GROWTH PERFORMANCE OF BROILER CHICKENS ON COLD AQUEOUS *JATROPHA TANJORENSIS* LEAF EXTRACTS

1Omoikhoje, S.O; 2Eguaoje, A.S*; 3Iyiorobhe, P; 4Akangbe, E; 5Aidelomon, E.O
*2Eguaoje, S. A. Department of Animal Production and Health, College of Agriculture and Natural Resources, Iguoriakhi Edo State,Nigeria.
1,3Department of Animal Science, Faculty of Agriculture, Ambrose Alli University, Ekpoma, Edo State
2,4Department of Animal Production and Health, College of Agriculture and Natural Resources, Iguoriakhi Edo State, Nigeria.
5Department of Animal Husbandary Sciences, University of South Bohemia, Ceske Budejovice, Czech Republic
Email: eguaojeabiodunstanley@gmail.com; Phone: 07031677645

ABSTRACT
The study was conducted to assess the growth performance, cost and returns of broiler chickens on cold aqueous leaf extract of Jatropha tanjorensis. A hundred and fifty (150) anak 2000 broiler chicken was randomly allotted into five (5) treatment groups (T_1, T_2, T_3, T_4 and T_5) in a completely randomized design (CRD). Each treatment group contained three (3) replicates with ten (10) birds each per replicates and the experiment lasted eight 8 weeks (56days). The birds were fed commercial starter diet for one week acclimatization period after which they were fed formulated started and finisher diet. The T_1 (control) which took the antibiotic (Doxygen) in drinking water, while the birds in T_2, T_3,T_4, and T_5 were offered cold aqueous leaf extract of Jatropha tanjorensis leaves at 25mL, 50mL, 75mL and 100mL per liter of drinking water, respectively. The result showed the different dosages of CALEJ did not significantly ($P>0.05$) influence the live weight, daily weight gain, feed conversion ratio and protein efficiency ratio but the daily feed intake on broiler chicken were significantly ($p<0.05$) Influenced. Average live weights were statistically similar ($p>0.05$) among birds with respective values of 824.44, 878.89, 835.56, 866.66 and 872.22 g/bird in treatments 1 (control), 2 (25mL CALEJ), 3 (50mL CALEJ), 4 (75mL CALEJ), and 5 (100mL CALEJ). In this study, it was observed that the administration of different dosages of cold aqueous leaf extract of Jatropha tanjorensis did not adversely affect the growth performance and feed efficiency of broiler chickens. However, the best growth performance, cost and returns were obtained in broiler chickens administered 25mL CALEJ per litre of drinking water. This therefore revealed the potential of cold aqueous leaf extract of Jatropha tanjorensis as probiotics additive in poultry production.
Keywords: Aqueous Leaf Extract, Broiler Chicken, Growth Performance, Jatropha tanjorensis

INTRODUCTION

Nigeria livestock industry is ridden with myriad of problems, which have resulted to a gross shortage/low intake of meat and other animal products (Nworgu, 2002). Inspite of the country's numerous human and natural resources, Nigeria still remain among the least consumers of animal protein in Africa with an average of about 53.8g of protein intake out of which only 6.0-8.4 g/head/day is of animal origin (Egbunike, 1997). To increase protein intake in Nigeria, there is the urgent need to increase poultry production particularly broiler chickens at household and commercial holdings. It has triggered the discovery and widespread use of a number of "feed additives". The main objective of adding feed additives is to boost animal performance by increasing their growth rate, better-feed conversion efficiency, greater livability and lowered mortality in poultry birds. Recently attention has been shifted to the use of feed additives of plant origin as against the synthetic growth promoters that has adverse residual effect on the quality of the animals and the products obtained in the long run. These plants are readily availability, cost effective and have high potency against some diseases (Chigozie, *et.al*, 2018). Some plants however are known to contain phytotoxins whereas others contain invaluable bio-actives. It is imperative, that man properly screens the phyto constituents of these sources before their uses (Aziz, *et.al*, 2018). *Jatropha tanjorensis* is one of the plants both used for ethno-medical and nutritional purposes (Kigen, *et.al*, 2019). It belongs to the family, ''Euphorbiacea''. It is a natural hybrid between *J. curcas* and *J. gossypifolia* (Prabakaran,

1999). *Jatropha tanjorensis* is a native of Central America and has become naturalized in some tropical and subtropical countries, like India, Nigeria and Canada.. Based on the phytobiotic potentials of Jathropha. The study was aimed at investigating the effect of cold aqueous leaf extract of *Jatropha tanjorensis* on the growth performance of broiler chickens.

MATERIALS AND METHODS

Experimental Location and Duration

The experiment was carried out at the Poultry Unit of the Teaching and Research Farm, Ambrose Alli University, Ekpoma, Edo State of Nigeria for a period of (8) weeks between the months of February and April, 2021.

