вершенствовании ветеринарного дела в Российской Федерации / Л. Я. Юшкова, Н. А. Донченко // Научное обеспечение животноводства Сибири : сб. науч. статей / материалы Интернет-конференции, Красноярск,12-13 мая 2016 г. - Красноярск, 2016. - С. 110-114.

Статья передана в печать 21.06.2016 г.

УДК 619:616.99:615.284:636.976 (548.7)

ANTHELMINTIC EFFICACY OF ALBENDAZOLE AND LEVAMISOLE AGAINST GASTROINTESTINAL PARASITES IN SRI LANAKAN ELEPHANTS AT UDAWALAWE, SRI LANKA

***D.S. Weerasekera, S., **B.V.P. Perera, ***R.P.V.J. Rajapakse**
*Faculty of science, Trinity College, Kandy, Sri Lanka
**Elephant Transit Home, Department of wildlife Conservation, Udawalawe, Sri Lanka
***Department of Veterinary Pathobiology, Faculty of Veterinary Medicine and Animal Science, University of Peradeniya, Sri Lanka

The prevalence and anthelmintic efficacy of Levamisole and Albendazole (Combined treatment) against gastrointestinal parasites under field conditions in Udawalewa Elephant transit home (ETH), Sri Lanka elephants (Elephas maximus maximus). The first test was done by using Albendazole alone and next treatment was combined treatment. All the elephants used for the experiment were positive for gastrointestinal parasites including Strongyl type eggs, and fasciola type eggs. It was concluded that combine treatment is highly effective against gastrointestinal parasites in elephants.

Проведено сравнение антигельминтной эффективности препаратов «Альбендазол» и «Левомизол» при желудочно-кишечных паразитозах слонов Шри-Ланки. Первый тест проводился с использованием только альбендазола, второй тест –комплексное использование препаратов. Слоны, находящиеся в эксперименте, были инвазированы фасциолами и стронгилятами. Было установлено, что комплексное лечение наиболее эффективно против желудочно-кишечных гельминтов слонов.

Keywords: albendazolum, levamizolum, combine treatment, Strongylata, Fasciola, elephants, Sri Lanka.
Ключевые слова: альбендазол, левамизол, комплексное лечение, стронгилята, фасциола, слоны, Шри-Ланка.

Introduction. There was a fast increase in the number of elephants in ETH. Those elephants are coming from various places in Sri Lanka, and there is a tendency to bring wide range of gastrointestinal parasites of elephants into ETH. At the beginning of research there were only 41 elephants at ETH and it has risen up to 48 elephants within three months. Since wildlife conservation is popular worldwide, there is a major veterinary importance of animal health and hygienic factor. Therefore, understanding of parasitological problems and appropriate prevention methods is needed for elephants, because elephants at ETH belong to the young category and share the same patch of lands and these lands also shared by wild and feral animals as well. Parasitic diseases are one of the common problems in the animal management practice and development of elephant health and hygiene because incidence of clinical and sub-clinical diseases of Elephants can be brought down through controlling the gastrointestinal parasites [1, 2]. There are various procedures to reach this target, but traditionally, farmers and pet owners use chemotherapeutic medicines to control range of internal and external parasites in farm animals and pet animals. Several broad-spectrum anthelmintics are available in the pharmaceutical market for the control of parasitic infection. Control has relied on regular treatment with anthelmintic medicines [3, 4, 5] .

Albendazole has shown excellent antiparasitic activity against a wide range of gastrointestinal parasites of many livestock and pet animals [6, 7, 8]. Some parts of the world, variety of unexpected reactions have been reported in elephants after parenteral administering of albendazole at the recommended dose of 0.75 mg/kg body weight [9]. But administering Albendazole at a dose rate of 0.75 mg/kg body weight is currently practiced for elephants at ETH, who are claiming excellent results without any adverse side effects. The aim of the present study was to determine the prevalence of gastrointestinal parasites in elephants in and around ETH and to study the anthelmintic efficacy of Albandazole and Levamisole combination in oral administering against gastrointestinal parasites (Personal communication).

