Contents Lists Available at: https://journal2.unusa.ac.id/

Medical Technology and Public Health Journal

Journal Home Page: https://journal2.unusa.ac.id/index.php/MTPHJ

Potential Combination Ethanol Extract Of Papaya Leaf (*Carica Papaya L*) And Soursop Leaf (*Annona Muricata L*) On The Death Of *Ascaridia Galli* Worm *In Vitro*

Maulida Aisshella N[1] | Yauwan Tobing Lukiyono[1*] | Irwan Sulistio[3] | Agus Aan Adriansyah[4]

[1]*Departemen of Health Analyst, Faculty of Health, Universitas Nahdlatul Ulama Surabaya, Indonesia*
[2]*Departemen of Health Analyst, Faculty of Health, Universitas Nahdlatul Ulama Surabaya, Indonesia*
[3]*Departemen of Environmental Health, Faculty of Health, Politeknik Kesehatan Kemenkes Surabaya, Indonesia*
[4]*Departemen of Public Health, Faculty of Health, Universitas Nahdlatul Ulama Surabaya, Indonesia*

***Corresponding Author*:**
Maulida Aisshella N, Department of Health Analyst, Faculty of Health, Universitas Nahdlatul Ulama Surabaya, Indonesia.
Email: maulidaaisshella08@gmail.com

DOI: *10.33086/mtphj.v10i1.8046*

Article History:
Received, September 15th, 2025
Revised, September 28th, 2025
Accepted, October 09th, 2025
Available Online: March 03st, 2026

Please cite this article as:
N Aisshella, Maulida, et. al., "Potential Combination Ethanol Extract Of Papaya Leaf (Carica Papaya L) And Soursop Leaf (Annona Muricata L) On The Death Of Ascaridia Galli Worm In Vitro" Register: Medical Technology and Public Health Journal, Vol. 10, No. 1, pp. 66-74, 2026

ABSTRACT

Worm infestations are a significant public health issue, primarily caused by Soil Transmitted Helminths (STH). One of the most common parasites affecting poultry is Ascaridia galli, which causes ascariasis and results in weight loss and impaired growth in affected birds. This study aims to evaluate the anthelmintic effects of a combined ethanol extract of papaya leaf and soursop leaf on the mortality of Ascaridia galli in vitro. We employed a quantitative, experimental laboratory approach using a Posttest-Only Group Design to determine the efficacy of the combined extracts as a treatment for Ascaridia galli. Each treatment group consisted of 7 worms, and the experiment was repeated 6 times with exposure times of 2, 4, and 6 hours. The data collected were analyzed using probit regression to assess the potential of the combined ethanol extracts of papaya and soursop leaves on the mortality rates of Ascaridia galli. The effectiveness of the extracts was evaluated based on the LC50 (lethal concentration for 50% of worms) and LC50 (lethal time for 50% of worms). The study found that the LC50 values were 47.614% at 2 hours, 20.549% at 4 hours, and 8.091% at 6 hours, while the LC50 values were 4.006 hours for 25% mortality and 1.536 hours for 50% mortality. These results indicate that the combined ethanol extracts of papaya leaf (Carica papaya L.) and soursop leaf (Annona muricata L.) show potential as an effective anthelmintic treatment against Ascaridia galli, with mortality rates increasing with longer exposure times and higher concentrations.

Keywords: Papaya Leaf, Soursop Leaf, Anthelminthic, Ascaridia galli

INTRODUCTION

Indonesia is a country with a steadily growing population and an increasing demand for animal protein. According to Sulastri and Hamdani (2018), helminthiasis, a form of endoparasitism, is one of the diseases that affects chickens. Helminthiasis is an infectious disease caused by soil-transmitted helminths (STH), or intestinal nematodes, transmitted through soil (Rahmawati et al., 2023).

