

# The Level of Leukocytes, Eosinophils, Monocytes, and Lymphocytes in Mice (*Mus musculus*) on Post-Inoculation of *Trypanosoma evansi*

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**Abstract:** *Surra* is a disease that has an economic impact because it has a wide geographical distribution and is able to infect various domestic and wild mammals, causing death. This disease makes livestock productivity, causes milk and meat production to drop, makes carcass quality poor, reduces production performance, and requires high cost for treatment. This study aims to determine the level of leukocytes, eosinophils, monocytes, and lymphocytes of mice inoculated with *Trypanosoma evansi*. The results are presented in a descriptive form. The research results showed that the Leukocyte levels were P0 =  $13.62 \pm 7.08^{ab}$ , P1 =  $8.15 \pm 1.04^a$ , P2 =  $13.18 \pm 4.69^{ab}$ , P3 =  $16.22 \pm 4.95^b$ ; Eosinophils levels were P0 =  $0.05 \pm 0.13^a$ , P1 =  $0.97 \pm 0.82^a$ , P2 =  $0.36 \pm 0.05^a$ , P3 =  $0.00 \pm 0.00^a$ , in which there was no significant difference in the four treatments for leukocytes and eosinophils; while the Monocytes levels were P0 =  $1.83 \pm 0.50^a$ , P1 =  $1.48 \pm 0.24^a$ , P2 =  $2.68 \pm 0.45^b$ , P3 =  $5.43 \pm 0.37^c$ ; Lymphocytes levels were P0 =  $7.71 \pm 4.36^b$ , P1 =  $3.41 \pm 1.34^a$ , P2 =  $5.85 \pm 1.24^{ab}$ , P3 =  $8.53 \pm 3.91^b$ , in which there were significant differences between the four treatments for monocytes and lymphocytes, with  $p \leq 0.05$ . *Trypanosoma evansi* inoculation can increase level of leukocytes, eosinophils, monocytes and lymphocytes in mice after 3 days of infection.

## 1 INTRODUCTION

A parasitic disease that frequently attacks cattle is *Trypanosomiasis* (*Surra*). This disease makes livestock productivity, causes milk and meat production to drop, makes carcass quality poor, reduces production performance, and requires a high cost of treatment (Dargantes, 2010). *Trypanosomiasis* is caused by a protozoon, a blood parasite called *Trypanosoma evansi*. This parasite can be found in the blood circulation in the acute phase of infection. *T. evansi* takes glucose as a source of nutrients so that if the animal does not have good nutritional intake, the parasite will cause a decrease in blood glucose. *Trypanotoxin* is a toxin produced by *Trypanosoma sp* that can lyse red blood cells and lead to anemia condition in host animals (Astuti *et al.*, 2006). This study aims to determine the levels of leukocytes, eosinophils, monocytes, and lymphocytes in mice that are inoculated with *Trypanosoma evansi*.

## 2 LITERATURE REVIEW

*Trypanosoma evansi* was firstly discovered by Griffith Evans in camels and horses in India. This disease has the local name *surra*, meaning “thin”. *T. evansi* is allegedly derived from the evolution of *T. Brucei*, which causes the *nagana* disease in animals in Africa. The spread of *T. evansi* in India is through infected camels for trade (Eyob and Matios, 2013). The *surra* case was first reported in Indonesia in 1897 in the horse population on the island of Java, sporadically spreading throughout Indonesia (Ausvetplan, 2006).

## 3 METHOD AND MATERIALS

This research was an experimental research with a post-test only on control group design. This study applied Completely Randomized Design (RAL) with random sampling technique in 4 treatments using 6 replications. Three variables comprise of the independent variable, which was the difference in

the time of taking blood; the dependent variables, which were the amounts of leukocytes, eosinophils, monocytes, and lymphocytes of mice (*Mus musculus*); and control variables namely sex, age, cage, and treatment (pellet and drink).

