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The effect of *Haematobia exigua* infestation on cattle behaviour and milk production

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Abstract
This research was carried out to study the effect of *H.exigua* fly annoyance on cattle behaviour and milk production. Two cattle farms having high and moderate infestation with *H.exigua* were treated with flumethrin pour on. A highly significant reduction in the frequency of fly avoidance behaviour was observed in both infested groups (p<0.001) after treatment.
The pre-treatment frequency of head toss, leg stamps, tail flicks, ear flicks and skin twitches *viz*., 3.37±0.24, 3.47±0.37, 28.42 ±1.79, 15.84 ±1.10 and 21.68±1.32 respectively was observed in cattle having high fly infestation.
The post treatment observation on frequency of fly avoidance activities *viz*., head toss, leg stamp, tail flick, ear flick and skin twitches had significantly (p<0.001) reduced to 0.42±0.14, 0.42±0.16, 04.11±0.56, 0.95±0.21 and 1.32±0.32 respectively among animals with high fly infestation. Similar trend was also observed in cattle with moderate fly infestation.
A significant (p<0.05) increase in milk yield was recorded from 3rd day of post treatment and a highly significant increase (p<0.001) in milk yield was noticed from 4th to 7th day post treatment in both high and moderately infested animal group. It was estimated that an average loss of 374 and 288 ml milk yield / day / animal that had high and medium fly intensity, respectively.

Keywords: *Haematobia exigua*, Cattle behaviour, Insecticide, Milk production

Introduction
Haematobia exigua, is an obligate blood sucking ectoparasites of cattle and buffalo. Its intermittent feeding habit causes irritations, sores particularly on sides of the neck rand near median canthus of the eyes which may attract myiasis producing flies (Johnson, 1989; Mosca *et al*., 2018; Anbarasi *et al*., 2021) [10, 13, 1]. In addition, during the high fly infestation the cattle exhibit fly avoidance activities including head tossing, leg stamping, skin and tail twitching, resulting in disturbed grazing and poor utilization of nutrients (Hart, 1994) [8]. The effects of *Haematobia* fly infestations associated blood loss, annoyance, skin lesions and energy losses arising out of fly avoidance behaviour on milk yield was studied (Granett and Hansen, 1956) [7]. The increased frequency of these fly avoidance activities may cause loss of energy, reduction in weight gain and milk production (Boland *et al*., 2008) [4]. It has been estimated that a cow infested with 200 numbers of *H.exigua* adult flies showed 520 ml and 28 g reduction in milk production and live weight gain per day respectively in Australia (Jonsson and Mayer, 1999) [11]. In the United States the economic losses associated with *Haematobia* infestation in cattle farms is estimated to be $ 800 million annually (Byford *et al*., 1992) [6]. *H.exigua* fly infestation is very common among cattle farms of Namakkal, Tamil Nadu, India (Anbarasi *et al*., 2021) [1] and there is paucity of research about the economic impact on milk yield in cattle. Hence, present research is undertaken to determine the same.

Materials and Methods
Two cattle farms infested with *H.exigua* were selected for studying the effect of fly infestations on cattle behaviour and milk production during peak fly season.

The fly intensity was recorded by filming method (Canon, 14.0 mega pixel) and the farms were categorized as high (G1-16 nos) and moderate (G2-17 nos) fly infested groups which had fly numbers ranged from 200-300 &100-200, respectively.

Flumethrin pour-on (Flumitas, 1% w/v, Intas pharmaceuticals Ltd., Ahmedabad) was used in this study to record the behavioural changes and milk yield after treatment at the recommended dose of 10 ml/100 kg body weight (Bordoloi *et al*., 2019; Anbarasi *et al*., 2024) [5, 2].

The behavioural changes such as head tosses, leg stamps, tail flicks, ear flicks and skin twitches in response to *Haematobia* fly intensity were recorded by video filming for one min per animal at 15 min intervals before and after treatment.

Milk yield of all the animals was recorded in the morning and evening for a period of 7 days before and after treatment and the mean milk yield of each group was arrived.

The data on cattle behaviour and milk yield before and after treatment was analysed by paired T-Test.

