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## The effect of tick control on the prevalence of dermatophilosis on indigenous cattle in Ghana

MORROW (A.N.), ARNOTT (J.L.), HERON (I.D.), KONEY (E.B.M.), WALKER (A.R.). L'effet d'une lutte contre les tiques sur la fréquence de la dermatophilose chez les bovins autochtones au Ghana. *Revue Elev. Méd. vét. Pays trop.*, 1993, 46 (1-2) : 317-322

L'effet de trois régimes de lutte contre les tiques sur l'infestation par *Amblyomma variegatum* et sur la dermatophilose bovine a été évalué dans les plaines côtières du Ghana. Les animaux d'un kraal ont été traités tous les 15 jours avec l'amitraz très concentré pulvérisé en faible volume sur les sites préférentiels de fixation des tiques. Les animaux des deux autres kraals ont été traités par application topique dorsale d'un acaricide à base de deltaméthrine, mensuellement pour l'un, et pour l'autre à des moments stratégiques, basés sur les augmentations saisonnières prévues du niveau de l'infestation par *A. variegatum*. Les animaux d'un quatrième kraal (groupe témoin) ont été traités par les bouviers selon les systèmes traditionnels afin d'empêcher une accumulation de tiques excessive. Le traitement effectué tous les 15 jours a réduit le niveau d'infestation par *A. variegatum* et la fréquence de la dermatophilose est tombée à un niveau bas. L'acaricide topique a réduit la fréquence de la maladie de façon semblable.

Mots clés : Bovin - Dermatophilose - Lutte antiacarien - Tique - *Amblyomma variegatum* - Acaricide - Ghana.

### INTRODUCTION

Dermatophilosis is an exudative dermatitis caused by the branching filamentous actinomycete *Dermatophilus congolensis*. It is one of the main constraints to increased cattle productivity in West and Central Africa and on some of the Caribbean islands. The severe clinical form of the disease seen on cattle in parts of the tropics is usually associated with the presence of *Amblyomma variegatum* ticks (7, 9). The effectiveness of three tick control regimes on the occurrence of *A. variegatum* and dermatophilosis on indigenous cattle on the coastal plains of Ghana was investigated in this study.

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### MATERIALS AND METHODS

Four herds were selected for use in the tick control study from a group of herds where the occurrence of ticks and dermatophilosis had been monitored continuously over the previous two years. Animals in these herds were kept under traditional management practices in which they were herded twice daily (dawn to 11.30 am and 14.00 to 18.00 pm) on communal unfenced land. The animals were confined in the middle of the day and at night in open unshaded kraals, fenced cattle holding areas. The four kraals were located near to Accra on the coastal plains of Ghana.

#### Amitraz treatment group

Animals in herd A were treated with the amidine acaricide, amitraz ("Triatix"; Pitman Moore Ltd, U.K.) at the predilection feeding sites of ticks in the axilla, groin, ventral surface, ears and under the tail every second week using a high concentration minimum volume (HCMV) technique. The acaricide, which was prepared just prior to treatments by adding one 20 g sachet of Triatix Stock Spray Powder containing 25 % amitraz as a wettable powder, to 2 l of clean water, was applied by hand spraying with a 5 l hand spraying pressure machine using 50-100 ml per animal.

A pilot study was carried out over the initial 5 months in which a group of five tagged animals were treated with amitraz HCMV spray every week to compare the level of tick control achieved under this treatment regime with that obtained following fortnightly treatments on a second group of five tagged animals of a similar age.

#### Deltamethrin treatment groups

Animals at two other kraals (herds B and C) were treated with the synthetic pyrethroid acaricide and insecticide deltamethrin as a pour-on containing 1 % deltamethrin in an oil base ("Spot On"; Pitman Moore Ltd, U.K.); in herd B it was applied once every month while in herd C it was used at strategic times based on expected increases in the level of infestation with *A. variegatum*. Animals were confined in a cattle race during treatments which involved the application of the deltamethrin pour-on, at a dosage rate of 1 ml per 10 kg body weight, along the dorsal mid line putting approximately one third of the treatment dose over the shoulders and a further third on the rump, using a Phillips Automatic Drencher.

