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Effects of *Allium sativum* and *Sida cordifolia* Extracts on Performances of Maradi Red Goat

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ABSTRACT

The study was aimed to evaluate effects of Allium sativum and Sida cordifolia on growth and coccidiosis in goat. A total of 55 goats aged from 3 to 4 days have been used and 5 groups of 11 goats each one were formed. Groups A1 and A2 were medicated with 250 mg Allium per kg of body weight respectively 4 and 2 times/week, S1 and S2 with 250 mg of Sida per kg respectively 4 and 2 times/week, and group T receiving 2 times/week 10 ml of water per kg.

Average daily gain was not significantly different (p= 0,647) between groups, but hematocrit values were higher (p<0,05) for animals of group S2 than those of groups A1, S1 and T. Coccidiosis prevalence and infestation level were lower in S2 (16526,66 ± 17014oocysts/g and 68,18% respectively) and the maximum was found for S1 with 41830,43 ± 41649,59oocysts/g and 88,8% respectively.

The results suggest that extracts of Sida cordifolia might have some therapeutic effects by improving growth and reducing mortality in goats. While, special attention must be taken when using more than 500 mg of Allium sativum because of its possible toxicity in young goats. Anyway, research has to continuous in order to corroborate o no these findings.

Key words: *Allium sativum, Sida cordifolia, coccidia, goat, performances*

INTRODUCTION

Breeding in Niger, with more than 7 million UBT and over 500 livestock markets, is the second sector of the economy and represents 12% of the national GDP, (Platform Paysanne du Niger 2010). But, the development of the sector faces different problems due to multiple causes, such as inappropriate practices for example, that facilitates the establishment of several diseases in animals. Those include parasitism which causes economic losses constituting a major obstacle to the development of animal production and health[10]. Indeed, the prevalence rate of parasites in pasture is around 65-90%[21] with a gastrointestinal infestation rate that varies from 86,8 to 100%[15,33].

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This heavy infestation causes not only a gradual decrease of animal productivity[38] or poor daily weight gain[21,22] but also, in some cases, the death of young goats[23]. In addition, chemicals used for the treatment of such diseases causes progressively, reported in many studies, the establishment of parasite resistance[3,11,34]. Thus, it is necessary to look over for alternative. Today, traditional or local knowledges are seen to be good future solutions for the prevention or the fight against these diseases, by using extracts of medicinal plants (onion, cucurbit, the sagebrush, garlic, *Sida cordifolia*, etc.). Because, it has been reported that garlic (*Allium sativum*), has positive effects not only against cardiovascular problems[26,37] and metabolic syndrome[8] but has also properties as anticancer[5,46,47], antidiabetic[16,18], anti - inflammatory[12,19] antioxidant[6,12,27] antimicrobial[9,24,30,31] gastro protective agent[6] renoprotective effect[28,40] etc. For the *Sida cordifolia* extracts, several properties have been also reported: anti-inflammatory, antioxidant, antipyretic, antitoxic, antimicrobial, anti-osteoarthritic activity, reduce the infarctus risk and regenerate liver in case of hepatectomy[17,25,29,32,36,42,45].

The main objective of this study was to evaluate the effects of *Allium sativum* (garlic) and *Sida cordifolia* extracts on the body weight, and coccidiosis in red goat of Maradi.

MATERIALS AND METHODS

This study was carried out in the Secondary Goat Breeding Centre of Maradi located at 1 km from the town of Maradi. A total of 55 young goats, aged from 3 to 4 days were selected after the colostrum ingestion period. The staff of 55 animals was divided into 5 groups of 11 goats each one, receiving different solutions of medication as following:
Group A1: received 4 times/week a solution containing 250 mg of garlic/kg of body weight
Group A2: received 2 times/week a solution containing 250 mg of garlic/kg of body weight

Group S1: received 4 times /week with a solution containing 250 mg of *Sida cordifolia*/kg of body weight
Group S2: received 2 times /week with a solution containing 250 mg of *Sida cordifolia*/kg body weight Group T (control): receiving 2 times /week 10 ml of drinking water /kg of body weight.

To prepare the extracts, the garlic pods and aerial parts of *Sida cordifolia* were first weighed and pounded. Dilution is made with 25 g of pounded mater per liter of distilled water, so that the solution could be administered orally to goats. The solutions were administrated during the first two months of goat life. Body weight and temperature were registered every week, and the number of death was mentioned each day. After the period of solutions administration, blood and feces were sampled three times a month.

