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Research Article

Evaluation of the antiparasitic properties of *Allium sativum* L. (Alliaceae) in the treatment of intestinal coccidiosis in broilers

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Abstract

The objective of this study was to evaluate the phytotherapeutic efficacy of *Allium sativum* L. (garlic) as alternative compounds to antibiotics used by farmers in the treatment of coccidiosis in poultry. In this study, 20 chickens divided into 4 batches received only garlic powder in their feed. The results obtained after a natural infestation revealed a weight loss in all subjects before administration of the different products. Following treatment, a considerable decrease in coccidia eggs in the chickens receiving the highest concentrations of the products. The weight gain was more or less high in the treated batches except in the control batches. In conclusion, this study generated biological results. These data support that garlic could be used as alternatives to antibiotics in poultry and many other livestock operations. Although they have important functions, further experiments are needed to elucidate the biological mechanisms behind their use in animals.

Keywords : Garlic, intestinal coccidia, broilers

INTRODUCTION

In an effort to cover the need for animal protein, many African governments have supported the development of short-cycle poultry production in the hope of providing populations with high nutritional value products at low cost. Guinea is not immune to this reality where poultry farming is slowed down by viral, bacterial and parasitic diseases. As for parasitic diseases, they weigh heavily on the subjects (especially young people) by their spoliating actions.

In the urban district of Dalaba, chicken farming improves the living conditions of the population by providing substantial income. Unfortunately, the extensive breeding system practiced means that these animals contract numerous diseases, among which intestinal coccidiosis occupies an important place. These diseases are recurrent and lead to large zoo-economic losses on the farmers' farms¹⁻⁴. These losses are concretely translated by chick mortality and the decrease in production of young and adults. This is also the case for *Ascaridia*, which is part of the gastrointestinal parasites that are responsible for significant economic losses estimated at 20% in the farms where they occur⁵.

The control of gastrointestinal parasitosis is essentially based on the use of chemical anthelmintics. Regrettably, the high cost of these products associated with the cost of treatment fees for livestock agents and often the absence and/or unavailability of the latter have led some livestock farmers to

practice the traditional pharmacopoeia based on medicinal plants as in other countries⁶. Among the medicinal woody species commonly used to treat gastrointestinal parasitosis in chickens, garlic cloves are often used by farmers⁷.

Based on their therapeutic scheme, this study was initiated at the laboratory of the Institute of Science and Veterinary Medicine of Dalaba with the aim of providing basic data on the efficacy of garlic as antibiotic replacement compounds.

MATERIALS AND METHODS

MATERIALS

Plant material

This material consisted of one (1) kilogram of *Allium sativum* pods (Figure 1).



Figure 1 : The garlic plant

Animal material

It consisted of twenty (20) Cobb 500 broilers from two (2) different poultry farms whose rearing practice is characterized by enclosure.

Sampling and laboratory equipment

For laboratory analysis, droppings were collected from the different batches on different dates from the subjects. Sampling, laboratory and other miscellaneous materials were used during the research.

METHODS

The objective of this work was to evaluate the therapeutic efficacy of garlic extract against coccidia in Cobb 500 broilers.

Survey of executives and analysis of archives

During the interview with the managers of the study area, the following points were discussed: (1) information and statistical data concerning gastrointestinal parasitosis, in particular coccidiosis in modern chickens, (2) knowledge of the virtues of medicinal plants used in the prevention and treatment of coccidiosis in the farms of Dalaba

After the surveys of the executives, the following work was divided into two stages, a first experiment concerning the tests of the aqueous extracts of garlic and vinegar on the subjects and a second one concerning the effects of the garlic powder.

Constitution of the second experimental core

20 Cobb 500 broilers were selected. The criteria for selecting the subjects and the duration of the trial were identical to the previous ones.

Chickens were randomly divided into 4 batches of 5 chickens ranging in weight from 650g to 1100g.

- LTN : the neutral (untreated) control lot;
- LA1: the batch treated for 7 days with garlic powder with 5g in 500g of feed;
- LA2: the batch treated for 7 days with garlic powder with 10g in 500g of feed;
- LA3: the batch treated for 7 days with garlic powder with 15g in 500g of feed;

Preparation of garlic cloves

After breaking up, the pieces were placed on a plate and dried. Then the dried product was crushed in a mortar and sifted and put in a closed bottle, labeled and kept under cover.

Pre-trial clinical examination

This stage of the work consisted in looking for symptoms of diseases at the level of the subjects in all the batches. For that, group and individual examinations of the subjects were carried out.

