

# Eradication of a new focus of *Amblyomma variegatum* in Puerto Rico

B.H. Bokma<sup>1</sup>

J.L. Shaw<sup>1</sup>

**BOKMA (B.H.), SHAW (J.L.).** Éradication d'un nouveau foyer d'*Amblyomma variegatum* à Porto Rico. *Revue Élev. Méd. vét. Pays trop.*, 1993, 46 (1-2) : 355-358

Une infestation par *Amblyomma variegatum* est apparue en mai 1992 dans un petit troupeau d'élevage de génisses laitières à Camuy, un site tout à fait nouveau près de la côte nord-ouest de Porto Rico. Cette constatation a été faite après environ trois années sans infestation à Porto Rico et dans les Iles Vierges américaines, et l'infestation ne serait pas associée à une des infestations précédentes. Les méthodes pour éradiquer la tique comprennent un traitement de tout le bétail, à intervalles de 2 semaines, par pulvérisation avec de l'amitraz à 0,025 p. 100 et de la perméthrine à 0,055 p. 100. Les chiens et les poules sont également inspectés et les propriétaires sont encouragés à réduire le nombre de ces espèces. Tout le bétail des fermes limitrophes est inspecté et traité fréquemment. Il n'y a pas eu de signe d'extension et l'infestation devrait être éliminée dans les 18 mois à venir.

**Mots clés :** Bovin - Chien - Poule - *Amblyomma variegatum* - Tique - Lutte antiacarien - Acaricide - Pulvérisation - Porto Rico - Saint-Croix - Iles vierges américaines.

## INTRODUCTION

The 3-host African-origin tropical bont tick (TBT), *Amblyomma variegatum* (Fabricius), has been present in the Caribbean since the early 1800's (1, 10, 13). The TBT spread from early established infestations on Guadeloupe and later Antigua and St. Kitts to many different islands. This spread included St. Croix (U. S. Virgin Islands, late 1960's), Puerto Rico (1970's), and its island municipalities, Vieques (early 1980's) and Culebra (mid 1980's) (1, 2, 6, 11, 13)<sup>b\*</sup>. The general biology, mechanisms of spread, and the peculiarity the TBT presents in the Caribbean are described by other authors (4, 5, 8)<sup>c</sup>.

In Puerto Rico and the U. S. Virgin Islands, infestations of ruminants, particularly cattle, have been associated with high mortality due to the cutaneous dermatophilosis, an infection caused by the aerobic actinomycete, *Dermatophilus congolensis* (3,12)<sup>a,e</sup>. The disease heartwater, an infection caused by a rickettsia, *Cowdria ruminantium*, has not been identified in ruminants in Puerto Rico and the U. S. Virgin Islands<sup>e</sup>.

In addition to the infestations with the TBT, in 1978 Puerto Rico became reinfested with *Boophilus microplus*

(Canestrini), the 1-host southern cattle tick, after a period of some 24 years of free status following its earlier eradication in 1954. An active eradication program has ensued since. Both Puerto Rico and the U. S. Virgin Islands are currently under Federal quarantine for *Boophilus microplus*<sup>d,e</sup>.

Eradication efforts in St. Croix in the late 1960's and early 1970's, in Puerto Rico and its island municipalities during the late 1970's and the 1980's, and an additional infestation in St. Croix during the 1980's, have been described by several authors (2,6,7,9,11)<sup>b</sup>. The TBT has been repeatedly eradicated from individual foci of infestations. No active infestations of the TBT existed subsequent to elimination on St. Croix (December 1987) and Culebra island (April 1989). The last incidental findings of the male tick was in the Lares municipality and in August of the same year, two male ticks were found in the Rincon municipality<sup>e</sup>.

The new active infestation was detected in Puerto Rico during May 1992.

The intent of this paper is to review surveillance for the TBT in Puerto Rico and to present and discuss the eradication procedures used in the most recent infestation.

