

# Identification of Parasitic Disease (Toxoplasmosis) in Wild Cats in Bekasi City

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**Abstract:** *Toxoplasmosis is a disease caused by Toxoplasma gondii, an intracellular parasite that infects humans and pets. The prevalence of toxoplasmosis in Indonesia is still high in humans, around 67.3% and in cats, 9.4%. Cats are definitive hosts of Toxoplasma gondii. The excrement excreted by cats contains oocysts infective to humans. This study aims to identify diseases caused by parasites in wild cats in the city of Bekasi, West Java using ICT and microscopy methods. This study aims to identify diseases caused by parasites in wild cats in the city of Bekasi, West Java using ICT and microscopy methods. Examination of toxoplasmosis in cats was carried out using the ICT microscopic test method using the flotation concentration method. This research is an analytic observational study with a cross sectional design. The research sample consisted of 30 wild cats taken randomly sampling. Analysis of the research data was only proven through a table comparing the microscopic method with the ICT method. In the microscopic method, 30 samples (100%) were negative. Other infections were found in the samples on microscopic examination, namely worm eggs in all samples (100%). In the ICT method, it was found that 1 sample (3.3%) was positive and 29 samples (96.7%) were negative. It is not recommended to have direct contact with wild cats as long as it is not confirmed that they are free from infection by parasites.*

**Keywords:** Wild cat, immunochromatography (ICT), Toxoplasmosis, floating method, helminthes

## 1. Introduction

Toxoplasma gondii is a single - celled living thing, it is a parasite in the bodies of other living organisms (hosts) and takes all the nutrients from the host. Toxoplasma gondii is a protozoan parasite with natural properties, its course can be acute or chronic, systemic or asymptomatic. These parasites include zoonotic parasites that can live in the bodies of various types of warm - blooded animals and can be transmitted to humans. Toxoplasma gondii. was first studied by Nicolle and Manceux in 1908 based on their research on parasites they found in the blood, liver, and spleen of the hermit crab (*Ctenodactylusgundii*), a hamster - like rodent found in North Africa. These animals are regularly used in leishmaniasis research in Charles Nicolle's laboratory at the Pasteur Institute in Tunis (Soedarto, 2012).

There are three stages of Toxoplasma gondii, tachyzoites, bradyzoite stages which form cysts in the tissues, and sporozoites which form in the oocysts. Oocysts are found in the intestines of cats and are only excreted by cats through their feces (Soedarto, 2012). Transmission to humans can occur acquired or congenital. Obtained transmission can occur in both children and adults, (Jawetz, et al, 2008).

The prevalence of toxoplasmosis in an area is influenced by many factors, such as the habit of eating undercooked meat, the presence of cats mainly kept as pets, the presence of rats and birds as intermediate hosts which are prey for cats, the presence of a number of vectors such as cockroaches or flies which can transfer oocysts from feces. cat to food. Earthworms also play a role in moving oocysts from the deep layers to the soil surface (Sutanto, 2008).

According to Natadisastra et al (2015) Toxoplasma gondii can also be transmitted through blood transfusions from infected people, organ transplants from infected people, and working in laboratories with infected animals. Congenital infection early in pregnancy can result in abortion of the fetus, or stillbirth. If the infection occurs in the last months of pregnancy, the baby in the womb does not show abnormalities, but three months after birth, the clinical symptoms of toxoplasmosis in the baby begin to appear. Transmission of toxoplasmosis from mother to child can also occur through breast milk, if the mother catches this disease during the puerperium (Soedarto, 2009).

The important role of cats as spreaders of toxoplasmosis has been widely studied by experts abroad. Their conclusion generally states that where there are cats there must be toxoplasmosis in wild animals, pets and humans (Sasmita, 2006).

Serological tests for the detection of toxoplasmosis will help determine the levels of IgM and IgG antibodies. An antibody is a protein normally present in the body or produced in response to an antigen (in this case, Toxoplasma) for the purpose of neutralizing the antigen. Determining IgM levels is helpful in the diagnosis of active toxoplasmosis, because the levels of these antibodies increase within one week of infection and can remain elevated for up to three months. IgG antibodies rise within two to four weeks after infection and may remain elevated for a full year to follow. Determination of antigen and antibody levels will help your veterinarian make a confirmatory diagnosis. The polymerase chain reaction test is a reliable test to verify the presence of Toxoplasma gondii in samples. Tentative diagnosis in cats by finding oocysts in their feces. One method used to

determine the presence of *Toxoplasma gondii* oocysts is using the saturated NaCl (Brine) flotation method with direct samples of cat feces (Simamora, et al, 2015).

