



Efficacy of feeding Taramira seed and introduction of poultry birds in animals shed to control tick infestation on buffalo under field conditions

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Ticks are widely distributed in the tropical and sub-tropical regions worldwide and account for heavy production losses in livestock. These are haematophagous arthropod ectoparasites that infest livestock including dairy animals of all age groups and effect their health and productivity. Ticks suck large quantities of blood of their host resulting in anemia and they produce ‘tick worry’ which is the result of tick bites, local skin reactions, blood loss and secondary fly attacks (Kemal *et al.* 2016). According to FAO (2004), an estimated 80% of the world’s cattle population remains infested with ticks. Ticks cause infurcation and restiveness in animals and causes huge economic losses to livestock by their direct effects like sucking blood, damaging the skin and hides, resulting in reduction in weight gain and milk yield and indirectly, act as vectors for transmitting infectious diseases (Spickett 2013, Grisi *et al.* 2014, Rafique *et al.* 2015). In India, due to tick infestation and tick borne diseases (TTBDs), the cumulative losses were recorded at 61076.46 million INR or USD787.63 million (Singh *et al.* 2022). It has been suggested that if global warming leads to temperature increases, the abundance of ticks will increase in some regions where ticks are endemic (Olwoch *et al.* 2009). While acaricides have shown effectiveness in reducing tick infestations, continuous and excessive use of acaricides has led to the development of resistance in ticks, rendering some chemical compounds ineffective (Abbas *et al.* 2014). To maintain the health and productivity of animals, it is imperative that appropriate and balanced control measures should be adopted against tick infestation in dairy animals.

Taramira (*Eruca sativa*) seeds are naturally enriched with GSLs and are cheap ingredients for several applications, from pest management in agriculture to human and animal health (Matteo *et al.* 2018 and Giannini *et al.* 2021). Livestock fed on taramira seed and cake are seen to be tick free. Poultry birds such as guinea fowl or chickens, are

known for their tick-feeding behaviour. Keeping the above facts in view, an attempt was made to evaluate the efficacy of feeding Taramira seed and introduction of poultry birds in animals shed to control ticks infestation on buffalo under field conditions.

The study was conducted from July to September 2022, buffalo (45) reared under farmer’s field were randomly selected and distributed equally into three groups, i.e. T₁ (control), T₂ [Application of Amitraz on animal body (250 ppm) along with shed treatment with Malathion (5000 ppm)] and T₃ (Feeding of Taramira seed @ 70 g/day/ animal and introduction of poultry birds in animals shed). In T₂ group, Amitraz diluted in clean water, was sprayed on the animal with a hand sprayer in the morning and was repeated at 15 days interval. After spraying, the animals were allowed to stand in sunlight for 1 h. Malathion diluted with clean water, was sprayed with hand sprayer in the shed as well as outside the shed in morning time and repeated at 15 days interval.

For T₃, Taramira seeds were cleaned, dried, and ground into a coarse powder. The powdered Taramira seeds were mixed with concentrate mixture and fed to animal in morning time. Suitable housing facilities were provided to accommodate the poultry birds (Punjab brown) near the animal shed and were left free to roam in animal shed every day in morning between 5.00–8.00 AM. All animals were managed on traditional system of feeding and management. Before initiating the study, tick were counted on certain body parts of the animal to establish baseline tick infestation levels. The counting of ticks was done on neck, shoulder and peri-anal region at fortnightly intervals. The data were analyzed statistically in a completely randomized design, and the significance of the difference between treatments means was determined by using one-way ANOVA conducted with the help of SPSS computer software version 21. Mean differences among different treatments were then separated using Tukey’s test.

The results obtained on tick load in three groups are presented in Table 1. The results of the present study revealed that group T₃, depicted a subsequent reduction in the ticks’ infestation from day 0 to the 60th day of the

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Table 1. Average tick load and percentage of protection after application of acaricides and biological interventions