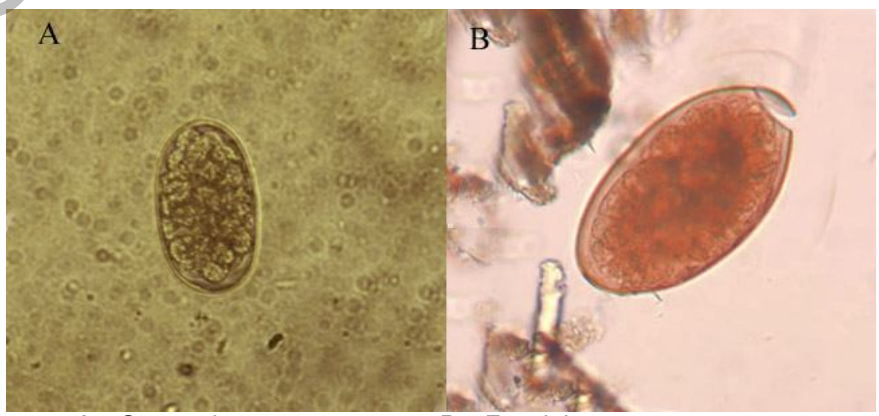
Anthelmintic medicines such as Albendazole, Ivermectin, and Levamisole are used to treat parasitic infection in ruminants and large non ruminants. The regular use of these medicines and sometimes unsuitable use unavoidably issue of resistance. There is lot of research conducted in anthelmintic resistance on livestock therefore it is recommended to keep animals in dry environment for 12 to 24 hours after deworming to ensure that eggs and larvae that survive the anthelmintics are not deposited on safe pasture [10]. This presupposes that 24 hours after treatment there should not be viable helminthes eggs; therefore, the hatching of viable eggs seven days after treatment in our study is an indication that the worms survived. Ivermectin, being the most widely used because of its effect against ectoparasites, has been grossly overused; hence it is highly susceptible to resistance development in livestock and other captive animals[1, 4, 8] .

It has been reported that nematodes in animal herd usually develop anthelmintic resistance more rapidly [5]. Also, the Faecal egg count reduction test (FECRT) used in vivo assay. Albendazole, Ivermectin, and Levamisole were effective in livestock though resistance to albendazole was suspected are also at variance with the results. Difference in location, brand of medicine available, and type of animals used for experiments and level of resistance already developed by helminthes are likely reasons for the imbalance [5, 6]. Levamisole in ruminants has been known to produce adverse reactions such as muscle tremors and hyperesthesia with irritability even at recommended doses; subsequently the subcutaneous administering inducing a lower blood peak of the medicine is often preferred in farm animals [7, 8]. Based on the adverse reactions in farm animals, Levamisole is often administered with caution using the lower dose range which may at times result in suboptimal dosing when given through the subcutaneous route, resulting in the gradual development of resistance [1, 9].

Currently, failure of anthelmintics and reduced efficacy due to resistance of nematodes in livestock and pet animals are becoming a threat in some regions and are of increasing importance of proper treatment methods for gastrointestinal parasites [2, 4, 7]. Most of the parasitic nematodes of captive elephants have shown resistance to common anthelmintics, especially in warm and humid parts of the world and this has been suspected to be due to frequent dosing and poor therapeutic strategies [1,5]. Medicine resistance was first reported in the late 1950's and early 1960's [1, 5, 10]. By the nineties, anthelmintic resistance had become a serious problem. Recently, lots of research works have been conducted on this in many parts of the world [3, 9]. We need to investigate the anthelmintic response for elephants that have acquired helminth infections naturally to treatment with two commonly used anthelmintics .

However, the FECRT can be standardized by randomization of animals into treatment groups for even dispersion of egg counts and medicine effectiveness, accurate dosing to make sure that no administered medicine is lost, and proper tagging of animals in each treatment group to ensure correct sampling. Our study was conducted with strict adherence to the standardisation method to ensure accuracy of our data in reference to the medicine we evaluated.

