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Ectoparasite Infestation on Beef Cattle (*Bos Indicus*) in Kendit Sub-District, Situbondo District

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Abstract

The purpose of this study was to determine the type and percentage of ectoparasites attacking the cattle cow in the Kendit Sub-District, Situbondo District. The research was conducted from July to September 2020 with 100 samples of cow taken. The identification of ectoparasites was carried out at The Laboratory of the Animal Health Center of Situbondo Regency. This study was survey with a cross-sectional design. This study found several ectoparasites of the type of flies that infested the cattle cow: *Musca domestica* 29.20%, *Haematobia irritans* 58.96%, *Stomoxys calcitrans* 2.82%, *Tabanus rubidus* 0.42%, *Tabanus megalops* 0.56%, *Hippobosca maculata* 0.14%. In addition, this study also found ectoparasites of fleas that attacked the cattle cow, among others *Bovicola bovis* 2.12%, and *Haematopinus eurysternus* 5.78%. In this study, the dominant type of fly ectoparasite was *Haematobia irritans* 58.96% and the dominant ectoparasite from flea was *Haematopinus eurysternus* 5.78%. The suggestions for this research were this research should be continued with a longer time, the fishing method must be more varied because the more fishing methods used, the higher diversity results and it is advisable to maintain cage sanitation, improve maintenance management, and the cleanliness of cattle sheds surroundings to maintain cattle condition.

Keywords*:* Ectoparasite, Beef Cattle, Kendit Sub-District, Situbondo District

Introduction

In tropical climates, the presence of ectoparasites almost occurs throughout the year. Indonesia as a tropical country has big problems due to ectoparasite infestation in ruminant farms. The existence of these ectoparasites is increasingly detrimental if not controlled properly (Subronto, 2003). Ectoparasites can also act as vectors or carriers of disease germs, causing restless livestock due to itching, causing injury to livestock, irritation, decreased skin quality, decreased appetite, and decreased livestock productivity. The number of parasite populations around the cage is strongly influenced by the level of cleanliness and sanitation of the cage. Therefore, it is necessary to know the type, predilection, and predisposition of ectoparasites so that prevention can be done.

Situbondo District makes the livestock sector one of the leading sectors. Most of the residents of the Situbondo District raise beef cattle. One of the Sub-Districts in Situbondo District which has the highest population level of beef cattle is Kendit Sub-District. The Sub-District has a beef cattle population of 14,024 heads (BPS Situbondo District, 2020). Economic losses arising from ectoparasite infestations can cause emaciation, decreased body resistance, and slow growth in livestock so that it will reduce meat production, body weight, and selling value in livestock. Ectoparasite infestation can have a direct or indirect impact. The indirect impact of animals can experience hair loss, pruritus, alopecia, and experience skin irritation, while the direct impact of animals experiences anemia, stunted growth, and can even cause sudden death (Yadav, 2017).

Efforts to prevent and control ectoparasites are very necessary to avoid loss of selling value and decrease in meat production

in beef cattle. These efforts will be successful if supported by knowledge of ectoparasites that infect beef cattle so that the therapy and treatment given will be right on target. This study aims to identify the diversity of ectoparasites in beef cattle in the Kendit Sub-District, Situbondo District. This research needs to be done because in Kendit Sub-District there are still few reported cases related to ectoparasite infestation in beef cattle. Similar studies are rarely conducted in Indonesia and considering that there are no data on ectoparasite infestations in beef cattle in Kendit Sub-District, Situbondo District. Based on the above background, it is necessary to study the detection and identification of ectoparasite infestations in beef cattle, so that a policy step can be taken, especially to overcome it.

Materials and Methods

This research design uses a non-experimental method in the type of survey study. This research is descriptive research, namely activities to reach conclusions on the hypothesis of a problem by seeing, observing, and describing objects. Sampling was divided into two parts, namely obligate parasites, and facultative parasites. Sampling was carried out every day from morning to evening.

A total of 100 samples were taken from seven villages based on a comparison of the total population of the study, obtained samples from Balung Village as many as 20 individuals, Bugeman Village as many as 12 individuals, Kendit Village as many as 19 individuals, Klatakan Village as many as 16 individuals, Kukusan Village as many as 12 individuals, Rajekwesi Village as many as 10 individuals, and Tambak Carving Village as many as 10 individuals. Identification of ectoparasites was carried out at the Central Laboratory of Animal Health, Situbondo District. This research was conducted in July-September 2020.

