Jurnal Biosains Pascasarjana Vol. 24SP (2022) pp

THE RELATIONSHIP BETWEEN GASTROINTESTINAL WORMS PREVALENCE AND AGE OF CIDOMO DRILLING HORSE IN MATARAM CITY

Syafindri[1*], Kholik[2], Kunti Tirtasari[3], Maratun Janah[4]
[1]Student of Faculty of Veterinary Medicine, Universitas Pendidikan Mandalika, Mataram, Indonesia
[2,3]Department of Veterinary Public Health, Faculty of Veterinary Medicine, Universitas Pendidikan Mandalika, Mataram, Indonesia
[4]Department of Microbiology and Parasitology Faculty of Veterinary Medicine, Universitas Pendidikan Mandalika, Mataram, Indonesia
*[1]e-mail : syafindri.ilman@gmail.com
[2]e-mail : kholiqvet@gmail.com

Abstrak

Kuda penarik cidomo yang digunakan sebagai sarana transportasi di Kota mataram sangat rentan terhadap infeksi cacing saluran pencernaan karena hidup dijalan dengan pemeliharaan tradisional yang akan berdampak pada kesehatan kuda. Studi cross-sectional telah dilaksanakan pada kuda penarik cidomo di Kota Mataram pada Februari sampai maret 2021. Penelitian ini bertujuan untuk mengetahui hubungan prevalensi cacing gastrointestinal dengan umur kuda penarik cidomo di Kota Mataram. Sebanyak 74 feses kuda penarik cidomo telah dikoleksi langsung dari rektum kuda untuk dilakukan pemeriksaan telur cacing untuk mengukur tingkat prevalensi cacing gastrointestinal. Pemeriksaan telur cacing pada feses dilakukan di Laboratorium Equine Clinical Skill Center Fakultas Kedokteran Hewan Universitas Pendidikan Mandalika dengan metode sedimentasi dan flotasi. Hubungan antara prevalensi cacing gastrointestinal dengan umur kuda penarik cidomo dianalisis dengan uji Pearson dengan α = 0,05. Hasil penelitian menunjukkan prevalensi cidomo-pulling yang terinfeksi cacing saluran cerna adalah 76,1% (53/7). Telur cacing yang teridentifikasi yaitu Strongylus spp, Trichostrongylus spp, Cyathostoma spp, Ostertagia spp, dan Parascaris equorum. Hubungan prevalensi cacing gastrointestinal dengan umur kuda penarik cidomo tidak bermakna dengan nilai p = 0,22.

Kata Kunci: cacing gastrointestinal, kuda, prevalensi, umur

Abstract

Cidomo-pulling horses used as a means of transportation in Mataram City are very susceptible to intestinal worm infections because they live on the road with traditional maintenance which will have an impact on horse health. A cross-sectional study has been carried out on cidomo-pulling horses in Mataram City from February to March 2021. This study aims to determine the relationship between the prevalence of gastrointestinal worms and the age of cidomo-pulling horses in Mataram City. A total of 74 feces of cidomo-pulling horses were collected directly from the horse's rectum for examination of worm eggs to measure the prevalence of gastrointestinal worms. Examination of worm eggs in feces was carried out at the Equine Clinical Skill Center Laboratory, Faculty of Veterinary Medicine, Universitas Pendidikan Mandalika with sedimentation and flotation methods. The relationship between the prevalence of gastrointestinal worms and the age of the cidomo-pulling horse was analyzed by Pearson's test with α = 0.05. The results showed that the prevalence of cidomo-pulling infected with intestinal worms was 76.1% (53/7). The worm eggs identified were *Strongylus* spp, *Trichostrongylus* spp, *Cyathostoma* spp, *Ostertagia* spp, and *Parascaris equorum*. The relationship between the prevalence of gastrointestinal worm infection and the age of the cidomo-pulling horse was not significant with p = 0.22.

