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COMPARATIVE ACARICIDAL EFFICACY OF CYPERMETHRIN, IVERMECTIN, TRICHLORPHON AND *AZADIRACHTA INDICA* (NEEM) IN LAYERS NATURALLY INFESTED WITH *ARGAS PERSICUS*

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Acaricidal efficacy of cyperrnethrin, ivermectin, trichlorphon and *Azadirachta indica* (Neem) was evaluated in commercial layers (N = 500 of 40 to 50 weeks of age, naturally infested with *Argas persicus*. The number of ticks was counted on all the birds before treatment and on day 1, 7, 14,21 and 28 post-treatment. The best control achieved was 86.85% by cypermethrin treated birds against *Argas persicus* infestation followed by ivermectin (82.96%), 40% *Azadirachta indica* (51.89%) and trichlorphon (27.54%). Cypermethrin, invermectin, *Azadirachta indica* (40%) and trichlorphon were 35.42, 50.28, 75.24, 86.85 and 86.85; 1.64,9.34,41.20, 82.96 and 82.96; 42.16, 57.83, 67.02, 75.67 and 51.89 and 28.74,37.12,42.51,34.13 and 27.54% effective on day 1,7,14,21 and 28 post-treatment respectively.
Key words: acaricidal efficacy, *Argaspersicus*, layers

INTRODUCTION

The use of chemicals is the primary method to control ectoparasites of livestock all over the world. In Pakistan, due to lack of efficient extension work and limited facilities and resources, our poultry farmers are still utilizing the old traditional practices to control different poultry diseases. The resultant situation exposes the flocks to a number of viral, bacterial, fungal, rickettesial and parasitic diseases. These diseases cause a huge loss to this industry in terms of body weight reduction, retarded growth, poor egg production, poor body resistance and mortality. Much attention has been given to treat the bacterial and viral diseases, while parasitic infestations. particularly tick problems have largely remained neglected.

Ticks can transmit certain diseases like fatal anaemia (Lucas, 1954), spirochaetosis, tularaemia, aegyptianellosis and encephalitis (Philip, 1963) resulting in heavy losses to the poultry industry. In addition, tick infestations may cause heavy mortality by sucking blood and causing irritation to the birds which consequently affect the economical production of poultry (Edgar and King, 1950). This papers reports the comparative efficacy of cypermethrin, ivermectin, trichlorphon and *Azadirachta indica* (Neem) against tick infestation on commercial layers in district Faisalabad.

MATERIALS AND METHODS

Commercial layers (n = 500) about 40 to 50 weeks of age, naturally infested with *Argas persicus* were selected. They were divided into five groups (A, B, C, D and E) of 100 birds each and treated with cypermethrin (1 ml/litre of water; spray), ivermectin (100 fg/kg body weight; orally), trichlorphon (0.15%; spray) and *Azadirachta indica* (Neem) (20 and 40% leaf extract in water; spray) respectively. The group E served as infested untreated control. Ticks were counted on all the birds before treatment and on day I, 7, 14, 21 and 28 post-treatment. Efficacy of all the chemicals was evaluated by controlled method (Moskey and Harwood, 1941) on the basis of reduction in number of ticks on different days post-treatment (PT).

RESUL T AND DISCUSSION

The use of chemicals is the primary method to control tick infestation in poultry all over the world, but development of resistance against various chemicals, their non-availability and inconvenient dosage form has always posed a challenge for the veterinarians to select an acaricide. The results of control of tick infestation on commercial layers achieved by different acaricides as used in this study are shown in Table I. The maximum control achieved was 35.42, 50.28, 75.24, 86.85 and 86.85% on day 1, 7, 14, 21 and 28 PT- in the cypermethrin treated birds. The second best control achieved was with ivermectin, being 1.64, 9.34, 41.20, 82.96 and 82.96% on day I, 7, 14, 21 and 28 PT, respectively. The third acaricide in the order of effectiveness was *Azadirachta indica* (40%), being 42.16, 57.83,67.02,75.67 and 51.89% effective on day 1,7, 14, 21 and 28 PT respectively. The least control of tick infestation in experimental layers was achieved by trichlorphon (28.74, 37.12, 42.51,34.13 and 27.54% on day 1, 7, 14, 21 and 28 PT respectively). The analysis of variance revealed a highly significant difference in control of ticks by different acaricides. There was a highly significant difference between cypermethrin and trichlorphon, whereas there was a non-significant difference among ivermectin, *Azadirachta indica* (20%) and *Azadirachta indica* (40%) treated groups. Further, there also existed a non-significant difference at various days PT among the acaricides.