The species of ticks present in a sub sample collected from animals in these kraals, before the study commenced were identified. The adult ticks present on the 10 tagged animals in the amitraz treatment group (herd A) and on a group of 5 tagged animals in each of the two deltamethrin treatment groups (herds B and C) were identified to genus and counted *in situ* before they were treated. The animals were cast and whole body counts were made of attached adult ticks of both sexes except for *Boophilus* where only partially engorged females were counted. All animals in the kraals were examined for the presence of skin lesions when they were being treated and those having exudative lesions typical of dermatophilosis were classified as positive.

### Control group

Animals in the fourth kraal (herd D) were also examined each month for the presence of skin lesions and the number of adult ticks of the various types present on a group of 5 tagged animals in the herd counted. It was not possible to have a control group that remained completely untreated as this would have been incompatible with normal practices at the kraal and could have exposed the project to too high a risk. Animals at this kraal were kept under the traditional system and only received acaricide treatment to control excessive tick build-up as determined by the herdsman. The details of the acaricide treatments that were carried out were noted during visits to the kraal.

Animals in all four kraals were of a similar breed, Ghana Sanga (West African Shorthorn/Zebu crosses) and the four groups had a similar age structure. The tagged animals in each kraal, on which tick counts were carried out, were all females aged between 9 months and one year at the beginning of the study. There were a total of 70 head of cattle in herd A, 94 in herd B, 187 in herd C and 136 in herd D.

## RESULTS

The ticks found on cattle in the selected herds were identified as *Amblyomma variegatum*, *Hyalomma marginatum rufipes*, *Rhipicephalus senegalensis*, *Boophilus decoloratus* and *Boophilus annulatus* with *A. variegatum* being the most common species present. The numbers of adult *A. variegatum* ticks found on animals in the pilot study, to compare weekly and fortnightly treatments with amitraz HCMV spray, are shown in figure 1. Weekly treatments kept infestation levels very low. However, animals which were treated fortnightly had considerably more ticks attach during the second week compared to the first week post treatments.

The number of ticks of the various species found on animals two weeks after treatment with amitraz HCMV spray showed considerable seasonal variation with very few ticks present in January, February and early March (fig. 2). There was a very sudden and marked increase in the

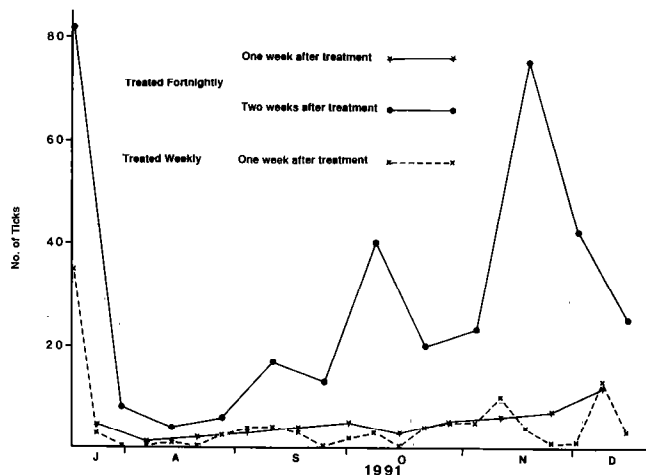


Figure 1 : Mean *A. variegatum* counts on animals treated either weekly or fortnightly with amitraz HCMV.

