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The Efficacy Study of Duramectin, Oxfendazole, Piperazine, and Pyrantel pamoate Against Gastrointestinal Worms In Horses In Yogyakarta Special Region

Studi Efikasi Duramectin, Oxfendazole, Piperazine dan Pyrantel pamoate terhadap Cacing Gastrointestinal pada Kuda di Daerah Istimewa Yogyakarta

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Abstrak

Penelitian ini bertujuan untuk mengetahui efikasi obat cacing duramectin, oxfendazole, piperazine, dan pyrantel pamoate terhadap cacing gastrointestinal pada kuda di Daerah Istimewa Yogyakarta. Sampel penelitian menggunakan 40 ekor kuda yang menderita infeksi cacing gastrointestinal. Semua kuda dilakukan pemeriksaan untuk mengetahui gejala klinis dan pemeriksaan pendukung di laboratorium parasitologi untuk pemeriksaan telur cacing dari feses kuda. Kuda dengan hasil positif terdapat telur cacing dengan jumlah di atas 200 telur per gram feses kuda. Penelitian ini bertujuan untuk menentukan efektifitas obat cacing yang akan digunakan. Penelitian kuda dibagi menjadi empat kelompok perlakuan, masing-masing kelompok terdiri dari sepuluh kuda. Kelompok I diberi duramectin dengan dosis 0,2 mg / kg berat badan. Kelompok II diberi oxfendazole dengan dosis 7,5 mg / kg berat badan, Kelompok III diberi pengobatan Piperazin 125 mg per kilogram berat badan dan Kelompok IV diberi pirantelpamoate dengan dosis 20 mg / kg berat badan. Setelah menerima pengobatan, kuda-kuda diamati untuk mencatat kemajuan dalam hal gejala klinis dan jumlah dan jenis telur cacing dalam kotoran mereka setiap tiga hari selama empat kali berturut-turut. Hasil data penelitian ditabulasi dan dianalisis secara deskriptif komparatif.

Hasil penelitian menunjukkan berbagai tingkat kemanjuran obat cacing untuk kuda. Oxfendazole dapat membunuh cacing *Strongylus* dan *Parascaris*. Duramectin membunuh cacing *Strongylus* dan mengurangi beberapa cacing *Parascaris*. Piperazine dan pyrantel pamoate membunuh cacing *Strongylus* dan mengurangi beberapa *Parascaris*.

Kata kunci: duramectin; kuda; obat cacing; oxfendazole, piperazine, pyrantel pamoate

Abstract

This research aimed at determining the efficacy of duramectin, oxfendazole, piperazine, and pyrantelpamoate against gastrointestinal worms in horses in Yogyakarta Special Region. The object of research involved 40 horses diagnosed with gastrointestinal worm infection. All of the horses were subjected to examination for clinical symptoms and parasitology laboratory checkup for signs of worm eggs in their feces, and they were pronounced positive for experiment animals with at least 200 eggs per gram of feces per horse. The research horses were weighed to determine the dose of worm medication to be used. The research horses are divided into four treatment groups, each group consists of ten horses. Group I was given duramectin with a dose of 0.2 mg/kg of body weight. Group II was given oxfendazole with a dose of 7.5 mg/kg of body weight, Group III was given 125 mg Piperazin treatment per kilogram of body weight and Group IV was given pyrantel pamoate with a dose of 20 mg/kg of body weight. *After* receiving the*medication, the horses were observed to document the progress in terms of clinical symptoms and the amount and type of worm eggs in their feces every three days for four times in a row. The research data results were tabulated and were descriptive-comparatively analyzed. The research result showed varying efficacy level of worm medication for horses. Oxfendazole kills Strongylus and Parascaris worms. Duramectin kills Strongylus worms and reduce some of the Paraascaris worms. Piperazine and pyrantel pamoate kills the Strongylus worms and reduce some of the Paraascaris.*

Key words: duramectin; gastrointestinal worms; horses; oxfendazole; piperazine; pyrantel pamoate.

