



# International Journal of Chemistry and Pharmaceutical Sciences

ISSN: 2321-3132 | CODEN (USA): IJCPNH

Available online at: <http://www.pharmaresearchlibrary.com/ijcps>



## The Effect of *Sclerocarya Birrea* (A. Rich) Aqueous Extract on The Zoo technical Performance of Broilers Chickens

Konan Kouakou Severin<sup>1\*</sup>, Toure Daouda<sup>1</sup>, Kamagate Tidiane<sup>1</sup>, N'guessan Jean-David<sup>2</sup>

<sup>1</sup>Biotechnology and Valorisation of Agroressources Laboratory, UFR Biological Sciences, Peleforo GON COULIBALY University, Korhogo, 1328 Korhogo, Côte d'Ivoire.

<sup>2</sup>PharmacodynamicBiochemicalLaboratory, University of Felix Houphouet Boigny, 22 BP 582Abidjan 22- Côte d'Ivoire.

### ABSTRACT

As part of the search for alternatives to pharmaceutical products used to improve poultry productivity, several alternative methods are increasingly proposed such as the use of plant extracts. Thus, the aim of the present study was to evaluate the effect of adding aqueous extract from leaves of *Sclerocarya birrea* to water, on the zootechnical performance of broilers. A total of 300 one-day-old chickens were randomly distributed into three experimental batches of 100 chicks each. The control group chickens (Lot A) were provided with drinking water without the addition of leaves extract of *S. birrea*. Lots B and C had access to water containing respectively 5 g/L and 10g/L of aqueous extract of leaves of *S. birrea*. Throughout the experiment, weight growth, weight gain, consumption index and mortality rate were recorded once a week during four (4) weeks. The results obtained showed that chickens having received aqueous extract of leaves of *S. birrea* have the highest live weights with a consumption index and the lowest mortality rate. In addition, chickens having received 10g/L of extract record the best zootechnical performances. Under the present experimental conditions, the addition of aqueous extract of leaves of *S. birrea* to drinking water had a positive impact on the zootechnical performances of broilers chickens.

**Key-words:** *Sclerocarya Birrea*, broiler, consumption index, weight gain

**ARTICLE HISTORY:** Received 31 March 2020, Accepted 30 May 2020, Available Online 27 Sept 2020

©2020 Production and hosting by International Journal of Chemistry and Pharmaceutical Sciences, All rights reserved.

**Citation:** Konan Kouakou Severin, et al. The Effect of *Sclerocarya Birrea* (A. Rich) Aqueous Extract on The Zoo technical Performance of Broilers Chickens, 8(9), 2020: 186-190.

This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

### CONTENTS:

1. Introduction . . . . .	135
2. Materials and Methods. . . . .	136
3. Results and Discussion. . . . .	136
3. Conclusion . . . . .	139
4. References. . . . .	139

### \*Corresponding author

**Konan Kouakou Severin,**

Biotechnology and Valorisation of Agroressources  
Laboratory, UFR Biological Sciences, Peleforo GON  
COULIBALY University, Korhogo, 1328 Korhogo, Côte  
d'Ivoire.,



JOURNAL QR-CODE

## 1. Introduction

Côte d'Ivoire, like many countries in West Africa, imports meat products to cover its needs in animal protein [1]. To reduce the volume of imports of meat products, particularly poultry, a policy for developing the poultry sector through management structures has been implemented in the country. Despite these efforts, the Ivorian poultry sector is facing difficulties linked to the high costs of food inputs and pharmaceutical products which represent more than 2/3 of the production costs in semi-intensive poultry farming [2]. Indeed, to increase productivity, farmers use pharmaceutical products (vitamins, antibiotics and antiparasitics) to treat various pathologies of chickens. This has the consequences of increasing production costs and the appearance of multi-resistant microorganisms [3]. Faced with the risk of the appearance of resistance and a health problem for the consumer [4], other methods of improving productivity should be adopted by using plant extracts in animal husbandry poultry [5; 6]. Thus, the objective of this study is to contribute to improving the productivity of broiler chickens by evaluating the effect of aqueous extract of leaves of *Sclerocarya birrea*, a plant traditionally used in sub-Saharan Africa [7; 8; 9]. Antibacterial [10], antidiabetic [11] and antioxidant [12] properties of *S. birrea* have been reported.