Results

All treated animals were found to be free of stress due to complete disappearance of the flies after 30 minutes of flumethrin pour on application and maintained for upto 4 weeks. The frequency of pre and post treatment (Flumethrin 1% pour on) cattle behaviour such as head tosses, leg stamps, tail flicks, ear flicks and skin twitches in response to *Haematobia* fly abundance are shown in Table 1**.**

Table 1: Cattle behaviour in response to flumethrin treated animals

Parameters	Cattle behaviour count/Minute				
	Head tosses	Leg Stamps	Tail Flicks	Ear Flicks	Skin Twitches
High fly intensity (N=16)					
Before	3.37±0.24	3.47±0.37	28.42±1.79	15.84±1.10	21.68±1.32
After	0.42±0.14	0.42±0.16	4.11±0.56	0.95±0.21	1.32±0.39
P value	0.001	0.001	0.001	0.001	0.001
Moderate fly intensity (N=17)					
Before	2.63±0.39	2.37±0.30	23.11±1.77	11.74±0.97	18.26±1.19
After	0.42±0.19	0.47±0.19	4.63±0.59	1.11±0.20	1.47±0.29
P value	0.001	0.001	0.001	0.001	0.001

*Each value is a mean of seventy observations.

$p<0.001$ - highly significant

A significant effect of fly intensity on fly avoidance behaviour of animals was noticed. In this study, the pre-treatment frequency of head tosses, leg stamps, tail flicks, ear flicks and skin twitches was 3.37±0.24, 3.47±0.37, 28.42±1.79, 15.84 ±1.10 and 21.68±1.32 respectively in animals with high fly infestation, and it was significantly higher ($p<0.001$) than fly avoidance activities exhibited by the animals with moderate and low fly intensity. In addition, the frequency of head toss and tail switching was >2 and 14-28 per min respectively. The post treatment observation of frequency of fly avoidance activities revealed that head toss, leg stamp, tail flick, ear flick and skin twitches had significantly ($p<0.001$) reduced to 0.42±0.14, 0.42±0.16, 04.11±0.56, 0.95±0.21 and 1.32±0.32 among animals with high fly infestation. Similar trend was recorded in animals in moderate fly infestation.

The mean difference between before and after treatment milk yield are shown in the table 2

Table 2: Average milk yield increase in animals post treatment

Group	Post treatment Day	Average milk yield increase (ml/day/animal	P-Value
High (N=16)	Day 1	-038.39±051.370	0.332
	Day 2	024.11±045.208	0.602
	Day 3	180.36±047.342	0.041
	Day 4	555.36±038.152	<0.001
	Day 5	621.61±027.206	<0.001
	Day 6	630.36±032.416	<0.001
	Day 7	622.86±035.881	<0.001
Moderate (N=17)	Day 1	-000.84±023.031	0.971
	Day 2	052.10±023.783	0.644
	Day 3	240.34±030.459	0.048
	Day 4	434.45±032.319	<0.001
	Day 5	428.57±019.752	<0.001
	Day 6	428.57±018.375	<0.001
	Day 7	421.45±017.643	<0.001
	Over all	335.93±017.717	

Figures in parenthesis are the number of observations.

$p>0.05$ - Not Significant

$p<0.05$ - Significant at 5% level

$p<0.01$ - Highly significant at 1% level

The results of the study revealed that there was no significant impact on the milk yield for the first 2 days of treatment in the group that had high fly intensity (N=200-300). But, a significant ($p<0.05$) increase in milk yield was observed from 3rd day of post treatment, and it was highly significant ($p<0.001$) from 4th to 7th day of post treatment. An average of 0.5 litre/day increase in milk yield was observed in this study. Similarly in the group that bore a moderate fly intensity (N=100-200), milk yield began to increase after 3rd day of post treatment and continued till 7th day. Yet a highly significant

(p<0.001) rise in milk yield was recorded from 5th day onwards and an average increase in milk yield was around 0.4 litre / day. The results showed that fly population beyond threshold level undoubtedly exert marked impact on milk production of animals.

