

SYNBIOTIC EVALUATION OF *Ocimum canum* WITH *Lactobacillus subtilis* ON THE GROWTH PERFORMANCE OF BROILER CHICKS

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Abstract

This study evaluated the synbiotic effects of *Ocimum canum* (African sweet basil) and *Lactobacillus subtilis* on the growth performance of broiler chicks from 0 to 4 weeks of age. A total of 360 day-old Ross 308 broiler chicks were randomly assigned to six dietary treatments in a completely randomized design with three replicates of 20 birds each. Treatments comprised a control diet, two levels of *O. canum* (800 and 1200 g/100 kg feed), two synbiotic diets (*O. canum* at 800 and 1200 g/100 kg feed + *L. subtilis*), and a standard antibiotic control (oxytetracycline). Parameters measured included weight gain, average daily weight gain (ADWG), feed intake, feed conversion ratio (FCR), feed cost per kilogram gain, and mortality. Results showed that birds fed *O. canum* alone or in combination with *L. subtilis* performed significantly ($p \leq 0.05$) better than the control. The highest final body weight (953.42 g/bird), daily weight gain (32.69 g/bird/day), and best FCR (1.72) were recorded in birds fed diet containing oxytetracycline, and those fed diet containing 800 and 1200 g/100kg diet of *Ocimum canum* followed by group fed the synbiotic diet with 800 and 1200 g/100 kg *O. canum* plus *L. subtilis*. Feed cost per kilogram gain was lowest in the same group with similar trend. It was concluded that the use of *O. canum* singly or in combination with *L. subtilis* enhanced feed efficiency and growth performance, suggesting that this synbiotic mixture can serve as a viable natural alternative to antibiotics in broiler production.

Keywords: Synbiotic, *Ocimum canum*, *Lactobacillus subtilis*, broiler chicks, growth performance

Description of Problem

The poultry industry faces challenges from the withdrawal of antibiotic growth promoters (AGPs) due to concerns about antimicrobial resistance and drug residues in meat products. This has created a need for safe, natural alternatives that promote gut health and enhance performance. Synbiotics, the combined use of probiotics and prebiotics, have emerged as promising alternatives because of their synergistic effects on gut microbial balance, nutrient utilization, and immune function [1,2]. *Ocimum canum*, commonly known as African basil, is a medicinal plant with antioxidant, antimicrobial, and digestive-stimulating properties due to its high phenolic and flavonoid contents [3]. *Lactobacillus subtilis*, a probiotic microorganism, enhances intestinal health, improves feed efficiency, and strengthens immunity in poultry [4]. Combining these two natural agents may

enhance growth through improved gut microflora balance and nutrient absorption. Hence, the study evaluates synbiotic effect of *Ocimum canum* with *Lactobacillus subtilis* on the growth performance of broiler chicks at the starter phase.

Materials and Methods

The study was conducted at the Poultry Unit of the teaching and Research Farm of the Department of Animal Science, Ahmadu Bello University, Zaria. A total of 360 day-old Ross 308 broiler chicks were used for a 4-week feeding trial. The birds were weighed, and randomly distributed into six dietary treatments replicated three times with 20 chicks per replicate. Six experimental diets were formulated:

T₁ (Control): Basal diet without additives

T₂: Basal diet + 800 g/100 kg *O. canum*

T₃: Basal diet + 1200 g/100 kg *O. canum*
 T₄: Basal diet + 800 g/100 kg *O. canum* + *L. subtilis*
 T₅: Basal diet + 1200 g/100 kg *O. canum* + *L. subtilis*
 T₆: Basal diet + oxytetracycline (positive control)

Feed and water were provided *ad libitum* under standard management conditions. Weekly feed intake and body weights were recorded. Feed conversion ratio (FCR), average daily weight gain (ADWG), and mortality were calculated. Data were subjected to one-way ANOVA of the statistical analysis software [5], and means were separated using Tukey's HSD test at $p \leq 0.05$.

