible for the control of aftosa and other vesicular diseases.
2. Provision of a laboratory service for the diagnosis and virus-typing of vesicular disease material.
3. Provision of personnel for field consultation in the prevention, diagnosis, control, and eradication of aftosa and other vesicular diseases.
4. Provision of the international coordination and collaboration necessary for intercountry activities for the prevention, control, and eradication of aftosa.
5. The conduct of research.

#### A. TRAINING

The training of technical personnel has always been a very important feature of the Center's program. In addition to the award of long-term fellowships, an average of two training courses a year have been held since 1953. By the end of 1959, a total of 132 veterinarians from 30 countries or territories had attended these courses under fellowships provided by the Organization, as well as an additional 121 who had attended at their own or at their country's expense.

##### 1. Twelfth Training Course

This course was held in Buenos Aires from 8-28 November 1959 with the collaboration of the Ministry of Agriculture of Argentina. Accommodations were provided by the School of Veterinary Medicine of the University of Buenos Aires and by the National Aftosa Institute. The program of the course was devoted almost exclusively to the types and subtypes of the aftosa virus. Veterinarians from Argentina, Brazil, Chile, Paraguay, and Uruguay attended, 18 with fellowships awarded by the Center and 35 without fellowships.

The first two weeks of the course were spent on lectures and demonstrations covering such subjects as the criteria necessary for the identification of a type and subtype of the aftosa virus, the importance of subtypes, the distribution and incidence of types and subtypes, the tests used in the identification of types and subtypes, the requirements for organizing a national service for the identification of subtypes, the exchange of information between countries, and the need for a regional campaign for the countries participating in the course.



*Laboratory class for veterinarians attending Twelfth Aftosa Training Course.*

The third week was devoted to study groups in which all fellowship recipients had an opportunity to practice the complement-fixation test techniques used in the identification of types and subtypes and to become acquainted with the techniques used in culture of tissue for the provision of tubes used in serum-neutralization tests.

The detailed syllabus of the course is given in Appendix 2 and a list of those who attended in Appendix 3.

## **2. Long-term Fellowships**

Dr. Carlos de Mello Bettencourt, of the Institute of Animal Biology, Km 47, Rio de Janeiro, Brazil, completed his period of eleven months' training at the Center on methods of culture of tissue and the use of tissue cultures for the multiplication of virus, the titration of virus, and the detection of antibodies.

Dr. Gamal El Din Zahran, a recipient of an André Mayer Fellowship of FAO, completed a year's work at the Center on the adaptation

of the aftosa virus to day-old chicks and chick embryos with a view to the production of modified strains of virus for use in vaccination. The results of Dr. Zahran's work were prepared in the form of two papers for publication.

Dr. Marjorie Pronger, of the Veterinary Division of the Ministry of Agriculture and Lands, Jamaica, spent three weeks at the Center and on a study tour in Brazil, under the Center's guidance. This tour was arranged by the Jamaica Government with the assistance of the fellowship division of the International Cooperation Administration of the U.S.A.

Dr. Rafael La Casa, Chief of the Antiaftosa Department of OIRSA (*Organismo Internacional Regional de Sanidad Agropecuaria*), spent three weeks at the Center to become conversant with recent developments in the field of aftosa and also to participate with the field services section of the Center in the preparation of an instruction manual for veterinarians with responsibilities for regulatory work in the OIRSA countries.

Dr. Alfredo García Pirazzi, of the Department of Animal Health of the Ministry of Agriculture, Argentina, arrived at the Center in September, following the award of a long-term fellowship of 11 months.

### 3. Educational Materials

*Literature* — As in former years, requests continued to be received for copies for distribution in Brazil of the booklet *A febre aftosa*. All these requests were met and permission was given to the Board of Agriculture of the State of Rio Grande do Sul to reproduce the booklet.

*Films* — A script was prepared and shooting was completed of a film to be entitled *Puede ser Aftosa*, for distribution in Mexico, Central America, and the Spanish-speaking countries of the Caribbean. This film is based on the "Plan of Action" prepared by the Center for use in the case of an outbreak of aftosa in countries at present free of the disease. Intended to show the importance of rapid action if there is any suspicion of the occurrence of aftosa the film will be completed for release during 1960.

## B. LABORATORY DIAGNOSIS

### 1. Virus Samples

The number of samples of material received for examination in 1959 was slightly higher than in previous years, but the distribution of the origin of the samples was little changed. The great majority came from vaccine production laboratories in Brazil and were sent to the Center for virus-typing as a check on the identity of the strains being used for preparation of vaccine.

Samples are received from other South American countries when any special investigation is required of a virus strain having unusual characteristics, or when, for example, there are vaccine failures in the field and the presence of a different subtype of virus is suspected. Also, in the case of a few countries lacking the facilities for determining the immunological type of the aftosa virus, samples are sent to the Center for routine diagnosis.

The Center performs an important service for the countries of Central America in examining material from outbreaks of vesicular disease. In these countries there is always risk that the clinically similar condition of vesicular stomatitis that occurs there might be mistaken for aftosa. Fortunately, the diagnosis has, so far, always proved to be "vesicular stomatitis" and the "Plan of Action" to be followed in the case of an outbreak of aftosa has never had to be put into effect. This plan was prepared and distributed by the Center in 1958 in order to obtain the coordinated and rapid action required if a focus of aftosa is to be eliminated before it spreads beyond the limits of immediate control.

Table 1 gives a summary of the results of the examination of material received during 1959.

*Table 1*  
*Results of the Examination of Samples Received for Diagnosis and Typing during 1959*

Country	Positive for foot-and-mouth disease				Positive for vesicular stomatitis		Negative	Total
	Types				Types			
	O	A	C	Mixed	New Jersey	Indiana		
Argentina.....	2	13	2	—	—	—	1	18
Brazil.....	150	161	95	32*	—	—	52	490
Colombia.....	3	4	—	—	—	—	2	9
Costa Rica.....	—	—	—	—	1	—	—	1
Ecuador.....	—	7	—	—	—	—	2	9
Guatemala.....	—	—	—	—	1	—	—	1
Nicaragua.....	—	—	—	—	2	—	—	2
Paraguay.....	—	—	3	—	—	—	4	7
Peru.....	—	1	2	—	—	—	—	3
Uruguay.....	1	3	2	—	—	—	—	6
Venezuela.....	1	1	—	—	—	—	—	2
TOTAL.....	157	190	104	32	4	—	61	548

\* 2 OA, 14 OC, 16 AC.

The Center is a source of supply of reference strains of virus for use as seed virus for vaccine production, and also of type-specific sera and the corresponding viruses for use in diagnostic tests. In 1959 these products were distributed to a total of 13 laboratories in South America.



## 2. Virus Subtypes

Reference was made in the Annual Report for 1958 to the Center's work on the examination of strains of the aftosa virus in connection with their classification as subtypes. The Center acts as the channel of communication between the Latin American countries and the World Reference Laboratory on Foot-and-Mouth Disease at Pirbright, England, which has the responsibility for coordination in the identification and classification of the types and subtypes of the virus.

The importance of subtypes in relation to the control of the disease was emphasized by the Center in its Twelfth Training Course in November 1959, which was devoted especially to this subject.

### a) Type "A"

The investigation of a subtype of type "A" virus encountered in Brazil utilized much time and attention of the staff at the Center during 1959. The following is a brief account of this strain and of the results of its examination.

*Strain 1898* — In September 1958, samples of cattle-tongue epithelium were received for type determination from the aftosa vaccine production section of the Biological Institute, São Paulo, Brazil. Negative results were obtained in the routine complement-fixation tests used to determine the virus type, although it was later proved that the samples had a high content of active virus.

This virus strain was being used for inoculation of cattle in a slaughterhouse in Santos, State of São Paulo, for the production of infective material for preparation of vaccine. The strain had been obtained from another vaccine production institute in the State of Rio Grande do Sul and had been supplied as a type "A" strain.

Further samples of the same strain were obtained from São Paulo, and the investigation was given priority at the Center.

