TICK CONTROL ON ELAND (Taurotragus oryx) AND BUFFALO (Syncerus caffer) WITH FLUMETHRIN 1% POUR-ON THROUGH A DUNCAN APPLICATOR

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ABSTRACT
Eland (Taurotragus oryx) and buffalo (Syncerus caffer) in the Game Ranching Research Station at the Mushandike Sanctuary in Zimbabwe were treated with 1% flumethrin pour-on to control unacceptably high tick numbers. The pour-on was at first applied with a drenching gun and later by means of a Duncan Applicator. This device allows contact with a saturated treatment column while the animals consume a specially formulated attractant lick from the feed bin. Tick counts done over 3 summer seasons demonstrated the efficacy both of the pour-on acaricide and the method of application.

Key words: Eland, Taurotragus oryx, buffalo, Syncerus caffer, tick control, Duncan Applicator.

INTRODUCTION
Tick infestation on wild animals in the smaller wildlife parks in Zimbabwe is regarded as a major production constraint and threatens the well-being of a large number of wild animals1,2. Chemicals are considered an important adjunct to other tick control methods but until now, as far as is known, a suitable application method has not been available for wildlife. Only eland (Taurotragus oryx) and buffalo (Syncerus caffer) at Mushandike are tame enough to be put through a plunge dipping tank. Pour-on acaricides seemed to offer a solution, but still require close proximity between the applicator and the animal being treated. The Duncan Applicator was tested in this trial as a means of overcoming the latter problem.

MATERIALS AND METHODS
Mushandike Sanctuary (20° 12'S, 30° 40'E) lies within the Zimbabwe Natural Region V. Soils are generally poor, being derived from granite, and grass cover is therefore moderate to sparse. Grass types include Eragrostis aspera, Hyparrhenia rufa, and various species of Hyparrhenia species. Tree types consist mainly of Brachystegia speciformis and Terminalia sericea and various species of Acacia. Eland and buffalo, wildebeest (Connochaetes taurinus), zebra (Equus burchelli), impala (Aepyceros melampus), sable antelope (Hippotragus niger), tsessebe (Damaliscus lunatus), waterbuck (Kobus ellipsiprymnus) and kudu (Tragelaphus strepsiceros) are found within the Game Ranching Research Station. Mean annual rainfall is 600 mm, falling mainly in summer between October and April. During the years of this trial, rainfall varied between 441.6 mm in 1986/87 and 710.2 mm in 1987/88.

The Game Ranching Research Station is game-fenced, separating it from the rest of the Mushandike Sanctuary. All animals are permitted free range, but buffalo are penned at night in order to keep them relatively tame and manageable. Before 1981 controlled burning of the habitat took place. Since then only 2 controlled burns have been carried out in 2 wet valley areas to stimulate early grass growth.

The animal handling facilities consist of a mustering pen and race. Although the animals are fairly tame, the buffalo sometimes refuse to go through the race.

Experimental animals
Eland
All animals have numbered brands or ear tags. During the first season, which started on 16 December 1986, eland (n=39) were assigned to the following 3 groups:

a) 13 animals, untreated until 28 February 1987, when their tick burdens had become excessive and they were dipped with the conventionally dipped group;

b) animals, dipped in a conventional diptank containing 250 ppm each of chlorfenvinphos and dioxathion (Supona, Cooper) at 7 to 14 d intervals as is required by the regulations applying to cattle;

c) 14 animals, treated with 1% flumethrin pour-on (Drastic Deadline, Bayer) at a dosage of 1 mg kg⁻¹ estimated live mass.

In the second and third seasons, which started on 3 December 1987 and 21 September 1988 respectively, it was impossible to run separate untreated and conventionally dipped groups. It was therefore decided to try to identify animals which missed treatment by the Duncan Applicator, and compare their tick counts with those of treated animals. This identification rested on the following criteria:

a) Animals identified by herdsmen as having wandered off into areas of the Game Ranching Research Station far removed from where Duncan Applicators had been placed;

b) Animals with no oil stains on their horns;

c) Animals identified as having been prevented access to the applicators by dominant animals.

Buffalo
Buffalo numbers varied from 7 to 20, depending on how many could be mustered at each occasion. They were not divided into groups, and all mustered animals were treated with flumethrin.