Determination of the type and number of ectoparasites in beef cattle were analyzed descriptively based on the results of the identification of the observed characteristics. To calculate the relative abundance of each type of ectoparasites in beef cattle, the formula according to Cameron (2002) is:

$$\text{Infestation Precentag} = \frac{\text{The Number of Each Parasite}}{\text{Total parasite}} \text{x} 100\%$$

Results and Discussion

Based on the examination of 100 samples of beef cattle taken from all villages in Kendit Sub-District, Situbondo District, 709 samples of ectoparasites were obtained. 100 samples of beef cattle were obtained from Balung Village with 21 heads, Bugeman Village with 12 heads, Kendit Village with 19 cows, Klatakan cattle with 16 heads, Kukusan Village with 12 heads, Rajekwesi Village with 10 heads, and Tambakukir Village with 10 heads. The results of ectoparasite infestation in beef cattle from seven villages in Kendit Sub-District, Situbondo District with a total of 207 species of *M. Domestica*, 418 species of *H. irritans*, 20 species of *S. calcitrans*, three species of *T. rubidus*, four species of *T. megalops*, one species of *H. maculata*, 15 species of *B. bovis*, and 41 species of *H. eurysternus* with a total of 709 ectoparasite species from 100 beef cattle samples. The most common ectoparasites found in Kendit Sub-District, Situbondo District were *H. irritans* and *M. domestica* species.

This study found several types of ectoparasites, namely *M. Domestica, H. irritans, S. calcitrans, T. rubidus, T. megalops, H. maculata, B. bovis, and H. eurysternus*. The results of the number and percentage of ectoparasites found in beef cattle in Kendit Sub-District, Situbondo District can be seen in Table 1.

Table 1. Number and Percentage of Ectoparasites in Beef Cattle in Kendit Sub-District, Situbondo District

Species	Number	Percentage (%)
M. domestica	207	29.20
H. irritans	418	58.96
S. calcitrans	20	2.82
T. rubidus	3	0.42
T. megalops	4	0.56
H. maculata	1	0.14
B. bovis	15	2.12
H. eurysternus	41	5.78
Total	709	100

Musca domestica flies have colors that vary from light gray to dark gray. The thorax of this fly is generally gray with four longitudinal stripes and there is a dark band rising at the venation of the fourth longitudinal wing. The abdomen is brownish yellow with a black median stripe. *Musca domestica* has red eyes

and there are gaps between them to distinguish the sex of the fly. Female flies are almost twice as wide as male flies (Taylor *et al.*, 2007).

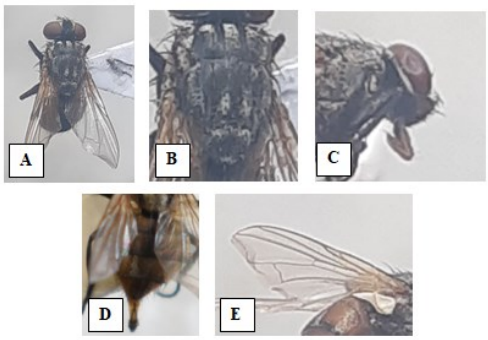

Figure 1. *Musca domestica* was observed in infested beef cattle. (A) General form *M. domestica* (B) Thorax (C) Suction mouth type (D) Abdomen (E) Wing venation

The *Haematobia irritans* fly is generally gray with a dark line on the thorax. It has an upright proboscis and palps that are parallel and along with the prognosis, a piercing and blood-sucking type proboscis, and a gray abdomen (Taylor *et al.*, 2007). This fly is the smallest fly among the blood-sucking flies of the Muscidae family.

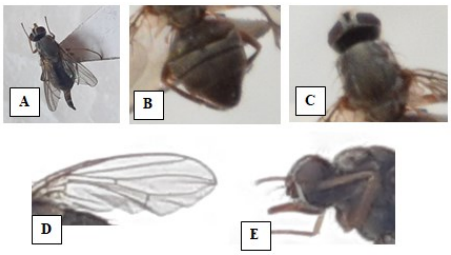

Figure 2. *Haematobia irritans* was observed in infested beef cattle. (A) General shape of *H. irritans* (B) Abdomen (C) Thorax (D) Wing venation (E) Piercing and sucking mouth type

The *Stomoxys calcitrans* is similar to the house fly, *Musca domestica*, having the same size and four longitudinal dark stripes on the thorax. However, the abdomen is shorter and wider than *Musca domestica* with three black dots on the second and third segments of the abdomen. The simplest method to distinguish house flies from *Musca domestica* and other sucking flies is to look at the shape of the proboscis, in *Stomoxys calcitrans* it is longer and visible (Taylor *et al.*, 2007).

