

# THE ANIMAL DIAGNOSTIC SERVICE IN COLOMBIA<sup>1</sup>

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*Colombia has taken steps to protect its important livestock resources by setting up numerous animal diagnostic centers. These now serve most of the rural areas, providing vital services at token cost to the farmer. In 1970 the 23 existing centers analyzed more than 500,000 laboratory samples and performed a wide variety of other tasks.*

## Introduction

In Colombia the activities involving livestock development and health control are carried out by the Colombian Agriculture and Livestock Institute (ICA).

As distinguished from that in other countries, livestock production in Colombia for the most part involves large herds, owing to the abundant natural and developed grazing lands. Of the total area of the country (114 million hectares), some 41 million hectares are pastureland, of which only 40 per cent is being utilized; a third of this area consists of developed pasture and the rest of natural pasture. This situation, together with the tropical nature of the country, calls for an unusual type of livestock production involving particular health problems.

The various ecologic zones contain 21 million head of cattle. The colder zones, between 1,500 and 3,000 meters above sea level, have been shown very suitable for milk production. On the other hand, beef cattle production has been established in the lowlands, which are characterized by extensive plains.

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The tropical climate does not permit a ready adaptation of specialized strains of cattle; therefore, it was necessary to establish genetic improvement programs by crossbreeding native breeds with specialized ones.

The more prevalent diseases affecting Colombian cattle are foot-and-mouth disease (fortunately only the A and O types exist) and brucellosis (second in importance, with an average 7 per cent infection rate throughout the country). To control foot-and-mouth disease, the Frenkel type of bivalent A-O vaccine is used. For immunization against brucellosis, strain 19 vaccine is used—principally in calves between three and six months of age.

Studies show that tuberculosis does not exist in the country, and anthrax has been controlled by routine vaccination.

Because of the tropical climate, the cattle at lower altitudes are affected considerably by two hematozoic parasites—anaplasma and babesia.

Deficiency diseases are also economically important, mainly as a result of the use of natural grazing lands.

Next in importance to cattle raising is the poultry industry, which has grown significantly in the last 10 years. Total fowl population in 1970 was 21 million. The major poultry diseases are leukosis, Marek's disease, Newcastle disease, infectious bronchitis, mycoplasmosis, and salmonellosis. There are no cases of laryngotracheitis or bird plague.

The total number of hogs in the country is about 2 million, and classic hog plague exists. There are some 1,700,000 sheep in all; their

TABLE 1—Growth of the veterinary diagnostic centers.

Year	No. of centers	Organizing agency
1961	10	Colombian Zooprophyllactic Institute
1962	11	" " "
1963	15	" " "
1964	15	" " "
1965	17	" " "
1966	18	" " "
1967	18	" " "
1968	19	" " "
1969	22	Colombian Agriculture and Livestock Institute
1970	23	" " " "

most frequently noted problems are due to parasitism and enterotoxemia. There are also about 1.5 million horses, the main disease problem of which is Venezuelan equine encephalomyelitis. Some cases of equine infectious anemia have also occurred.

Programs for prevention of animal diseases, especially those that are epizootic, have been revised and modified in terms of placing greater responsibility in the hands of the livestock owners, with minimum controls. To this end, training courses for cattle owners have been increased, an extension program in cattle raising has been established, and private technical assistance in this field has been stimulated.

Thanks to the establishment of diagnostic centers, it has been possible to carry out animal health programs, and preparations have been made to expand them and to improve their techniques.

### History of the Diagnostic Service

Diagnostic services were begun in 1954 with the creation of the National Foot-and-Mouth Disease Institute, whose principal functions were to diagnose and classify vesicular diseases and produce a vaccine against foot-and-mouth disease. In 1956 the Government of Colombia contracted for the technical assistance of the Zooprophyllactic Institute of Brescia (Italy) for the production of such vaccine and for the establishment of a network of diagnostic services similar to that in Italy. The training of

technical and auxiliary personnel and the procurement of equipment got underway immediately.