Day	Group 1 (Control)					Group 2					Group 3				
	Neck	Shoulder	Peri-anal region	Total tick load	Neck	Shoulder	Peri-anal region	Total tick load	% of protection	Neck	Shoulder	Peri-anal region	Total tick load	% of protection	
0 day	15.80 ±1.35	14.13 ±1.25	16.67 ±1.36	46.60 ±1.29	16.73 ±0.86	15.20 ±0.73	16.40 ±0.81	48.33 ±0.79	-	15.60 ±0.89	13.69 ^b ±1.07	17.10 ±0.76	46.39 ±0.91	-	
15 days	17.34 ^e ±0.91	15.91 ^c ±0.89	16.34 ^e ±0.81	49.59 ^c ±0.92	8.07 ^a ±0.77	5.26 ^a ±0.93	6.93 ^a ±0.91	20.26 ^a ±0.85	58.08	12.53 ^b ±0.95	9.86 ^b ±0.89	12.27 ^b ±0.82	34.76 ^b ±0.86	25.07	
30 days	19.20 ^e ±0.88	18.37 ^c ±0.98	17.54 ^e ±1.12	55.11 ^c ±0.97	4.17 ^a ±0.59	2.13 ^a ±0.30	2.06 ^a ±0.26	8.36 ^a ±0.36	82.70	08.06 ^b ±0.79	06.23 ^b ±0.81	06.26 ^b ±0.91	20.55 ^b ±0.82	55.70	
45 days	22.67 ^b ±1.22	21.07 ^c ±1.23	19.54 ^e ±0.99	63.28 ^b ±1.11	1.73 ^a ±0.34	1.20 ^a ±0.28	1.27 ^a ±0.34	4.20 ^a ±0.29	91.31	02.07 ^a ±0.53	02.27 ^b ±0.46	01.17 ^a ±0.31	5.51 ^a ±0.41	88.12	
60 days	23.07 ^b ±1.38	22.11 ^b ±1.31	22.34 ^b ±0.97	67.52 ^b ±1.21	1.06 ^a ±0.26	0.0 ^a ±0.00	1.00 ^a ±0.30	2.06 ^a ±0.28	95.74	1.80 ±0.39	0.0 ^a ±0.00	0.0 ^a ±0.00	1.80 ^a ±0.39	96.12	

^{Ab}, means in the same row for each parameter in between treatments with different superscripts are significantly different (P<0.05).

treatment (Table 1). The shoulder and the peri-anal region showed no tick infestation on the 60th day of the treatment in T₃ group, whereas, the control showed a significant increase in the ticks' infestation in all the regions after 15th day of the treatment. The control group showed a gradual increase in the ticks' infestation in all three regions of the animal. However, group T₂ animals depicted a significant decrease in the infestation from the 15th day onwards (Table 1). On the day 15 of treatment, group T₂ animals' load showed higher tick reduction as compared to T₃ animals. Thereafter, the gradual improvement in the percentage of protection was observed in animals of T₂ than that of group T₃.

The results revealed that initially, total ticks infestation was almost similar in all three groups. However, within 15 days of intervention, the tick's infestation was found to be promptly reduced in T₂, followed by T₃. On the contrary, in the control group, the tick infestation increased subsequently. The above results showed a positive outcome in the biocontrol method by using Taramira (*Eruca sativa*) seed for feeding in buffaloes and introducing poultry birds in animal sheds. Rehman *et al.* (2017) also suggested that applying Taramira on the body and in feed is an effective practice among farmers and has been shown to control ticks' infestation. Similarly, Jamil *et al.* (2022) reviewed and proposed that the tick population can be controlled to some extent by chickens and can predate on a considerable population of ticks in the morning time than evening time. These chickens can be used in integrated pest management (IPM), which reduces the number of pests such as ticks (Sahito *et al.* 2013). Previously, studies by Dreyer *et al.* (1997) and Samish and Rehacek (1999) also suggested that poultry birds play an essential role in the predation and control of ticks on cattle. Applying amitraz on the animal body (250 ppm) and shed treatment with Malathion (5000 ppm) showed a sudden decrease in the tick infestation within 15 days of intervention. These results were in corroboration with the findings of Jonsson *et al.* (2010) who applied 250 ppm of Amitraz spray on the body of cattle to check the control of tick formation. Similar results were also seen in the experiment conducted by Peter *et al.* (2006) and Singh *et al.* (2014) on the resistance status of *Rhipicephalus (Boophilus) microplus* against amitraz. Malathion treatment has also been accordingly used in controlling the animal tick population. Singh *et al.* (2014) worked to check Malathion resistance in the tick population, and the results showed that with increased concentration, the mortality of ticks also increased. Combining acaricides with the shed Malathion treatment improved the present study's result.

SUMMARY

An on-farm trial was conducted to evaluate the efficacy of feeding Taramira (*Eruca sativa*) seed and introduction of poultry birds in animals shed to control ticks infestation on dairy animals under field conditions. Buffalo (45) reared under farmer's field were randomly selected and

distributed equally into three groups, i.e. T_1 (control), T_2 (Application of Amitraz on animal body (250 ppm) along with shed treatment with Malathion (5000 ppm)) and T_3 (feeding of Taramira seed @ 70 g/day/animal and introduction of poultry birds in animals shed). The results of the study revealed that T_2 showed a sudden decrease in the tick infestation within 15 days of intervention. However, T_3 group depicted a subsequent reduction in the ticks' infestation from day 0 to the 60th day of the treatment compared to the control. The animal bodies showed no tick infestation on the 60th day of the treatment in T_3 group, whereas, the control showed a significant increase in the ticks' infestation in all the regions with the passing of days. Based on the study, it was concluded that the feeding of Taramira seed and introduction of poultry birds in animals shed were able to reduce the tick load by 95%. This eco-friendly technology can be used by the dairy farmers at their dairy farm, as tick control is of utmost priority for the betterment of the health, production and productivity of buffalo.

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