Short Communication

OCCURRENCE OF DIPTERAN LARVAL INFESTATION AMONG LIVESTOCK SPECIES IN CAUVERY DELTA REGION OF TAMILNADU

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ABSTRACT

A total of 46 maggot samples were collected from various sites of different species that were reported to the Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu during the period from April 2023 to April 2024. The maggots were preserved in 70% ethanol and identified based on the morphological features of posterior spiracles. The larvae were found to be of the flies of the genus Chrysomyia, Lucilia, Oestrus ovis, Sarcophaga and Musca. In this study, Chrysomyia (47.82%) was more prevalent than other larva-Lucilia (32.60%), Oestrus ovis (8.69%), Sarcophaga (6.52%) and Musca (4.34%). The occurrence of myiasis were highest during the rainy season (41.30%) followed by summer (34.78%), winter (23.91%). Rump, shoulder, brisket and umbilical regions were some of the areas, the lesions of wound myiasis were frequently located. The study highlights the seasonal occurrence of various dipteran larval infestations among the livestock species from Cauvery delta region of Tamil Nadu.

Key words: *Chrysomyia, Lucilia, Maggot, Musca,Oestrus ovis, Sarcophaga*, Season

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INTRODUCTION

Myiasis is one among the common causes of huge economic loss caused by the dipteran flies. Infestation by larval stages of flies result in skin damage, reduction in the wool yield, lameness and toxaemia. Unlike, some are known for their contributions to medicine through "maggot therapy", some as forensic indicator species and many as environmental pollinators (Wayman *et al*., 2000). Myiasis is commonly defined as the

infestation of live human and vertebrate animals with larvae (maggots) of flies from the order Diptera, which feed on the host`s dead or living tissue, liquid body substances or ingested food (Farrar *et al*., 2024) and they infest the host in three forms viz., traumatic or wound form (the larvae feed on living or necrotic tissues), furuncular form (larvae penetrate the healthy skin and a furuncle develops) and cavitary form (larvae invade mainly the digestive and urinary tracts) (Marcondes and Thyssen, 2022).

Primary myiasis, caused by flies such as *Lucilia, Calliphora and Phormia*, occurs when their eggs are deposited on skin, with maggots feeding on living tissue, often burrowing deep. Secondary myiasis, caused by flies like *Chrysomyia* and *Sarcophaga,* involves maggots feeding on necrotic tissue in wounds without burrowing (Soulsby, 1982). Certain fly larvae, like *Lucilia caesar* and *Phaenicia sericata* have also been linked to botulism in chickens. It is due to the fact that *Clostridium botulinum* multiplies in carrion, where it may be picked up by the larvae and then passed on to chickens which feed on that maggot (Slapeta, 2022). The current study reports the occurrence of maggot infestations in various livestock species from Cauvery delta region of Tamil Nadu, India.

MATERIALS AND METHODS

A total of 46 samples including dead and live maggots were collected from various locations of different species (cattle, sheep, goat, chicken and dog) reported to Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu, Thanjavur, at different points of time during the period from April 2023 to April 2024. The maggots were preserved in 70 % ethanol and submitted to Department of Veterinary Parasitology, Veterinary College and Research Institute, Orathanadu for morphological identification. The maggots were processed in 10% sodium hydroxide solution followed by dehydration in the ascending grades of alcohol and posterior end of maggots were carefully cut from larvae and cleared under lacto phenol and focused on low power microscopy for identification.

RESULT AND DISCUSSION

The maggots recovered from the cases were found to be the dipteran larvae of flies namely *Musca, Chrysomyia, Lucilia, Sarcophaga* and *Oestrus ovis,* based on the morphological characters of the postpreverior spiracles (Table.1). From the current studies, it was found that the Chrysomyia was more prevalent (47.82%) in the Cauvery delta region, over other larva which is followed by *Lucilia* (32.60%), *Oestrus ovis* (8.69%), *Sarcophaga* (6.52%) and *Musca* (4.34%). In addition to that it was observed that the cattle (34.78%) accounted for the highest proportion of recorded cases than the dogs (32.60%) followed by goats (21.73%), sheep (8.69%) and chicken (2.17%). Added to the above results, it was found that the occurrence of myiasis was found to be maximum during the rainy season (41.30%) followed by summer season (34.78%), winter season (23.91%) (Fig.1a, 1b). Frequency of maggot

infestation was higher in rump, shoulder, brisket and umbilical region as described (Fig. 2). The table.2 shows the seasonal occurrence of maggot infestations during the period from April 2023 to April 2024.

