



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2018; 6(6): 841-843

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Received: 23-09-2018

Accepted: 24-10-2018

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Comparative efficacy of Keetguard, amitraz and Deltamethrin in naturally infected *Rhipicephalus* spp. ticks in cows

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Abstract

A total of 32 clinical cases of cows infested with *Rhipicephalus* spp. ticks were divided into four groups with eight animals in each group. Group A were given weekly tape water bath for 3 consecutive weeks whereas group B, group C and group D were applied externally keetguard liquid, deltamethrin 12.5% and amitraz 12.5% at their recommended dose at weekly intervals for 3 consecutive weeks. Amitraz or keetguard treated groups showed complete knock down of all ticks from cows after 2nd weeks of application while deltamethrin treated groups revealed complete knock down of ticks after 3rd weeks of application. Treatment with keetguard showed 66.02% and 100% efficacy while amitraz treatment showed 77.08% and 100% efficacy against ticks on the seventh day and fourteenth day, respectively compared to day 0 values. However, deltamethrin treated cows revealed 54.08%, 96.60% and 100% efficacy against ticks on day 7, day 14 and day 21, respectively compared to day 0 values. Amitraz and keetguard showed comparable *in-vivo* efficacy against tick infestation in cows.

Keywords: Amitraz, cow, deltamethrin, keetguard, rhipicephalus

1. Introduction

Tick cause significant economic losses to the livestock industries. The loss inflicted to skins and hides alone is very high. Downgrading the quality of skins and hides, mainly as a result of tick bite damage are reported to be responsible for losses amounting to millions of US dollars per annum [1]. On a herd basis the accumulated effect of ticks biting stress can cause loss of appetite (anorexia) and loss of blood. Ticks acts as a vector for many important animal diseases such as theileriosis, babesiosis, cowdriosis and anaplasmosis and in addition, as ectoparasites contribute to reduced productivity in cattle [2]. The control cost of ticks and tick-borne diseases in India has been determined in the tune of about US\$498.7 million per annum [3]. A number of drugs *viz.*, ivermectin [4], doramectin [5], amitraz [6], cypermethrin [7], etc. had been used as acaricides to control ticks and mites infestation in various species of animals worldwide. The present study was conducted to evaluate the comparative efficacy of most commonly used acaricides in naturally tick infested cows.

2. Materials and Method

A total of 32 clinical cases of ticks infestation in cows were divided into 4 groups. Out of 4 groups; Group A were given weekly tape water bath for 3 consecutive weeks; Group B were given keetguard liquid bath with water (1: 20 dil.) and was applied twice a week for 3 consecutive weeks; Group C were applied deltamethrin 12.5% @ 2 ml/liter of water at weekly interval for 3 times and Group D were applied with amitraz 12.5% @ 2 ml/liter of water at weekly intervals for 3 consecutive weeks. The cows were selected irrespective of their sex and age. An area of 10 cm² of skin from three different regions of the body were selected and examined once in a week for the presence and density (number of ticks per 10 cm² of skin) of the ticks on days 0, 7, 14, 21 and 28, post therapies. No insecticides or any other measures were taken for control of ticks present in cattle premises. All the ticks present on animal body were treated irrespective of their larval/nymphal/adult stage. Resultant efficacy of the acaricides was assessed on the basis of tick counts/intensity before and after treatment. The percentage efficacy was determined by comparing the treated group and control group using the following formula, given by Drummond *et al.* (1981).

$$\% \text{ Efficacy} = \frac{C - T}{C} \times 100$$

Where,

C = mean of the controlled group, T = mean of the treated group.

3. Results and Discussion

The microscopic examination of ticks infested over the body of all 32 cows revealed the presence of *Rhipicephalus* spp. (*Boophilus* spp.) (Fig 1 & 2).

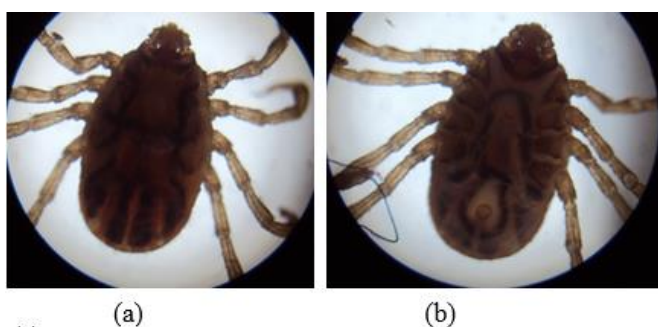


Fig 1: *Rhipicephalus* (*Boophilus*) spp. a) Dorsal view b) Ventral view

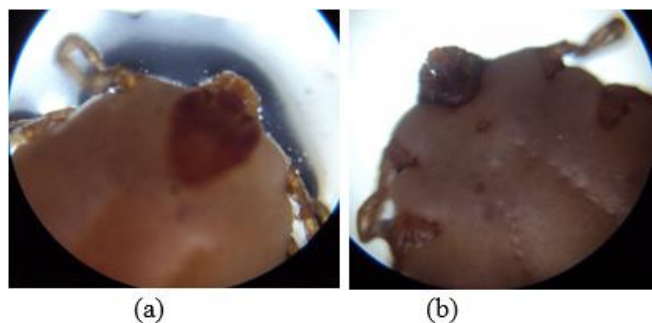


Fig 2: *Rhipicephalus* (*Boophilus*) spp. a) Dorsal view b) Ventral view of anterior parts

Clinical examination with hand lens showed the presence of ticks on various regions of the body (Fig 3).

