RESEARCH ARTICLE
Open Access

Journal of Veterinary and Animal Sciences
ISSN (Print): 0971-0701, (Online): 2582-0605
https://doi.org/10.51966/jvas.2022.53.1.13-17

Amelioration of fly annoyance in dairy cattle by using illuminated fly traps#

N. B. Praveenkumar[1]*, A. Prasad[2], L. Bindu[3], S. Biju[4], and V. L. Gleeja[5]
Department of Livestock Production Management
College of Veterinary and Animal Sciences, Mannuthy, Thrissur -680651
Kerala Veterinary and Animal Sciences University, Kerala

Citation: Praveenkumar, N. B., Prasad, A., Bindu, L., Biju, S. and Gleeja, V.L. 2022. Amelioration of fly annoyance in dairy cattle by using illuminated fly traps. J. Vet. Anim. Sci. **53**(1):13-17
DOI: https://doi.org/10.51966/jvas.2022.53.1.13-17

Received: 18.03.2021 *Accepted: 05.05.2021* *Published: 31.03.2022*

Abstract

Blood-sucking and biting flies are a significant source of annoyance to warm-blooded animals. Behavioural changes in animals may include attempts to pursue, remove or avoid the disturbance caused by the fly by means of body movement. In the presesnt study the behaviour during a 10 min period in each four-hour interval i.e. 1 AM, 5 AM, 9 AM, 1 PM, 5 PM and 9 PM was analysed and noted for inclusion in the ethogram. The cows with light trap (treatment) were compared with those without light traps (control) to study the effectivenss of the fly trap in reducing annoyance in cattle. All the seven avaoidance behaviours were counted such as head movement, ear shaking, tail movement, skin twitching, licking, kicking on belly and restlessness and were recorded by scan method. The results of this study indicated that the incidence of all the seven fly avoidance behaviours were significantly higher ($p<0.01$) in the control group. It could also be concluded that the occurance of all the behaviours in the control group at 1 PM were significantly high followed by 5 PM. The findings of the study suggest that fly activity in dairy farms was high during the afternoon hours followed by evening time and illuminated fly traps could be used effectively in controlling flies, so that the fly avoidance behavior by cattle was reduced on dairy farms.

Keywords: *Fly annoyance, behaviour, light trap, ethogram*

#Part of M.V.Sc. thesis submitted by the first author to the Kerala Veterinary and Animal Sciences University, Pookode, Wayanad, Kerala

1. *M.V.Sc. scholar*
2. *Assistant Professor, Department of Livestock Production Management*
3. *Assistant Professor, Department of Veterinary Parasitology*
4. *Assistant Professor, Department of Livestock Production Management*
5. *Assistant Professor, Department of Statistics*

**Corresponding author email: praveenkumarvet1996@gmail.com Ph.9008353657*

Blood-sucking and biting flies are a major source of annoyance to warm-blooded animals. Behavioural changes in specific animals may include attempts to pursue, remove or avoid annoyance caused by flies by means of body movement (Ralley et al., 1993). Insect- repelling behaviors, like ear-flicking, head-shaking, muscle-twitching, stamping and tail-switching are exhibited by many ungulates to resist or dislodge biting insects in an attempt to reduced pain and blood loss from bites (Hart, 1994). The primary consequences of such behavior is the of loss of energy, accompanying stress, consequent reduction in feed intake, blood losses and resultant reduction in milk, meat, manure production and draught power, all of which translate to a loss of productivity with significant economic impact (Barre, 1981). Flies have been described as the greatest ectoparasite hazard to livestock as these insects cause decreased efficiency in feed conversion, decreased milk production and reduced weight gain (Kirk and Hinkle, 2003). Extreme insect harassment could result in a negative energy balance and ultimately poor physical condition of animals (Helle and Kojola, 1994). The biting flies impose numerous costs on ungulate hosts, including blood loss, reduced feeding or resting time as a result of disturbance and disease transmission (Mooring, 2003). It is against this background that studies leading to a quantification of behavioural changes on account of the fly menace are needed. Therefore, the current experiment was conducted to determine the effectiveness of fly traps in ameliorating the effects of fly menace in dairy cattle, to record the fly annoyance during different periods of the day and fly avoidance behaviour exhibited by animals.