***Keywords**: age, horse, gastrointestinal worms, the prevalence*

1. INTRODUCTION

Horses are one of the livestock groups in a society with a population that is not high enough. The existence of horses currently plays a role as a source of food, a means of transportation, sports or recreation, agriculture, and war (Mansyur et al., 2014). Lombok Island, especially in the city of Mataram, most of the horses (Equus caballus) are used as a means of transportation known as Cidomo. Cidomo horses will be very susceptible to a large number of parasites, especially gastrointestinal parasites. Cidomo horses are susceptible to parasites because the maintenance of cidomo-pulling horses is still traditional with health care, the housing system, and feeding management are not optimal.

The age of the horse is very decisive for the spread of gastrointestinal parasites. Utami's research (2016), that the prevalence of gastrointestinal parasites found in adult horses is higher than in other puppies, namely; prevalence of Haemonchus sp. (55%), Ostertagia sp. (5%) and Paramphistomum sp. (15%), while the prevalence of gastrointestinal parasites found in puppies was higher than in adult horses, namely Strongyloides westi (40%) and Ascaris equorum (10%). This situation seems to be in accordance with the opinion of Setiawan et al. (2014) which stated that horses aged more than 4 years had a low prevalence of worm infections due to better immunity.

Worm infections that can cause helminthiasis in livestock generally have a low mortality rate but have a direct effect on livestock productivity and the zoonotic impact of helminthiasis on public health. Zoonotic worm parasitic diseases that are generally transmitted from horses to humans have been reported in several previous studies such as parasitic worms that cause fasciolosis, and other parasites that cause cryptosporidiosis and giardiasis, which contribute to degrading human health (Snedeker et al. 2013; Zahedi et al. 2016); Sazmand et al., 2020).

Gastrointestinal parasites in horses will also have an impact on the health of the horses themselves which will reduce their productivity and increase the cost of treatment, especially since horses are kept in a traditional system. Buzat et al. (2016) stated that horses infected with gastrointestinal parasites will experience decreased performance, decreased body weight, and physical condition, to serious pathological conditions such as colic, severe diarrhea, and even death. Oka et al. (2014) stated that the horse-rearing system in Lombok is generally semi-intensive in nature, which is sometimes released to graze so that sanitation and disease control factors are still lacking attention. Maintenance systems that are still traditional will cause horses to be susceptible to gastrointestinal worm infections.

Gastrointestinal worms in cidomo horses in the city of Mataram have been classified as moderate according to what was reported in research resultTirtasari et al. (2020), intestinal nematodes such as Trichostrongylus spp, Strongylus spp, and Capillaria spp have infected cidomo horses in eight traditional markets in Mataram City with a high prevalence at a moderate degree of infection.

Worm infections in horses that have occurred in cidomo horses of various types *Equus caballus*in the city of Mataram and can be influenced by the age factor, then research that aims to determine the relationship between the prevalence of helminthiasis and the age of cidomo pulling horses in the city of Mataram is needed as a basis for tackling cases of helminthiasis by using appropriate and effective anthelmintics.

2. RESEARCH METHOD

2.1 Research Design

This research is an epidemiological cross-sectional study conducted from February to March 2021. This study will explain the relationship between the prevalence of gastrointestinal worms and the age of Cidomo Horses in Mataram City. The sample used in this study was the faeces of cidomo pulling horses in several traditional markets in Mataram City.

The selection of markets to be included uses a purposive sampling method. The purposive sampling method was carried out based on considerations related to information from health workers about the market and the number of cidomo and previous research data, eight markets were chosen in Mataram City, namely: Pagesangan Market, Pagutan Market, Karang Jasi Market, Dasan Agung Market, Cakra Market, Cemara Market, Kebon Roek Market, and ACC Market because these markets have a relatively large number of cidomo pulling horses.

Examination of faecal samples of cidomo pulling horses was carried out at the Equine Clinical Skill Center (CSC) Laboratory, Faculty of Veterinary Medicine, Mandalika University of Education.

