SERO-EPIDEMIOLOGICAL SURVEY ON BOVINE TICK-BORNE DISEASES IN THE LESSER ANTILLES

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Abstract

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As part of a tick-borne disease control programme in the Lesser Antilles, studies were undertaken to determine the prevalence of cowdriosis, babesiosis and anaplasmosis in an effort to determine what the impact of tick eradication would be. The epidemiological situation for bovine babesiosis and anaplasmosis is unstable in all the islands of the Lesser Antilles, but the clinical cases are only recorded in imported breeds, which represent less than 5% of the cattle population. The native cattle population react as if naturally resistant. When the *A. variegatum* tick eradication campaign begins, it will be necessary, by the end of the acaricide treatment regime, to immunize all the imported cattle born during that period, and possibly all of the seronegative imported cattle already on the islands. Both Antigua and Guadeloupe have a long history of infestation with the tick and both have experienced clinical cases of cowdriosis. On the other islands, less than 6% of the sera were positive and this correlates well also with an apparent absence of clinical cases of cowdriosis.

1. INTRODUCTION

The zoo-sanitary situation of livestock in the Caribbean region is poorly known. As part of a joint project funded by the French Government (FIC), a regional survey began in 1992, mainly for determining the prevalence of ticks and tick-borne diseases.

Two tick species, *Amblyomma variegatum* and *Boophilus microplus*, are involved in the transmission of cowdriosis (heartwater) for the first one, of babesiosis and probably also anaplasmosis for the second one.

This study focuses on the presence of cowdriosis in the Lesser Antilles and on the epidemiological situation of babesiosis (*Babesia bovis & B. bigemina*) and anaplasmosis (*Anaplasma marginale*). The beginning of an eradication campaign against *A. variegatum* this year, requires particular attention with regard to the impact on the other tick species *B. microplus* and on the incidence of transmitted diseases.

2. MATERIAL AND METHODS

2.1. Sampling strategy

A cluster sampling was applied. Each island was divided into districts or municipalities; in each district/municipality, one per cent of the herds were randomly selected and all the animals sampled in each herd. For each herd a file was completed, including data on the farming and the tick control. For each sampled animal, the breed, sex, age and presence of ticks were noted.

2.2. Serological tests

For cowdriosis an indirect ELISA test was used [1]. For *Babesia bovis* an indirect ELISA test was provided by the Animal Production and Health Section of the Joint FAO/IAEA Division, Vienna, Austria. For *B. bigemina* and *Anaplasma marginale* a DOT-ELISA test was used [2].

3. RESULTS

4.

A total of 1795 sera were collected from 547 herds randomly distributed on the 11 islands. The serological results are presented in the Table I. In 8 islands, the age of the sampled animals was obtained. Five hundred and seventy six 12 month old calves were examined.

For the 3 islands of St-Kitts & Nevis, Barbados and Grenada, the age of the animals was not determined. To calculate the inoculation rates *h*, it was assumed that the mean age was the same as the mean for other 8 islands. The inoculation rates are presented in Figure 1 for each island and each disease, and the risk areas determined according to Mahoney, 1972 [3].