The decade 1960-1970 witnessed organization of much of the network of laboratories that now exists in the country (see Table 1). The first laboratories were established in the major cattle regions, which at that time were experiencing outbreaks of foot-and-mouth disease. Nine laboratories were already in operation in 1960; they were located in Bogotá, Bucaramanga, Cali, Manizales, Medellín, Popayán, Tunja, Santa Marta, and Barranquilla.

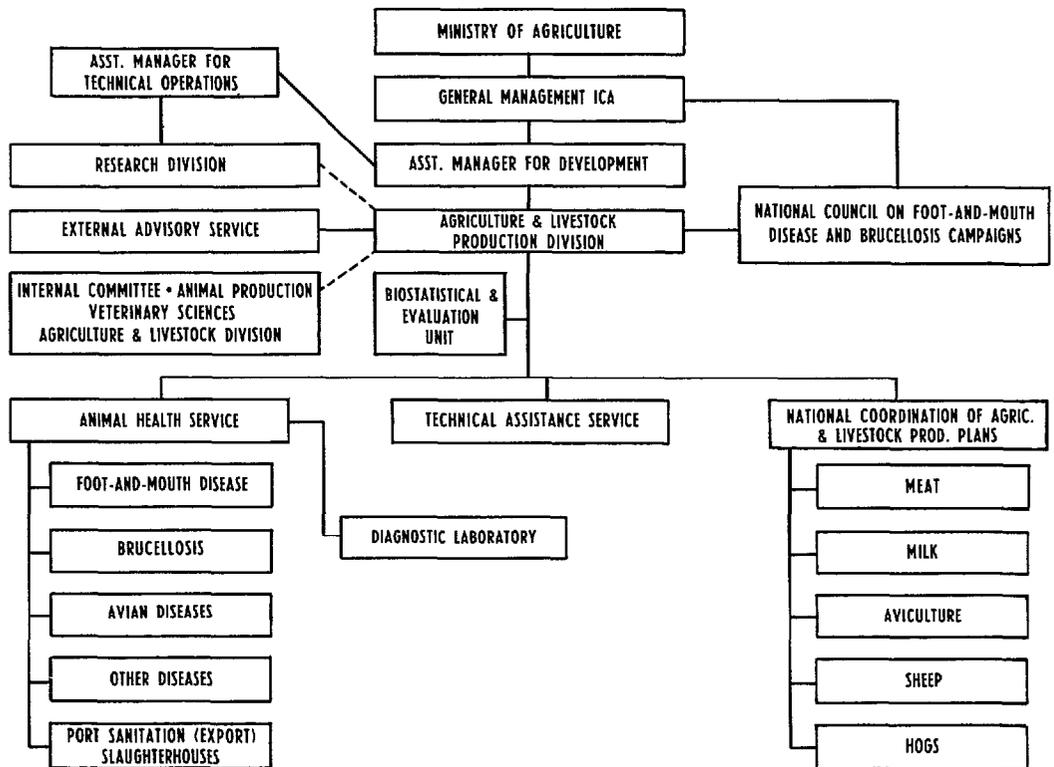
There are now 23 regional laboratories in operation, providing direct services to 80 per cent of the national territory; in addition, there are well-equipped national referral laboratories to assist the other installations, especially with regard to training, standardization of techniques, reagents, and certain types of research. It is noteworthy that there were two research and diagnostic institutions in operation in the country up to 1968—the Colombian Zooprophyllactic Institute and ICA—which were merged principally to avoid duplication and to make better use of human, material, and economic resources.

### Organization of the Service

#### *Administrative Organization*

The diagnostic service functions as a national program of the Department of Animal Health of the ICA (Figure 1).

FIGURE 1—Organization of the diagnostic service in Colombia.



### Personnel

The service's program is directed, at the national level, by a veterinarian charged with coordinating and supervising the activities being developed. With the collaboration of the technicians of the Department of Veterinary Sciences, he organizes the training courses, prepares material for publication, adapts laboratory techniques, and supervises the work of the centers.

