Full Length Article

FIELD EVALUATION OF HOUSE FLY DELTA TRAPS IN PIGGERY AND CATTLE FARMS

S.T. Bino Sundar[1*], T.J. Harikrishnan[2], Bhaskaran Ravi Latha[3], T.M.A. Senthil Kumar,[4]G. Sarath Chandra[5], Serma Saravana Pandian [6], C. Pandian[7] and K. Ambasankar[8]

Department of Veterinary Parasitology
Madras Veterinary College
Tamil Nadu Veterinary and Animal Sciences University, Chennai – 600 007

ABSTRACT

*In the present study, red acrylic delta traps were fabricated and evaluated in piggery and cattle farms to trap house flies. Two different pellet baits; one containing (Z)-9-Tricosene, fish meal and molasses (FMP) and other with added antioxidant, butylated hydroxy toluene (FMPB) were used in the traps. In piggery and cattle farms, the traps were suspended at a height of six feet from ground level using metal wires at a distance of three meters between each trap. Each trial was conducted for seven days and the trial was repeated six times continuously without replacement of baits. Trapped flies were counted after each trial. In piggery farm, a total of 1232 flies were trapped, out of which 454 and 778 flies were trapped in FMP and FMPB pellet baited traps, respectively. Total number of flies trapped in the first, second, third, fourth, fifth and sixth week of the study period was 308, 247, 196, 133, 204 and 144, respectively. In cattle farm, a total of 435 flies were trapped, out of which 160 flies were trapped in FMP pellet baited traps and remaining 63.21 per cent (275 flies) were trapped in FMPB pellet baited traps. Total number of flies trapped in the first, second, third, fourth, fifth and sixth week of the study period was 134, 96, 82, 55, 27 and 41, respectively. The variation in trap catches of flies in traps baited with FMP and FMPB pellets was highly significant in both piggery (χ^2 value = 170.42** $p<0.01$) and cattle farms (χ^2 value 60.80** $p<0.01$). Delta traps were found effective in luring house flies and can be used in livestock farms to control house flies.*

Keywords: House fly, Delta traps, (Z)-9-Tricosene, Piggery farm, cattle farm

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[1] Associate Professor and Head, Department of Veterinary Parasitology, VC& RI, Theni- 625 534, *Corresponding author Email id: microfilbino@gmail.com
[2] Professor and Head (Retd), Central University Laboratory, TANUVAS, MMC, Chennai – 51
[3] Professor and Head, Department of Veterinary Parasitology
[4]Project Director, Translational Research Platform for Veterinary Biologicals (TRPVB), TANUVAS, MMC, Chennai – 51
[5]Professor and Head, Pharmacovigilance Laboratory for Animal Feed and Food Safety (PLAFFS), TANUVAS, MMC, Ch –51
[6]Professor and Head, Department of Animal Husbandry Economics, VC& RI, Namakkal
[7]Associate Professor and Head, Veterinary University Training and Research Centre, Sathuvachari, Vellore - 632 009
[8]Scientist, Central Institute of Brackishwater Aquaculture, Chennai - 600 028

INTRODUCTION

The house fly (*Musca domestica*) is a great menace in livestock farms causing irritation and fly worry to animals and farm workers. Animals spent lot of time and energy in wading away the flies and this leads to production losses which are often not calculated promptly. Apart from the irritation and nuisance they cause, house flies are also efficient transmitters of several notable bacterial, viral, and parasitic diseases such as cholera, typhoid, paratyphoid, tuberculosis, bacillary diarrhoea, poliomyelitis, infectious hepatitis, amoebic dysentery, giardiasis, habronemosis and thelaziosis in animals and man either mechanically and cyclically. Although several managemental, physical, chemical and biological approaches are being used to control house flies, effective ways of controlling the house fly still eludes us. Insecticide resistance is one of the major concerns in using insecticides for house fly control in livestock farms and ecofriendly non-insecticide-based approaches are the need of the hour.