Repeated complement-fixation test, in which were included sera of all the known types of aftosa virus and of vesicular stomatitis virus, failed to reveal the identity of this new strain. The aftosa sera used were the reference sera of the World Reference Laboratory for types O, A, C, SAT 1, SAT 2, SAT 3, and Asia 1. As these results indicated the possibility of the presence of a new type of virus, a sample was immediately sent to the World Reference Laboratory. The results of the first tests performed there confirmed the results obtained at the Center, namely, that there appeared to be no connection with any of the known types.

In the meantime, the investigation was proceeding in the Center and it became evident that there might be some connection between strain 1898 and type "A". The use of sera prepared from various strains of type "A" virus in tests of serum protection and serum

neutralization showed a strong relationship between strain 1898 and certain "A" type strains that had been isolated during recent years from outbreaks of the disease in Brazil. The type "A" reference strain routinely used in type determination is of European origin and was isolated over 30 years ago.

In the World Reference Laboratory, in the Center, and in the Biological Institute, São Paulo, cross-immunity experiments were performed in cattle. The results of these, of cross-immunity experiments in guinea-pigs, and of the many serological tests that were made, showed conclusively that the new strain 1898 was a subtype of type "A" but demonstrated more antigenic dissimilarity to other "A" subtypes than had hitherto been encountered.

The fact that negative results were obtained in complement-fixation tests can be attributed to the lesser sensitivity of this test for the detection of antigenic differences, as compared with serum protection tests, serum neutralization tests, and cross-immunity tests.

It appears that there is a wide range of subtypes of type "A". Strains of this immunological type isolated in Brazil during the last 10 years are not too different from the European reference strain used in the earlier examinations of strain 1898. Strain 1898 is not too different from these other Brazilian strains, but is apparently at the other extremity of the range from the old European strain.

The origin of strain 1898 is somewhat obscure. It appears to have originated during the passage of strains by inoculation of cattle in slaughterhouses in Rio Grande do Sul. Whether this was by the production of a "variant" by the passage of virus in immune or partially immune cattle, or whether the strain was introduced into a slaughterhouse from the field and replaced the laboratory strain used for inoculation, has not been determined. What did occur was the immunizing failure of the vaccines prepared from strain 1898, because they provided insufficient protection against the more usual type "A" strains found in the field.

*Strains 984 and 2454* – Reference to the results of the examination of samples for diagnosis shows that aftosa virus of type "A" was isolated from 7 out of 9 samples received from Ecuador. Further details of this series of outbreaks are given later in this report, but part of the work involved in the examination of these strains was to determine whether there was any significant antigenic difference between them and the type "A" strains used for vaccine production in Colombia and in Venezuela. Cross-complement fixation tests were performed with homologous and heterologous virus and serum mixtures, using a strain isolated from Ecuador in 1956 (No. 984), one of the strains isolated in 1959 (No. 2454), the Colombian vaccine production strain 1433, and the Venezuelan vaccine production strain "Táchira". All four strains were found to be antigenically similar.

b) Type "O"

*Strain 2143* – This is a type "O" strain of aftosa virus received from a vaccine production institute in the State of Bahia, Brazil, for checking of the immunological type after passage in cattle in a slaughterhouse. This strain would appear to be similar to 2 or 3 others from different origins in Brazil, all of which are markedly different antigenically from the remaining "O" strains in the Center's collection. The examination of these strains is proceeding with the use of identified reference sera supplied by the World Reference Laboratory.

C. ADVISORY SERVICES

The advisory services of the Center involve the travel of staff members to the various countries of the Americas, in addition to the answering of many inquiries by correspondence.

Most of the travel is to the countries of South America affected with aftosa, there being less necessity for visits to countries free of the disease. One exception in this latter category is Panama, which is the site of the headquarters of the Antiaftosa Department of OIRSA and also the geographical bulwark against the spread of the disease from South to Central America. Travel by members of the Center's staff is not all in connection with advisory services; some is related to training activities and some to the research program. Table 2 lists the countries of South America that were visited in 1959, by country and staff member. Included is the travel that was required in conducting the Twelfth Training Course in Argentina and in undertaking some of the research program in São Paulo and Pôrto Alegre, Brazil.

*Table 2*  
*Countries of South America Visited during 1959 by Staff Members of the Pan American Foot-and-Mouth Disease Center*

Country	Staff Member					
	Director	Chief of Laboratories	Chief of Field Services	Senior Virologist	Field Officer	Serologist
Argentina.....	3*	3	1	2		1
Bolivia.....			1		1	
Brazil**.....	1	3	2	1	1	1
Chile.....	1					
Colombia.....	2	1	3		2	
Ecuador.....	1		2		2	
Paraguay.....					1	
Peru.....	1		1		2	
Uruguay.....	1	1				
Venezuela.....	2	1	2		1	
TOTALS.....	12	9	12	3	10	2

\* Number of separate occasions on which the country was visited.

\*\* Visits involving journeys to other parts of Brazil from the Center's headquarters in Rio de Janeiro.

## L. "Conferencia Internacional Antiaftosa"

One of the most important features of the Center's program during 1959 was the sponsoring of a meeting between government veterinarians from Colombia, Ecuador, Panama, and Venezuela. This was the "Conferencia Internacional Antiaftosa" (International Antiaftosa Conference) held in Bogotá, Colombia, from 12-18 April, with the collaboration of the Ministry of Agriculture of Colombia. Its purpose was to discuss at a technical level the problems common to the four countries concerned and to reach agreement on intercountry collaboration. These four countries form a natural unit for coordination of national antiaftosa programs. Panama is, of course, free of the disease, but the improvement of land communications between Colombia and Panama by the proposed extension of the Pan American Highway through Darién will expose Panama and the countries of Central America to greater risk of the spread of the disease. This gives rise to an obvious need for a high degree of collaboration between Panama and Colombia.



COUNTRIES PARTICIPATING IN THE INTERNATIONAL ANTI-AFTOSA CONFERENCE

Each of the countries at the Conference was represented by senior officials of the Ministries of Agriculture (see Appendix 5). The aftosa problems and programs of the area were reviewed and a series of important recommendations was drafted, designed to lead to greater uniformity of action and to closer collaboration between each of the

countries represented. A report of the Conference has been published separately by the Pan American Sanitary Bureau (*Miscellaneous Publication No. 55*).

Colombia, having a frontier with each of the remaining three countries, is in a key position and one of the approved recommendations provided for coordinated programs between Colombia and Ecuador, Colombia and Panama, and Colombia and Venezuela. This recommendation was rapidly implemented, and in the remaining nine months of the year, after the conclusion of the Conference in April, an extensive study was first made of the border areas of Colombia/Ecuador and Colombia/Venezuela by members of the Center's staff, accompanied by veterinarians of the national services. Later, the problems and necessary programs of these areas and also of the Colombia/Panama border area were discussed in the following series of meetings:

(1) Colombia/Venezuela border area, northern section: A meeting was held in July in Maicao, Guajira, Colombia, attended by the government veterinarians of the contiguous zones of that area of Colombia and Venezuela, by two senior representatives of the Ministry of Agriculture of Venezuela, and by the Chief of Field Services and the Field Officer from the Center.

(2) Colombia/Venezuela border area, central section: A meeting was held in July in Cúcuta, Norte de Santander, Colombia, attended by the government veterinarians of the contiguous zones of that area of the two countries, a senior representative from the Ministry of Agriculture of Colombia, and the same senior representatives from Caracas and from the Center as attended the Maicao meeting.

(3) Colombia/Ecuador border area: A meeting was held in October in Ipiales, Nariño, Colombia, attended by local Ministry of Agriculture officials, senior representatives from Bogotá, Colombia, and Quito, Ecuador, an FAO veterinary consultant stationed in Ecuador, local Colombian civic authorities, and the Field Officer from the Center.

(4) Colombia/Panama border area: A meeting was held in October in Panama City, Panama, attended by senior representatives of the Ministries of Agriculture of both countries, a representative of the U.S. Army Mission to Panama, the Antiaftosa Department of OIRSA, and the Field Officer from the Center.

