Ivermectin in the treatment of helminthiasis in caged raised adult guinea-fowl (*Numida meleagris galeata* Pallas)

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OKAEME (A. N.), AGBONTALE (J.). L'ivermectine dans le traitement de l'helminthose chez des pintades adultes (*Numida meleagris galeata* Pallas) élevées en cage. *Revue Élev. Méd. vét. Pays trop.*, 1989, **42** (2) : 227-230.

Le traitement à l'ivermectine des helminthoses naturelles chez les pintades élevées en cage s'est révélé d'une grande efficacité dans l'élimination de l'infection due aux stades juvénile et adulte de *Heterakis gallinarum, Ascaridia galli, Subulura suctoria, Raillietina* spp. et *Capillaria caudinflata* aux doses de 0,07 mg/kg et 0,14 mg/kg par volaille adulte, administrées par voie sous-cutanée. Il n'a été observé aucun effet secondaire chez les pintades traitées qui sont restées indemnes de toute infection helminthique pendant 6 semaines. La largeur de spectre est discutée et le rapport coût-efficacité fait l'objet d'une brève analyse. *Mots clés* : Pintade - *Numida meleagris galeata* - Anthelminthique - Ivermectine - Nématodose - Nigeria.

INTRODUCTION

Gastrointestinal helminthiasis is a serious economic disease in guinea-fowl production (1). The effect on young guinea-fowl is debilitation with usually low mortality. Studies on the efficacy of Piperazine™, a drug of choice in the control of helminthiasis in guinea-fowl has its limitation (2) as some helminths remain unaffected.

This study attempts the use of broad-spectrum anthelmintic, ivermectin derived from avermectins, a family of broad-spectrum antiparasitic agent (Ivomec™, MSD Agvet, Hoddesdon, Herfordshire, U.K.). The use has not been tested to our knowledge, in guinea-fowl, in order to examine its level of efficacy and suitability in an avian species.

MATERIALS AND METHOD

Naturally clinically affected 28 weeks guinea-fowls 1.34-1.44 kg (mean weight 1.35 kg, n = 60) were selected based on repeated faecal Stoll's dilution method (8). The animals were divided into three groups, two of which had 24 guinea-fowls per group and the third 12. Treatment with ivermectin was administered subcutaenous at breast muscle region at dose rate of 0.07 mg/kg, group I ; 0.14 mg/kg, group II ; and no treatment as control, group III, respectively. The calculated dosage levels were based on recommended 0.2 mg/1 kg or 10 mg/50 kg for other animals. However 33 and 70 per cent of the calculated dosage was chosen considering the small blood volume and weight of guinea-fowl.

Following treatment the faecal dropping were examined 24-28 hours after and subsequently weekly for a period of 8 weeks for the presence of helminths and their eggs. At the end of the experiment, two each of the guinea-fowls from two groups of levels of treatment were sacrified and their gastrointestinal organs examined for the presence of helminth. The selected disease free guinea-fowls were those indicating no helminths based on egg count analysis.

RESULTS

It was observed that the guinea-fowls which were treated with ivermectin improved in vitality. Initial cases of helminthiasis no longer show signs of unthriftiness, diarrhoea and reduced food intake. It was found that before treatment there were high prevalent rates of *Heterakis gallinarum, Ascaridia galli* (Table I). Helminth egg count per gram (epg) of faeces was very high for *H. gallinarum* and *Subulura suctoria* with epg 2,354 (n = 60), epg 850 (n = 4) respectively. There were also mixed helminth infections of combinations *H. gallinarum* and *A. galli* ; *H. gallinarum* and *Raillietina* ; and *H. gallinarum* and *S. suctoria.*

Infection rate was greatly reduced within the first six weeks following treatment with very few eggs in faeces, 10-30 epg at 7 to 8 weeks (Table II). Examination of faecal dropping 24 and 48 hours following treatment revealed the elimination of whole juvenile and adult stages of worms (Table III). The high percentage elimination of the various helminth species correlated with the zero infection rates indicating a high efficacy of the drugs. There is however no significant difference ($P > 0.05$) on the efficacy of the drug at double the dose level (Table II). The absence of

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TABLE I Helminth infection rate in adult guinea fowls before treatment.