Laboratory analysis before the test (D28)

On the eve of coproscopy, sheets of ream paper were placed at different locations in the chicken house. The droppings deposited by the chickens on the cards were collected in the collection bags and then packed in a cooler and taken to the laboratory for analysis.

The enrichment method (flotation) was the one used for the identification of eggs in the feces of the subjects from the different batches, then the quantitative method of the MacMaster slide was used for the determination of the parasite load of the subjects.

Pathological examination before the test

On 28th day, euthanasia of subjects was performed and a lesion search examination was performed.

Experimental test with garlic pod extract

The products were diluted in water before being administered orally to subjects in batches for 7 days.

Post-trial clinical examination

This step of the work consisted in looking for symptoms of coccidiosis at the level of the subjects in all the batches.

Laboratory analysis and search for lesions after treatment after the trial (D40)

After the test, the sampling and analysis procedures were the same as those performed before the test.

Experimental treatment with garlic powder

The garlic powder was added to the feed (500g) and then mixed with exponential doses of 5g, 10g and 15g before being given to the subjects of batches LA1, LA2, LA3 for 7 days.

Data processing and analysis

All data were analyzed with Epi Info7 version 3.1 and Epidata software.

RESULTS

Results of the executive survey and analysis of the archives

The management survey and the analysis of records did not reveal any statistical data on the use of medicinal plants for the treatment of coccidiosis in broilers. However, managers recognize the therapeutic value of garlic for diarrhea, ascariasis and salmonellosis in humans.

Results of the survey of the breeders

The farmers surveyed are confronted with coccidiosis problems on their farms and recognize the different symptoms of the disease. On these farms:

- Young subjects are more susceptible to this disease;
- 90% do not have prophylaxis programs;
- 40% use a veterinarian in case of illness;
- 100% use medicines from veterinary pharmacies while administering the products in drinking water;
- 30% have already used medicinal plants such as *Carica papaya* for deworming chickens;
- no breeder has yet used garlic in the prevention or treatment of sick animals.

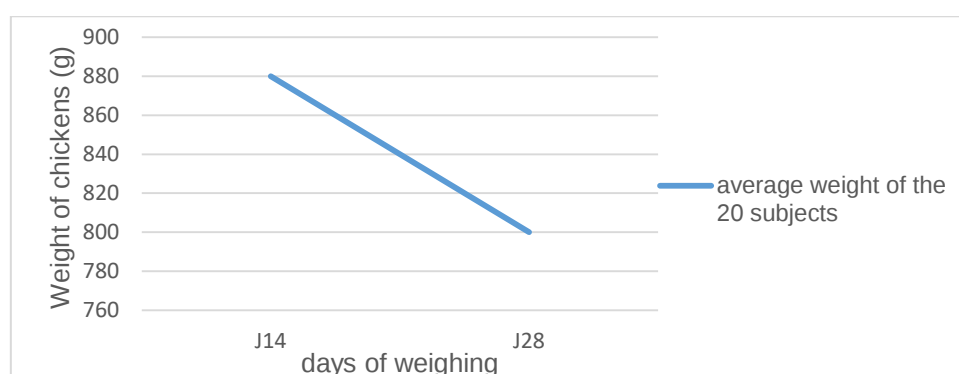
Clinical examination results (table 1, 2 and figure 2).

Table 1: Results of clinical examination at D 14

Day	Number From observed subjects	Number of suspects	Suspicion rate	Symptoms and observations
14	20	15	75%	- Bloody diarrhea; - Abatement ; - Weight loss

Table 2: Results of clinical examination at D 28

Days	Number From observed subjects	Number of suspects	Suspicion rate	Symptoms and observations
28	20	20	100%	-bloody diarrhea in droppings; -weakness; -anorexia; -wetland ; -Weight (average weight of 760g).