## 2. Ecuador

Toward the end of the year, the general opinion of the disease situation in Ecuador was markedly changed by the isolation in the Center's laboratories of aftosa virus of type "A" from material received from outbreaks of vesicular disease in the coastal area of Ecuador. The solidarity established between the countries that attended the

Conference in Bogotá was evident from the immediate assistance offered by the authorities in Colombia and Venezuela. The Chief of Field Services from the Center travelled to Ecuador as soon as the diagnosis was made, to help plan coordinated action of the veterinary services in Ecuador, with the assistance of her neighbors, so that effective control of the situation may be rapidly established and spread of the disease to the valuable, high-grade stock of the highlands prevented.

### 3. OIRSA (*Organismo Internacioanl Regional de Sanidad Agropecuaria*)

In November 1958 the Center conducted its Eleventh Training Course in San José, Costa Rica, on the prevention, control, and eradication of aftosa. Emphasis was placed on prevention, the participants at the course all coming from countries free of the disease. Attention was drawn to the risks associated with the importation of certain products of animal origin and to the need for uniformity of action in the countries of Central America. During 1959, as a sequel to this course, the Antiaftosa Department of OIRSA prepared a draft of a guide for veterinarians and port inspectors on the interpretation of import regulations. The Center has assisted in this work by correspondence, through visits of staff members to Panama, and during a three weeks' visit made to the Center by the Chief of the Antiaftosa Department.

The work of the Advisory Services of the Center reported so far has dealt with those countries that are either free of the disease or less seriously affected than others. The situation in the other countries has not been neglected, although limitations of time, staff, and resources have prevented accomplishing as much work as is necessary.

### 4. Bolivia and Peru

The absence of any geographical barriers to the movement of livestock in the border area of Bolivia and Peru makes it necessary to coordinate each country's program for the control of aftosa. Following a visit to this border area by the Center's Field Officer, a report was submitted to the Ministry of Agriculture of Peru, which distributed it to all government veterinarians and other interested officials and organizations.

A noteworthy development of the campaign in Bolivia was the inauguration in 1959 of the Institute of the Ministry of Agriculture in La Paz. The Center has cooperated in the development of this Institute through advisory visits, the training of Bolivian veterinarians, and the provision of biological materials and a foundation stock of mice.

## 5. Argentina and the Countries of the River Plate

During 1959, there was a marked increase in inquiries and requests received in the Center from the countries of the River Plate. Reference to Table 2, recording staff travel, will show that these requests have not remained unanswered.

During 1958 and 1959 there was increasing awareness of the fact that, in certain cases, meat and meat products may be associated with some risk of the dissemination of aftosa. This has acted as a stimulus to work on aftosa prevention and control, especially in the meat-exporting countries.

The culmination of the Center's program in 1959 in this area was the organization of the Twelfth Training Course in Buenos Aires, which has already been mentioned. Although the principal object of this course was to emphasize the importance of subtypes of the aftosa virus, there is no doubt that the opportunity thus afforded for veterinarians from Argentina, Brazil, Chile, Paraguay, and Uruguay to discuss their common problems was most valuable. It is hoped that this course will prove to be the start of a program of intercountry collaboration as successful as that now being conducted in the northern part of South America.

## 6. Sources of Virus for Vaccine Production

In the preparation of aftosa inactivated virus vaccine, there is now a choice of three sources of virus. There is the method, originally used, of inoculating the virus into the tongues of cattle on the day prior to slaughter and, after slaughter, of collecting the resultant vesicular material. There is the culture method in which the virus multiplies in cattle-tongue epithelium suspended in an appropriate medium, and there is the culture method in which the virus is produced in monolayers of cattle or pig-kidney cells.

The first method of inoculating cattle in slaughterhouses has the disadvantage of maintaining foci of infection on premises from which the disease may easily spread. Also, the status of the cattle's immunity greatly influences the amount of virus obtainable, and very strict control must be kept of the identity of the virus stains being used, as it is relatively simple for this to be lost. It is therefore advantageous for vaccine-production laboratories to use one of the methods of virus culture.

The method of culture in cattle-tongue epithelium, usually referred to as Frenkel's method, is of proven value, but for large-scale production of virus it requires a well-organized system for the collection of tongue epithelium and the installation of relatively expensive equipment.

The technique of using kidney-cell monolayers for the production of virus is of more recent introduction, and there is not the same

experience as with the other methods with respect to the value of the virus thus produced for the preparation of potent vaccine.

A number of laboratories have sought the opinion of the Center on the relative merits of these two culture systems. The monolayer method is used in the routine production of vaccine by the Bacteriological Institute, Santiago, Chile; experimental work using this method is in progress at the National Aftosa Institute in Buenos Aires, Argentina, at the Biological Institute in São Paulo, Brazil, and at the Center. Regular exchanges of information are made with these institutes, and during 1959 the Center conducted a series of collaborative experiments on this subject with the Biological Institute in São Paulo in order to obtain, as rapidly as possible, an authoritative opinion backed by experimental evidence. The information collected so far is that it is quite practicable to produce the necessary quantities of virus; the experience in the field application of the vaccine in Chile has been most encouraging, and the experimental results obtained in São Paulo and at the Center have demonstrated that the immunogenicity of this virus compares favorably with that produced by other methods.

## **7. Survival of Virus in Meat and Offal**

It has been known for many years that the aftosa virus can survive in certain tissues of an animal after death in the infective stages of the disease. The conditions of storage used in the meat trade are very favorable for the continued survival of this virus, and thus there may be risks of dissemination of the disease associated with the distribution of meat and offal. The magnitude of these risks depends upon a number of factors, and in international trade it is the responsibility of the importing country to ensure, insofar as economic factors will permit, that any risks taken are commensurate with the status of the disease in that country.

In May 1959 the United States of America banned the importation of cured meats from countries affected with aftosa. This resulted in a loss of export trade for certain South American countries, particularly Argentina and Brazil. The Ministries of Agriculture of these two countries consulted the Center on the technical points involved, and following their request that the Center send a representative to assist them in their discussions, the Chief of Laboratories went to Buenos Aires to attend a series of joint meetings.

There being no dispute about the facts relating to the survival of the virus, the Center was unable to advise any contestation of the decision made by the United States Department of Agriculture. The only aspect of the problem open to discussion was whether it would be possible to ensure that the exported material consisted solely of muscle in which there is no survival of the virus under the particular conditions; or whether there remained a risk of the inclusion of, for



example, lymphatic tissue, in which the virus could survive. The methods of processing the meat are under study in the countries concerned, with a view to obtaining more information about these points.

This loss of valuable markets served to emphasize the need to intensify the programs for the control and eradication of aftosa.

## 8. Miscellaneous

Many of the other requests made for the advisory services of the Center were also in connection with the risks associated with importations from countries affected with aftosa. For example, inquiries were received about the importation of cattle, horses, sheep, fighting bulls, wild animals for exhibition in zoological gardens, wool, hides, skins, biological products, and animal feeding stuffs.

### D. RESEARCH

The research program of the Center is the foundation upon which many of the other services are based. Without the backing of the experience gained in the Center's laboratories, much of the value of the Center's advisory services would be lost. The training program would suffer greatly without the assistance of the laboratory staff, who are highly skilled in the most recent techniques and well informed on current advances in virology and immunology.

The research program is relatively restricted in its scope, the efforts being focused on improvement in the methods of prevention of aftosa in susceptible animals. This includes research on related subjects. For example, the program includes work on improving the tests used in the diagnosis of the disease and those necessary in controlling the potency of vaccines, as well as on improving the sources of virus for vaccine production, etc.