## MATERIALS AND METHODS

### Surveillance and detection of infestation

As part of the *Boophilus microplus* eradication program, all active livestock premises are visited routinely by surveillance teams made up of livestock inspectors. These teams inspect cattle for ticks, both visually and by manual palpation or scratching. All cattle farms not known to be infested are inspected on a random basis but at least annually. Those farms considered to be at a higher risk of becoming infested (larger herds, multiple sites, dealers of cattle, adjacent to known infested farms) are inspected more frequently. In addition, as part of the *Boophilus microplus* eradication program, movement permit teams visit farms in order to allow movement of non-infested cattle. After preventive treatment with acaricide, cattle found to be free of tick infestations are permitted movement. Approximately 14,000 of the islands's 21,000 active cattle farms are considered non-infested (either "post-treatment" or "free.")

1. USDA, APHIS, VS, PO Box 71355, San Juan, Porto Rico 00936-8455.

\* See "Other sources" at the end of the article.

## Eradication procedures

The treatment programs used for TBT eradication in St. Croix and Puerto Rico have been described previously (2,6,7,9)<sup>b,d</sup>.

Generally the program consists of quarantine and bangle tag identification of all animals on affected pastures; intensive surveillance for TBTs on all host animals; a reduction in the number of free-roaming dogs and poultry; a minimal 18-month program of biweekly inspections and spray treatments of all ruminants and equines with acaricides (in cattle and goats, 0.025 % amitraz, with occasional use of 0.055 % permethrin, and in sheep and equines, 0.055 % permethrin); the biweekly treatment of, and tick surveillance on, all domestic mammalian host animals on the immediately adjacent premises; increased area surveillance for ticks within a mile or so of the fencelines, and an increased island-wide surveillance for TBT.

Infested herds are maintained under treatment for at least 18 months and until such time that no ticks are collected for at least six months. In the event that several herds are involved, quarantine releases are effected in blocks of herds, after all herds have completed the minimal requirements.

Additional measures that can be used but are not currently a part of this effort are brush clearing and ground treatment with an acaricide and the trapping of, inspection for ticks on, and elimination of free-roaming animals, especially dogs and poultry, but also mongoose and wild deer (St. Croix and Culebra). These latter two species have not delayed eradication in our experience.

Herds found to be infested with *Boophilus microplus* are placed under individual farm quarantine and all cattle are whole body spray treated with amitraz at 0.025 %. Treatments are generally given every three weeks. The treatment cycles last for 231 days. If the farm is found positive at the end of the treatment cycle then the treatments are extended for at least 63 days or until no ticks have been found on pre-release scratch. Other species of livestock have not been found to present persistent infestations and are not now being placed under systematic treatment.

## RESULTS

### Surveillance and detection of infestation

On 18 May 1992 during a routine movement permit inspection, one herd was found to be infested with the TBT. The infested farm is located in the Quebrada barrio (ward) of the Camuy municipality. The farm consists of 18.2 ha and is in karst hill-lands typical of Puerto Rico's northern coast, about 16 km inland from the north coast.

The farm is surrounded by karst hills and many adjacent cattle herds. The herd is located in an area where the Camuy River runs underground.

The cattle population of this farm on 19 May 1992 was determined to be 33 animals, including 30 dairy replacement heifers and three bulls. The owner typically raises heifers from about three months of age until they are bred and ready for sale as replacement heifers. Cattle were generally of Holstein Friesian breeding with some Brown Swiss or Creole breeding evident. Twenty-nine animals were found to be infested with adult and nymphal stages of the TBT. About 300 specimens of *Amblyomma variegatum* were collected during two days of inspections and many specimens were submitted for laboratory confirmation. Interestingly, this herd did not show signs of cutaneous dermatophilosis.

A very active effort to detect further cases of TBT infestations began immediately after the detection on the infested farm. Five immediately adjacent premises were surveyed for host animals, including cattle, horses, goats, sheep, dogs, chickens, and other fowl. These animals were all inspected for TBTs. Approximately 100 total sites were visited on the first round of proactive surveillance. A total of three rounds of surveillance involving 78 premises in the immediate vicinity have been accomplished during the period May 1992 to January 1993.