Introduction

The incidence of gastrointestinal disease in horses in Yogyakarta Special Region and Central Java in 2012 includes 9 cases of diarhea in horses and 11 cases in young horses, 8 cases of enteritis in young horses, and 19 cases colic in horses (Anonymous, 2012), they were examined and treated by the Yogyakarta Special Region (DIY) and Central Java PORDASI's Mobile Veterinary Clinic in 2011. The results of gastrointestinal worm examinations in those horses showed that there were 39 horses positively infected by *Strongylus sp*. worms, and 11 horses positively infected by *Parascaris sp.* worms. These phenomena show that gastrointestinal diseases in horses in DIY and Central Java caused by *Strongylus sp*. worms reached 81% and the ones caused by *Parascaris sp.* worms reached 19%. These incidence of worm infection triggered complaints among veterinary practitioners and it is suspected that gastrointestinal worm infection in horses has become resistant against worm medications generally used in the fields. Alternative actions need to be taken to overcome the high incidence of gastrointestinal parasite diseases so as to ensure the maximum efficacy of treatments.

Delays in handling these cases will lead to loss for horse famers as the infection could set off chronic diarrhea, emaciation, anemia, conception problems, and death. It could also hinder the success of the program to increase horse population in DIY and Central Java areas. One the efforts include the need to evaluate the efficacy of several anthelmintics against gastrointestinal worms in horses. The treatment of gastrointestinal worms in horses is usually not performed under programmed and detailed processes, the efforts have been tentative, and were based on foreign textbooks and were not performed with a research, therefore, the results have not been satisfying.

Materials and Method

There were 40 horse patients involved in this research, they were all infected by worms to the infestation above 200 eggs in feces, the eggs came from *Strongylus sp.* and *Parascaris sp.* worms, the horses were divided into four groups of ten. Each group was then divided into two sub-groups of 5 *Strongylus sp.* infected horses and 5 *Parascaris sp.* infected horses. Group I received 0.2 mg Duramectin treatment of body weight (Gordon, *et al.*, 1981) injected subcutaneously, Group II received 7.5 mg Oxfendazol treatment of body weight (Gordon, *et al.*, 1981), given orally, and Group III was given 125 mg Piperazin treatment of body weight (Gordon, *et al.*, 1981), and Group IV was given 15 mg Pyrantel Pamoate treatment of body weight (Gordon, *et al.*, 1981). For each groups has been administered worm medicine one times treatment. After treatment, the horses were examined on day 3, 6, 9, and 12 to determine the number of worm eggs which have been eliminated through their feces.

The worm egg examination results from Laboratory Parasitology Faculty of veterinary Medicine were tabulated and analyzed descriptive-comparatively to determine the efficacy order of anthelmintics against gastrointestinal worms in research horses.

Results and Discussion

The sample faeces from 40 horses that was infected by gastrointestinal worms were examination with quantitative method. The faeces of each group positive infected by *Strongylus sp.*and *Parascaris sp.* eggs with various clinical symptoms, including diarrhea, colic, enteritis and emaciation. The number of eggs in each group varied widely. Group I showed 5750 EPG *Strongylus sp.*and 3600 EPG *Parascaris sp.* Group II showed 13100 EPG *Strongylus sp.* and 750 EPG *Parascaris sp*. Group III showed 15600 EPG *Strongylus sp.* and 1700 EPG *Parascaris sp.*. Group IV

showed 17900 EPG *Strongylus sp.*eggs per gram of feces and 68000 *Parascaris sp.* eggs per gram of feces. Grup I until Grup IV can see in the Appendices (Tabel 2 until Table 5).

Table1. Efficacy of Duramectin, Oxfendazol, Piperazin, Pyrantelpamoate against gastrointestinal worms in horses in DIY (Sleman, Kodya Yogyakarta, Bantul) (n=10 horses)

Worm Medicine	Number of Horses	Type of Worm	Before treatment (EPG)	After Treatment (days)			
				3	6	9	12
Duramectin	5	*Strongylus sp.*	5.750	350	0	0	0
	5	*Parascaris sp.*	3.600	200	300	250	250
Oxfendazol	5	*Strongylus sp.*	13.100	300	0	0	0
	5	*Parascaris sp.*	750	0	0	0	0
Piperazin	5	*Strongylus sp.*	15.600	1000	400	200	0
	5	*Parascaris sp.*	1.700	600	300	500	350
Pyrantel pamoate	5	*Strongylus sp.*	17.900	2300	300	150	0
	5	*Parascaris sp.*	68.000	1550	1100	900	900

