Journal of Scientific Agriculture 2018, 2: 97-100
doi: 10.25081/jsa.2018.v2.1038
http://updatepublishing.com/journals/index.php/jsa

Regular Article

ISSN: 2184-0261

Survey of flies (order: diptera) of Medical and Veterinary importance infesting livestock in Maiduguri, Borno state, Nigeria

Biu Abdullahi Abubakar, Kyari Falmata, Onyiche Emmanuel ThankGod*, Abdulhamid Abdulmalik, Mohammed Ali

Department of Veterinary Parasitology and Entomology, University of Maiduguri, Nigeria

ABSTRACT

An entomological survey of dipterous flies was conducted between January and March 2017 to investigate the distribution, relative abundance and monthly distribution of vectors flies of livestock in Maiduguri metropolis, Borno state. A total of 5192 flies were caught from four (4) different locations within Maiduguri using biconical trap and aerial sweeping hand net. Flies were collected and identified using standard taxonomy keys. *Musca domestica* was considered most prevalent 4346 (73.71%) while Hippobosca *equina* 4(0.08%) was the least. Others are *Stomoxys calcitrans* 6(0.12%), *Tabanus* sp. 5(0.10%) and *Lucilia cuprina* 831(16%). The number of female flies caught in the study campaign was higher 3086(59.44%) than that of male flies 2106(40.56%). The total number of non-haematophagous flies caught was much higher 5177(59.42%) than that of haematophagous flies 15(0.29%). Furthermore, of the four different sampling area; Livestock market has the higher number of catches 3432 (66.10%), Animal science poultry house 920(17.72%), Large animal clinic 462 (8.09%) and Gidan doki had the least catches 378(7.28%). In addition, the number of adult flies caught was higher 2922 (56.28%) than immature flies 2270 (43.72%). Results from the monthly distribution shows that January had the least 1473 (28.37%) followed by February 1664 (32.05%) and March 2047 (39.43%) had the highest number of catches. The veterinary and medical importance of the findings is discussed.

Received: March 28, 2018
Accepted: May 24, 2018
Published: June 19, 2018

***Corresponding Author:**
Onyiche Emmanuel ThankGod
Email: eonyiche@yahoo.com

KEYWORDS: Diptera, musca, maiduguri, livestock, haematophagous, flies

INTRODUCTION

Dipterous flies are important insect orders in terms of their impacts on Veterinary medicine, medicine and agriculture [1]. In the class insect, the dipteral are considered as one of the largest orders and over 120,000 species have been described to date [14}. These flies undergoes complete metamorphosis. Many well known dipteran species have been implicated in myiasis [2] mechanical and biological vectors for protozoan cysts, helminth eggs, bacterial and viral pathogens [3].The Dipterans as a group of insects have a considerable impact on the environment.

Musca domestica (Diptera: Muscidae) has been reported as a mechanical vector responsible for a wide range of infections [3]. *Stomoxys calcitrans* can attack several large mammals including horses serving as vector of *Habronema microstoma* and have also been implicated as mechanical vector for *Trypanosoma evansi* (Surra) [4]. *Trypanosoma evansi* have been detected in tabanids (*Tabanus taeniola*) collected in Zambia [5]. Furthermore, *Lucilia* sp. have been implicated with myiasis while *Hippobosca* sp. are ectoparasites that sucks blood and transmits pathogen to animals [6].

Flies are reported to have economic importance in poultry farms either directly by causing annoyance to workers or indirectly by causing reduction in egg production of hens [7,8]. The occurrence and distribution of these dipterous flies in metropolitan and rural areas are factors of public health concern. This is because they can be associated with epidemic outbreaks of diseases [9]. Therefore, in the last two decades, there is a growing interest among entomologists to study the distribution, seasonality and abundance of flies in poultry farms, slaughter houses, cattle farms and horse stables in relation to environmental and climatic variables. It is against this backdrop that this investigation was undertaken to find out the distribution, prevalence and the relative abundance of dipterous flies of livestock in various locations in Maiduguri, Borno state.

MATERIALS AND METHOD

Study Area

Maiduguri is the capital city of Borno State in northeastern Nigeria. It lies between latitude 10.20N and 13.40N longitude 9.80E and 14.40N. It is approximately 69,436 sq km in size(Figure 1). It shares international boundary with Niger Republic to the North, Republic of Chad to the Northeast and Cameroun to the East [10]. The Maiduguri metropolitan abattoir is located in Maiduguri, the capital of Borno State. The area also has a temperature that ranges between 34°c to 42°c with mean annual rainfall of 647mm [11].

