Information and epidemiological surveillance system for vesicular diseases in the Americas(*)

by

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The present report is a general description of the information and epidemiological surveillance system for vesicular diseases developed in the Americas with the co-operation of the Pan American Foot-and-Mouth Disease Centre (PFMDC). Further details are given in the attached list of references.

1. BACKGROUND INFORMATION CONCERNING THE DEVELOPMENT OF THE INFORMATION AND EPIDEMIOLOGICAL SURVEILLANCE SYSTEM

In the 1960's, organized and systematic control and eradication programmes for Foot-and-Mouth Disease were set up in the countries of South America. Governments contributed their own resources for this purpose and, in certain cases, obtained loans from the Interamerican Development Bank (IDB). These measures enabled the countries to set up and complete their veterinary services infrastructure and, while giving priority to Foot-and-Mouth Disease control programmes, they constituted the basis in certain countries (Bolivia, Brazil, Equador, Paraguay) for the organization of programmes to control other diseases which hampered livestock production, such as Brucellosis, Tuberculosis, Rabies and parasitoses.


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This rationalisation of the measures to control Foot-and-Mouth Disease in the countries in question triggered a modification in programme management methods and drew attention to the need for information.

It can be said that the years up to 1970 represented a period in which the countries became aware of the need to have at their disposal information and epidemiological surveillance systems.

Immediately it was set up, the Centre began collecting epidemiological information, mainly in the course of visits by its advisers to the various countries.

In mid-1961, following the 8th resolution adopted by the 28th General Session of the Office International des Epizooties (OIE), the South American countries authorized the periodic publication of the results of tests carried out by the Centre to identify samples sent to it. In addition, reports were received concerning samples examined in various countries that already had a laboratory infrastructure.

Later on, during the Foot-and-Mouth Disease Technical Meeting held in Montevideo, Uruguay, in February 1962, between Argentina, Brazil, Chile, Paraguay and Uruguay, it was recommended that the national animal health authorities provide the information necessary to enable the Centre to issue a periodical Epidemiological Bulletin. As a result, from July 1961 to December 1967, all member-countries of the Organization of American States (OAS) received regularly an epizootiological information sheet giving details of outbreaks of vesicular diseases — identifying the viruses involved — provided by the animal health departments or obtained from examinations carried out by the Centre on samples submitted by the countries.

In 1969, during the IInd Interamerican Meeting, at ministerial level, on the Control of Foot-and-Mouth Disease and other zoonoses (RICAZ-II), the Centre presented a working paper entitled « Data with respect to Foot-and-Mouth Disease in South America » which summarized the information published to date by the various countries. The RICAZ-II recommended that the Centre prepare an epidemiological surveillance programme for Foot-and-Mouth Disease and Vesicular Stomatitis, the information being distributed mainly to the animal health authorities in the countries of the Americas.

On the basis of this initial recommendation, the « Epidemiological Report on Foot-and-Mouth Disease and Vesicular Stomatitis » was prepared and sent to all the countries of the Americas and to certain international organizations such as the United Nations Food and Agriculture Organization (FAO) and the O.I.E.

The RICAZ-III in 1970 requested the Centre to intensify the necessary measures and to organize a meeting of specialists in the field of disease reporting. It was recommended that the member-countries set up and actively assist national departments responsible for collecting statistics and recording
outbreaks of Foot-and-Mouth Disease. In the same year, the Centre set up its own unit for collecting statistics and epidemiological information.

In 1971, during RICAZ-IV, the Centre submitted a project to collect statistics on animal diseases, with special reference to the organization of epidemiological statistics systems for Foot-and-Mouth Disease.

Also in 1971, information with respect to affected cases and herds, geographic location and laboratory diagnosis began to be published on a fortnightly basis. The scope of this publication was extended to take account of the expansion of the programmes in each country.

At the end of 1971, tests began, in the parishes on the border of Rio Grande do Sul (Brazil), under the guidance of the Centre, on a project for the organization of epidemiological information systems for Foot-and-Mouth Disease in the Rio Grande do Sul State, with the aim of setting up a technical demonstration zone in this State and a place in which to train personnel destined to be placed in charge of epidemiological statistics units and information systems in other countries.