Bekasi City is one of the cities located in West Java where the wild cat population is very high. We can find wild cats in almost all places, both in residential areas, streets, markets, campuses, schools and offices. The existence of these cats does not really have an immediate impact on health. The population of feral cats in the city of Bekasi is not known with certainty. For comparison, the total population of cats in Jakarta in 2020 is 622, 786, (Kumparan, 2020). The city of Jakarta is demographically adjacent to the city of Bekasi, so it is very possible that the feral cat population in these two cities is almost the same.

This study aims to identify diseases caused by parasites in wild cats in the city of Bekasi, West Java using ICT and microscopy methods.

## 2. Material and Methods

This study used primary data from serological/ICT test results and microscopic examination results from 30 stray cats in Bekasi city. Serological examinations were carried out at two Animal/Pets clinics and assisted by veterinarians on duty at the clinics. Microscopic examination was carried out at the Parasitology Laboratory, TLM Department, PoltekkesKemenkes Jakarta III. Tools and materials: vacuum tube, tourniquet, test cassette/kit, 1 ml syringe, centrifuge, microscope, object glass, deck glass, dropper pipette, sample bottle, alcohol, NaCl, Aquadest, Xylol, tissue, name label, writing instrument, personal protective equipment (lab coat, handscoon, mask and camera). The material used is serum for ICT examination and faeces for microscopic examination.

Procedure: Clinical examination is carried out by a veterinarian including identification of the sex and physical condition of the cat. ICT method examination: Blood sampling is carried out by a veterinarian at the Pandu - Vet and Am. Vet animal clinics. Blood sampling procedure: one of the cat's paws is attached with a tourniquet and smeared with 70% alcohol. Blood is taken from the cephalic vein or saphenous vein with a 1 to 3 ml syringe. Enough blood is taken, then the blood sample is put into a non - EDTA tube and placed obliquely so that the blood serum can easily come out and be taken. Then the blood sample was centrifuged at 1500 rpm to obtain serum. Then the serum is dripped into the sample well as much as 3 - 5 drops and read after 3 to 5 minutes. If the test goes well, you will see color movement along the result window towards the center of the test. The results are declared valid when a colored line appears on the control section. The results will remain stable within 15 minutes and will be invalid if the reading is carried out for more than 20 minutes. The result is positive if a colored line appears in the "C"/control area and if a line appears in the test area, it indicates that there are specific IgG/IgM *Toxoplasma gondii* antibodies. The result is declared negative: if a colored line appears in the "C"/control area and there is no line in the test area. The result is declared invalid: if no colored line appears in the "C"/control area. Microscopic examination: the stool sample

is sufficiently placed in the sample bottle. If the stool consistency is hard, 0.9% NaCl is added to soften the stool consistency. Close the pot tightly and put a label or identification number. Samples were examined using the floating concentration method using saturated NaCl, then examine it under a microscope with an objective lens magnification of 40x and 100x. The test results are positive if there are *Toxoplasma gondii* oocysts, while the results are negative if there are no oocysts.

## 3. Ethical Clearance

Ethical clearance was obtained from Health Polytechnic Ministry of Health Medan Ethics Commission Number: 01.003/KEPK/Poltekkes Kemenkes Medan 2022, March 25, 2022.

## 4. Results

The results of the physical examination of 30 wild cats (*Felis catus*) in Bekasi in 2022 are presented in Table 1 below.

**Table 1:** Distribution of Sex of feral cats in the city of Bekasi in 2022

Sex	Frequency (n)	Percentage (%)
Male	12	40
Female	18	60
Total	30	100

From table 1 it can be seen that the majority of cats are female, namely 18 cats (60%) and 12 males (40%). Based on these data it can be concluded that the sex of the wild cats in this study was dominated by the female. Based on data for 2021 it is estimated that the number of male cats is greater than that of females, namely 54.5% (Kumparan, 2021). The results in this study were the opposite, this was due to random sampling of wild cats where the behavior of female cats was more docile so they were easier to sample.

**Table 2:** Examination Results of *Toxoplasma gondii* Microscopic Method and ICT Method

Examination results of <i>Toxoplasma gondii</i>	Metode			
	Microscopy		ICT	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Positive	0	0	1	3,3
Negative	30	100	29	96,7
Total	30	100	30	100

From table 2 it can be seen that the results of the microscopic method of *Toxoplasma gondii* examination did not find oocysts in all samples which was zero and the ICT method examination found 1 positive sample (3.3%). These results cannot be followed up with statistical tests, but in substance there are differences in the results of the microscopic method of *Toxoplasma gondii* examination with the ICT method.

**Table 3:** Description of Other Parasitic Infections (Worms) on Microscopic Examination

Others Parasitic Infection	Frequency (n)	Percentage (%)
<i>Toxocara cati</i>	24	80
<i>Toxocara cati</i> and <i>cacingtambang</i>	6	20
Total	30	100

From table 3, it was found that there were 26 positive wild cats infected with the *Toxocaracati* parasite and 6 cats (20%) had a mixed infection with hookworms.