2.2 Research Sample

The market is an aggregation point or a gathering place for cidomo horses so that sampling can be done at markets in the city of Mataram. Cidomo-pulling horses can come from various regions or districts around the city of Mataram

The sample size in this study was 74 cidomo draft horses. The number of samples refers to Tirtasati et al. (2020) which states that markets with cidomo horses that have been infected with gastrointestinal worms include: Pagesangan Market, Pagutan Market, Karang Jasi Market, Dasan Agung Market, Cakra Market, Cemara Market, Kebon Roek Market, and ACC Market. The sample calculation refers to the Thrusfield formula (2005):

$$n = \frac{1962 \cdot Pexp\ (1 - Pexp)}{d2}$$

where, n = number of samples needed = Cl (Confidence Interval= 95%) = 1.96; Pexp = estimated prevalence = 74%; d = Desired precision = 10%.$Z\alpha$

2.3 Research Tools and Materials

The tools used for sampling were plastic samples, spoons, and cool boxes. The tools used for sample examination are scales for weighing faeces, beaker glass, filters, test tubes, test tube racks, object glass, cover glass, microscope, centrifuge, and Pasteur pipette. The materials used are saturated salt solution, alcohol, antiseptic soap, and distilled water.

2.4 Sample Inspection

There were 74 faecal samples of Cidomo horse rats taken directly from the rectum which had been collected in this study. Fresh faeces from the rectum of cidomo-pulling horses were put in 20 gram plastic bags and stored in cool boxes and brought to the Mandalika University of Education Equine Clinical Skill Center laboratory for examination using the sedimentation and flotation methods referring to Kabir et al. (2017).

Examination of the faecal samples of cidomO-drawing horses using the sediment method was carried out by weighing 5-10 grams of faeces placed in a beaker glass, added with 50 ml of water, and homogenized. A homogeneous mixture of feces and water was then filtered and centrifuged at 1500 rpm for 5 minutes. The upper liquid of the sample is discarded, then the deposit is placed on a glass object to be examined under a microscope with 100x and 400x magnification (Kabir et al., 2017)

Examination of the faecal samples of horses pulling cidomo using the flotation method is carried out by weighing 5-10 grams of feces, putting the feces into a beaker glass and adding 50 ml of water, then stirring until homogeneous and filtered with a tea strainer. Sample filtrate was taken 15 ml put into a tube and centrifuged at 1500 rpm for 5 minutes, then the top of the centrifuge was discarded and a saturated salt solution was added and centrifuged for 5 minutes. Saturated salt was added again until it was convex and covered with a cover glass for 5 minutes and placed on a glass object, then immediately examined under a microscope with 100x and 400x magnification (Kabir et al., 2017).

2.5 Data Analysis

Data on the results of an examination of the feces of cidomo pulling horses will be presented in the form of pictures and tables as well as the prevalence based on the identified gastrointestinal worm eggs. Prevalence calculations to describe research results are based on prevalence calculations by Stevenson (2008).

Data on the relationship between the prevalence of gastrointestinal worms and the age of cidomo-pulling horses in the city of Mataram will be carried out by the Pearson test chi-*square using* SPSS for windows with $\alpha = 0.05$

3. RESULTS AND DISCUSSION

The results of an examination of the feces of cidomo pulling horses in the Equine Clinical Skill Center (CSC) laboratory, Faculty of Veterinary Medicine, Mandalika University using the flotation (flotation) and sedimentation (sedimentation) methods on 74 samples of cidomo horse feces in eight traditional markets in Mataram City can be seen in Table 1.

Based on Table 1. The overall prevalence of gastrointestinal worm infections in cidomo draft horses in this study was 71.6% (53/74). The highest prevalence was in young horses (<4 years) which were 90.1% (10/11), and the lowest infection was in adults (4-8 years) with a prevalence of 63.0% (17/27), and old age (> 8 years) is 72% (26/36).

The overall prevalence of this study is almost the same as that of Tirtasari et al. (2021) who reported that cidomo horses in the city of Mataram had been infected with gastrointestinal nematodes with a prevalence of 74.04%. The highest prevalence of gastrointestinal worms was in young cidomo horses (<4 years) followed by old horses (>8 years) at 72.2% and the lowest prevalence was in adult horses (4-8 years) of 63.0%.

Table 1. Prevalence of gastrointestinal worm egg infection in cidomo horses in Mataram city based on age.

