

## THE PRESENCE OF INSECTS IN ANIMAL FARM IN NORTH SULAWESI

Wisje LusiaTOAR<sup>1</sup>, Max TULUNG<sup>2</sup>, Ventje MEMAH<sup>2</sup>, Endang PUDJIHASTUTI<sup>2</sup>,  
Laurentius RUMOKOY<sup>1,2</sup>, Ivone Maria UNTU<sup>1</sup>

<sup>1</sup>Faculty of Animal Husbandry, Sam Ratulangi University, Jalan Kampus Unsrat,  
Manado 95115, Indonesia

<sup>2</sup>Entomology Study Program, Postgraduate Programs, Sam Ratulangi University,  
Jalan Kampus Unsrat, Manado 95115, Indonesia

Corresponding author email: wisje\_toar@live.com

### Abstract

*The existence of insects in the environment of animal farm has a big role in connection with the development of livestock production in tropical humid areas especially for those located in North Sulawesi, Indonesia. By understanding of the presence of insects in the animal farm environment could help to control the various roles of insect in transmitting pathogenic agents to livestock. Today this understanding is important because there are so many farms that are traditionally carried out which confronted with health control. This article aims to present some important insect order located within the livestock environment in North Sulawesi Indonesia as well as various achievements in detecting the existence of flies. Some of the important species of Diptera found in farms such as: Stomoxys calcitrans, Musca domestica, Musca bakeri, Chrysomyamega cephalo, Haematobia exigua, Haematobia irritans and Sarcopaga spp. This scientific information is expected to be a technical information for farmers, observers, and researchers who are interested in this domain.*

**Key words:** insect, Diptera, livestock, environment.

### INTRODUCTION

Clean environmental conditions of livestock in tropical humid areas can support maximum livestock production. This situation depends on various factors, such as climate, sanitation level, quality aspects of cattle house construction, control of disease, and the commitment of farmers to maintain quality livestock management (Baldacchino et al., 2013).

The insects have a big role in the development of livestock. They can spread pathogenic agent to the animals (Rumokoy et al., 2017<sup>a</sup>) and therefore the presence of some orders of insect in North Sulawesi may interfere to the health of livestock even to its house building quality.

A farm which has traditionally maintained could get a higher risk than in modern livestock with more stringent health control standards (Toar et al., 2017). Up to now, in tropical humid region, exist many farms which are traditionally managed. For that reason, it is necessary to recognize the presence of various insect orders that can affect the livestock improvement.

This article specifically discusses the presence of insects, especially flies, in farming environ-

ments conducted in several locations in North Sulawesi Province, on the other hand to be linked with the development of cattle and goat farms located in this province.

### MATERIALS AND METHODS

The presence of insect in animal livestock was detected through a field observation. The part of this study to evaluate the insect orders in an environment of livestock was realized in an animal house. An observation has been done in „Sentrum Agraris Lotta” (SAL) located in the village of Pineleng, Minahasa regency during a week in July of 2017. The animals reared in the animal houses were goats, pigs and cows. In this part, three objects were applied to detect the insects: animal feed, floor, and wood part of house construction.

To obtain the data of the species of flies (Diptera) in the livestock area then an observation was realized during seven days in cattle farms which were traditionally maintained from three regions in the North Sulawesi province in Indonesia: Minahasa, Minahasa Utara and Tomohon. The adhesive trap was used to collect the insects.

The livestock improvement achievement was evaluated by using the data about goats and cow's quantity evolution in North Sulawesi during a period of year 2011 to 2016. This data obtained from a data source of BPS North Sulawesi Indonesia (BPS, 2018).

## RESULTS AND DISCUSSIONS

The data of the insects found around in farm sites is presented in Table 1 above. The order of Diptera was the most common type of insect found on the floor and in the remaining animal feed material in the cage.

