Model dinamika sistem pemanfaatan serangga parasitoid (hymenoptera: pteromalidae) dalam upaya mengendalikan lalat

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Abstrak

ABSTRACT
Flies have been the most common problem encountered in husbandry management either in big animals or poultry; and it has not been easy to solve. Disturbances caused by flies especially when the fly population is high do not directly affect the animals themselves, but they rather socially have effects on the breeders and the people living in the areas -around the farm. The use of chemical insecticide in controlling fly population around animal farms has been minimized, and nowadays natural enemies of flies-are more commonly used. Research on the use of parasitoid insects in controlling flies has been continuously conducted in some countries. ln Indonesia, there have not been many studies done on the use of parasitoid insects particularly in animal farming despite the country?s big potential in fauna.

The study on the use of parasitoid insects (Hymenoptera: Pteromalidae) in controlling the population of filth flies in chicken farms was done by adopting data from research done earlier for 3 years (1996 - 1998). This research was a pioneering work and was the only research ever on the application of parasitoid insects in the field of animal husbandry conducted at three chicken farms in Bogor Regency. Observation on fluctuation of filth fly population and that of parasitoid in relation to some macro climate variables recorded at the nearest weather station was done in the first year. In the following years, at one of that chicken farm, an application of parasitoid by inundation of Spalangia endius Walker (Hymenoptera: Pteromalidae) and monitoring of fluctuation of fly and parasitoid population were done with regard to micro climate variables in the hen houses measured by thermohygrograph.

Correlation between monthly average population of fly and parasitoid during dry and rainy seasons and that of some macro and micro climate variables was measured using correlation analysis for the identification of climate variables that influenced the fluctuation of fly and parasitoid population the most.

Natural phenomena and all the results of the data processing above, along with supply of secondary data derived- from existing references was formulated into a system dynamic model. This is a model with a capability of

analyzing dynamic behaviors of fly and parasitoid population that forming a complex system which characterized by its 'relation to several factors (biotic and a biotic ones), related factors changing dynamically, as well as non linear relation and feedback mechanism in it.

As far as macro climate is concerned, it has insignificant effects on the fluctuation of fly and parasitoid population despite a significant difference in the monthly total rainfall between the dry and the rainy seasons, because the chicken manure as flies breeding place in the pen system of egg layer hens are protected, and thus the climate variables does not directly affect them. The correlation of monthly average population of fly puparia and progeny parasitoid
indicated a high value (r = 0.914). lt showed the parasitoid characteristics being pupal parasitoid and obligat toward fly puparia. The fluctuation of fly population correlated only significantly with the humidity in the pen. Thus, the fluctuation of fly population during the inundation period was not only infiuenced by parasitoid activities but also by the fluctuation of monthly average humidity inside the hen houses.

The construction of this dynamic- model was preceded by making a Causal Loop Diagram (CLD), producing three main subsystems namely the subsystems of fiy and parasitoid which each fonning a positive feedback cycle (R= Reinforcing), and the subsystem of how the first two subsystems were related which forming a negative feedback cycle (B= Balancing).

The Causal Loop Diagram described further how interaction mechanism between the flies and the parasitoid was as well as how it related to other various factors affecting that relation in a very complex system of chicken fami ecosystem. Then, CLD was transformed into three models of Stock Flow Diagrams (SF D), the first of which was SFD picturing the dynamic of fly population and its parasitoid and its relation with factors of macro climate using the data from the research result ofthe first working paper. This was a natural model for interaction between flies and parasiloid in a conditional ecosystem (Generic Model). The second model was the one for the use of parasitoid in controlling population of flies with the application of parasitoid S. endius inundation using the data from the research result of the second working paper (inundation Model). The last was a prediction model having some intervention to
identify the most important factors in the efforts of controlling the tlies by relying on the role of parasitoid and a biotic factors. Due to limited data, the construction of the model had to be carried out with strict assumptions.

With the advantages of system dynamic model which were possible for being simulated and getting intervention, it was indicated that the increasing

capacity of parasitoid and pen humidity were important factors in the efforts of controlling fly population in the ecosystem of chicken farm. Pen humidity was basically a representation of manure condition being a breeding place for both flies and parasitoid, and was closely related with the structure and management of the pen, either chicken food quality. Meanwhile, increasing capacity of parasitoid could mean increasing number as well as potential ofparasitoid in attacking their host. in order to increase the parasltoid potential, efforts in habitat conservation supporting the survival of parasitoid have to be a primary consideration.