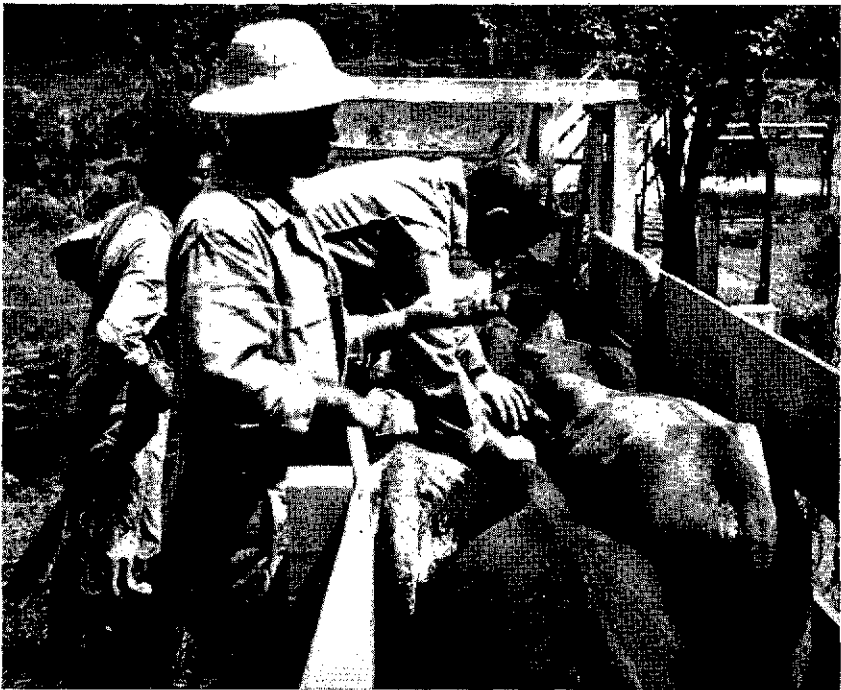
The vaccines presently in use for the prevention of aftosa are of the type in which the virus is inactivated by chemical and physical means. The immunity obtained from such vaccines is relatively short and their usefulness in controlling the disease is limited. The relatively favorable situation in Colombia and Venezuela is one that can be dealt with by using the present vaccines, but it is unlikely that adequate control will be established in those countries with very large cattle populations, such as Argentina and Brazil, unless improved vaccines can be made available.

For this reason, much of the activity of the research group is directed toward the development of a modified live virus vaccine, as this would appear to offer the best hopes of a satisfactory solution to the problem of producing a strong immunity of long duration.

## 1. Modified Live Virus Vaccines

The development of a modified live virus vaccine requires the production of a strain of virus that is no longer pathogenic but is still infective and antigenic when inoculated into the animal to be protected. In the case of aftosa virus, this modification of the pathogenicity of the virus can be brought about by serial passage in a variety of hosts. Reference has been made in previous Annual Reports, and in published papers from the Center, to the experimental use for vaccination of an "O" type strain of virus modified by passage in rabbits. The Annual Reports have also referred to the passage of strains in mice, in day-old chicks, and in chick embryos.

Work was continued during 1959 in all these hosts, because a routine procedure for the production of strains of satisfactory modification has not been evolved. It appears probable that a selection will



*Experimental inoculation of cattle with a new vaccine under development at the Center.*

have to be made of the best of the modified strains available of each immunological type and, by chance, those selected may have been produced by passage in mice, in rabbits, or in chick embryos. The passage of virus strains in these hosts can be done with far fewer

facilities than are required for testing them in cattle. Consequently, in view of the absence of adequate large-animal accommodation, it has not been possible to determinate what loss of pathogenicity for cattle has occurred for all the strains undergoing modification.

The progress achieved during 1959 is summarized below, according to the animals used for passaging:

a) *Rabbits*

*Type "O" strain* — This strain, at the 111th passage level in rabbits, has been used with relatively satisfactory results as a modified live virus vaccine in controlled experiments and in the field (see 1958 Annual Report<sup>1</sup>). Small-scale field trials were continued in 1959 on five different farms in the State of Rio de Janeiro, involving a total of 290 cattle. This included a group of 20 calves less than 12 months old and of these, 9 developed benign lesions of aftosa confined to the feet. Of the remaining 270 adults, mild lesions were detected in 5 animals. All these cattle were also vaccinated with type "A" and "C" inactivated virus vaccines within a few weeks of receiving the type "O" modified live virus.

A percentage of the cattle on each farm were bled to provide sera for use in serum protection tests, in order to obtain an indication of the immune response in the herd. In these field trials in Brazil there are always some cattle that are already immune, but the significant response is the raising of the antibody titer in a high percentage of the animals, those susceptible and those immune. For example, blood samples were collected from 32 out of 58 cattle vaccinated on one farm. The mean initial serum protection index was 2.1; one month after vaccination the mean had risen to 5.2, and at four months it was still as high as 3.9.

The newborn calf is susceptible to the pathogenic action of the modified virus in the same way as the unweaned mouse or rabbit. It is necessary, therefore, to determine at what age the calf loses this susceptibility. It is also necessary to determine whether the pregnant cow may be vaccinated without prejudice to the fetus. Little information has been accumulated at the Center on the susceptibility of calves, but it has been observed in laboratory experiments and in the field that calves even up to one year old may still develop vesicular lesions of the disease following inoculation with the modified strain of virus.

In order to investigate the effect of the modified virus on pregnant cows, the assistance of the Biological Institute, São Paulo, was enlisted. A long-term experiment was commenced during the year on the Institute's experimental farm at Campinas, State of São Paulo, in which heifers in various stages of pregnancy will be inoculated with modified virus. In the meantime, valuable information has been

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<sup>1</sup> *Miscellaneous Publication PAHO, No. 56.*

obtained from observations on some pregnant cows included among the cattle vaccinated in one field trial. Fifteen cows calved within three months of vaccination. No ill effects were observed during the pregnancy or in the calves.

Another phase of work with this modified strain was started during the year in collaboration with the "Desidério Finamor" Institute of the Board of Agriculture of the State of Rio Grande do Sul. This was an investigation of pathogenicity in pigs and sheep with a view to determining the possibility of using such a strain for the vaccination of these species. Although the 111th rabbit passage of the virus is of very low pathogenicity for cattle, it proved capable of producing disease in pigs indistinguishable from that produced by an unmodified virus. The effect on sheep was much less severe, although a local vesicular reaction was produced in those animals inoculated in the tongue. In view of these reactions, higher passages of the strain were revived to determine whether they were of lesser pathogenicity.

*Type "A" strain* -- The passaging of this strain was continued, and with passages in the 60's it was found possible to infect rabbits 37 days old. One test of pathogenicity conducted in cattle showed that insufficient modification had been obtained for trial as a vaccine.

*Type "C" strain* -- Twenty-six passages of a type "C" strain (Re-sende) were completed, by which stage it was found possible to infect rabbits 29 days old. No tests were made in cattle.

#### *b) Mice*

Routine passaging of a number of different strains has been continued -- for example 2 of type "O", 6 of type "A" and 2 of type "C" in suckling mice and 1 of each of the three types in young adult mice. These passages were required for a variety of reasons, but the possibility was always kept in mind that the loss of pathogenicity for cattle to be expected with such passaging might have reached a level low enough for the strain to be tried as a modified live virus vaccine.

Only one of these strains was tested in cattle in this connection during the year. The 91st passage of the "A" type strain "São Bento" was selected, but it was found to retain some residual pathogenicity for cattle.

#### *c) Chicks and chick embryos*

This work, begun in 1958, was continued up to September 1959 by Dr. Gamal El Din Zahran during the tenure of his FAO André Mayer Research Fellowship.

A strain of each of types "O", "A" and "C" was maintained by serial passage in chicks of gradually increasing age from 1 to 29 days

old for 84, 55 and 50 passages, respectively. The pathogenicity of virus of the 70th, 50th and 45th passages, respectively, was tested by the inoculation of cattle. The "O" and the "A" strains proved still to be pathogenic for cattle, although of reduced virulence, but the indications were that the 45th passage of the "C" strain was sufficiently modified to warrant more extensive trials being performed. Unfortunately, the facilities available did not permit this being done during the year.

Each of the virus strains passed in chicks was transferred to chick embryos.

The "O" strain was transferred without difficulty, using the 50th chick passage. The strain was then continued for 30 passages by the chorioallantoic membrane route.

The "A" strain proved to be more difficult to adapt to the egg. Three attempts by the chorioallantoic membrane route failed, although the technique was used making alternate passages in eggs and chicks. Finally, by using the 4th chick passage of this alternating series, which had started with the 35th chick passage, intravenous inoculation was successful. The series was then maintained for 20 passages.

The "C" strain was readily adapted to the egg, starting with the 5th chick passage by the chorioallantoic membrane route. A total of 30 egg passages was made.

