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# Efficacy of tobacco extract and *Flumethrin* Pour-on against cattle tick, *Amblyomma variegatum*

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## Abstract

*The comparative efficacies of topical tobacco extract and flumethrin pour –on against the cattle tick Amblyomma variegatum was evaluated. Thirty Ndama cattle were divided into three treatment groups of ten animals per group viz: Flumethrin treatment group 1; Tobacco treatment group 2 and the untreated control group 3, in a completely randomized design. Ticks were counted visually and by palpation of affected areas at 0, 7, 21, 28 and 35-day period. Backline application of flumethrin was from the pole to the base of the tail according to manufacturer's instruction while application of tobacco was through the aid of cotton wool soaked in liquid tobacco extract. The flumethrin pour-on produced a significant reduction in tick count by the 21st day reaching as high as 100 %( 43.33 and 0) while the tobacco extract produced comparable result at a longer time of 35 days (46.22 and 0). The tobacco extract however maintained the protection against Amblyomma variegatum in the face of continuous challenge by infective tick larvae up until the 64th day post-challenge. Significant re-infestation of ticks could be seen however in the flumethrin count 40th day post-challenge. This confirmed the efficacy of tobacco in protecting cattle against tick, Amblyomma variegatum .*

**Keywords:** Cattle, efficacy, Flumethrin, tick, tobacco extract

## Introduction

The infestation of animal by parasitic ticks is responsible for such conditions like anaemia, due to blood loss, tick paralysis due to neurotoxins in the salivary secretions as well as vectors to several parasitic diseases such as anaplasmosis, babesiosis and cowdriosis (Jongejan *et al*, 1988). Tick infestation is also one of the several factors incriminated with the development of streptothricosis (Koney and Morrow, 1990), because tick bite lesions serve as entry point for *Dermatophilus congolensis* (Ranaivosen *et.al.*, 1986).

They are responsible for significant economic losses in hides and wool production, lower milk yield, weight loss and death in highly infested animal. The terminal effect in case of severe infestation is death. Organophosphorus and carbamate chemicals (Wharton and Norris, 1980), *ivermectin* (Roncalli *et al*, 1984) as well as the Pyrethroids (Nolan *et al*, 1979) have been found effective in the elimination of ticks in cattle. Injectable *doramectin* have also produced a measure of therapeutic success (Gonzales *et.al*, 1993).

There are however several constraints on over dependency on chemical control of ticks. These include the development of resistance to conventional acaricides, (Beugnet and Chardonet, 1995), environmental concerns, human safety and residues (Crowe, 1978) as well as research and development costs (Pegram, 2001). In many African countries tick eradication and or control could not be sustained because of non-recoverable, escalating costs and inadequate infrastructure.

The future of tick control therefore lies in a systematically developed and integrated approach. This is fulfilled to a great extent in the use of herbs in the control of tick.

Herbal medicines are natural, environmental friendly and easily available, especially in village settings where the practice of animal health specialists or veterinarians is to a large extent not feasible. Traditional herders in the southwestern Nigeria have implicated tobacco juice extract in the cure of several ectoparasitic infestations. There is however no scientific validation of this claim in cattle infested with ticks.

Tobacco, the test plant for this study, belongs to the family *Solanacea* and to the genus *Nicotiana.* They are herbs of ten feet or more tall, mostly annual or perennial in growth with extensive leaf area compared with other crop plants (Wheightman, 1978).
The objective of this study was to assess the potential of tobacco juice extract in the control of cattle tick, *Amblyomma variegatum* on cattle.

## Materials and Methods.

Thirty adult Ndama cattle of both sexes were randomly allocated into three treatment groups of ten animals per treatment in a completely randomized design during the mid-rainy season of September. This is based on uniformity of infestation with cattle tick, *Amblyomma variegatum* during this period. Animals with severe infestations were not used for the study so as to make the count practicable, and this was by palpation and visual count of prime sites.

Group 1 was treated with *flumethrin* (Bayticol®) pour-on. Backline application of *flumethrin* was from the pole to the base of the tail at manufacturer's recommended dose volume of 1ml per 10kg body weight. Group 2 was tobacco extract treatment, applied with the use of cotton wool soaked in liquid tobacco, produced by squeezing the fluid out of a whole tobacco plant and applied without any dilution. The test solution was without any dilution and was applied topically at 500 mls per animal to paint the skin, not as a dip or wash. The discoloration of the skin served as an indicator of application. Group 3 was the untreated control.

