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# GROWTH PERFORMANCE OF GOATS IMMUNIZED WITH THORAXIAL ANTIGENS OF *MUSCA DOMESTICA*

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***Abstract***

*The antigen thoraxial extracted from some insects indicated a potential in immunity system amelioration in mammalian. This study aimed to evaluate the growth performance of goats immunized with IATMd (immunogen antigens of Musca domestica). Twelve goats were used in this experiment. Each experiment animal was treated with 10 µl of thoraxial antigens of Musca domestica. The animals were divided into two groups: control group and treated group. The growth performances were evaluated under three parameters: Body weight gain, feed intake and FCR. All animals were fed with the same feed. The data were collected during eight weeks and analyzed by using t-student procedure. The results showed that FCR of the animas in treatment group was significance higher than in the control group (P<0.05) while there has no different statistically on body weight gain (P>0.05). It was concluded that immunization of IATMd extract could improve nutrient metabolism in goats that play a role in FCR value of these animals experiment.*

***Key words****: insect antigens, Musca domestica, FCR value, goats.*

## INTRODUCTION

Goat production is an important source for food in many regions in the world. In Indonesia local goats are cultivated to support meat production. The Ettawa goats breet could be reared for milk production (Salim & Susanti, 2016) and for meat production. The demand of meat production farming has an increasing due to the significance augmentation of human population (Sumardianto et al., 2013).

On the other hand, goat farming with local breed generally is reared with a little amount by household.

Even though the numbers are small, this farming pattern is spread over many locations. Accumulatively, the amount is important by contribution to a provision of food for the community.

The health of goats is one of the determining factors to increase goat production, especially in relation to viral and bacterial infections (Aldridge et al., 2018) and will determine to a level of success in livestock management systems (Silva et al., 2014; Caroprese et al., 2016). To get animal good health, it has to anticipate the bacterial pathogen spread which related to the report of Heidt et al. (2012). The immune system becomes active when exposed to antigens (McGeer et al., 1989).

Antigen derived from insects has begun to be known for its use in improving the immune system of mammalian livestock (Rumokoy et al., 2017) including goats (Toar et al., 2017). Ameri et al. (2008) reported the use of crude extracts gave an immune response in cattle against insect infestations.

Subsequently, a variety of antigens extracted from insect are potential support goats production optimally (Toar et al., 2019).

Good production is also a consequence of the functioning of the immune system properly so as to control bacterial infection or infestation of parasitic organisms such as insects.

This paper presents the results of research activities using thoraxial antigens extracted from *M. domestica* on growth performance of local goats.

This research work is a continuation of previous research that has been done by observing the role of IAMTd on blood serum immunoglobulin levels in goat kids, which showed that this immunogen extract indicated to increase serum IgG of goat kids (Rumokoy et al., 2020).

## MATERIALS AND METHODS

Twelve local goats after weaning were used in this experiment. The initial body weight of animals is shown in Figure 1. The animals were divided into two groups: a control group (AK1) and a treatment group (AK2). Animals were reared in experiment cage. All animals were offered various local green forages which were alternately supplied in the same manner. Drink water were available *ad libitum* to all animals observed. The animals of treatment group were immunized with thoraxial antigen extract of *M. domestica* (IATMd). Each experiment animal in AK2 group was treated by subcutaneous injection with 10 µl of IAMTd.

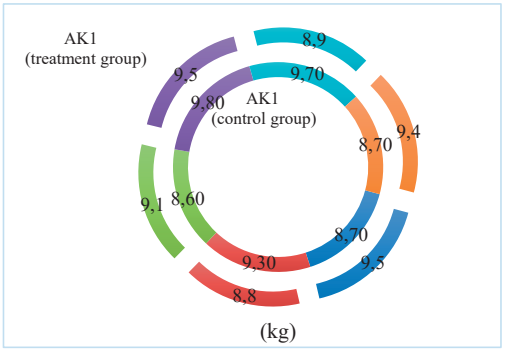


Figure 1. The initial of body weight of animal experimental

Data were collected during eight weeks and analyzed by using t-student procedure to evaluated the effect of IATMd on growth performance of two groups studied.
The effect of the treatment was recorded after two weeks of immunization over an eight weeks periode. The growth performances were evaluated according to the following parametres:

1) Dry Matter (DM) of feed intake calculated as:

$$DMI = \frac{(fo - rf)}{t}$$

which:

fo = total DM weight of feed offered (g);
rf = total DM of residual feed (g);
t = number of days during observation.

2) Daily body weight gain (DWG), calculated as:

$$DWG = \frac{(fbw - ibw)}{t}$$

which:

fbw = final body weight (g);
ibw = initial body weight (g);
t = number of days during observation.

3) Feed conversion ratio (FCR) was calculated as a ratio of dry matter of feed intake and daily body weight gain and expressed in the following formula:

$$FCR = \frac{DMI}{DWG}$$

which:

DMI is dry matter of feed intake (g);
DWG is daily body weight gain (g).