Sources of Ingredients and fresh Jatropha tanjorensis leaves

The ingredients for the broiler starter and finisher diets were purchased from reputable feed dealers in Benin City, Edo State, Nigeria. Fresh leaves of *Jatropha tanjorensis* were harvested within the University vicinity.

Processing of *Jatropha tanjorensis* leaves

The fresh leaves of *Jatropha tanjorensis* were thoroughly rinsed with clean water to remove strange materials such as dirt and dusts. The fresh leaves (100g) was cut into pieces, pulverized and infused into 1litre of water for 24hours. Thereafter, the solution was filtered in the morning using a sieve cloth or clean handkerchief to obtain the filtrate or extract. Thereafter, the extract was diluted with clean water (volume/volume) to form the different dosages of 0, 25, 50, 75 and 100ml/litre of water designated as treatments (T) 1, 2, 3, 4 and 5 respectively. This procedure was carried out daily and the filtrate served to the experimental birds in their drinking water.

Feeding and Experimental Treatments

The birds were fed commercial starter diet for one (1) week acclimatization period after which they were fed formulated starter and finisher diets as shown in Table 3.1. The starter and finisher phases lasted for four (4) weeks each. Five (5) treatments (T_1, T_2, T_3, T_4, and T_5) were prepared to contain 0, 25, 50, 75 and 100ml of cold aqueous leaf extract *Jatropha tanjorensis* (CALEJ) per litre of drinking water. The birds in the control group were administered synthetic antibiotics (Doxygen) at weekly intervals following the manufacturers prescription as positive control. The basal diets (starter and finisher) were formulated to meet the nutritional requirement of broiler chicken according to NRC (1994).

Table 1: Nutrient composition of the formulated starter and finisher diets

Ingredients	Maize	SBM	FM	PKC	Wo	Bm	Ls	Pmx	Lys	Met	Salt	Total	CP	ME
Starter	55.00	32.00	1.50	3.50	3.30	1.50	2.50	0.25	0.10	0.10	0.25	100.00	21.33	2886.19
Finisher	58.00	25.00	1.50	4.50	5.30	3.00	2.00	0.25	0.10	0.10	0.25	100.00	19.07	2869.20

SBM: *Soya Bean meal****;FM:*** *Fish Meal;* ***PKC:*** *Palm Kernel Meal;****WO:*** *Wheat Offal;* ***LS:*** *Lime Stone;* ***PMX:*** *Premix*

LYS: *Lysine;* ***MET:*** *Methionine;* ***CP:*** *Crude Protein****; ME:*** *Metabolizable Energy*

Experimental Birds, Design and Management

A total of 150 Anak 2000 broilers chicks were used for the experiment. Thirty (30) chicks were randomly selected and allocated to each of the five (5) treatment groups (T_1, T_2, T_3, T_4, and T_5) in a completely randomized design (CRD). Each treatment group contained three (3) replicates with ten (10) birds per replicate. The chicks were brooded for four (4) weeks and during this period they were fed a commercial starter diet without the experimental treatments for one week acclimatization period. Thereafter, the aqueous leaf extract of *Jatropha tanjorensis* was added into 1 litre of drinking water at different dosages of 0, 25, 50, 75 and 100ml.The birds were allowed free access to the treatments (T_1, T_2, T_3, T_4, and T_5) and the basal diets throughout the duration of the study. All routine management practices were carried out including vaccination. The birds in the control group (T_1) were administered the synthetic antibiotic (Doxygen) at weekly intervals, following the manufacturer's prescription as positive control.

Growth Performance Study

During the feeding trial, daily feed consumption and weight changes was recorded and weight gain, feed conversion ratio and protein efficiency ratio were estimated.

Cost and Returns Analysis

The prevailing market prices of feed ingredients, *Jatropha tanjorensis* leaves and the live market value of broiler chickens as at the time of the experiment was used to estimate cost of feed consumed, cost of feed per kg weight gain, income and net profit.

Statistical Analysis

Data generated were subjected to a one way analysis of variance (ANOVA) and treatment means that significantly differed were compared using the Duncan's Multiple Range Test (DMRT) as outlined by Steel and Torrie (1990) using the SPSS (2014) package, IBM version 20.

RESULTS AND DISCUSSIONS

Growth Performance of Broiler Chickens

The effect of different dosages of cold aqueous leaf extract of *Jatropha tanjorensis* (CALEJ) on the growth performance of broiler chickens finisher phase are shown in Tables 2.