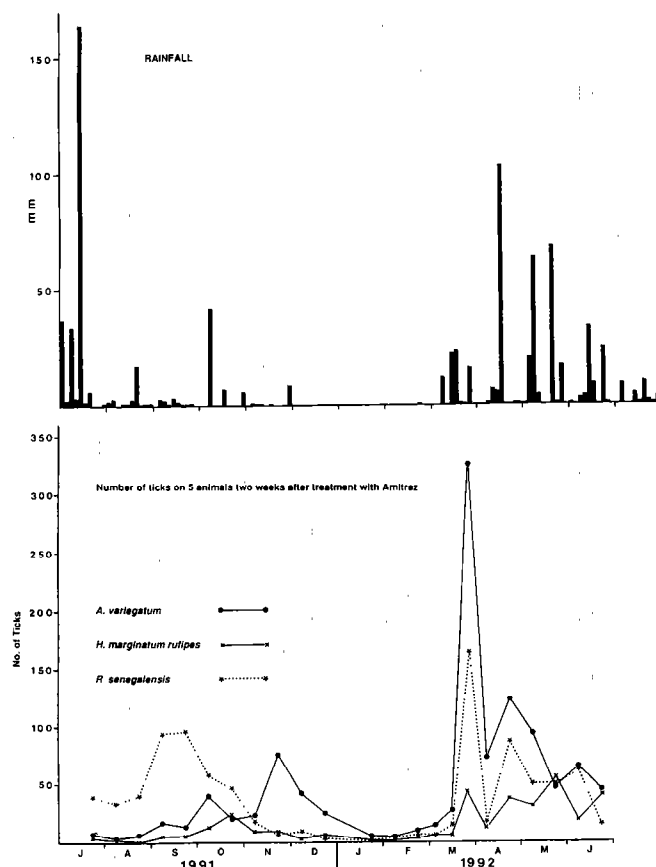


Figure 2 : Three-day rainfall totals and the number of ticks attached to a group of 5 animals two weeks after treatments with amitraz HCMV.

number of ticks, especially *A. variegatum* and *R. senegalensis* which attached between treatments in late March 1992, soon after the first heavy rainfall following a prolonged dry period (November 1991 to February 1992). The

number of *A. variegatum* which attached between fortnightly treatments declined from mid November to the end of January, remained quite low until mid March when the mean number present per animal was 5 and then suddenly increased to a mean of 65 two weeks later. The prevalence of dermatophilosis on animals in this herd fell from 11 % in August to less than 3 % in October and remained at that level until the end of the study (fig. 3). One animal had localised lesions which persisted throughout the period of the study while all new cases were mild and transient.

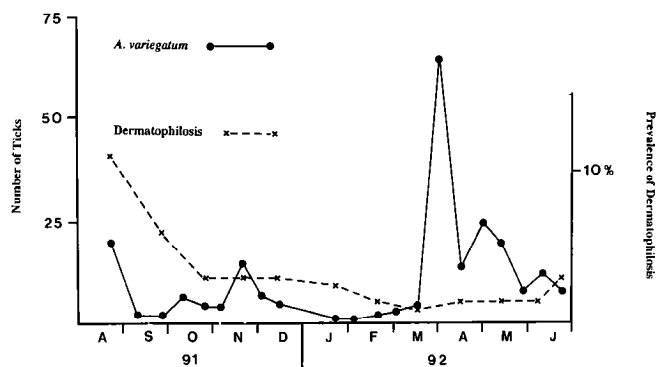


Figure 3 : *A. variegatum* counts and the prevalence of dermatophilosis on animals in Herd A. The tick counts were carried out prior to fortnightly treatments with amitraz HCMV.

The level of control of *A. variegatum* ticks obtained by monthly treatment with deltamethrin pour-on was similar but slightly better than that achieved by fortnightly spraying with amitraz (fig. 2, 4). The number of ticks present one month after treatment with deltamethrin pour-on was very low during the period from November to March and then increased suddenly during the one month period to early April. The marked increase in tick challenge which occurred during the second half of March coincided with weeks 3 and 4 post treatment when protection, which lasts for about two weeks, would have already worn off. Tick numbers on animals in all four kraals under observation increased very dramatically in this period when the first rains followed a prolonged dry period. The prevalence of dermatophilosis on animals in this herd fell from over 5 % when treatment commenced in November to less than 2 % within two months and remained at that level (fig. 4).