## 2. Materials and Methods

### Plant material:

The plant material consists of leaves of *S. birrea* (Anacardiaceae) harvested in the region of Korhogo (North of Côte d'Ivoire).

### Animal material:

The experiment was performed in a commercial poultry farm (Ivograin, Côte d'Ivoire) using 300 one-day-old Hubbard chicks. Body average live weight of the chicks was  $48.6 \pm 2.3$  g

### Methods

#### Preparation of aqueous extract of *Sclerocarya birrea*:

The fresh leaves harvested in the morning were first washed and then dried in the open air out of direct sunlight at 37°C in the laboratory of Peleforo GonCoulibaly University for 3 weeks. The dried leaves were pulverized using an IKA Labortechnik type MFC® grinder. The powder obtained was used to prepare aqueous extract according to the method described by [13]. Thus, to 1L of distilled water, 100g of *S. birrea* powder are added under magnetic stirring for 2 days. The homogenate was filtered through cotton wool and then Whatman # 1 paper. The filtrate obtained was evaporated under vacuum at 30°C using a RotavaporBüchi and then dried in a study. The dry powder obtained which constitutes the aqueous extract was stored at 4°C. Treatment of chickens for the experimental study average weight was used. These chicks were acclimated for 2 weeks. They were all vaccinated against viral diseases such as Gumboro, Newcastle and bronchitis infections.

After the acclimatization period, chickens were randomly assigned to three lots of 100 chickens each. The chickens in lot A (control) received drinking water without adding

*S. birrea* extract. Chickens in lots B and C received drinking water for one week containing respectively 5 g/L and 10 g/L of aqueous extract of *S. birrea*. Then, the zootechnical parameters such as the weight growth, the consumption index as well as the mortality rate were determined.

#### Determination of the zootechnical parameters of chickens :

During the experiment period, body weight (BW), consumption index (CI) and number of dead birds were recorded at weekly intervals. The average weight and the average weight gain (AWG) of each batch were determined according to the method described by [14].

The chickens were weighed individually before the experiment on D0 (when they arrive) and each week during the experiment. The average weights (AW) of chickens per lot are determined from the following formula:

$$AW = 1/N \times \sum iW$$

$\sum iW$ : Sum of individual weights of chickens per batch (g);  
N: Number of chickens per lot. These average batch weights calculated in this way were used to determine the average weight gains (AWG) of chickens per batch as follows:

$$AWG = AW - AWp$$

AW: Average weight of the week (g); AWp: Previous week average weight (g)

The Consumption Index (CI) per lot was determined from the following formula:

$$CI = FC/AWG$$

FC: Feed consumption

The mortality rate was determined at the end of the experiment by reporting the total number of dead chickens and the total number of chickens in each batch.

#### Statistical analysis

The data obtained were entered with Excel (Microsoft 2010, USA) and analyzed with Graphpad.5.01 software (USA). The data have been presented as a mean  $\pm$  standard deviation in tables. The materiality threshold was set at P-value <0.05.