As of mid-1972, the 143 units located in this State regularly sent weekly information by cable to the central unit, indicating outbreaks on the location map and giving monthly information on affected herds. At the end of 1972, the system was extended to other Brazilian States, to cover seven States in two or three years.

In the same year, an epidemiological statistics unit was also set up in Paraguay with the assistance of the Centre. The unit was organized on the same basis as the Rio Grande do Sul unit. The system was subsequently extended to Uruguay.

During the period from 1973 to 1977, the system was implemented in the other countries on the basis of experience gained in Rio Grande do Sul, and personnel training activities were stepped up.

In 1973, the Centre organized the first epidemiological statistics and information systems training course, in order to train personnel from Brazil, Paraguay and Uruguay.

Several countries have begun to use the location maps to communicate and record information.

During the RICAZ-VI in 1973, the Centre suggested incorporating these operations in an epidemiological surveillance system at continent level. On the basis of experience already gained, documents were submitted on the functioning of the epidemiological information systems to the « Regional Seminar on epidemiological surveillance systems for transmissible diseases and zoonoses », which was held in Rio de Janeiro in December 1973.

The recommended system at continent level concentrated on two basic aspects:
a) weekly information on the presence of vesicular diseases, using small-scale location maps, and
b) monthly information with respect to affected herds and laboratory examinations.

The second aspect includes information on vesicular diseases in countries free of Foot-and-Mouth Disease.

During the second meeting of the South American Commission for the Control of Foot-and-Mouth Disease (COSALFA-2) held in 1974, all the South American countries expressly undertook to take part in the epidemiological surveillance and information system at continental level, and the PFMDC presented the document entitled « Basic Epidemiological Surveillance System for Vesicular Diseases », which gave details of the mechanism for circulating information at international level.

In the same year, information systems were introduced on the border between Paraguay and Brazil. These later served as an example for other border information systems that are currently in force.

Finally, the Paraguay national Foot-and-Mouth Disease control programme was assessed, providing the first example of epidemiological indicators.

In 1975, a diagnosis of the status of Foot-and-Mouth Disease, Rabies and Brucellosis was made in Brazil. This diagnosis was carried out as part of the information system, and covered 20 States.

In 1976 and 1977, on the basis of an agreement with the Brazilian government, four training courses on epidemiology and information systems were planned. Although these courses were organized principally for Brazilian veterinary surgeons, several veterinary surgeons from other countries also took part.

The system was consolidated during the period from 1977 to 1980, both at national and continent level.

The system at continent level, which the countries had agreed in 1974 to contribute to on the basis of a uniform mechanism proposed by the PFMDC, became operational in 1977.

As of May 1977, the weekly publication commenced of an epidemiological report indicating the presence of outbreaks of vesicular diseases in South America, on the basis of a geographic location map. The fortnightly report began to be published monthly, giving information on the number of affected herds and the laboratory diagnoses, on the basis of the political-administrative divisions of the countries in the regions affected by and free from Foot-and-Mouth Disease. These two publications represent the practical application of the agreements entered into by the countries in the affected region during the annual meeting of the COSALFA in 1977 and the resolution approved at the RICAZ-X in the same year.
Since September 1978, the data contained in these two reports is processed by the Centre's computer.

Since 1980, information has been widely used to improve the effectiveness of the control programmes for Foot-and-Mouth Disease.

On the basis of a project prepared by the Centre and financed by the United Nations Development Programme (UNDP), operations have been underway since 1981 in Panama and Central America to train specialists and extend the system to this region.

Over the past few years, a whole series of operations have been undertaken to:

a) Adapt the basic elements of the information networks to the various regional strategies that are beginning to be defined, based on the epidemiological characteristics of eco-systems comprising different levels of risks in the event of an outbreak of Foot-and-Mouth Disease.

b) On the basis of the degree of development achieved by these information systems, extend their mechanisms to cover other diseases that are the subject of systematic official programmes. The results obtained to date in this respect are encouraging.

c) Extend the technical co-operation provided with respect to the organization and implementation of information systems to the countries of Central America, Mexico and the Caribbean, for vesicular diseases (preventive control of Foot-and-Mouth Disease and other exotic diseases, control of Vesicular Stomatitis).

In summary, the Centre supported the national animal health departments in the following areas:

— In determining the general outline of the information systems organization.
— In training national veterinary surgeons in the organization of information systems.
— In providing technical assistance for the implementation of the systems.
— In distributing and circulating information to the countries of the region, to other countries of the world and to the international organizations concerned (FAO, OIE, IICA, EEC, OIRSA).