Materials and methods of research. Twenty elephant calves were examined for the prevalence of gastrointestinal parasites from ETH. From each elephant 10g of faecal matter was collected and eggs identified of gastrointestinal parasites by using simple salt flotation technique (figure 1). Infections were confirmed before the beginning of the treatment for elephants in the ETH. Wild elephants in the national park were not treated against gastrointestinal parasites but elephants that newly released were treated with Albendazole day before the releasing. The last set of elephants has been released one year before the study period. After treatment, treated elephants were separated from the untreated elephants in ETH and the elephants in the national park. Albendazole 0.75 mg/kg body weight alone and Albendazole 0.75 mg/kg body weight / Levamisole 0.75 mg/kg body weight (combined treatment) treatments have been tested in different months of the year.



A - *Strongyle* type worm eggs; B - *Fasciola* type worm eggs

Figure 1 – Types of worm eggs in 10g of elephant faecal matter in elephants at ETH

All the selected animals are young elephants and calves (9 year ≤ 6months) and all the Elephants were positive for gastrointestinal parasites, they were containing Strongyle type worm eggs and fasciola type worm eggs in their faecal matter (figure 1). Elephants which were treated have been stationed in ETH for more than 1 year without release them to wild. In the national park treated animals were not mixed up with wild elephants, ETH elephants were separated from wild elephants but shared the same water resources and grazing lands with wild elephants. Unprotected area with scrub jungle some times wild elephants roam at night but not when the ETH elephants are present. Care takers did not allow the elephants to cross their restricted boundaries; the area is separated with electric wire fences.

Out of the elephants positive for parasitic eggs, 20 elephant calves were randomly selected for treatment with Albendazole 0.75mg/kg of body weight and Another 10 gastrointestinal parasites positive elephants from ETH and another 10 from national park were used as control group. Control group of elephants was not treated with Albendazole 0.75mg/kg or Levamisole 0.75mg/kg and treated group of elephants were administered Albendazole dose rate of 0.75 mg/kg body weight in the milk feeding time at 9.00am (figure 2). As second part of the treatment, combine treatment is practiced during the milk feeding time at 9.00 -10.00 am. From the elephants in ETH, 20 combine treatment treated elephants were selected. 20 elephants were selected as control group without the treatment.

General body conditions of all treated animals were observed throughout the study period regarding to clinical signs i.e. soundness, irritation, depression, feed intake and faecal appearance. Strongyle type and Fasciola type EPTG was taken from all the animals, every 5 days continuously for 25 days after treatment, considering treatment date or day before as day 0.

Figure 2 - Funnel milk feeding with antihelmintic tablets

Faecal samples of all the elephants were collected and analyzed by using eggs per 10g technique (EPTG) modified from Eggs per gram method (EPG). Parasitic EPTG were identified on the basis of classifications described in standard specimens (Strongyle type and fasciola type). Anthelmintic efficacy was analyzed by using T-Test comparing treated elephants with untreated elephants and pre treatment egg count with post treatment egg count per EPTG.

Results of the research. Elephants used for experiment were positive for strongyle and fasciola type eggs per 10g of faecal matter (EPTG). At the day 0 EPTG, of strongyle type eggs in treated elephants was 12.76 and the untreated elephants strongyle type EPTG was 13.33. In the treated group strongyle type EPTG was gone down, from day 0 to day 5 with a significant difference (P=0.00) while untreated group is not showing a significant difference with day 0 to day 5 (P = 0.88) (figure 3). In the treated group days up to day 20, showing a significant difference in strongyle type EPTG with day 0, but the day 25 was not showing a significant difference with day 0 (P=0.08). In the untreated group there was no significant difference in the day 5 to day 25 with the day 0 in strongyle type EPTG (P >0.05). When comparing the days from 5 to 25 from treated elephants Strongyle type EPTG and untreated elephants strongyle type EPTG showing a significant difference (P <0.05). In the day 0 there was no significant difference in strongyle type EPTG in treated group and untreated group (P = 0.83). In the treated elephants there was a fast growth in Strongyle type EPTG from day 20 to day 25, from the day 10 to day 20 Strongyle type EPTG was showing a slight growth, but it was a low count compared to untreated elephants strongyle type EPTG (figure 3).