Table 1. Some orders of insect found in animal husbandry

Insect order	Feed	Floor	Wood material
Diptera	+++	+++++	+
Coleoptera	++	+	++
Hymenoptera	+	++++	+++
Phtiraptera		+	+
Blattodea		++	++
Isoptera			+++

The Muscoid Diptera were an important insect in this order, and almost of them recognized as animal pest as reported by Almeida et al. (2014). Baldacchino et al. (2013) mentioned a member in *Muscidae* family was *Stomoxys calcitrans* as a pathogen agent transmitter in livestock. Rumokoy et al. (2017<sup>a</sup>) and Haselton et al. (2015) underlined that *Musca domestica* included also as an important pathogen transmitter to animals. This study confirmed that the presence of Coleoptera in animal feed could led a nutrition quality reducing.

Darsilawati (2015) has been studied five species of Coleoptera as pest in row material of animal feed: *Tribolium castaneum*, *Cryptolestes ferrugineus*, *Sitophilus zeamays*, *Alphitobius diaperinus*, *Oryzae philus surinamensis*. We found also that Formicidae as one of the insect family in Hymenoptera, was the most frequent insect found at the location of animal house during the observation. This insect acted as decomposer by feeding the organic matter in livestock area (Evans et al., 2011). We have found also another orders Phtiraptera and Blattodea. During the observation we have got these insects in the goat's pen although the activities of the parasite in general directly in the skin of the animals.

These insects could be a responsible organism for spreading of various pathogen micro-organism and parasites to animal husbandry. The Anoplura and Mallophaga were classified as suborder in this order (Ward, 1977). Almost of these insect found were grouped as ectoparasites. Seyoum et al. (2015) reported that some important ecto-parasites in small ruminant and by its infestation could lead to considerable economic losses to farmers due to loss of productivity, mortality, and skin diseases.

The abundance of flies in these region as described in Figure 1, showed that the highest values of the flies was *Haematobia irritans*, followed by *Musca domestica*, *Stomoxys calcitrans* while the others species still existed in almost areas, excepted *Haematobia exigua* was identified by our flies-trap the region of Minahasa Utara.

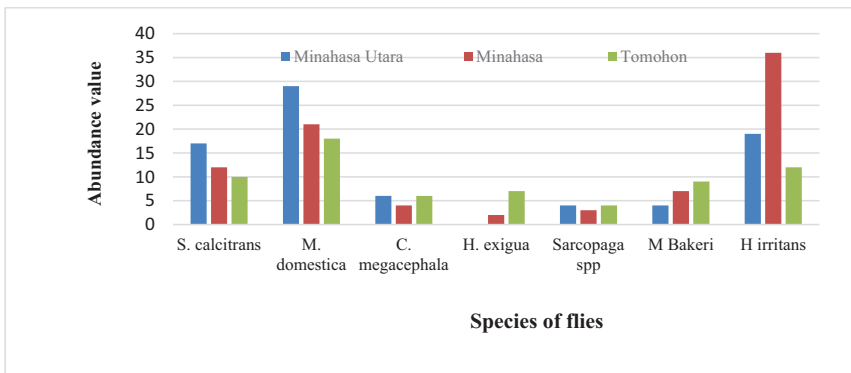


Figure 1. Graph of flies found cattle farm in Minahasa, Minahasa Utara and Tomohon

Table 2. Cows quantity evolution in North Sulawesi during a period of year 2011 to 2016

Areas	2011	2012	2013	2014	2015	2016
Bolaang Mongondow	22670	23433	21011	22406	23078	24693
Minahasa	17821	26113	17291	20559	21499	24238
Kepulauan Sangihe	1808	1802	1658	2017	1813	1843
Kepulauan Talaud	1702	1787	1386	1518	1603	1698
Minahasa Selatan	15431	17438	15541	16192	16439	17345
Minahasa Utara	13436	14271	14802	15341	16064	16718
Bolaang Mongondow Utara	12490	13072	12847	13738	14690	16392
Kepulauan Sitaro	60	4253	83	39	30	30
Minahasa Tenggara	3716	107	3935	4375	4392	4392
Bolaang Mongondow Selatan	3775	4050	3879	4214	4667	5442
Bolaang MongondowTimur	3108	3847	3098	4128	4595	4825
Kota Manado	2343	2462	2678	2692	2695	2964
Bitung	2226	2361	2564	2615	2668	2721
Kota Tomohon	2941	3110	3056	3202	3294	3619
Kota Kotamobagu	1733	1999	2118	2161	2217	2295
Sulawesi Utara	105260	120105	105947	115197	119744	129215