The 24th, 20th and 28th egg passages, respectively, of these "O", "A" and "C" strains were inoculated into cattle to determine whether they had become nonpathogenic. All three strains were found to be very much modified; only one of six cattle reacted and that only with a local lesion at the site of inoculation. When the immunity produced by the inoculation of these modified strains was subsequently challenged by the inoculation of cattle virus, 4 out of the 5 nonreactors were found to be completely resistant.

The details of these experiments performed by Dr. Zahran have been submitted by him in the form of two papers for publication.

## 2. Aftosa Virus Cultures

### a) *Preparation of vaccines*

The Frenkel technique of virus culture, which is frequently used in connection with the production of inactivated aftosa virus vaccines, was continued during the year on a routine basis. The purpose has been to propagate and to test strains for suitability in vaccine production and to increase the Center's collection of strains of the various types of virus which have been adapted to this method of propagation. This is of considerable service to national vaccine production laboratories.

During the year 6 strains of "O" type, 2 strains of "A" type, and 1 strain of "C" type were passed regularly, and 15 batches of Schmidt-Waldman aluminium hydroxide vaccine were prepared.

### *b) Composition of culture media*

An important variable in the culture of virus by the Frenkel method is the culture medium. Experiments have been continued on the composition of the medium with the object of simplifying it as much as possible.

Of the media studied the two which received the greatest attention were:

- (1) A relatively simple medium composed of a standard formula known as "Glucosol" plus 0.3 per cent peptone.
- (2) A more complicated medium composed of "Glucosol", peptone and aminoacids.

A strain of each of the three virus types, well adapted to culture by the Frenkel method, was submitted to seven serial passages in parallel cultures using the two media. In each case the resultant growth of virus was titrated, and while a trend toward higher titers was found in the richer medium, in no case was the difference significant. It was concluded, therefore, that with strains well adapted to the Frenkel method the simpler medium could be used without the occurrence of a significant drop in the virus titer.

### **3. Isolation of Virus in "Normal" Cattle-tongue Epithelium**

In a country where aftosa is enzootic it is well recognized that, when cattle are inoculated in a slaughterhouse for the production of virus for preparation of vaccine, there is the risk of contamination of the harvested material with virus from the field. This may be caused by the presence among the inoculated cattle of animals in the incubative stages of the disease.

It is also possible that when tongues are collected at a slaughterhouse to be used as a source of epithelium for the tissue culture of virus, some of the cattle may have been in the incubation stage of the disease at the time of slaughter. Thus, epithelium from the tongues of such animals could contain aftosa virus, and cultures in which it is used, would therefore be contaminated. The practice was instituted during the year of making routine tests of all batches of cattle-tongue epithelium for the presence of aftosa virus. This was done by inoculating unweaned mice with a centrifuged suspension prepared from a representative sample of the epithelium from each lot of tongues.

A total of 29 lots, coming from two slaughterhouses in the neighborhood of Rio de Janeiro, were tested in this way. There was an average of 10 tongues in each lot. The results were negative on 28 occasions, but in one test a strain of virus of type "O" was isolated.

#### 4. Kidney-cell Monolayer Cultures

Extensive use has been made of monolayer cultures of cattle-kidney and pig-kidney cells during the year. One of the most important applications under investigation is the use of cell monolayers for the culture of virus for vaccine production. Other applications have been for the titration of virus, for the performance of serum neutralization tests in the detection of antibody, for the study of virus multiplication, and for the study of differences in the cytopathogenic effect of individual virus strains.

##### *a) Use of monolayer virus for the preparation of vaccine*

A total of nine different virus strains of type "O", "A" or "C" were passaged serially in cattle-kidney-cell monolayers with the object of obtaining strains adapted to this method of culture. In order to obtain sufficient virus for preparation of vaccines, cultures were made in 1-liter Roux flasks. The virus content of the cultures was titrated in tubes of pig-kidney cells, in unweaned mice, and also by the Dulbecco plaque-counting method, using pig-kidney cells.

With the "C" type strain it was not uncommon to find that the titer obtained in pig-kidney tubes was from 5 to 10 times higher than that obtained in unweaned mice. Five batches of vaccine of the "A" São Paulo strain and three batches of the "C" Resende strain were prepared and used in many of the experiments on the use of mice for the potency testing of vaccines. The potency of one of these vaccines, "A" São Paulo 14th culture passage, was tested in cattle. The results were difficult to interpret owing to irregularity of response, but the protective action of the vaccine was clearly evident.

Collaborative experiments on this same subject were started during the year with the Biological Institute, São Paulo.

##### *b) Rate of production of a cytopathogenic effect*

The rate of the production of a cytopathogenic effect (CPE) was studied by using two strains of virus on cattle-kidney and on pig-kidney monolayers. On the latter, the CPE became detectable after about 150 minutes with both strains of virus. On cattle-kidney monolayers, however, one strain produced the CPE as rapidly as on pig cells, whereas the other required 40 to 50 minutes longer. It was also noted that involvement of 75 per cent of the pig-kidney cells had occurred after 60 minutes, whereas with cattle cells it required 90 minutes for the same effect to be produced.

##### *c) Use of monolayer techniques in the investigation of subtype strain 1898 of type "A"*

This virus strain was passaged in bovine-kidney-cell monolayers and it was observed that plaques of two sizes were formed. By

appropriate dilution and selection techniques, a small plaque line and a large plaque line were established. The thermostability of these two lines was studied. The small plaque line proved to be the more stable. Serum neutralization tests using the two lines and a type "A" serum gave results that indicated a more rapid neutralization of the large plaque virus. These tests are being continued in conjunction with agar diffusion tests in an attempt to obtain more information about this very interesting strain.

*d) Virus contamination of kidneys used for culture of cells*

On a number of occasions, a cytopathogenic effect has been observed between the 4th and the 6th day of culture of the normal kidney cells before they are used for virus inoculation. The cytopathogenic agent was isolated and identified as being aftosa virus.

Examples of when this virus contamination has been observed are as follows:

<i>Cell Seed No.</i>	<i>Date</i>	<i>Production</i>	<i>Contamination</i>
<i>Cattle Kidney:</i>			
96	1 June	9 flasks 213 tubes	All, "O" virus Some, "O" virus
<i>Pig Kidney:</i>			
48	10 April	46 flasks 174 tubes	2 flasks, "A" virus None
50	8 May	52 flasks 390 tubes	All, "A" virus All, "A" virus
51	21 May	38 flasks 120 tubes	All, "O" virus Some, "O" virus
55	17 June	28 flasks 195 tubes	2 flasks, "C" virus None

The kidneys are all obtained from local slaughterhouses and this report has already described how, on one occasion aftosa virus was isolated from apparently normal tongue epithelium. A point of interest and importance, however, is that the preparation of the kidney-cell cultures involves digestion of the tissue with trypsin. The virus of aftosa is susceptible to the action of trypsin. The implication is, therefore, that the virus surviving this treatment may be intracellular. Studies are being carried out to eliminate the possibility that contamination took place in the laboratory and to determine whether such findings present evidence of the occurrence of healthy carriers of the virus.



## 5. Use of Mice in Tests of Vaccine Potency

Potency tests of aftosa vaccine are usually conducted in cattle, but the high cost of these animals and the difficulty of obtaining susceptible cattle in countries where the disease is enzootic and where vaccination is practiced, generally make it impracticable to test the potency of each batch of vaccine. It would be highly desirable, therefore, to find a laboratory animal that could be used as a substitute for cattle in such tests. As mentioned in previous Annual Reports, this has been one of the problems included in the research program of the Center.

The experience that aftosa virus could be adapted to young adult mice led to an investigation of the immune response in these animals to aluminium hydroxide vaccines, assessing the immunity established by the response to inoculation of the vaccinated mice with adapted strains of virus.

Encouraging results have been obtained by the subcutaneous inoculation of young adult mice, 3 to 6 weeks old, weighing 9 to 13 g at the beginning of the experiments. Twenty-one days later the vaccinated mice and unvaccinated control mice are inoculated intraperitoneally with an adapted strain of virus of either the "O", "A" or "C" type. By the inoculation of serial tenfold dilutions of the adapted virus, a comparison can be made between the titration end-point in the vaccinated and in the control mice, or the result of the inoculation of the challenge virus can be assessed on a qualitative basis by noting the mice "protected" and "not protected".

