A comparison of the efficacy of doramectin, closantel and levamisole in the treatment of the 'oriental eye fluke', *Philophthalmus gralli,* in commercially reared ostriches (*Struthio camelus*)

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ABSTRACT

Commercially reared ostriches at Msengi farm situated in the Chinhoyi area of Mashonaland West province in Zimbabwe were found to be infected with the 'oriental eye fluke', *Philopthalmus gralli,* in 2001. This was the 1st record of the fluke in Zimbabwe. Trials were conducted to identify a suitable drug for the treatment of this fluke. A total of 12 ostriches confirmed to be infected with the fluke through clinical examination of the eyes and identification of the fluke were randomly divided into 3 equal groups, with each group receiving a different treatment protocol. The 3 drugs used were doramectin, levamisole and closantel. Each of the drugs was used in combination with chloramphenicol as an eye ointment. Levamisole was administered topically into the eye whereas doramectin and closantel were administered parenterally as an intramuscular injection. The results indicated a positive response in levamisole-treated birds but there were no noticeable responses to doramectin and closantel treatments.

Key words: closantel, doramectin, efficacy, levamisole, oriental eye fluke, *Philophthalmus gralli*, *Struthio camelus*.

Mukaratirwa S, Chimbwanda M, Matekwe N, Matenga E **A comparison of the efficacy of doramectin, closantel and levamisole in the treatment of the 'oriental eye fluke', *Philopthalmus gralli,* in commercially reared ostriches (*Struthio camelus*)**. *Journal of the South African Veterinary Association* (2008) 79(2): 101–103 (En.). School of Biological and Conservation Sciences, Faculty of Science and Agriculture, University of KwaZulu-Natal, Westville Campus, Durban, South Africa.

INTRODUCTION

The ostrich industry is steadily growing in Zimbabwe, hence the need to document the diseases affecting the ostrich, including their control and treatment. Since *Philophthalmus gralli* was reported in Zimbabwe[7], it is important to treat and control the parasite to prevent it from spreading. The fact that *Philophthalmus* spp. are also of zoonotic importance, having been reported in humans in Ceylon[2], Israel[6], Mexico[5] and Thailand[11], means that effective control will prevent the infection from spreading to humans.

Attempted treatment of *P. gralli* has included the manual removal of the flukes from eyes of birds under anaesthesia[3] but this method produced no significant change in the infection. Topical treatment of infected birds with carbamate powder together with an antibiotic at an interval of 3 times a day produced temporary reduction in the trematode population, but after a few days many flukes were found to invade the eye again[3]. Additional carbamate treatment resulted in the elimination of the flukes[3].

The objective of this study was to evaluate the efficacy of doramectin, closantel and levamisole in the treatment of *P. gralli* infection in the ostrich.

MATERIALS AND METHODS

Ostriches at Msengi farm, situated in the Mashonaland West province of Zimbabwe were clinically examined to determine the level of infection by *P. gralli.* The level of infection was graded according to the area of nictitating membrane covered by parasites.

A total of 12 ostriches that were found to be infected were designated as shown in Table 1 and randomly divided into 3 equal groups of 4. Group A was treated with levamisole (Tramisol®) topically, at a dose of 1.5 mg/kg (split equally per eye), Group B was treated with closantel (Seponver®), 3.5 mg/kg per bird intramuscularly and Group C was treated with doramectin (Dectomax®) at a dose rate of 0.5 mg/kg intramuscularly. The choice of the drugs used in the study was based on the drugs which were available on the market at the time of conducting the study. Chloramphenicol eye ointment was also applied topically to all the birds. The treatments were repeated after 1 week. All the birds were prevented from accessing water from a stream passing through the farm which had been determined as the source of infection.

Birds were examined for the presence of flukes and for changes in the clinical picture of the condition 3 weeks after the 1st treatment.

RESULTS AND DISCUSSION

The results indicated a marked improvement in the clinical condition of the birds that were treated with levamisole (Table 2). The fluke burden in the eyes was reduced to at least less than 5 % a week after the 2nd treatment with levamisole. Two of the cases had their fluke burden changed from ++ to + and 1 case changed from ++ to 0. The 4th case in this group died during the course of the experiment from undetermined causes.

The birds that were treated with doramectin and closantel did not show significant changes in the clinical condition or burden of flukes in the eyes, although there were slight reductions in the amount of ocular discharge (Table 2).

The reduction in the amount of ocular discharge in cases treated with doramectin and closantel could be attributed to the effects of the chloramphenicol that was used in all the cases.

There was no significant change in fluke burden for cases treated with doramectin. This was not a surprise as the drug acts as a GABA agonist in neurotransmission thereby causing muscle paralysis[1]. Since flukes do not use GABA as a neurotransmitter, doramectin is not expected to have an effect on flukes[10].

