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Research Article

Efficacy of different drugs against tick infestation in goats reared under semi-intensive system

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Abstract

Study was conducted on a total of 90 goats for assessing the efficacy of different drugs against tick infestation in goats reared under semi-intensive system at Taluka Khipro, District Sanghar. Goats were divided into three groups viz. A, B and C. A group was treated with Trichlorfon, B with Cypermethrin and C was kept as control group. Four species of ticks were found to be commonly infesting the goats such as *Hyalomma anatolicum, Amblyomma variegatum, Boophilus microplus,* and *Rhipicephalus anguineus.* All tick-infested goats showed clinical signs of weakness, anemia, and anorexia. Further, efficacy of Trichlorfon and Cypermethrin was observed against the tick infestation by single and multiple applications. In a single application of the 1st treatment, the highest rate of efficacy was observed by Trichlorfon (85.6, 81.6 and 78.4%) followed by Cypermethrin (81.6, 77.6 and 68%), at 7th, 14th and 21st days. While the control group remained positive and trend in the increase of tick infestation. While all treated goats had shown improvement in health by clinically and disappeared the symptom of the disease. It conclusion *Hylomma* species was most prevalent tick detected in goats reared under the semi-intensive system. Trichlorfon was found to be much effective drug against tick infestation compared Cypermethrin.

Keywords: Damage; Efficacy; External parasites; Goat; Prevalence; Tick

Introduction

Goats play considerable role in the global small ruminant production. Pakistan with the estimated population of 63.3 billion ranked as 3rd major goat rearing country in the world following India and China. These small animals fulfill the demand of national and international communities by providing meat, milk, skin and by-products **[1, 2]**.

It has been studied that the goats possess amazing adaptation and resistance

capability to the endemic diseases. Despite some of bacterial, metabolic, protozoal and viral disorders cause huge economic losses [3]. Further, ecto-parasites like lice; ticks and mites infestation are relatively common in goats and cause considerable loss in production [4]. Among all external parasites, ticks infestation is a major threat to the goats raised under semi-intensive system. As reported by United Nations Food and Agricultural Organization (FAO), Ixodidae tick infestations cause economic loss of about $US7.0 billion [5]. It is essential to implement efficient tick control program in the developing countries like Pakistan [6]. However, chemical-resistance by ticks and external parasites against different chemical treatments has been a major constraint. The resistance is developed due to misuse of chemical drugs including injection of inappropriate drug with wrong concentration [7, 8].

Synthetic Pyrethroids like Deltamethrin and Cypermethrin are commercially available drugs, commonly used in agriculture and control of external parasites [9]. Cypermethrin is marketed as popular acaricides and considered highly effective by conventional dip, spray and pour-on formulations against several species of single- and multi-host ticks of cattle. It has also been found to be very effective against the biting louse Bovicola ovis of sheep [10, 11]. Trichlorfon is also useful for the treatment of parasites such as lice, leeches and nematodes such as camalanus worms. Although these drugs are in common use against the ectoparasites of goat reared under semi-intensive system, but their use in appropriate concentration is very important, otherwise they may threat the animals [12, 13]. Keeping in view such aspects current research was planned where by the main objective was to evaluate the efficacy of Cypermethrin and Trichlorfon against tick infestation in goats under semi-intensive system.

Materials and methods

The present study was carried out from June to September 2019 to evaluate the efficacy of drugs like of Cypermethrin and Trichlorfon against ticks infestation in goats under semi-intensive system.

A total of Ninety (n=90) tick infested goats were randomly selected at Taluka Khipro, district Sanghar. The solutions were prepared according to the instructions of the manufacturers by topical applications. The tick infested goats were divided into three groups viz. A, B and C containing 30 goats in each. Goats in group A were treated with Trichlorfon, in group B with Cypermethrin, however group C was kept as control and treated with normal saline (0.9%). Goats in each group were clinically examined before and after treatment for the presence of ticks. Data was collected on 0, 7, 14 and 21 days. All the goats were provided with feed and water on *ad-libitum*.

Statistical analysis

The collected data was tabulated in MS-Excel and statistical analysis was performed using Statistical Package for Social Sciences version-24.0 version. Means were considered significantly different ($p<0.05$).

Results

A total of 90 experimental goats of both sexes were examined for the presence of different species of ticks at Taluka Khipro district Sanghar and efficiency of different drugs was assessed. For identification of the tick species, the main characteristics of the body like palps, color (pattern), eyes, festoons, adanal plates, and legs were observed (Table 1).