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Application of treatment
During the 1986/87 season the flumethrin pour-on was applied to each animal individually by means of a hand-held dosing gun. If the animals were put through the race, the pour-on was applied along the dorsal midline. This was not always possible with the buffalo, in which case the pour-on was squirted onto the animals from the sides of the mustering pen. The eland in the flumethrin group were treated 3 times with 14 d intervals from 15 December 1986, whereas the treatment intervals were extended. The timing of the treatments is shown in Fig. 1-4. The other eland were dipped conventionally at 14 d intervals.

In the second and third seasons, treatment took place by means of 4 Duncan Applicators. The applicators were first activated on 14 December 1987, and again 5 times until the end of April 1988, for periods of 6 to 12 d at a time. In the third season, the applicators were first activated on 21 November 1988 for 9 d, on 29 December for 9 d, on 30 January for 5 d, on 3 March for 13 d and finally on 28 April for 7 d.

The Duncan Applicator
The development of this device followed the introduction into Zimbabwe of the pour-on acaricides for domestic livestock. It consists of a drum-like base which incorporates a feed bin at the top and an overflow recovery bin below. A treatment column consisting of a specially threaded pipe, rises through the centre of the feed bin. A container with a flow control valve at the base, is filled with the acaricide and secured to the top of the treatment column. The applicator is activated by opening the flow control valve. A specially formulated attractant feed is placed in the feed bin to attract animals to the device. The flow control valve is set to provide a continual supply of pour-on acaricide down the treatment column while the applicator is activated. While feeding at the device, animals come in contact with the treatment column and the acaricide is deposited on their heads, ears, necks and shoulders. Secondary distribution of the acaricide is achieved by the self-grooming habits of the animals, and by body contact between them.

Tick counts
Data on tick counts are presented in Figs. 1-4. Except for the data from mid-December 1986 to mid-February 1987, all counts were made during early morning hours in midsummer. Tick counts were made by hand with the aid of a handheld magnifying glass. Healthy animals were treated with flumethrin by means of a Duncan Applicator (Fig. 1). The development of this device followed the introduction into Zimbabwe of the pour-on acaricides for domestic livestock. It consists of a drum-like base which incorporates a feed bin at the top and an overflow recovery bin below. A treatment column consisting of a specially threaded pipe, rises through the centre of the feed bin. A container with a flow control valve at the base, is filled with the acaricide and secured to the top of the treatment column. The applicator is activated by opening the flow control valve. A specially formulated attractant feed is placed in the feed bin to attract animals to the device. The flow control valve is set to provide a continual supply of pour-on acaricide down the treatment column while the applicator is activated. While feeding at the device, animals come in contact with the treatment column and the acaricide is deposited on their heads, ears, necks and shoulders. Secondary distribution of the acaricide is achieved by the self-grooming habits of the animals, and by body contact between them.

Tick counts

Fig. 1: Mean number of adult ticks per eland either untreated ("control"), dipped in chlorfonvaphos plus dioxanthion ("conventional"), or treated with flumethrin by means of a Duncan Applicator, from mid-December 1986 to early April 1987.

Fig. 2: Mean number of adult ticks per eland treated with flumethrin (Duncan Applicator) and untreated controls from mid-December 1987 to end of April 1988.

Fig. 3: Mean number of adult ticks on eland treated with flumethrin (Duncan Applicator) and untreated control from early August 1989 to the end of April 1989.

Fig. 4: Mean number of adult ticks on buffalo treated with flumethrin by means of a Duncan Applicator for 3 seasons from end of December 1986 to end of April 1989.
Because animals could not be handled, apart from the lifting of their tails, the ticks on one side of each animal were counted from a distance of approximately 1 m (sometimes closer when circumstances permitted and other times further when animals could not be herded into the race). This count was then doubled and added to the ticks counted on the perineum, to arrive at an estimate of the animal’s total tick burden. Only adult ticks were counted and recorded. The presence of immature ticks was merely noted, with no attempt at quantification. Tick counts were done mainly on treatment days, commencing December 1986 and 1987, and August 1988, and continued until March/April of each following year.