Age	Number of cidomo draft horses	positive	negative	Prevalence
Young <4 years	11	10	1	90.1%
Adult 4-8 years	27	17	10	63.0%
Old >8 years	36	26	10	72%
Total	74	53	21	71.6%

Maswarni and Nofiar's (2014) assertion that young horses are more likely to be infected with parasitic worms than adult horses is supported by the high incidence of gastrointestinal worms in young Cidomo horses. This situation is related to the higher level of immunity in adult horses compared to baby horses, especially in newborn foals and foals that receive artificial milk. Levine (1994) explained that species, age, resistance, or immunity factors, especially the younger age, are very susceptible and have sensitivity to gastrointestinal nematode infections. Age

affects the concentration of natural immunity (passive) and active immunity found in the animal's body, by factors of sanitation and cleanliness of the cage, sex, and age of livestock.

The results of identification of the types of worm eggs in the faeces of the cidomo towing horse using the flotation and sedimentation methods included Strongyle-type worms including Strongylus spp, Trichostrongylus spp, Cyathostoma spp, and Ostertagia spp, and parascaris equorum. The morphology of each type of gastrointestinal worm eggs identified in cidomo horse feces at the Mataram city market can be seen in Figure 1.

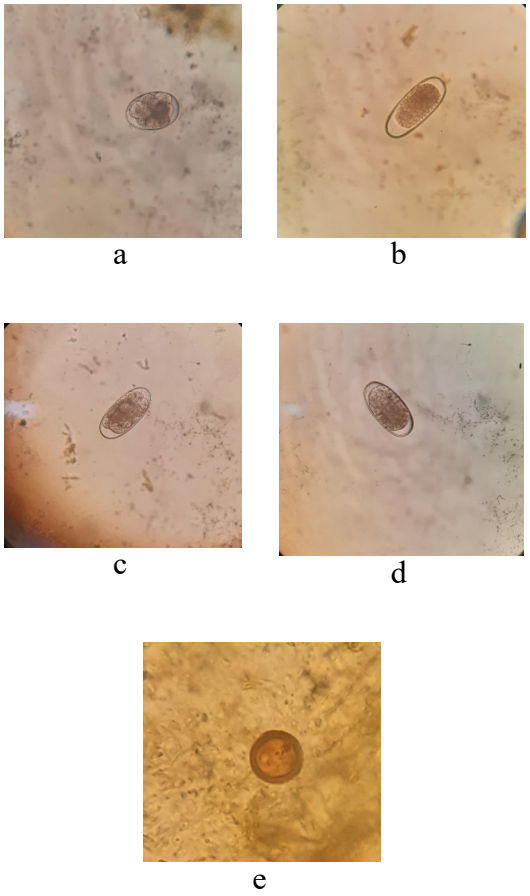

Figure 1. Picture of Worm Eggs Identified on Cidomo Drag Horses in Mataram City. (a) *Strongylus*spp, (b) *Trichostrongylus*spp, (c) *Cyathostoma*spp, (d) *Ostertagia*spp and (e) *Parascaris equorum* (400x magnification).

Figure 1 shows Strongylus spp worm eggs are oval in shape, have morula, and have thin walls. Trichostrongylus spp worm eggs have an elliptical shape, are colorless, have small murills, and have a thin shell. The morphology of Trichostrongylus spp eggs is almost the same as that of Trichostrongylus spp eggs (Souza et al. 2013),

Cyathostoma spp worm eggs have an elliptical shape, a thin shell, and a large morula. Ostertagia sp. It has an elliptical egg shape, is gray in color, has a thin sheath, contains segmented embryo cells, and has a cavity. Parascaris equorum worm eggs are almost round in shape, have an albumin layer, and are brownish-yellow in color. The results of this study were almost the same as the types of nematode worms in the gastrointestinal tract such as Trichoderma sp., Strongylus sp., and Parascaris equorum which were also found in equine in Bangkalan Madura district (Apriliawati et al. 2019).