Among research horses, *Strongylus sp.* and *Parascaris sp.* eggs were positively found. This is in line with the opinions of Blood and Handerson (1989), Soulsby (1982) and Frasser (2005), the two types of worms frequently infect horses and trigger some clinical symptoms such as diarrhea, colic, chronic intestinal inflammation, anemia, and can even cause death. *Strongylus sp.* infection in horses usually involve *Strongylus vulgaris, Strongylus edentates* and *Strongylus equines* (Soulsby, 1982). This is consistent with Levine's opinion (1968) that worm infestation in host animals can be determined by the number of eggs eliminated through defecation. Levine (1994) further explained that worm infestation can be determined by the number of eggs found in the host's feces. If less than 5.000 eggs were found per gram of feces, it is considered as a light infestation, if between 5.000 to 25.000 eggs were found per gram of feces, it is a moderate infestation, if more than 25.000 eggs were found per gram of feces, it is a heavy infestation. In the Table 1, the research results show which anthelmintics are effective for gastrointestinal worms and that they are only capable of reducing the number of worm infestation in horses. This is in agreement with the opinions of Tanu (1972) and Kirk and Bitsner (1985), that there are two types of anthelmintics: femifugum, which can only expel worms from the body, and vermicidum, which can kill the worms.

Table 2. Group I, 10 horses infected by *Strongylus sp.*and *Parascaris sp.*which treated with 0.2 mg Duramectin in District Sleman, Kodya Yogyakarta, Bantul

Group I	Sex	Age (years)	Clinical sign		Amount of eggs (EPG)
			BCS	Form of faeces	
Surani	Female	8	3	Pasta	*885 Strongylus sp.*
Giga	Male	4	2	Pasta	880 *Strongylus sp.*
Cussion Light	Male	7	3	Pasta	1250 *Strongylus sp.*
Avanza	Male	5	3	Profus, kolik	1400 *Strongylus sp.*
Legian	Male	4	3	Profus, enterik	1335 *Strongylus sp.*
Sigi	Female	6	3	Pasta	*665 Parascaris sp.*
Sulteng	Male	2	2	Pasta	750 *Parascaris sp.*
Kiki	Female	3	3	Pasta	650 *Parascaris sp.*
Juki	Male	3	3	Pasta	850 *Parascaris sp.*
Miming	Female	2	3	Pasta	685 *Parascaris sp.*
Total					5750 *Strongylus sp.* 3600 *Parascaris sp.*

Table 3. Group II 10 horses infected by *Strongylus sp.* and *Parascaris sp.* which treated with 7.5 mg Oxfendazolin District Sleman, Kodya Yogyakarta, Bantul

Group II	Sex	Age (years)	Clinical sign		Amount of eggs (EPG)
			BCS	Form of faeces	
Suti	Female	3	3	Pasta	*13600 Strongylus sp.*
Andri	Male	2	2	Pasta	14500 *Strongylus sp.*
Amin	Male	6	3	Pasta	13150 *Strongylus sp.*
Bandon	Male	5	3	Profus	11450 *Strongylus sp.*
Kuntho	Male	4	3	Profus	12800 *Strongylus sp.*
Gisel	Female	1	3	Pasta	*1045 Parascaris sp.*
Ronaldo	Male	1	2	Pasta	1280 *Parascaris sp.*
Sri	Female	2	3	Pasta	890 *Parascaris sp.*
Joko	Male	2	3	Pasta	285 *Parascaris sp.*
Atin	Female	1	3	Pasta	250 *Parascaris sp.*
Total					13.100 *Strongylus sp.* 750 *Parascaris sp.*

Table 4. Group III, 10 horses infected by *Strongylus sp.* and *Parascaris sp.* which treated 125 mg Piperazinin District Sleman, Kodya Yogyakarta, Bantul

