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## Diversity and activity of bloodsucking flies (Diptera: Muscidae) in Cibungbulang dairy farm, Bogor regency Indonesia

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**Abstract**

Flies cause problem and be important vectors of several diseases of medical and veterinary. There are non and bloodsucking flies in livestock. The existence of flies on a dairy farm cause decrease of cows productivity, body weight and as pathogens transmitter. The purpose of this study was to determine of haematophagus flies diversity and the degree of its infestation, also flies daily activities on cows. The study was conducted in 27 dairy farms at Cibungbulang area, which divided into three categories namely Low Density Farms (1-10 cattles/cowshed), Medium Density Farms (11-20 cattles/cowshed) and High Density Farms (more than 20 cattles/cowshed). In all farms, flies collected by sweeping net on five cattle bodies inside the cowshed. It took 3-5 minutes to get flies for every cattle with the net. There were 5 species muscidae haematophagus flies, i.e. *Stomoxys calcitrans* (19, 15%), *Haematobia exigua* (5,40%), *S. indicus* (3,20%), *S. bengalensis* (0,32%) and *S. sitiens* ( 0,02%) from total 26 flies species caught in the farm. The highest of *S. calcitrans* infestation discovered on Low Density farm, followed by *H. exigua*. The bloodsucking flies that have activities during the day were *S. calcitrans* and *H. exigua*, while *S. sitiens*, *S. bengalensis* and *S. indicus* were active in the morning and evening.

**Keywords:** bloodsucking flies, Cibungbulang Bogor, dairy farm, *Stomoxys*

**1. Introduction**

Most of nuisance flies which affect human and livestock health belonging to the Dipteran order, Cyclorrhapha sub-order and its members consist of more than 116,000 species worldwide. Various species of these flies are mainly classified into the Muscidae family (various species of house flies, stable flies, and horn flies), Calliphoridae (various species of blow flies), Sarcophagidae (various species of flesh flies) <sup>[1]</sup>.

The flies that infest dairy cattle are divided into two groups, namely groups of blood-sucking flies and groups of non-blood sucking flies. The species of blood-sucking flies that have been reported to infest dairy cattle is *S. calcitrans* L. <sup>[2, 3]</sup>, *S. sitiens*, *S. indicus* <sup>[4]</sup>, and *Haematobia irritans* <sup>[2, 5]</sup>, while the species of non-blood sucking flies, especially is *Musca domestica* L. <sup>[2-3]</sup>. These flies generally breed in dairy cattle dung <sup>[6]</sup> which accumulated a lot around farms that use cowshed as a place to maintain and take care the cattles.

Male and female of *S. calcitrans* L., known as stable flies, are both obligate hematophagy. As a result of the blood sucking activity by these flies, livestock suffered from severe pain which can reduce the productivity and animal body weight <sup>[7, 8]</sup>. Also, stable flies can transmit several pathogenic agents between hosts whose distances are far apart and are known to have potential as vectors of *Trypanosoma vivax* <sup>[9]</sup> and *T. evansi* <sup>[10]</sup>. Other than that, various species of bacteria such as *Escherichia coli*, *Staphylococcus aureus*, and *S. intermedius* are found in the cuticle, mouth part, and digestive tract of the *S. calcitrans* <sup>[8]</sup>. These flies are reported to cause national economic losses in the United States which reach 72 million dollars per year <sup>[11]</sup>.

The high rate of fly infestation can increase the frequency of transmission of animal diseases which cause the rise in the cost of purchasing drugs, the use of veterinary services and decreases livestock productivity (such as meat and milk). The importance of knowledge of fly biology can be used a reference in selecting appropriate and efficient control strategies. Nowadays, in Indonesia, there is a lack of information on various species of blood-sucking flies on dairy farms. This study aimed to identify the diversity of species of flies, measure the degree of infestation, and daily activities of blood-sucking flies in 27 dairy farms in the livestock business area (KUNAK) in Cibungbulang, Bogor District.

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**2. Material and Method**

- 1 The research was conducted from May to August 2015. The fly sampling was carried out on 27 dairy farms in the Livestock Business Area (KUNAK) of Bogor District which were divided into three categories namely low density livestock (1-10 dairy cattle/cowshed), medium density farms (11-20 dairy cattle/cowshade), and high density farms (> 20 dairy cattle/cowshade). Determination of livestock samples for each category was carried out proportionally from all livestock populations found in KUNAK. Identification of flies was carried out at the Medical Entomology Laboratory, Department of Animal Infectious Diseases and Veterinary Public Health, Faculty of Veterinary Medicine, IPB University.
- 2 Flies collected using sweep net on 5 cows in each farm. The collection of flies for each spot was done for 3-5 minutes each hour for 12 hours observation (06.00am-06.00pm). The flies that have been collected were then put in the plastic and euthanised using chloroform. The fly was then pinned and identified using a fly identification key by its morphology [12] to determine the diversity of all caught flies species.