The results regarding the type of worm eggs found in this study were slightly different from those of Tirtasari et al. (2021) who identified the presence of Capillaria spp besides Trichostrongylus spp, Strongylus spp in cidomo horses in Mataram City in the 2020 study, while this research which was conducted in 2021 also identified the presence of eggs. Cyathostoma spp worms, Ostertagia spp, and parascaris equorum Facts This suggests that epidemiologically helminthic infections will vary depending on environmental conditions, agents, and the host. Environmental conditions in developing countries including Indonesia have the potential for transmission of disease agents caused by worms, especially the environment which is continuously exposed to worm eggs and larvae. Worm infection is a big challenge,

Types and prevalence of gastrointestinal worm eggs identified in cidomo-pulling horses in Mataram City based on age can be seen in Table 2.

Table 2. Types and Prevalence of Gastrointestinal Worm Eggs in Cidomo Draft Horses in Mataram City by Age

Types of worm eggs		Age <4 years	Age 4-8 years	Age >8 years	Total
Strongyle	Positive	10	17	26	53
	Prevalence	90.9%	63.0%	72.2%	71.6%
Strongylus spp	Positive	4	12	8	24
	Prevalence	36.4%	44.4%	22.2%	32.4%
*Trichostrongylus*spp	Positive	8	15	19	32
	Prevalence	72.7%	55.6%	52.8%	56.8%
*cysthostoma*spp	Positive	4	11	15	30
	Prevalence	46.4%	40.7%	41.7%	40.5%
Ostertagia spp	Positive	3	8	4	15
	Prevalence	27.3%	29.6%	11.1%	20.3%
Parascaris equorum	Positive	0	3	0	3
	Prevalence	0%	11.1%	0%	4.1%

Table 2. Shows the results of examination of the feces of cidomo pulling horses at the Equine Clinical Skill Center (CSC) Laboratory of the Faculty of Veterinary Medicine, Mandalika University with the flotation (flotation) and sedimentation (sedimentation) methods in the digestive tract, it was found that the highest infection of gastrointestinal worms in cidomo pulling horses was strongyle type with an overall prevalence of 71.6%. The prevalence at a young age (< 4 years) is 90.9%, adults (4-8 years) is 63.0%, and old age (> 8 years) is 72.2%. The high prevalence rate of strongyle worms is due to the large number of strongyle worm genera that have a predilection for the digestive tract.

The results showed that the prevalence of gastrointestinal worms varied in cidomo draft horses in Mataram City. The more varied prevalence of gastrointestinal worms can occur due to differences in the conditions of origin of cidomo horses and the method of rearing them, as well as the administration of worm medicine, considering that cidomo horses on the market can come from various regions or regencies. Control of gastrointestinal helminthiasis by regularly deworming horses in traditional rearing systems is determined by the egg re-emergence period which may be influenced by climatic conditions (Holm-Martin et al. 2005; Lester et al. 2014).

Idris et al. (2019) stated that the developmental life cycle of some worms (Nematodes) such as Strongyloides and Hookworm has a free-living stage (rhabditiform larva) and a parasitic stage (filariform larva) which may require a different host or environment. This suggests that environmental conditions in developing countries with poor sanitation conditions will allow the spread of worm larvae in the environment which causes an increase in the variety of worms that have the opportunity to infect horses.

Strongyle infection was higher in young horses (<4 years) in this study which was 90.9% (10/11) followed by old age (> 8 years) of 72.2% (26/36) and the lowest prevalence was in adult age (4-8 years) 63.0% (17/27). According to Setiawan et al, (2014), The cause of the high prevalence of the strongil type may be due to the frequent grazing of cidomo-pulling horses and indiscriminate defecation on the side of the road that contaminates the grass. This study was supported by Levine (1994) who stated that large and small strongil-type worms produce eggs that hatch above the ground and develop into infective third-stage larvae.

Horses become infected by ingesting the larvae while grazing. In addition, the high prevalence of gastrointestinal worms caused by the research carried out in the rainy season resulted in a moist environment that supported the growth and development of worms which facilitated the spread of worms from contaminated horse feces to other horses in the same market area, according to the results of the study. Kusmayadi (2002) found a prevalence of strongil-type worms in horse-drawn horses in Denpasar of 70.27%.