Source: BPS Indonesia

Table 3. Goats quantity evolution in North Sulawesi during a period of year 2011 to 2016

Areas	2011	2012	2013	2014	2015	2016
Bolaang Mongondow	8716	8654	8010	8034	8112	8176
Minahasa	3023	3059	3202	2682	2601	2601
Kepulauan Sangihe	3643	3703	3792	3856	5224	5284
Kepulauan Talaud	2161	2946	3012	3162	3034	2799
Minahasa Selatan	2394	3309	3329	3387	4046	4248
Minahasa Utara	3053	3475	3508	3542	3585	3680
Bolaang Mongondow Utara	6294	6483	6742	7972	9426	10634
Kepulauan Sitaro	549	1826	738	832	936	949
Minahasa Tenggara	1691	636	1646	2007	2487	1936
Bolaang Mongondow Selatan	3662	3793	4550	2680	2975	4267
Bolaang MongondowTimur	3250	3966	4110	2612	3678	4000
Kota Manado	1532	1538	1554	1552	1667	1883
Bitung	1701	1852	1873	1929	1989	2047
Kota Tomohon	895	951	895	860	812	570
Kota Kotamobagu	2199	1257	1220	1092	1120	1165
Sulawesi Utara	8716	8654	8010	8034	8112	8176

Source: BPS Indonesia

The legs and proboscis of flies used as carriage instruments to transport the pathogenic microbes to other animals (Barro et al., 2006; Toar et al., 2013)

The evolution of livestock quantity as presented in Table 2 and Table 3 describes the condition of animal husbandry production, particularly connected to the quantity of cows and goats in North Sulawesi during the years 2011 up to 2016. In this province, the increasing of cow's quantity occurred sharply from the year of 2013 (105,947 heads) until to the year of 2016 (129,215 heads). This reality was different if compared to the quantity of the goats: the quantity of goat's number dropped sharply from 8,716 goats in 2011, reduced to 8,010 in 2013, after that tended to be increased slightly in 2014 (8,034 heads), and then in 2016 raised up to be 8,176 heads. It has been recorded that in 2008 has reached up to about 16,000 heads (BPS, 2018), which meant that in this intervals of time about 50% declined. Although the goat's production was decreased but according to Ditjenak (2015) reported that in the GRDP (*gross regional domestic product*) of livestock in North Sulawesi province Indonesia started at 996 billion rupiahs in the year of 2010 attained 1.305 billion rupiahs in the year of 2014.

The decrease in production in terms of amounts in goat farms has a relation with disease caused by microbes or parasites agents such as insects. Some scientific efforts to control the adverse insects have been reported by Rumokoy et al. (2017<sup>b</sup>), Baldacchino et al. (2013) Barro et al. (2006). It becomes a challenge in overcoming the impact of insect both as ecto-parasites and as organisms that degrade the quality of feed or pen house especially that made of wood. However, there are always other factors, intercepting each other as a challenge in developing livestock production in North Sulawesi in the zone of the tropical humid climate.

## CONCLUSIONS

We concluded that various insect orders were capable to spread pathogens in livestock in North Sulawesi Province located in tropical humid climates. To overcome the negative role problems of some insects in livestock

development, it should also necessary to consider other factors contributing to the livestock improvement.

## ACKNOWLEDGEMENTS

We address our thankful to all parties for those who have contributed to this study, specifically addressed to the Director of „Sentrum Agraris Lotta” (SAL) who has provided facilities support for conducting some part of this research.