RESULTS

Dominant tick species appeared to be *Rhipicephalus appendiculatus* and *Rhipicephalus zambeziensis*, which together accounted for approximately 70% of estimated tick infestations on the animals inspected. Recorded estimates did not differentiate between these 2 species because of the obvious difficulty in achieving identification under field conditions. Other species present were *Hyalomma spp.*, *Boophilus spp.*, *Rhipicephalus evertsi evertsi*, and *Abyomma hebreum*.

*H. hebreum* was present in low numbers early in the 1986/87 season, then disappeared entirely later. *Boophilus spp.*, did not appear during this first season. Mean total tick numbers per animal are shown graphically in Fig. 1-4.

DISCUSSION

The application of flumethrin pour-on against ticks in this trial was done with due regard for the necessity for strategic tick control, which allows low-level tick infestations for the maintenance of immunity to tick-borne diseases.

The tick counting method used in this trial was clearly inadequate when compared to the methods conventionally used for domestic species, where each animal can be immobilised for enumeration of ticks in the axillae and on the inner thighs. If anything, the actual tick numbers in this trial must have been consistently underestimated. It was, however, the best that could be achieved under the prevailing circumstances, and still provided convincing proof of the effect of the treatment. Very few semi and fully engorged ticks were seen on flumethrin treated animals, whereas the conventionally dipped eland had many.

In order to demonstrate the continued presence of a tick challenge on the pasture, the eland in the conventionally dipped group were dipped at 14 d intervals during the first season, which gave inadequate tick control. As many as 200 adult ticks per head were seen on flumethrin treated eland in the latter half of February 1987, but many of these were found to be dead or dying upon closer examination of some of the tamer animals.

There was a rapid increase from 250 to 540 adult ticks per buffalo from the second to the third assessment in the first season. The African buffalo is not a very hairy animal, much like it’s cousin the Asian buffalo (*Bubalus bubalis*). The Asian buffalo has a low sebaceous gland density. The African buffalo has a much higher sebaceous gland density. Application of flumethrin pour-on by means of the Duncan Applicator had a sudden and clearly visible impact on tick numbers. The flumethrin pour-on is applied to the fore quarters of the treated animals, and yet spreads to achieve effective control also of *Hyalomma spp.* and *R. evertsi evertsi* on the perineum. Its spread is thought to occur through diffusion in the sebum of the hair coat and is evidently enhanced by self-grooming and body contact between animals. Four applicators were strategically placed, which meant that other animals could also come into contact with the chemical. Besides eland and buffalo, wildebeest, sable antelope, zebra, and waterbuck were regularly seen using the applicators.

It is important to realise that the Duncan Applicator offers a means for discrete treatments against tick infestations, and not for continuous exposure of the tick population to the acaricide. Any decision to activate an applicator in a game ranching situation should be based on the presence of unacceptably high tick numbers, and not on a misguided attempt to keep the animals “tick-free”. Such activation, leading to treatment of tick-infested animals for a limited period, has been shown to have a definite impact on tick numbers, and is therefore, considered a valuable part of what should be an integrated ectoparasite control strategy.

Accurate calculation of each animal’s dosage does not seem necessary, because the applicator is simply kept active for long enough to ensure application of adequate amounts of the acaricide as shown by a visible reduction in tick numbers. The results of this trial indicate that this approach works, and that the animal which may get a subtherapeutic dose eventually benefits
from the effective treatment of its compatriots, either through direct rub-off or from an overall reduction in the tick population.

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Book review/Boekresensie

BEHAVIOR PROBLEMS IN DOGS

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William Cambell is well-known to veterinarians in the field of dog behaviour, and the first edition of his book was used by many people throughout the world. To publish a second improved edition was therefore a worthwhile effort. The layout and typesetting make the book extremely user-friendly. The contents of 15 chapters cover a wide spectrum of normal behaviour, behavioural problems and the treatment thereof. The book also deals with genetics, breeding, training, management and care of dogs. It is a comprehensive work on dog ethology and a valuable reference to every veterinarian who attends to dogs in his/her practice.

Non-veterinarians who have joined the field of treating behavioural problems in animals, often try to popularise their subject by presenting it in a humorous vein. In contrast, the professional approach in this book can only be applauded. The work is based on personal experience gathered over a considerable period of time and it contains many real-life case reports. I have no hesitation in recommending this book to my colleagues.

JSJ Odendaal