Further, it was estimated that an average loss of 374 and 288 ml milk production / day/ animal that had high and moderate fly intensity, respectively and the results are shown in the Table 3.

Effective control of the flies using flumethrin treatment led to an appreciable increase in milk yield of cows, which in turn, increased the profit of farmer. It was calculated that rise in milk yield, due to fly control measures undertaken, fetched Rs. 421/- and Rs. 289/- as additional profit margin of high fly and moderate intensity group respectively (Table 4). However, when cost of control deducted, Rs 256 and 124 were obtained respectively as net profit of high intensity and moderate intensity treated group.

Table 3: Milk yield increase in different groups in response to treatment

Group	Difference in milk yield (Litre/day)	P-Value
High (N=16)	0.374±0.031 (112)	0.007
Moderate (N=17)	0.288±0.019 (119)	
Over all	0.329±0.023 (231)	

Table 4: Profit margin in response to *H. exigua* fly control

Fly intensity group	Profit from increased milk yield / cow/month (Rs)	Expenditure / cow (Rs)	Net return / cow/ month (Rs)
High	421.36	165.00	256.36
Moderate	289.67	165.00	124.67

Discussion

In this study, the frequency of head toss, leg stamp, tail flick, ear flick and skin twitches was recorded respectively 2.74±0.21, 2.49±0.21, 22.04 ±1.20, 12.56±0.67 and 18.18±0.84 per min as overall pre-treatment cattle behaviour. But, a marked reduction in the frequency of cattle behaviour was observed after treatment. These findings are in agreement with observation of the Harvey and Launchbaugh (1982) [9] who recorded high frequency of fly avoidance activities in untreated steers than in steers treated for horn flies. The high frequency of tail switching and head tossing (>2/min) observed during heavy fly infestation in this study confirms the findings of the authors, as they also observed high frequency of tail switching among untreated steers. It is presumed that animals tend to exhibit potential fly avoidance activities such as head tossing and tail switching when other behaviours failed to yield desirable relief during high fly intensity. As result of which animals may incur heavy energy loss, thus would likely affect the production performance.

In this study, the pre-treatment frequency of head toss, leg stamp, tail flick, ear flick and skin twitches was 3.37±0.24, 3.47±0.37, 28.42±1.79, 15.84±1.10 and 21.68±1.32, respectively in animals with high fly infestation. Interestingly, a significant reduction (p<0.001) in head tossing (0.42±0.14), leg stamping (0.42±0.16), tail flicking (4.11±0.56), ear flicking (0.95±0.21) and skin twitching (1.32±0.32) was observed after treatment. A similar reduction in the frequency of fly avoidance activities was also found among animals with low to moderate fly infestations. This observation suggests that the frequency of fly avoidance activities is directly proportional to fly intensity. Besides, it could be construed that flumethrin pour on was effective against *Haematobia* flies. The findings of the present study are in corroboration with observations of the Boland *et al*., (2008) [4] who observed a significant difference in fly avoidance activities between untreated and steers treated with organophosphate ear tag. Further they also reported that fly avoidance behaviour was positively correlated with (p<0.003) fly intensity. However, a variation in the level of statistical significance could be due to efficacy of insecticide used.

In this study, the impact of *H. exigua* fly infestation on milk production of 33 lactating cows, maintained at two different farms, was studied by recording the milk yield for 7 days pre and post treatment with flumethrin pour on. The results of the study revealed that a significant (p<0.05) rise in the milk yield was observed on 3rd DPT in group which had the high fly intensity (N=200-300) and highly significant rise (p<0.001) was recorded from 4th - 7th DPT with an average rise of 500 ml /day / animal. A similar pattern of rise in the milk yield was observed in another farm which had a medium fly intensity (N=100-200). However, a highly significant (p<0.001) rise in the milk yield was recorded from 5th DPT onwards with an average rise in the milk yield of 400 ml/day/animal.

