



Contribution to the study of the antiparasitic activity of *Euphorbia hirta* macerate on rabbit coccidia

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Abstract

The objective of this study was to evaluate the therapeutic properties of *Euphorbia hirta* macerate against coccidia, with a view to reducing the excessive use of antiparasitics in *rabbitfarms*. The research methodology was based on the harvesting and treatment of the plant, the constitution of the different experimental batches, the identification of the infestation of the subjects, the determination of the parasite load of the different batches, the administration of the different anti-coccidial formulations, and the post-treatment laboratory analysis. In this experiment, 15 rabbits were used in 5 batches of 3. The product of interest was freshly macerated in drinking water at the concentration of 0.03 and administered *per-os*. The results showed that the macerate has dose-dependent anticoccidial activities. Weight gain was high in all subjects except the control lot.

Keywords: *Euphorbia hirta*; Antiparasitic activity; Coccidiosis; Digestive pathologies; Rabbit farming

1. Introduction

Coccidiosis is a very recurrent parasite in rabbit farming. It seems to be the most deadly rabbit disease. The Republic of Guinea is a country with a strong pastoral tradition, with immense natural potentialities because of the diversity of its agro-ecological conditions. Rabbit farming is part of the population's pastoral activities and should contribute to the supply of animal protein and the country's economic development. However, the profitability of this activity is increasingly reduced by digestive pathologies, particularly coccidiosis, which is an enzootic disease linked to a protozoan belonging to the genus *Eimeria*. Indeed, coccidia of the genus *Eimeria* in rabbits are responsible for significant economic losses due to mortality, growth retardation and veterinary costs [1]. In the face of this disease, the use of veterinary products is recommended by several scientific studies despite the extreme sensitivity of rabbits to anti-infective. However, in practice, several therapeutic failures and cases of resistance, toxicity as well as risks of disruption of the environmental balance for both rabbits and consumers have been reported around the world. The relatively high cost of these products, the sensitivity of their use and the packaging requirements do not allow all farmers to use them judiciously. In the face of these challenges, finding appropriate solutions to health problems is of paramount importance.

Euphorbia hirta is a small herbaceous plant that is widespread in all tropical and subtropical regions of the world. The plant grows in cultivated fields, roadsides and gardens. It is widely used in traditional medicine for a variety of therapeutic indications such as gastrointestinal, respiratory and liver infections. Various parts of the plant can be used (the whole plant, aerial parts, roots, latex) and administered in different ways (fresh, macerated, decocted form...) [2].

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Euphorbia hirta has been recognized for its anxiolytic and healing properties in addition to its many traditional uses in jaundice, kidney stones, sleep disorders and lactation.

The objective of this study is to test the *In vivo* antiparasitic properties of *Euphorbia hirta* on coccidia in rabbits.

2. Material and methods

2.1. Equipment

2.1.1. Study area

This study took place in the laboratory of the Institute of Sciences and Veterinary Medicine in Dalaba (Guinea) with its mild, semi-temperate climate (foutanian type), its tourist sites and its rich fauna and flora.

The area is characterized by the alternation of two (2) seasons of equal duration, a dry season (November to April) and a rainy season (May to October). The average rainfall varies between 1,500 and 2,000 mm per year and the rainfall over the last 10 years has varied between 1,425.4 and 1,869.8 mm/year.

2.1.2. Plant material

It consists of the whole plant of *Euphorbia hirta* collected in the allotments of the urban commune of Dalaba between July and August 2021. The plant was authenticated using the key "African medicinal herbs" by Pousset J.L 1988, page 80 [3], dried in the shade at room temperature for 1 month, put in a mortar and crushed with the pestle and macerated at a mass concentration of 0.03 in drinking water.

2.1.3. Animal material

Fifteen rabbits of the African dwarf breed, bred at the Institute's animal house, were identified and used in this trial. Pastoral resources consisting of wild grasses were used as green fodder in the feed rations of the animals fed ad libitum.

2.2. Experimental procedure

After spraying, 9.7 g of *E. hirta* powder was dissolved in 300 ml of water for 24 hours maceration, giving a mass concentration of 0.03. Five batches of rabbits (3 rabbits per batch) were constituted: batch 1 (Control) received physiological water, batches 2, 3 and 4 of rabbits were treated with *E. hirta* macerate at the dose of 1 ml/ kg, 3 ml/ kg and 5 ml/ kg respectively for 3 successive days and batch 5 (Reference) received Anticoc Super.