Lure and kill traps are one among the options in integrated house fly management strategies (Butler *et al.,* 2007, Chapman *et al.,* 1998, Butler and Mullens, 2010, Colacci *et al.,* 2020, Hinkle and Hogsette, 2021, Geden *et al.,* 2021, Guarino *et al.,* 2022). Several house fly trap prototypes have been designed and field tested with fruitful results. Delta traps are quite commonly used in trapping agricultural pests. Use of delta house fly traps in livestock sector is comparatively less practiced especially in field conditions. Hence this study was undertaken to fabricate delta traps using pheromone-based baits as lures for trapping house flies and to evaluate the field efficacy of these traps in piggery and cattle farms.

MATERIALS AND METHODS

Red acrylic delta traps fabricated following the USDA approved dimensions with a length of 28 cm, width of 20 cm, height of 15 cm and sides of 20 cm with a 20 x 20 cm insert at the base along with yellow sticky insert of 20 x 20 cm dimension was placed for actively flying insects (Fig. 1). The yellow sticky insert was prepared from a yellow-coloured sticky insect glue roll sheet purchased from Harmony Ecotech, Hyderabad. Pellet baits prepared using Fish meal and the pheromone Z-9-Tricosene (FMP pellets) and similar pellet baits with added antioxidant butylated hydroxy toluene (FMPB pellets) were used as lures in delta traps.

Evaluation of Delta traps

Piggery farm

Traps were evaluated in a private piggery farm at Tiruporur, Chennai housing Large White Yorkshire pigs reared in cement flooring with swill feeding practices (Fig.2). A total of 60 pigs were housed in a tile roofed shed of dimensions, Length: 60 feet, Width: 20 feet and Height: 10 feet. Eight traps were used for the study. Four traps contained FMP pellets and another four traps contained FMPB pellets to lure flies. The traps were randomly suspended at a height of six feet from ground level using metal wires at a distance of three meters between each trap. The distance of three meters between each trap was standardized by a trap distance optimization

study done earlier (unpublished data). Traps were cleaned, trapped flies were collected and the insect trapping glue sheet was replaced at weekly intervals. Each trial was conducted for seven days and the trial was repeated six times continuously without replacement of the baits. Trapped flies were counted after each trial. Fly intensity was measured using spot cards before and after deployment of the traps.

Cattle farm

Red acrylic delta traps were evaluated in a private cattle farm at Madhavaram Milk Colony, Chennai housing Jersey and Holstein Friesian cattle (Fig. 3) by following the same procedure as done in piggery farm. A total of 40 cattle were housed in a asbestos roofed shed of dimensions, Length: 80 feet, Width: 12 feet and Height: 10 feet.

Statistical analysis

Data was analysed by Chi square test using Microsoft Excel and IBM ™ SPSS™ Version 20.0 for Windows™.

RESULTS

Delta trap trial in piggery farm

A total of 1232 flies were trapped in piggery farm out of which 36.9 % (454 flies) were trapped in FMP pellet baited traps and remaining 63.1% (778 flies) were trapped in traps with FMPB pellet. There was a reduction in the number of flies trapped from the first week to fourth week of the trial followed by an increase in the fifth week and then a decrease in the sixth week. Total number of flies trapped in the first, second, third, fourth, fifth and sixth week of the study period was 308, 247, 196, 133, 204 and 144, respectively. The variation in trap catches of flies in traps baited with FMP and FMPB pellets was highly significant (χ^2 value = 170.42** $p<0.01$). Spot card count before placement of traps was 83 and spot card count after completion of the six week trapping trial was 5. The per cent reduction in spot card count after placement of traps was 93.97.