Parasite type	Percentage infection per cent (No)	Helminth egg per gramm of faeces (epg)			
		1st week range	mean	2nd week range	mean
A = *Heterakis gallinarum*	60 (36)	100-10,700	2,354	100-5,300	2,040
B = *Ascaridia galli*	267 (16)	100-200	157	100-400	255
C = *Capillaria caudinflata*	3.3 (2)	50-200	125	NS	
D = *Subulura suctoria*	6.6 (4)	700-900	850	20-500	620
E = *Raillietina* spp.	38.3 (23)	Not counted		Not counted	

NS : Not seen in faeces.

TABLE II Percentage helminth infection following ivermectin treatment.

Treatment dosage	No.	Mean wt.	Duration in weeks post treatment and percent infection based on epg							
			1 wk	2 wk	3 wk	4 wk	5 wk	6 wk	7 wk	8 wk
0.07 mg/kg	24	1.35 kg	0	0	0	0	0	0	4.25 (SS)	4.25 (HB)
0.14 mg/kg	24	1.35 kg	0	0	0	0	0	0	4.25 (SS)	4.25 (SS)
Control	12	1.35 kg	100 (HG)*	100 (HG)	100 (HG)	100 (HG)	100 (HG)	75 (HG)	75 (HG)	75 (HG)
			83.3 (AG)	75 (AG)	83.3 (AG)	66.3 (AG)	75 (AG)	66 (AG)	66 (AG)	66.3 (AG)
			25 (SS)	25 (SS)	25 (SS)	25 (SS)	1.256 (SS)	16.6 (SS)	16.6 (SS)	16.6 (SS)
			33.3 (CC)	33.3 (CC)	16.6 (CC)	8.3 (CC)	8 3 (CC)	8.3 (CC)	8.3 (CC)	8.3 (CC)

*HG = *H. gallinarum* ; AG = *A. galli* ; SS = *S. suctoria* ; CC = *C. caudinflata*.

helminth following *post-mortem* examination at the end of experiment further confirms the efficacy of ivermectin.

DISCUSSION

The use of broad-spectrum anthelmintic in the raising of guinea-fowls is an advantage to the farmer because in most cases infections are usually mixed. These helminths known to reduce productivity due to their pathologic effects (3) have to be eliminated or controlled in order to achieve economic gain and reduce production losses.

The use of ivermectin from this experiment has shown that the drug is a very effective anthelmintic with high efficacy (Table II). Although minimum effective dosage have not been established in poultry (3, 4) a dose rate of 0.14 mg/kg b.w. have been found to control helminthiasis in guinea-fowl (7). The drug is effective against *Capillaria caudinflata, Subulura suctoria, Acuaria* sp, *Ascaridia galli, Heterakis gallinarum* and *Raillietina* spp.

The effect on the tapeworm *Raillietina* spp. is unexpected, as the drug is known to have no effect on tapeworms (4). A possible explanation of the observation from this study is that the detachment of several nematodes from the gut system of the animal due to drug action may lead to indirect deleterious effects such as cell mediated reactions, lymphocyte attachment to the helminths and biotoxin release because of the small gut size, leading to unconducive conditions for any inhabiting worms, thus the elimination of the *Raillietina* spp. Piperazine™ which is effective against *Raillietina* spp. (1) compared to ivermectin are both believed to affect GABA-mediated neurotransmission of helminths (3, 11), although ivermectin is biochemically different with a wider spectrum of efficacy.

The non appearance of either the egg or juvenile stages following treatment is an indication of the drug action against the juvenile stages and probably the toxic inhibitory effect to egg production in adult worms. The juvenile and adult worms were passed out

TABLE III Adult and juvenile stages of helminths eliminated with faeces following treatment.