According to data from the World Health Organization (WHO) in 2022, helminthiasis poses a significant global challenge, impacting approximately 24% of the world's population. The high humidity characteristic of Indonesia's climate creates an environment conducive to the proliferation of parasites, including worm eggs that develop into infective stages. Infestations in chickens can have serious consequences, leading to reduced feed efficiency and stunted weight gain despite adequate feed intake. Ultimately, this situation can result in reduced harvest weight and decreased egg production, leading to wasted feed costs and significant economic losses (Elenwo, 2014). In East Java, the prevalence of helminthiasis was recorded at 7.95% between 2008 and 2010 (Halleyantoro et al., 2019).

The tropical climate significantly contributes to the high prevalence of helminthiasis, creating optimal conditions for the development of infective worm eggs. Additionally, unhealthy lifestyle habits—including poor hygiene and sanitation—coupled with socio-economic factors, further exacerbate this issue (Lukiyono et al., 2020).

The incidence of helminthiasis is intricately linked to various sectors, including animal husbandry. In particular, adult worms are commonly found in the intestines of chickens on farms, causing detrimental effects on their health and increasing mortality rates. Helminths pose a significant health threat to poultry species, such as native chickens and wild birds (Prastowo & Ariyadi, 2015). Several types of worms frequently infect chickens, including Capillaria sp., Heterakis sp., Strongyloides sp., and Ascaridia sp. (Kusuma et al., 2021). Among these, the Ascaridia galli worm—a member of the largest class of nematodes in poultry—commonly infects chickens, residing in their intestinal tract and duodenum. Farmers can incur substantial economic losses in their livestock operations due to infections with Ascaridia galli worms, estimated at 2.49-3.48 million per year, resulting in weight loss and impaired growth (Balqis et al., 2014).

One strategy to address the rising incidence of helminthiasis is to educate farmers on preventive measures against Ascaridia galli contamination and on treatment options for chickens diagnosed with exposure to this parasite. In Indonesia, treatment for worm infections typically involves the use of synthetic anthelmintic drugs such as piperazine, albendazole, and pyrantel pamoate. However, routine use of these anthelmintics poses a risk of developing resistance, which can reduce the effectiveness of these medications over time (Maryam et al., 2018). Therefore, it is crucial to explore safe alternative treatments using natural ingredients. Papaya leaves (Carica papaya L.) and soursop leaves (Annona muricata L.) are plants known for their potential in reducing and preventing helminthiasis in chickens, as they exhibit antimicrobial, antiviral, antibacterial, antiparasitic, and anthelmintic properties (Hasmilah, 2015).

Specifically, papaya leaves contain a wealth of substances, including over 50 active ingredients, including carpaine compounds that can inhibit the growth of worms, parasites, and various cancer cells. Additionally, papaya leaves offer anti-cancer benefits against breast, pancreatic, prostate, skin, cervical, and lung cancer. They are also rich in alkaloids and tannins, which serve as anthelmintics. Alkaloids are alkaline compounds that can disrupt electrolyte balance in worms, leading to impaired nerve coordination.

Soursop leaf (Annona muricata L.) is a species belonging to the Annonaceae family, known for its numerous benefits to human health. It serves as a traditional medicinal plant with a variety of properties and can also be used as a supplementary feed for livestock. Traditionally, soursop leaves have been used to prevent and treat conditions such as rheumatism, flu, and coughs, as well as for their anticancer properties. Furthermore, soursop is commonly used to treat ailments caused by worms and parasites (Salempa, 2008).

Soursop leaves contain alkaloids, tannins, and several chemical compounds classified as Annonaceous acetogenins, which are believed to possess cytotoxic potential. Alkaloids, in particular, can reduce worm movement intensity, making them appear weaker.

Research by (Widiastuti et al., 2015) emonstrated that extracts from papaya leaves (Carica papaya L.) can kill Ascaridia galli worms within 24 hours at a concentration of 15%. In comparison, studies on soursop leaves (Annona muricata L.) have revealed their antiparasitic properties, including the ability to eliminate worms within 4 hours at a 25% concentration. Thus, researchers are interested in conducting in vitro studies to explore the combined effects of ethanol extracts from both papaya leaves (Carica papaya L.) and soursop leaves (Annona muricata L.) on the mortality of Ascaridia galli worms.