The cases that were treated with closantel did not show any significant improvement in the condition or reduction in the number of flukes. This is in spite of the fact that closantel is a drug widely used against flukes. It is mainly effective against immature and mature stages of *Fasciola*[12], but has never been recorded to be active against *P. gralli.* Closantel produces a stunting effect on flukes less

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Received: July 2007. Accepted: April 2008.

Table 1: **Fluke burden, clinical signs observed and drugs administered for each case.**

Case	Group	Fluke burden*	Clinical signs	Drugs administered
1. Female	A	++++	Mucoid ocular discharge, severe conjunctivitis, periorbital alopecia and semi-blind	a. Levamisole b. Chloramphenicol
2. Male	A	++	Mild conjunctivitis and ocular discharge	a. Levamisole b. Chloramphenicol
3. Male	A	++	Mild conjunctivitis and ocular discharge	a. Levamisole b. Chloramphenicol
4. Female	A	++	Mild mucoid ocular discharge, conjunctivitis and swollen eye	a. Levamisole b. Chloramphenicol
5. Female	B	+++	Moderate conjunctivitis and ocular discharge with swollen eyes	a. Closantel b. Chloramphenicol
6. Male	B	++++	Moderate conjunctivitis and ocular discharge	a. Closantel b. Chloramphenicol
7. Female	B	+++	Mild conjunctivitis, ocular discharge and eyes slightly swollen	a. Closantel b. Chloramphenicol
8. Male	B	++	Mild conjunctivitis, ocular discharge and swollen eyes	a. Closantel b. Chloramphenicol
9. Male	C	+++	Protruding nictitating membrane, mild ocular discharge and conjunctivitis	a. Doramectin b. Chloramphenicol
10. Male	C	+++	Severe conjunctivitis and ocular discharge	a. Doramectin b. Chloramphenicol
11. Female	C	+++	Severe conjunctivitis, ocular discharge and swollen eyes	a. Doramectin b. Chloramphenicol
12. Female	C	++	Mild ocular discharge and conjunctivitis	a. Doramectin b. Chloramphenicol

* ++++, >50 % of nictitating membrane covered by flukes; +++, 25–50 % of nictitating membrane covered by flukes; ++, 5–24 % of nictitating membrane covered by flukes; +, <5 % of nictitating membrane covered by flukes.

Table 2: **Fluke burden and clinical signs after treatment.**

Case	Drug used	Fluke burden* before treatment	Fluke burden* after treatment	Clinical signs after treatment
1. Female	Levamisole	++++	–	Died
2. Male	Levamisole	++	0	No clinical signs observed
3. Male	Levamisole	++	+	No clinical signs observed
4. Female	Levamisole	++	+	No clinical signs observed
5. Female	Closantel	+++	+++	Moderate conjunctivitis and ocular discharge
6. Male	Closantel	++++	++++	Moderate conjunctivitis and ocular discharge.
7. Female	Closantel	+++	+++	Mild ocular discharge and conjunctivitis
8. Male	Closantel	++	++	Mild conjunctivitis, ocular discharge and swollen eyes
9. Male	Doramectin	+++	+++	Mild ocular discharge and conjunctivitis
10. Male	Doramectin	+++	+++	Severe conjunctivitis and ocular discharge
11. Female	Doramectin	+++	+++	Severe conjunctivitis, ocular discharge and swollen eyes
12. Female	Doramectin	++	++	Mild ocular discharge and conjunctivitis

*Defined in Table 1.

than 4 weeks of age[1]. The lack of action on *P. gralli* may be as a result of the fact that the flukes were still immature, or may also be attributed to the route of administration resulting in insufficient concentration in areas were flukes were attached.

Cases treated with levamisole showed significant improvement in both the clinical condition and the number of parasites. The exact mechanism of action of levamisole on *P. gralli* has not been documented. In nematodes it acts as a cholinergic agonist resulting in neuromuscular paralysis of the parasite[9]. It has been used in poultry against fowl eyeworm, *Oxyspirura mansoni,* a nematode, when application of several drops of 10 % solution was effective in killing the parasite. It is quite possible that levamisole could have acted in more or less the same way as it acts on roundworms. Levamisole has been reported to have the ability to restore cell-mediated immunity of the host by stimulating the proliferative responses of lymphocytes, lymphokine synthesis, antibody production and chemotaxis, phagocytosis and intracellular killing by macrophages[4], and it is not clear if any of these activities had an effect on the fluke.

In the past creosol had been tried experimentally, where 2 drops per eye resulted in 100 % recovery[8]. Topical treatments with carbamate powder together with an antibiotic have yielded favourable results[3]. To date there is no standard treatment that has been established for treatment of *P. gralli.*

Although levamisole was effective in eliminating the fluke, the efficacy of flukicides like praziquantel, triclabendazole, and resorantel need to be determined. Further research needs to be carried out to elucidate the mechanism of action of levamisole against the fluke.

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