Sampling Points and Period

The study was conducted during the dry season which lasted for three months between January and March, 2017. Samples were collected from four locations within the metropolis. These areas included; Large animal clinic, Faculty of Veterinary Medicine; Poultry House, Animal Science Department. Both Large animal clinic and Poultry house are located within the University of Maiduguri. Other include Livestock market also known as Kasuwan shanu, where the sale of small and large ruminants including camels takes place and finally Gidan Doki, a place where horses are been kept mostly in two areas involving Unguwan doki and Shehu's palace (Figure 1)

Sample Collection and Identification

Flies were caught using biconical traps baited with piece of beef. Also, Aerial sweeping net was also used as described by Thadeu and Barros [12]. Briefly, the holder of the aerial sweeping net stands beside the animals sweeping the net at different time intervals capturing the flies hovering in the region of the animals.

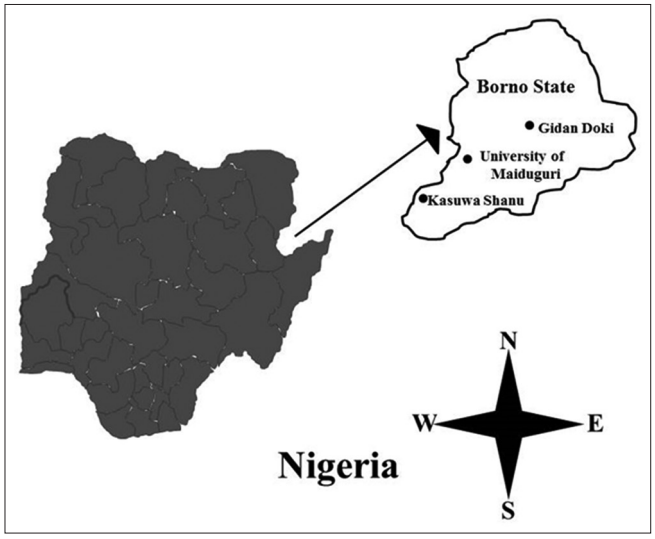

Figure 1: Map of Nigeria showing the study area, Maiduguri, Borno State

The samples (flies) collected were counted and subsequently preserved in 2% formalin. Thereafter, they were taken to parasitology laboratory, faculty of Veterinary Medicine, University of Maiduguri, Nigeria. The flies were emptied into Petri dishes and examined using the stereoscopic microscope. Identification was done using taxonomic features such as wing venation, mouth parts, antennae, and size of the flies as described by Soulsby [4].

Statistical Analysis

Data obtained are summarized in tables and figures. One sample t test was performed using Graph pad Prism version 5. Significant levels were set at ($p < 0.05$).

RESULTS

The results of the population and relative abundance of different dipterous flies in Maiduguri, Borno State are presented in Table 1. *Musca domestica* was the most prevalent of the dipterous flies 4346(83.71%) while *Hippobosca equina* was the least 4(0.08%). Others included *Lucilia cuprina* 831(16%), *Stomoxys* calcitrans 6(0.12%) and *Tabanus* sp. 5 (0.10%). No significant difference ($p > 0.05$) was observed between the different genera of dipterous flies caught in Maiduguri, Borno State.

Table 2 shows the distribution of flies according to sex. The number of female flies 3086 (59.44%) was more than male flies 2106 (40.56%). No significant difference was observed between sexes ($p > 0.05$).

The results of the distributions of flies according to feeding habits are presented in Table 3. The number of non haematophagous

Table 1: Population and relative abundance of dipterous flies in Maiduguri, Borno State

Genus	Number of catches	Relative abundance (%)
Musca domestica	4346	83.71
Lucilia cuprina	831	16.00
Hippobosca equina	4	0.08
Stomoxys calcitrans	6	0.12
Tabanus sp.	5	0.10
Total	5192	100

Table 2: Distribution of flies according to sex

Sex of flies	Number of catches	Relative abundance
Male	2106	40.56
Female	3086	59.44
Total	5192	100

Table 3: Distribution of flies according to feeding habits

Feeding habit	Number of catches	Relative abundance
Haematophagous	15	0.29
Non haematophagous	5177	99.71
Total	5192	100

flies 5177 (59.42%) caught in this campaign was more than haematophagous flies 15 (0.29%) with significant difference ($p<0.05$).

