

Comparison of the Anthelmintic Efficacy of Three Commercial Products against Ascarids and Capillaria SPP. in Fighting Cocks

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ABSTRACT

The aim of the present study was to evaluate the anthelmintic efficacy of three commercial compounds against ascarids and *Capillaria* spp. in naturally infected fighting cocks from Mexico. First experiment—Forty cocks were selected on the basis of eggs per gram (EPG) counts quantified by the McMaster method. On day 0 the birds were divided into four groups of 10 cocks, each subjected to the treatments. Group 1 received a single oral dose of 1 mg of ivermectin, 25 mg of praziquantel and 40 mg of fenbendazole given in tablets according to body weight (b.w). Group 2 was treated with a single oral dose of 1 mg of ivermectin, 25 mg of praziquantel and 40 mg of fenbendazole given in tablets/b.w. but formulated with a different excipient. Group 3 received a single tablet containing 0.2 mg of abamectin and 30 mg of albendazole. Group 4 served as a non-treated control. Fecal analyses were carried out on days 0 (day of treatment), 7, 14, 21 and 28, being collected from the floor where the cocks were individually caged. Efficacy was measured on the percentage of egg reduction from day 0 with respect the EPG counts from the control group. In a second experiment the study was similarly performed using another cock-farm located at approximately 300 km away from the first one. Results indicated an overall efficacy of 100%, 94.0% and 100% for groups 1, 2 and 3 in the first experiment and 100%, 100%, 100% for groups 1, 2 and 3 of the 2nd experiment, respectively. It is concluded that all drugs used exerted high efficacy in fighting cocks naturally infected with helminths.

Keywords: Anthelmintic Efficacy, Commercial Drugs, Fighting Cocks

1. Introduction

In Mexico the cockfight is a popular activity frequently carried out in places for combat called “palenques”. The fights generally take place on holidays, national festivities or week-ends throughout the country. Important to note is the fact that the cockfight is also a growing industry which provides employment and involves thousands of people engaged in the gambling on the outcome of of this festive activity.

However, one of the important factors which hampers the aggressive performance of fighting cocks at the time of combat is the decrease of energy commonly caused by different parasitic infections. On the other hand, there is very limited information on the use of drugs that can remove helminths from the cocks. The present study was aimed at the evaluation of the antelmintic efficacy of

three commercial compounds against Ascarids and *Capillaria* spp. in fighting cocks from two different farms.

2. Material and Methods

2.1. First Experiment

2.1.1. Location of the Study

This study was carried out at the farm “El Colorado”, located in the municipality of Tulancingo, in the state of Hidalgo, Mexico, (central part of Mexico).

2.1.2. Study Animals

Forty adult and young fighting cocks with no deworming background of at least 6 months were selected for inclusion in the trial. They were chosen on the basis of egg counts per gram (EPG) by using the quantitative McMaster method. All animals were individually caged,

being feed on peleted food, water being supplied *ad libitum*

2.1.3. Drugs for Evaluation

1)Vermicell-Gallos (Laboratorios ANDOCI, S.A de C.V.[®]), formulated in tablets containing 1 mg de ivermectin, 25 mg of praziquantel and 40 mg of fenbendazole.

2)Endovet-Gallos. (Revetmex[®]), formulated in tablets containing 1 mg de ivermectin, 25 mg of praziquantel and 40 mg of fenbendazole, being formulated with an excipient different from the previous one.

3)Trifen-Plus (Laboratorios Aranda[®]), formulated in tablets each containing 0.2 mg of abamectin and 30 mg of Albendazole.

2.1.4. Animal Identification

All groups of animals were identified with plastic numbered and colored rings. Each cock was always kept in an individual cage.

$$\text{Efficacy} = \frac{\text{No. de EPG in the non-treated group} - \text{No. de EPG in the treated group}}{\text{No. de EPG in the non-treated group}} \times 100$$

2.2.1. Statistical Analyses

With the aim of determining possible differences among groups on each date of sampling, the obtained data was subjected to the Kruskal-Wallis test. In addition, in order to compare the quantity of EPG in each group from the initial to the last samplings, the Wilcoxon rank test was employed.

2.2.2. Second Experiment

In a second experiment, the study was similarly performed using the same drugs and treatments with the difference that the study was undertaken in another cock-farm called “La Quinta Portuguesa”, located at approximately 300 km from first one.

40 fighting cocks positive to ascarids were selected from 125 animals available were divided into 4 groups of 10 animals each ready for treatment as in Experiment one. The same measurements of anthelmintic efficacy were similarly undertaken so as to be compared with those of the first experiment.

3. Results

General results can be seen in **Tables 1 to 4**.

3.1. First Experiment

Group 1 showed a gradual reduction of EPG after treatment, the efficacy exerted being of 97.0%, 91.0%, 100% and 100%, for days 7, 14, 21 and 28, after treatment, respectively (**Table 1**).

Group 2 showed percentages of egg reduction of

2.1.5. Conduction of the Study

The forty selected cocks were divided into 4 groups of 10 animals each for treatment.

