

EFFECTS OF *FICUS EXASPERATA*, *AZADIRACHTA INDICA* AND *MANGIFERA INDICA* LEAVES ON OOCYSTAL COCCIDIA EXCRETION AND ON RABBIT GROWTH

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ABSTRACT

Synthetic anticoccidial curative action was decreased significantly. The aim of this study was to find an alternative cure to synthetic anticoccidials for the growing rabbits. We used 54 growing rabbits (6 groups and 9 rabbits per group). Three experimental groups (A, B and C) were used to test the effect of tropical leaves on coccidian. In addition, other 3 groups (T1, T2 and T3) were used to test the effect of sulfadimethoxine. Groups A, B and C diet was supplemented with *Ficus exasperata*, *Azadirachta indica* and *Mangifera indica* fresh leaves respectively. All animal of 3 groups were artificially infected with a coccidial inoculum at 25 days age. Group T1 was infected such as leaves groups and untreated; group T2 was not infected but it was treated with sulfadimethoxine and group T3 neither was infected nor received sulfadimethoxine. The mortality was low in group A (0 rabbits) compared to groups B, T3 (3 rabbits), C (5 rabbits) and T1 (9 rabbits) ($P < 0.1$). It was similar to group T2 (2 rabbits). The secreted oocyst decreased in group A, C and T2 to 57%, 31% and 44% respectively from 35 to 65 days of age ($P < 0.01$). However, oocyst rate was not reduced in group B, T1 and T3. It was increased (36%) in group T1 ($P < 0.01$). *F. exasperata* leaves could be used as alternative to synthetic anticoccidials treatment in traditional rabbit breeding.

Keywords: Rabbit, Coccidian oocysts, tropical forage

INTRODUCTION

Fattening rabbits are frequently confronted with digestive pathologies such as coccidiosis disease (Thoto, 2006). To fight against coccidiosis, the rabbit breeder generally uses sulfonamides or sulfadimethoxines in drinking water or rabbit food. However, the presence of sulfonamide residues in rabbit meat could affect the health of the consumer. Indeed, the body can develop resistance to antibiotics and toxicity (Kim and Lee, 2003). The emergence of antibiotic resistant bacteria is a major health problem. However, there are alternative solutions with the use of certain plants (Dossou, 2008). Several plants such as *F. exasperata* (Bafor *et al.*, 2009) and *M. indica* (Sereme *et al.*, 2008) are already used to treat digestive disorders in humans. The objective of this study is to reduce the effect of coccidia in rabbits using tropical plants.

MATERIALS AND METHODS

The study was carried out in Côte d'Ivoire and the samples have been collected in Bingerville which is an endemic area (Kimsé *et al.*, 2016). Rabbit feces analyzes for the number of oocysts were carried out at the national laboratory for support to agricultural development (LANADA). Mortality was observed by counting animals that died of digestive disorders.

Animals and experimental devices

The feces of 54 rabbits (*Oryctolagus cuniculus*) weaned at 25 days of age was used. Rabbits were housed in individual cages. They were randomly divided into 6 groups (A, B, C, T1, T2 and T3). All animals received 120 g industrial food (FACI, Table 1). Group A, B and C were provided fresh leaves as additional to the industrial pellet. Group A, B and C received 150 g *Ficus exasperata*, *Azadirachta indica* and *Mangifera indica* fresh leaves respectively. Group

T1, T2 and T3 were fed with industrial pellet only. For coccidian effect, all animals (group A, B, C, T1 and T2) were infected artificially with coccidian except group T3. The group T1 was the positive control and T3 the negative control. To compare the effect of leaves to the synthetic treatment, group T2 received sulfadimethoxine 100-CR® (50 mg sulfadimethoxin per kg bodyweight per day for 30 days)

Table 1. Chemical composition the commercial feed

Nutrients	level (%)	Additifs
Crude protein	16.6	Vit. A 7500 U.I./Kg
Crude fat	3.9	Vit. D3 3000 U.I./Kg
Crude fiber	13.2	Vit. E 15 mg/Kg
Mineral matter	9.4	Vit. B1, 2, 3, 6, 12
Calcium	0.9	Lysine, Méthionine
Phosphate	0.9	Mg, Mn, Zn, Cu, Fe, Se
Sodium	0.3	