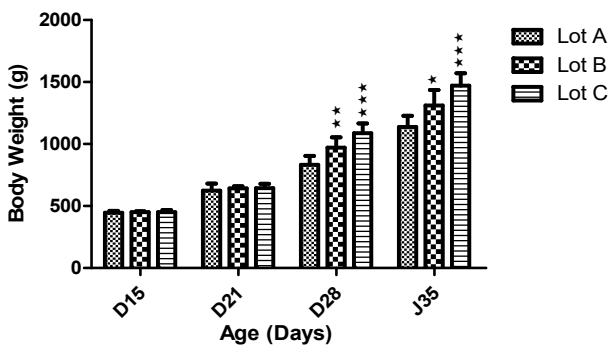
## 3. Results and Discussion

### Weight growth gain :

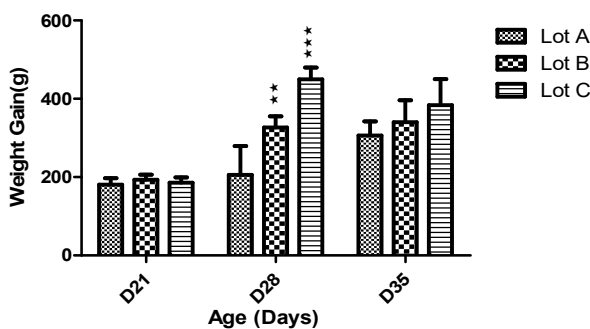
Figure 1 represents the evolution of average live weights of chickens before, during and after the supplementation of drinking water with aqueous extract of *S. birrea*. Average weights of chickens in the 3 batches are not significantly different (P <0.05) at D15 and D21. This observation is confirmed by the weight gain observed on D21 (Fig. 2). The Statistical analysis indicates that there is no significant difference between the weight gains of the 3 batches. On the 28th day of experimentation, i.e. one week after stopping the treatment, we record average live weights of  $831.74 \pm 72.36$  g,  $970.32 \pm 84.60$  g and  $1086.86 \pm 78.40$  g respectively for the lot A, lot B and lot C. Statistical analysis shows that there is a significant difference between the average weights of the chickens having received *S. birrea* and those of lot A (control). Furthermore, chickens having received 10 g / L of *S. birrea* extract have the highest live weights. During this period (D28), the

determined weight gains also show values which are significantly higher in the treated chickens (lot B:  $326.52 \pm 28.71$  g and lot C:  $449.86 \pm 29.85$  g) against an average value of  $205.84 \pm 73.50$  g for the chickens who have not received the extract.

At the end of the experiment (J35), we note an average weight of  $1470.40 \pm 101.18$  g in the chickens of lotC against values of  $1310.60 \pm 125.30$  g and  $1138.20 \pm 89, 79$  g respectively for lots B and A. statistical analysis shows that the average live weight of chickens is the most important ( $P < 0.05$ ). As for the weight gain, the statistical analysis does not show a significant difference at D35 although the weight gain of the chickens in lot C is higher than the others (lot B and lot A).



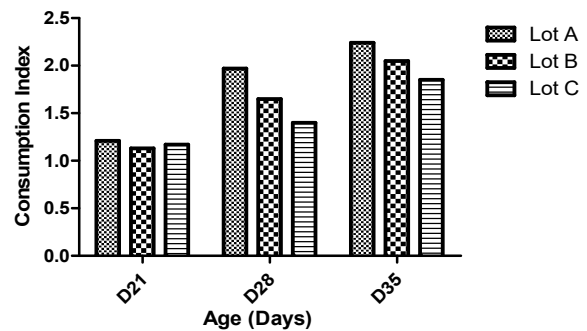
**Fig 1:**Broiler body weight gain. Values are expressed as mean  $\pm$  SEM (n = 100);  $p < 0.05$ , \* compared to control group;  $p < 0.05$ , \*\* compared to control group.



**Fig 2:**Broiler weight gain. Values are expressed as mean  $\pm$  SEM (n = 100);  $p < 0.05$ , \*\* compared to control group;  $p < 0.05$ , \*\*\* compared to control group.

### Consumption index :

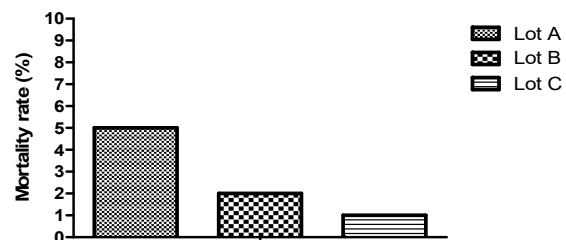
Figure 3 shows the consumption index during the experiment. Analysis of this figure indicates that the consumption indices (CI) are substantially identical in the chickens of the 3 batches on D21. At the end of the study, the chickens in batch A recorded the highest consumption index (CI = 2.24) compared to 2.05 and 1.85 respectively in the chickens in batches B and C.



**Fig 3:**Broiler consumption index

### Mortality rate:

Figure 4 shows the mortality rates for different batches of chickens. On the 35th day, we recorded mortality rates of around 7% in lot A against 3% and 2% respectively in B and C.