**3. Result and Discussion**

**3.1 Diversity species of flies in cibungbulang dairy cattle**

A total of 26 species of flies belonging to 5 families

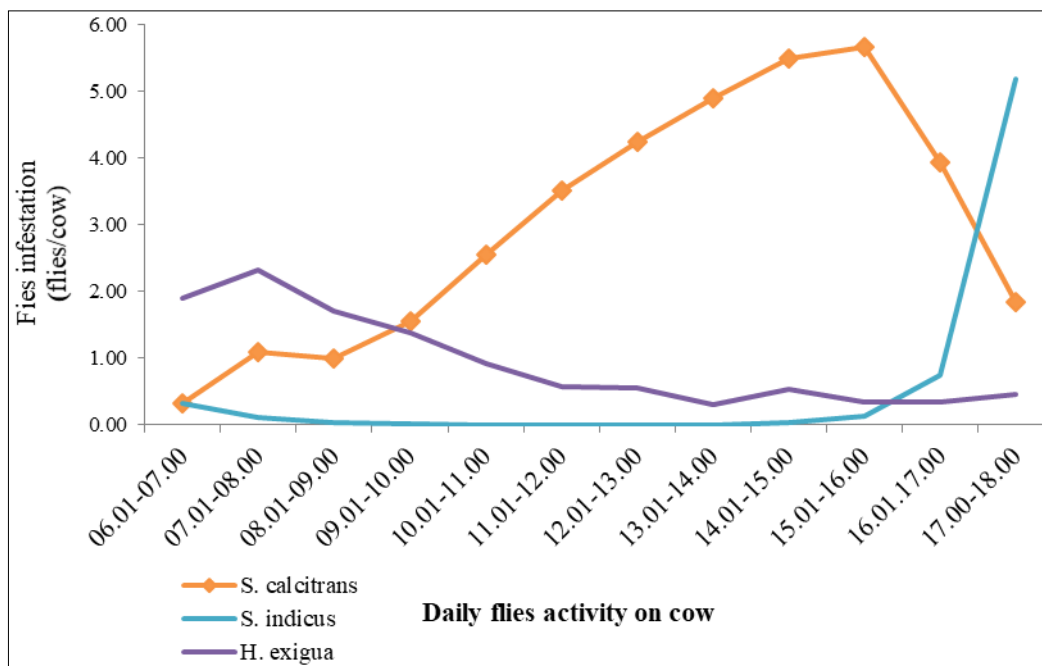
(Muscidae, Calliphoridae, Sarcophagidae, Tabanidae. and Hippoboscidae) were identified in this study. All flies, including blood-sucking flies from Muscidae family, came from the Stomoxyinae subfamily and the degree of infestation is shown in Table 1.

*S. calcitrans* is the main blood-sucking fly in dairy farming [13, 3]. The research in Thailand [5] reported that *S. calcitrans* spread globally in all animal nurseries, both at zoos, farms, wildlife conservation areas, and national parks. The relatively high population of *S. calcitrans* is likely due to the consequences of relatively high host densities, as well as environmental conditions suitable for *S. calcitrans* larvae completing their life cycle. The mixture of manure with silage and feed spills in dairy farms is an excellent medium for the development of *S. calcitrans* larvae [4]. These factors' combination plays a significant role in the abundance of *S. calcitrans* in cattle dairy farm.

The infestation of *S. calcitrans* in high-density farms was the lowest when compared to others due to the higher cattle density in the same cage area (around 16 x 9 m<sup>2</sup>) then on all farm categories. The high density of cattle forms joint protection against blood-sucking flies attack. The protection in the form of foot beats, head gored, skin muscle contractions, and tail flicks. Foot beats and head gored are more influential in reducing fly infestation in the body, compared to skin muscle contraction and tail flicks [14].

