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Comparative Effect Of Aqueous Extract Of *Thonningia sanguinea* And *Sclerocarya birrea* On Zootechnical Performance Of Broilers Chickens.

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ABSTRACT

Preserving consumer health by supplying more Bio-products, most of research is oriented towards alternative solutions such as plant extract in veterinary medicine. Thus, the present study aims to compare the effect of the aqueous extract of the leaves of *Sclerocarya birrea* and the inflorescences of *Thonningia sanguinea* on the zootechnical parameters of broilers chickens. To do this, three hundred chickens were divided into 3 batches of 100 chickens. The chickens of batch A have received non-supplemented drinking water. Those of batch B and C received drinking water containing respectively 10g/L of aqueous extracts of *Thonningia sanguinea* and *S. birrea* at 21 days of age while one week. The results showed that the chickens watered with the solutions containing the extracts of THOS and *S. birrea* have the best weight growth and weight gain. In addition, the chickens of these batches have recorded the lowest consumption index and mortality rates. However, no significant difference ($p < 0.05$) was observed between the zootechnical performance of the chickens having received the water containing the extracts of the two plants. The aqueous extract of *Thonningia sanguinea* and *S. birrea* could be used to improve the productivity of broiler farming.

Keywords: *Sclerocarya birrea*; *Thonningia sanguinea*; Broiler chicken; Body growth

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INTRODUCTION

Africa is well known continent for its rich ethno botanical wealth, particularly regarding medicinal plants which are used by local populations in human and animal health [1]. These plants include *Thonningia sanguinea* and *Sclerocarya birrea*. In Côte d'Ivoire, several research works have already shown that these plants are used in animal health [2].

Sclerocarya birrea (Anacardiacae), commonly known in English as Marula is a plant species found in savannah zones. All parts of the plant were used by the local population to feed livestock or to treat numerous diseases in some African countries [3]. Organs of this plant such as bark and leaves have antibacterial activity [4, 5], antioxidant activity [6] and prevent cellular aging [7]. The populations of northern Côte d'Ivoire use this plant to reduce the disease incidence in cattle and sheep [8]. *Thonningia sanguinea* belonging to the Balanophoracae family, it is a plant traditionally used against parasitic [9] and bacterial [10] infections. The aqueous extract of this plant improves zootechnical parameters in laying hens [11]. The aim of this study was to compare the effects of *Thonningia sanguinea* and *Sclerocarya birrea* on the zootechnical performance of broilers chickens.

MATERIAL AND METHODS

Vegetal material

The vegetal material is constituted by of leaves of *S. birrea* and inflorescences of *T. sanguinea* collected in the month of August 2019 at Sakassou (center of Côte d'Ivoire).

Preparation of the aqueous extract

The inflorescences of *T. sanguinea* and leaves of *S. birrea* were washed, cut up, air dried for 10 days and pulverized into powder then. 100g of powder are added to 1L of distilled water. The solution is stirred for 48 hours then filtered through cotton wool and 3 times through Wathman paper, evaporated under vacuum at 30°C. The dried powder constitutes the aqueous extract [12].

Birds treatment

For the study, three hundred 2-week-old Hubbard with average weight 48.6 ± 2.3g were used. These chicks were acclimatized for 2 weeks. They have been vaccinated against viral pathologies such as Gumboro, Newcastle and bronchitis infections. After this acclimatization period, the chickens were divided into 3 batches of 100 chickens. Each chicken was assigned a number ranging from 1 to 100. At 21 days, the chickens in batch A have received drinking water without the addition of aqueous plant extract. Those in batches B and C received respectively 10g / L of aqueous extract of *S. birrea* and *T. sanguinea*. The chickens were weighed weekly to determine zootechnical parameters such as body growth, weight gain and the consumption index. The mortality rate was determined at the end of the study.