The increase in milk yield following treatment could be attributed to absence of stress, energy and nutrient loss as a result of drastic reduction in fly numbers within 30 min of application of flumethrin pour on. It could be assumed that the energy and nutrient loss, which usually occur due to fly avoidance behaviour of animals and blood sucking activity of *Haematobia* flies, might have been restored upon treatment and utilized for milk production. The results of the present study are in accordance with Morgan and Bailie (1980) [12] who recorded a significant (p<0.001) increase in the milk yield in Holstein Friesian after treating with synthetic pyrethroid permethrin. In their study, they observed a mean rise of 0.8 kg/animal/ day. The quantum of rise in the milk yield was higher than the present study; this could be due to breed variation and climatic influence on production. However, the results of the study are in corroboration with the findings of Bordoloi *et al*., (2019) [5] who reported that the total milk yield of the farm increased from 25 to 27 lit / day in response to treatment of cows against *Haematobia* flies with one percent flumethrin pour on in Assam, India.

In the present study, a significant rise in the milk yield was observed from 4th and 5th DPT in group with high and medium fly infestation respectively. This observation points to the fact that, in spite of complete disappearance of flies within 30 min of application of insecticide, at least 4-5 days are required for restoration of lost energy and nutrients, to be diverted to milk production. The results of the present study are in accordance with the findings of Block and Lewis *et al*., (1986) [3] who recorded a rise in milk production in Holstein Friesian cross from 6th DPT with fenvalerate impregnated ear tag for control of dipteran flies.

Conclusion

There was an increased milk production in *H.exigua* infested cattle having treated with flumethrin pour on. Hence to improve profitability, farmers need to reduce / control the fly population through application of flumethrin pour on whenever the fly population is increasing.

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Conflict of interests
There is no conflict of interest

References

1. Anbarasi P, Ponnudurai G, Senthilvel K, Sukumar K, Srinivasan P. Impact of *Haematobia exigua* (Buffalo Fly) in Cattle in Namakkal Region, Tamil Nadu**.** J Anim Res. 2021;11(1):207-211.
2. Anbarasi P, Ponnudurai G, Senthilvel K, Sukumar K, Srinivasan P. Efficacy of flumethrin pour on against *Haematobia exigua* fly infesting cattle under field conditions. Int J Trop Insect Sci. 2024; 44:1561-1566.
3. Block E, Lewis DJ. Efficacy of insecticidal ear tags on fly control and milk production of dairy cows. Can J Anim Sci. 1986;66:47-51.
4. Boland HT, Scaglia GPAS, Umemurat K. Impact of horn flies, *Haematobia irritans* (L.), (Diptera: Muscidae), on the behavoiur of beef steers. PAS. 2008;24:656-660.
5. Bordoloi G, Sarmah PC, Dutta JB, Boro PK, Saikia K, Boruah K, *et al*. Flumethrin pour-on application for control of *Haematobia* fly infestation in dairy cows: A case study. J Entomol Zool Stud. 2019;7:624-626.
6. Byford RL, Craig ME, Crosby B. A review of ectoparasites and their effect on cattle production. J Anim Sci. 1992;70:597-602.
7. Granett P, Hansens EJ. The effect of biting fly control on milk production. J Econ Entomol. 1956;49:465-467.
8. Hart BL. Behavioural defense against parasite Interaction with parasite invasiveness. Parasitol. 1994;109:S139-151.
9. Harvey TL, Launchbaugh JL. Effect of Horn Flies on Behavior of Cattle. J Econ Entomol. 1982;75(1):25-27.
10. Johnson SJ. Studies on Stephanofilariasis in Queensland. PhD Thesis, Department of Tropical Veterinary Science, James Cook University, Townsville, Australia. c1989.
11. Jonsson N, Mayer DG. Estimation of the effects of buffalo fly (*Haematobia irritans exigua*) on the milk production of dairy cattle based on meta-analysis of literature data. Med Vet Entomol. 1999;13:372-376.
12. Morgan DW, Bailie HD. A field trial to determine the effect of fly control using permethrin on milk yields in dairy cattle in the UK. Vet Rec. 1980;106(6):121-123.
13. Mosca M, Vabret M, Randleff-Rasmussen P, Pin D. Skin lesions in Aubrac cows strongly associated with fly bites (*Haematobia irritans*). Vet Dermatol. 2018;29:254-294.

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