

THE PREVALENCE OF VIA ANTIBODIES OF FOOT-AND-MOUTH DISEASE IN CATTLE IN NORTHERN CHOCO, COLOMBIA. 1975.

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SUMMARY

Healthy foot-and-mouth disease (FMD) carriers may be found among cattle with antibodies against VIA (virus-infection-associated antigen). A serological survey was made using the double agar gel diffusion test to detect such antibodies. The prevalence and localization of cattle with antibodies against VIA in the North part of the Chocó was determined. This is the first Colombian area declared free of clinical foot-and-mouth disease. The survey was made as a preliminary step to detect healthy virus carriers.

A random sample of 496 cattle was taken in 1975 according to a binominal design based on a critical prevalence level of 0.5%. This survey established a prevalence rate of 12% of cattle with VIA antibody.

This data will provide a basis for future evaluation of the presence or absence of FMD virus in the Chocó.

INTRODUCTION

The creation and maintenance of areas free of foot-and-mouth disease (FMD) within an affected country is important for the eventual free exportation of cattle and meat products to FMD-free countries.

However, the initial phase of eliminating clinical infection in such areas must be supported by a system which permits the detection of FMD-infected cattle, since their presence could lead to epidemics and seriously jeopardize the

effectiveness of the control campaign.

This paper describes the results of a serological survey carried out to determine the prevalence of cattle with VIA (virus-infection-associated antigen) antibodies (2, 7) in the Northern part of the Chocó, Colombia. The Chocó, located near the border with Panama, is the first FMD-free area in Colombia; this survey was the first step in detecting healthy FMD-virus carriers in that region.

MATERIALS AND METHODS

1. Study area

Area N° 1, in the Northern part of the Chocó (Figure 1), includes 17,000 sq kms. A large part of the physical and human resources of the National Foot-and-Mouth Disease Control Campaign (3) is presently concentrated in this area. The cattle population, calculated from the 1974 census, is 18,463 head, mostly zebu or mixture crosses.

The cattle farms are distributed unevenly among the municipalities of Acandí, Bahía Solano, Bojayá, Juradó and Riosucio, and are characterized by low terrain which floods during the rainy season and a large number of streams which cut through the region. These factors make the construction of roads difficult.

2. Selection of the sample

In order to determine sample size using the binominal model, certain assumptions were made, such as a critical prevalence rate of positive

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NOTE: The opinions issued in this paper express exclusively the criterion of the authors.