The Body Weight (**BW**) and The Consumption Index (**CI**) of chickens were determined from the following formula:

$$BW = 1/N \times \Sigma iW$$

Σ iW: Sum of individual weight of chickens per batch (g); **N**: Number of chickens/batch.

$$CI = FC/BWG$$

FC: Feed Consumption/week; Body Gain Weight (**BWG**)

Statistical analysis

Microsoft Excel 2013 and GraphPad Prism 5.01 for Windows (GraphPad Sofware, USA) were used for all data analyses. They results are presented as means ± standard deviation. The significance level was set at p-value <0.05.

RESULTS

Table I presents the body weight and body gain weight of the chickens before, during and after water supplementation with the aqueous extract of *S. birrea* and *T. sanguinea*. Analysis of the table reveals that the average weight of the 3 batches of chickens are not significantly different (p <0.05) at 15th (D15) and 21st (D21) day of age. The observation of the average weight gain shows that there is no significant difference (p <0.05) during the treatment period (D15 to D21).

Table 1 : Effect of *S. birrea* and *T. sanguinea* on body weight and body weight gain

Parameters	Days	Batch		
		A (Control)	B (*S. birrea*)	C (*T. sanguinea*)
Body weight (g)	15	455±16,95^{a}	451,2±9,36^{a}	455±8,63^{a}
	21	625,86±24,35^{b}	637±22,80^{b}	651,4±15,24^{b}
	28	831,7±80,93^{c}	1086,86±48,38^{d}	1126,72±30,63^{e}
	35	1138,2±100,39^{g}	1470,4±113^{f}	1522,8±76,7^{f}
Body weight gain (g)	15	-	-	-
	21	180,9±18,08^{A}	185,8±15,28^{A}	187,4±13,16^{A}
	28	205,84±82,17^{C}	449,86±33,37^{B}	4481,18±26,91^{B}
	35	306,46±40,06^{D}	383,56±74,78^{D}	395,92±84,65^{D}

At the 28th day, the analysis shows that the chickens having received the various plant extracts have significantly higher average weight than those watered with water without plant extract (Batch A). In addition, chickens treated with *T. sanguinea* extract (Batch C) had the best body growth with an average weight of 1126.72 ± 30.63g against 1086 ± 48.38g (Batch B). At the same time, the analysis of Table I shows a significant difference (p <0.05) between the average weight gains of untreated chickens (Batch A) and treated chickens (Batch B and C).

At the end of the study (D35), the table presents the final body weight 1138.2 ± 100.39g, 1470.4 ± 113g and 1522.8 ± 76.7g respectively for the chickens of batches A, B and C. Statistical analysis (p <0.05) indicates that the average weight of the treated chickens (Lots B and C) are higher than that of the untreated chickens (lot A). Furthermore, no significant difference was observed between the body weight of the treated chickens. However, the body gain weight recorded at D35 shows no significant difference between the treated and untreated chickens.

Figure 1 shows the evolution of Consumption index (CI) during the experiment. The Consumption index (CI) of the 3 batches was increased during the study. However, the consumption index recorded for untreated chickens are higher (Batch A) compared to those of treated chickens (Batches B and C). In addition, the chickens of Batch C had the lowest CI.

Figure 2 presents the average mortality of the 3 batches at the end of the study. The lowest average mortality was recorded with *T. sanguinea* treatment (5%) compared with *S. birrea* treatment (7%) and control (10%).

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Figure 1 : Effect of *S. birrea* and *T. sanguinea* on consumption index