**Fig 4:**Broiler mortality rate

### Discussion

The objective of this study was to assess the effect of aqueous extract of leaves of *S. birrea* on the zootechnical performance of broilers. The results of the study showed that chickens having received drinking water containing aqueous extract of leaves *S. birrea* (lots B and C) have a better weight growth compared to those without extract (batch A). The live weights of the treated chickens are significantly ( $P < 0.05$ ) higher than those of batch A after the stop of treatment (D28 and D35). These results are in agreement with those found by [15] and [16] who showed that supplementing the drinking water of broiler chickens with 10 g / L of aqueous extract of *Thonningia sanguinea* improves weight growth. In addition, [17] in a study conducted in Niger, showed that supplementing the food with *Moringaoleifera* leaf meal improves the zootechnical performance of broilers. The improvement in weight growth observed in chickens treated with the extract of *S. birrea* is confirmed by the significantly higher weight gains ( $P < 0.05$ ) mainly in chickens in lotC. These results are consistent with those found by [18] who revealed in a study that the addition of *Origanummajorana* extract in drinking water improves the zootechnical parameters as well as the state of health of the broiler chicken. In addition, the treated chickens record the lowest consumption indices and mortality rates with mortality rates of 7%, 4% and 2% respectively in lots A, lot B and lot C. These results could explain by the pharmacological properties of *S. birrea*.

Indeed, the literature reports that *S. birrea* have antibacterial [19; 20], nutritional [9], antioxidant properties [21]. The phytochemical screening of *S. birrea* showed the presence of compounds such as flavonoid, tannins, saponins and glycosides [22]. The presence of these important chemicals groups could permit to justify its traditional usage. Others authors have also shown that the fruits of *S. birrea* are used as a feed supplement for ruminants in semi-humid areas of Nigeria [23].

#### Conflicts of interest

The authors declare no conflict of interest

#### Source of funding

The study was carried out with funding from the Biotechnology and Valorisation of Agrossources, Peleforo GON COULIBALY University, Korhogo,

#### 4. Conclusion

In this present study, it was shown that the supplementation of aqueous extract of leaves of *S. birrea* in drinking water improves weight performance, reduces the consumption index as well as the mortality rate in chickens of flesh. It should be noted that the best performance has been obtained with supplementation with 10 g/L of extract of *S. birrea*. We consider that aqueous extract of leaves of *S. birrea* might be used efficiently as an alternative to veterinary pharmaceutical products to improve the productivity of poultry production.