Each center has a head veterinarian, an assistant veterinarian, a secretary, and two technical assistants. Recently ten of the centers were provided with microbiologists, thereby releasing the veterinarians from routine diagnostic work and permitting them to go into the field and carry out research.

### Buildings

When the centers first began operating, they

were installed in buildings that had been remodeled for that purpose. (Because of difficulties and disadvantages, specifically designed buildings have been constructed over the years). There is no uniform model for the entire country, owing to climatic conditions.

Most centers have a reception room; an office for the professional personnel; serology, microbiology, and histopathology laboratories; a necropsy room; rooms for reserve laboratory animals; and rooms for inoculated animals. By special agreement with the Ministry of Health, some centers have special areas used for observing dogs suspected of having rabies.

In order to maintain progress toward greater integration with the private sector and with other health disciplines, the centers have been expanded in recent years to provide space for animal health services. Each center also has a lecture hall which, in most cases, is used as well

for meetings of private trade associations, institutions, and other groups.

### Equipment

Each center has the following minimum equipment: an incubator, autoclave, microscope, centrifuge, water bath, refrigerator, incinerator, distillation apparatus, gas equipment, necropsy equipment, and glassware for microbiology and serology.

Special considerations regarding equipment include the following:

(a) It must be kept in mind that the incinerator and sterilizer are the most important pieces of equipment for assuring elimination of infectious materials.

(b) Gas equipment may vary, depending on conditions in each town or city. Initially, because the use of gas was not popular in the country, it was necessary to use gas cylinders which operated on the basis of a 1.020 solution.<sup>4</sup>

(c) Before the purchase of any electrical equipment, it is necessary to determine the kind of power supply available in the region. Many pieces of equipment have proved unusable because of voltage differences from zone to zone.

### Reagents

In Colombia there are no private laboratories producing reagents, and imported reagents are too costly. Therefore, since its inception the diagnostic program has had a central laboratory charged with the production of the most important reagents for general use, such as agar, selected and enriched media, dyes, and buffer solutions.

Similarly, the common biological reagents for diagnosing infectious diseases, such as pullorum antigen, Bang's antigen, and sera for typing purposes, are prepared in the official Biological Products Laboratory. Certain special reagents are obtained from the Pan American Foot-and-Mouth Disease and Zoonoses Centers, the Weybridge Referral Laboratory, the U.S.

<sup>4</sup>An Esso product.

Department of Agriculture, and the World Health Organization.

### Budget

The approximate cost of each center is as follows:

Construction . . . . .	US\$35,000
Permanent equipment . . . . .	10,000
Glassware and reagents . . . . .	1,000
Personnel costs per month:	
2 veterinary technicians . . . . .	600
1 microbiologist . . . . .	200
1 secretary . . . . .	100
2 assistants . . . . .	150
Monthly laboratory maintenance cost . . . . .	800

It should be noted that, beginning in 1969, a schedule of fees was instituted for the diagnostic services, in order to stress the importance of the diagnoses. This measure was fully accepted by the cattle owners. The fees established were as follows: necropsy for larger animals, US\$2.00; necropsy for poultry, US\$1.00; microbiological test, US\$0.50 per case; and serodiagnosis, US\$0.15 per specimen. There is no charge for cattle owners who take part in health programs set up by the Government, nor are fees charged in connection with campaigns against foot-and-mouth disease and brucellosis. Similarly, no charge is made when the materials provided are for a special investigation, when exotic diseases are present, or when serious outbreaks of epizootic diseases affect the community.