## RESULTS AND DISCUSSIONS

The significant role of IAMTd immunization in experimental goats on the measured parameters was obtained in daily body weight gain and FCR values as presented in the graphs (Figures 3 and 4).
The immunization with IAMTd to local experimental animals did not have a significant effect on the average of dry matter intake in treatment group (AK2) compared to the control group (AK1) where P value was higher than 0.05 although the data showed tendency that most of the animals used in this experiment had a higher DMI rates in the treatment group compared to control group as presented in Figure 2. These results remained that at the applied dose of antigen did not provide a negative impact on young goat palatability.
The use of IATMd has an effect positive on immune system of the goat kids that leads to control pathogen agent infection, thereby ensuring metabolic activity in utilizing nutrient intake to be a muscle formation development (Rumokoy et al., 2020)
Conditions can contribute to weight gain of animal treatment as shown in Figure 3.

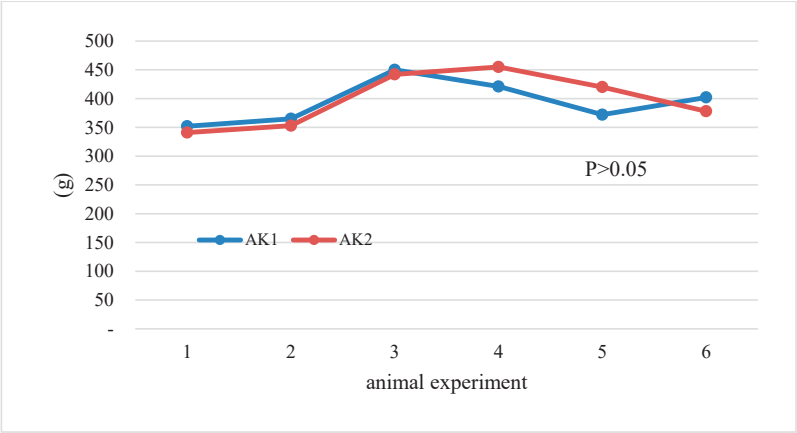


Figure 2. Dry matter intake (gram $d^{-1}$)

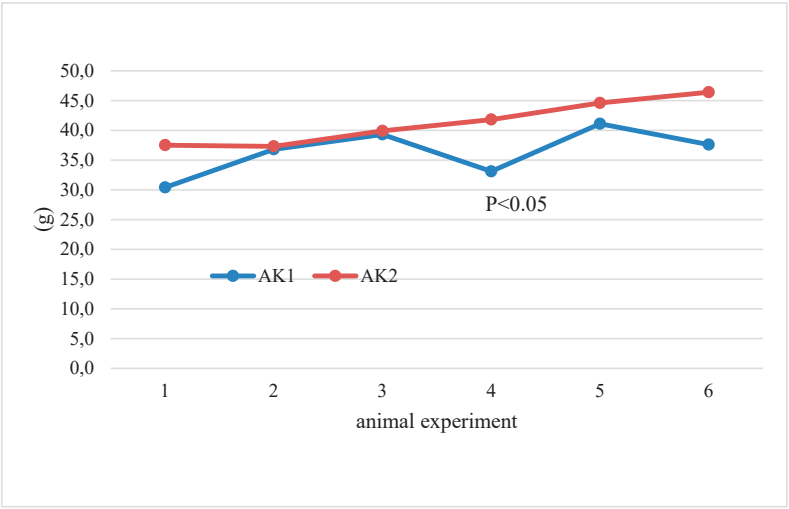


Figure 3. Daiy Weight gain (gram $d^{-1}$)

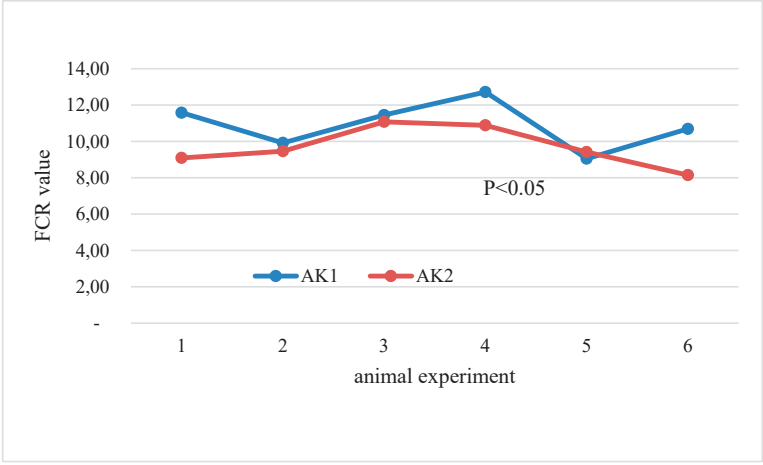


Figure 4. Feed Conversion Value

The average of daily weight gain obtained in AK1 (control group) was significantly lower than in AK2 as treatment group (P<0.05) as shown in Figure 3.