Group III	Sex	Age (years)	Clinical sign		Amount of eggs (EPG)
			BCS	Form of faeces	
Toyota	Male	5	3	Pasta	*13200 Strongylus sp.*
Antonio	Male	4	2	Pasta	15120 *Strongylus sp.*
Jaryati	Female	6	3	Pasta	17680 *Strongylus sp.*
Tini	Female	5	3	Profus	14200 *Strongylus sp.*
Pambudi	male	4	3	Profus	14800 *Strongylus sp.*
Bunga	Female	1	3	Pasta	*1015 Parascaris sp.*
Sobar	Male	2	2	Pasta	1230 *Parascaris sp.*
Andalas	Male	1	3	Pasta	2292 *Parascaris sp.*
Dakor	Male	1	3	Pasta	2988 *Parascaris sp.*
Dulman	Male	2	3	Pasta	975 *Parascaris sp.*
Total					15.600 *Strongylus* 1.700 *Parascaris sp.*

Table 5. Group IV, 10 horses infected by *Strongylus sp.* and *Parascaris sp.* which treated with 15 mg Pyrantel Pamoate in District Sleman, Kodya Yogyakarta, Bantul

Group IV	Sex	Age (years)	Clinical sign		Amount of eggs (EPG)
			BCS	Form of faeces	
Maskina	Female	7	3	Pasta	*1650 Strongylus sp.*
Budi	Male	4	2	Pasta	25500 *Strongylus sp.*
Jarwo	Male	3	3	Pasta	16700 *Strongylus sp.*
Jeram	Male	5	2	Profus	15800 *Strongylus sp.*
Waryoto	Male	4	2	Profus	15150 *Strongylus sp.*
Dina	Female	1	3	Pasta	*20110 Parascaris sp.*
Darmin	Male	1	2	Pasta	*72300 Parascaris sp.*
Cika	Female	2	2	Profus	*91250 Parascaris sp.*
Doni	Male	1	2	Profus	*93100 Parascaris sp.*
Sakura	Female	1	3	Pasta	*63240 Parascaris sp.*
Total					17.900 *Strongylus* 68.000 *Parascaris sp.*

According to Blood and Handerson (1989), most infected horses suffer from infestation by worms belonging to the genus *Strongylus*, such as *Strongylus vulgaris. Strongylus vulgaris* is also known as *Delafondia vulgaris,* it belongs to *Strongylus* genus, *Strongiloidea* family*, Strongylida* order, *Secermentea* sub-class and *Nematode* class (Soulsby, 1982). Large roundworms (ascaris), which often infect horses, can cause acute infection in a young horse. The visible clinical symptoms include acute colic, weakness, emaciation and death which is usually caused by *Parascarisequorum* (Blood and Handerson, 1989, and Radostits, *et al.*, 2006). Table 6 shows that the Duramectin experiment with a dose of 0.2 mg/kg of body weight injected subcutaneously was effective to kill *Strongylus sp.* worms, this was evident from feces examination that before treatment there were 5.750 eggs per gram of feces and after treatment, on day 3 there were 350 eggs per gram of feces, and on day 6 *Strongylus sp.* worm eggs were not found (Table 6). In the case of *Parascaris sp.* worms, Duramectin can only reduce the number of infestation, as shown from the examination that on day 3, day 6, day 9, and day 12 consecutively, 200, 300, 250, and 250 worm eggs were still found per gram of feces (Table 7). This may be caused by the working method of Duramectin which is similar to Avermectin, Duramectin stimulates high-affinity binding of gamma aminobutyric acid, and disrupts chlor pathways and causes cell membrane hyperpolarization, therefore, it hinders neural delivery which causes neural paralysis on nematode worm peripheral muscles and is less capable to penetrate the brain blood barrier (Subronto and Tjahayati, 2001).

The experiment using Oxfendazol with a dose of 7.5 mg/kg body weight orally (Gordon, *et al.*, 1981), Effectively kills *Strongylus sp.*dan*Parascaris sp.* worms, this is evident from worm egg examinations in the horses's feces on day 6, day 9, and day 12 that showed no *Strongylussp* (Table 8). worm eggs. In the case of *Parascaris sp.*, on day 3, day 6, day 9, and day 12, eggs were not found (Table 9). This is in line with the opinion of Brander, *et al.*, (1982), this medicine is effective against nematodes, trematodes and cestodes. Oxfendazol's working method is by blocked the worm's fumarate reductase enzymes and hindering its glucose extraction and influencing its glycogen metabolism, this causes inability of the worm's interstitial cells to absorb food so that the worm runs out of glycogen and is unable to produce ATP (Subronto and Tjahayati, 2001; Rossoff, 1990; Adam, 1995).