2. SYSTEM OF OPERATION

The information and epidemiological surveillance system for vesicular diseases is considered to be an important aspect of the activities of animal health departments responsible for disease control programmes.

From an operational point of view, it constitutes all operations necessary to obtain, on a systematic and timely basis, knowledge of the development
of vesicular diseases and of the factors that determine their occurrence in the context of time and space.

3. OBJECTIVES

The ultimate objective of the information and epidemiological surveillance system is to improve the effectiveness of the programmes.

The intermediate objectives are as follows:

a) to assist in making decisions with respect to disease control;
b) to organize the necessary information circuits (user-source), and
c) to improve the pertinence and reliability of the information.

4. INFORMATION AND EPIDEMIOLOGICAL SURVEILLANCE SYSTEM FUNCTIONS

a) Communication of important epidemiological information;
b) collection of required information;
c) processing;
d) storage and recovery;
e) sorting and interpretation;
f) issuing of appropriate recommendations with respect to the application of control measures, and
g) appropriate distribution of the information prepared and the recommendations to the decision-making and operational units.

5. SYSTEM ORGANIZATION STRATEGY

The strategy followed to tackle information problems relating to control programmes and the setting up of information networks, can be summarized as follows:

a) obtain a clear understanding of the epidemiological problem to be solved;
b) understand the surveillance process from the point of view of the objectives, goals and organization of the programmes;
c) determine the decisions to be made with respect to this control and the type of information required;
d) define information requirements: configuration of the information networks (user-source).
6. IMPLEMENTATION CONDITIONS

In order to develop this strategy in each of the countries of South America, efforts have been made to meet the following conditions:

a) the information must be useful and fulfil specific objectives;

b) the information included must be of a simple nature and in limited quantity;

c) priority must be given to data reflecting the effects of programmes, limiting such data to essential information;

d) procedures and documents must be standardized: a small number of forms that are simple to fill out; distribution limited to the persons who really require the information;

e) the information system is an integral part of animal health operations, and consequently all the personnel working on the programmes must take part in the system, the only exception being that a central statistical and epidemiological unit must be set up and, in the case of certain large countries, regional units must also be formed;

f) personnel working on the programmes must be trained to work with the system and to use the information;

g) the community must be educated and its structures must be used to improve the supply of data;

h) all the sectors must in return be provided with data accompanied by comments and recommendations;

i) in each local unit a register of the stock-farms and total herds must be set up, this census being accompanied by a map of the district indicating the epidemiological problems encountered, and

j) the system must be implemented by region.

7. OPERATIONAL ELEMENTS

The principal elements for the operation of the system are:

a) A group of information sources.

The principal sources include: stock-farms, veterinary diagnosis laboratories, official veterinary services, private veterinary surgeons, animal husbandry co-operatives, slaughterhouses, meat processing facilities, milk industry facilities, serum banks.

b) A « sensorial » device.

Constituted by all the local veterinary units, who collect information transmitted to receivers-users of the information, the « sensorial » device is mainly set up by local veterinary units that are spread out in such a way as to cover the entire territory that is the subject of animal disease control pro-
grammes. Each local veterinary unit has a well defined area under its responsibility. The cases of vesicular disease that are notified are indicated on a map of the area divided up into squares bearing code numbers. The system provides for the transmission of this information (the location codes concerned) obtained at local level to the higher echelons of the department by means of a simple telephone message, telegram, radiogram or telex. By way of an example, the epidemiological information system for the Rio Grande do Sul State in Brazil is described below.

c) Receivers.