The results of testing vaccines in young adult mice in this way must be correlated with the results of testing the same vaccines in cattle. This work is in progress in collaboration with the Division of Veterinary Investigations of the Ministry of Agriculture, Maracay, Venezuela. A preliminary report of this possibility of using mice for testing the potency of aftosa vaccines was prepared and submitted for publication during the year.

## 6. Papers Published during 1959

1. *Studies on rabbit-adapted foot-and-mouth disease virus. I. Propagation and pathogenicity.* Raymundo G. Cunha and Ervin Eichhorn. *Amer. J. vet. Res.* 20: 133-137, 1959.
2. *Studies on rabbit-adapted foot-and-mouth disease virus. II. Immunogenicity.* Raymundo G. Cunha, Ivo Torturella, and Ubiratan M. Serrão. *Amer. J. vet. Res.* 20: 138-144, 1959.
3. *Research on the development of a modified live virus vaccine in foot-and-mouth disease.* W. M. Henderson and Raymundo G. Cunha. *Proceedings XVI Internat. vet. Congress, Madrid*, 2: 395-396, 1959.

## 7. Papers Presented or Submitted for Publication during 1959

1. *¿Qué es necesario en la lucha contra la fiebre aftosa?* W. M. Henderson, lecture delivered at the Veterinary Science Faculty of the University, La Plata, Argentina.
2. *Foot-and-mouth disease and related vesicular diseases.* W. M. Henderson. For publication in *Advances in Veterinary Science*, Volume VI, Academic Press.
3. *Foot-and-mouth disease virus. I. Propagation of three immunological types of virus in chicks one to twenty-nine days old.* G. E. D. Zahran.
4. *Foot-and-mouth disease virus. II. Propagation and modification of three immunological types of virus in embryonated hen eggs.* G. E. D. Zahran.
5. *The demonstration of an immune response to foot-and-mouth disease vaccine in a protection test in young adult mice.* Raymundo G. Cunha.

## IV. INTERNATIONAL RELATIONS

The prevention, control, and eradication of aftosa, is an international problem. The creation of the Center and its continued maintenance offer an excellent example of how the necessity for international collaboration is appreciated by the countries of the Americas.

The holding of the "Conferencia Internacional Antiaftosa" in Bogotá in April 1959, with the participation of Colombia, Ecuador, Panama, and Venezuela, as well as the success that attended it, marked a very important step in the Center's efforts to achieve the establishment of intercountry programs.

The idea of intercountry collaboration is so well accepted in the Americas that similar success can be predicted whenever such collaboration is useful and the necessary arrangements are made to bring the animal health authorities of other neighboring countries together.

### A. Member Governments

The relations between the Center and the ministry of agriculture officials of the countries of the Americas have remained excellent. Special mention should be made of the assistance of the Ministry of Agriculture of Argentina, without which it would have been impossible to conduct the Twelfth Training Course; the collaboration and hospitality of the Ministry of Agriculture of Colombia, which made it possible to hold the international conference in Bogotá; the interest

and initiative of the Ministry of Agriculture of Venezuela, which has resulted in the initiation of collaborative research programs; and the continuing and increasing assistance of the Federal and State officials in Brazil, which has enabled the Center to initiate new experiments in São Paulo and in Rio Grande do Sul, in addition to those conducted at its headquarters at São Bento, Rio de Janeiro.

## B. International Agencies

*United Nations Food and Agriculture Organization* — Excellent collaboration has continued with the Animal Production Branch of FAO. In the Center's work in the field, close contact has been maintained with the FAO veterinarians in Central America, Brazil, Ecuador, and Paraguay.

*World Reference Laboratory* — The unusual characteristics of virus strain 1898, described in the earlier part of this report, necessitated consultation with the World Reference Laboratory, whose diagnostic services were immediately and freely given. The virus samples dispatched from the Center were examined in tests involving cattle, guinea-pigs, and mice, and from the results of the investigations made there and in Brazil it was established that the strain belonged to one of the immunological types existing in South America.

*International Office of Epizootics (Paris)* — Close contact was maintained during 1959 with this Office whose President, Dr. Arménio Eduardo França e Silva visited the Center accompanied by the Permanent Regional Representative for the Americas, Dr. Carlos Ruiz Martínez.

*OIRSA (Organismo Internacional Regional de Sanidad Agropecuaria)* — Frequent exchanges of correspondence with OIRSA continued as in previous years, and increased personal contact was established between staff members. The Chief of Field Services represented the Center at the VII Meeting of OIRSA held in Mexico City in February. The Chief of the Antiaftosa Department of OIRSA attended the conference in Bogotá in April, participated in meetings arranged by the Center with Panamanian and Colombian officials, and also spent three weeks at the Center in August.

*International Cooperation Administration of the United States of America* — Contact was maintained with the officials of ICA in a number of member countries, especially in Brazil, Bolivia, Colombia, Ecuador, Paraguay, and Peru.

## V. CONCLUSIONS

During 1959 there were various indications that the Center's program was achieving some success, that its activities were creating

interest, and that there was a desire on the part of many countries for greater technical assistance.

This led to consideration being given by the Organization of American States and by the Pan American Sanitary Bureau, to the possibility of an expansion of the Center's work.

It is most unfortunate that there is a severe restriction to the implementation of plans for expansion, owing to continued lack of essential accommodation at the Center's headquarters.

The principal sections of the Center's program may be assessed as follows:

#### **A. Training**

The program during 1959 laid emphasis on the award of fellowships for veterinarians to spend a number of months at the Center for individual training, and on conducting for fellows from a group of countries courses in one of those countries rather than at the Center. It is felt that when the course is taken in the country it has much more impact, by facilitating contact with a much larger group than could be brought to the Center. There is also the opportunity for participation by senior officials who probably could not be spared by their Ministries for the time required to attend a course in Rio de Janeiro.

#### **B. Laboratory Diagnosis**

Samples received at the Laboratory have again increased over the previous years indicating that the countries need and value a reliable reference laboratory to which materials can be sent to confirm or check on national laboratory activities. The receipt at the Center of a number of samples of virus showing unusual immunological characteristics involved more work than that required for the routine determination of virus type. The Twelfth Training Course on this subject was held for the purpose of stressing the importance of recognizing such subtypes of virus and of disseminating knowledge about the laboratory techniques necessary for their identification.

#### **C. Advisory and Field Services**

The establishment and filling of a post of Field Officer in the early part of the year greatly increased the extent of the Center's services in this category. The need for more personnel in this section is still very obvious, if the present level of achievement is contrasted with the magnitude of the problem. The development of control programs on an area basis (i.e., involving two or more countries) has constituted a major step forward in the fight against the disease in the Hemisphere, and has greatly increased the demands in the Center for field services.

#### **D. Research**

A noteworthy difference in the research program in 1959 was the extension of the work to other Institutes in the continued absence of adequate facilities at the Center. The greatest need in this connection is accommodation for large animals. In spite of this physical handicap, the research program has made progress. Studies have revealed new information on the viruses involved in the aftosa problem, advances have been made in the attenuation of viruses to be used for the production of a live virus vaccine, and encouraging results have been reported in the development of a vaccine potency test using laboratory animals.

## Appendix 1

### Personnel of the Professional Staff during 1959

Dr. Iris de Abreu Martins (Brazil), Virologist  
Dr. Raymundo G. Cunha (Brazil), Chief of Laboratories  
Dr. Peter R. Ellis (Great Britain), Chief of Field Services  
Dr. Karl E. Federer (Germany), Serologist  
Dr. William MacGregor Henderson (Great Britain), Director  
Dr. Moyses Natan Honigman (Brazil), Research Assistant  
Dr. Roberto Goic Martinic (Chile), Field Officer  
Dr. Miguel A. Norambuena (Chile), Senior Virologist  
Dr. Janos Ladislao Saile (Hungary), Assistant Serologist  
Dr. Ubiratan M. Serrão (Brazil), Junior Veterinarian  
Dr. Ivo Torturella (Brazil), Senior Veterinarian  
Professor Florindo Villa-Alvarez (Brazil), Administrative Officer.