The adult *Tabanus rubidus* fly species has a length between 12.5 mm - 20.5 mm, has a brown to black body, on the abdomen, there are 3 light-colored longitudinal stripes; one median line appears clear and the other two lines appear smoother (Desquesnes, 2018). Callus on *Tabanus rubidus* fly is black and separated by gaps.

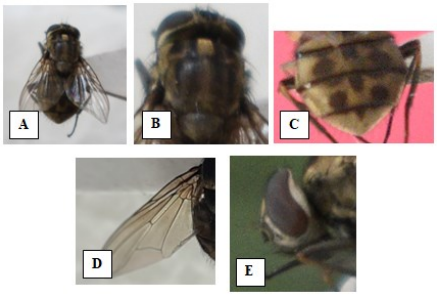

Figure 3. *Stomoxys calcitrans* was observed in infested beef cattle. (A) General shape of *S.calcitrans* (B) Thorax (C) Abdomen (D) Wing venation (E) Piercing and sucking mouth type

The *Tabanus megalops* fly species has a brown to black body, on the abdomen, there are three light-colored longitudinal stripes, one median line that is visible and the other two lines appear fainter (Mullens, 2019). *Tabanus rubidus* and *Tabanus megalops* have a characteristic that can distinguish them from the shape of the callus, in *Tabanus megalops* the callus is black and elongated without any gaps.

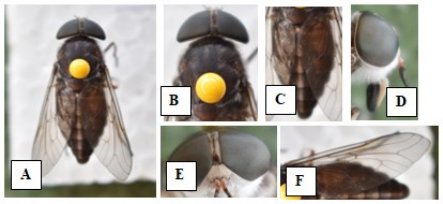

Figure 4. *Tabanus rubidus* was observed in infested beef cattle. (A) General shape of *T. rubidus* (B) Thorax (C) Abdomen (D) Piercing and sucking mouth type (E) Shirt shape (F) Wing venation

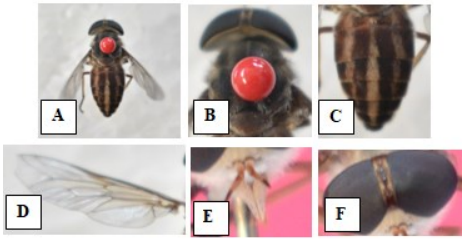

Figure 5. *Tabanus megalops* was observed in infested beef cattle. (A) General shape *T. megalops* (B) Thorax (C) Abdomen (D) Wing venation (E) Mouth type (F) Callus shape

The body of the *Hippobosca maculata* fly dorsoventrally the head, thorax, and abdomen looks flat so that the appearance of this fly looks bad. The mouth of this fly does not point downwards but points forward, the abdominal integument is soft and flexible. *Hippobosca maculata* feet are generally strong with a fairly large femur, tibia that is flat and short and on the tarsal part, there are claws. Legs tend to be shorter and stronger with tough tarsal claws so these flies attack mammal species more often than poultry species. *Hippobosca maculata* feet are adapted to grip and stick to rough skin and hair (Reeves and Lloyd, 2019).

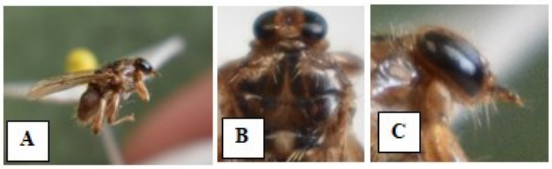

Figure 6. *Hippobosca maculata* was observed in infested beef cattle. (A) General shape *Hippobosca maculata* (B) Thorax (C) Mouth type

The *Bovicola bovis* louse is red-brown with a dark stripe on the abdomen in a transverse direction. Has a relatively large head almost as wide as the body and has a rounded head tip, the mouth is on the ventral side and is modified into a chewing shape. The legs are slender and have small claws for moving between the hairs (Taylor *et al*., 2007).