Most of the ticks were located in the perineum region with few scattered in the dewlap, elbows and the interdigital spaces. To make the count practicable, each animal was divided into two by an imaginary line drawn from the middle of the nares through the head and extending through the dorsal, perineal and ventral regions according to Muniz *et.al.*1995. Ticks were counted visually and by palpation of considered areas at 0, 7, 14, 21 and 35 days

The animals were grazed twice daily on good quality pasture characteristic of the rainy season with water provided all the time. No concentrate supplementation or salt lick was provided. Animals were herded together and identified by

their specific names well documented against the treatment given.

Treated animals were left under continuous exposure to infective larvae so as to establish the length of protection against the cattle ticks after application (Challenge study).

*Analysis of Data.*
Tick counts within a group were summed and the geometric mean calculated. The percentage efficacies of treated groups were calculated using the formula:

$$\% \text{ Efficacy} = \frac{\text{Mean no. of ticks in control group} - \text{Mean of ticks in treated group}}{\text{Mean no. of ticks in control group.}}$$

The analysis of tick count was evaluated using a two-way analysis of variance, on days 0, 7, 14, 21, 28 and 35 and treatment compared at $\alpha$=0.05.

## Results and Discussion

The initial mean tick density at the onset of the study were : 46.33± 0.50; 46.22 ± 0.44; and 46.22 ± 0.49 for treatments 1, 2 and 3 respectively, which were not significantly different (P>0.05), confirming similarity of tick burden before commencement of the study. This is an indication of adequate selection of cattle for study.

In treatment 1, the *flumethrin* treatment, tick count ranged between 46.33 and 0 with 100% efficacy reached by 21st day. In treatment 2, the tobacco treatment, the tick count ranged between 46.22 and 0 with 100% efficacy reached at 35th day. (Table 1). This shows that maximal efficacy of medicament was attained by the 21st day in *flumethrin* compared with 35th day in the tobacco treated. Also for each day of analysis there were significant differences (P< 0.05) in mean tick count between the *flumethrin* group and the tobacco treatment group.

This maximal efficacy of *flumethrin* reached at a shorter period than topical tobacco extract is comparable to the effect of injectable *doramectin* against cattle tick (Muniz *et. al.*1995). This efficacy of *doramectin* like that of *flumethrin* pour-on may be due to the mechanism of

*Table 1: Mean number of ticks on cattle and percentage efficacy of treatments.*

| Treatment Groups | Group Size | Post Treatment Days | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0 | 7 | 14 | 21 | 28 | 35 |
| Flumethrin | Mean No of Ticks. | $46.33^{aB}$ | $12.44^{bB}$ | $1.78^{cA}$ | $0.44^{dA}$ | $0.22^{eA}$ | $0.11^{fA}$ |
| | Standard Deviation. | 0.50 | 0.53 | 0.67 | 0.53 | 0.44 | 0.33 |
| | Geometric Mean No of Ticks. | 46.20 | 12.80 | 1.70 | 0 | 0 | 0 |
| | Percentage Control (%) | NA | 70.77 | 94.41 | 100 | 100 | 100 |
| Tobacco | Mean No. of Ticks. | $46.22^{aA}$ | $22.56^{bB}$ | $10.56^{cB}$ | $1.44^{dB}$ | $0.11^{eB}$ | $0.11^{eA}$ |
| | Standard Deviation. | 0.44 | 0.53 | 0.73 | 0.88 | 0.33 | 0.33 |
| | Geometric Mean No. of Ticks. | 45.90 | 23.00 | 10.40 | 4.20 | 0.90 | 0 |
| | Percentage control (%) | NA | 47.48 | 76.36 | 90.72 | 98.16 | 100 |
| Untreated control | Mean No. of Ticks. | 46.55 | 43.56 | 42.00 | 44.00 | 50.56 | 49.89 |
| | Standard Deviation | 0.49 | 13.24 | 17.62 | 20.75 | 24.23 | 23.93 |
| | Geometric Mean No. of Ticks. | 41.40 | 43.80 | 44.0 | 45.30 | 49.00 | 49.30 |
| | Percentage control. | NA | NA | NA | NA | NA | NA |

NA: Not Applicable.
a, b: Values with different superscripts along each row differ (P<0.05)
A, B: Values with different superscripts within each column differ (P<0.05).
The Percentage reduction represents the number of ticks relative to the control

injectable drugs passing directly into the portal system. The efficacy of topical drugs however is limited by the possibility of drugs not reaching the target parasite because of organic dirt on surface of skin. Also because direct effect of sunlight on skin decomposes topical drugs.