## REFERENCES

- Almeida J.L., Giufrida R., Andrade R.A.P., Chave M.P., 2014. Muscoid Díptera as potential vectors of bacterial agents on dairy farms in the northern region of Paraná, Brazil. *Semina: Ciências Agrárias* (Londrina), 35 (6), 3127-3137. <http://dx.doi.org/10.5433/1679-0359.2014v35n6p3127>.
- Baldacchino F., Muenworn V., Desquesnes M., Desoli F., Charoenviriyaphap T., Duvallet G., 2013. Transmission of pathogens by *Stomoxys* flies (Diptera, Muscidae): a review. *Parasite*, 20 (26), 1–13.
- Barro N., Aly S., Tidiane O.C., Sababénédjo T.A., 2006. Carriage of bacteria by proboscises, legs, and feces of two species of flies in street food vending sites in Ouagadougou, Burkina Faso. *J. Food Prot.*, 69(8), 2007-2010.
- BPS (Badan Pusat Statistik) Indonesia. [www.bps.go.id](http://www.bps.go.id). Accessed 14 April 2018.
- Darsilawati I., 2015. Hama gudangordo Coleoptera pada bahan baku pakan ternak impor dan status resistens in yaterhadapfosfin. Tesis. Sekolah Pascasarjana Institut Pertanian Bogor.
- Ditjenak (Direktorat Jendral Peternakan dan Kesehatan Hewan), 2015. Livestock and animal health statistic. 238 p. [http://perpustakaan.bappenas.go.id/ontar/file?file=digital/156517-\[Konten\]-Konten%20D782.pdf](http://perpustakaan.bappenas.go.id/ontar/file?file=digital/156517-[Konten]-Konten%20D782.pdf). Accessed 25 April 2018.
- Evans T.A., Dawes T.Z., Ward P.R., Lo N., 2011. Ants and termites increase crop yield in a dry climate. *Nature Communications*, 2, 262. <http://doi.org/10.1038/ncomms1257>.
- Forrester D.J., McLaughlin G.S., Telford Jr S.R., Foster G.W., Mccown J.W., 1996. Ectoparasites (Acari, Mallophaga, Anoplura, Diptera) of White-Tailed Deer, *Odocoileus virginianus* from Southern Florida. *Journal of Medical Entomology*, 33(1), 96–101.
- Haselton A.T., Acevedo A., Kuruvilla J., Werner E., Kiernan J., Dhar P., 2015. Repellency of  $\alpha$ -pinene against the house fly, *Musca domestica*. *Phytochemistry*, 117, 469-75. doi: 10.1016/j.phytochem
- Rumokoy L., Toar W.L., 2015. The Paradox of Nutrient Fulfillment and Immunity Challenge on Chicken Livestock Development in Tropical Humid Regions. *Journal of Agriculture and Agricultural Science Procedia*, 6, 259-264. DOI 10.1016/j.aaspro. 2015.08.069

- Rumokoy L., Kaunang C., Toar W., 2017<sup>a</sup>. Effects of citronella oil extract of *Cymbopogon nardus* L. on contact frequency proportion of *Musca domestica* L. (Diptera: Muscidae) in ration and broilers performance. Indonesian Journal of Entomology (JEI), 14(2), 89–96. DOI: 10.5994/jei.14.2.89.
- Rumokoy L., Adiani S., Assa G.J.V., Toar W.L., Aban J.L., 2017<sup>b</sup>. Entomology contribution in animal immunity: Determination of the crudethoraxial glandular protein extract of *Stomoxys calcitrans* as antibody production enhancer in young horses. Journal of Entomological and Acarological Research, 49(3), 140–143. <http://www.pagepressjournals.org/index.php/jear/article/view/7074/6924>
- Seyoum Z., Tadesse T., Addisu A., 2015. Ectoparasites Prevalence in Small Ruminants in and around Sekela, Amhara Regional State, Northwest Ethiopia. Journal of Veterinary Medicine, article ID 216085, 6 pages. <http://dx.doi.org/10.1155/2015/216085>.
- Toar W.L., Kaunang C., Untu I.M., Rumokoy L., Kiroh H., 2017. The empowerment of crude extract antigen-G of insect on goats immunity enhancement: An entomology contribution in animal husbandry. Scientific Papers, Series D, Animal Science, vol. LX, 271-273.
- Toar W.L., Warouw J., Tulung M., Najohan M., Rumokoy L., 2013. The Landing Periodicity of *Stomoxys calcitrans* in rations, supplemented with citronella and papain on broiler health. Lucrări Științifice-Universitatea de Științe Agricole și Medicină Veterinară, Seria Zootehnie, 53, 325-328.
- Ward R.A., 1977. Pathogens of Anoplura and Mallophaga. Bull World Health Organ., 55(1), 305–309. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2366774/>.