Hyalomma anatolicum

In (Plate 1), it shows identification characteristics of *Hyalomma anatolicum* tick. Plate indicates that capitulum, which is very large and bearing article. Body also contain palps, basis capituli depression posterior dorsally. Eyes are convex, festoons are alos present (some species reduced in number), however legs are annulated.

Amblyomma variegatum

Identification characteristics of *Amblyomma variegatum* ticks are shown in (Plate 2). It shows that Palpus is longer than

basis capituli, Basis capituli not laterally extended, eyes flat- convex, Festoons present and ventral scutes and annulated.

Boophilus microplus

In (Plate 3), it shows identification features of *Boophilus microplus*. Plate shows that palpus is short, basis capituli latterly extended, eyes present (indistinct), festoons absent and slender, yellow slightly beaded.

Rhipicephallus anguineus

Identification features of *Rhipicephallus anguineus* are shown in the (Plate 4). Plate indicates that palpus is medium, basis capituli laterally extended, eyes are flat-convex, festoons are present and legs possess uniform color.

Clinical findings in tick-infested goats

The clinical aspects like appetite, body condition, hair loss, general weakness and color of mucous membrane of experimental goats were recorded and result are depicted in the (Table 2), which indicates that ticks infested goats showed in-appetence, normal/pale skin color, mild dehydration, dry/rough body coat, anemic mucous membrane, mild hair loss, moderate weakness and moderately dull.

Trichlorfon and Cypermethrin efficacy at single treatment

During the present study efficacy rate Trichlorfon and Cypermethrin treatments at single application dose was assessed against tick infestation and results are given the (Table 3). The highest efficacy rate was observed 85.6, 81.6 and 78.4% from Trichlorfon (group A) on 7th, 14th and 21st day respectively. Cypermethrin (group B) showed the efficacy rate (81.6, 77.6 and 68%. However, the control group showed more infestation of ticks with the passage of time, as shown in (Table 3).

Trichlorfon and Cypermethrin efficacy percentage after multiple treatments

During the present study, multiple application efficacy rates of Trichlorfon and Cypermethrin was observed in both groups (A and B). The highest efficacy rate was observed (98.4, 96 and 86.4%) by Trichlorfon followed by Cypermethrin (95.2, 92 and 80.8%), at 7th, 14th and 21^{Ist} day after the treatment against tick infested groups A and B respectively. While, control group C remained positive and showed an increased intensity of tick with the passage of time, as shown in (Table 4).

Table 1. Identification characteristics of different tick species

Features	*Hyalomma anatolicum*	*Amblyomma variegatum*	*Boophilus microplus*	*Rhipicephalus anguineus*
Palps	Long	Long	Short	Medium
Color (pattern)	Absent	Present	Absent	Absent
Eyes	Convex	Flat – convex	Present (indistinct)	Flat – convex
Festoons	Present (some species reduced in number)	Present and ventral scutes	Absent	Present
Adanal plates	Anals, accessory and sub-anals	Platelets	Anals and accessory	Anals and accessory +/-
Legs	Annulated	Annulated	Slender, yellow slightly beaded	Uniform color
Basis capitula and capitulum	Not laterally extended	Not laterally extended	Laterally extended	Laterally extended