This study aims to evaluate the effectiveness of a combination of ethanol extracts from papaya leaves (Carica papaya L) and soursop leaves (Annona muricata L) in killing Ascaridia galli worms in vitro.

MATERIAL AND METHODS

The research employs an experimental approach using a Posttest-only Group Design to assess the anthelmintic properties of this combination on Ascaridia galli in vitro mortality.

Prior to commencing the research, an ethics application was submitted, and the study received ethics approval under the number 0488/EC/KEPK/UNUSA/2024. The materials utilized in this investigation include the extracts of papaya leaves (Carica papaya L.) and soursop leaves (Annona muricata L.), 0.9% NaCl, 96% ethanol, pyrantel pamoate tablets (250 mg), and Ascaridia galli worms..

Begin by preparing papaya leaf and soursop leaf powders, then mix them with 96% ethanol at a 1:2 (g: ml) ratio. Blend the mixture thoroughly and then filter it. Allow the filtrate to precipitate for 24 hours. After that, use a rotary evaporator to concentrate the upper filtrate until a relatively thick extract is obtained.

Next, prepare a 0.9% NaCl solution for use. Freshly slaughtered native chickens at the Sidoarjo Ban market are processed individually, and the intestines are carefully split open. Using tweezers, extract the worms from the chicken intestines and place them in the 0.9% NaCl solution.

For the extract concentrations, create 25% and 50% solutions using the maceration method at room temperature (approximately 25ºC) for about 24 to 72 hours. For the 25% concentrated extract, weigh out 12.5 grams each of the concentrated papaya leaf extract and the concentrated soursop leaf extract, and dissolve them in 100 ml of distilled water. For the 50% concentration, weigh out 25 grams each of the papaya and soursop leaf extracts, then dissolve them in 100 ml of distilled water. Each concentration should be prepared in six replicates. Store the extracts in dark, tightly sealed bottles labeled for identification, and keep them at around -20ºC for long-term storage or around 4ºC for short-term use.

Pyrantel pamoate tablets (250 mg each) were crushed and dissolved in 100 mL of 0.9% NaCl, yielding a 0.25% solution. A total of 168 Ascaridia galli worms were divided into four treatment groups, with 7 worms per group. The treatment involved immersing the worms in the test substance for each group. Following this, the worms were observed for mortality at 2, 4, and 6 hours. To assess the worms' vitality, they were gently disturbed with a stirring rod; those that did not exhibit movement were considered dead. The time of death and the number of deceased worms were recorded.

The data collected from these observations were subsequently analyzed using probit regression through the Statistical Product and Service Solution (SPSS) Version 21 software, in order to determine the Lethal Concentration (LC50) and Lethal Time (LC50) values for Ascaridia galli worms when exposed to a combination of ethanol extract from papaya leaves (Carica papaya L.) and soursop leaves (Annona muricata L.).

RESULTS AND DISCUSSION

The results regarding the mortality percentage of Ascaridia galli worms after treatment for durations of 2 hours, 4 hours, and 6 hours, using various concentrations of a combination of papaya leaf extract (*Carica papaya L.*) and soursop leaf extract (*Annona muricata L.*), are presented in the table below:

Table 1. Percentage mortality of *Ascaridia galli* worms after being treated for 2 hours using several concentrations of a combination of papaya leaf (*Carica papaya L*) and soursop leaf (*Annona muricata L*) extracts.

Treatment	Number of *Ascaridia galli* worm	Number of death						Average Worm Mortality	Worm Mortality Percentage
		Replication							
		1	2	3	4	5	6		
Negative Control (-)	7 tails	0	0	0	0	0	0	0	0%
Positive Control (+)	7 tails	3	4	6	5	6	2	4,33	61,8%
Concentration 25%	7 tails	2	1	1	3	3	2	2	28,5%
Concentration 50%	7 tails	2	3	3	5	4	5	3,67	52,4%

From Table 1, it can be observed that the highest mortality rate of Ascaridia galli worms after 2 hours of treatment with varying extract concentrations was observed at a 50% concentration, with a mortality percentage of 52.4% (3.67 worms). Conversely, the lowest mortality was observed at a 25% concentration, with a mortality rate of 28.5% (2 worms). The positive control using piperantel pamoate at a concentration of 0.25% resulted in a mortality rate of 61.8% (4.33 worms), while the negative control with 0.9% NaCl exhibited no mortality (0% mortality; 0 worms).