Table 4 shows the distribution of flies according to locations. The livestock market had the highest number of catches 3432 (66.10%) while Gidan doki had the least number of catches 378 (7.28%). Others included Poultry house 920 (17.72%) and Large animal clinic 462 (8.89%) with no significant significance ($p > 0.05$).

Table 5shows the distribution of flies according to age. More adult flies were caught 2922 (56.28%) than immature flies 2270 (43.72%). No significant difference was also observed between ages ($p>0.05$).

Finally, the monthly distribution of dipterous flies during the study period is shown in Table 6. More flies were caught in the month of March 2047 (39.43%) followed by February 1664 (32.055) and January 1473 (28.375) had the least catches. No significant difference ($p> 0.05$) was observed between months.

DISCUSSION

A total of 5192 flies comprising of five (5) genera were caught from four (4) different locations within Maiduguri. These genera of dipterous flies of medical and veterinary importance includes *Musca domestica*, *Tabanus* sp., *Hippobosca equina*., *Lucilia cuprina* and *Stomoxys calcitrans Musca domestica* was the most prevalent and abundant of the flies in the study area. This may be unconnected with the fact that majority of the catches were from the Livestock market although in all locations, *Musca domestica* was the most abundant while *Hippobosca equina* was the least of the flies. Similar findings have been reported by other researchers [13, 14]. In addition to *Musca domestica*, Biu *et al*., [13] reported the presence of other dipteral flies such as *Simulium sp*., *Glossina sp*., and *Anopheles sp*. which was not caught in this study. The difference may be due to the location of the study. The abundance of *Musca domestica* compared to other genera found in this study could be likely due to the fact that *Musca domestica* has a worldwide distribution. *Musca* species is also a pest on most farm animal, at homes and everywhere. Furthermore, the micro and macro-environmental conditions are favourable for the breeding of the flies and completion of their life cycle. *Hippobosca equina* has low numbers in this study and could be ascribed to host specificity and to a large extent the inadequacy of the technique used during sample collection.

More flies were caught in the livestock market and least flies were caught in Gidan doki. Effects of factors such as management practices, presence of natural enemies and environmental conditions could have attributed to the differences in their densities/abundance observed in the above sampling sites. Also, animals are slaughtered and meat are sold around the vicinity of the market. This attracts a lot of flies and protective netting are not used. This could also be the reason for the high number caught in the study area. Furthermore, Maiduguri, is a Sahelian region with high temperature and this fly is known to survive and reproduce successfully. Furthermore, more flies were caught in March than in February and January had the least. This may be unconnected with the temperature and humidity at that particular time of the year. From the meteorological data, March had the highest relative humidity and temperature. Temperature and humidity plays an important role in the abundance and presence of flies. Ahmed *et al.* [15] opined that optimal temperatures stimulate quick reproduction. Therefore, flies numbers are influenced by the meteorological parameters in the study areas.

In addition, more female flies were caught than male. This has serious implications for reproduction as the abundance of more female flies will mean more reproduction and hence more number of flies. Haematophagous flies were few in number and were only caught in Gidan doki where horses are kept. Non haematophagous were the most prevalent. In respective of the number of haematophagous flies, their mere presence play a significant role in the transmission of blood borne protozoa pathogens.

Musca domestica has been reported as a mechanical vector for more than 65 human and animal gastro-intestinal diseases [3]. In villages, this type of insects cause decreased livestock production spreading important animal diseases [16]. *Musca domestica* have evolved to live in close association with humans as annoying pestiferous scavengers. Outbreaks of diarrheal diseases are closely correlated with the seasonal increase in

Table 4: Distribution of flies according to sampling location

Sample location	Number of catches	Relative abundance
Large Animal Clinic	462	8.89
Poultry House	920	17.72
Livestock Market	3432	66.10
Gidan Doki	378	7.28
Total	5192	100

Table 5: Distribution of flies according to age of flies

Age of flies	Number of catches	Relative abundance
Immature	2270	43.72
Adult	2922	56.28
Total	5192	100

Table 6: Monthly distribution of dipterous flies during the study period

Month	Total catch (%)	*Musca domestica*	*Tabanus* sp.	*Lucilia cuprina*	*Stomoxys calcitrans*	*Hippobosca equine*
January	1473 (28.37)	1088	0	380	4	0
February	1664 (32.05)	1407	5	250	0	4
March	2047 (39.43)	1851	0	193	2	0
Total	5192 (100)	4346	5	831	6	4

abundance of this fly. Fly control has been closely correlated with a decrease in the incidence of such diseases [17].They transmit disease through small particles that readily adhere to the exterior surfaces of the fly most especially the hairs and bristles and they do not detach easily. The occurrence, distribution and abundance of these dipterous flies in metropolitan areas are factors of public health relevance.