Dosage of drug	Helminth eliminated	No of faeces examined	No of positive faeces	Percentage infection
0.07 mg/kg	*Heterakis gallinarum* (A/J)	24	16	66.6
	Ascaridia galli (A/J)		24	100.0
	Subulura suctoria		10	41.7
	Capillaria caudinflata		6	25.0
	Raillietina spp.		18	75.0
0.14 mg/kg	*Heterakis gallinarum* (A/J)	24	18	75.0
	Ascaridia galli (A/J)		20	83.4
	Acuaria sp.		4	15.6
	Subulura suctoria		8	33.3
	Raillietina spp.			

A/J : Adult and juvenile stages.

dead with faecal dropping. This confirms the mode of action of paralysis and ultimate killing of the helminth (4, 5). When ivermectin is compared to Piperazine™ (1) it further confirms the broader spectrum of ivermectin by the elimination of *C. caudinflata* which were not readily eliminated by Piperazine™.

The use of ivermectin in avian species is limited, high doses of 0.3-1.5 mg/bird have been used in the treatment of ascaridiosis and capillariosis in pigeon (9) without any side effect. Toxic levels of 7.5-15 mg/bird in pigeon were found to be eliminated fast (9) from blood circulation, but it could have bioviability up to 35 days in ruminants (4, 8) and from this experiment over 42 days (6 weeks). This wide margin of safety and long residual effect of the drug make it a potential curative and preventive drug. This study also further revealed that half the calculated dosage is as effective as the full dosage. The use of high doses in the field for guinea-fowl is therefore not recommended as lower doses are very effective and would be less expensive from view point of cost benefit.

CONCLUSION

The significance of this study is the successful use of ivermectin in the control of helminth infection in guinea-fowl. The very small quantity of drug, administered subcutaneously, to achieved desired result, in terms of cost-benefit, and its efficacy is satisfactory if computed into production cost. The effect of the drug against the juvenile and adult worms removes the problems of inhibitory stages of helminths post-treatment reinfection and repeated treated if hygiene conditions are good. In cage raised guinea-fowl, helminthiasis can be efficiently controlled following treatment, because of reduced risk of helminth reinfections.

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OKAEME (A. N.), AGBONTALE (J.). La ivermectina para el tratamiento de helmintosis en pintadas adultas (*Numida meleagris galeata* Pallas) criadas en gallinero. *Revue Élev. Méd. vét. Pays trop.*, 1989, **42** (2) : 227-230.

The treatment of natural infections of helminthiasis in caged raised guinea-fowls indicates a high efficacy of ivermectin in the elimination of infection due to both juvenile and adult stages of *Heterakis gallinarum, Ascaridia galli, Subulura suctoria, Raillietina* spp. and *Capillaria caudinflata* at dose levels of 0.07 mg/kg and 0.14 mg/kg per adult bird, subcutaneously administered. Guinea-fowls treated responded with no observable side effect and remained clean of any helminth infection for over 6 weeks. Discussion on the broad-spectrum and cost-effectiveness of the drug are briefly mentioned. *Key words* : Guinea-fowl - *Numida meleagris galeata* - Anthelmintic - Ivermectin - Nematodosis - Nigeria.

El tratamiento con ivermectina de las helmintosis naturales en las pintadas criadas en gallinero se mostró muy eficaz para eliminar la infección causada por los estados juveniles y adultos de *Heterakis gallinarum, Ascaridia galli, Subulura suctoria, Raillietina* spp. y *Capillaria caudinflata* a dosis de 0,07 mg/kg y 0,14 mg/kg por ave adulta, administradas por vía subcutánea. No se observó ningún efecto segundario en las pintadas tratadas que quedaron indemnes de cualquiera helmintosis durante 6 semanas. Se discute la anchura del espectro y se analiza brevemente la relación costo-eficacia. *Palabras claves* : Pintada - *Numida meleagris galeata* - Antihelmíntico - Ivermectina - Nematodosis - Nigeria.

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