Island-wide surveillance for the TBT was increased via a publicity campaign for program employees and livestock owners.

The augmented surveillance for the TBT has not resulted in any additional findings. One entirely circumstantial result of this augmented surveillance has been the detection of a lone male *Amblyomma cajennense* (Fabricius) tick during routine surveillance of a dairy herd in the Rincon municipality, located at the extreme western end of Puerto Rico.

Intensive surveillance in the area also resulted in detecting a number of herds infested with *Boophilus microplus*, reinforcing in program inspectors the continued need for surveillance activities.

### Eradication procedures

Quarantine and treatment procedures specific for the TBT were begun on the infested farm as described above. The infested herd has continued under a biweekly schedule of treatment and scratching and has been free of all signs of infestation since June 1992.

Movement restrictions do not allow movement from the infested farm unless repeated examinations before treatments demonstrate no ticks on any animals. Follow-up of animals moved from the infested farms to dairy herds has been negative.

All livestock herds immediately adjacent to the infested farm were also treated biweekly as described above. After five biweekly treatments, adjacent *Boophilus microplus* infested herds were changed to routine treatments on a 21-day schedule. The treatments are to be discontinued after 231 days of treatment, after a successful negative scratch for all ticks, provided the TBT-infested farm remains free of ticks.

## DISCUSSION

### Surveillance and detection of infestation

Over the years, surveillance for the TBT in our area has depended primarily on the physical presence and activities of governmental livestock inspectors, animal health technicians, and veterinarians on farms. In addition, private veterinarians, livestock owners, extension and University personnel, and abattoir inspectors have occasionally had important roles in detecting and reporting the TBT.

In Puerto Rico, surveillance for tick infestations has depended markedly on the inspectors in the *Boophilus microplus* eradication program. These employees see thousands of the preferred hosts in their routine activities. The level of coverage has increased to the point that almost all cattle herds are examined yearly. Many non-infested herds are inspected as frequently as every three months. All cattle in infested herds are treated routinely every three weeks. Vieques island remains free of TBT, and except for cattle movement permits it is not currently covered by the eradication program. Culebra island has been cleared of both ticks, and except for movement permits is not under any treatment.

The risk of spread of the TBT has been reduced significantly. This is evidenced by the relative lack of findings subsequent to the eradication in Puerto Rico, St. Croix, Vieques, and Culebra. In contrast, once established in focal areas, such as occurred in Puerto Rico during the 1970's, the TBT successfully demonstrated its ability to infest new areas (2).

The Camuy herd is located in an area of Puerto Rico that has not before had TBT infestations. Camuy is at least thirty miles from any previous focus and well over one hundred miles away from most recent areas of infestation. These areas, Culebra and St. Croix, are separate islands with very little movement of livestock or other animals to Puerto Rico.

In the case reported here, after extensive surveying house-to-house, there is no evidence of movements, legal or illegal, of livestock, poultry, dogs, and cats. Domestic animal movements are therefore an unlikely mechanism for TBT spread.

The occasional findings of isolated male TBTs and this particular active but limited infestation, in areas widely separated from the known foci of infestation, are presumably due to the movement of TBTs on migratory or emigrating birds, such as the cattle egret. An additional possibility is small domestic mammals. Studies on migration patterns of the cattle egret have been reported at the October 1992 meeting of the United States Animal Health Association (Louisville, Kentucky) by Dr. Victor NETTLES (Southeastern Cooperative Wildlife Study Group, Athens, Georgia) and Dr. Glen GARRIS (World Health Organization, Bridgetown, Barbados). Marked cattle egrets from Guadeloupe or from Antigua have been encountered as far away as in Florida (marked in Guadeloupe).

This infested farm described in this report is a preferred area for cattle egrets, *Bubulcus ibis* (L.), perhaps due to a freeflowing spring and lush grassy conditions. Due to the lack of any other known link to any active focus of infestation, we presume that cattle egrets transmitted this infestation from a neighboring island.