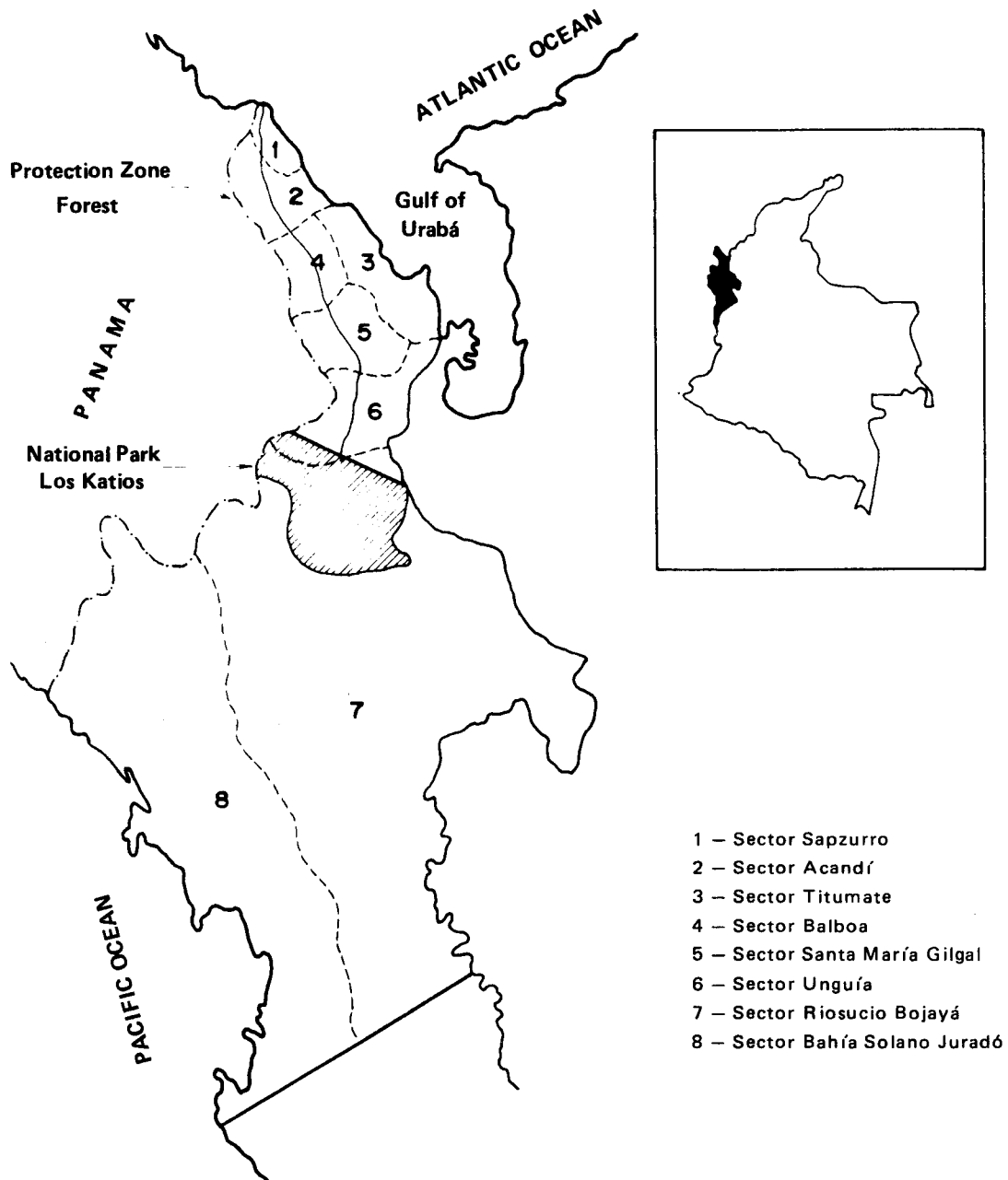


FIGURE 1: Sectorial divisions of Area 1 (Northern Chocó) of the National Foot-and-Mouth Disease Control Campaign, site of the study of prevalence of VIA-positive reactors.

reactors of 0.5%, that is, $p = 0.005$ at a 10% significance level (1). Thus, the equation for calculating n is:

$$n = \log \alpha / \log q$$

Applying the equation to the conditions of the present study:

$\alpha = 0.1$; $p = 0.005$; $q = 0.995$; and thus:

$$n = \frac{\log (0.1)}{\log (0.995)} = \frac{-1}{-0.0021769} = n = 459$$

The sample size was increased by 8%, which resulted in a greater precision of the results. Final sample size was 496 animals. The sample proportion (f) was calculated as follows:

$$f = \frac{n}{N} = \frac{496}{18,463} = \frac{1}{37,223} = 0.02686 \text{ or } 2.7\%$$

A two-step selection system was used. First, the farms were selected with a probability proportional to the number of cattle. Then, within each

farm the cattle were selected randomly.

3. VIA antibody tests

Sera were obtained during 1975 and processed at the Laboratorio de Investigaciones Médicas Veterinarias (LIMV) in Bogotá.

Each serum was tested against VIA in the double immunodiffusion test, as described elsewhere (4, 5, 7).

RESULTS

A prevalence rate of $12\% \pm 2.8\%$ (95%) of positive reactors was obtained (Table 1). Included in this category were positive sera which produced clear precipitation bands, as well as those scored as "suspect", which showed formation of weak bands (5, 7). The results divided by sector are also shown in Table 1. Some sectors showed a higher number of positive cattle, as in the case of Riosucio-Bojayá, and were followed in decreasing order by Balboa, Unguía, Acandí, Santa María and Bahía

TABLE 1. Cattle with VIA antibodies in different sectors of area 1 (Northern Chocó), Colombia

Sector	Farms		Cattle sampled	Results	
	Tested	Positive		Positive	Negative
Acandí	103	16 (15%)	151	18 (12%)	133 (88%)
Titumate	9	0 (0%)	19	0 (0%)	19 (100%)
Balboa	28	5 (18%)	41	7 (17%)	34 (83%)
Santa María	28	3 (11%)	70	3 (4%)	67 (96%)
Unguía	49	10 (20%)	132	18 (14%)	114 (86%)
Riosucio—Bojayá	24	3 (12%)	59	14 (24%)	45 (76%)
Bahía Solano—Juradó	24	1 (4%)	25	1 (4%)	24 (96%)
Totals	265	38 (14%)	497	61 (12%)	436 (88%)

Solano-Juradó. In Titumate no positive sera were found.

Table 1 shows that the number of farms in which positive animals were detected corresponds to the above-mentioned distribution, with the exceptions of Unguía, which had the largest number of positive farms, and of Riosucio-Bojayá which placed after Acandí.

DISCUSSION

A prevalence rate of 12% of cattle with VIA antibodies was observed in the Northern region of the Chocó. This figure exceeds the values previously fixed (critical prevalence of 0.5%), clearly demonstrating the presence of a significant number of positive reactors in Area 1 cattle.

The prevalence rates in each of the sectors and in the total sample could be caused by past infections -- the last outbreak of the disease, caused by virus A, was registered in May 1974 -- or by the presence of some carrier cattle. Cattle in Area 1 were vaccinated with a vaccine produced by the Frenkel method (9), which was used in the Area

until January 1974. The vaccination program was discontinued at that time and replaced by a system of strict epidemiological surveillance. The possibility of persistence of a certain number of positive animals as a consequence of these vaccinations cannot be excluded. Specifically, insufficiently inactivated vaccines may induce the formation of VIA antibodies in some animals that have been vaccinated several times (6, 8); however, work in progress indicates that VIA antibodies produced by vaccination disappear more rapidly than those produced by apparent or inapparent infection (6).

Future serological surveys to determine the prevalence and distribution of VIA-positive cattle should indicate more accurately any virus activity in the Chocó. With regard to the existence of healthy carriers in areas free of apparent infection and having the above-mentioned conditions, the validity of this experiment can only be evaluated through further testing for virus from oesophageal-pharyngeal fluid (10), combined with the determination of the presence of VIA antibodies in groups of serologically positive and negative animals. Such a test is presently being carried out within Area 1, and results will be published in due course.

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