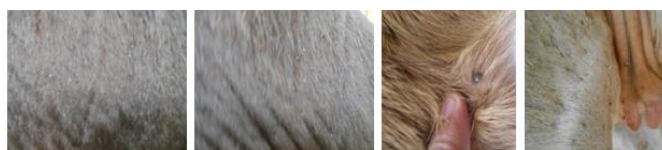


Fig 3: Ticks infestations on various parts of body in cows

Disease control group revealed significant ($p < 0.05$) increase in tick density from day 0 to day 28 of treatment (Table 1).

Table 1: Comparison of the tick density (number of ticks per 10 cm² of skin) obtained from the cows treated with Keetguard, Deltamethrin and Amitraz against disease control groups on various days of visual examinations (Mean±SD).

Groups	Day 0	Day 7	Day 14	Day 21	Day 28
A	21.25±3.69	23.86±3.76 ^c	26.75±3.85 ^b	29.13±3.31 ^a	32±3.42 ^a
B	23.15±5.91 ^a	7.86±1.25 ^{ab}	00	00	00
C	21.75±6.54	9.83±0.83 ^b	0.74±0.26 ^a	00	00
D	24.00±3.20 ^a	5.51±1.41 ^a	00	00	00

a, b, c Statistically significant difference ($P \leq 0.05$) when compared with the values pertaining at the respective day of various groups Amitraz/ keetguard treated groups showed complete knock down of all ticks from cows after 2nd weeks of application while deltamethrin treated groups revealed complete knock down of ticks after 3rd weeks of application. On day 7 of application of acaricides dead ticks were found attached to the cow's body in all treatment groups. Treatment with keetguard showed 66.02% and 100% efficacy against ticks on day 7 and day 14, respectively compared to day 0 values. Deltamethrin treated cows revealed 54.08%, 96.60% and 100% efficacy against ticks on day 7, day 14 and day 21, respectively compared to day 0 values. However, amitraz treatment showed 77.08% and 100% efficacy against ticks on day 7 and day 14, respectively compared to day 0 values. At each feeding site of ticks a scar was present in most of the cases after the tick has detached. Scar formation at tick feeding sites after the tick has detached owing to granuloma and the wound healing process. When the skin of livestock animals is made into leather these scars remain as blemishes that reduce the value of the leather. Amitraz has shown an excellent reduction in the number of ticks (77.08% and 100% on day 7 and day 14, respectively) and is substantiated by earlier findings of 91 % on Day 1 to 98 % on Day 28 reduction in spite of the heavy infestations at the commencement of the trial [8]. These heavy infestations probably resulted from resistance to organophosphate and carbamate acaricides due to their indiscriminate use. In the dipping trials with amitraz, weekly dipping for nine times causes re-infestation rate zero in African tick species on cattle

in Tanzania [9]. The intensive use of deltamethrin resulted in the selection of resistant to ectoparasite population over a due course of time [10, 11]. The high rate of mortality with Keetguard may have resulted from the cumulative effect of herbal extracts in contrast to individual efficacy of the different phytochemical ingredients. It was observed earlier that an extract of *Cuora serrata* proved to be toxic killing 100% of the larvae of *R. microplus* at the concentrations of 50, 25, 12.5 and 6.25 mg/ml after 48h [12]. In another study on efficacy of herbal plants against ectoparasites, after 24 h of treatment, the highest acaricidal activity of 70.8% was recorded in the ticks treated with 8% extract of *Anona squamosa* followed by *Nicotiana tobacum* (45.8%) and *Tamarindus indica* (41.7%) extracts, whilst 29.8% and 20.8% mortality, respectively, was recorded in ticks treated with *Eucalyptus globulus* and *Citrus limonum* extracts against *R. Microplus* [13]. It was observed that at 10% concentration of extracts, 35% of the ticks treated with *Acorus calamus* died within 24 hrs of treatment [14]. Earlier tick infested buffaloes and cattle treated five times at 6-day intervals (0, 6, 12, 18 and 24) with (AV/EPP/14) (containing the active ingredients: *Cedrus deodara*, *Pongamia glabra*, *P. pinnata*, *Azadirachta indica*, *Eucalyptus globulus* and *Acorus calamus*) resulted in elimination of 65.3, 87.6, 96.5, 99.6 and 100% of the ticks, respectively. The treated animals were free of ticks for a period of 30 days after the last treatment [15].

4. Conclusion

It can be concluded that the amitraz and keetguard is highly efficacious against the tick infestation in cows. Both products

have immediate acaricidal property against tick and effectively reduce the nuisance of ectoparasites. Deltamethrin has shown poor response owing to development of resistance as synthetic pyrethroids are being used intensively as insecticides for long period.

5. Acknowledgements

Authors are thankful to the Director, ARDD, Govt. of Tripura and Principal, College of Veterinary Sciences & A. H., R. K. Nagar, West Tripura, Tripura for providing research facilities and Ayurvvet Ltd. for providing necessary funding.

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