Restricting the application of deltamethrin on animals in kraal C to the times when it was expected that the tick challenge would increase resulted in less satisfactory tick control (fig. 5). However this was sufficient to control the occurrence of dermatophilosis, the prevalence of which fell from 5.5 % in November to less than 3 % in February,

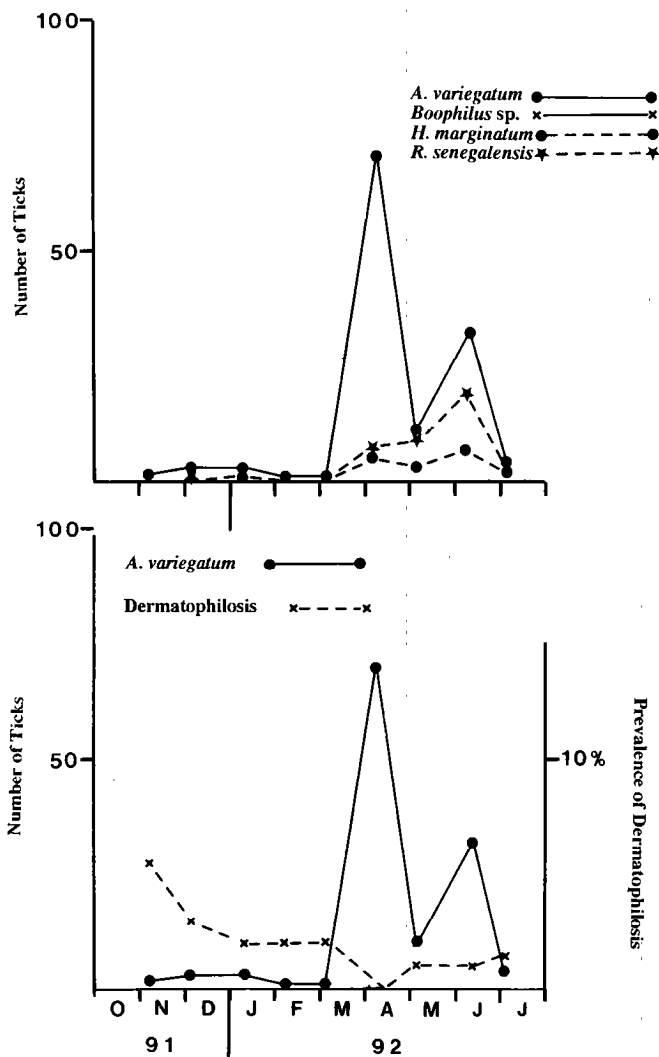


Figure 4 : Tick counts and the prevalence of dermatophilosis on animals in Herd B. The tick counts were carried out prior to monthly treatments with a deltamethrin based pour-on acaricide.

remained at a low level until June when it increased somewhat and then fell back down to less than 2 % at the end of the study.

The level of infestation on animals in the control herd where the application of acaricide was left to the discretion of the owners/herdsmen is shown in figure 6. The animals in this herd were exposed to a continuously high level of challenge with *A. variegatum*. Acaricide treatment was carried out by the herdsman by hand using lindane ("Gammatox", Coopers Animal Health Ltd, U.K.) in between the April and May tick counts and again between the May and June tick counts. The prevalence of dermatophilosis in this herd increased to above 10 % over the final four months of the study (fig. 6).