Mentioned previously was the finding in June 1992 of a male *Amblyomma cajennense* tick in Rincon. Of interest is that in August 1983, a single semi-engorged female *Amblyomma cajennense* was collected from a bull in Aguada, a neighboring municipality. We speculate that the spread of this species from countries that have this tick could also occur on birds, similar to the TBT. Another method that has been proposed is via infested materials brought in either legally or illegally.

A concern regarding the effective surveillance for TBT is that active treatment of herds for *Boophilus microplus*, done on a 21-day schedule, may mask TBT infestations. Established low level infestations should become evident after treatments are halted. A benefit of continual treatments could be the elimination of TBT infestations before they become infested.

The most previous examination of this particular herd was in November 1990. The herd had not been scratched in over 18 months. While this particular herd was not found to be infested with *Boophilus microplus*, several adjacent herds were infested. The resulting increased emphasis on surveillance has greatly benefitted the tick program.

### Eradication procedures

The eradication techniques described here were developed based on investigative work completed in Puerto Rico by the USDA (5, 6). The costs of TBT eradication have been presented previously (6). Due to the mechanics and specific costs involved in delivering spray-application pesticide to animals on farms, Puerto Rico's tick eradication program would benefit enormously by the availability of pour-on formulations of efficacious acaricides, such as flumethrin or amitraz.

B.H. Bokma J.L. Shaw

From our perspective, the eradication of the TBT from different infested islands is highly desirable. This will certainly depend on the availability of adequate resources, infrastructure, and governmental or industry authority, as well as governmental and industry resolve.

## ACKNOWLEDGEMENTS

The authors would like to express their thanks to the livestock inspectors, animal health technicians, and other veterinary personnel who worked closely with this case. The tick eradication program and the veterinary services divisions of the P.R. Department of Agriculture and the USDA's Animal and Plant Health Inspection Service are indebted to these individuals for the diligence shown.

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In May 1992 an infestation with the tropical bont tick appeared in a small dairy heifer replacement herd in Camuy, Puerto Rico, a completely new site located near Puerto Rico's northwest coast. This finding occurred after some three years of no infestation in either Puerto Rico or the U.S. Virgin Islands and is not suspected of being associated with any previous infestations. The methods used to eradicate this tick include spray treatment at a two-week interval of all domestic livestock, with amitraz at 0.025 % and permethrin at 0.055 %. Dogs and chickens are also inspected. Owners are encouraged to reduce numbers of these species. All livestock on adjoining farms are inspected and treated on a frequent basis. There has been no evidence of any spread and the infestation is expected to be eliminated within 18 months.

**Key words :** Cattle - Dog - Hen - *Amblyomma variegatum* - Tick - Tick control - Acaricide - Spraying - Puerto Rico - Saint Croix - U.S. Virgin Islands.

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**BOKMA (B.H.), SHAW (J.L.).** Erradicación de un foco de *Amblyomma variegatum* en Puerto Rico. *Revue Elev. Méd. vét. Pays trop.*, 1993, **46** (1-2) : 355-358

En mayo 1992 apareció un brote de garrapatas en un pequeño hato lechero de novillas de reemplazo en Camuy, región indenne en la costa noroeste de Puerto Rico. Este hallazgo se dió tres años después de la última aparición en Puerto Rico o en las Islas Vírgenes de los E.U.A. y no se sospecha que tenga relación alguna con infestaciones anteriores. Los métodos utilizados para la erradicación de la garrapata incluyeron el tratamiento con aerosol de amitraz al 0,025 p. 100 y permethrin al 0,055 p. 100, a dos semanas de intervalo para todos los animales domésticos. En la inspección se incluyeron perros y gallinas, recomendándose la reducción en número de estas especies. Todos los animales domésticos de fincas contiguas fueron inspeccionados y tratados frecuentemente. Hasta el momento no han habido muestras de diseminación y se espera obtener la eliminación del brote en 18 meses.

**Palabras claves :** Bovino - Perro - Gallina - *Amblyomma variegatum* - Garrapata - Control de Garrapata - Acaricida - Pulverización - Puerto Rico - Santa Cruz - Islas Vírgenes de los E.U.A.