



UNIVERSIDAD NACIONAL MAYOR DE SAN MARCOS

(Universidad del Perú, DECANA DE AMERICA)

Facultad de Medicina Veterinaria
Laboratorio de Microbiología y Parasitología
Sección Parasitología



Av. Circunvalación cdra. 28 s/n – San Borja. Telf. 4353348 anexo 226 Fax. 4353189,
Lima-Perú

Assessing the effectiveness of an antiparasitic oral containing doramectin (doraQuest I.a. ®) for the control of parasites in horses

Eva Casas A.; Amanda Chávez V.

Centro de Investigación IVITA

Laboratorio de Parasitología - Facultad de Medicina Veterinaria

Universidad Nacional Mayor de San Marcos

ABSTRACT

We evaluated the efficacy and residual load of an antiparasitic oral in gel (**doraQuest I.a. ®**) based on doramectina composition is 1.75% (w/w) in riding horses, for the control of gastrointestinal nematodiasis, for a period of 70 days post- treatment. The study was conducted at the Army Equitation School of La Molina, Lima, Peru, between the months of January to March 2007. Twenty horses were selected, whose ages were an average of 5 years, naturally infected with gastrointestinal parasites and parasitic load egg type Strongylus older than 200 HPG. The horses were distributed equally according to their parasite load, into two groups, control (untreated), and another group treated with **doraQuest I.a. ®**, by oral. Dosage used was 200 mcg / kg. All animals remained together during the period of the experiment. The results showed that (**doraQuest I.a. ®**) by the oral route showed a high efficiency 100%, against strongylus eggs, from 7 up to 63 days after treatment and was effective until the day 70, time that lasted for the evaluation against gastrointestinal nematodes. With the proof of the found results in horses, **doraQuest I.a. ®**, prevents the re-infection of nematodes, for a period of approximately 60 days, because from the 70 days the presence of type strongylus eggs was observed. There were no adverse reactions when accomplishing the dosification in horses.

Keywords: doraQuest I.a. ®, orally, doramectin, nematodes, horses.

Laboratorio de Parasitología. FMV-UNMSM. Lima Perú.

® Agrovvet Market.

INTRODUCTION

The domestic species in the country are conformed primarily by ruminants and monogastrics. Thus, Peru has a 1'062154 of population of horses (*Equus caballus*), (INEI, 1996), which are designed to work load, transport and sporting activities. The rate of infectious diseases and parasite present in this species, are important because they are highly susceptible animals. The parasites present in horses depend mainly on the conditions of breeding and age of the horses. Clinical manifestations in horses by the presence of parasites are very obvious, because they produce pictures of colics, which often end up with the death of the animal.

In our country, between the parasites of clinical significance in equidae are the following: flukes (*Fasciola hepatica*), tapeworms (*Anoplocephala spp.* and *Paranoplocephala sp.*); Nematodes (*Strongylus sp.*, *Triodontophorus sp.*, *Trichostrongylus axei*, *Dyctiocaulus arnfieldi*, *Oesophagostomum sp.*, *Cyathostomum sp.*, *Strongyloides westeri*, *Parascaris equorum*, *Oxyuris equi*, *Drachia megastoma*, *Habronema muscae*), causing myiasis parasites (*Gasterophilus sp.*, *Callitroga sp.*); mite (*Sarcoptes equi* *Psoroptes equi equi* *Chorioptes bovi equi* and *Demodex equi* *Trombicula autommalis*); tick (*Boophilus microplus*, *Otobius sp.*), lice (*Haematopinus asini*) and fleas (*Echidnophaga gallinacea*, *Pulex irritans* and *Tunga penetrans*) (Rojas, MC, 1994; Zaldivar, RS, 1991).

Within the above parasites, most important nematodes belonging to the family Strongylidae is important in regions of equine breeding intended for agricultural labour, as for the production of selected horses racing or sports (Cordero del Campillo, 1999). The group of large strongylids consists of three species: *Strongylus vulgaris*, *Strongylus edentatus* and *Strongylus equinus*. They are characterized by inhabiting the large intestine, measuring between 3 and 5 cm, and the forms are infective larvae of the third stage to be found in the pastures of which feed the horses (Powell and Jackson, 1994). The first two species are prevalent in horses from around the world, the third is less frequent and their impact is sporadic (Powell and Jackson, 1994). They produce significant damage, which varied according to the migration carried out by different species during their larval stage, as well as the adults who feed is blood and mucous or merely intestinal contents.