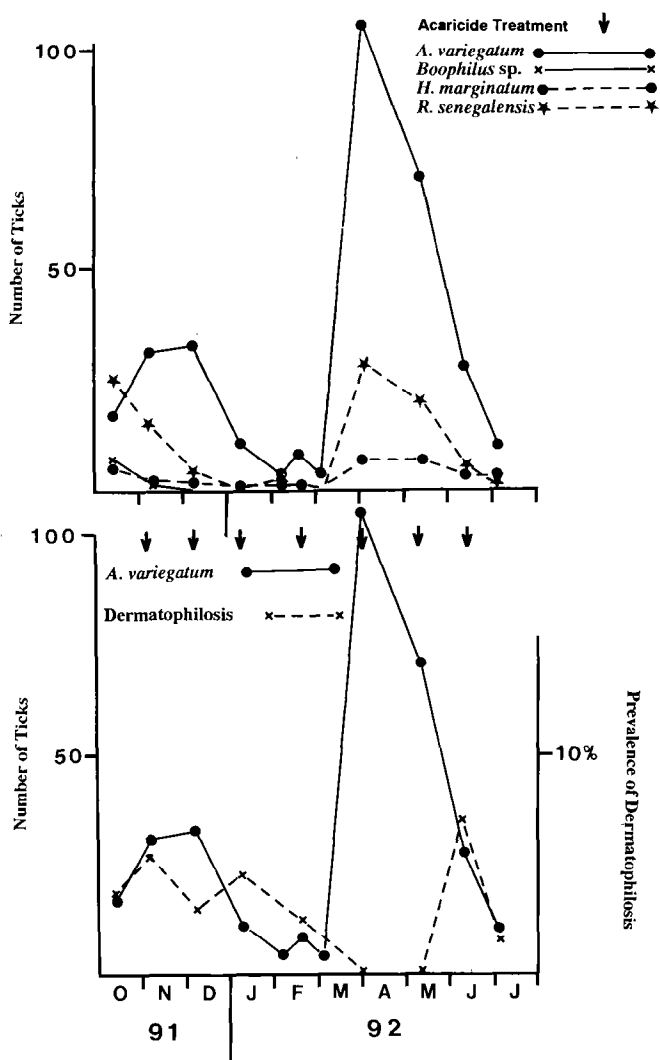


Figure 5 : Tick counts and the prevalence of dermatophilosis on animals in Herd C which were treated with a deltamethrin based pour-on acaricide at the times indicated by the vertical arrows.

### DISCUSSION

The association between the occurrence of a severe form of dermatophilosis and the presence of *A. variegatum* ticks is based on their similar geographical distribution (1, 2, 3, 6), the similar seasonal occurrence of adult *A. variegatum* ticks and dermatophilosis (7, 9) and reports that tick control measures reduce the incidence of dermatophilosis (4, 6, 9). Animals vary in the number of ticks they pick up or carry and in their susceptibility to dermatophilosis with very marked differences between certain breeds (5). The type of tick control required for the control of