Materials and methods

Study area

The study was conducted in the month of November 2020 at University Livestock Farm (ULF & FRDS), College of Veterinary and Animal Sciences Mannuthy, Thrissur.

Data recording

Six Holstein Friesian crossbred dairy cattle were selected for the study. Animals were housed under a semi closed barn. A surveillance camera was fitted in the selected spot of University Livestock Farm of College of Veterinary and Animal Sciences Mannuthy to record the behaviour of cattle due to fly annoyance. Two groups of six cattle each that included a treatment group subjected to fly traps (5W white LED bulb with blue coloured plastic pot coated with thin layer of castor oil) and a control group (without the traps) were studied for a period of one month.

Behavioural measures

Monitoring the animal behaviour called as ethology, would give the exact representation of animal behaviour during fly annoyance. Fly repellent behavioural patterns such as head movement, ear shaking, tail movement, skin twitching, licking, kicking on belly and restlessness were recorded by scan method. The behaviour during a 10 min period in each four-hour intervals i.e. 1 AM, 5 AM, 9 AM, 1 PM, 5 PM and 9 PM was analysed and noted for the ethogram study. The activities related to fly annoyance were quantified and analysed for effectiveness of traps.

Statistical Analysis

Analysis of repeated measures of ANOVA was calculated by using SPSS Version 24.0

Results and discussion

In the presesnt study the cows with light trap (treatment) were compared with the cows without light traps (control) to study the effectivenss of fly traps in reducing the annoyance in cattle and the same is depicted in Table 1. All the seven avoidance behaviours were counted and comparative number is presented in the Table 1. The results result of the study showed that all the seven fly avoidance behaviour were significantly higher ($p<0.01$) in the control group when compared to the treatment group. The results of the experiment indicated that the use of light traps was very effective in reducing fly annoyance behavior in cattle. The results of the current study is in accordance with Ralley et al. (1993) who reported that dairy heifers displayed a specific

Table 1. Average count of fly avoidance behaviour/day/time in both cows with (T) and without trap (C) experimental groups.

	Avoidance behaviour count/day/time						
Items	Head shaking	Tail movement	Ear shaking	Licking	Kicking	Skin twitching	Restlessness
Cows with trap (T)	$1.456^{a} \pm 0.617$	$5.522^{a} \pm 2.076$	$1.822^{a} \pm 1.899$	$0.578^{a} \pm 0.345$	$0.056^{a} \pm 0.126$	$0.267^{a} \pm 0.654$	$1.189^{a} \pm 0.374$
Cows without trap (C)	$5.833^{b} \pm 0.617$	$36.756^{b} \pm 2.076$	$16.056^{b} \pm 1.899$	$2.267^{b} \pm 0.345$	$1.456^{b} \pm 0.126$	$5.322^{b} \pm 0.654$	$4.211^{b} \pm 0.374$

Table 2. Interactions of all the fly annoyance behaviour between cows with (T) and without trap (C) groups