The difference of the groups related to mean FCR value was significant (P<0.5). The treatment animal group had a significantly smaller value than the control animal group. The FCR values of the treatment group ranged from 8.15 to 11.8. These FCR values were better than in the control group with FCR values ranging between 9.05 and 12.72

## CONCLUSIONS

The IATmd substance in this study had a positive effect in keeping the palatability of goats, and also to improve body weight gain and the value of the feed conversion ratio of the trial animals

## REFERENCES


Aldridge, M.E., Fearon, J.E., Haynes, B.P., Miller, H.M., Sanford, K.Y., Scott, R.R., ... & Memili, E. (2018). Solutions for Grand Challenges In Goat And Sheep Production. *Biotropia*, 26(1), 55-64. Retrieved May 10, 2021, from https://journal.biotrop.org/index.php/biotropia/article/view/944

Ameri, M., Wang, X., Wilkerson, M.J., Kanost, M.R., & Broce, A.B. (2008). An immunoglobulin binding protein (antigen 5) of the stable fly (Diptera: Muscidae) salivary gland stimulates bovine immune responses. *Journal of medical entomology*, 45(1), 94-101. Retrieved April 10, 2021, from https://academic.oup.com/jme/article/45/1/94/874205?login=true

Caroprese, M., Ciliberti, M. G., Santillo, A., Marino, R., Sevi, A., & Albenzio, M. (2016). Immune response, productivity and quality of milk from grazing goats as affected by dietary polyunsaturated fatty acid supplementation. *Research in veterinary science*, 105, 229-235. Retrieved, 19 May 2021, from https://pubmed.ncbi.nlm.nih.gov/27033938/

Heidt, P.J., Midtvedt, T., Rusch, V., & Versalovic, J. (2012). *Bacterial species as partners and pathogens*. Retrieved April 19, 2021, from http://www.old-herborn-university.de/wp-content/uploads/publications/books/OHUni_book_25.pdf.

McGeer, P.L., Akiyama, H., Itagaki, S., & McGeer, E.G. (1989). Immune system response in Alzheimer's disease. *Canadian Journal of Neurological Sciences*, 16(S4), 516-527. Retrieved May 10, 2021, from https://www.cambridge.org/core/journals/canadian-journal-of-neurological-sciences/article/immune-system-response-in-alzheimers-disease/98FC6CD39A11434C6FEBE407F76A064D.

Rumokoy, L., Adiani, S., Assa, G.J.V., Toar, W.L., & Aban, J.L. (2017). Entomology contribution in animal immunity: Determination of the crude thoraxial glandular protein extract of *Stomoxys calcitrans* as an antibody production enhancer in young horses. *Journal of Entomological and Acarological Research*, 49(3). Retrieved April 12, 2021, from https://pagepressjournals.org/index.php/jear/article/view/7074.

Rumokoy, L., Kiroh, H., Untu, I.M., Assa, G., Turangan, S., & Toar, W.L. (2020). Antigen-G of Larva Serum of *Musca domestica* as an Immunoglobulin Production Promoter in Goats under an Organic Maintenance. *Animal Production*, 22(1), 31-36. Retrieved May 07, 2021, from https://doi.org/10.20884/1.jap.2020.22.1.36

Salim S., & Susanti Y., (2016). Pemerintah Dorong Pengembangan Ternak Kambing Perah. *Ditjen Peternakan dan Kesehatan Hewan. Kementan*. Retrieved April 10, 2021, from https://ditjenpkh.pertanian.go.id/pemerintah-dorong-pengembangan-ternak-kambing-perah.

Silva, J.B., Fagundes, G.M., Soares, J.P., Fonseca, A.H., & Muir, J.P. (2014). A comparative study of production performance and animal health practices in organic and conventional dairy systems. *Tropical animal health and production,* 46(7), 1287-1295.

Sumardianto, T.A.P., Purbowati, E., & Masykuri, M. (2013). Karakteristik karkas kambing kacang, kambing peranakan ettawa, dan kambing kejobong jantan pada umur satu tahun. *Animal Agriculture Journal*, 2(1), 175-182. Retrieved April 10, 2021, from https://ejournal3.undip.ac.id/index.php/aaj/article/viewFile/2145/2163.

Toar, W.L., Kaunang, C., Untu, I.M., Rumokoy, L., & Kiroh, H. (2017). The empowerment of crude extract antigen-gof insect on goats immunity enhancement an entomology contribution in animal husbandry. *Scientific Papers. Series D. Animal Science,* 60. Retrieved April 10, 2021, from http://animalsciencejournal.usamv.ro/pdf/2017/Art47.pdf

Toar, W.L., Rumokoy, L., Untu, I.M., & Assa, G. (2019). Insect Crude Thoraxial Antigen-G Extracted from Apis mellifera to Enhance Serum Immunoglobulin of Goats: An Entomology Contribution in Animal Science. *Animal Production*, 20(2), 133-138.