## Appendix 2

### Twelfth Training Course

8-28 November 1959

*Buenos Aires, Argentina*

### Program of Work

#### November:

Sunday, 8th

Arrival of fellows.

Monday, 9th

a. m.

Opening ceremony.

p. m.

Types and subtypes of the aftosa virus: the present position with consideration of the criteria necessary for the identification of a type and a subtype.

Distribution and incidence of the types and subtypes; history of recent examples.

Tuesday, 10th

a. m.

Discussion of the facts presented on the importance of subtypes.

Discussion of the criteria necessary for identification of subtypes.

p.m.

Tests used in the identification of types and subtypes: complement-fixation, serum neutralization, serum protection, cross-immunity, and other tests.

Wednesday, 11th

National holiday.

Thursday, 12th

Demonstration and discussion: the complement-fixation test.

Friday, 13th

a.m.

Demonstration: the use of the complement-fixation test in the demonstration of a subtype.

p.m.

The identification of subtypes; the function of the Center in collaboration with the World Reference Laboratory.

Requirements for the organization of a national service for the identification of types and subtypes.

Saturday, 14th

Visit to the "Instituto Nacional de Fiebre Aftosa".

Monday, 16th

a.m.

Demonstration: the use of the serum neutralization test in unweaned mice in the identification of a subtype.

p.m.

Demonstration: the use of the serum protection test in unweaned mice in the identification of a subtype.

Tuesday, 17th

a.m.

Examination of animals inoculated 16 November.

Demonstration: The use of the test of serum neutralization in tissue culture for the identification of a subtype.

p. m.

Demonstration: other tests, including the agar diffusion test.

Wednesday, 18th

a. m.

Examination of animals, culture tubes, and agar plates.

p. m.

The requirements for intercountry programs for the control of aftosa.

The exchange of information between countries.

Thursday, 19th

a. m.

Examination of animals, culture tubes, and agar plates.  
Visit to "Laboratorios Asociados".

p. m.

Discussion of the subjects presented during the afternoon of 18 November.

Friday, 20th

a. m.

The necessity for a regional antiaftosa campaign for the countries participating in the course; discussion.

p. m.

Visit to "Laboratorios Lauda".

Saturday, 21st

Visit to "Laboratorios Afta" (Cancelled because of rain).

Monday, 23rd

to

Thursday, 26th

Those attending the course with fellowships were divided into two groups; each group spent two days on practical work on the complement-fixation test and on the culture of tissue.



Friday, 27th

a.m.

Special session on the problems associated with the exportation of meat from countries affected with aftosa. Speakers: Dr. Héctor G. Aramburu (Argentina) and Dr. Nelson Magallanes (Uruguay), both members of their countries' delegations to the United States of America in connection with this problem.

p.m.

Closing ceremony.

Saturday, 28th

Departure of fellows.

### Appendix 3

#### Twelfth Training Course

8-28 November 1959

Buenos Aires, Argentina

List of Attendants

#### A. With PASB/OAS Fellowships

##### ARGENTINA:

- Dr. Elpidio César Fernández, Laboratorios Ferwin, Córdoba.
- Dr. Luis Necchi, Laboratorio de Tecnología Veterinaria SRL, Rosario.
- Dr. Reynaldo Francisco Priotto, Dirección de Sanidad Animal, Ministerio de Agricultura, Córdoba.
- Dr. Aldo Norberto Rovea, Laboratorios Olcese, Rosario.

##### BRAZIL:

- Dr. Milton Guimarães Guerreiro, Instituto de Pesquisas Veterinárias, "Desidério Finamor", Pôrto Alegre.
- Dr. Paulo Chaves Garcia Leite, Laboratório Leivas Leite S. A., Pelotas.
- Dr. Bruno Wilhelm Mohrdieck, Instituto de Pesquisas Veterinárias, "Desidério Finamor", Pôrto Alegre.

**CHILE:**

- Dr. Aldo Gaggero Capellaro, Instituto Bacteriológico de Chile, Santiago.
- Dr. Adolfo Schoijet, Instituto de Investigaciones Veterinarias, Departamento de Ganadería, Ministerio de Agricultura, Santiago.
- Dr. Luis Meléndez Vargas, Instituto Bacteriológico de Chile, Santiago.

**PARAGUAY:**

- Dr. Roque Concepción Ramírez Meza, Departamento de Ganadería, Ministerio de Agricultura, Asunción.
- Dr. Feliz Humberto Paiva, Departamento de Ganadería, Ministerio de Agricultura, Asunción.

**URUGUAY:**

- Dr. Daniel Abaracón, William Cooper and Nephews Ltd., Montevideo.
- Dr. Ernesto Giambruno, Dirección de Ganadería, Ministerio de Ganadería y Agricultura, Montevideo.
- Dr. Antonio Mario Craniello, Dirección de Ganadería, Ministerio de Ganadería y Agricultura, Montevideo.
- Dr. Nelson Magallanes, Jefe, División de Sanidad Animal, Dirección de Ganadería, Ministerio de Ganadería y Agricultura, Montevideo.
- Dr. Hugo González Marini, Dirección de Ganadería, Ministerio de Ganadería y Agricultura, Montevideo.
- Dr. Raúl Angel Casas Olascoaga, Instituto Veterinario Uruguay, Montevideo.

**B. Without Fellowships**

**ARGENTINA:**

- Dr. Albrecht Adam, Facultad de Agronomía y Veterinaria, Universidad de Buenos Aires, Buenos Aires.
- Dr. M. Rodríguez Aguilar, Laboratorio Med-Vet, Buenos Aires.
- Dr. Héctor G. Aramburu, Laboratorios Lauda, Buenos Aires.
- Dr. Oscar Argento, Laboratorios Penta, Buenos Aires.
- Dr. R. Campion, Laboratorio AFTA, Buenos Aires.
- Dr. Abel D. Cardarelli, Instituto Rosenbusch, Buenos Aires.
- Dr. Eduardo G. Charles, Laboratorios Veterinarios Sud Americanos SRL, Buenos Aires.

- Dr. Alberto C. Crescini, Productos Veterinarios Cooper, Laboratorio Bacteriológico, Buenos Aires.
- Dra. Emilia Degiorgi, Instituto Nacional de Fiebre Aftosa, INTA, Buenos Aires.
- Dr. A. L. Durlach, E. R. Squibb and Sons de Argentina, S. A., Buenos Aires.
- Dr. Bernardo Epstein, Facultad de Ciencias Veterinarias, Universidad de La Plata, La Plata.
- Dr. Roger Guy Espinet, Laboratorio Med-Vet, Buenos Aires.
- Dr. René Zapata Etchegorry, Dirección de Ganadería de la Provincia de Buenos Aires, La Plata.
- Dr. Emilio S. Gimeno, Facultad de Ciencias Veterinarias, Universidad de la Plata, La Plata.
- Dr. Juan Mario Lanusse, Laboratorios Asociados, Buenos Aires.
- Dr. Juan Antonio Rodríguez Loustau, Paul Hermanos, Buenos Aires.
- Dr. Florestano S. Maliandi, Laboratorio Biológico San Jorge Buenos Aires.
- Dr. Felipe Eduardo Marcovecchio, Laboratorios Unidos de América, Buenos Aires.
- Dr. Enrique García Matta, Laboratorios Lauda, Buenos Aires.
- Dr. Benjamín L. Morán, Laboratorios Nova, Buenos Aires.
- Dr. Arturo Nottebohm, Laboratorios Asociados, Buenos Aires.
- Dr. José Pahn, E. R. Squibb and Sons de Argentina, S. A., Buenos Aires.
- Dr. Oswaldo A. Peso, Laboratorios Asociados, Buenos Aires.
- Dr. Luiz Pizzi, Laboratorios Lauda, Buenos Aires.
- Dr. Armando Romat, Paul Hermanos, Buenos Aires.
- Dr. Carlos T. Rosenbusch, Instituto Rosenbusch, Buenos Aires.
- Dr. Luis Schang, Laboratorios AFTA, Buenos Aires.
- Dra. Martina Segura, Instituto Nacional de Fiebre Aftosa, Buenos Aires.
- Dr. Juan Carlos Speroni, Laboratorios Asociados, Buenos Aires.
- Dr. Juan Torti, Laboratorio Med-Vet, Buenos Aires.
- Dr. Luis P. Troisi, Laboratorios AFTA, Buenos Aires.
- Dra. Catalina A. M. de del Valle, Laboratorio Biológico San Jorge, Buenos Aires.