Interactions	Avoidance behaviour count						
Treatment	Head shaking	Tail movement	Ear shaking	Licking	kicking	Skin twitching	Body movement
T × P1	$1.600^{a} \pm 1.073$	$2.467^{a} \pm 2.274$	$2.133^{a} \pm 1.934$	$0.067^{a} \pm 0.323$	$0.000^{a} \pm 0.205$	$0.000^{a} \pm 0.678$	$1.800^{a} \pm 0.666$
T × P2	$1.800^{a} \pm 1.034$	$2.667^{a} \pm 2.439$	$2.600^{a} \pm 1.104$	$0.933^{a} \pm 0.601$	$0.133^{a} \pm 0.491$	$0.000^{a} \pm 0.639$	$1.533^{a} \pm 0.679$
T × P3	$1.800^{a} \pm 1.444$	$4.533^{a} \pm 4.454$	$1.200^{a} \pm 3.009$	$0.400^{a} \pm 0.398$	$0.067^{a} \pm 0.470$	$0.133^{a} \pm 0.655$	$0.800^{a} \pm 0.490$
T × P4	$1.400^{a} \pm 1.139$	$8.733^{a} \pm 6.859$	$2.533^{a} \pm 5.971$	$0.467^{a} \pm 1.164$	$0.000^{a} \pm 0.331$	$1.462^{a} \pm 1.300$	$0.600^{a} \pm 0.661$
T × P5	$1.733^{a} \pm 1.225$	$12.267^{a} \pm 6.191$	$1.000^{a} \pm 2,178$	$1.467^{a} \pm 0.926$	$0.133^{a} \pm 0.674$	$1.000^{a} \pm 2.095$	$0.733^{a} \pm 0.924$
T × P6	$0.400^{a} \pm 1.398$	$3.067^{a} \pm 2.746$	$1.467^{a} \pm 3.082$	$0.133^{a} \pm 1.161$	$0.000^{a} \pm 0.274$	$0.000^{a} \pm 0.985$	$1.667^{a} \pm 1.045$
Control							
C × P1	$4.133^{aA} \pm 1.073$	$12.133^{a} \pm 2.274$	$11.600^{a} \pm 1.934$	$1.733^{a} \pm 0.3230$	$0.467^{a} \pm 0.205$	$2.733^{a} \pm 0.678$	$2.467^{a} \pm 0.666$
C × P2	$5.067^{a} \pm 1.034$	$17.800^{b} \pm 2.439$	$14.800^{a} \pm 1.104$	$1.933^{a} \pm 0.601$	$2.600^{ab} \pm 0.491$	$2.667^{a} \pm 0.639$	$3.407^{a} \pm 0.679$
C × P3	$4.733^{a} \pm 1.444$	$15.400^{a} \pm 4.454$	$9.133^{a} \pm 3.009$	$0.733^{ab} \pm 0.398$	$1.467^{a} \pm 0.470$	$1.800^{a} \pm 0.655$	$1.200^{abc} \pm 0.490$
C × P4	$6.733^{a} \pm 1.139$	$91.000^{c} \pm 6.859$	$24.667^{ab} \pm 5.971$	$3.400^{a} \pm 1.164$	$1.000^{a} \pm 0.331$	$8.133^{b} \pm 1.300$	$4.133^{abd} \pm 0.661$
C × P5	$6.600^{a} \pm 1.225$	$65.667^{d} \pm 6.191$	$22.800^{ac} \pm 2,178$	$2.800^{a} \pm 0.926$	$2.267^{ac} \pm 0.674$	$11.267^{bc} \pm 2.095$	$7.862^{c} \pm 0.924$
C × P6	$7.733^{aB} \pm 1.398$	$18.533^{a} \pm 2.746$	$13.333^{c} \pm 3.082$	$3.000^{ab} \pm 1.161$	$0.933^{a} \pm 0.274$	$5.333^{ab} \pm 0.985$	6.133acd ± 1.045

individual and group pattern of behaviour for the purpose of removing or avoiding biting flies, especially horse flies, which were the chief source of visible annoyance. The most frequent individual behaviour was tail switching and this occurred more frequently during daily activities, especially when the population of biting flies were high. Flies on the upper neck and face could usually be dislodged by ear flicking. Horse flies flying in and around the head would usually annoy the animals enough for ear flicking, head tossing or head movement. Stomping or kicking to the belly region was the specific responses to mosquitoes, horse flies, and stable flies (Ralley et al., 1993).

El-Laithy (2007) also compared the behaviour of deltamethrin treated and non-treated animals. The author observed that tail switching was the most recurrent fly repellent behaviour in the non-treated cows followed by ear shaking and skin twitching, whereas the lowest recorded fly avoidance behaviour by non-treated cows were stamping of hind legs, head shaking and stamping of fore legs. Eicher et al. (2001) also found that tail switching was

the most frequent fly-avoidance behaviour in dairy cattle for dislodging the flies. These findings were in accordance with our results.

The interaction of both the treatment and control groups with all the time intervals is presented in Table 2. It indicated that interaction of all the behaviours in control group at 1 PM was significantly higher followed by observations at 5 PM .

It was evident from the results of the study that the fly avoidance behaviour was predominantly high in the control group when compared to the treatment group in all the time intervals. At 1 PM interval the avoidance behaviour reached a peak and this was followed by the observations at the 5 PM interval in control group (Fig. 1).