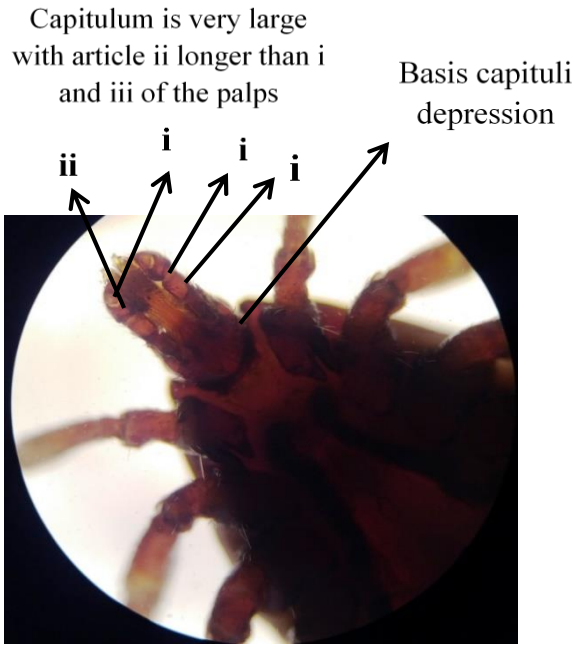

Plate 1. ***Hyalomma anatolicum***

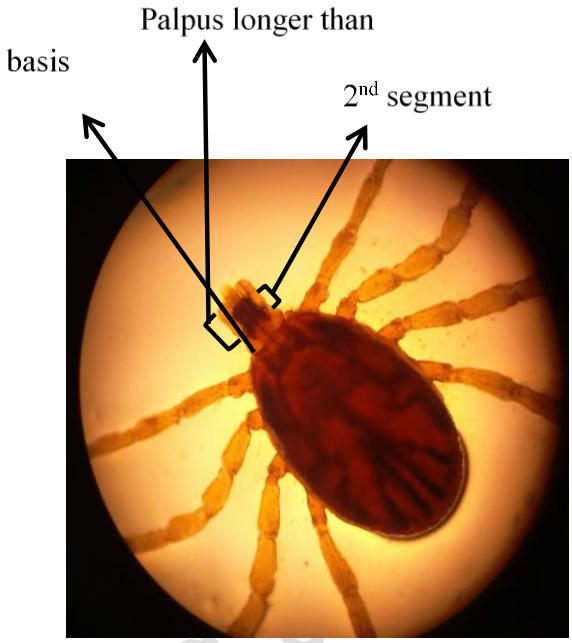

Plate 2. ***Amblyomma variegatum***

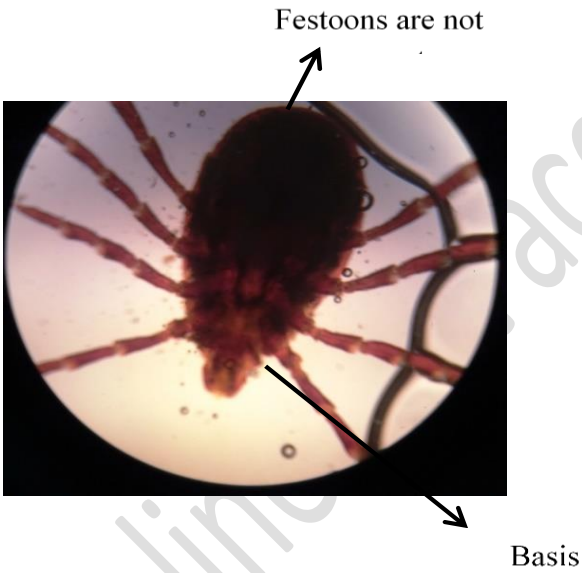

Plate 3. ***Boophilus microplus***

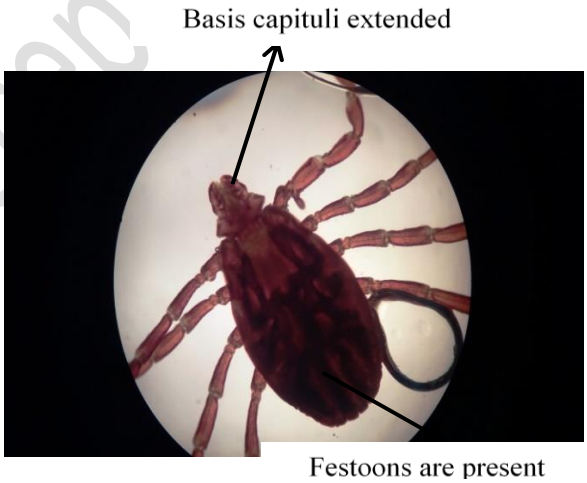

Plate 4. ***Rhipicephallus anguineus***

Table 2. Major clinical signs observed in tick-infested goats

Clinical signs	Major observations
Appetite	In-appetence
Skin color	Normal/Pale
Body condition	Thin
Dehydration	Mild
Body coat	Dry and rough
Mucous membrane color	Anemic
Hair structure /loss	Mild
Weakness	Moderate
Dullness	Moderate

Table 3. Trichlorfon and Cypermethrin efficacy percentage after a single treatment

Group	Drugs	0 day No. (%) Infestation rate (%)	7th day No. (%) Efficacy rate (%)	14th day No. (%) Efficacy rate (%)	21Ist day No. (%) Efficacy rate (%)
A	Trichlorfon 1%	125 (100)	18 (14.4) 85.6	23 (18.4) 81.6	27 (21.6) 78.4
B	Cypermethrin 1%	125 (100)	23 (18.4) 81.6	28 (22.4) 77.6	40 (32) 68
C	Control group	125 (100)	135 (108)	138 (110.4)	145 (116)