Table 2. Percentage mortality of *Ascaridia galli* worm after being treated for 4 hours using several concentration of a combination of papaya leaf (*Carica papaya L*) and soursop leaf (*Annona muricata L*) extract.

Treatment	Number of *Ascaridia galli* worm	Number of death						Average Worm Mortality	Worm Mortality Percentage
		Replication							
		1	2	3	4	5	6		
Negative Control (-)	7 tails	0	0	0	0	0	0	0	0%
Positive Control (+)	7 tails	4	5	6	5	6	4	5,0	71,4%
Concentration 25%	7 tails	3	4	4	4	3	5	3,83	54,7%
Concentration 50%	7 tails	4	6	6	6	7	4	5,5	78,5%

According to Table 2, the highest mortality rate of Ascaridia galli worms was observed in the treatment group exposed for 4 hours to various concentrations of extract combinations at 50%, resulting in a worm death percentage of 78.5% (5.5 worms). After 4 hours of treatment with different extract concentrations, the lowest mortality rate for Ascaridia galli worms was observed at 25%,

with a mortality of 54.7% (3.83 worms). In the positive control group using 0.25% pirantel pamoate, the percentage of dead worms reached 71.4% (5 worms). In contrast, the negative control group treated with 0.9% NaCl showed 0% mortality (0 worms).

Table 3. Percentage mortality of *Ascaridia galli* worm after being treated for 6 hours using several concentration of a combination of papaya leaf (*Carica papaya L*) and soursop leaf (*Annona muricata L*) extract.

Treatment	Number of *Ascaridia galli* worm	Number of death						Average Worm Mortality	Worm Mortality Percentage
		Replication							
		1	2	3	4	5	6		
Negative Control (-)	7 tails	0	0	0	0	0	0	0	0%
Positive Control (+)	7 tails	5	6	7	6	7	5	6,0	85,7%
Concentration 25%	7 tails	4	3	5	5	5	6	4,67	66,7%
Concentration 50%	7 tails	5	6	6	7	5	7	6,0	85,7%

According to the data presented in Table 3, the highest mortality rate for Ascaridia galli worms was observed following a 6-hour treatment with various concentrations of combinations, specifically at 50%, resulting in a worm death percentage of 85.7% (6 worms). After a 4-hour treatment with these combinations, the lowest concentration of Ascaridia galli worms was recorded at 25%, yielding a mortality rate of 66.7% (approximately 4.6 worms). In the positive control group treated with 0.25% pirantel pamoate, the percentage of dead worms also reached 85.7% (6 worms). Conversely, the negative control using 0.9% NaCl showed a 0% mortality (0 worms).

The findings from this research were subsequently analyzed using probit regression. The results of this analysis, including the LC_{50} and LC_{50} mortality rates for Ascaridia galli worms, are detailed in the following table:

Table 4. LC_{50} 2 Hours

Treatment	Mortality (%)	Concentration (%)	Confidence level (%)	Lower Limit (%)	Upper Limit (%)
LC_{50} 2 Hours	50	47,614	95,0	36,484	125,412

Based on the results presented in Table 4, the probit regression analysis on the mortality rate of *Ascaridia galli* worms indicates a Lethal Concentration (LC50) value of 47.614% at the 2-hour mark.

Table 5. LC_{50} 4 Hours

Treatment	Mortality (%)	Concentration (%)	Confidence level (%)	Lower Limit (%)	Upper Limit (%)
LC_{50} 4 hours	50	20,549	95,0	-70,897	31,726

In accordance with Table 5, the results from the probit regression test regarding the mortality rate of *Ascaridia galli* worms reveal a Lethal Concentration (LC_{50}) of 20.549% at the 4-hour interval.