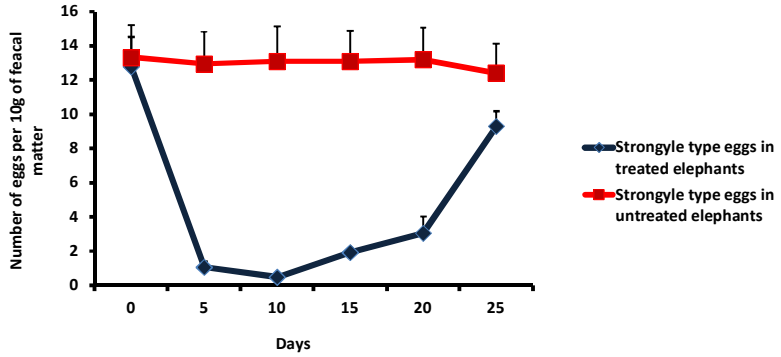


Figure 3 - Comparison between Albendazole group of elephants with Strongylata and untreated elephants

The efficacy of Albendazole alone at the dose rate of 0.75 mg/kg body weight for fasciola type EPTG was significantly different (P = 0.00) from day 0 to day 5 in treated group of elephants in ETH, and it was not significantly different (P = 0.89) in untreated group of elephants in ETH and Udawalawe national park, but in the day 5, in facsiola type EPTG was significantly different (P = 0.02) with treated group of elephants and untreated group of elephants (figure 4). The treated group of elephants and untreated group of elephants did not show a significant difference (P > 0.05) in facsiola type EPTG with day 0 and day 10 to 25 (figure 4). In the treated group of elephants showed a clear reduction in facsiola type EPTG from day 0 to day 5 but from day 10 to day 25 there was no difference as compared with the untreated group of elephants (figure 4).

In the treated group of elephants from ETH was shown 13.15 of mean count of strongyle type EPTG while group of untreated elephants showed 11.83 mean count of strongyle type EPTG in the pre 5 to 25 in treated group of elephants are showing a significant difference (P=0.00) in the strongyle type EPTG . In the untreated group of elephants there was not shown a significant difference (P > 0.05) in the strongyle type EPTG when comparing with day 0 with day 5 to day 25. it was significantly different when comparing the strongyle type EPTG with day 5 to day 25 between treated group of elephants and untreated group of elephant which was not significant (P = 0.46) when comparing day 0. In the treated group of elephants strongyle type EPTG has clearly dropped from day 0 to day 5 and gradually increasing the EPTG from day 10 to 25 by maintaining a low number than untreated group (figure 5).