PARAGUAY:

- Dr. Oscar R. Bojanovich, Servicio Técnico Interamericano de Cooperación Agrícola, Asunción.

URUGUAY:

Dr. Homero Giacometti, William Cooper and Nephews, Ltd.,  
Montevideo.

Dr. Arturo Lezama, Dirección de Ganadería, Ministerio de Ga-  
nadería y Agricultura, Montevideo.

Appendix 4

Long-Term Fellows

May 1958 – April 1959

Dr. Carlos de Mello Bettencourt Filho      PASB/OAS Fellowship  
Instituto de Biologia Animal  
Ministério da Agricultura  
Km 47, Rio de Janeiro, Brazil

November 1958 – October 1959

Dr. Gamal El Din Zahran      FAO André Mayer  
Veterinary Research Laboratories      Research Fellowship  
Ministry of Agriculture  
Dokki, Cairo, Egypt

August 1959

Mrs. Marjorie Pronger      ICA Fellowship  
Department of Agriculture and Lands  
Falmouth, Jamaica

August 1959 – September 1959

Dr. Rafael La Casa      OIRSA Expense  
Jefe, Departamento Antiaftoso  
Organismo Internacional Regional  
de Sanidad Agropecuaria  
Panamá, República de Panamá

September 1959

Dr. Alfredo García Pirazzi      PASB/OAS Fellowship  
Dirección General de Sanidad Animal  
Ministerio de Agricultura  
Buenos Aires, Argentina

## Appendix 5

### “Conferencia Internacional Antiaftosa”

12-18 April 1959

Bogotá, D.E., Colombia

#### List of Attendants

#### COLOMBIA:

##### *Participants:*

- Dr. Ramiro Ortiz Otero, Director, Departamento de Servicios Agropecuarios, Ministerio de Agricultura, Bogotá.
- Dr. Arturo Navarro Leyes, Jefe Campaña Nacional Antiaftosa, Ministerio de Agricultura, Bogotá.
- Dr. Carlos Bernal López, Asesor Técnico, Campaña Nacional Antiaftosa, Ministerio de Agricultura, Bogotá.
- Dr. Marino Mejía Arango, Jefe, División de Ganadería, Ministerio de Agricultura, Bogotá.
- Dr. Rafael Moreno Fernández, Jefe, Sanidad Animal, Ministerio de Agricultura, Bogotá.
- Dr. Alvaro Muñoz Dávila, Profesor, Facultad de Medicina Veterinaria, Manizales, Caldas.
- Dr. Miguel Ordóñez Bornacelli, Facultad de Medicina Veterinaria, Ciudad Universitaria, Bogotá.
- Dr. Guillermo Pérez Grisales, Jefe de Aftosa y Campañas Sanitarias del Valle del Cauca, Cali.
- Dr. Gustavo Román, Asociación Colombiana de Médicos Veterinarios, Bogotá.

##### *Advisers:*

- Dr. Hernando Almanza, Laboratorios “LAR”, Bogotá.
- Dr. Carlos Arturo Bacca, Profesor a Tiempo Completo, Facultad de Medicina Veterinaria y Zootecnia, Ciudad Universitaria, Bogotá.
- Dr. Silvio Barei, Instituto Zooprofiláctico Colombiano, Ciudad Universitaria, Bogotá.
- Dr. José Joaquín Bohórquez, Instituto “BYALA”, Bogotá.
- Dr. Reynaldo Caicedo A., Director, Instituto “BEHRING”, Bogotá.
- Dr. Manuel Gómez Rueda, Ganadero, Bogotá.
- Dr. Lalaleo Paucar, Jefe, Sección Veterinaria, Instituto Nacional de Higiene “Samper Martínez”, Bogotá.

- Dr. Luis Rodríguez Sáenz, Jefe de Aftosa y Campañas Sanitarias de Nariño y Putumayo, Zona Agropecuaria, Pasto.
- Dr. Ricardo Rodríguez Lee, Director, Departamento Veterinario, E. R. Squibb International Corporation, Bogotá.
- Dr. Amadeo Grosso, Jefe, Zona Agropecuaria del Departamento de Antioquia, Medellín.
- Dr. José Velásquez Q., médico veterinario particular, Bogotá.
- Dr. Hernando Obando G., Jefe, Campañas Sanitarias de la Guajira, Maicao.
- Dr. Luis Francisco Llanes, Jefe de Aftosa y Campañas Sanitarias de Norte de Santander, Cúcuta.

*Observers:*

- Dr. Ramón Santamaría, Jefe de Ganadería de la Secretaría de Agricultura, Santander del Sur, Bucaramanga.
- Dr. Julio E. Varela, Médico Veterinario representante de la Secretaría de Agricultura del Tolima, Ibagué.

ECUADOR:

*Participants:*

- Dr. Gustavo Darquea Terán, Embajador del Ecuador, Bogotá.
- Dr. Jorge Sotomayor Navas, Director General de Ganadería y Veterinaria, Quito.
- Dr. Víctor Moscoso Silva, Jefe, Laboratorio de Virología, Instituto "IVEL", Dirección General de Ganadería y Veterinaria, Guayaquil.

PANAMA:

*Participants:*

- Dr. Ramón A. Vega, Jr., Director, Departamento de Sanidad Animal, Ministerio de Agricultura, Comercio e Industria, Panamá.
- Dr. Nicolás Álvarez Trujillo, Médico Veterinario del Departamento de Sanidad Animal, Ministerio de Agricultura, Comercio e Industria, Panamá.

VENEZUELA:

*Participants:*

- Dr. David Itriago Sifontes, Director de Ganadería, Ministerio de Agricultura y Cría, Caracas.

- Dr. Alirio Contreras Castillo, Jefe, División de Sanidad Animal, Dirección de Ganadería, Ministerio de Agricultura y Cría, Caracas.
- Dr. Rogerio Peñuela M., Jefe, División de Investigaciones Veterinarias, Maracay.
- Dr. Rafael Fuentes Marins, Jefe, Servicios de Virología, División de Investigaciones Veterinarias, Maracay.
- Dr. Francisco Padilla Pérez, Jefe Sección de Control de la Fiebre Aftosa, División de Sanidad Animal, Ministerio de Agricultura y Cría, Caracas.
- Dr. Carlos Palacios García, Jefe, Sección de Investigaciones, División de Investigaciones Veterinarias, Maracay.
- Dr. Carlos Ruiz Martínez, Delegado del Gobierno de Venezuela en el Comité Permanente de la Oficina Internacional de Epizootias, Caracas.

#### ORGANISMO INTERNACIONAL REGIONAL DE SANIDAD AGROPECUARIA (OIRSA)

##### *Observer:*

- Dr. Rafael La Casa, Jefe, Departamento Antiaftoso, Panamá, República de Panamá.

#### PAN AMERICAN HEALTH ORGANIZATION

- Dr. Henry J. Keane, Veterinary Consultant, Zone IV, Pan American Sanitary Bureau, Lima, Perú.
- Dr. Ulpiano Blanco, Program Coordinator, Pan American Sanitary Bureau, Bogotá, Colombia.

#### PAN AMERICAN FOOT-AND-MOUTH DISEASE CENTER

- Dr. Wm. M. Henderson, Director.
- Dr. Raymundo G. Cunha, Chief of Laboratories.
- Dr. Peter R. Ellis, Chief of Field Services.

##### *Secretary General of the Conference:*

- Dr. Carlos E. Morales R., Ministerio de Agricultura, Bogotá, Colombia.

COMPOSTO E IMPRESSO NAS  
OFICINAS DO SERVIÇO GRÁFICO  
DO I.B.G.E. — LUCAS, ESTADO  
DA GUANABARA — BRASIL