At the finisher phase (Table 2), there were significant differences ($P<0.05$) in final live weight, daily weight gain, daily feed intake, feed conversion ratio and protein efficiency ratio of broiler chickens. Birds placed on T_2 (25mL CALEJ) had significantly ($P<0.05$) higher live weight (2.20kg/bird) compared to 1.83, 1.82 and 0.65kg/bird recorded in birds maintained on T_4, T_5, T_1 and T_3 respectively. Daily weight gain was also significantly ($P<0.05$) highest (63.19g/bird) in birds placed on T_2 (25mL CALEJ) while least mean value of 53.64g/bird was observed in birds placed on T_3 (50mL CALEJ). Daily feed intake was significantly ($P<0.05$) highest (85.51g/bird) in birds placed on T_3 (50ml CALEJ) while least mean value of 81.28g/bird was observed in birds placed on T_2(25mL CALEJ). Better ($P<0.05$) feed conversion ratio (1.29) was recorded among birds placed on T_2, followed by 1.39 in T_4 and poorest in T_5 1.47 and T_1 (1.48). Protein efficiency ratio (3.33%) among birds placed on T_2 was superior to the values recorded among birds placed on other treatments while the least PER was obtained in birds on T_3 (2.82%).

Cost and returns analyses of broiler chickens

Table 2 reflects the cost and return analyses of broiler chickens administered different dosages of CALEJ. At the finisher phase, cost of feed consumed (₦/bird) was highest in birds maintained on T_3 (₦556.17) and least (₦528.66) in T_2. The least cost of feed per kg weight gain was obtained in birds on T_2 (₦298.79), followed by T_4 (₦324.25), and highest (₦370.30) in birds placed on T_3. Total cost of production was highest in birds on the control (₦1,250.83), T_3 (₦1,244.67) and least (1,216.89) in birds on T_2. Income and net profit was least in T_3 (₦4,125.00 and ₦2,880.33), followed by T_5 (₦4,575.00 and ₦3,340.37) and highest in T_2 (₦5,500.00 and ₦ 4,223.11).

Table 2: Performance characteristics of broiler chicken as affected by the treatments of the finisher phase

	Varying Dosage of CALEJ (mL)					
Parameters	**T_1 (0%)**	**T_2(25%)**	**T_3(50%)**	**T_4(75%)**	**T_5(100%)**	**SEM±**
Live weight(kg/bird)	1.82^b	2.20^a	1.65^b	1.85^b	1.83^b	3.67
Daily weight gain (g/bird)	56.53^b	63.19^a	53.64^c	58.63^b	56.78^b	2.04
Daily feed intake (g/bird)	84.00^b	81.28^c	85.51^a	81.84^c	83.18^b	0.98
Feed conversion ratio	1.48^b	1.29^d	1.60^a	1.39^c	1.47^b	2.08
Protein efficiency ratio (%)	2.97^b	3.33^a	2.82^c	3.08^b	2.99^b	3.38
Cost of feed consumed (₦/bird)	546.35	528.66	556.17	532.30	541.01	0.00
Cost of feed/kg weight gain(₦1/kg)	345.17	298.79	370.30	324.25	340.29	0.00
Total cost of production (₦)	1,250.83	1,216.89	1,244.67	1,231.39	1,234.63	0.00
Income (₦/bird)	4,625.00	5,500.00	4,125.00	4,625. 00	4,625. 00	0.00
Net profit (₦/bird)	3,374.17	4,223.11	2,880.33	3,393.61	3,340.37	0.00

abcd: Means in the same row with varying superscripts differ significantly ($P<0.05$). SEM = Standard Error of Mean. **CALEJ**: Cold Aqueous Leaf Extract of *Jatropha tanjorensis*.

DISCUSSION

Growth Performance of Broiler Chickens

The results on the performance of broiler chickens as influenced by the administration of different dosages of cold aqueous leaf extract of *Jatropha tanjorensis* revealed that at the finisher phase, live