### Operation of the Service

#### Field Activity

When the Service was begun in 1956, the work of the laboratory personnel consisted mainly of publicizing the veterinary tasks performed. To that end, professional staff members visited cattle ranches, poultry farms, pig farms, and other livestock production areas and performed many other activities—including diagnosis, treatment, and future planning for the ranches. This arrangement made it possible

to publicize the importance of veterinary services among the animal industries, and at the same time to promote the use of laboratory services. It thus provided a good opportunity to point out the need for veterinarians and to initiate private technical assistance. Also, the veterinarians serving in the centers are now widely known and are acquainted with the problems of their regions. A good example of the progress achieved this way is the poultry industry, which began and developed with the help of the diagnostic laboratories, reaching peak production within a relatively short time.

Over time the situation has changed, in that most clients now take the materials to be examined to the laboratory. Since there are now professionals who provide private technical assistance, either individually or in institutions, an effort is made to channel all the results, prophylactic measures, and treatments through them. However, when no other professionals are available, or when outbreaks of epizootic or unusual diseases occur, technicians from the centers collaborate in field activities. These staff professionals also participate in official animal health programs.



A laboratory technician examines the viscera of an animal suspected of having a highly infectious disease.

### Laboratory Work

In the reference laboratories the professionals attached to the centers receive special training in the techniques of pathology, micro-

biology, and toxicology. Courses in preventive medicine are offered periodically, with major emphasis on the epidemiologic aspects of those diseases having the greatest incidence in the country.

Most of the centers' time is spent on laboratory work. During 1970, the 23 diagnostic centers processed 500,421 specimens, or an average of 22,746 specimens per year per center (including Bang's serology test). Figure 2 gives a breakdown of the various diseases diagnosed by the laboratories that year; Figure 3 shows the number of serologies performed on cattle and birds in 1961-1962 and 1969-1970.

There has been a wide distribution of instructions for taking specimens and for preserving suspect materials and sending them to the laboratory. This has been accomplished by means of informative leaflets. The laboratories also provide specimen containers and preservatives—such as test tubes, glycerine, formaldehyde, sterile cotton swabs, and (in some cases) culture media.

Each laboratory is capable of performing necropsies, direct microscopic observations, titrations, serologies, laboratory animal inoculations, and culturing of bacteria.

When materials are submitted for study, an effort is made to report the results rapidly and precisely. The final results are reported by telephone, letter, or telegram.

In addition to routine diagnostic tasks, each center engages in research projects, such as epidemiologic surveys to ascertain a region's animal health problems, and to determine local vectors, water analysis, and physiologic constants. It is hoped that analysis of such data will ultimately produce a map of the country's epidemiologic conditions.

### General Activities

The diagnostic laboratories have become pillars of health campaigns, because they provide the technical support for professionals in charge of those programs. Their regional location permits constant surveillance of the country's health conditions. Because of their training and the data available to them, profes-

FIGURE 2—Diseases of domestic animal species diagnosed at the 23 centers during 1970.