Collected data were analyzed by the SPSS 15.0 program for Windows. A multivariate linear model is applied to analyze the significance of the group effects: treatment lot, animal age and serial analysis on the weight gain, body temperature, hematocrit and prevalence of coccidiosis. When a significant difference is shown, the arithmetic means are compared each other by the Waller-Duncan test. P values <0.05 were considered statistically significant.

RESULTS

Table 1 shows that the average daily weight gain (ADG) did not differ significantly between groups. In group A1, the weight gain was low (22,10 ± 20,50 g) and its progression curve seemed lower than in the other groups (Figure 1). Also, the average weight gain of all goats dropped drastically at 3 months of age, and thereafter, increased in the following month.

The average body temperature of goats in group A1, although was not significantly different from those of groups T and A2 (Table 1), was the lowest with 37,9 ± 1,21°C. But in groups S1 and S2, it has been found the highest temperatures with 38,33 ± 0,85°C and 38,32 ± 0,86°C respectively. Figure 2 showed also that the curves of the

same groups (S1 and S2) remained higher in temperature throughout all the experiment, while curves of groups A1 and T had tendency to have the lowest values. In addition, all temperature curves showed a drastic drop in the third month of age.

Table 1: Effect of different treatments on the parameters analyzed

Groups	ADG (g)	Rectal T° (°C)	Hematocrit (%)	Coccidia infestation		Mortality (%)
				Intensity (oocysts/g)	**Prevalence** (%)	
A1	22.10[a] ±20.5	37.90[a] ±1.21	28[a] ±3.57	29.356.25[ab] ±27.679.27	88.88	63.63
A2	30.52[a] ±24.27	38.10[a] ±0.93	31.95[bc] ±4.12	20.880.95[ab] ±17.719.01	88	36.36
S1	33.00[a] ±26.02	38.33[b] ±0.85	30.21[ab] ±4.12	41.830.43[b] ±30.649.59	88.88	27.27
S2	33.45[a] ±25.07	38.32[b] ±0.86	34.46[c] ±4.35	16.526.66[a] ±14.014	68.18	36.36
T	27.59[a] ±21.83	37.97[a] ±0.92	29.18[a] ±2.16	20.962.5[ab] ±20.244.17	84.21	54.54
P	0.647	<0.05	<0.05	<0.05		

Different letters in the same column indicates significant differences between the arithmetic means (p<0.05). **P**: significance level; **ADG**: Average daily weight gain; **T°:** temperature

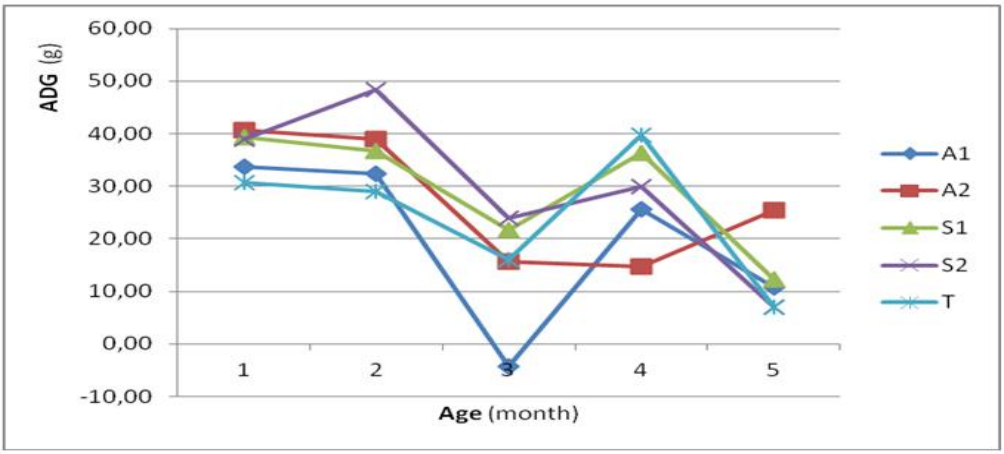


Fig. 1: Variation of daily weight gain

According to Table 1, blood tests showed that groups A1 and T had the lowest hematocrit rates with respectively 28±3,57% and 29,18±2,16%, although this difference was not significant with the group S1 (30,21 ± 4,12%). And, when looking Figure 3, it is observed clearly that hematocrit curves were highest for animals of groups S2 and A2.