weight, daily weight gain, daily feed intake, feed conversion ratio and protein efficiency ratio were significantly different. In the present study, cold aqueous leaf extract of *Jatropha tanjorensis* did not exert any negative influence on the growth of the birds at the finishing phase indicating that the concentration of the toxicant inherent in the leaf extract was not toxic to the birds. The lowest and best feed conversion ratio observed among the broiler chickens that had 25mL of cold aqueous leaf extract of *Jatropha tanjorensis* may be attributed to the improvement in the energy and protein consumption of the birds resulting from the enhanced nutrient availability due to cold aqueous leaf extract of *Jatropha tanjorensis*. The better final live weight and daily weight gain of birds on 25mL of cold aqueous leaf extract of *Jatropha tanjorensis* suggests that this level may have stimulated a higher digestive activity on the nutrients consumed by the birds thereby promoting greater efficiency in utilization of feed resulting in enhanced growth which culminated into the highest final live weight. The numerically lowest but best feed conversion ratio recorded among broiler chickens that had 25mL of cold aqueous leaf extract of *Jatropha tanjorensis* at the finisher phase could be attributed to the improvement in the energy and protein consumption of birds resulting from the enhanced nutrient availability due to cold aqueous leaf extract of *Jatropha tanjorensis*. The comparable values in the daily feed intake of broiler chicken at the finisher phase is an indication that the different dosage of CALEJ was within the tolerable limits of the birds and palatability of feed was not compromised and thus the growth of the birds was not suppressed. This implies that the administration of 25mL of cold aqueous leaf extract of *Jatropha tanjorensis* improved the conversion ability of the birds. These observations lend support from the report of Omoikhoje *et al*., (2018) that 50mL/Litre of water of *Senna occidentalis* aqueous leaf extract enhanced the growth performance of broiler chickens. The cost of feed consumed, cost of feed per kg weight again and total cost of production were lowest in broiler chickens that had 25mL CALEJ compared to those on other treatment groups. In the same vein, the income generated and net profit were higher in broiler chickens administered 25mL CALEJ than those placed on other treatments. This is in tandem with the observations of Augustine *et al.,* (2010) who fed cockerel chicks and broiler chickens with *Cajanus cajan* and *Cassia obtusifolia* seed meals respectively. The result in the study showed that broiler chickens on 25mL CALEJ had better live body weight which translated to the highest profit per bird. Thus, it could be inferred that it was more economically viable to administer 25mL CALEJ to broiler chickens in place of antibiotics for profit maximization. This further reasserts the opnion of Zahari and Alimon (2006) that any improvements in feed efficiency through the use of local feed stuffs reduce high production cost and consequently increase the net profit.

CONCLUSION

In this study, it was observed that the administration of different dosages of cold aqueous leaf extract of *Jatropha tanjorensis* did not adversely affect the growth performance and feed efficiency of broiler chickens. However, the best growth performance, cost and returns were obtained in broiler chickens administered 25mL CALEJ per litre of drinking water. This therefore revealed the potential of cold aqueous leaf extract of *Jatropha tanjorensis* as probiotics additive in poultry production.

REFERENCES

Augustine J.U., Igwebuike S., Salome A., Midau M.R., Jaafar-furo D.I., Dazala I.U. Evaluation of economic performance of broiler on Cassia obtusifolia seed meal. International Journal of Sustainable Agriculture, 2010; 2(3): 47-50.

Aziz, M.A, Adnan, M, Khan, AH, Shahat, AA, Al-Said, M.S, and Ullah, R. (2018). Traditional uses of medicinal plants practiced by the indigenous communities at Mohmand Agency, FATA, Pakistan. J Ethnobiol Ethnomed.; 14 (1): 1–16.

Chigozie, O.O, Uzoma, N.O, Ikechukwu, U.R. and Ikechukwu, E.S. (2018). Nutritional composition of jatropha tanjorensis leaves and effects of its aqueous extract on carbon tetrachloride induced oxidative stress in male Wistar albino rats. Biomed Res. 29 (19): 3569–76.

Egbunike, G.N. (1997). What is Animal Science? And how can Nigeria get out of malnutrition. In: Livestock Products. Ologhobo, A.D., Iyayi E.A., Adesehinwa A.O.K and Bamgbose A.M.(eds). Proc. 2nd Ann. Conf. of ASAN. Held at Airport Hotel, Ikeja – Lagos on the 16th - 17th September, 1997: 1-12

Iwalewa, EO, Adewumi, C.O, Omisore, N.O, Adebanji, O.A, and Azike, C.K. (2005). Proantioxidant effects and cytoprotective potentials of nine edible vegetables in Southwest. Niger J Med Food. 8: 539–44.

Kigen, G, Kamuren, Z, Njiru, E, Wanjohi, B and Kipkore, W. (2019).. Ethnomedical, Survey of the Plants Used by Traditional Healers in Narok County, Kenya. Evidence-based Complement Altern Med.

Omoikhoje, S.O., Obasoyo D.O. Okosun, S.E. Uwaya, J. Adamu, I, and Idahor E. (2018). Impact of coffee weed (Senna occidentalis) leaves Aqueous Extract as Probiotic on the performance of broiler chicken in humid Tropical Environment. Microbio. Res. J. Inter. 23(6):1-10.

Prabakaran, A.J and Sujatha, M. (1999). Jatropha tanjorensis Ellis & Saroja, a natural interspecific hybrid occurring in Tamil Nadu, India. Genet Resour Crop Evol. 46: 213–8.

SPSS, (2014). Statistical Packages for Social Sciences Version 20 Model IBM

Steele, R.G.D and Torrie, J.H. (1990). Principles and procedures of statistics. A biometrical approach 3rd edition, Mcgraw-Hill Book Co. Inc, New York.

Zahari M.W., Alimon A.R. Use of palm kernel cake and Oil palm by-product in compounding feed. Palm oil development, 2006; 40(1): 5-9.