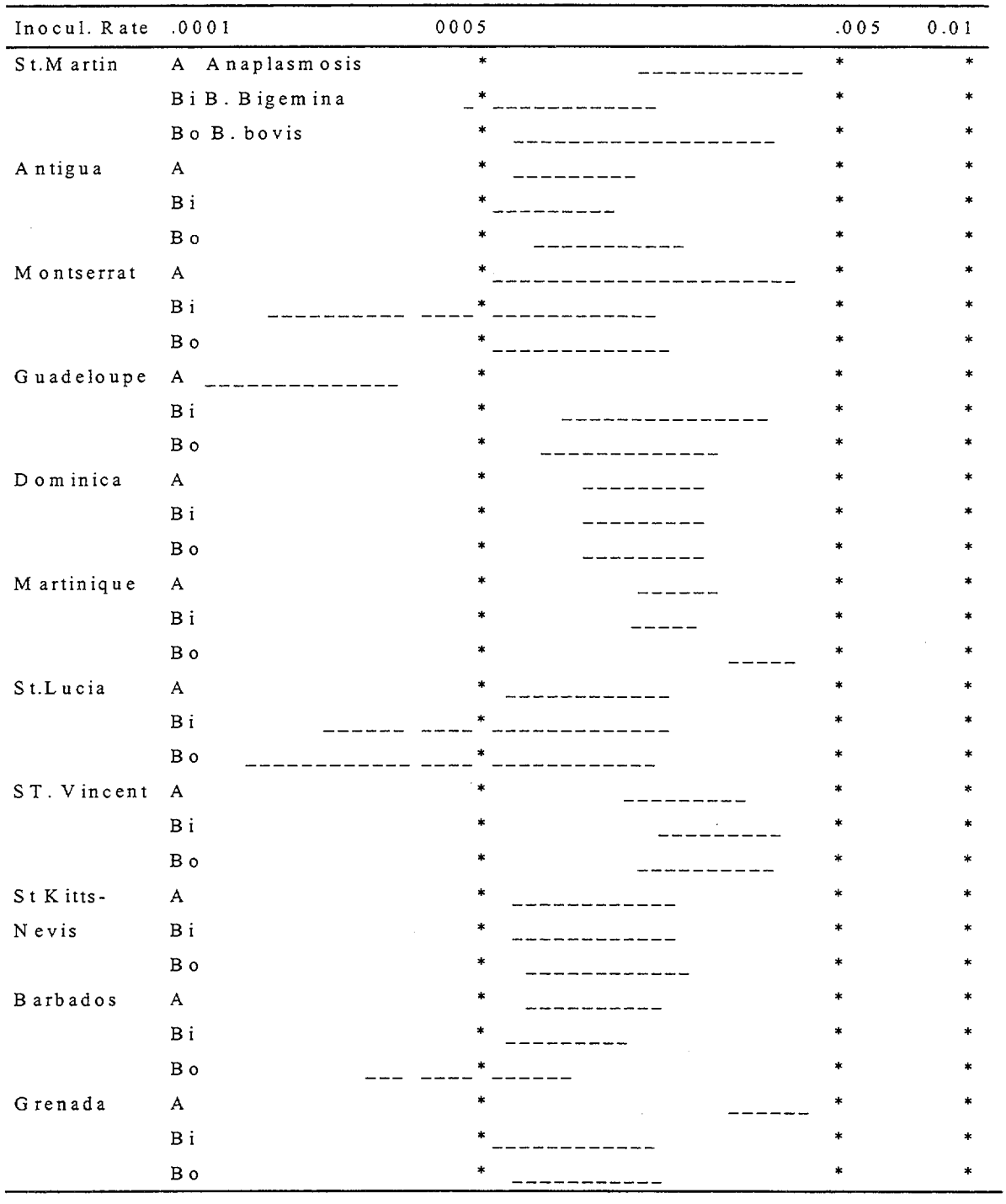

FIG. 1. Inoculation rate for anaplasmosis and babesiosis and critical level for enzootic stability (inoculation rate > 0.005)/instability (low risk for inoculation rate (<0.0005, maximum risk for inoculation rate between 0.0005 and 0.005).

TABLE I. SEROPREVALENCES & INOCULATION RATES OF TICK-BORNE DISEASES IN THE LESSER ANTILLES

Island	ANA		BBI		BBO		CW
	%	H	%	H	%	H	%
St Martin	68	0.0034	32	0.0011	44	0.0017	0
Antigua	29	0.0012	22	0.0009	36	0.0016	13
Montserrat	45	0.0017	18	0.0006	27	0.0009	0
Guadeloupe	1	0.0004	58	0.0034	38	0.0019	19
Dominica	47	0.0023	46	0.0022	47	0.0023	3
Martinique	52	0.0027	47	0.0023	69	0.0042	3
St. Lucia	36	0.0014	28	0.0010	24	0.0010	3
St Vincent	51	0.0023	58	0.0028	55	0.0026	2
St Kitts-Nevis	34	0.0014	34	0.0014	38	0.0016	0
Barbados	45	0.0020	30	0.0012	22	0.0008	6
Grenada	71	0.0041	25	0.0010	33	0.0013	2