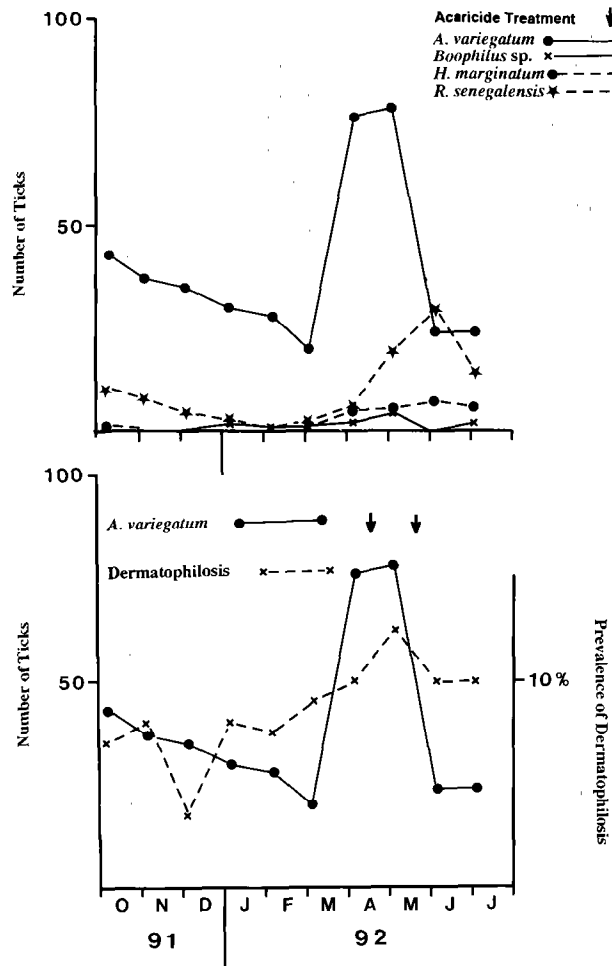


Figure 6 : Mean monthly tick counts and the prevalence of dermatophilosis in animals in Herd D (control group).

bovine dermatophilosis will therefore depend on the breed of animals one is dealing with. It has been shown that when susceptible Friesian cattle are maintained almost tick free they do not develop the disease whereas untreated control animals were all severely affected within 6 months of becoming tick infested (5). Ghana Sangas, which are relatively resistant to dermatophilosis are the predominant type of cattle on the Accra Plains. OPPONG (8) observed that the prevalence of dermatophilosis on cattle kept under traditional management on the Accra Plains increases from 4.9 % in the dry season to 12.8 % in July, towards the end of the early rains. The wet season prevalence mentioned by OPPONG (8) is in agreement with the findings of the present study where over 10 % of the animals in the control group were affected at that time of year. The present study showed that limited tick control on these animals is effective in reducing the prevalence of dermatophilosis. The continuing low level of

dermatophilosis in the acaricide treatment groups could be largely accounted for by the persistence of a few established cases.

Weekly treatments with amitraz HCMV at the predilection sites kept tick numbers at a low level but at fortnightly intervals the tick numbers increased in the second week post treatment indicating the relatively short residual activity of this form of acaricide and pheromone attraction when some ticks attached. Monthly treatments with deltamethrin pour-on, which has residual activity providing a high level of protection for two weeks post treatment, gave slightly better tick control than fortnightly treatment with amitraz HCMV. Using the latter dermatophilosis was reduced to less than 3 % and remained at this level until the end of the study. Treatment with deltamethrin pour-on at monthly intervals reduced the prevalence of dermatophilosis to less than 2 % whereas attempted strategic application of deltamethrin pour-on in early November, December and January, mid February, early April, mid May and mid June gave satisfactory control of *A. variegatum* and reduced the prevalence of dermatophilosis to 3 % and finally less than 2 % at the end of the study. However the data suggests that strategic tick control should be based on prevailing climatic conditions rather than expected seasonal changes in the prevalence of *A. variegatum* ticks. The sudden increase in the number of ticks on animals soon after the first rains may have had little to do with any effect which climatic conditions have on the development of the tick but rather that it was related to the availability of suitable physical conditions in the habitat for the tick to gain access to the host.

Compared to the amitraz HCMV spray deltamethrin pour-on is easier to apply, it has a longer residual effect and it kills biting flies and when extensively used in a tsetse infested area it will reduce or eliminate tsetse populations. However, the cost of treatment must be considered and it should preferably be affordable by the owners of the indigenous cattle and relate to expected financial returns. To be fully effective conventional hand spraying with acaricide requires the use of 5 to 10 l of wash per head and much of this runs off and is wasted. The HCMV technique involves application to predilection sites and tick clusters and there is little run off. Adult *A. variegatum* ticks are found feeding on animals predominantly on the udder and scrotum and in the groin and axilla and dewlap with a tendency to cluster which makes them particularly suitable for this form of treatment. Small groups could easily be treated using a hand held 500 ml or 1 l sprayer. At current prices amitraz HCMV costs £ 0.03 per treatment or £ 0.7 per annum if applied throughout the year at fortnightly intervals. The deltamethrin pour-on costs £ 0.6 per treatment or £ 7.2 if applied at monthly intervals or £ 4.2 if used 7 times strategically. The prevalence of dermatophilosis was somewhat less in the deltamethrin treatment groups compared to amitraz HCMV treatment group but the cost of the deltamethrin pour-on is such that it is difficult to see how it could be sustained in the returns expect-

ted from indigenous cattle. The owners of these cattle would be unlikely to be able to afford £ 0.6 per treatment whereas they could possibly afford £ 0.03.