The best control effected by cypermethrin may be attributed to higher sensitivity of ticks to this chemical compared with others. The number of ticks at different days PT also indicated that cypermethrin has long term effect. Liebisch et al. (1991) evaluated cyhalothrin, cypermethrin and flumethrin against tick infestation and found that all the acaricides were very effective in tick reduction by 85-100%. Cypermethrin gave complete protection against *Argas persicus* infestation (Chhabra and Dorona, 1994) on fowls, geese, turkeys and pigeons. Khalaf-AUah (1996) also reported 98% effectiveness of cypermethrin against tick infestation.

Table t. Percent control of ticks on commercial layers with various acaricides at different days post treatment

Acaricide/Group	aNo.ofticks before treatment	No. of live ticks and % control (days post-treatment)				
		1	7	14	21	28
Cypermethrin	8.75	5.65 (35.42)	4.35 (50.28)	2.25 (72.28)	1.15 (86.85)	1.15 (86.85)
Ivermectin	9.1	8.95 (1.64)	8.25 (9.34)	5.35 (41.20)	1.55 (82.96)	1.55 (82.96)
Trichlorphon	8.35	5.95 (28.74)	5.25 (37.12)	4.8 (42.51)	5.5 (34.13)	6.05 (27.54)
Azadirachta indica (Neem) (20%)	8.95	6.75 (24.58)	4.95 (44.69)	3.7 (58.65)	4.65 (48.04)	5.85 (34.63)
Azadirachta indica (Neem) (40%)	9.25	5.35 (42.16)	3.9 (57.83)	3.05 (67.02)	2.25 (75.67)	4.45 (51.89)
Control	8.25	8.5 (3.03)	8.9 (7.87)	9.15 (10.90)	9.85 (19.39)	10.65 (29.09)

Figures in parentheses indicate percent control in treated and percent increase in number of ticks in untreated control groups.
a = Average number of ticks counted per bird of each group before treatment.
b = Average number of ticks counted per bird of each group after treatment.

$$\text{*Percent control} = \frac{\text{Average number of ticks before treatment} - \text{Average number of ticks after treatment}}{\text{Average number of ticks before treatment}} \times 100$$

$$\text{**Percent control} = \frac{\text{Difference (Average number of ticks at indicated day)} - \text{(Average number of ticks after treatment)}}{\text{Average number of ticks before treatment}} \times 100$$

Aside from the use of cypermethrin for the control of tick infestation on livestock and poultry in the field, in vitro and in vivo tests had also been conducted for the evaluation of cypermethrin and other products of the same family i.e. deltamethrin, perrnethrin, alphacypermethrin, decamethrin etc. against different species of *Argasid* and *Ixodid* tick infestation on livestock and poultry. Overall results of these studies showed that all the products were effective against ticks with variable efficacy (Gupta and Kurnar, 1994; Alien et al., 1996, Dusbabek et al., 1997; Zieger et al., 1998).

The acaricidal efficacy of ivermectin was 82.96% on day 28 PT. The effective control obtained by using this chemical may be attributed to its binding with the body tissues or low excretion rate. Mousa et al. (1998) reported that a single oral dose of 100 fg (femto gram) of ivermectin per kg body weight can cause 75.5% paralysis of *Argas persicus* after 75 hr. So for, negligible effort has been made for the evaluation of ivermectin against tick infestation on poultry.

Trichlorphon showed 27.54% effectiveness against *Argas persicus* infestation on poultry. It was thus the least effective among the four chemotherapeutic agents used in this study for the control of *Argas persicus* in poultry, although trichlorphon had been used successfully against different tick infestations on different animals. One important factor regarding the low efficacy of this compound is that the regular use of trichlorphon resulted in the development of resistance by ticks against this compound. Smirnova and Polyakov (1978) reported that after 11 to 13 generations the ticks had become resistant to trichlorphon. They recommended that trichlorphon should not be used continuously for more than 3 to 4 years at a time and could be replaced for the intervening periods by other acaricides.

Neem is a traditional medicinal plant which is commonly available in Pakistan, but its medicinal activity against ticks has not yet been determined here. The pest control potential of various extracts and compounds isolated from the kernels and leaves had been evaluated. Laboratory and field trials data revealed that *Azadirachta indica* (Neem) extracts were toxic to over 400 species of insect pests (Williams et al., 1996). The efficacy of Neem was found to be 34.63 and 51.59% against *Argas persicus* infestation on layers with 20 and 40% leaf extracts respectively. Effective acaricidal efficacy of this plant was obtained by Williams (1993) who found that extracts of *Azadirachta indica* caused 80% hatching failure of *Boophilus* eggs. Maske and Bhilegaonkar (1995) reported 70% efficacy of herbal preparation containing extracts of *Cedrus deodera*. *Azadirachta indica* and *Embelic* against *Ixodid* ticks. This difference may be due to the fact that only extract of *Azadirachta indica* was used in the present investigation rather than a mixture of different herbal preparations.

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