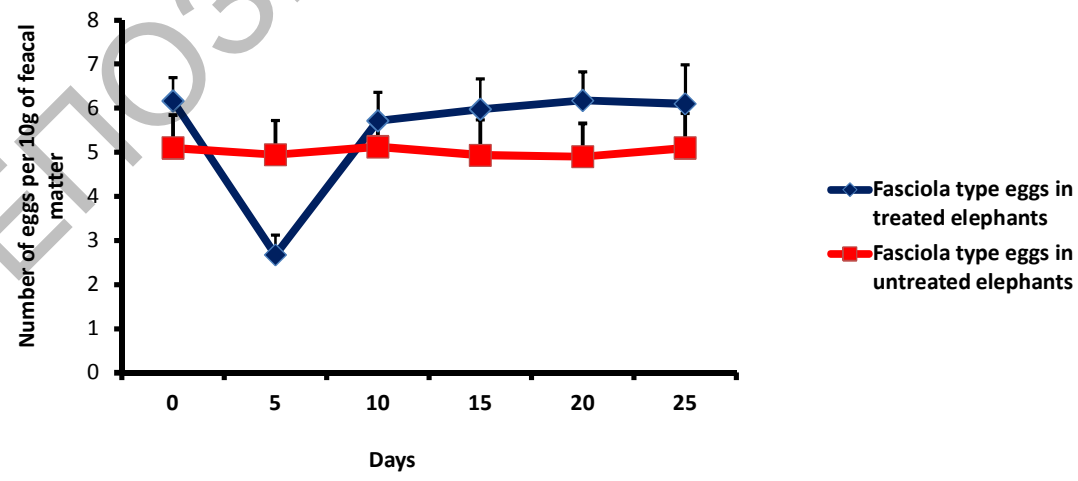


Figure 4 - Comparison between Albendazole group of elephants with Facsiola and untreated elephants

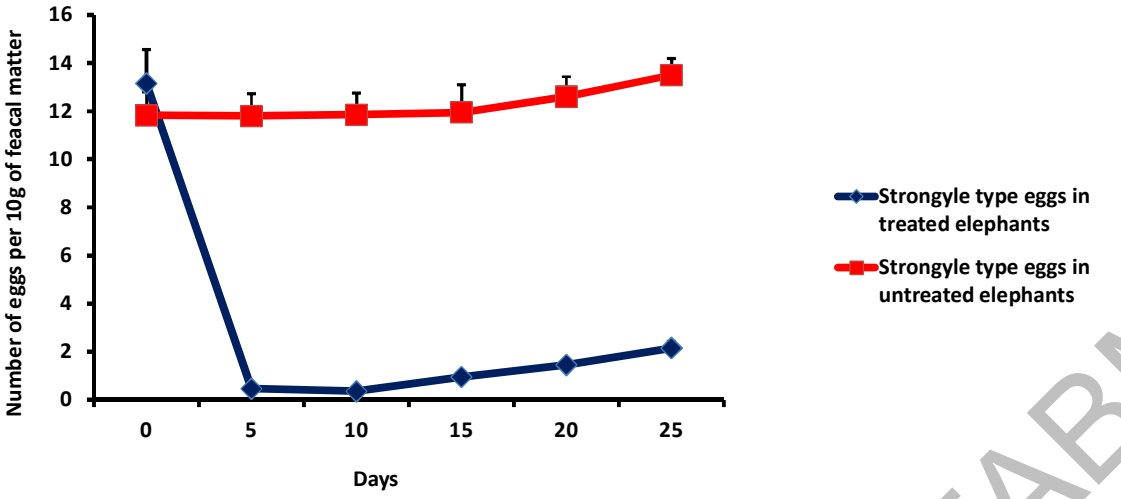


Figure 5 - Comparison between combine treated group of elephants with Strongylata and untreated elephants

In the treated group of elephants facsiola type EPTG was significantly different (P=0.00) from day 0 with the day 5 to 25 but it was not significantly different in untreated group of elephants (P >0.05). When comparing the treated group of elephants' facsiola type EPTG from day 5 to 25 with untreated group of elephants' facsiola type EPTG was significantly different (P =0.00). In the day 0 untreated group of elephants was not significantly different (P=0.59) with the treated group of elephants' facsiola type EPTG. From day 5 to day 15 fasciola type EPTG was showing a gradual growth in treated group of elephants and from the day 15 to 20 it showed a decline and again day on 20 to 25 it is showed a growth (figure 6) but mean number of facsiola type EPTG in the treated group of elephants was always showing a low number than untreated group (figure 6).

