

Chemoprophylaxis: Boran cattle can be productive under high tsetse challenge

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Résumé

TRAIL (J.C.M.), MURRAY (M.), SONES (K.), JIBBO (J.M.C.), DURKIN (J.), LIGHT (D.). Chimio prophylaxie : les bovins Boran peuvent être productifs malgré une infestation massive de glossines. Rev. Elev. Méd. vét. Pays trop., 1984, 37 (N° spécial) : 270-275

La productivité du bétail Boran maintenu avec chimio prophylaxie sous risque trypanosomien élevé a été évaluée au Ranch de Mkwaja en Tanzanie. Vingt mille relevés de vêlage enregistrés sur une période de 10 ans ont été analysés.

Dans une zone d'infestation massive à *G. m. morsitans*, *G. pallidipes* et *G. brevipalpis*, il a été établi que par une stratégie faisant appel à un produit chimio-prophylactique, le chlorure d'isoméamidium, on pouvait atteindre un haut degré de productivité.

En moyenne, au Ranch de Mkwaja, le poids de veau sevré à 8 mois rapporté à l'année et à 100 kg⁷³ de poids métabolique de vache était approximativement égal à 80 p.100 de celui des meilleurs Boran kenyan élevés dans un environnement indemne de glossines.

Mots-clés : Chimio prophylaxie - Chlorure d'isoméamidium - Glossines - Trypanosomoses - Productivité - Bétail Boran - Tanzanie.

Summary

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The productivity of Boran cattle maintained with chemoprophylaxis under severe trypanosomiasis risk was evaluated at Mkwaja Ranch, Tanzania. Twenty thousand calving records collected over a period of 10 years were analysed. It was

established in an area of massive Glossina morsitans morsitans, G. pallidipes and G. brevipalpis challenge that using a chemoprophylactic drug (isometamidium chloride) strategy a high level of productivity could be achieved. On average, the weight of 8 month old weaner calf per 100 kg⁷³ metabolic weight of cow per year at Mkwaja was approximately 80 p.100 of the best kenyan Boran reared in a tsetse-free environment.

Key words : Chemoprophylaxis - Isometamidium chloride - Boran cattle - Tsetse flies - Trypanosomiasis - Productivity - Tanzania.

1. INTRODUCTION

Chemoprophylaxis against bovine trypanosomiasis has been in widespread use in Africa for more than 30 years. However, there have been few attempts to assess its effectiveness in terms of animal performance achieved. Studies undertaken to date have usually considered viability and growth only and have tended to be on a small-scale and of relatively short duration. However, the existence of the records kept at the Mkwaja Ranch, Tanzania, by virtue of their completeness and volume represented an unique and previously untapped source of information for evaluation of the long-term effectiveness of chemoprophylaxis (2).

Thus, ILRAD and ILCA in collaboration with Amboni Ltd. (owners of Mkwaja Ranch) and May and Baker Ltd., carried out an analysis of matching animal health, animal productivity and trypanocidal treatment data based on more than 20 000 calving records over the 10 year period from 1973 to 1982.

2. MATERIALS AND METHODS

Mkwaja Ranch is located on the coast of Tanzania in Pangani District, about 100 km south of Tanga. The ranch covers an area of approximately 47 250 hectares of coastal forest-savannah mosaic vegetation. The area is heavily infested with three species of tsetse, Glossina morsitans morsitans, G. pallidipes and G. brevipalpis (3). The level of tsetse challenge is such that cattle cannot survive unless protected by trypanocidal drugs (1).

Mkwaja Ranch was established by Amboni Ltd. in 1954. Although known to be infested by tsetse, the decision to set up the ranch was made due to the availability of the prophylactic drug Antrycide prosalt. The original objective was to rely on a chemoprophylactic regime in the short term with the long term aim being to control the tsetse by establishing barriers, game fences, game shooting, selective clearing and controlled burning, and insecticides. By 1964, the efforts to control tsetse were abandoned and a chemoprophylactic regime based on the use of isometamidium chloride*, was progressively adopted.

* Samorin, May and Baker T.M. - Trypanidium, N.D., Rhône-Mérieux.

Over the last 10 years, the ranch has supported some 12 000 head consisting of an average 4 800 cows and 180 bulls. The ranch was established with local East African Zebu which have been progressively upgraded by the importation of Boran bulls and Boran semen from Kenya. From 1973 to June 1980, breeding cows, heifers, bulls, young bulls and steers were maintained under Samorin prophylaxis on a herd basis; Samorin was used at 0.5 mg/kg. Trypanosome infection was monitored by thick blood smears. One month after the last herd prophylaxis, 30 to 40 animals per herd (herds averaged 225 to 300) were tested every one or two weeks depending on a subjective assessment of the level of challenge.

The animals selected usually included any animals considered to be in poor condition. When approximately 20 p.100 of the sample was positive, the entire herd was treated with isometamidium chloride. In addition, individual animals that appeared sick when entering or leaving night paddocks were tested. If positive for trypanosomes and the next isometamidium chloride treatment of the herd was not yet due, that animal would be treated with diminazene di-acetate* at 3.5 mg/kg. All pre-weaning calves were treated at monthly intervals with diminazene di-acetate.

In June, 1980, the criteria for herd treatment and the drug regime employed were changed. Beginning two months after the last prophylaxis, as soon as routine examination revealed the first positive case, all animals in a herd were treated with diminazene di-acetate and then one week later with isometamidium chloride at 1 mg/kg. However, in late 1981 and 1982, only Samorin was used as Berenil was not available.