Artificial infection and oocysts counting

The rabbits of group A, B, C and T1 aged 25 days were randomly selected and artificially infected with a coccidian inoculum. The inoculum was obtained by using infected rabbits fresh feces. One hundred (100 g) of infected feces were ground and then centrifuged. 10 ml of the inoculum obtained were directly used in drinking water to infect animals orally. Infection was positive when infected rabbits excrete coccidia one week after inoculation. Assay of the excreted oocysts was carried out with 3 g of faeces

according to Mac Master method as described by Kimsé et al, (2016). The effect of treatment (leaves and sulfamid) was observed using a 3 g sample of droppings from each cage every 2 days.

Statistical analyzes

Effects of treatment on the OPG number and their evolution during rabbit growth have been evaluated by an ANOVA 1 analysis at the threshold $\alpha = 0.05$. The comparison of means, in order to assess the impact of the treatment on animals, was carried out using the Tukey test. Analyzes were carried out using RStudio 3.1 software. The effect of treatment on mortality was evaluated in pairs using the chi-2 test at the threshold of $\alpha = 0.05$ with excels program.

RESULTS AND DISCUSSION

The highest mortality rate was observed on infected and untreated rabbits (group T1, $P < 0.05$). All the rabbits in this group died (Table 2). Contrary, group A mortality (0%) was the lowest in this study ($P < 0.05$). Nevertheless, group A was not differed significantly than group T2. However, groups T3 and C lost more animals than half their initial strength (5/9). This rate (56%) was not different to mortality rate in group B (34%) and T2 (23%). Group B and group T2 mortalities were not different.

Table 2: effect leaves supplementation and sulfadimethoxin on mortality

	Group A	Group B	Group C	Group T1	Group T2	Group T3
<i>Mortality</i>	0 (0)	3 (34)	5 (56)	9 (100)	2 (23)	5 (56)
Group A		0,06	0,01	0,01	0,13	0,01
Group B	0,06		0,34	0,01	0,60	0,34
Group C	0,01	0,34		0,02	0,14	1
Group T1	0,01	0,01	0,02		0,01	0,01
Group T2	0,13	0,60	0,14	0,01		0,14
Group T3	0,01	0,34	1	0,01	0,14	

() percentage of dead rabbit; Group A = infected rabbits whose diet was supplemented with *Ficus exasperata* leaves. Group B = infected rabbits whose diet was supplemented with *Azadirachta indica* leaves. Group C = infected rabbits whose diet was supplemented *Mangifera indica* leaves, Group T1 = infected rabbit and untreated, Group T2 = not infected rabbits and treated with sulfadimethoxin, Group T3 = not infected rabbits and untreated

The high mortality observed in this work was due to the high pathogenic of coccidia species encountered in this area. Thus, 11 species of coccidia were identified, including *E. magna*, *E. perforans*, *E. intestinalis* and *E. flavescens* which are very pathogenic (Ming-Hsien et al., 2010; Kimsé et al., 2016). This is specific to humid tropical areas. These areas are very favorable for the development of these digestive parasites (Akpo et al., 2011). Without effective treatment, mortality increases when rabbits were infected with these highly virulent

species. In this study, mortality was low when the infected rabbit diet was supplemented with *F. exasperata* and *A. indica* fresh leaves. It was the same for infected rabbit treated with

sulfadimethoxin. These leaves could have a coccidiostatic action. The effect of the leaves of *F. exasperata* on coccidian was greater than *A. indica* and sulfadimethoxin. Which explains the sharp drop in the number of oocysts in *F. exasperata* (Table 3). Thus, the number of oocysts from rabbits treated with *F. exasperata* leaves reduced the infection. This forage could consistently maintain the number of oocysts as the sulfadimethoxin treatment. For the other groups, the peak of oocyst excretion was observed approximately 2 weeks after weaning (figure). This period would be the most favorable for preventive treatment because the rabbit's immune system is fragile.