Table 4. Trichlorfon and Cypermethrin efficacy percentage after multiple treatments

Group	Drugs	0 day No. (%) Infestation rate (%)	7th day No. (%) Efficacy rate (%)	14th day No. (%) Efficacy rate (%)	21Ist day No. (%) Efficacy rate (%)
A	Trichlorfon 1%	125 (100)	17 (13.6) 86.4	5 (4) 96	2 (1.6) 98.4
B	Cypermethrin 1%	125 (100)	24 (19.2) 80.8	10 (8) 92	6 (4.8) 95.2
C	Control group	125 (100)	130 (104)	140 (112)	145 (116)

Discussion

The present study was carried out in Khipro, district Sanghar to evaluate the efficacy rate of Trichlorfon and Cypermethrin acaricides against ticks infestation reared under semi-intensive system. Study revealed four most common species of ticks infesting the goats like *Hyalomma anatolicum, Amblyomma variegatum, Boophilus microplus, Rhipicephalus anguineus*. These findings are is in close agreement with **[13]**, who reported that the ticks identified from Tandojam and its surrounding were the same as observed in the current study.

In the present study, the clinical findings in goat were observed such as dullness and depression in severe tick-infested animals, decreased appetite, and mucous membrane was in pale color indicating anemia, thin body condition with dry and rough body coat, hair losses at ears, weakness. The clinical findings observed were similar to the study conducted by **[14, 15]**, who reported direct blood losses results from heavy tick burden as well as the appearance of toxicosis in sheep. The tick bites can be injurious that causes severe skin damages, abscess formation at the infestation site and were the entry site for the secondary bacterial infection. Another similar type of study was conducted by **[15]** recorded that disorders of the blood, anemia, hypersensitivity, irritability, dermatitis, skin necrosis, low weight gains, secondary infection, focal hemorrhages and inflammation of the ear orifices. Further, **[16]** reported that ticks also cause retard growth and reduce the productivity of the goats in Abuja, Nigeria. So these findings were similar to previously reported.

Further, Trichlorfon efficacy of 1st treatment, on 1st day 92%, 98% on 7th day at 2nd treatment and 100% at 14th day at 3rd treatment was observed, while by single application the results were 96%, 80%, and 70% effective against ticks in goat at 1st day, 7th day and 14th day treatment respectively, the similar study results were reported by **[17, 18]**, that Trichlorfon was effective 83.45% against the control of cattle tick effectively. Trichlorfon was also effective to control the parasites such as lice (Argulus), leeches and nematodes such as camalanus worms, but when used in

animals it causes little bit poising, such side effects were dependent on the amount of its concentration use and its absorption from the skin or intestine repeatedly **[18- 20]**.

Cypermethrin efficacy was observed 90%, 96% and 98% of 1st, 2nd and 3rd treatment on 7day, 14day, and 21st day respectively. While, the results of single time application efficacy were observed 92%, 50% and 24% on the 1st, 7th and 14th day respectively. These results are similar with the results observed by **[15, 21, 22]** who reported that the efficacy of Deltamethrin was 79.5%, at 3 days and 100% at the 5th day of the post-treatment. In contrast, a higher were observed by **[16, 17, 23, 24]** against the *Argas Persicus* tick mortality by using the Cypermethrin related compound. He reported that Deltamethrin was effective 99.15% as compare to Peracetic acid 63.42% after dipping, respectively. However, the single use results were also different from the present study. It has also reported that the deltamethrin was effective, it had a prolonged acaricidal effect as 71.19%, 90.35%, and 100% reduction in tick burden by the end of 2nd, 3rd, and 4th week of post-treatment **[25]**.

Conclusion

The study concludes that *Hylomma* species was most prevalent in goats reared under the semi-intensive system at Khipro, District Sanghar. Tick infested goats were weak and dull. Trichlorfon was found more effective to treat and control the ticks in goats as compared to Cypermethrin.

Authors' contributions

Conceived and designed the experiments: AA Jariko & AA Khaskheli, Performed the experiments: AA Jariko, RA Jariko & MA Jariko, Analyzed the data: MA Brohi & MQ Koondhar, Contributed reagents/ materials/ analysis tools: ZA Khoso & IA Ujjan, Wrote the paper: AA Khaskheli.

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