The high prevalence of gastrointestinal worms may be due to the similar rearing system, climate, and breed of the horse or horse breed. Worm parasites, especially the strongil type, usually infect the large intestine of the horse and can cause illnesses ranging from mild to sudden death. Horses

become infected by eating grass contaminated with eggs, infective larvae, or penetration through the skin by infective larvae. The impact of intestinal nematode worm infection is very large, namely decreased work productivity because it can cause weakness, weight loss, colic, loss of appetite, diarrhea, and even death.

Results The lowest prevalence was Parascaris equorum of 4.1% in cidomo pulling horses in Mataram City because the horse samples used were horses that were more than 4 years old (4-8 years). The prevalence results are consistent with those reported by Umar et al. (2013) in horses aged 5-8 years who received Parascaris equorum infection of 6.3% according to the opinion of Setiawan et al. (2014), in his study that horses aged more than 4 years had a low prevalence of infection due to better immunity.

The relationship between the prevalence of gastrointestinal worms and the age of cidomo-pulling horses in Mataram City was tested using the chi-square table. Pearson test results *Chi-square* with SPSS for windows which can be seen in Table 3.

Table 3. Relationship between Gastrointestinal Worm Prevalence and Age of Cidomo Pulling Horses in Mataram City,

Age	Prevalence		Total	db	X2	p-values
	+	-				
Young	O	10	1	11		
	E	7,9	3,1			
Mature	O	17	10	27	2	3,016	0.221
	E	19,3	7,7			
Old	O	26	10	36		
	E	25,8	10,2			
Total		53	21	71		

Information; O = observation;
E = expectations; db = degrees of freedom

Table 3. Explains that the results of the Pearson test analysis chip-*square using* SPSS for windows regarding the relationship between the prevalence of gastrointestinal worms and the age of cidomo pulling horses in the city of Mataram, it was found that there was no significant relationship because a p-value > 0.05 (p-value = 0.221) with α = 0.05 was found.

This non-significant relationship was due to the prevalence of gastrointestinal worms in young cidomo horses (< 4 years), adults (4-8 years), and old horses (> 8 years) in relatively the same rearing systems, namely in traditional kennels, so the infection rate Gastrointestinal worms are assumed to be the same.

Another influencing factor was the disproportionate number of young, adult, and old horses used in this study because the number of young horses was less than that of adults and old horses. The results of this study are consistent with previous studies conducted in Turkey and Ethiopia which showed no significant difference between the prevalence of gastrointestinal nematode infection and the age of horses (Aypak and Burgu, 2013; Mezgebu et al., 2013).

The factor that can cause variations in the prevalence or variations in the types of worms that can infect cidomo-pulling horses that are no less interesting is the existence of resistance to deworming drugs because the administration of deworming drugs that are not paid enough attention will cause resistance. Several studies have documented that worms have experienced adaptation and evolutionary changes due to climate change or resistance to anthelmintic drugs (James et al. 2009; Bauri et al. 2015; Hotez et al. 2016). Kholik et al. (2019) stated that there had been indications of worm resistance to the administration of the Albenzole type worm drug in cattle based on examinationFecal Egg Count Reduction Test (FECRT) with a worm egg reduction value of 83.81 ± 74.51% per gram of feces. This fact illustrates that adaptation of worms to anthelmintic drugs can occur.

5. CONCLUSIONS

Based on the results of the study, it was found that there was no significant

relationship between the prevalence of gastrointestinal worm infections and the age of cidomo-pulling horses in the city of Mataram. The highest prevalence of gastrointestinal worm infection was in young horses and the lowest infection was in old age with the types of worm eggs identified, namely Strongylus spp, Trichostrongylus spp, cyathostoma spp, Ostertagia spp, and Parascaris equorum.

Based on the absence of a relationship between the prevalence of gastrointestinal worm infections and the age of cidomo-pulling horses in the city of Mataram, it is necessary to administer periodic deworming to various cidomo horses with the right dosage,

ACKNOWLEDGEMENTS

Thank you to the Equine Clinical Skill Center Laboratory, Faculty of Veterinary Medicine, Mandalika University, Mataram for facilitating this research.