Table 6. LC_{50} 6 Hours

Treatment	Mortality (%)	Concentration (%)	Confidence level (%)	Lower Limit (%)	Upper Limit (%)
LC_{50} 6 Hours	50	8,091	95,0	-646,006	24,071

According to Table 6, the probit regression analysis of the mortality rate for *Ascaridia galli* worms shows a Lethal Concentration (LC_{50}) value of 8.091% at the 6-hour mark.

Table 7. LT_{50} 25%

Treatment	Mortality (%)	Time (Hours)	Confidence level (%)	Lower Limit (Hours)	Upper Limit (Hours)
LT_{50} 25%	50	4,006	95,0	2,905	5,101

Based on the findings presented in Table 7, the probit regression analysis of the mortality rate of *Ascaridia galli* worms yields a Lethal Time (LC_{50}) of 4.006 hours for the combination of both extracts at 25%.

Table 8. LT_{50} 50%

Treatment	Mortality (%)	Time (Hours)	Confidence level (%)	Lower Limit (Hours)	Upper Limit (Hours)
LT_{50} 50%	50	1,536	95,0	-1,791	2,647

Based on the analysis presented in Table 8, the probit regression results for the mortality rate of Ascaridia galli worms indicate a Lethal Time (LC_{50}) of 1.536 hours for the combination of both extracts at 50% concentration. The accompanying LC_{50} and LC_{50} results demonstrate a considerable variation in some values. This discrepancy may stem from the mortality data not showing a consistent relationship with dose or time, as well as from inadequate sample size or dose variation to yield stable estimates. Nevertheless, the LC_{50} and LC_{50} values can still be reported, with the caveat that the results may not be precise due to the wide ranges observed.

DISCUSSION

Papaya leaf (*Carica papaya*) is rich in nutrients, containing over 50 active ingredients. Among these is the compound carpain, known for its ability to inhibit the growth of parasites and various types of cancer cells. The high alkaloid and tannin content of papaya leaves contributes to their anthelmintic activity. The alkaloids in papaya leaves can disrupt electrolyte balance in worms' bodies, leading to impaired nerve coordination.

Soursop leaves (*Annona muricata L*) contain alkaloids, tannins, and various compounds classified as Annonaceous acetogenins, which are believed to possess cytotoxic potential. The alkaloids in soursop leaves can reduce the intensity of worm movement, resulting in weaker worms than in their initial condition.

This study employed a proper experimental design using a post-test control group to group and treat the test animal samples. The test subjects were *Ascaridia galli* worms, which were treated with varying concentrations of two extracts (25% and 50%) for 2, 4, and 6 hours. The results are presented in tabular form.

As indicated in Table 1, the highest mortality rate for *Ascaridia galli* worms was observed after 2 hours of treatment with various combinations of extracts at 50% concentration, resulting in

52.4% mortality (3.67 worms). Conversely, the lowest concentration of Ascaridia galli worms was 25%, with a mortality rate of 28.5% (2 worms). In the positive control using 0.25% pirantel pamoate, the mortality rate was 61.8% (4.33 worms), whereas in the negative control with 0.9% NaCl, the mortality rate was 0% (0 worms). Overall, each treatment group showed a trend in which higher treatment concentration correlated with greater numbers of dead worms.

According to Table 2, the highest mortality rate of Ascaridia galli worms was observed in the 4-hour treatment with the 50% concentration combination, resulting in a worm death percentage of 78.5% (5.5 worms). In contrast, the lowest mortality rate during the same 4-hour treatment was observed at a 25% concentration, with 54.7% dead worms (3.83 worms). The positive control group, which utilized 0.25% pirantel pamoate, demonstrated a dead worm percentage of 71.4% (5 worms). In the negative control group using 0.9% NaCl, no mortality was observed (0%; 0 worms). Overall, as the treatment concentration increased, the number of dead worms increased in each treatment group.