The receivers are the users of the information, selected according to their responsibilities and the types of decision to be made, and to their position in the animal health organization hierarchy. From an operational viewpoint, the receiver-user is the local veterinary surgeon. From a strategic viewpoint, the receiver-user is an inter-disciplinary group which processes, analyses, interprets, makes recommendations and suggests possible solutions to the problems detected. At national level, this group corresponds to the regional and central statistical and epidemiological units; at continent level, it corresponds to the statistical and epidemiological sections of the PFMDC.

d) A communications network linking up the « sensorial » device to the receivers-users group. In the information system for vesicular diseases, a weekly, monthly and annual communication mechanism has been adopted. The weekly communication gives information with respect to the squares on the map that are affected by a vesicular disease. The monthly communication gives information on the total number of affected herds and the causal virus, based on the political-administrative divisions of each country. The annual communication summarizes the epidemiological status during the year, the vaccine coverage obtained, the production of vaccines and their testing, and the resources employed for control measures and other aspects of the programmes. This annual report is studied by the COSALFA and the RIMSA. The information is transmitted by radio, telephone and telex for the weekly communication, and by means of standard written reports for the monthly and annual communications. The weekly communication uses numerical codes to identify the squares on the maps and the week in question.

e) Return and circulation of the information.

Once the information has been processed, analysed and interpreted with a view to taking the necessary action, it is sent back out to the individual units that had submitted information and are responsible for making decisions. In the case of an information system at continent level for vesicular diseases, the information is sent back out through weekly and monthly epidemiological reports.

8. EXAMPLE OF THE FUNCTIONING OF THE INFORMATION AND EPIDEMIOLOGICAL SURVEILLANCE SYSTEM

In order to make it easier to understand the functioning of the weekly information system, the example of Brazil is given below.
The report in code is sent out by the local veterinary unit in a parish — in this case, Bagé. The map used has one square for every five minutes.

The receiver-user at regional level is the Animal Health Protection Unit of the Agriculture Department in Rio Grande do Sul State. At national level, it is the Health Surveillance Division of the Brazilian Ministry of Agriculture Health Protection Secretariat. The map used at the level of the Rio Grande do Sul State has one square for every fifteen minutes, whereas the map used at national level (Brazil) is divided into squares corresponding to one degree.

At continent level, the receiver-user is the PFMDC.

With respect to the weekly information system, the veterinary unit sends a telegram every Friday indicating the presence of outbreaks of vesicular disease in the relevant squares. The absence of any outbreaks is also reported.

The Rio Grande do Sul unit receives the information from all the local units on Monday, and passes it on in condensed form to the central unit in Brasilia. The information is then analysed and the results of this analysis dictate the special or general control measures to be adopted.

The central unit in Brasilia receives the information from all the States on Wednesday and condenses it before transmitting it by telex to the PFMDC. At the same time, the information is analysed in order to determine the normal or special measures to be taken with respect to a region that is seriously at risk.

The PFMDC receives the reports from those countries where affected areas have been identified. The information is processed each Friday on a digital computer, using the established programme, and the results are distributed in the form of the Weekly Epidemiological Report to all the countries and the other organizations concerned. The Centre also sorts the information by comparing it with information for prior periods and by applying certain indicators.

9. RESULTS AND PRODUCTS OF THE INFORMATION SYSTEM

9.1. BEHAVIOUR OF VESICULAR DISEASES

a) Identification of Foot-and-Mouth Disease eco-systems.

By analysing the behaviour in the context of time and location of Foot-and-Mouth Disease, it is possible to identify eco-systems of the disease in a country and, on a general basis, on a continent. The results obtained constitute the basis for regionalisation activities in the countries concerned. Systematic control measures can be applied on the basis of eco-systems, thus ensuring that available resources are used rationally.
Control measures will vary for each eco-system, according to whether it is: endemic with a permanently present virus, epidemic with the risk of the virus being introduced in susceptible herds, para-endemic with very sporadic cases of Foot-and-Mouth Disease, or free from the disease.

b) Determination of the spread of the disease.

It is also possible to visualize the spread of the disease as, for example, in the case of the spread of a Foot-and-Mouth Disease epizootic in Uruguay. The PFMDC monitors and analyses the situation in the border areas in order to warn the countries concerned on a timely basis.

Thus in 1976 the countries of the Rio de la Plata basin (Argentina, Bolivia, Paraguay, Uruguay, Brazil) were warned of the occurrence of the epidemic caused by the Bagé strain virus. The information provided generally includes preliminary details with respect to the antigenic and immunogenic characteristics of the field virus.

9.2. FUNCTIONING OF THE ORGANIZATION FOR THE IMPLEMENTATION OF CONTROL MEASURES

The data obtained through the information system provide the following information:

a) the measures adopted to control Foot-and-Mouth Disease, the transfer and concentration of animals;

b) diagnosis activities;

c) measures aimed at immunizing cattle herds against Foot-and-Mouth Disease, concerning mainly the production and testing of vaccines and the level of vaccine coverage;

d) personnel training activities;

e) the resources made available, and

f) the social communication and health education activities that are set up.