BIBLIOGRAPHY

Apriliawati, E., Mufasirin, M., Wurlina, W., Hastutiek, P., Suwanti, L.T., Tehupuring, B.C. 2019 Prevalence and Nematode Infection Level on Gastrointestinal Tract at Horse (Equus caballus) in Bangkalan Madura. J. Parasite Sci. 3. 83–88. https://doi.org/10.20473/jops.v3i2.16523

Aypak, S., Burgu, A. 2013. Prevalence of the stomach helminths in equines. *YYU Vet Fak Derg.* 24(1): 29-35. https://dergipark.org.tr/tr/download/article-file/146383

Bauri R.K., Tigga M.N., Kullu S.S. 2015. A review on use of medicinal plants to control parasites. *Indian Journal of Natural Products and Resources (IJNPR) [Formerly Natural Product Radiance (NPR)] Natl. Inst. Sci. Commun. Inf. Resour.* 2015;6(4):268–277. http://op.niscair.res.in/index.php/IJNPR/article/view/8837

Buzatu, M.C., Mitrea, I,L,, Lyons, E. 2016. Epidemiological study on parasite infections in horses from different types of equine establishments Romania. AgroLife Scientific Journal. 5(1):31-35. https://agrolifejournal.usamv.ro/pdf/vol.V_1/Art4.pdf

Holm-Martin, M., Levot, G. W., & Dawson, K. L. 2005. Control of endoparasites in horses with a gel containing moxidectin and praziquantel. *The Veterinary record*, *156*(26), 835–838. https://doi.org/10.1136/vr.156.26.835

Hotez, P. J., Pecoul, B., Rijal, S., Boehme, C., Aksoy, S., Malecela, M., Tapia-Conyer, R., & Reeder, J. C. 2016. Eliminating the Neglected Tropical Diseases: Translational Science and New Technologies. *PLoS neglected tropical diseases*, *10*(3), e0003895. https://doi.org/10.1371/journal.pntd.0003895

Idris, O. A., Wintola, O. A., & Afolayan, A. J. (2019). Helminthiases; prevalence, transmission, host-parasite interactions, resistance to common synthetic drugs, and treatment. *Heliyon*, *5*(1), e01161. https://doi.org/10.1016/j.heliyon.2019.e01161

James, C. E., Hudson, A. L., & Davey, M. W. 2009. Drug resistance mechanisms in helminths: is it survival of the fittest? *Trends in parasitology*, *25*(7), 328–335. https://doi.org/10.1016/j.pt.2009.04.004

Kabir, M.H.B., Sabrin, M.S., Islam, M., Alam, M.M., Mahmud, M.S. 2017. Studies on the Degree of Infection of Gastrointestinal Parasites in Cattle at Sher-e- Bangla Nagar Area, Dhaka, Bangladesh. International Journal of Life Science and Engineering. Vol. X, No. X, 2017, pp. XX-XX.

Bangladesh. http://www.aiscience.org/journal/ijlse

Kholik, Putri R R, Yunitaningrum A L, Septiyani E, Situmorang F J I C, Mashur, & Atma C D. 2019. Fecal egg count reduction test (FECRT) for measurement of gastrointestinal helminth resistance to anthelmintic of Bali cattle in North Lombok. AIP Conference Proceedings (Vol. 2199). American Institute of Physics Inc. https://doi.org/10.1063/1.5141304

Kusmayadi, I.K. 2002. Prevalensi Infeksi Cacing Tipe Strongil pada Kuda Dokar di Kota Denpasar. S.KH. Skripsi, Fakultas Kedokteran Hewan, Universitas Udayana, Bali.

Lester HE, Matthews JB. Faecal worm egg count analysis for targeting anthelmintic treatment in horses: points to consider. Equine Vet J. 2014;46:139–45.

Levine, N.D. 1994. Buku Pelajaran Parasitologi Veteriner. Second edition. Gadjah Mada University Press. Yogyakarta.