The larvae of *S. Vulgaris*, has high pathogenicity. When penetrates the intestinal wall, they exercise traumatic action, revealing small bleeding points in its trajectory. It is responsible for producing parasitic arteritis due to the migration of larvae through arteries. In consequence clots, thrombosis and aneurysms can take place, compromising irrigation. The most affected arteries are the mesentéricas, iliac and in some case the spermatic. Problems caused by the larvae are varied depending on the size of the aneurysm and its location. In milder cases can be seen fatigue, decreased performance and colic more or less intense. In the most serious cases can occur broken vessels, internal bleeding and sudden death (Quiroz, 1989). Other parasites such as *Parascaris equorum* and *Gasterophilus spp.* produce lacerations and ulcers, which can cause peritonitis resulting in the death of the animal. Almost all cases of parasitic infections cause in the equine animal depression and weight loss, mainly due to loss of appetite, by the traumatic effect of the parasites (and Alva and Castro, 1998; Sanchez-Silva *et al.*, 2003).

In recent years, the progress in the control of internal parasites has been good starting from the year 1940 with compounds based in Fe

notiazina and bisulfuro carbon. (Powell and Jackson, 1994), followed by benzimidazols that get to have an efficacy of around the 90 % compared to large and small strongylids

adults (Cordero del Campillo, 1999). The Mebendazole, Febendazole and Cambendazole are effective only against strongiloides adults (Soulsby, 1987). Drudge and Lyons (1979) describe that the small parasites have resistance to the benzimidazols in the United States. In 2003 Witzendorff et al, also describe it in Chile.

While is now available anthelmintics highly effective, the pharmaceutical industry continues to investigate new products, including groups of avermectins and milbemicins. The avermectins and its structural analogues, and milbemicins families are macrocyclic lactones isolated from strains of Actinomices the genus Streptomyces (Campbell and Benz, 1984).

The ivermectin has shown a high degree of effectiveness on larval and adult stage of large and small strongilids in horses (Klei *et al.*, 1993). In addition, are highly effective in *Parascaris equorum* (Di Pietro *et al.*, 1988), *Trichostrongylus axei*, *Oxyuris equi*, *Strongyloides westeri*, *Dictyocaulus arnfieldi* as well as larvae *Gasterophilus spp.* (Lyons *et al.*, 1993). They act on the central nervous system of the nematode mature and immature hypobiotics, releasing excessively gamma amino butyric acid which produces flaccid paralysis of muscles and eventually death (Sumano and Ocampo, 1997).

In our country, the treatment of parasitic diseases listed above, are performed based on benzimidazolics (albendazole, fenbendazole, triclabendazole) and macrocyclic lactones molecules developed for use in animals (ivermectin, abamectin, doramectin, moxidectin and eprinomectin) that show a similar spectrum of action including gastrointestinal, lung, eye and tissue nematodes, scabies mites, miasis, chewing and sucking lice and ticks of a single host.

Availables in 1% solution, administered subcutaneously (ivermectin, abamectin, doramectin and moxidectin) or intramuscularly (doramectin) at the rate of 1 ml/50 kg (cattle and sheep) or 1, 5 ml/50 kg (pig) for a dose of 200 or 300 mg/kg respectively.

The oral formulations, for its lowest systemic activity, are highly effective against endoparasites but often have no effective against ectoparasites. This is the case of formulations for horses and sheep, with the exception of *Oestrus ovis*. (Wang, 2001).

It is also worth mentioning that the moxidectin horse for a double dose is administered to ivermectin in this species. Doramectin and ivermectin can be administered to animals of all ages, but moxidectin and abamectin should not be administered in calves younger than 8 and 16 weeks, respectively.

The drug **doraQuest I.a.**® is a formulation of 200 µm / kg doramectin, thus allowing for direct action for a long period, about the variety of parasites that affects the horses and allowing for saving money for the purchase of livestock in antiparasitic and hand of work.

In our country, there is no programs dosage parasite in horses, so its strength is based on the submission of clinical symptoms or experience of the owner without even conducting a coprologic test to demonstrate the etiology of parasitism. Faced with this reality, the objective of this study was to evaluate the efficacy and residual load of a new formulation the **doraQuest I.a.**® for the control of gastrointestinal parasites in horses naturally infected for a long period.

MATERIALS AND METHODS

Place of study

The trial was conducted in the Army Equitation School, located in the district of La Molina, in the Department of Lima, Peru, located approximately 500 meters above sea level, with a temperate climate. The study was conducted between January and March 2007, under the sponsorship of Agroveter Market SA

Animals

Were incorporated into the study a total of 20 horses, between males and females of different ages naturally infected with gastrointestinal parasites, being selected by the McMaster's technique those egg counts greater than 200 eggs per gram of feces (epg) highlighting the eggs "type strongylus" among others. Mean age was five years (range: 3 to 9 years), with an average weight of 350 kg.

To assign animals to the working groups, they were listed in descending order according to the counting of eggs per gram of feces, and then are equally distributed to each of the two experimental groups.

Drugs

The doraQuest is a new composition, doramectin to the 1.75% (w / w), developed especially for horses in gel for oral whose dose is 200 µg / kg of doramectin. The syringe is 6.84 g and has 6 marks. Each line doses product for 100 kg bodyweight. The syringe of 17.1 g has 15 brands. Each line doses product to 100 kg bodyweight.