## 5. Discussion

Based on the examination results, it was found that there were differences in the results of the examination of the IgG/IgM antibody ICT method with the microscopic method. The examination results from the two different methods showed that there were differences in the examination results obtained from the same wild cat subject, namely the sample with the identity number K2. In the ICT examination the blood sample showed reactive results whereas, in the microscopic method the stool sample showed a negative result for *Toxoplasma gondii* oocysts. This can be caused because IgM is the first antibody to appear, usually 1 week after infection. The amount increases until it peaks after 1 - 3 months.

According to Alpiniawati (2017) the decline will take the next 9 months until it is not detected. Along with decreasing IgM levels, there is an increase in IgG levels 1 - 2 weeks after infection and will continue to increase up to 6 - 8 weeks later and will last up to 1 - 2 years and in some cases will last a lifetime (Tolistiawaty et al, 2013). This statement is in accordance with the results of a study in which 1 faintly visible reactive sample was found out of 29 samples in the serological examination of *Toxoplasma gondii* antibodies. Even though it looks vague, this reactive result must be watched out for as a form of active infection against *Toxoplasma gondii*. This vague reactive result can occur if IgM antibodies appear indicating a new infection or IgG antibodies which can form as the body's response if it has been previously infected. Negative results in the microscopic method can occur because the *Toxoplasma gondii* oocyst is not carried into the feces or it can occur due to the use of an inappropriate flotation solution so that it is not found when observing under a microscope.

The results of the ICT method comparison test in the study showed different results from the microscopic method. Based on the research results, the ICT method has the advantage of being faster in detecting *Toxoplasma gondii* infection in wild cats. The ICT method can be recommended as a qualitative initial serological screening test to detect *Toxoplasma gondii* infection in wild cats. In addition, the ICT method is an easy and fast method and does not require special preparation. ICT metode is not recommended as a diagnosis, while the microscopic method examination takes a long time and requires several preparations such as preparing a flotation solution, namely saturated NaCl. In addition, good knowledge and observation is needed in interpreting microscopic results because the oocyst forms of *Toxoplasma gondii* are difficult to distinguish from *Neospora caninum*, *Hammondia sp.*, and *Sarcosystis sp.*

Although it requires some preparation before carrying out the examination, this method is the gold standard examination and confirmation test to detect a positive infection with *Toxoplasma gondii* which is characterized by the presence of oocysts with a round shape, tends to be oval, 10 - 13 microns in size, transparent and contains two sporocysts, each sporocyst contains four trophozoites.

The interesting thing in this study was the infection by worms of the type *Toxocaracati* as many as 26 individuals (80%) and 6 individuals (20%) mixed infections with hookworms. These results are in line with the research of Hana, Indra, and Marek (2021) that in their research on cases of worm infection in cats in the city of Surabaya using a total sample of 100 samples consisting of 50 samples of pet cat feces and 50 samples of wild cat feces. *Toxocaracati* worm eggs were found in 15 cases (83.4%) in wild cats and three cases (16.6%) in domestic cats. In infection with *Ancylostoma s.* eggs, 11 cases (91.7%) were found in wild cats and one case (8.3%) in domestic cats (Hana, Indra, and Marek, 2021). The results of another study conducted in Surabaya by Wahyudi in 2017 also obtained almost the same results, which were found in 68 (37.8%) of 180 cat feces samples that polluted public places in Surabaya. Species that cause environmental pollution include eggs of *Ancylostomasp.*, *Toxocaracati*, and *Toxascarisleonina*. Cats as free - living animals are very easy to find in public places. The habit of cats to defecate in any place such as dusty ground, gardens, sand pits, trash cans, even children's playgrounds. The proximity of human life to wild cats is one of the potentials that can transmit helminthiasis to humans as a zoonosis.

Some research from abroad also get the same results. Overall, 90.1% of 99 Danish outdoor cats harboured gastrointestinal helminths. *Toxocaracati*, the most prevalent species, was detected in 84.8% of the cats (N. Tecouchi, 2015) then About one in 10 cats is at risk of lungworm infection in Europe (Allesio Gianelli, 2017).

Hookworms are zoonotic, which means they can be transmitted to people. Hookworms do not infect humans internally like they do in cats or dogs, but they can cause a skin disease called cutaneous larva migrans. This can only occur if humans come into contact with a parasitized cat or litter contaminated with its feces. The infection causes a mild dermatitis accompanied by an itchy sensation.

## 6. Conclusion

- The prevalence of Toxoplasmosis cases through serology/ICT examination is 3.3%, and microscopic examination is 0%
- Examination using the ICT method is used as a qualitative initial serological screening stage while examination uses a microscopic method as a diagnosis.
- There was 100% infection from the helminths group with *Toxocaracati* species and 20% mixed infection with hookworms.

## Conflict of Interest

There is no conflict of interest in this research.

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