9.3. METHOD OF OPERATION

The Statistics Unit of the Centre has set up certain indicators to assist the countries in improving the use and analysis of the information and to ensure that such information functions as an effective epidemiological surveillance system. These indicators are based on data concerning the information system for the Rio Grande do Sul State which was the first to be organized in 1971 and which functions very satisfactorily. The details of these studies are given in the PFMDC publications.
a) Risk indicators.

These indicators identify the regional eco-systems by defining the development and spread of Foot-and-Mouth Disease on the basis of the degree of risk to which the animal population is subject in the context of time and space. Figure 1 presents the example of three parishes in the Rio Grande do Sul State (Brazil). In order to calculate the risk indicator, statistical information was used concerning the incidence of Foot-and-Mouth Disease from 1970 to 1979 in the 232 parishes of the State, which cover 265 sq. km. and include 12 million head of cattle and 400,000 herds. This data made it possible to set up an indicator which takes into account the monthly presence or absence of the disease in each parish.

The parish of Alecrim is located in a low risk area; Pedro Osorio is located in an average risk area and Dom Pedrito is a high risk parish. This indicator is in fact the opposite of the average rate of recurrence measure (ARR), which calculates the lapse of time between two outbreaks of Foot-and-Mouth Disease. As can be noted in Figure 1, the indicator is represented by a high figure in low risk areas and a low figure in high risk areas.

b) Epidemiological graph.

This graph makes it possible to draw up behaviour models, on the basis of time, for Foot-and-Mouth Disease in a given region.

Graph 1 represents the epidemiological graph for five parishes along the Rio Grande do Sul (Brazil) border during the period from 1970 to 1979. The graph allows for various epidemiological situations, and it is therefore possible to assess the situation for each month and to send out a warning when the monthly frequency level exceeds controllable levels.

10. BASIC REQUIREMENTS
FOR THE FUNCTIONING OF THE SYSTEM

10.1. ADMINISTRATIVE ORGANIZATION OF THE SYSTEM

It is important to note that the system was organized as a sub-system of the Foot-and-Mouth Disease control programmes or animal health programmes, bearing in mind that all the personnel employed with these programmes are involved in the system. As a result, no new administrative structures were set up. The only specific functions are those relating to the epidemiological and statistics units.

10.2. TRAINING

Over the past ten years the Centre has constantly supported countries in the organization of information and epidemiological surveillance units, and in particular in the training of personnel. The region now disposes of a team of specialists in the field of information, statistics and epidemiological systems.

<table>
<thead>
<tr>
<th>Parish</th>
<th>Risk Level</th>
<th>Index*</th>
<th>ARR** (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dom Pedrito</td>
<td>High</td>
<td>0.895</td>
<td>0.57</td>
</tr>
<tr>
<td>P. Osorio</td>
<td>Average</td>
<td>0.399</td>
<td>3.07</td>
</tr>
<tr>
<td>Alecrim</td>
<td>Low</td>
<td>-0.444</td>
<td>25.75</td>
</tr>
</tbody>
</table>

* Risk indicator
** ARR = average rate of recurrence
GRAPH 1: Monthly variations with respect to Foot-and-Mouth Disease (epidemic index) in five border parishes (Uruguaiana, Quaraí, Livramento, Dom Pedrito and Bagé), Brazil, 1970-1979.

In addition, within the context of training and assistance programmes implemented in the various countries, several technical and training manuals have been prepared and distributed to all the countries.

10.3. PERIODIC ASSESSMENT OF THE FUNCTIONING OF THE SYSTEM

Another essential aspect in improving the system was the periodic assessment of two elements: the content of the information produced, that is the efficiency of the system, on the one hand, and the functioning of the system with respect to the frequency and punctuality of communications, omissions and mistakes, on the other hand.

10.4. USE OF THE INFORMATION: EPIDEMIOLOGICAL ANALYSIS

During the initial phases of the implementation of the information system, the most important task was to set up information methods and to imple-
ment the system at national and continent levels. During subsequent phases, an epidemiological analysis of all information obtained was made in order to meet the following essential objective: provide increased assistance in the decision-making process with respect to Foot-and-Mouth Disease control programmes. The main examples in this respect have been given in the paragraphs concerning the functions and products of the system.