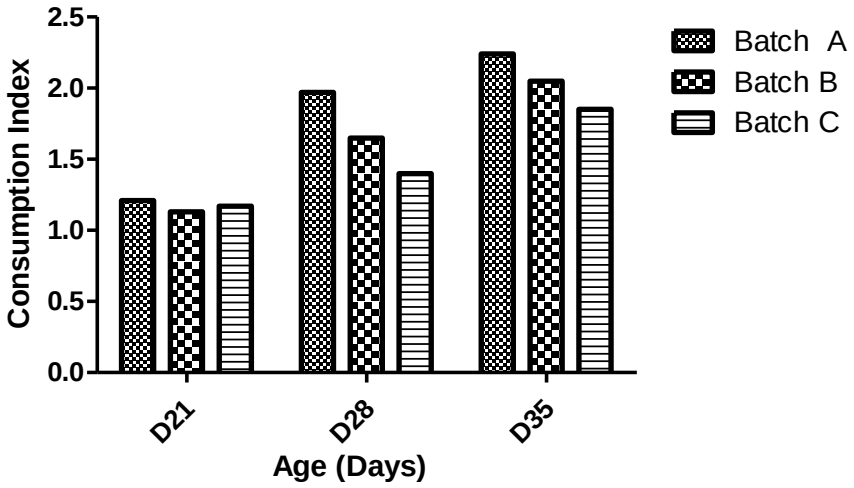
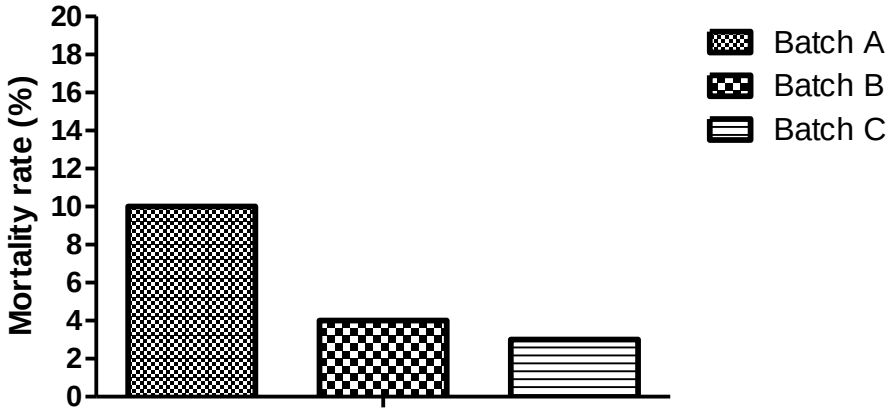


Figure 2 : Effect of *S. birrea* and *T. sanguinea* on mortality rate



DISCUSSION

The aim of the present study was to compare the effects of two plant extracts *S. birrea* and *T. sanguinea* on the zootechnical performance of broilers. The results obtained showed that the chickens watered with water containing the aqueous extracts of the two plants were recorded the best body growth and the best body gain weight with the lowest consumption index compared to the control. However, the best body growth was observed with *T. sanguinea* treatment. The supplementation of the feed with aqueous extract of *T. sanguinea* improves carcass characteristics in laying hens [11]. The aqueous extract of *T sanguinea* increases body weight of broilers during experimental colibacillosis [13]. However, our results disagree with others results who showed that supplementation of the feed with *S. birrea* seed cakes decreases body growth in broilers [14]. Others works have shown that supplementation of the feed with *S. birrea* nut meal did not significantly affect body growth and body gain weight on Japanese quail [15]. The improvement of body growth and body gain weight observed with chickens treated with extracts of *S. birrea* and *T. sanguinea* was justified by the lowest consumption index compared to the control. These results were agreed with works of several authors who reported that the aqueous extract of *Moringa oleifera* and *Eugenia caryophyllus* leaves improves body growth of Hubbard chicken [16, 17]. At the end of the study, chickens treated with the plants had the

lowest mortality rates. These results could be explained by the pharmacological properties of these two plants. Indeed, the results of various studies have revealed that *S. birrea* and *T. sanguinea* have antibacterial properties [5, 7], antioxidant activity [6, 18] linked to the presence of compounds such as saponins and polyphenols [19, 20].

CONCLUSION

The results of current study indicated that the treatment of the chickens with *S. birrea* and *T. sanguinea* aqueous extract improved body growth, body gain weight and consumption index of broilers. In addition, the treatment of the chickens with *S. birrea* and *T. sanguinea* decreased the consumption index and the death rate. However, no significant improvement of these parameters was observed between the chickens treated with the aqueous extract of different plants extracts at the end of the study. In conclusion, aqueous extract of *S. birrea* and *T. sanguinea* could be used an alternative of pharmaceuticals products used to improve poultry productivity

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