ANA=Anaplasmosis, BBI=Babesia bigemina, BBO=B. bovis, CW=Cowdriosis, H=Inoculation rate, %=Seroprevalence

4. DISCUSSION

4.1. Discussion on anaplasmosis and babesiosis

Except for anaplasmosis in Guadeloupe (probably absent), the seroprevalence of the 3 tick-borne diseases for 6-12 month old calves ranged from 18% to 71% on the different islands. Even when the inoculation rates were calculated from the confidence intervals of the seroprevalence rates, the great majority of *h* values fell within the area of instability with maximum risk. No value reached the typical value of enzootic stability. In isolated cases, disease existed in an unstable situation with a low risk of clinical cases e.g. *B. bigemina* in Montserrat and St Lucia and *B. bovis* in St Lucia.

The unstable situation with maximum risk would be manifested by numerous outbreaks of anaplasmosis and babesiosis. In Guadeloupe (E. Camus, personal communication) between 1988 and 1993, 19 clinical cases of *B. bovis* and 1 clinical case of *B. bigemina* were diagnosed in Holstein, Limousin and Charolais but not a single case in Creole Zebu cattle which represents 95 % of the cattle population. In Martinique, between 1983 and 1992, 9 cases of *B. bovis* in Holstein and 4 cases of anaplasmosis in Holstein and Brahman were reported [4]. In Nevis not a single case of babesiosis during a 4 year observation period was noted [5]. In St. Lucia an outbreak of anaplasmosis and babesiosis was observed in imported Holstein but not in native cattle [6].

Only rare cases were recorded in imported animals and mainly in dairy cattle. In Guadeloupe, the local Creole cattle are naturally resistant to cowdriosis, babesiosis and anaplasmosis [7]. In Martinique, there is a majority of Brahman Zebu, and the *Bos indicus* are known to be more resistant to babesiosis.

Is there a possibility that "the Australian model" is not applicable to other countries? The model was used in Brazil and Uruguay for babesiosis, and in Australia and Indonesia for anaplasmosis [8,9]. What would be the impact of a 3 year *A. variegatum* eradication campaign on *B. microplus* and the transmitted diseases? Considering the 20 year eradication campaign of *B. microplus* in Puerto Rico when the foci of *A. variegatum* were rapidly controlled, the eradication campaign will probably reduce the population of *B. microplus* and the seroprevalence rates of babesiosis and anaplasmosis, but is unlikely to eradicate *B. microplus* [10]. In Martinique, a strong *A. variegatum* tick control program resulted in a decrease of the seroprevalence rates from 71% to 50 % for anaplasmosis, from 83% to 60 % for *B. bovis* and 59% to 44 % for *B. bigemina*[11]. In the Lesser Antilles, the eradication campaign will reduce the percentage of immune animals and, after the 3 year acaricide treatment, the non-immune animals will

face contacts with a growing number of infected *B. microplus*. This phenomenon will be particularly critical for imported cattle.

The epidemiological situation for bovine babesiosis and anaplasmosis is unstable in all the islands of the Lesser Antilles, but the clinical cases are only recorded in imported breeds, which represent less than 5% of the cattle population. The native cattle population react as if naturally resistant. When the *A. variegatum* tick eradication campaign begins, it will be necessary, by the end of the acaricide treatment regime, to immunize all the imported cattle borne during that period, and possibly all of the seronegative imported cattle already on the islands.

4.2. Discussion on cowdriosis

Antigua and Guadeloupe were found to have a high percentage of seropositive cattle; 13% and 19% respectively. Both islands have a long history of infestation with the tick and both have experienced clinical cases of cowdriosis [12]. On the other islands, less than 6% of the sera were positive and this correlates well also with an apparent absence of clinical cases of cowdriosis. The 6% observed on Barbados probably indicates the limit of specificity of the ELISA test. Unfortunately, when sheep are considered, higher seroprevalences are observed on Martinique (15%) and Montserrat (11%) where cowdriosis is certainly absent [13]. Antibodies to *Cowdria ruminantium* are known to cross-react with *Ehrlichia ovina* and this *Ehrlichia* (and other species) are actively investigated on both islands of Martinique and Montserrat [14].

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