Myiasis have a worldwide spread. They occur both in humans and animals, yet are economically more important in animals than the man. Although the dipteran species of family Calliphoridae, Sarcophagidae, Muscidae and Fanniidae are most important in forensic investigations (Al-Ghamdi *et al.,* 2015), the larva from the flies of the genus *Chrysomyia, Lucilia, Musca, Oestrus* and *Sarcophaga* have a significant role in causing myiasis in animals (Jalajakshi and Hafeez, 2015; Jyothi Sree *et al.,* 2022). There are many classifications of myiasis where some flies need living tissues for the completion of their life cycle while some can continue to evolve in decaying matter too. But in common these flies need a medium to propagate where they lay their eggs/ larva and larva emerging out of the eggs, feed on the medium, grow and pupate, from which under ambient conditions the adult fly emerges out (Soulsby, 1982). The larval stages of these flies are the major culprits of myiasis, being recognized from ancient times itself, flies being one of the world's most devastating insects, responsible for severe losses in animal husbandry, with significant economic losses, including reduced milk production and weight, fertility issues, and reduced hide quality (Zumpt, 1965). However adult flies can also be annoying and can increase the stress level of the host causing anxiety, restlessness and reluctance to graze. Myiasis is the result of a complex interaction of factors, such as fly and host abundance, host susceptibility, climate and, critically, husbandry and management strategies, all of which change seasonally in space and time (Wall, 2012).

This study throws some light into the occurrence of dipteran infestation in Cauvery delta region where the occurrence of Chrysomyia larva was more than the larva of other flies- *Lucilia, Sarcophaga, Musca* and *Oestrus ovis*. In our study, the frequency of myiasis were more observed in cattle (34.78%) than dogs (32.60%), followed by goat (21.73%), sheep (8.69%) and chicken (2.17%) which was in correlation with the study conducted in Bangladesh (Sarker *et al.*,2016), where the occurrence was highest in cattle than goat. In addition to that, it was observed that myiasis occurred in different parts of the body of host where the occurrence of myiasis is highest in rump, umbilical and brisket, lowest in regions like ear, buccal cavity and jaw, and the regions like shoulder, vulva, groin and nasal septum were moderately affected which was in contrary to the studies conducted in Hungary (Farkas *et al*.,1997) and in Nilgiris (Soundararajan and Iyue, 2018) where the genital organs especially the vulval regions were affected more.The occurrence of myiasis in navel area of cattle as well as in brisket and mandible region of sheep was reported by Rahman *et al.* (2009) in Bangladesh and by Soundararajan and Iyue, (2018) in Nilgiris, respectively. The occurrence was more during the rainy season followed by the summer season which was at variance with the study conducted in Nilgiris (Soundararajan and Iyue,2018)

where the prevalence was more during the summer and medium during the south-west monsoon (rainy season).

The myiasis infested animals were often displayed loss of condition, and were lame, restless, anxious and often try to lick, kick or bite the affected areas. The myiasis infestations around the regions like the rump, groin and vulva can be due to the fact that they often get soiled by dung as well as by urine and can also be due to trauma caused during parturition which attracts the flies for egg laying. Nasal septum of the sheep was more affected than other animals due to the infestation of the larva of *Oestrus ovis* (Soulsby, 1982). Myiasis infestation in the hoof can occur as a secondary condition in foot lesions pertaining to FMD in cattle. It was observed that the sheep were more infested with the larva during the months May and June and common among the sheep that were infected with sheep pox. The occurrence of myiasis can occur due to the lesions caused during improper tagging. Since there is also the prevalence of the lumpy skin disease in the Cauvery delta region which was corroborated by Karthika *et al*. (2023), the ocular discharges as well as the wounds and the erosions caused due to the severity of lesions also encouraged the occurrence of myiasis. Their prevention and control methods play a significant role in hampering the economic losses caused by them. Some of the methods include selective breeding to eliminate skin folds at the back region of sheep, shearing to shorten the wool around tail and breech area, crutching and carcass destruction (Nouri and Salehi, 2020). As everything has a positive and negative side, the concept of myiasis have also been used as a recognised treatment for debridement of necrotic wounds in humans where the larva of blow flies, especially Lucilia sericata play a significant role (Sykes, 2023) as surgical maggots. This maggot therapy also considered to be safe and relatively a cost-effective method often associated with faster tissue growth, disinfection and reduction in the duration of the antibiotic therapy. Such therapy can also effectively reduce the biofilm and bacterial load in a wound (Bazalinski *et al*.,2019).