2.3. Parasite control

Animals exposed to natural infestation and/or administered the product of interest were previously coprologically analyzed before and after treatment by enrichment, flotation and Mac Master Methods. The number of eggs per gram of faeces (EPG) was determined using the McMaster technique with a NaCl solution of density 1 and the following formula: $EPG = (n1 + n2) / 2 \times 100$ where: n1 = number of eggs counted in cell 1 and n2 = number of eggs counted in cell 2.

3. Results

3.1. Harvesting and processing of the plant

The weight of the fresh raw material is 2087 g with a moisture content of 79% for a yield of 21% as shown in Table 1.

Table 1 Plant treatment results

Designation	Weight in(g)	Moisture content
Fresh material	2087	79%
Dry matter	436	21%

3.2. Results of parasitic control before treatment

On Day 28, the flotation enrichment method revealed that of the 15 samples taken and examined, 13 were positive with the observation of coccidia oocysts in the samples.

At the Mac Master method on Day 28, LTN, the batches 2, 3, 4, 5 showed positive samples (Figure 1).

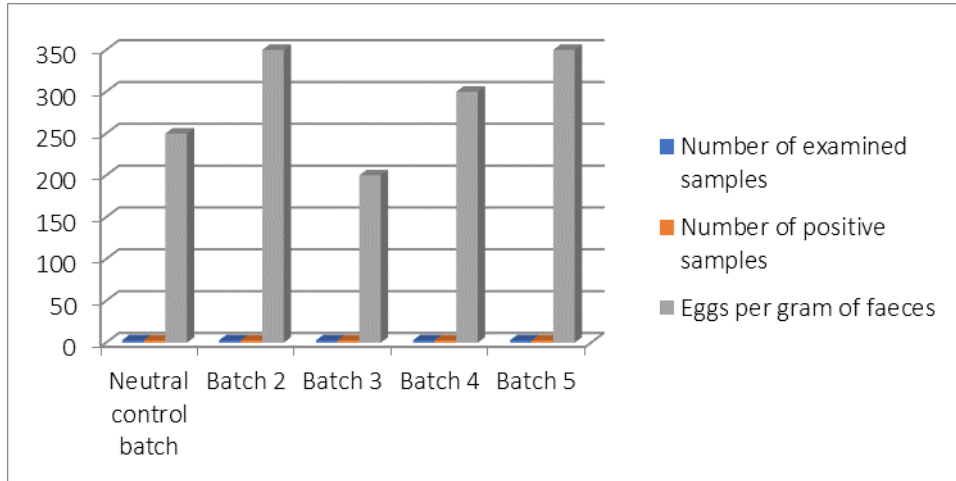


Figure 1 Number of oocysts per batch before treatment (Mac Master Method)

3.3. Treatment results (Figure 2 and Table 2)

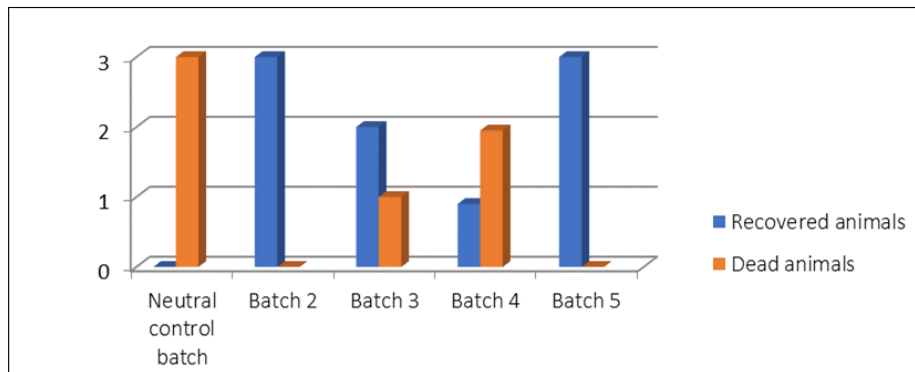


Figure 2 Number of cured and sick subjects per batch

Table 2 Treatment outcome

Lots	Administration doses of macerated product	Number of subjects treated	Number of subjects cured	Number of subjects not cured	Cure rate (%)
LTN	No treatment	3	3	0	0%
Lots2	6 ml	3	3	0	100%
Lots3	15 ml	3	2	1	66,66%
Lots4	10	3	1	2	33,33%
Lots5	20 ml Anticox Super	3	3	0	100%
TOTAL		15	12	3	80
Standard Error of Measurement					0,03