Numbers of trypanocidal drug treatments required and cattle performance traits were analysed by least squares fixed model procedures (4).

3. RESULTS

The more important cattle performance traits at Mkwaja Ranch are cow reproduction, cow and calf viability, calf growth and cow weight. The characteristics can be combined to build up an index including total weight of weaner calf produced per cow per year or per unit weight of cow per year, or per unit metabolic weight of cow per year. The merit of such indices lies in relating all the more important production characters back to the weight of breeding cow that has to be supported; this is closely associated with cow maintenance costs.

At Mkwaja Ranch, the age at first calving was around 47 months and the calving percentage 75 p.100. The average weaning weight at 8 months was 134 ± 0.2 kg while mean weight of cows, weighed approximately 10 months after their previous

* Berenil, T.M. Hoechst.

calf had been weaned, was 286 ± 0.1 kg. The best all round indication of herd productivity is the weight of 8 month old weaner calf produced per 100 kg⁷³ of cow per year (i.e., per unit metabolic weight of cow per year). For Mkwaja Ranch this was calculated as 137.8 kg.

In order to achieve this level of productivity, the number of isometamidium and diminazene treatments required were as follows: the mean number of treatments of Samorin over a complete calving interval of 485 days was 5.8 ± 0.2 , which represented a treatment every 83 days. The mean number of Berenil treatments was 0.8 ± 0.1 , i.e., treatment every 580 days. The number of treatments varied from year to year and was greater in the south of the ranch where the tsetse challenge was higher.

However, age and season of calving had no effect on the number of treatments required. Despite such extensive use of trypanocidal drugs, there was no indication from productivity levels of the development of drug resistance. In the same way, there was no evidence that the multiple inoculations of Samorin each animal received over the years had affected its productivity.

The pre-weaning mortality was 8.0 p.100 and the annual cow mortality rate was 5.8 p.100. Infectious diseases and predators, mainly lion, were the important causes of death. Post-mortem examination showed that the main infectious disease problems were anaplasmosis in adult cattle and salmonellosis in calves. Snakes believed to be mamba were also important, as was plant poisoning, thought to be Dichapetalum. No cases of East Coast fever, Theileria mutans, babesiosis or heartwater were found, reflecting the effective dipping regime, while helminths were effectively controlled by the use of anthelmintics. Trypanosomiasis was diagnosed in only 1 p.100 of calves necropsied, and 3 p.100 of adults, indicating that the trypanocidal drug strategy was highly effective.

4. DISCUSSION

The strategic use of trypanocides, acaricides, anthelmintics and vaccines against bacterial and viral diseases kept the major infectious diseases on Mkwaja Ranch under control and the overall mortality to less than 10 p.100 per annum. Thus, in an area where cattle if left untreated rapidly succumb to trypanosomiasis, the strategic use of the prophylactic drug isometamidium chloride every 80 days on average allowed the cattle to survive and be productive, without the development of any drug resistance or other side effects from the use of the drug. The productivity indices achieved, built up from the important performance traits, on both an individual and a herd basis, allowed not only an evaluation of the productivity at Mkwaja Ranch but permitted comparison with other livestock situations in Africa. The

most interesting comparison is with Kenya Boran reared in tsetse-free areas; this is particularly relevant as Kenya sires were used to upgrade the cattle on Mkwaja and because extensive analyses of the productivity of Kenya Boran have been carried out (5). Boran at Mkwaja were inferior in all performance traits to those in Kenya. Despite this, the herd productivity, which is probably the most meaningful comparison to be made, expressed as the weight of 8 month old weaner calf produced per 100 kg metabolic weight of cow per year, was approximately 80 p.100 of the Kenya Boran reared on ranches considered among the best in Africa.

In conclusion, the study of the records at Mkwaja Ranch covering a 10 year period shows that with good management and an efficient trypanosomiasis monitoring programme, chemoprophylaxis is highly effective in maintaining beef cattle in areas of high tsetse challenge. The fact that this result is based on one of the largest data sets ever analysed offers immediate hope for increased exploitation of tsetse-infested areas by encouraging more widespread rational use of chemoprophylaxis as an integral part of management. These findings should also provide encouragement to pharmaceutical companies and international agencies to develop new and improved trypanocidal drugs.

ACKNOWLEDGEMENTS

We would like to thank Dr. L. TOURATIER for his encouragement.

Resumen

TRAIL (J.C.M.), MURRAY (M.), SONES (K.), JIBBO (J.M.C.) DURKIN (J.), LIGHT (D.). Quimioprofilaxis : los bovinos Boran pueden ser productivos cuando sometidos a infestación elevada por glosinas. Rev. Elev. Méd. vét. Pays trop., 1984, 37 (N° spécial) : 270-275

Se evaluó la productividad de bovinos de raza Boran tratados por tripanocidos, con riesgos de infestación por tripanosomas en el rancho de Mkwaja, Tanzania. Se analizaron 20 000 datos de partos notados durante diez años. En una zona de infestación importante por G. m. morsitans, G. pallidipes y G. brevipalpis, se podía obtener una productividad elevada al utilizar el cloruro de isometamidio. Por término medio, en dicho rancho, el peso de ternero destetado a 8 meses de edad por 100 kg⁷³ de peso metabólico de vaca por año llegaba a unos 80 p.100 del de los mejores bovinos Boran de Kenia criados en una zona sin glosinas.

Palabras claves : Quimioprofilaxis - Cloruro de isometamidio - Glosinas - Tripanosomosis - Productividad - Bovino Boran - Tanzania.

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