## CONCLUSION

Dermatophilosis on the indigenous cattle population on the Coastal Plains of Ghana can be controlled by the limited use of acaricides applied either at the predilection feeding sites of *A. variegatum* or at selected times when the level of challenge increases. However, to be effective treatments need to be carried out more frequently than is commonly practiced at present. Amitraz HCMV proved effective in the control of *A. variegatum* ticks and dermatophilosis on the indigenous type cattle used in this study and is ideally suited for use by smallholders. The deltamethrin pour-on was somewhat more effective and while considerably more convenient to use it is perhaps too costly for regular use with this type of cattle unless tsetse control is also required. The timing of strategic control is critical to its success and tactical control closely linked to short term local climatic conditions is likely to give better results.

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MORROW (A.N.), ARNOTT (J.L.), HERON (I.D.), KONEY (E.B.M.), WALKER (A.R.). The effect of tick control on the prevalence of dermatophilosis on indigenous cattle in Ghana. *Revue Élev. Méd. vét. Pays trop.*, 1993, **46** (1-2) : 317-322

The effectiveness of three tick control regimes on the occurrence of *Amblyomma variegatum* and dermatophilosis on cattle on the coastal plains of Ghana were compared. Animals at one kraal were sprayed with amitraz at predilection feeding sites of ticks every second week using a high concentration minimum volume technique. Animals at two other kraals were treated with a deltamethrin based pour-on acaricide ; at one kraal it was applied once every month while at the other kraal it was used at strategic times based on the expected seasonal increases in the level of infestation with *A. variegatum*. Animals in a fourth kraal (control group) were treated, by the herdsmen, to control excessive tick build-up as practised under traditional management systems. Fortnightly treatment with amitraz reduced the level of infestation with *A. variegatum* and the prevalence of dermatophilosis dropped to a low level. The pour-on acaricide similarly depressed the prevalence of dermatophilosis.

*Key words* : Cattle - Dermatophilosis - Tick control - Tick - *Amblyomma variegatum* - Acaricide - Ghana.

MORROW (A.N.), ARNOTT (J.L.), HERON (I.D.), KONEY (E.B.M.), WALKER (A.R.). Efecto del control de garrapatas sobre la prevalencia de la dermatofilia en ganado autóctono en Ghana. *Revue Élev. Méd. vét. Pays trop.*, 1993, **46** (1-2) : 317-322

Se compara el éxito de los programas de control de garrapatas, principalmente *Amblyomma variegatum* y de la dermatofilia en el ganado de las planicies litorales de Ghana. Un grupo de animales se trató por aspersión con amitraz, en los sitios predilectos de alimentación de las garrapatas, a intervalos de dos semanas y con técnicas de altas concentraciones en volúmenes mínimos. En otros dos corrales los animales se trataron por depósito ("pour-on") con un acaricida a base de deltametrina. En uno de los corrales se aplicó mensualmente, mientras que en el otro se aplicó en momentos estratégicos, de acuerdo a los aumentos estacionales esperados en el nivel de infestación con *A. variegatum*. En un cuarto corral se mantuvo un grupo control, el cual fue tratado por el finquero mediante las prácticas de manejo tradicionales, para el control de garrapatas. El tratamiento quincenal con amitraz disminuyó el grado de infestación con *A. variegatum*, así como la prevalencia de dermatofilia. El acaricida por depósito disminuyó de manera similar la prevalencia de la dermatofilia.

*Palabras claves* : Bovino - Dermatofilia - Control de acaros - Garrapata - *Amblyomma variegatum* - Acaricide - Ghana.