Conclusion

In the present study cows with light trap (tratment) were compared with cows

Fig. 1 Ethogram study by using surveillance camera

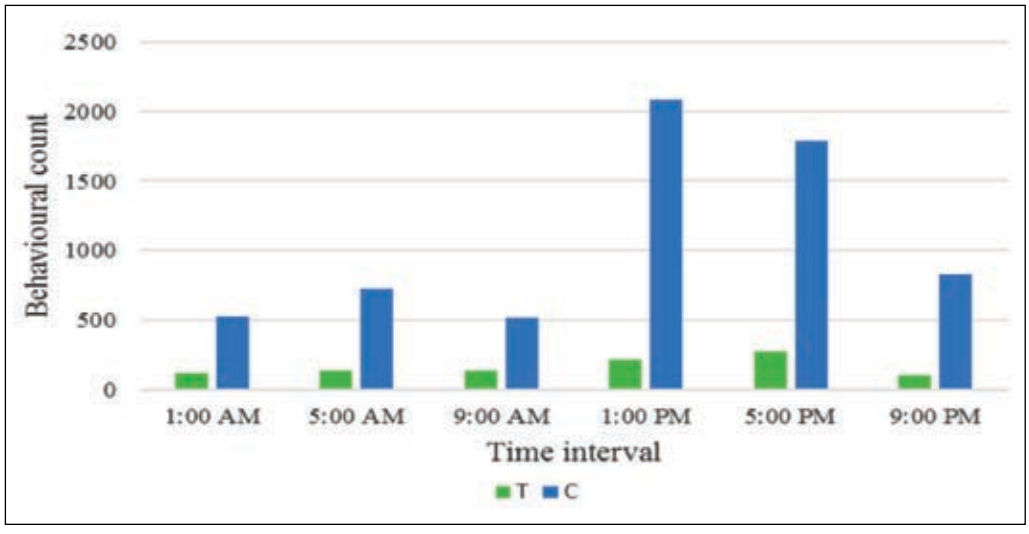

Fig.2 Diurnal variations of behaviour of cattle due to fly annoyance

without traps (control) to study the effectivenss of fly trap to reduce the annoyance in cattle and differences in fly annoyance behaviour shown by dairy cattl were recoreded. All the seven fly avoidance behaviours were significantly higher in the control group. This indicated the high efficiency of treatment group in reducing fly annoyance behaviour in cattle. The interaction of all the behaviour in control group (cows without treatment) at 1 PM was significantly high followed by that at 5 PM. The results of the present study suggest that the fly activity in dairy farms was high at afternoon hours followed by the evening hours and illuminated fly traps are more effective in controlling flies, so that the fly avoidance behavior was reduced in dairy farms.

Acknowledgement

The authors thank the Dean, College of Veterinary and Animal Sciences, Pookode for providing facilities for conduct of the study.

Conflict of interest

The authors declare that they have no conflict of interest.

References

Ralley, W.E., Galloway, T.D. and Crow, G.H. 1993. Individual and group behaviour of pastured cattle in response to attack by biting flies. Canad. J. Zool. **71**(4). pp.725-734.

Hart, B.L. 1994. Behavioural defense against parasites: Interaction with parasite invasiveness. Parasitology. **109**: S 139-S 151.

Barre' N. 1981. Les stomoxes ou. mouches boeufs. a` la re'union. Pouvoir pathoge`ne, e'cologie, moyen de lutte. GERDAT-IEMVT: Maisons-Alfort, France.

Kirk, J.H. and Hinkle, N.C. 2003. Spring preparation for fly pests on your Dairies. Department of Entomology, University of California-River Side.

Helle, T. and Kojola, I. 1994. Body mass variation in semidomesticated reindeer. Canad. J. Zool. **72**: 681-688.

Mooring, M.S., Fitz Patrick, T.A., Fraser, I.C., Benjamin, J.E., Reisig, D.D. and Nishihira, T.T. 2003. Insect defense behaviour by desert bighorn sheep. Southwestern Naturalist. **48**: 635-643.

El-Laithy, S.M.2007. Effect of Fly Annoyance on Dairy Cattle Behaviour and Milk Production. Benha Vet. Med. J. **18**(2): 1-11.

Eicher, S.D., Morrow –Tesch, J.L., Albright J.L. and Williams, R.E. 2001. Tail-docking alters fly numbers, fly avoidance behaviors, and cleanliness, but not physiological measures. J. Dairy Sci. **84**: 1822-1828. ■