CONCLUSION

Findings from this study demonstrate the presence of several genera of biting and non biting flies inhabiting the various study sites in Maiduguri, Nigeria. These findings in the study, calls for concern among stakeholders in the livestock industry. Attention should be focused on controlling fly number in the study areas to prevent their impact on the health of livestock. Therefore, further studies should be carried out to ascertain the pathogens that are been carried by this pest in the different agroecological zones of the state.

REFERENCES

1. Emameh Z, Syrjänen R, Barker L, Supuran HC. Parkkila S. Drosophila melanogaster: a model organism for controlling Dipteran vectors and pests. Journal of Enzyme Inhibition and Medicinal Chemistry. 2015; 30(3):505-513.
2. Hanan AMB. Prevalence of dipterous flies with veterinary importance in selected sheep's farms and slaughter houses in Jazan, Saudi Arabia. Egyptian Academic Journal of Biological Sciences. 2010; 3(2): 63-73.
3. Marchiori CH. Species of Diptera of medical, sanitary and veterinary importance collected from buffalo and cattle dung in South Goiás, Brazil. International Journal of Applied. 2014; 4(2):54-57.
4. Soulsby EJL. Helminths, *Arthropods and Protozoa of Domesticated Animals*. 7th ed. Bailliere Tindall, London, UK; 1982.
5. Taioe MO, Motloang MY, Namangala B. *et al.* Characterization of tabanid flies (Diptera: Tabanidae) in South Africa and Zambia and detection of protozoan parasites they are harbouring. Parasitology. 2017; 1-17.
6. Halos L, Jamal T, Maillard R. *et al.* Role of Hippoboscidae flies as potential vectors of Bartonella spp. infecting wild and domestic ruminants. Applied and environmental microbiology. 2004; 70(10):6302-6305.
7. Miller RW, Pickens LG, Potts WE. Comparison of traps and an integrated program to manage house flies and stable flies on dairy farms. Journal of agricultural entomology 1993.
8. Gruvel J. General considerations on the significance of the mechanical transmission of trypanosomes in cattle. Insect Science and its Application. 1980; 1:55-57.
9. Heath ACG. Distribution, seasonality and relative abundance of *Stomoxys calcitrans* (stablefly)(Diptera: Muscidae) in New Zealand. New Zealand Veterinary Journal. 2002; 50(3):93-98.
10. Musa AW, Pindar TY. Geographical history of Borno State; by the Borno State Ministry for Local Government and Chieftaincy Affairs. ALGON Diary.
11. Lake Chad Research Institute (LCRI). Annual Weather Report. IFAD-TAG. 2007; 718: 28.
12. Thadeu B, Barros ATM. Seasonality and relative abundance of Tabanidae (Diptera) captured on horses in the Pantanal, Brazil. Memórias do Instituto Oswaldo Cruz. 2001; 96(7): 917-923.
13. Biu AA, Kyari F, Al-Amin IA. Wet season survey of Dipteriid fauna around Lake Alau, Maiduguri, Nigeria. Journal of Agriculture and Veterinary Sciences. 2012; 4.
14. AL-Shaibani IRM, Al-Mahdi H. Seasonal Abundance of Flies (Diptera) in Animal Farms in Some Areas of Dhamar Governorate, Yemen. Yemeni Journal of Agriculture and Veterinary Sciences. 2014; 1(2):11-21.
15. Ahmed AB, Okiwelu SN, Samdi SM. Species diversity and seasonal occurrence of some biting flies in southern Kaduna, Nigeria, African Journal of Biomedical Research. 2005; 8:113–118.
16. Couri MS, Barros GPDS. Diptera hosts of Stylogaster Macquart (Diptera, Conopidae) from Madagascar and South Africa. Revista Brasileira de Entomologia, 2010;54(3): 361-366.
17. Hedges, A. Flies, gnats and midges. Mallis A, 1st ed. Handbook of Pest Control. Cleveland, Ohio, USA, 1980.