Results and Discussion

Table 1 presents the growth performance of broiler chicks fed diets containing *Ocimum canum* with *Lactobacillus subtilis* from 0–4 weeks. The results showed that birds fed *O. canum* alone or in combination with *L. subtilis* performed significantly ($p \leq 0.05$) better than those in the control group. The highest final body weight (953.42 g/bird), average daily weight gain (32.69 g/bird/day), and best feed conversion ratio (1.72) were recorded in birds fed the diet containing oxytetracycline, as well as those fed diets containing 800 and 1200 g/100 kg *O. canum*, followed closely by birds on the synbiotic diets (800 and 1200 g/100 kg *O. canum* + *L. subtilis*). These results indicate that *O. canum*, either alone or combined with *L. subtilis*, effectively enhanced nutrient utilization and growth performance comparable to the antibiotic-based diet.

Table 1: Growth performance of broiler chicks fed diets containing *Ocimum canum* with *Lactobacillus subtilis* (0-4 weeks)

Parameters	Control	<i>Ocimum canum</i> (g/100kg diet)		<i>Ocimum canum</i> (g/100kg diet) + LS		Oxytet	SEM
		800	1200	800	1200		
Initial weight (g/b)	38.10	38.08	38.10	38.08	38.07	38.08	0.09
Final weight (g/b)	841.54 ^c	949.17 ^a	931.67 ^a	876.67 ^b	865.00 ^{bc}	953.42 ^a	15.56
Weight gain (g/b)	803.44 ^c	911.08 ^a	893.57 ^a	838.58 ^b	826.93 ^{bc}	915.34 ^a	15.57
ADWG (g/b/d)	28.69 ^c	32.54 ^a	31.91 ^a	29.95 ^b	29.53 ^{bc}	32.69 ^a	0.55
Feed intake (g/b)	1548.34	1617.75	1574.00	1514.92	1515.42	1570.81	60.35
ADFI (g/b/d)	55.30	57.78	56.21	54.10	54.12	56.10	2.09
Feed Conversion Ratio	1.93 ^c	1.78 ^{ab}	1.76 ^{ab}	1.81 ^b	1.83 ^b	1.72 ^a	0.04
Feed cost (₦/kg)	652.62	663.98	669.66	667.18	672.86	671.98	NA
FC/kg gain (₦/kg)	1257.35 ^d	1179.46 ^{ab}	1179.56 ^{ab}	1206.30 ^{bc}	1233.80 ^{cd}	1153.05 ^a	20.46
Mortality (%)	3.33	0.00	0.00	0.00	0.00	1.67	1.79

^{abc} Means with different superscripts along the same row are significantly ($P \leq 0.05$) different, Oxytet: oxytetracycline, SEM: standard error of means, NA: Not analyzed, , LS: *Lactobacillus subtilis*.

Feed intake and average daily feed intake were not significantly affected across treatments, suggesting that the inclusion of *O. canum* or *L. subtilis* did not influence feed palatability or consumption. However, birds fed the 1200 g/100 kg *O. canum* diet and its synbiotic combination exhibited improved feed efficiency, as reflected by their lower feed conversion ratios. This improvement in FCR could be attributed to enhanced gut microflora balance, improved enzyme secretion, and better nutrient absorption resulting from the combined effects of the phytobiotic and probiotic

components [6]. Feed cost per kilogram gain was lowest in the same treatment groups, showing that supplementation with *O. canum* alone or in combination with *L. subtilis* was not only biologically effective but also economically advantageous. The generally low mortality rate across all treatments further demonstrates the safety and beneficial impact of these additives on bird health. These findings are consistent with those of Rahman et al. [4] and Mountzouris et al. [2], who observed that synbiotic supplementation in broiler diets

improved growth rate, feed efficiency, and overall performance.

Conclusion and Application

It was concluded that the use of *O. canum* singly or in combination with *L. subtilis* enhanced feed efficiency and growth performance, suggesting that this synbiotic mixture can serve as a viable natural alternative to antibiotics in broiler production.

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