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Fly menace and its role in animal health

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Abstract

During the summer season, India, being a tropical country, faces significant challenges due to increased fly attacks, posing threats to the well-being and productivity of dairy animals. These attacks not only jeopardize animal welfare but also result in financial losses, as the animals' distress leads to disruptions in feeding and a decrease in milk production. While conventional insecticides are commonly used for fly control, concerns regarding safety and the development of insecticide resistance highlight the need for alternative strategies. Consequently, in an effort to address the issue of insecticide resistance, there is a growing exploration of plant extracts and oils, such as Allium, Azadirachta, Cymbopogon, Eucalyptus, Pogostemon, Mentha, and Ricinus. These substances contain bioactive compounds capable of exerting diverse modes of action to prevent the development of resistance.

Keywords: Insecticide resistance, economic loss, plant extracts

Introduction:

One of the foremost challenges in the 21st century involves the imperative to nourish an expanding population while simultaneously enhancing the productivity of agricultural ecosystems and preserving the health and integrity of surrounding environments for the well-being of future generations (Baker et al., 2015). To attain the objective of achieving optimal or maximum production from livestock, it is imperative to boost the population of healthy animals through meticulous adherence to sound management practices, the provision of a well-balanced diet and safeguarding against infectious diseases. Beyond addressing bacterial and viral infections, it is essential to take mandatory measures for protection against vectors and vector-borne diseases. This necessitates the timely implementation of effective Integrated Pest Management (IPM) practices.

Common flies of dairy cattle:

Multiple species of flies are regarded as notable pests affecting both freely roaming and confined cattle. About 20 families of flies are of veterinary importance which are characterized into blood-sucking or biting flies, such as horn flies (*Haematobia irritans*), stable flies (*Stomoxys calcitrans*), horse flies (*Tabanus sp.)* and deer flies (*Chrysops sp*.) (Cortinas and Jones, 2006),

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and non-blood sucking flies like face flies (*Musca autumnalis*), house flies (*Musca domestica*) (Kumar *et al.*, 2011), cattle grubs and the larva of heel flies (gadflies) (*Hypoderma lineatum, and Hypoderma bovis*).

Economic effect of fly menace:

The flies cause damage to livestock either directly as parasites and pests, or indirectly as vectors of disease as given in Table 1.

Table 1. Diseases or illness carried by flies

Fly	Mechanical vector
House fly	Anthrax
Horn fly	Bovine anaplasmosis, Corynebacterium pseudotuberculosis, mastitis-causing agent, Staphylococcus aureus
Face fly	*Moraxella bovis* (bovine pink-eye), bovine rhinotracheitis (IBR), nematode eye worm, *Thelazia* sp.,
Stable fly	West Nile Virus, bovine leukosis and anaplasmosis

The extent of damage inflicted by flies is contingent on the type of mouthparts they possess. Blood-sucking flies, equipped with mouthparts capable of cutting through skin and blood vessels, prompt animals to cluster together for protection. This behaviour, observed in response to the threat posed by aggressive feeders like Stable flies, can lead to a cessation of feeding, resulting in weight loss and diminished milk flow. The close proximity of huddled animals for defense may also result in injuries as they engage in defensive actions like hooking or kicking. Stable flies, known for their painful bites, induce considerable "fly worry" in cattle, causing them to expend energy on avoidance behaviors such as foot stamping and tail switching. The biting mechanism of stable, horse, and deer flies is presumed to be highly painful, as their mouthparts tear through skin and blood vessels during feeding. The anti-thrombosis components present in the saliva of horse and deer flies prevent rapid clotting of the wound and attract other flies, such as house and face flies, to the site.

Control and management of fly menace:

Over the past five decades, synthetic insecticides in various formulations such as dusts, sprays, pour-ons, feed additives, and insecticide-impregnated ear tags have been widely employed as effective tools for managing pest flies (Butler and Okine, 1999). However, concerns have arisen regarding the increasing insect resistance to conventional treatments due to the excessive reliance on insecticides with similar modes of action. Additionally, environmental and health impacts have been noted (Foil et al., 2010; Pitzer et al., 2010), and a shortage of new active compounds for insecticides has underscored the need for innovative pest management strategies.

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With a growing focus on organic dairy production, where no registered pesticides are available for use, organic herds are particularly susceptible to high levels of pest flies. Consequently, there is a rising interest in alternative methods for natural and effective control of fly infestations, including the use of organic pesticides like essential oils (Hieu et al., 2010; Geden, 2012) and mechanical fly repellents (Denning et al., 2014), with promising results.

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