Group 1 received Vermicell-Gallos at a single oral dose of 1 tablet/2.5 kg/b.w.

Group 2 was treated with Endovet-Gallos at a single oral dose of 1 tablet/2.5 kg/b.w.

Group 3 received Trifen-Plus at a single oral dose of 1 tablet/1 kg/b.w.

Group 4 served as a non-treated control.

2.1.6. Fecal Analyses

Fecal individual fresh samples of feces were taken from the study animals on days 0 (day of treatment), 7, 14, 21 and 28 being transported to our laboratory for immediate analysis.

2.2. Efficacy

Efficacy was measured on the percentage of egg reduction of the treated animals relative to the non-treated control group following the formula of [1].

97.0%, 71.0%, 97.0% and 94.0% for days 7, 14, 21 y 28, respectively (**Table 1**).

Group 3 showed an efficacy of 100% for days 7, 14, 21 and 28 after treatment, respectively (**Table 1**).

Group 4 constantly maintained egg shedding during the experiment. The maximum mean number of EPG was 2350 (\bar{x} 235) and the minimum 950 (\bar{x} 95). (**Table 2**).

3.2. Statistical Analyses

3.2.1. Comparison Among Treatments in Each One of the Days of Fecal Sampling

On day 0, no statistical differences were found among

Table 1. Percentage of helminths-EPG reduction posttreatment with three commercial anthelmintics in fighting cocks from Tulancingo, Mexico.

Groups	Dose	Tx	Days after treatment			
			7	14	21	28
(n = 10 cocks/group)	1 tablet	0				
Group 1*	2.5 kg/b.w	-	97	91	100	100
Group 2**	2.5 kg/b.w	-	97	71	97	94
Group 3***	1 kg/b.w	-	100	100	100	100
Group 4 (Control)	0	-	-	-	-	-

Tx = Treatment; b.w. = body weight; *1 mg ivermectin, 25 mg praziquantel, 40 mg fenbendazole; **1 mg ivermectin, 25 mg praziquantel, 40 mg fenbendazole (formulated with different excipient); ***0.2 mg avamectin, 30 mg albendazole.

Table 2. Statistical analysis of the comparison on the efficacy of three commercial compounds against helminths of fighting cocks from Tulancingo, Mexico.

Groups	Day 0	Day 7	Day 14	Day 21	Day 28
Average number of eggs ± Standard Deviation					
Group 1	195 ^{a.1} ± 28.3	5 ^{a.1} ± 5.0	15 ^{a.1} ± 15.1	0 ^{a.2}	0 ^{a.2}
Group 2	160 ^{a.1} ± 23.3	5 ^{a.1} ± 5.0	50 ^{a.1} ± 36.5	5 ^{a.2} ± 5.0	10 ^{a.2} ± 6.7
Group 3	160 ^{a.1} ± 23.3	0 ^{a.1}	0 ^{a.2}	0 ^{a.2}	0 ^{a.1}
Group 4 (Control)	175 ^{a.1} ± 22.7	235 ^{b.2} ± 33.4	210 ^{b.1} ± 23.3	125 ^{b.1} ± 20.1	95 ^{b.2} ± 17.4

Mean in the same column with the same letter are statistically equal; Mean in the same row with equal number are equal to the average on day 0.

the EPG of the experimental groups ($p < 0.717$) (Table 2).

On day 7, statistical differences were found on the quantity of EPG of group 4 (non-treated control) with each one of the treated groups ($p < 0.0001$).

Results with the same tendency were found on days 14, 21, and 28, respectively.

3.2.2. Comparison of Fecal Samplings between Treatments

Treatment 1. Comparisons of each one of the average fecal samples from day 0 with the different days of samplings (7, 14, 21, and 28) showed a statistical difference using the Wilcoxon test of signed ranks ($p < 0.0085$).

With regard to treatments 2 and 3, the results obtained were similar to those found in group 1.

On the other hand, Group 4 showed no statistical differences on the average EPG obtained on day 0 when compared with the average EPG from days 7, 14 and 21. However, statistical difference were determined when fecal sampling of day 28 was analyzed ($p < 0.014$). (Table 2).

In addition, during the study of the group of Vermicell-Gallos, two cocks were positive to Dermanyssus spp. and another one was parasitized with some lice. After treatment these animals were observed to be negative. However, since the size sample of these arthropods was

Table 3. Percentage of helminths-EPG reduction posttreatment with three commercial anthelmintics in fighting cocks from La Portuguesa, Texcoco, Mexico.

Groups	Dose	Tx	Days after treatment			
(n = 10 cocks/group)	1 tablet	0	7	14	21	28
Group 1*	2.5 kg/b.w	-	100	100	100	100
Group 2**	2.5 kg/b.w	-	100	100	100	100
Group 3***	1 kg/b.w	-	100	100	100	100
Group 4 (Control)	0	-	-	-	-	-

Tx = Treatment; b.w. = body weight; *1 mg ivermectin, 25 mg praziquantel, 40 mg fenbendazole; **1 mg ivermectin, 25 mg praziquantel, 40 mg fenbendazole (formulated with different excipient); ***0.2 mg avamectin, 30 mg albendazole.

very small, these results should be recorded as additional data that need to be further confirmed.