Mansyur, U.H., Rusmana, D. 2014. Eksplorasi Hijauan Pakan Kuda dan Kandungan Nutrisinya. JITV, 19(3). https://pustaka.unpad.ac.id/archives/59337

Maswarni dan Nofiar, R. 2014. Majemen Pemeliharaan dan Pengembangbiakan Kuda. Jakarta Timur. Penerbit Swadaya.

Mezgebu, T., Tafess, K., Tamiru, F. 2013. Prevalence of gastrointestinal parasites of horses and donkeys in and around Gondar Town, Ethiopia. *Open J Vet Med.* 3(6): 267-272. http://dx.doi.org/10.4236/ojvm.2013.36043

Nalule A.S., Mbaria J.M., Kimenju J.W. In vitro anthelmintic potential and phytochemical composition of ethanolic and water crude extracts of Euphorbia heterophylla Linn. *J. Med. Plants Res.* 2013;7(43):3202–3210. DOI: 10.5897/JMPR12.1174. https://academicjournals.org/article/article1384438915_Nalule%20et%20al.pdf

Sazmand, A., Bahari, A., Papi, S., & Otranto, D. 2020. Parasitic diseases of equids in Iran (1931-2020): a literature review. *Parasites & vectors*, *13*(1), 586. https://doi.org/10.1186/s13071-020-04472-w

Setiawan, D. K., Dwinata, I. M., & Oka, I. B. M. (2014). Identifikasi jenis cacing nematoda pada saluran gastrointestinal kuda penarik cidomo di Kecamatan Selong, Lombok Timur. *Indo Med Vet*, *3*(5), 351-358. https://ojs.unud.ac.id/index.php/imv/article/view/14111

Snedeker, K. G., Anderson, M. E., Sargeant, J. M., & Weese, J. S. 2013. A survey of Canadian public health personnel regarding knowledge, practice, and education of zoonotic diseases. *Zoonoses and public health*, *60*(7), 519–525. https://doi.org/10.1111/zph.12029

Souza R P, Souza J N, Menezes J F, Alcântara L M, Soares N.M, Aquino Teixeira M C A. 2013. Human infection by *Trichostrongylus* spp. in residents of urban areas of Salvador city, Bahia, Brazil. Biomedica, 33(3): 439-445. https://doi.org/10.7705/biomedica.v33i3.770

Stevenson, M. 2008. An Introduction to Veterinary Epidemiology. EpiCentre, IVABS. Massey University, Palmerston North, New Zealand.

Thrusfield M 2005 Veterinary Epidemiology 2nd oxford. Blackwell Science.

Tirtasari, K., Atma, C.D., Kholik. 2021. Prevalence and degree of nematode infection of Horse *Equuscaballus*) used as public transport in Mataramcity, Indonesia. OP Conference Series: Earth and Environmental Science. 712(1): 012023 https://iopscience.iop.org/article/10.

1088/1755-1315/712/1/012023

Umar, Y,A,, Maikaje, D,B., Garba, U.M., Alhassan, M.A.F. 2013. Prevalence of Gastro-intestinal Parasites in Horse Used for Cadet Training in Nigeria. *J Vet Adv*. 3(2): 43-48. https://www.semanticscholar.org/paper/Prevalence-of-Gastro-Intestinal-Parasites-in-Horses-Umar-Bawa/0e74683986c5aeb23e11e22b8576305133125a29

Utami, S. M. 2016. Jenis dan Tingkat Serangan Parasit Gastrointestinal Kuda (Equus coballus) di Peternakan Kuda Desa Sempajaya Berastagi Provinsi Sumatera Utara. Skripsi. Universitas Sumatera Utara. http://repositori.usu.ac.id.

Zahedi, A., Paparini, A., Jian, F., Robertson, I., & Ryan, U. (2015). Public health significance of zoonotic *Cryptosporidium* species in wildlife: Critical insights into better drinking water management. *International journal for parasitology. Parasites and wildlife*, *5*(1), 88–109. https://doi.org/10.1016/j.ijppaw.2015.12.001