Experimental Groups

Control group: 10 horses untreated

Group Treated: 10 horses treated with the **doraQuest I.a.**[®] (doramectin 1.75% (w / w))

All animals were kept under the same manage conditions and environmental effects throughout the evaluation period, at the facilities of the Army Equitation School of Peru.

Coproparasitologic Analysis

During the study period were collected and identified fecal samples from animals selected for being equipped individually in a box heat and immediately transported to the Laboratory of Parasitology of the FMV-UNMSM, where conducted qualitative and quantitative coproparasitological examinations, by means of methods of flotation and Mc Master, respectively, at 0, 7, 14, 21, 28, 35, 42, 49, 63 and 70 days after treatment.

Analysis of the results

The percentage of efficacy was determined by the formula described by Powers et al. (1982), where:

$$\% \text{ Efficiency} = \frac{\text{Arithmetic average - arithmetic average}}{\text{Control Group} \quad \text{Treated Group}} \times 100$$

Arithmetic mean control Group

Efficacy was evaluated according to the following criteria:

- Highly effective > 98%
- Effective 90-98%
- Help in control 80-89%.
- Insufficiently active <80% (non-recordable)

(MERCOSUR, 1998)

The results were expressed as a percentage of effectiveness for the drug under evaluation.

RESULTS AND DISCUSSION

In our country, the population of horses is designed to work tasks (or animal transport) and as animal sport (step, jump or race). The equine is a very susceptible animal to the presentation of various diseases; inside them the parasitic diseases that cause weight loss due to the absence of appetite, and immunogenic depression, and may in some cases lead to death of the animal. Because of this, it is necessary to carry out management practices that enable an easy dosification with minor sequel of stress for the animal, since deworming traditional programs need more handling due to the application of drugs on an individual basis (against nematodes, flukes and tapeworms). Our study with the **doraQuest I.a.**® 200 mcg / kg of doramectin, which is administered orally (Table 1) have shown high efficiency up to 63 days and was effective until day 70, against nematodes genre strongylus common in horses. These results to be compared with other studies using only fenbendazole in horses, reported an efficiency ranging from 84.4 to 99.4% in reduction in egg Strongylus, between 10 and 14 days post dosing as well as the reduction by 100% in the case of eggs from *P. Equorum* (Varady *et al.*, 2004).

Table 1.

*Arithmetic Average of parasite eggs per gram of feces (epg) using the technique of McMaster and percentage of the effectiveness of **doraQuest I.a.**® in horses treated at 0, 7, 14, 21, 28, 35, 49, 63 and 70 days post treatment. January-March, La Molina Lima- Peru, 2007.*

	Treatment									
Classification of eggs	Number of eggs per animal (% efficiency)									
	Control	doraQuest I.a.®								
	Before del Tt°	Post Treatment (days)								
		7	14	21	28	35	42	49	63	70
	HPG	%	%	%	%	%	%	%	%	%
Eggs Type Strongylus	595	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	0 (100)	50 (91.6)

Similarly, another study to evaluate the effectiveness of ivermectin to control gastrointestinal nematodes in donkeys, proved 100% effective from day 7 to 28 starting treatment (Seri *et al.*, 2005). Demonstrating less effective in controlling nematodes that obtained in our study, despite the concentration of the drug was the same in both studies; however, the via of application used by these authors was the intramuscular, in contrast to our study, in which it was taken orally, given the characteristic of that gel, that presentation would probably have an impact on the absorption of the drug in its entirety, as well as the formulation of the drug.

On the other hand, the formulation given to this new product, it provides a long-acting compared to products evaluated before presenting conventional formulations. The difference between these products with the same or a different active ingredient is that the products have a long-acting antiparasitic activity in a therapeutic plasma level for a period of time considerably higher. (Eddi, 2000), in a study evaluating the prolonged control of a new formulation of 1% ivermectin w / w of long action against gastrointestinal parasites in cattle by 35 days referred to the success of its formulation incorporating a modifier absorption characteristics that gives long-acting.

In another study of anthelmintic efficacy of three endectocides administered orally in naturally infected horses, Rubilar *et al.*, (2001), showed a significant reduction in the level of parasitism in the group treated with doramectin use of kaolin mixed with honey, achieving a paste orally, where horses kept negative for 60 days post-treatment referring to the persistence of the drug in the form of administration, which would benefit the prolonged effect on the parasites present in the intestinal lumen and pharmacokinetic properties of doramectin that exercise greater retention at the level of local tissue, prolonging his permanence and producing a slow disposal of the product.

In conclusion, the results obtained in this study found that the drug used **doraQuest I.a.®** 200 mcg / kg of doramectin, was highly effective against strongylus eggs in horses during the 63 days and resulting effective to the day-long 70 evaluation. There were no seen adverse reactions or toxic reactions in the doses treated.

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