The pronounced efficacy of *flumethrin* may also be, because many pyrethroids cause repetitive discharges and eventual block invertebrate nerve fibers and cord of insects and other invertebrates (Abassy *et.al.*1983). The efficacy of a pyrethrum-based chemical, Tyrax, has been found to establish a cure in mange mites within a comparable time interval of 2 weeks (Taiwo *et al.*, 2001).

In the untreated control, the tick count increased proportionately and the percentage efficacy is not applicable unlike in the other two groups where the mean tick count decreased proportionately. The decrease in mean tick count in both *flumethrin* and tobacco groups as the days progressed were significant ($P<0.05$) indicating that evaluation of study at one weekly interval is consistent. The decrease in tick count noticed on day 14 in the untreated control group, may be due to natural variation in the dynamics of tick populations. The flumethrin was not applied on the surface area of contact but at the backline between the polls of the horn to the tail.

In the challenge study, cattle treated with tobacco extract remained protected 64-day post-challenge. (Table 2). This is consistent with previous work where tobacco extract protected against lice re-infestation 78 days post challenge (Fajimi *et al.*; 2003). However, in the *flumethrin* treated group, tick began to appear by the 40th day post challenge with a mean count of 0.77 (ranged 0—1), which increased subsequently to a mean of 3.0 (ranged 2—4) by the 92nd day. This higher protection of tobacco as against *flumethrin* is of great value in tropical countries where

**Table 2:** Duration of protection of *Flumethrin* and tobacco treated animals.

| Days Post-challenge | Flumethrin mean tick count | Tobacco mean tick count. |
|---|---|---|
| 1 | 0 | 0 |
| 8 | 0 | 0 |
| 16 | 0 | 0 |
| 24 | 0 | 0 |
| 32 | 0 | 0 |
| 40 | 0.77 (0,0,1,1,1,1,1,1,1,1)* | 0 |
| 48 | 0.66 (0,0,0,1,1,1,1,1,1,1)* | 0 |
| 56 | 0.66 (0,0,0,1,1,1,1,1,1,1)* | 0 |
| 64 | 0.66 (0,0,0,1,1,1,1,1,1,1)* | 0.22 ( 0,0,0,0,0,0,0,0,1,1)* |
| 72 | 1.00 (2,2,2,1,2,0,0,0,0,0)* | 0.22 (0,0,0,0,0,0,0,0,1,1)* |
| 78 | 1.11 (2,2,2,2,1,1,0,0,0,0)* | 0.44 (0,0,0,0,0,0,1,1,1,1)* |
| 86 | 1.55 (2,2,2,2,2,1,1,1,1,1)* | 0.66 (0,0,0,1,1,1,1,1,1,1)* |
| 92 | 3.00 (2,2,3,3,4,1,4,4,4,4)* | 0.66 (0,0,0,1,1,1,1,1,1,1)* |

*Actual tick counts in challenge study in bracket.
Days post challenge are the days after the 100% efficacy have been reached

values of pasture rotation are not given high priority and where tropical and sub-tropical environment offer ideal environment for the propagation of parasites (Ikeme, 1997).

This long lasting efficacy of tobacco extract as a protective agent against reinfestation may be due to the dusty residue left on the skin after application. Dusts of tobacco have been used as protective agent against leaf curl virus on plants (Anonymous, 1959).

However on safety, the hazardous effect of tobacco has been documented (Crowe, 1978; Sato et al; 1999). and may be pronounced by the possibility of screw worms damaging further a tick bite location (Gladney *et. al.* 1977) thereby aggravating the toxicity of tobacco extract applied to that region, in this study, adverse effects like itching, biting or restlessness were not noticed.

## Conclusion

*It can therefore be concluded that tobacco extract* used in the control of ticks in cattle confers a comparable protection as in conventional medicament and with an additional advantage of greater lasting effect post treatment.

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