Table 3: Effect of leaves on oocyst excretion during rabbit growth

	Ages (Days)				Standard deviation	P value
	35-42d	43-49d	50-57d	58-65d		
<i>Rabbit diet supplemented with fresh leaves</i>						
Lot A	19613 ^a	14663 ^b	10050 ^c	8350 ^c	3759	<0.01
Lot B	59500 ^c	103988 ^a	60500 ^b	42963 ^c	52588	<0.01
Lot C	44175 ^b	131500 ^a	32150 ^c	30450 ^c	52337	<0.01
<i>Rabbit diet not supplemented with fresh leaves</i>						
Lot T1	62338 ^c	186000 ^a	118013 ^b	97613 ^b	52031	<0.01
Lot T2	5050 ^a	4987 ^a	3265 ^b	2775 ^c	25667	<0.01
Lot T3	48375 ^c	100525 ^a	56788 ^b	50738 ^c	23282	<0.01

a, b, c: For the same line and for the same factor, the values followed by the same letter are not significantly different at the 5% threshold; Group A = infected rabbits whose diet was supplemented with *Ficus exasperata* leaves. Group B = infected rabbits whose diet was supplemented with *Azadirachta indica* leaves. Group C = infected rabbits whose diet was supplemented *Mangifera indica* leaves, Group T1 = infected rabbit and untreated, Group T2 = not infected rabbits and treated with sulfadimethoxin, Group T3 = not infected rabbits and untreated

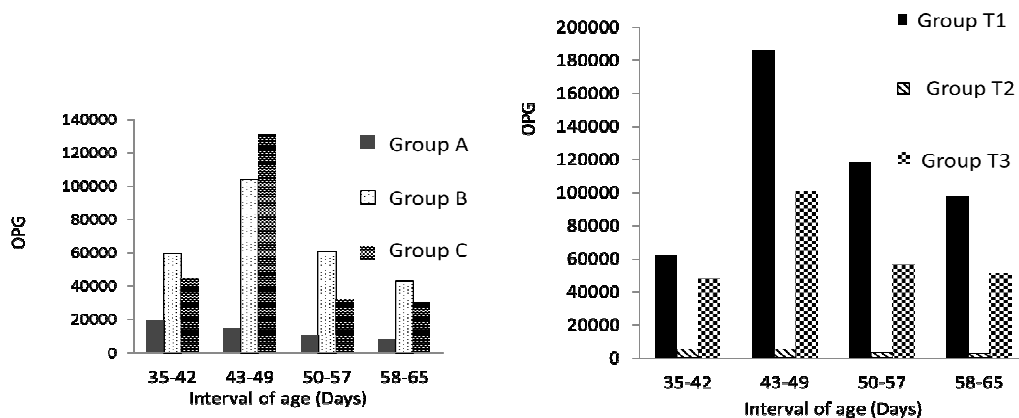


Figure: Effect of treatment on oocysts excreted by rabbits from 35th to 65th day of age
 Group A = infected rabbits whose diet was supplemented with *Ficus exasperata* leaves. Group B = infected rabbits whose diet was supplemented with *Azadirachta indica* leaves. Group C = infected rabbits whose diet was supplemented *Mangifera indica* leaves, Group T1 = infected rabbit and untreated, Group T2 = not infected rabbits and treated with sulfadimethoxin, Group T3 = not infected rabbits and untreated

CONCLUSION

The aim of this study was to propose an alternative to synthetic anticoccidials in breeding. Adding of *Ficus exasperata* and *Azadirachta indica* leaves to the diet reduced the mortality of growing rabbits unlike sulfadimethoxine. *F. exasperata* also reduced the number of oocysts excreted by more than half, better than sulfadimethoxine. The leaf of *F. exasperata* is a good alternative to synthetic anticoccidials for growing rabbits. However, additional studies are needed on a large population including growing rabbits and does before its widespread use.

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