In conclusion, the present study documented the proportionate occurrence of the dipteran larval infestation causing myiasis, host being affected, their seasonal occurence and the most common site of occurrence among the livestock species from Cauvery delta region based on the clinical-case-based sampling approach. Impaired husbandry facilities, improper drainage, location of the farms and poor postoperative care of wounds can also be some of the predisposing factors for occurrence of myiasis. The implication of these findings can give some guidance to combat them from occurring and highlights the importance of preventing such conditions to avoid huge economic loss to the marginal farmers.

Table.1. Morphological features of Posterior spiracles of maggots

Larva	Morphology
Chrysomyia sp. (Fig. 3)	Circular posterior spiracles without button, incomplete circumference of peritreme, each spiracle with three longitudinal slits
Sarcophaga sp. (Fig. 4)	Circular posterior spiracles with button, incomplete circumference of peritreme, each spiracle with three longitudinal slits
Oestrus ovis (Fig. 5)	D shaped stigmatal plate with radiating slits containing one central opening and many accessory openings
Lucilia sp. (Fig. 6)	Circular posterior spiracles with button, complete circumference of peritreme, each spiracle with three longitudinal slits
Musca sp. (Fig. 7)	D shaped spiracles with M shaped stigmal slits

Table. 2. Seasonal occurrence of maggot infestation

Season	Occurrence (%)	Species	Occurrence (%)
Summer (March to June)	34.78	Chrysomyia sp.,	37.5
		Lucilia sp.,	25
		Sarcophaga sp.,	6.25
		Musca sp.,	12.5
		Oestrus ovis	18.75
Monsoon (July to November)	41.30	Chrysomyia sp.,	63.15
		Lucilia sp.,	21.05
		Sarcophaga sp.,	10.52
		Musca sp.,	-
		Oestrus ovis	5.26
Winter (December to February)	23.91	Chrysomyia sp.,	36.36
		Lucilia sp.,	63.63
		Sarcophaga sp.,	-
		Musca sp.,	-
		Oestrus ovis	-