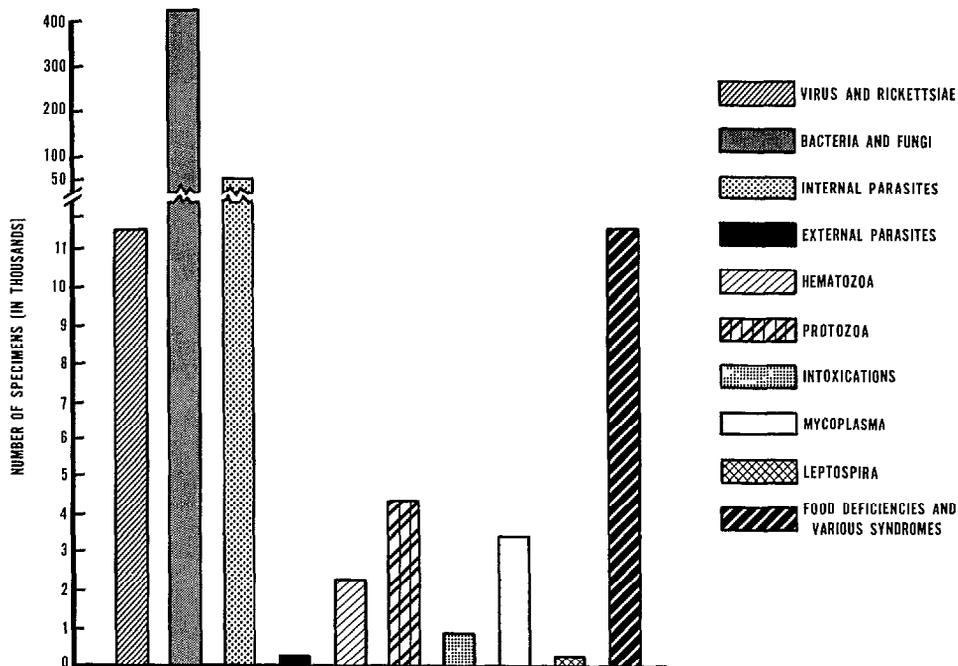
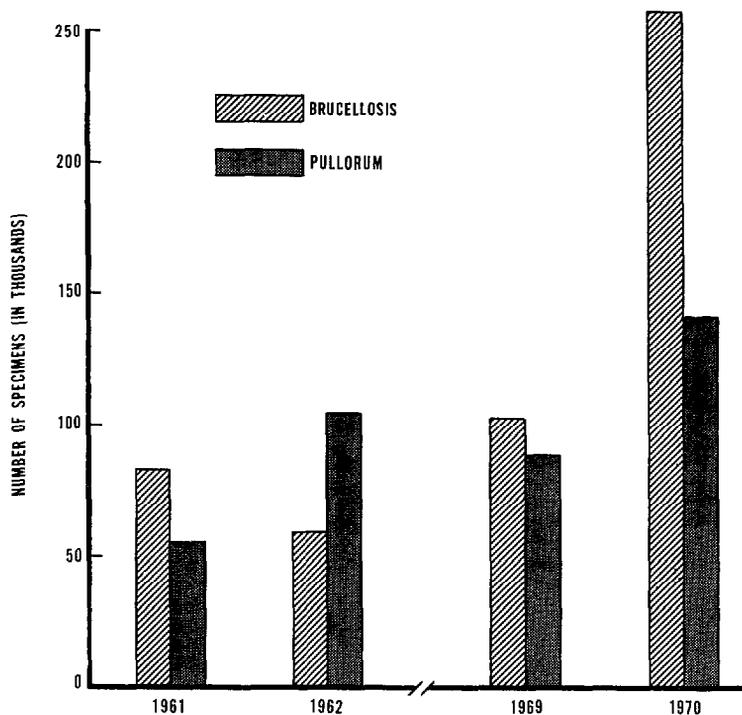


FIGURE 3—Serologies performed on cattle and birds during the years 1961 and 1962 as compared with 1969 and 1970.



sionals attached to the centers handle most of the technical consultations.

As for public health matters, in regions where animal-related health services are lacking the centers carry out activities in this field. For example, 80 per cent of the country's cases of canine rabies are diagnosed at the centers. A similar situation exists with regard to the examination of milk samples and other food products for human consumption. To strengthen such services, agreements are made with the Ministry of Health.

In cities which have universities, the diagnostic centers are integral parts of those institutions. The center's professional staff members teach and participate in practical student training courses.

### Needs of the Centers

A detailed analysis of the program's principal areas of weakness includes the following:

1. It has a cumbersome and slow system for making pathological and microbiological analyses. It must be kept in mind that many clients must travel great distances and cannot wait more than two or three days for results. This deficiency is due in large measure to a shortage of reagents.

2. The program lacks a data analysis system. The information received by the centers must serve as the basis for programming health campaigns. A computer system would be most useful in providing for proper utilization of such data.

3. There are shortages of equipment, because most such equipment must be imported and because it is not easily kept in working order in some parts of the country.

4. A dynamic public information system that would attract more clients is needed.

5. The country's difficult topographic conditions and extensive livestock activities result in many cases of toxicology in relatively inaccessible places and an attendant need to train technical personnel in this field.