Table 6. Efficacy of Duramectin to *Strongylus sp.* in horse (District Sleman, Kodya Yogyakarta, Bantul)

Worm Medicine	Number of Horses	Type of Worm	Before treatment (EPG)	After Treatment (days)			
				3	6	9	12
Duramectin	5	*Strongylus sp.*	5.750	350	0	0	0
	5	*Parascaris sp.*	3.600	200	300	250	250
Oxfendazol	5	*Strongylus sp.*	13.100	300	0	0	0
	5	*Parascaris sp.*	750	0	0	0	0
Piperazin	5	*Strongylus sp.*	15.600	1000	400	200	0
	5	*Parascaris sp.*	1.700	600	300	500	350
Pyrantel pamoate	5	*Strongylus sp.*	17.900	2300	300	150	0
	5	*Parascaris sp.*	68.000	1550	1100	900	900

Table 7. Efficacy of Duramectin to *Parascaris sp.* (District Sleman, Kodya Yogyakarta, Bantul)

Worm Medicine	Number of Horses	Type of Worm	Before treatment (EPG)	After Treatment (days)			
				3	6	9	12
Duramectin	Sigi	*Parascaris sp.*	*665*	50	80	50	50
Duramectin	Sulteng	*Parascaris sp.*	750	40	80	50	50
Duramectin	Kiki	*Parascaris sp.*	650	20	40	50	50
Duramectin	Juki	*Parascaris sp.*	850	45	50	50	50
Duramectin	Miming	*Parascaris sp.*	685	45	50	50	50
Duramectin	5 horses	*Parascaris sp.*	3600	200	300	250	250

Table 8. Efficacy of Oxfendazol to *Strongylus sp.* (District Sleman, Kodya Yogyakarta, Bantul)

Worm Medicine	Number of Horses	Type of Worm	Before treatment (EPG)	After Treatment (days)			
				3	6	9	12
Oxfendazol	Suti	*Strongylus sp.*	*13600*	45	0	0	0
Oxfendazol	Andri	*Strongylus sp.*	14500	60	0	0	0
Oxfendazol	Amin	*Strongylus sp.*	13150	95	0	0	0
Oxfendazol	Bandon	*Strongylus sp.*	11450	50	0	0	0
Oxfendazol	Kuntho	*Strongylus sp.*	12800	50	0	0	0
Oxfendazol	5 horses	*Strongylus sp.*	13.100	300	0	0	0

The experiment using Piperazin with a dose of 125 mg/kg of body weight (Gordon, *et al.*, 1981) against *Strongylus sp*. worms shows that no eggs were found as the result of examination on day 12. This means that the use of Piperazin for *Strongylus sp.* worms in horses is effective, because it can kill the worms on day 12 (Table 10). In the case of *Parascaris sp.* worms, Piperazin can only reduce its infestation in horses. This is evident from the results of worm eggs examination after experiment on day 3, day 6, day 9, and day 12 consecutively, they showed 600, 300, 500, and 350 eggs per gram of feces, consecutively (Appendices Table 11). This is consistent with the opinion of Yordan and Ewing (1980), that Piperazin works by preventing and blocking neuromuscular impulses on myoneural junctions of the worms, similar to the workings of anticholinergic compounds. Additionally, the worm's subsinate acid production is also hindered, so that the worm is intoxicated, paralyzed, and loses grabs on the intestine (Mutschler, 1991), and due to intestinal peristaltic movements, the worms were eliminated passively, alive (Yordan and Ewing, 1980). Ganiswarna (1995) also opines that Piperazin works by intoxicating and paralyzing the worms, working as anticholinergic and causing muscle hyperpolarization so that the worms experience energy loss and, finally, paralysis (Mutschler, 1991).