3.4. Results of the control examinations

Table 3 Comparison of coccidia oocyst levels before and after treatment (flotationenrichment method)

Days	Batch	Number of samples examined	Number of Positive samples	Positivity rate
J 28 (before)	Batch 1 (Control)	3	3	100%
	Batch 2	3	3	100%
	Batch 3	3	3	100%
	Batch 4	3	3	100%
	Batch 5	3	3	100%
J 40 (after)	Batch 1 (Control)	3	3	100%
	Batch 2	3	0	0%
	Batch 3	3	1	33,33
	Batch 4	3	2	66,66%

Table 4 Results of coccidia oocyst levels after treatment (Mac Master Method)

DAYS	Number of oocysts per batch				
	LTN	Batch 2	Batch 3	Batch 4	Batch 5
J40	500	0	100	150	0

4. Discussion

Given the magnitude of the health problems, considerable efforts have been made to develop molecules with sufficiently potent antihelminthic activity. In this context, authors have developed extracts of various plants that have been tested for their use against intestinal worms. Among them, *Euphorbia hirta*, *Cassia sieberiana* and *Carica papaya* were the most cited. In fact, studies have demonstrated the anthelmintic activity of *Euphorbia hirta* [4], *Carica papaya* [5] and *Cassia sieberiana* [6, 7]. The present study aims to evaluate *In vivo* the anthelmintic effects of *Euphorbia hirta* on coccidia in rabbits.

The weight of the fresh raw material has a moisture content of 79% for a yield of 21%. The high moisture content of the drug is believed to be due to the fact that the harvest was carried out during the winter period (July and August).

Laboratory analysis showed that rabbits were more parasitic with coccidia. This confirms the results obtained by Renaux S. (2001) [8] according to which these infections affect the digestive tract and are responsible for a slowing down or even a stoppage of growth which leads to rapid economic losses. In addition, in practice, apart from laboratory animals, there are no rabbits free of coccidia: they are notably present in breeding animals. The male can pass them on to the female and the mothers pass them on to all their offspring. As results, the *Euphorbia hirta* macerate showed a considerable decrease in the amount of coccidia oocysts up to (0%) for the batch (2) that received the 5 ml/kg dose. Maceration of 15.6g of the powder in 500ml of water induced a rate of 66.66%, while maceration of 4.6g in 152ml of water gave a rate of 33.33%. As for the weight gain, it was high in all subjects except the control lot. *Euphorbia hirta* macerate has dose-dependent anticoccidial activities. Treatment of rabbits in batch 2 with 9.7g of the powder in 300ml of drinking water gave an anticoccidial effect with a cure rate of 100% compared to the control batch. It could be deduced that the maceration of 9.7g with a concentration of 0.03 represents the most active solution for the treatment of coccidiosis. These different data reinforce the hypothesis of the effectiveness of the macerated solution at different doses in the subjects (rabbits).

Coccidiosis is the main cause of parasitic digestive disease in rabbit farms. Coccidia have an enormous multiplication capacity associated with a very high resistance of the oocysts to environmental conditions. *In vivo* tests on rabbits show

that the level of egg excretion has decreased in the subjects. These properties would be linked to the presence of flavonoids, coumarins and gall tannins [9,10].

5. Conclusion

The present study allowed us to evaluate the antiparasitic activity of the macerated *Euphorbia hirta* plant. Tests conducted on coccidia showed that the extract was active with inhibition rates ranging from 0 to 66.66%. The plant *Euphorbia hirta* L. is an alternative for controlling coccidiosis in rabbit farms. However, the harvesting and processing of the plant showed a high water content of the product after drying. We suggest further studies on the *In vivo* and *in vitro* effects of *Euphorbia hirta* powder for a good control of the pharmacological and toxicological parameters.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

No conflict of interest.

Statement of ethical approval

The study was conducted by following the ethical guidelines for research in Guinea, especially in Institute of Science and Veterinary Medicine (ISSMV) of Dalaba.

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