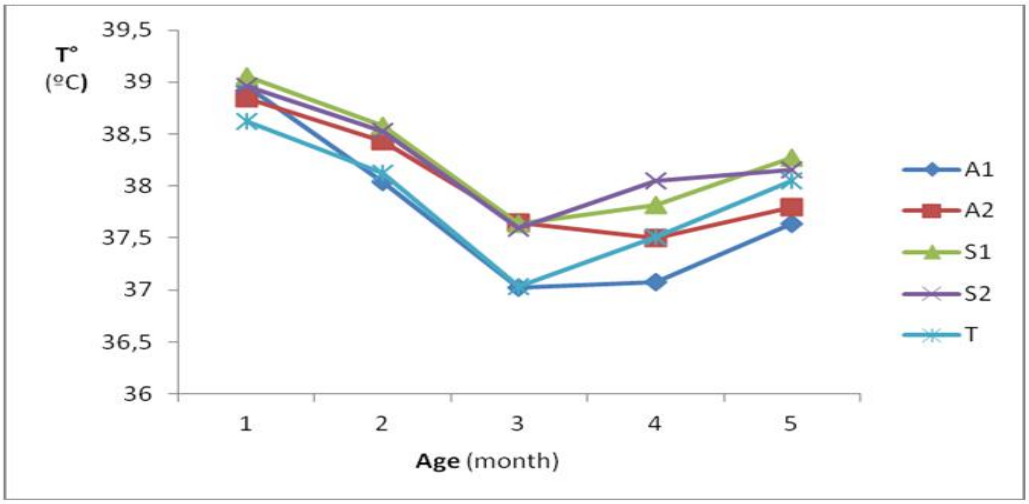


Fig. 2: Evolution of body temperature throughout the study

The intensity of coccidia infestation (oocysts/g of feces) was lower in group S2 (16526,66 ± 14014oocysts), but the difference was not significant when compared to groups A2, A1 and T (Table 1). According to Figure 4, the intensity was always lower in group S2 comparatively to groups S1 and A1. In addition the prevalence of coccidiosis or the presence of oocysts in the feces was lower in group S2 (68,18%) than in the other groups showing more than 80%.

Within the five groups of animals, the highest mortality (63,63%) was recorded in group A1 while the lowest (27,27%) was obtained in group S1.

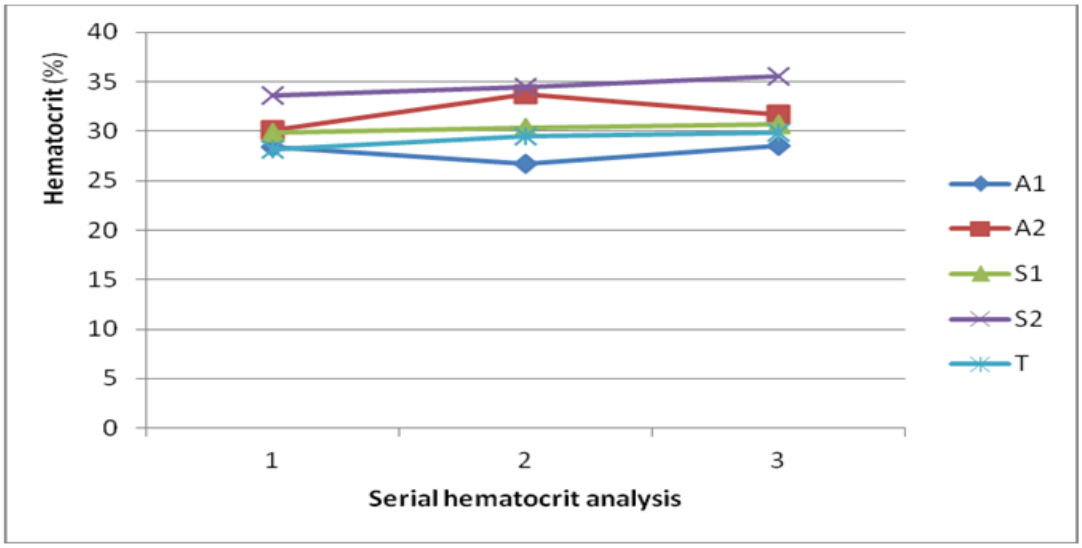
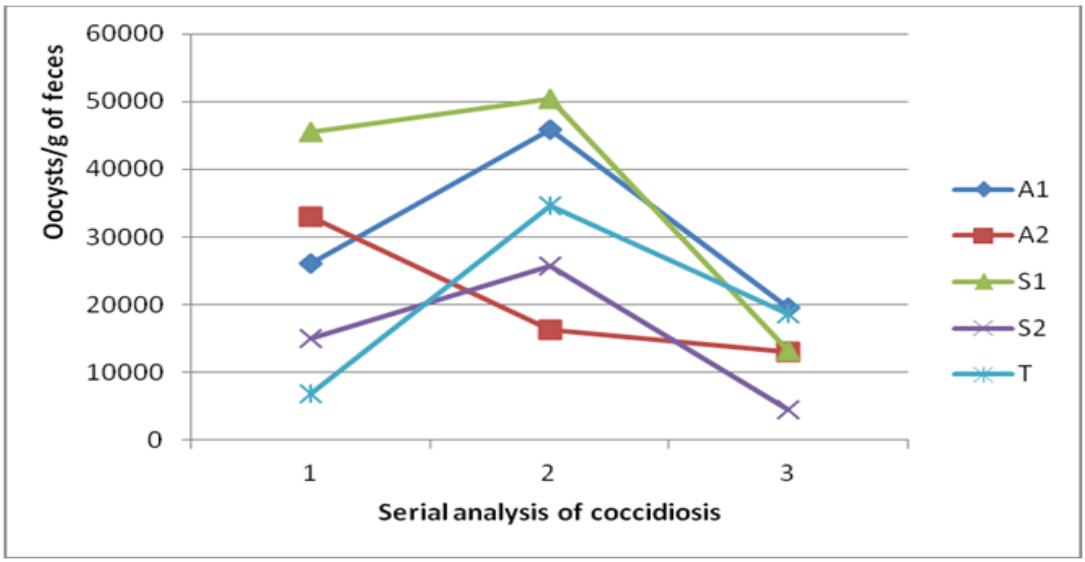