3.2.3. Second Experiment

All treated groups from “La Quinta Portuguesa” showed an EPG reduction of 100%, demonstrating an outstanding efficacy (Table 3).

According to the Kruskal-Wallis test, on day 0 no statistical difference on EPG was found between treated

Table 4. Statistical analysis of the comparison on the efficacy of three commercial compounds against helminths of fighting cocks from La Portuguesa, Texcoco, Mexico.

Groups	Day 0	Day 7	Day 14	Day 21	Day 28
Average number of eggs ± Standard Deviation (Percentage of Efficacy)					
Group 1	290 ^{a.1} ± 53.1	0 ^{a.1}	0 ^{a.1}	0 ^{a.1}	0 ^{a.1}
Group 2	275 ^{a.1} ± 58.1	0 ^{a.2}	0 ^{a.2}	0 ^{a.2}	0 ^{a.2}
Group 3	265 ^{a.1} ± 47.8	0 ^{a.2}	0 ^{a.2}	0 ^{a.2}	0 ^{a.2}
Group 4 (Control)	295 ^{a.1} ± 41.1	305 ^{b.1} ± 41.8	310 ^{b.1} ± 47.0	322 ^{b.1} ± 55.4	250 ^{b.1} ± 65.1

Mean in the same column with the same letter are statistically equal; Mean in the same row with equal number are equal to the average on day 0.

groups and the control group ($p < 0.898$). (**Table 4**)

On day 7 statistical differences between the quantity of EPG were observed in group 4 with regard to all other groups ($p < 0.0001$).

Results with a similar tendency were found on days 14, 21, and 28 after treatment, respectively.

3.2.4. Comparison of fecal Samplings between Treatments

Comparison of day 0 with each one of the average days of sampling (7, 14, 21, and 28) showed significant differences, using the Wilcoxon rank test ($p < 0.005$).

Results were similar when treatments of groups 1, 2 and 3 were compared.

In group 4, no significant difference was observed in the mean EPG from day 0, as compared with the average EPG from days 7, 14, 21 and 28 (**Table 4**)

4. Discussion

Information regarding the use of anthelmintics in game birds is very scanty.

Ref. [2] demonstrated that the administration of fenbendazole reduced natural nematode infection in pheasants and partridges.

In the present experiment, the data obtained from both farms showed that a combined dose of ivermectin/praziquantel/fenbendazole given at the producer recommended dose was highly effective in decreasing the percentage reduction of EPG and therefore the reduction of gastrointestinal nematode infections in common fowl (*Gallus gallus*) raised as fighting cocks.

It was also demonstrated that even when Vermicell-Gallos or Endovet-Gallos were formulated with a different excipient, they showed no statistical difference in efficacy. Nevertheless, it is important to point out that

they have shown better efficacy than ivermectin administered alone [3-5] praziquantel [6,7] for fenbendazole used as a single treatment [8-12].

On the other hand, the efficacy of the combined treatment of 0.2 mg of abamectin plus 30 mg/kg of albendazole were enough to remove all ascarids and some Capillaria, since no helminth eggs were found a few days after treatment. Perhaps a slight advantage of Trifen-plus is that only two drugs are needed to obtain similar efficacy and therefore cost decrease on treatments may be better when these drugs are used. However, a drawback for this compound is that if the cocks of either farm under study have a cestode infection, the use of the ivermectin/praziquantel/fenbendazole combination may be advisable instead since praziquantel is the drug of choice to remove this type of helminths.

It is important to mention that the efficacy of albendazole on its own against bird parasites has already been described by [13]. Nevertheless, as far as we know, no previous reports regarding the anthelmintic efficacy of an abamectin/albendazole combination are available. The slight difference in the percent reduction of egg output observed between the combination regimens using distinct excipients is an important topic for future investigations. They might correlate bioavailability and anthelmintic efficacy by the analysis of ingredient concentrations and their main metabolites by high performance liquid chromatography.

With regard to the relation of cost-benefit, although all treatments for fighting cocks are not expensive, but it is important to know the time of the year when helminth infections are spread in higher proportion in the birds so that a suitable treatment schedule may be established.

On the other hand, the effect of albendazole on enzy-

mes from common species of poultry-infecting nematodes has been demonstrated [13]; however, as far as we know, combination regimes employing an ivermectin/praziquantel/fenbendazole formulation with these anthelmintics in fighting cocks have not as yet been reported.

These results have demonstrated that combined dosing of some commercial anthelmintics provides highly promising efficacy against gastrointestinal nematodes on fighting cocks maintaining good health status, which is highly required for better performance in the fighting arena.

5. Conclusions

The combined administration of either ivermectin/praziquantel/fenbendazole or abamectin/albendazole administered in tablets at the producer's recommended dose exerted high efficacy against *Ascarids* and *Capillaria* spp. in naturally infected fighting cocks

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