The laboratory animals used were 24 adult male BALB/C-strain mice (*Mus musculus*) (aged > 2 months) with weight range of 25-30g.

*Trypanosoma evansi* was inoculated in mice through intraperitoneal technique. The blood of the mice containing the 10<sup>3</sup> Trypomastigote stadium parasite was injected for as much as 0.2 ml in the treated mice, except in the control mice. Blood was taken through the heart using 3 ml syringe with 26G or 28G needle. Then, the preparation of blood ulcers was conducted to determine the development of parasite in blood plasma. It was made by taking a little blood from the collection and dripping it on a glass object. Blood was applied to a glass object, and then methanol was added to conduct fixation for 3-5 minutes. Giemsa with 10% stain was done for 30 minutes on a blood vial that has been fixed with methanol. The stained preparation was washed with flowing water, dried up, and observed under a microscope.

#### 4 RESULTS AND DISCUSSION

Table 1: The Average (±SD) Mice Leukocyte Levels (10<sup>3</sup> Cell/μl) on Post-Inoculation in *Trypanosoma evansi*.

Treatment	Average (±SD)
P0 (Control: Blood-taking after 72 hours)	13.62±7.08 <sup>ab</sup>
P1 (Blood-taking after 24 hours)	8.15±1.04 <sup>a</sup>
P2 (Blood-taking after 48 hours)	13.18±4.69 <sup>ab</sup>
P3 (Blood-taking after 72 hours)	16.22±4.95 <sup>b</sup>

Note: The same superscripts in same column with P 0.067 ≥ 0.05 signifies no significant difference between treatments.

Table 2: The Average (±SD) Mice Eosinophil Levels (10<sup>3</sup> Cell/μl) on Post-Inoculation in *Trypanosoma evansi*

Treatment	Average (±SD)
P0 (Control: Blood-taking after 72 hours)	0.05±0.13 <sup>a</sup>
P1 (Blood-taking after 24 hours)	0.97±0.82 <sup>a</sup>
P2 (Blood-taking after 48 hours)	0.36±0.05 <sup>a</sup>
P3 (Blood-taking after 72 hours)	0.00±0.00 <sup>a</sup>

Note: The same superscripts in the same column with P 0.273 ≥ 0.05 signifies no significant difference between treatments.

Table 3: The Average (±SD) Mice Monocyte Levels (10<sup>3</sup> Cell/μl) on Post-Inoculation in *Trypanosoma evansi*

Treatment	Average (±SD)
P0 (Control: Blood-taking after 72 hours)	1.83 ±0.50 <sup>a</sup>
P1 (Blood-taking after 24 hours)	1.48±0.24 <sup>a</sup>
P2 (Blood-taking after 48 hours)	2.68± 0.45 <sup>b</sup>
P3 (Blood-taking after 72 hours)	5.43±0.37 <sup>c</sup>

Note: Superscripts are different in the same column with P 0.00 ≤ 0.01, indicating a very significant difference between control and treatments.

Table 4: The Average (±SD) Mice Lymphocyte Levels (10<sup>3</sup> Cell/μl) on Post-Inoculation in *Trypanosoma evansi*.

Treatment	Average (±SD)
P0 (Control: Blood-taking after 72 hours)	7.71±4.36 <sup>b</sup>
P1 (Blood-taking after 24 hours)	3.41±1.34 <sup>a</sup>
P2 (Blood-taking after 48 hours)	5.85±1.24 <sup>ab</sup>
P3 (Blood-taking after 72 hours)	8.53±3.91 <sup>b</sup>

Detail: Superscripts are different in the same column with P 0.042 ≤ 0.05, indicating a significant difference between control and treatments.

#### 5 CONCLUSIONS

*Trypanosoma evansi* infection affects leukocytes, eosinophils, lymphocytes, and monocytes levels, and the blood-taking of mice in different hours affects

levels of leukocytes, eosinophils, lymphocytes, and monocytes.

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