Based on the results presented in Table 3, the highest mortality of Ascaridia galli worms occurred during a 6-hour treatment with various concentration combinations, again at 50%, yielding a worm death percentage of 85.7% (6 worms). After 4 hours of treatment, the lowest mortality concentration was again 25%, resulting in a dead worm percentage of 66.7% (4.6 worms). The positive control group utilizing 0.25% pirantel pamoate also achieved a mortality rate of 85.7% (6 worms). In the negative control with 0.9% NaCl, no mortality was observed, resulting in a 0% mortality rate (0 worms). Overall, every treatment group showed a trend in which higher treatment concentration correlated with greater worm mortality.

According to Table 4, the probit regression results for the mortality rate of Ascaridia galli indicate that the Lethal Concentration (LC_{50}) at 2 hours is 47.614%. This finding demonstrates that this concentration of the combined extracts kills 50% of the worms within 2 hours.

As shown in Table 5, the probit regression analysis conducted at the 4-hour interval yielded an LC_{50} value of 20.549%. This result shows that the extract mixture, with an LC_{50} of 20.549%, effectively kills 50% of the worms within 4 hours.

Table 6 presents the results of the probit regression at the 6-hour mark, indicating an LC_{50} of 8.091%. These findings suggest that at this 6-hour point, a concentration of the extract combination can kill 50% of the worms.

Lastly, as shown in Table 7, the probit regression analysis yielded a lethal time (LC_{50}) of approximately 4.006 hours, indicating that administering a combination of the two extracts at 25% concentration can kill 50% of the worms.

According to the findings presented in Table 8, the probit regression analysis of Ascaridia galli mortality rates yielded a Lethal Time (LC_{50}) value. The results indicated that a combination of both extracts at 50% concentration could kill 50% of the worms in approximately 1.536 hours.
Research by (Widiastuti *et al*., 2015) investigated the impact of papaya leaf (*Carica papaya L*) ethanol extract on the mortality of Ascaridia galli worms in vitro across various concentrations of 5%, 10%, 15%, and 25%. Their study found that the Lethal Time (LC_{50}) was 18.866 hours. Meanwhile, (Amanda, 2024) examined the effectiveness of soursop leaf ethanol extract (*Annona muricata L.*) on the same worm species in vitro, testing concentrations of 25%, 50%, 75%, and 100%. This research determined a Lethal Time (LC_{50}) of 3.051 hours.. The innovation of the current study lies in combining the two extracts—papaya leaf and soursop leaf—at concentrations of 25% and 50%. Furthermore, this study not only assesses the Lethal Time (LC_{50}) but also evaluates the Lethal Concentration (LC_{50}).

CONCLUSION AND SUGGESTION

The concentration of the ethanol extract mixture of papaya leaf (*Carica papaya L*.) and soursop leaf (*Annona muricata L*.) significantly influenced the mortality of Ascaridia galli worms. The LC_{50} values were determined at 2, 4, and 6 hours, respectively, at concentrations of 47.614%, 20.549%, and 8.091%. Additionally, the LT50 values were 4.006 hours for 25% mortality and 1.536 hours for 50% mortality. This study indicates that the combination of ethanol extracts from papaya and soursop leaves has the potential to act as an effective antihelminthic agent, as evidenced by increased worm mortality at longer exposure times and higher concentrations. Future research is recommended to include in vivo testing and the identification of specific active compounds responsible for the observed anthelmintic effects.

ACKNOWLEDGEMENT

The authors would like to express their deepest gratitude to the Faculty of Health, Nahdlatul Ulama University of Surabaya, for the support of laboratory facilities and academic guidance during the research process. Appreciation is also extended to all laboratory staff for their technical assistance, as well as to colleagues who provided valuable input and suggestion. The authors also acknowledge the contribution of those who assisted with language editing, writing, and final proofreading of this manuscript.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

REFERENCES

Amanda. (2024). *Uji Efektivitas Ekstrak Etanol Daun Sirsak (Annona Muricata L) Terhadap Kematian Cacing Ascaridia Galli Secara In Vitro*. *1*, 4–6.