Table 9. Efficacy of Oxfendazol to *Parascaris sp.*(District Sleman, Kodya Yogyakarta, Bantul)

Worm Medicine	Number of Horses	Type of Worm	Before treatment (EPG)	After Treatment (days)			
				3	6	9	12
Oxfendazol	Gisel	*Parascaris sp.*	*1045*	0	0	0	0
Oxfendazol	Ronaldo	*Parascaris sp.*	1280	0	0	0	0
Oxfendazol	Sri	*Parascaris sp.*	890	0	0	0	0
Oxfendazol	Joko	*Parascaris sp.*	285	0	0	0	0
Oxfendazol	Atin	*Parascaris sp.*	250	0	0	0	0
Oxfendazol	5 horses	*Parascaris sp.*	750	0	0	0	0

Table 10. Efficacy of Piperazin to *Strongylus sp.* (District Sleman, Kodya Yogyakarta, Bantul)

Worm Medicine	Number of Horses	Type of Worm	Before treatment (EPG)	After Treatment (days)			
				3	6	9	12
Piperazin	Toyota	*Strongylus sp.*	*13200*	200	40	30	0
Piperazin	Antonio	*Strongylus sp.*	15120	200	30	50	0
Piperazin	Jaryati	*Strongylus sp.*	17680	200	30	40	0
Piperazin	Tini	*Strongylus sp.*	14200	200	150	40	0
Piperazin	Pambudi	*Strongylus sp.*	14800	200	150	40	0
Piperazin	5 horses	*Strongylus sp.*	15.600	1000	400	200	0

Table 11. Efficacy of Piperazin to *Parascaris sp.* (District Sleman, Kodya Yogyakarta, Bantul)

Worm Medicine	Number of Horses	Type of Worm	Before treatment (EPG)	After Treatment (days)			
				3	6	9	12
Piperazin	Bunga	*Parascaris sp.*	*1015*	200	50	100	90
Piperazin	Sobar	*Parascaris sp.*	1230	130	50	100	80
Piperazin	Andalas	*Parascaris sp.*	2292	90	60	100	60
Piperazin	Dakor	*Parascaris sp.*	2988	90	80	100	60
Piperazin	Dulman	*Parascaris sp.*	975	90	60	100	60
Piperazin	5 horses	*Parascaris sp.*	1.700	600	300	500	350

The effectiveness of Pyrantel pamoate with a dose of 15 mg/kg of body weight given orally against *Strongylus sp.* worms is good, this is evident from the results of examinations on day 12 where no eggs were found in the feces (Table 12). However, against *Paracaris sp.* worms in horses, this medicine succeeds only to reduce the level of infestation. This is proven from examination for *Parascaris sp.* eggs on day 3, day 6, day 9, and day 12 after treatment, the number decreases from 68.000 eggs per gram of feces to 1.550, 11.000, 900, 900 eggs per gram of feces, consecutively (Table 13). This means that Pyrantel pamoate is not effective to kill *Parascaris* sp. worms, it can only reduce the level of infestation. This is probably because Pyrantel pamoate as an anthelmintic treatment works similar to excessive stimulation of acethylcholine on neuromuscular joints which get continuously and excessively excited into paralysis (nicotine-like effect) (Levine, 1994). The worms experience paralysis due to excessive muscular spasms so that they get eliminated together with excrements (Duncan, 1983 and Katzung, 2004).

Table 12. Efficacy of Pirantel pamoat to *Strongylus sp.* (District Sleman, Kodya Yogyakarta, Bantul)

Worm Medicine	Number of Horses	Type of Worm	Before treatment (EPG)	After Treatment (days)			
				3	6	9	12
Pirantel pamoat	Maskina	*Strongylus sp.*	*1650*	180	50	10	0
Pirantel pamoat	Budi	*Strongylus sp.*	25500	190	60	10	0
Pirantel pamoat	Jarwo	*Strongylus sp.*	16700	580	65	50	0
Pirantel pamoat	Jeram	*Strongylus sp.*	15800	750	75	60	0
Pirantel pamoat	Waryoto	*Strongylus sp.*	15150	600	50	20	0
Pirantel pamoat	5 horses	*Strongylus sp.*	17.900	2300	300	150	0

Table 13. Efficacy of Pirantel pamoat to *Parascaris sp.*in District Sleman, Kodya Yogyakarta, Bantul)