Haematopinus eurysternus is one of the largest fleas on domestic animals. This flea has a pointed head, wide and short body shape. The color of the head to the thorax is yellow or brownish-gray, and the abdomen is blue-gray with dark lines on each side (Taylor *et al*., 2007).

Figure 7. *Bovicola bovis* was observed in infested beef cattle

Figure 8. *Haematopinus eurysternus* was observed in infested beef cattle

The existence of ectoparasite infestations is caused by poor environmental, climatic, and maintenance management conditions. This is one of the important factors causing the high ectoparasite infestation in beef cattle. The discovery of ectoparasites in beef cattle indicates the conditions around the beef cattle pen are dirty, humid, there is no sunlight entering the cage and the location of the disposal of livestock manure that always accumulates around the cage, whereas in cattle that rarely find ectoparasites, the conditions around the cage are clean, the dry floor of the cage and the presence of direct sunlight into the cage and the location of the manure disposal is located far from the cattle pen.

Musca domestica or commonly called the house fly is a cosmopolitan insect that can be found where there is human activity (Taylor *et al*., 2007). The results showed that house flies were mostly found in the head area, especially in the area around the eyes. *Musca domestica* flies can transmit pink eye disease, which is an infectious eye disease in livestock such as cattle, buffalo, sheep, and goats (Taylor *et al*., 2007), and in Szalanski's (2004) research, *Musca domestica* also acts as a vector of *Campylobacter* spp., and *E. coli* in turkeys, cattle and humans. These flies were found to breed in cow dung, then in the adult phase were often found perched on the body of cows and in this study were generally found in the head area around the eyes.

Haematobia irritans is the smallest fly among the blood-sucking flies of the Muscidae family, this *Haematobia irritans* fly has been identified as the most numerous of the fly species found. These flies are generally found in the head to the back area of cows, that these flies carry out blood-sucking activities in the horns and backs of cows, but will move to the stomach area when the weather is hot (Taylor *et al*., 2007). According to Partoutomo *et al*.

(1981), *H. irritans* can be a vector of Kaskado disease by harboring *Stephanofilaria* larvae. Flies that land on wounds that have been infected with *Stephanofilaria* worms, suck blood and fluids from the wound, then the microfilariae develop into infective stage 3 larvae within 3 weeks. The larvae then move to the next blood-sucking animal from the fly's proboscis into the skin. The larvae in eight weeks become adult worms and produce microfilariae (Estuningsih, 2007).

There were 20 *Stomoxys calcitrans*. This fly resembles the house fly *Musca domestica*, which is about the same size and with four longitudinal dark stripes on the thorax. There is a characteristic of this fly, which is that it has a shorter and wider abdomen than the *Musca domestica* fly with three black dots on the second and third segments of the abdomen, and this fly has a prognosis with a piercing and blood-sucking type. food by sucking the blood of the host (Taylor *et al*., 2007). This fly species is found on smallholder farms with cows in cages. According to Torr *et al*. (2006), the pile of manure on smallholder farms causes a stronger smell to attract Stomoxys calcitrans. These flies are found on the back and abdomen of cows and breed in food waste, as well as a mixture of cow dung and urine (Salem, 2012).

In this study, two species of Tabanus flies were found, namely *Tabanus rubidu*s and *Tabanus megalops*. Tabanus fly is an ectoparasite that has a large and sturdy body. *Tabanus rubidus* usually has a larger size than *Tabanus megalops*. These flies have a wide range of roaming and are persistent bites that are active during the day. Apart from being a vicious blood sucker, this fly is also a vector of Surra disease (Taylor *et al*., 2007). This fly always makes a wound first by tearing the skin before sucking the blood of the landlady, thus leaving scars on the landlady. The callus of the *Tabanus rubidus* fly is black and separated by a gap, while that of the *Tabanus megalops* fly is black and elongated without any gaps.

Only one of the *Hippobosca maculata* flies was found. The number of findings of *Hippobosca maculata* in this study was related to the condition of the cage area in Kendit Village which was open, so that the cage was not wet, because sunlight and air could enter properly. This fly is a blood-sucking fly and has a characteristically flattened head, thorax, and abdomen. The abdominal integument is soft and flexible. Legs tend to be shorter and stronger with hard tarsal claws so these flies attack mammal species more often than poultry species (Reeves and Lloyd, 2019). This study found these flies in the perineal area of cows, this is influenced by the perineal position that is difficult to reach with the extremities of cows.