10.5. STANDARDIZATION AND SYSTEMATIZATION OF DATA COLLECTION, PROCESSING AND DISTRIBUTION PROCEDURES

The national bodies have prepared technical manuals giving details with respect to the collection, transmittal, processing and distribution of information. The aim is to provide the minimum amount of documentation indicating easy and quick procedures.

One important aspect is the marked progress that has been made in the distribution of the information collected. At least once a month the following are prepared and distributed: charts, graphs, assessments, and also comments to assist in orienting field work, an interpretation of the facts presented, forecasts of expected behaviour and observations concerning means of action and the use of resources. Important information from throughout the world which may be of vital interest to the countries of the region is also included.

10.6. INFORMATION AND EPIDEMIOLOGICAL SURVEILLANCE SYSTEMS AND THEIR INCIDENCE ON BORDER AGREEMENTS

In the context of Foot-and-Mouth Disease control programmes, border agreements with respect to animal health have been entered into by most South American countries. The implementation of these agreements relies on the functioning of information systems which already cover the economic and public health consequences of Foot-and-Mouth Disease and other important diseases. These sub-systems are part of the national system of each country. The Centre usually plays a co-ordinating role in these agreements.

10.7. CO-ORDINATION WITH OTHER SYSTEMS

There exists a certain dependent relationship between the information and epidemiological surveillance system and the information systems of other sectors of the countries’ economies. This relationship varies from one country to another. As a general rule, these systems are combined with:

a) other agro-pastoral programmes, whether they be other animal health programmes, animal husbandry development programmes or general agro-pastoral programmes;

b) public health and veterinary public health programmes;

c) educational programmes (in rural areas); and
11. EXTENSION OF THE INFORMATION AND EPIDEMIOLOGICAL SURVEILLANCE SYSTEM FOR VESICULAR DISEASES TO OTHER DISEASES

In the past few years, certain countries have used the system for other diseases that develop in acute form, such as Classical Swine Fever and cattle Rabies, or for certain chronic diseases such as Brucellosis and Bovine Tuberculosis, and certain parasitoses such as Mange and Scab and sheep ticks.

Recently, the executive body of the Pan American Health Organization (PAHO) decided to use the Centre’s system as a model for certain zoonoses. In addition, the COSALFA-VIII recommended that the system be extended to Classical Swine Fever and African Swine Fever, in co-operation with the Interamerican Institute of Co-operation for Agriculture (IICA) and the OIE.

The Centre’s criteria for the extension of the system are as follows:

11.1. The present system is organized in such a way that it comprises all the basic elements applicable to any information and epidemiological surveillance system for other animal diseases.

11.2. An essential aspect of the system is the existence of organized disease control or prevention programmes, which must be taken into account. These programmes must also be closely co-ordinated or be organized on the same basis as the Foot-and-Mouth Disease control programmes.

11.3. In the case of zoonoses, there must be close co-operation between the public health and animal health sectors.

11.4. Any extension of the system must be accompanied by additional resources for the national support units and by a training course for programme employees. The necessary resources must also be available to enable advisers from the Centre to assist the countries and to call upon auxiliaries to process and analyse the information for the system at continent level.

11.5. A « pilot » area must be set up that is representative and can be used for field training activities.

11.6. The system must be extended progressively, on the basis of the resources available and the results of assessments made within the scope of the system.
12. REFERENCES

ASTUDILLO V. — Proyecto de desarrollo de sistemas de notificación y de registro de datos sobre enfermedades de los animales. Presentado en la RICAZ-IV, Lima, Perú, 5-7 abril 1971. 52 págs.


CENTRO PANAMERICANO DE FIEBRE AFTOSA. — Informe del programa de vigilancia epidemiológica de la fiebre aftosa. Presentado en la RICAZ-VI, Medellín, Colombia, 9-12 abril 1974. 8 págs.

CENTRO PANAMERICANO DE FIEBRE AFTOSA. — Guía para la recopilación y registro de información para caracterizar regionalmente la fiebre aftosa en América del Sur. (Guidelines for compiling and recording information to characterize FMD regionally in South America.) Mayo, 1979.