Worm Medicine	Number of Horses	Type of Worm	Before treatment (EPG)	After Treatment (days)			
				3	6	9	12
Pirantel pamoat	Dina	*Parascaris sp.*	*20110*	80	50	30	30
Pirantel pamoat	Darmin	*Parascaris sp.*	*72300*	70	60	30	30
Pirantel pamoat	Cika	*Parascaris sp.*	*91250*	380	340	300	300
Pirantel pamoat	Doni	*Parascaris sp.*	*93100*	250	200	150	150
Pirantel pamoat	Sakura	*Parascaris sp.*	*63240*	720	450	390	390
Pirantel pamoat	5 horses	*Parascaris sp.*	68.000	1550	1100	900	900

Conclusion

Oxfendazole is found effective to kill *Strongylus sp.* and *Parascaris sp.* worms in horses. Duramectin, Piperazin, and Pyrantelpamoate are found effective to kill *Strongylus sp.*worms, but they succeed only to reduce *Parascaris sp.* worm infestation in horses.

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References

Anonymous. (2012). *Laporan Tahunan Klinik Hewan Keliling PORDASI DIY danJawa Tengah*.

Adams, R. H. (1995).*Veterinary Pharmacology and Therapeutic, 7th Edition*. Iowa StateUniversity Press. Ames.

Blood, D. C., dan Handerson, J. A. (1989). *Veterinary Medicine 5th Edition*. Lea and Febiger, Pliladelphia.Pp. 767-768.

Brander, G. C. dan Pugh, D. M., Bywater, R.I., dan Jenkins, W.L. (1991). *VeterinaryApplied Pharmacology and Therapeutics, 5th Edition*.BaillereTindall, British.

Duncan, J. (1983). Anthelmintics for Use in Equine Practice. *Pharmacological Basis of Large Animal Medicine Eds. Bogan, J. A., et al.* Blackwell Scientific Publication. Oxford.

Frasser, C. M. (2005). *The Merck Veterinary Manual: a Handbook of Diagnosis, Therapy, and Disease*. Blackwell Publishing. USA.

Ganiswarna, Sulistia G. (1995). *Farmakologi dan terapi, Edisi keempat*. Bagian Farmakologi Fakultas Kedokteran Universitas Indonesia. Jakarta.

Gordon, L. C., Edward, H., Walter, E. W., Glen, J. S., dan Richard, B. K. (1981). *Formulary*. Purdue University School of Veterinary Medicine.

Katzung, B. G. (2004). *Farmakologi Dasar dan Klinik*. Bagian Farmakologi Fakultas Kedokteran Universitas Airlangga.

Kirk, R.W., Bistner, S.I. (1985). *Hand book of Veterinary Procedures and Emergency Treatment.* 4th Ed. W.B. Saunders Co. Philadelphia. P 928.

Levine, N. D. (1968). *Nematoda Parasites of Domestic Animals and Man.* Burgess Publishing Company. Minneapolis. Hal. 185-189.

Levine, N. D. (1994). *Parasitologi Veteriner*. Gadjah Mada University Press.

Mutschler, E. (1991). *Dinamika Obat*. ITB Bandung.

Radostits, O. M., Gay, C. C., Hinchcliff, K. W., Constable. P. D. (2006). *Veterinary Medicine a Textbook of the Disease of Cattle, Horses, Sheep, Pigs and Goat 10th Ed.* Saunders Elsevier. USA.

Rosoff, L. S. (1990). *Handbook of Veterinary Drugs 2nd Ed.* Springer Publisher Company. New York.

Soulsby, E.J.L., 1982. *Helminth, Anthropods and Protozoa of Domesticated Animal. 7th ed.*ELSB and Bailliere Tindal, London. Hal. 313-314.

Subronto, P. danTjahayati, I. (2001). *IlmuPenyakitTernak II*. Gadjah Mada University Press, Yogyakarta. Hal. 397-399.

Tanu, I. (1972).*Anthelmintika dalam Farmakologi dan Terapi*, Bagian Farmakologi, FKUI, Jakarta.

Yordan, H. E. dan Ewing, S. A. (1980). Concepts of Gastro-intestinal Parasitism and Strategies for Designing Corrective and Control Programs.*Veterinary Gastroenterology Ed. Anderson, N. V.* Lea and Febiger. Philadelphia.