Fifteen *Bovicola bovis* fleas were found that perched and resided on the top of the head, neck, and back of cows, this is by Lewis (1962) who observed cattle that were caged and tied up in 38 days and found 100 *Bovicola bovis*, this is because the cows are not able to rub their bodies, while in the released cows the population of *Bovicola bovis* is further reduced. The *Bovicola bovis* tick is found in every part of the hairy region of the cow. *Bovicola bovis* does not suck blood but chews the hair, skin, and secretions of its host cells.

The number of *Haematopinus eurysternus* fleas obtained was forty-one. This tick is the largest tick on domestic animals. At the time of collection *Haematopinus eurysternus* lice were most commonly found on tail hairs and in-ear hairs. This finding is by the research of Awaluddin *et al* (2017) that these lice are often found on body parts of cows that have long hair, such as around the eyes and tail, and in heavy infestations, they can attack all parts of the body, from the base of the horn to the base of the tail.

The highest number of ectoparasites was found in the village of Klatakan, from observations it was known that this was related to poor cage sanitation and a dirty cage environment, large piles of livestock feces and leftover animal feed that were not cleaned could invite the presence of flies (Pruett, 2003). According to Barros (2001), poor cage sanitation causes a distinctive odor from livestock manure which will be smelled more strongly by nuisance flies so that it can invite flies to settle in dirty cages. While the village with the least number of ectoparasites is Kendit village, this is because the cage system in Kendit village is quite good in terms of cage cleanliness, this is because farmers are more routinely cleaning the cage twice a day. According to Taylor *et al*., (2007) cages that are regularly cleaned can eliminate egg-laying media for flies. In addition, the light intensity in the cage is also sufficient because the average cage has good ventilation so it does not cause the cage to become humid. According to Barros (2001), a moist cage is more favorable for flies.

The results of this study showed that the highest percentage of ectoparasites that infested beef cattle in Kendit Sub-District, Situbondo District was the fly species *Haematobia irritans* (58.96%). The *Haematobia irritans* fly is a type of fly that lives in flocks or groups and prefers cow blood (Kuramochi 2000). The large pile of feces on the floor and around the cage is also one of the factors for the large population of *Haematobia irritans* flies because these flies are more likely to breed in the fresh feces of farm animals. This causes flies to continue to breed and experience a permanent life cycle in the vicinity of the cattle pens they occupy (Taylor *et al*., 2007). The least number of ectoparasite species found was the *Hippobosca maculata*. This species tends to live in dry areas and is not found in wet areas (Reeves and Lloyd, 2019). Therefore, this type of fly was found on farms in Kendit village with good sanitation and ventilation.

Mosquito-type ectoparasites of the Order Diptera were not found in this study, this may be due to the limited research time from 07.00 to 12.00 according to Foster (2019), mosquitoes reach their peak at night. Several other ectoparasite species such as Tabanus also have a certain active time and are at their peak during the day or the sun is hot, therefore there may be differences in the number of ectoparasites if the study is carried out for a longer time each day (Desquesnes, 2018).

Conclusions

Species of ectoparasites that attacked beef cattle in Kendit Sub-District, Situbondo District was *Musca domestica*, *Haematobia irritans*, *Stomoxys calcitrans*, *Tabanus rubidus*, *Tabanus megalops*, *Hippobosca maculata*, *Bovicola bovis*, and *Haematopinus eurysternus*. The percentage of each species of ectoparasites that attacked beef cattle in Kendit Sub-District, Situbondo District was *Musca domestica* 29.20%, *Haematobia irritans* 58.96%, *Stomoxys calcitrans* 2.82%, *Tabanus rubidus* 0.42%, *Tabanus megalops* 0.56%, *Hippobosca maculata* 0.14%, *Bovicola bovis* 2.12%, and *Haematopinus eurysternus* 5.78%. Some recommendation of this study is the research can be continued with a longer sampling time (from morning to night), the fishing methods used should be more varied, such as traps, because the more fishing methods used, the higher diversity results. Breeders are more concerned with maintaining the sanitation of the cage, improving the management of maintaining cleanliness around the cattle pens to maintain the condition of the livestock.

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