**Figure 2 :** Weighing curve at D 14 and D 28

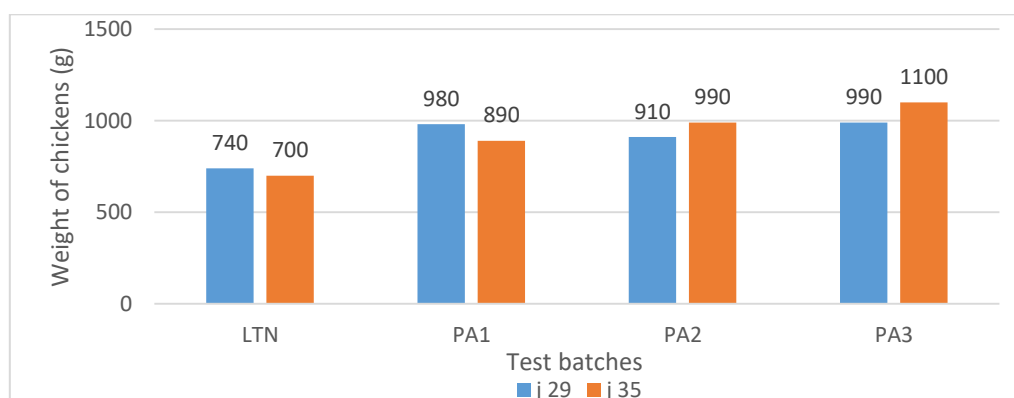
III-1-3- Results of the laboratory examinations before the test with the garlic powder (table 3, 4 and figure 3).

Table 3: Results of the flotation enrichment method before test

Day	Number of subjects reviewed	Number of samples taken and examined	Number of positive samples	Positivity rate	Parasite eggs observed
28	20	20	15	75 %	-coccidia <i>sp</i> in each sample

Table 4: Treatment and monitoring results (see table and graph).

Lots	Doses, products and routes of administration	Number of subjects tested	Number of subjects cured	Cure rate (%)
PA1	5 g of garlic powder in 500g of food	5	0	0
PA2	10g of garlic powder in 500g of food	5	1	20
PA3	15g of garlic powder in 500g of food	5	3	60

**Figure 3 :** Weighing at D 29 and D 35

III-1-5- Results of the control examinations after the experimentation with garlic powder

Table 5: Positivity rate of fecal concentrations of coccidia *sp* eggs at D 40

Days	Lots	Number of samples examined	Number of positive samples	Positivity rate
J 28	AP1	5	5	100%
	AP2	5	5	100%
	AP3	5	5	100%
J 40	AP1	5	5	100%
	AP2	5	4	80%
	AP3	5	2	40%

Table 6: Number of coccidia eggs per gram of feces (OPG)

Days	Lots	Number of samples examined	Number of positive samples	OPG
J 28	AP1	3	2	350
	AP2	3	1	550
	AP3	3	1	200
J 40	AP1	3	1	250
	AP2	3	1	400
	AP3	3	0	0

Table 7: Results of anatomical-pathological examinations

Day	Lots	External observations	Internal observations
J 40	AP1	Normal appearance	- coccidial eggs and petechiae in the cecum
	AP2	Normal appearance	- coccidial eggs and petechiae in the cecum
	AP3	Normal appearance	- normal appearance of internal organs

DISCUSSION

This study initiated at the laboratory of the Institute of Science and veterinary Medicine of Dalaba provided us with basic data on the efficacy of *Allium sativum* (garlic) in the treatment of coccidiosis in broilers.

At the beginning and throughout the trial, clinical examination revealed subjects suspected of having coccidiosis based on symptoms characterized by abatement, weight loss, bloody diarrhea, etc. These observations could be explained by the natural infestation conditions to which the subjects were subjected.

Coproscopic examinations revealed the presence of coccidia eggs in some subjects. These analyses showed that chickens in the study area are susceptible to coccidia, according to Ivore et al. 1993⁸. This susceptibility may be related to farming conditions and practices, since farmers rarely deworm their birds and pay little attention to the health of their flocks. The positivity rate obtained is higher than that obtained by (Mpoame et al., 2000) ⁹ in a trial of treatment of chickens against gastrointestinal parasites with aqueous decoctions of papaya seeds (*Carica papaya*). This parasite, like many others, causes intestinal lesions (inflammation, haemorrhagic diarrhoea, even clostridiosis and necrotic enteritis) and is

responsible for important economic losses, through mortality or growth retardation ¹⁻⁴.

After our different trials of treating the subjects against coccidiosis with the powdered form of garlic, microscopic examination of the droppings at D 35 revealed a decrease in coccidia eggs. The reduction rates of coccidia eggs were noticed in the batches of garlic powder that received the higher concentrations. This shows that coccidia in the digestive tract were sensitive to the effects of *Allium sativum* which showed a repulsive effect on the parasites after 7 days of treatment.

CONCLUSION:

This study generated biological results. These data support that garlic could be used as alternative to antibiotics in poultry farming and in many other livestock farms. The use of this natural product as antiparasitic in veterinary pharmacopoeia to combat parasites and their gastrointestinal effects by farmers would be more or less justified. However, it would be imprudent to conclude on any effectiveness of this plant in the fight against coccidia. Although having these important functions, further experiments are needed to elucidate the biological mechanisms behind the use of these products in subjects.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

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