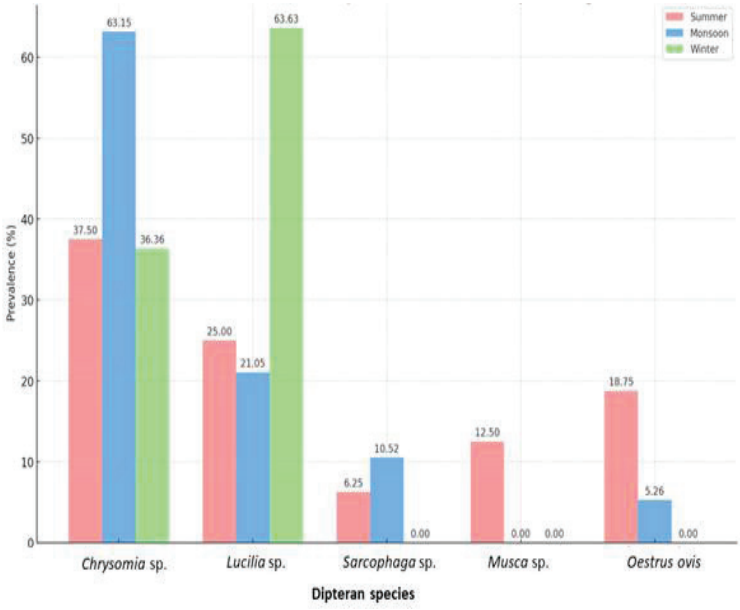

Fig.1a. Seasonal occurrence of various dipteran flies

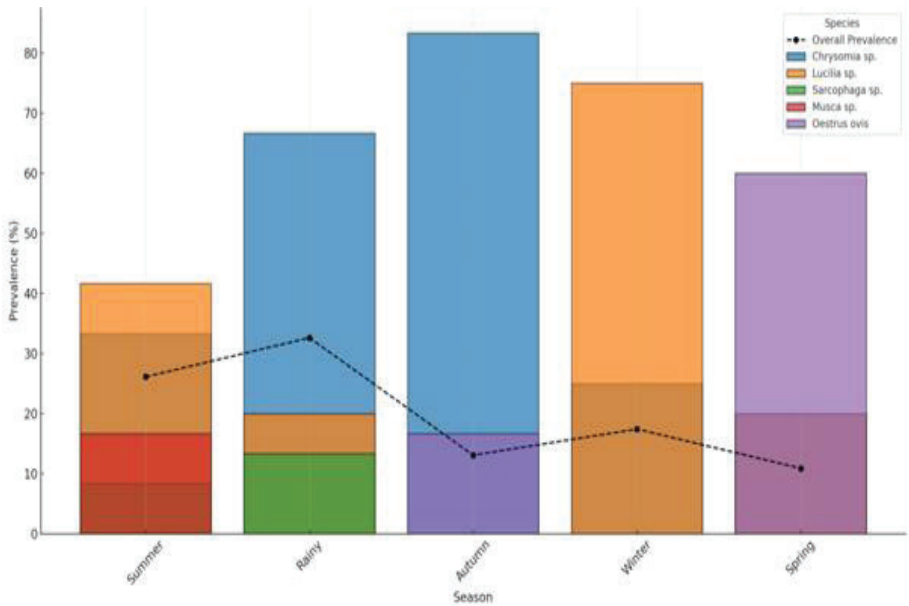

Fig.1b. Seasonal occurrence of various dipteran flies

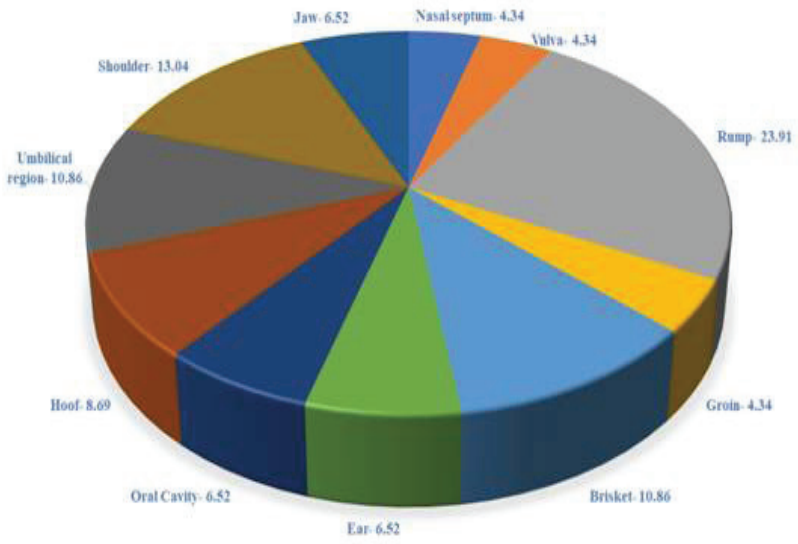

Fig.2. Occurrence of various myiasis sites

Fig. 3. Posterior spiracles of *Chrysomia* sp.

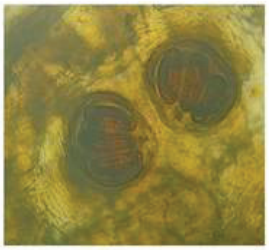

Fig. 4. Posterior spiracles of *Sarcophaga* sp.

Fig. 5. Posterior spiracles of *Oestrus ovis*

Fig. 6. Posterior spiracles of *Lucilia* sp.

Fig. 7. Posterior spiracles of *Musca* sp.

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