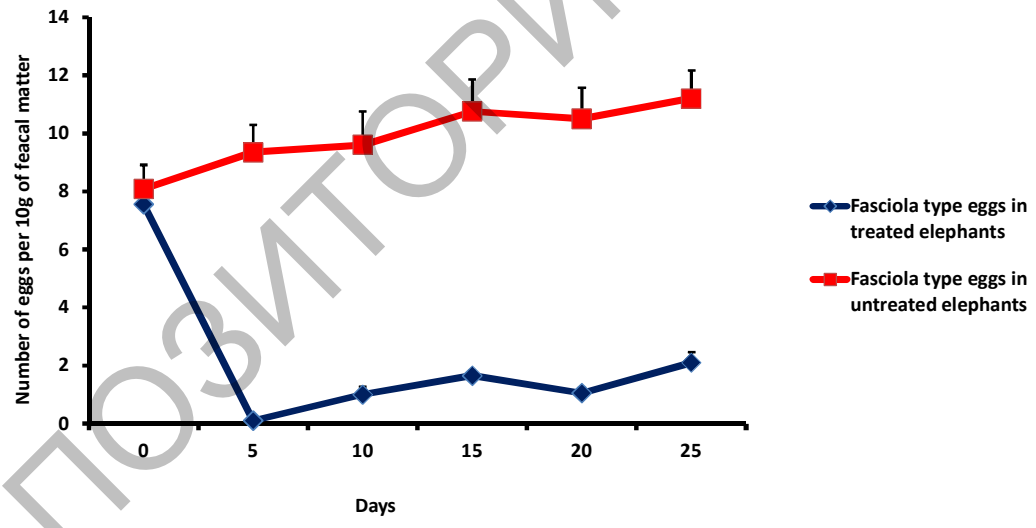


Figure 6 - Comparison between combine treated group of elephants with Facsiola and untreated elephants

No abnormalities were observed in physical conditions such as soundness, appetite and faecal appearance in any of the treated Elephants during 25 days of post-treatment period.

Conclusion. This study showed that administering combined treatment for each elephant was significantly effective against gastrointestinal parasites in Elephants than administering Albendazole alone 0.75mg/kg body weight for each elephant.

References. *1. Sattar, S. P. Potential benefits of quetiapine in the treatment of substance dependence disorders / S. P. Sattar, S. C. Bhatia, F. Petty // J. Psychiatry Neurosci 29. – № 6. – 2004 – p. 452–457. 2. Sattar, S. P. New acgme work-hour guidelines and their impact on current residency training practices / S. P. Sattar, F. Basith, J. Madison, S. C. Bhatia // Acad Psychiatry 29. – № 3 – 2005. – p. 279–282. 3. Ullah, R. Anthelmintic potential of thymoquinone and curcumin on fasciola gigantica / R. Ullah et. al. // PLoS One 12. – № 2. – 2007. – p.*

171–267. 4. Phiri, A. M. A novel assay for the detection of anthelmintic activity mediated by cuticular damage to nematodes: Validation on caenorhabditis elegans exposed to cysteine proteinases / A. M. Phiri et. all. // Parasitology, 1-11. – 2012. – p. 211–234. 5. Canton, C. Resistant nematodes in cattle: Pharmaco-therapeutic assessment of the ivermectin- ricobendazole combination / C. Canton et. al. // Vet. Parasitol. – p. 40–48. 6. Bjorck, L. Decline in coronary mortality in sweden between 1986 and 2002: Comparing contributions from primary and secondary prevention / L. Bjorck // PLoS One 10. – № 5. – p. 124–769. 7. Ferguson, T. S. Birth weight and maternal socioeconomic circumstances were inversely related to systolic blood pressure among afro-caribbean young adults / T. S. Ferguson // J. Clin. Epidemiol. 68. – № 9. – p. 1002–1009. 8. Ahmadi Jouybari, T. Evaluating effect of albendazole on trichuris trichiura infection: A systematic review article / T. Ahmadi Jouybari // Iran J. Parasitol. 11. – № 4. – p. 441–447. 9. Hillebrandt, H. Commentary: Three ways to falsify the case for mass deworming against soil-transmitted helminths / H. Hillebrandt // Int. J. Epidemiol. – 2011. – p. 324–365. 10. Sasaki, E. Peracute bacterial meningitis due to infection with klebsiella pneumoniae in captive-bred ruffed lemurs (varecia variegate) / E. Sasaki // J. Comp. Pathol. – 2015. – № 6. – p. 231–244.

Статья передана в печать 03.03.2017 г.