### Prospects for the Diagnostic Program

Current plans call for constructing centers over the next few years in those areas not yet served effectively. In addition, funds are available to renovate and fully equip existing centers.

With the diagnostic laboratories as a base, health campaigns will be carried forward in an organized way so as to control and eradicate those diseases which most directly affect the country's livestock industry.

### SUMMARY

Colombia's regional centers for diagnosing animal diseases now provide nearly all rural areas with this essential service. Their main function is coping with cattle diseases (among others foot-and-mouth disease, brucellosis, and hematozoic parasites), but they are also designed to diagnose diseases of hogs, poultry, and other livestock. In 1971 there were 23 of these centers, and construction of five more was planned for the immediate future.

In general, each center has a serology, microbiology, and histopathology laboratory. It also has staff offices, a necropsy room, places for keeping animals, and a special room for observing dogs that may have rabies. The staff includes two veterinarians, a secretary, two

technical assistants, and in some cases a microbiologist. On the average the centers cost about \$45,000 each to build and equip and \$2,000 per month to operate (in terms of 1971 US dollars).

At first the center staffs did a lot of field work to publicize their services. Now that their activities are well known, however, most of the work is done on samples brought to the center. During 1970 the 23 centers each processed an average of 22,700 laboratory specimens. (The laboratories are equipped to culture bacteria and perform necropsies, titrations, serologies, laboratory animal inoculations, and microscopic examinations.)

Besides their routine duties, the centers often help with public health campaigns, diagnosing most of the country's cases of canine rabies and frequently examining food samples to assure they are safe for human consumption. They also carry out research projects such as epidemiologic surveys and help universities in their region to train veterinary personnel.

#### REFERENCES

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#### MENINGOCOCCAL DISEASE SURVEILLANCE IN CANADA

In 1970 it became apparent that there was an increased incidence of meningococcal infection in the Canadian state of Manitoba; by the year's end, this incidence was four times greater than that noted during the previous decade and also four times greater than that noted in the rest of Canada. This increased incidence continued into 1971.

The occurrence of meningococcal disease has not been random throughout the province. Census district 16, encompassing northern Manitoba, and census district 12, covering the Interlake region, have both had a high incidence of meningococcal infection. In census district 16, the 1970 incidence was 48.1 per 100,000 and in census district 12 the 1971 incidence was 58.0 per 100,000. Although a large number of cases have occurred in the city of Winnipeg, the incidence there remains far below that of the two epidemic areas.

In both years the disease tended to appear in the late winter and early spring; few cases were reported during the summer and autumn months. The largest number of cases occurred in infants under one year of age.

In 1971, all documented meningococcal disease occurring in the Interlake area was Group A. In fact, it became apparent that the excess incidence that occurred in 1971 in Manitoba was probably due to the imposition of Group A strains on a background of Group B and C disease.

The 25 Group A strains identified were all susceptible to sulphonamides. This is extremely important and suggests that these strains can be eradicated in carriers by sulphonamide prophylaxis. Secondary cases should not occur in these families. However, Group A strains resistant to sulphonamides have occurred in every country where Group A disease has been epidemic in the past decade, and their appearance can be anticipated in Manitoba.

In summary, after an absence of 15 years, Group A meningococcal disease has reappeared in North America and has caused a five-fold increase in the number of cases of meningococcal disease in Manitoba during 1971. It has gradually spread from predominantly Indian communities in Northern Manitoba into similar communities in Southern Manitoba and is now spreading within the city of Winnipeg. The occurrence of large numbers of Group A meningococcal infections during the next two to three years can be anticipated. The organism may spread to other parts of Canada and North America. If it follows the pattern of Group B and C meningococci, sulphonamide-resistant Group A organisms can be anticipated. [*Epidemiological Bulletin* of the Canadian Department of National Health and Welfare, 17 (3), 1972.]