Balqis, U., Hambal, M., Cut, D., & Utami, S. (2014). Gambaran Histopatologis Usus Halus Ayam Kampung (Gallus Domesticus) Yang Terinfeksi Ascaridia Galli Secara Alami Histopathological Changes Of Chicken (Gallus Domesticus) Small Intestine Naturally Infected By Ascaridia Galli. *Jurnal Medika Veterinaria*, *8*(2).

Elenwo. (2014). Production Losses Associated With Gastro-Intestinal Helminthiasis In Egg-Laying Domestic-Fowl (Gallus Gallus Domesticus: Galliformes) In Poultry Farms In Parts Of Rivers State, Nigeria. *Journal Of Natural Sciences Research*, *4*(1), 14–19.

Halleyantoro, R., Riansari, A., & Dewi, D. P. (2019). Insidensi Dan Analisis Faktor Risiko Infeksi Cacing Tambang Pada Siswa Sekolah Dasar Di Grobogan, Jawa Tengah. *Jurnal Kedokteran Raflesia*, *5*(1), 18–27.

Hasmilah, I. A. D. M. (2015). Efektivitas Salep Ekstrak Ekstrak Daun Sirsak (Annona Muricata L.) Pada Mencit Yang Terinfeksi Bakteri Staphylococcus Aureus Ita Hasmila 1 , Amaliah 1 , Muhammad Danial 1 1. *Prosiding Seminar Nasional Mikrobiologi Kesehatan Dan Lingkungan*, 54–62.

Kusuma, Nusantoro, S., Awaludin, A., Junaidi, Y., & Lusyta Aulyani, T. (2021). Identifikasi Keragaman Jenis Parasit Cacing Pada Ternak Ayam Kampung Di Kabupaten Jember. *Jurnal Ilmu Peternakan Terapan*, *4*(2), 71–77.

Lukiyono, Y. T., Sumarsono, T.-, & Murhadjito, I. R. (2020). Prevalensi Helmintiasis Pada Siswa Kelas 1 – 6 Sekolah Dasar Manyar Sabrangan Surabaya Tahun 2020. *The Journal Of Muhammadiyah Medical Laboratory Technologist*, *3*(2), 94. Https://Doi.Org/10.30651/Jmlt.V3i2.6167

Maryam, S., Wahid Jamaluddin, A., Ris Program Studi Veteriner, A., & Parasitologi, J. (2018). Uji Perbandingan Efektivitas Daya Anthelmintik Ekstrak Daun Sirsak (Annona Muricata L.) Comparison Of The Effectiveness Of Anthelmintic Power Of Annona Muricata L. Leaves Extract. *Jurnal Agrisistem Juni*, *14*(1), 37–45.

Prastowo, J., & Ariyadi, B. (2015). Pengaruh Infeksi Cacing Ascaridia Galli Terhadap Gambaran Darah Dan Elektrolit Ayam Kampung (Gallus Domesticus). *Jurnal Medika Veterinaria*, *9*(1), 12–17.

Rahmawati, A. M., Anam, K., & Sasikirana, W. (2023). Review Artikel : Potensi Daun Pepaya (Carica Papaya L.) Sebagai Antikanker. *Generics: Journal Of Research In Pharmacy*, *3*(1), 27–35.

Salempa, P. (2008). *Kloroform Kulit Batang Sirsak (Annona Muricata Linn .)*. *90224*, 37–40.

Widiastuti, R., Mardiyaningsih, A., Djayanti Putri, Y., Studi, P. D., & Bhakti Setya Indonesia Yogyakarta, P. (2015). Uji Aktivitas Ekstrak Etanol Daun Pepaya (Carica Papaya) Terhadap Waktu Kematian Cacing Ascaridia Galli Schrank Secara In Vitro. *Prosiding Seminar Nasional & Internasional*, 141–146.