Delta trap trial in cattle farm

In delta trap trial in cattle farm, A total of 435 flies were trapped in cattle farm out of which 36.78 (160 flies) were trapped in FMP pellet baited traps and remaining 63.21 per cent (275 flies) were trapped in FMPB pellet baited traps. There was a reduction in the number of flies trapped from the first week to fifth week of the trial followed by an increase in the sixth week. Total number of flies trapped in the first, second, third, fourth, fifth and sixth week of the study period was 134, 96, 82, 55, 27 and 41, respectively. The variation in trap catches of flies in traps baited with FMP and FMPB pellets was highly significant (χ^2 value = 60.80** $p<0.01$). Spot card count before placement of traps was 58 and spot card count after completion of the six week trapping trial was 27. The percent reduction in spot card count after placement of traps was 53.44 per cent.

DISCUSSION

The red acrylic delta trap was found to lure house flies in piggery and cattle farms. Trap servicing was also easy with the delta trap requiring less time and effort with only cleaning of traps and replacement of the insect trapping glue sheet once in a week in piggery

and cattle farms. Glue based traps have been evaluated by researchers in laboratory conditions and livestock farms. Hogsette (2008) compared the efficacy of different (Z)-9-tricosene based sticky traps under laboratory conditions and found higher efficacy of adhesive roll encapsulation trap (than adhesive glue board trap and adhesive glue board trap in trapping house flies. At field level, Pickens *et al.* (1986) Rutz *et al.* (2000), Kaufman *et al.* (2005) and Gerry *et al.* (2011) evaluated the use of sticky traps and sticky ribbons to trap flies in different dairy farms and recommended the use of these traps in the integrated pest management programmes for control of house flies in commercial dairy operations. In the present study, eight delta traps suspended six feet above the floor horizontally in cattle farm and piggery farm trapped 435 and 1232 flies respectively, during the study period of 42 days and this was efficient compared to the level of fly infestation in the farms in the study wherein fly infestation was more in piggery farm compared to cattle farm.

Johnson and Campbell (1987) evaluated four sticky-trap designs viz., pyramid trap, cylindrical trap, square panel trap and blood board sticky trap for their effectiveness in capturing the face fly, *Musca autumnalis*, from three different locations in an irrigated pasture. Among different sticky-trap designs, pyramid traps captured significantly more male and female face flies (Johnson and Campbell 1987) and house flies (Pickens and Miller, 1987). In the present study, fish meal and pheromone-based pellet baits were found effective in luring house flies. Pickens *et al.* (1994) advocated the use of baited cone traps and white pyramidal traps covered with sticky sheets in outdoor conditions to trap house flies.

Based on the observations made in the present study delta traps can provide a sensitive and continuous system to trap house flies effectively in piggery and cattle farms. Delta traps are also cost effective, weightless and easy to carry and stock compared to other trap prototypes and can also be fabricated in low-cost material such as foam boards. Delta traps were also found to be safe provided that they are deployed in a safe distance away from animals (six feet from ground level). In the present study, pigs were found to charge the traps when deployed in heights lower than six feet above the ground level. Delta traps were found sturdy in spite of attacks by monkeys on the traps deployed in piggery farm which was adjacent to a forest area. Another advantage of delta traps over electric or solar traps is that these traps do not contaminate the environment as like high voltage electric traps where trapped flies are shattered facilitating the release of body fragments of flies, microparticles and bacteria which could lead to food contamination (Ananth *et al*., 1992; Urban and Broce, 2000). In addition, flies maimed by sub lethal shock in electric and solar traps could walk on food surfaces and promote food contamination (Pickens, 1989) and this problem is not there in glue traps where flies once trapped cannot escape and eventually die of exhaustion.

In conclusion, the red acrylic delta traps baited with (Z)-9-tricosene impregnated in fish meal pellets could help to efficiently trap house flies and can be used in piggery and cattle farms as part of Integrated house

Fig 1. Red acrylic delta trap used in piggery and cattle farms

Fig 2. Delta traps deployed in piggery farm

fly management practices as opined by Hinkle and Hogsette, 2021, Geden *et al.* 2021 and Guarino *et al.* 2022 to effectively control house fly populations thereby minimizing the use of chemical insecticides.

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Fig 3. Delta traps deployed in cattle farm