**Table 1:** Diversity, percentage and degree of bloodsucking fly infestation (fly/cow) on each farm of 27 dairy cattle in Cibungbulang Bogor regency

No	Species	Percentage	The degree of infestation (flies/cattle/12 hours)		
			Low density farm	Medium density farm	High density farm
1	<i>Stomoxys calcitrans</i>	19.15	42.93	34.55	29.54
2	<i>Haematobia exigua</i>	5.40	15.02	13.02	3.80
3	<i>Stomoxys indicus</i>	3.20	7.62	2.93	10.80
4	<i>Stomoxys bengalensis</i>	0.32	1.18	0.40	0.34
5	<i>Stomoxys sitiens</i>	0.02	0.02	0.02	0.09



**Fig 1:** Dominant activity of blood-sucking flies in dairy cattle in Cibungbulang, Bogor District, May-August 2015.

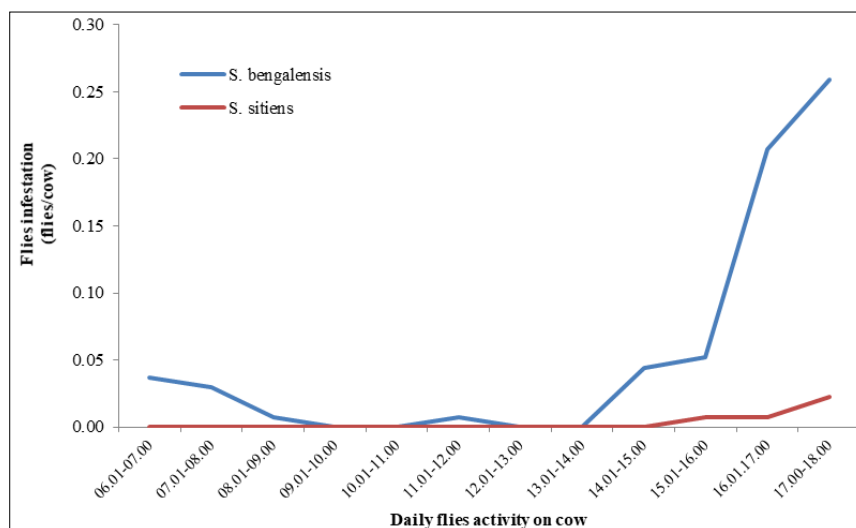


Fig 2: Non dominant activity of blood sucking flies in dairy cattle, Cibungbulang, Bogor District, May-August 2015

### 3.2 Daily activity of blood-sucking flies

The daily activities of bloodsucking flies was different for each species. *S. calcitrans* showed its activity throughout the day inside the cage and has highest number at 14.00-15.00. *S. calcitrans* activity was different from other species of flies from the same genus such as *S. indicus*, *S. bengalensis*, and *S. sitiens* which show its activity in the morning and evening. *S. indicus* begins to show its activity at 06.00 to 08.00 and decreases in the next hour, then continues to increase from 14.00 until the end of the observation at 18.00. *S. bengalensis* shows an activity pattern that is relatively similar to *S. indicus* but with a much lower infestation rate. *S. sitiens* was not caught in cattle in the morning. The daily activity of *S. sitiens* starts at 13.00, and continues to increase in the evening with a low infestation rate. *Stomoxys* activity to approach the cattle is not different with report from Thailand<sup>[4]</sup>, which explained that *S. calcitrans* were active throughout the day while *S. indicus* and *S. sitiens* were only active in the morning and evening.

Another blood-sucking fly from a different genus found in this study is *Haematobia exigua*. This fly has the same daily activity as *S. calcitrans* which is active throughout the day. The difference occurs in the hours of activity. *H. exigua* showed an increase in the early morning (06.00-07.00) but continued to decline in the following hours, although it was still found throughout the day until the end of the observation at 18.00. Other species of blood-sucking flies such as *Tabanus* and *Hippobosca*, as well as *Stomoxys dux*, are found in this research. However, due to a small number, these flies are not discussed in this paper.

### 4. Conclusion

There were five species of blood-sucking flies from Muscidae family from a total of 26 species of flies found, namely *Stomoxys calcitrans* (19.15%), *Haematobia exigua* (5.40%), *S. indicus* (3.20%), *S. bengalensis* (0.32%), *S. sitiens* (0.02%). The infestation of *S. calcitrans* in farms with low cattle population densities is highest (42.93 flies/cattle/ 12 hours), followed by *H. exigua* (15.02 flies/cattle/ 12 hours). *S. calcitrans* and *H. exigua*, are active in sucking blood throughout the day, while *S. sitiens*, *S. bengalensis*, and *S. indicus* are active in the morning and evening.

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