#### 5. References

- [1] AC Bonny, TG Karou, K Atobla, LG Bohoua, LS Niamkey. Carrying Salmonella to the raw gizzard of chickens displayed for sale in Abidjan, Côte d'Ivoire. J. Appl. Biosci., 2011, 47: 3230-3234.
- [2] FAO. Animal Production and Health Division of the Food and Agriculture Organization. Poultry sector review-Côte d'Ivoire, 2008, pp. 20-77.
- [3] GB Goualie, LMP Konan, TG Karou, LSNiamke. Evolution of antibiotic resistance of Campylobacter sp. isolated from broilers in Abidjan, Ivory Coast. J. Appl. Biosci., 2020, 148: 15202-15208.
- [4] P Sanders, A Bousquet-Melou, C Chauvin, PL Toutain. Use of antibiotics in animal husbandry and public health issues. INRA Prod. Anim., 2011, 24 (2) : 199-204
- [5] MN Alloui, A Agabou, N Alloui. Application of herbs and phytogenic feed additives in poultry production-A Review. Global J. Anim. Sci. Res., 2014, 2 (3): 234-243.
- [6] A Raach-Moujahed, F Zouaghi, KHajlaoui. Effects of 3 additives: RovabioExel; KemzymePlus Dry and Cibenza DP 100 on performances of broiler chickens. J. New Sci., 2017, 37: 2024-2030.
- [7] AL Sene, K Niang, G Faye, N Ayessou, MB Sagna, M Cisse, ADiallo, OK Cisse, M Gueye, A Guisse. Identification of uses of Sclerocarya birrea (A. Rich) hoscht in the ferlo area (Senegal) and evaluation of the biochemical and nutritional potential of its fruit. Afr. J. Food Agric. Nutr. Dev., 2018, 1: 13470-13489
- [8] H Yougouda. Sustainable management and population structure of multipurpose species: the case study of Sclerocarya birrea (A. Rich.) in the Sahelian zone of Cameroon. J. Anim. Plant. Sci., 2018, 36: 5879-5890.
- [9] AA Mariod, SI Abdelwahab. Sclerocarya birrea (Marula), An African Tree of Nutritional and Medicinal Uses: A Review. Food Rev. Int., 2012, 28: 375-388.
- [10] AJ Mai, M Emmanuel, P Ayim, MB Magaji. Evaluation of Antibacterial Activities and Cytotoxicity of Sclerocarya birrea Stem Bark. Open Access Library Journal, 2019, 6: e5706.
- [11] V Atto, DP Koffi, GF Monteomo, MF Adeoti. Phytochemical Screening of Sclerocarya birrea (Anacardiaceae) and Khayasenegalensis (Meliaceae), Antidiabetic Plants. Int. J. Pharm. Chem., 2016, 2 (1): 1-5
- [12] AA Mariod, B Matthäus, K Eichner, IH Hussein. Antioxidant properties of methanolic extracts from different part of Sclerocarya birrea. Int. J. Food Sci. Technol., 2008, 43(5): 921-926.
- [13] A Touré, C Bahi, K Ouattara, AJ Djaman, A Coulibaly. Phytochemical screening and in vitro antifungal activities of extracts of leaves of Morinda morindoides (Morinda, Rubiaceae). J. Med Plants Res., 2011, 5(31): 6780-6786.
- [14] KS Konan, D Toure, A Toure, JD N'guessan Jean David. Effect of Thonningia sanguinea (Balanophoraceae) on zootechnical and biochemical parameters of broiler chickens. J. Phytopharmacol., 2020, 9(2): 115-119.
- [15] JND Trébissou, KB Bla, AF Yapou, AJ Djaman. Effects of Thonningia sanguinea (Balanophoraceae), a plant extract on broiler chickens (Hubbard race) in Côte d'Ivoire. Int. J. Chem. Pharm. Sci., 2014, 2(8): 1078-1081.
- [16] KA Yao, AL N'dri, A Toure, M Coulibaly, KS Konan, JD N'Guessan. Study of the bio-tolerance of aqueous extract of Thonningia sanguinea (Balanophoraceae) in Isa Brown laying hens. Res. J. Animal Veterinary Fishery Sci., 2016, 4: 1-8.
- [17] T Abasse, I Maigachi, W Habba, D Diallo. Effect of supplementing the flour of Moringa oleifera (Lam.) leaves in the production of broilers in Niger. Int. J. Biol. Chem. Sci., 2017, 11(2): 722-729.
- [18] N Sahraoui, R Larbi, M Lakhdar, M Berrahmani, D Guetarni, J L Hornick. Impact of a plant extract "Origanum Majorana" on the zootechnical parameters and health status of broiler chicken. Rev. Mar. Sci. Agron. Vet., 2016, 4(3): 72-77.

- [19] AS Kutama, MI Auyo, ML Umar, M Hadiza, S Bai. Assessing the antibacterial activity of morula (*Sclerocarya birrea*) stem bark and leaf extracts against some selected bacterial isolates in Kano, Nigeria. *World J. Agric. Sci.*, 2013, 1 (6): 209-2014.
- [20] LM Manzo, DH Bako, I Moussa, Kikhiri. Phytochemical Screening and Antibacterial Activity of Stem Bark, Leaf and Root Extract of *Sclerocarya birrea* (A. Rich.) Hochst. *Int. J. Enteric. Pathog.*, 2017, 5(4):127-131.
- [21] MF Armentano, F Bisaccia, R Miglione, D Russo, N Nolfi, M Carosino, PB Andrade, P Valentao, MS Diop, M Milella. Antioxidant and Proapoptotic Activities of *Sclerocarya birrea* [(A. Rich.) Hochst.] Methanolic Root Extract on the Hepatocellular Carcinoma Cell Line HepG2. *Biomed. Res. Int.*, 2015, 2015: 561-589.
- [22] AA Abdulhamid, YU Dabai, AM Ismail. Preliminary Phytochemical and Antibacterial Screening of Crude Methanolic Extracts of Some Plants against Tested Bacterial Isolates. *The Pharm. Chem. J.*, 2018, 5(1):174-181.
- [23] N Muhammad, IJ Omogbai, SA Maigandi, IA Abubakar, SB Shamaki. Quantification of *Sclerocarya birrea* (Marula) fruits as feed supplement for ruminants in dry sub-humid zone of Nigeria. *World Scientific News*, 2016, 46: 88-99.