Fig. 3: Evolution of hematocrit values



DISCUSSION

In 2010, an Indian team led by Ghost, reported that ingestion of 250 mg of garlic per kg of body weight in calves older than 5 days, improved their performance because the average daily gain and food intake increased significantly. Interestingly, the results of the present study show no significant differences in weight gain and goats ingesting, even if somewhere, the weight gain in animals receiving the garlic 2 times/week (A2) has tendency to be improved. This could be probably due to the fact that the amount of 250 mg received 4 times a week could be in excess. Similar findings were reached in previous study with amount of *Azadirachta indica* medication frequency[2]. So that, the adjustment of the amount in the present work, from 4 times to 2 times a week, allows benefic effects on goats. Thus, this slight improvement in weight gain and hematocrit in the group receiving 2 times garlic (A2), could be the basis for the observed low mortality in this group, comparatively to the control group (T) or the group receiving 4 times garlic extracts (A1). Such results have been also described in the literature. Thus, in 2012, Salami and colleagues noted that the combined administration of 75 mg of garlic and 75 mg of onion produced more erythrocytes hemolysis in albino rats than in the control group, or in a group which received only 150 mg of onion. Also, intraperitoneal injection of 5 g of garlic per kg of body weight during one month,

induced more oxidative anemia of erythrocytes than the untreated rats[14]. In addition, oral administration of 2,86 g of garlic per kg of body weight reduced weight gain in rats[41]. Furthermore, the use of 3 garlic cloves/ animal did not change results for hematocrit nor for intensity of coccidia infestation in weaned goats with 112 days of age[4]. This is partially in contradiction with the presents results since with the 2 times/week administration, hematocrit was higher values than in the case of control animals. This disagreement may be due to the lack of dose adjustment in the reported study and the animal age effect could be with importance. Recall that in the reported study, animals are older than in the present one. In animals treated with *Sida cordifolia,* it was shown a general tendency of improving the average gain and hematocrit volume, comparatively to groups A1 and T. This is probably due to its beneficial effects on liver, particularly in protection and regeneration of liver tissue[33,43]. Because this organ could promote better assimilation of food by improving digestion and absorption and therefore, a better weight gain in goats. Otherwise, there have been reported favorable effects on metabolic profiles of garlic intake[1]. In the present study, these favorable effects are suspected with *Sida cordifolia*. Also, the high metabolism resulting from this large absorption of nutrients could be the basis of the high temperatures registered in goats receiving *Sida cordifolia*. Elsewhere in the US, Mahesh and Satish[20] showed that the extract of fresh *Sida cordifolia* leaves has antimicrobial effects in vitro. This antibacterial activity was already observed in the present study, as the lowest death rate was observed in animals receiving extracts of *Sida cordifolia* especially those of group S1. Concerning the infestation, it seems that group S1 and A1 are the most infected by coccidia oocyts and this may be due to the stress caused by the highest number of the goats caching for extract administration. Moreover, during the third month of experiment, many young goats were affected by diarrhea because of the high number of coccidia found during the analyses made in that month. And this may justify the rapid decrease of temperature and weight gain curves during this third month of age.

CONCLUSION

As regard to the present results, the administration of 250 mg of extracts of *Sida cordifolia* may be a promising way to improve growth and reduce mortality in young goats. In the case of *Allium sativum*, it is important to note that a weekly dose more than 500 mg per animal could be toxic for the young goat.

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