PHENOTYPIC AND BIOCHEMICAL CHARACTERIZATION OF NOILER BIRDS FED SOLID WASTE PRODUCTS OF SUGAR INDUSTRY MEAL-BASED DIET IN TROPICAL ENVIRONMENT

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ABSTRACT
The study was conducted to determine the phenotypic and biochemical characteristics of Noiler birds fed Solid Waste Products of Sugar Industry (SWAPSI) meal-based diet in tropical environment. A total of one hundred and fifty (150) day old Noiler chicks were purchased from a reputable poultry dealer in Makurdi, Benue State, and brooded for a period of one week using conventional brooding method. On arrival, the chicks were given anti stress in the drinkers.Data were collected on body weight and body weight gain. The design of the experiment was Completely Randomised Design. All data collected were analysed using One Way ANOVA of the SPSS statistical software version 21. The result obtained indicated that the SWAPSImeal-based diet had significant (P<0.05) effect on body weight and body weight gain, inclusion of solid waste product of sugar industry at Treatment 2 shows significant (P<0.05) higher body weight at week 1(282.13), week 2(462.9), week 3(592.0), week 4(731.3), week 5(805.56), week 6(887.8) and week 7(960.2) compare to other treatments. Body weight gain was affected significantly (P<0.05) at weeks 1, 2, 5, and 6. Treatment 2 shows significant higher body weight at week 1 and week 2 (161.88, 126.83) while treatment 6 and 3 shows significant (P<0.05) higher body weight gain at week 5 and week 6 (108.15, 150.90). it was concluded that cooked Solid Waste Products of Sugar Industry (SWAPSI) meal-based diets could be used to replace maize in Noiler production to reduce the cost of feed.
Keywords: Noiler, Chickens, Hatchery, SWAPSI, Weight.

INTRODUCTION

The poultry sector encounters major difficulties because of the competition with humans for scarce feed supplies, especially grains, which results in elevated production expenses (Chandrasekaran, 2014). This has made animal protein increasingly unaffordable, creating an urgent need for cost-effective, less competitive, and poultry-friendly feed alternatives. Solid Waste Products of Sugar Industry (SWAPSI), a readily available agricultural by-product, can reduce feed costs and mitigate environmental hazards associated with poor waste management. With Nigeria's annual population growth rate at 2.58% (Worldometer, 2020), competition for grains between humans and animals continues to intensify. The current trend of the cost of poultry is gradually making the insufficiently available animal protein unaffordable therefore there is urgent need for animal scientist to search for readily available alternatives, less competitive, low production cost, and poultry health-friendly feeding stuff Noiler chickens, developed in Nigeria by Amo Farm Sieberer Hatchery Limited, are dual-purpose birds bred for meat and eggs. Genetic development began in 2003, with commercial sales starting in 2014 (Amo-Farm, 2018).

Noilers are now raised in nine countries across West Africa, offering a viable alternative to local chickens, which frequently struggle in terms of meat and egg yield. Renowned for their high survival rates and ability to adapt to harsh environments, Noilers yield more meat, with roosters reaching weights of 2–2.5 kg and hens' 1–1.3 kg in just 14 weeks (Akinbobola, 2019). They are suitable for any production systems and can do well on low-quality feed while foraging like native chickens. With their diverse feather colors, resilience, and productivity, Noilers represent a sustainable strategy for enhancing poultry production and tackling the issues of feed expenses and food security in the region. Therefore, this research was carried out to evaluate the body weight and bodyweight gain of Noiler birds fed SWAPSI meal-base diet.

MATERIAL AND METHODS

Location of study

The experiment was carried out at the College of Agriculture, Science and Technology Livestock Complex, Doma road, Tudun-Amba, Lafia, Nasarawa State. The study area lies between latitude 7º and 9º Northland longitude 7º and 10º east. It has a climate typical of the tropical zone because of its location. It has a temperature ranging from 20ºc in October to 36ºc in March while annual rainfall is about 1168.90 mm (Faculty of Agriculture Weather Station 2022).

Experimental Procedure

Sources of Experimental Feed Ingredients and Processing

SWAPSI was source from sugar processing industry in Numan LGA of Adamawa State, the SWAPSI collected, was sun dried for 2 - 3 days to reduce the moisture content and also to avoid the growth of mold and rancidity after which it was grinded to produced SWAPSI meal. Other ingredients were purchase (from bio- ingredient Ltd Abuja) such as maize, rice offal, ground nut cake, fish meal, palm oil, lysine, methionine, salt and premix.

Experimental Design and Management of Experimental Birds

The design of the experiment was Completely Randomized Design (CRD). The experiment was conducted using one hundred and forty-four (144) day old noiler chicks. The chicks were purchased from a reputable distributor in Makurdi, Benue State, Nigeria. Twenty-four (24) chicks each were randomly allocated to six (6) dietary treatments, no addition of SWAPSI at T1 and T2 but having maize as the main source of energy, T_3, T_4 (processed cooked SWAPSI) with unprocessed SWAPSI replacing 100 percent of maize used in diets and T_5 T_6 (cooked and rumen liquor fermented SWAPSI) having fermernted SWAPSI used (no added maize) as the only source of energy.

Data collection

All Data collected on growth parameters were subjected to one-way Analysis of Variance (ANOVA) using the SPSS statistical software (2011). Where significant differences exist, Duncan Multiple range test was used to separate the mean at 5% probability level.

Body Weight:

Live body weights were measured at hatch using sensitive electronic scale and then at weekly interval until 20 weeks of age.

Body Weight Gain:

Average daily gain (ADG) was estimated using the formula

(a) Body weight gain = $(W2 - W1)/N$

Where:

W_2 is the present weight,

W_1 is the initial weight and

N is the number of days taken from initial weight to the present weight.

RESULTS

Table 1: SWAPSI had significant effect ($P<0.05$) on body weight at all weeks of study except at weeks 0 and 1 which was not significant. T2 consistently showed significantly ($P<0.05$) higher body weight at week 1, 2 , 3, 4, 5,6, and 7 (282.13, 462.9, 592.0, 731.3, 805.56, 887.8, 960.2) compared to other treatments at weeks 2, 3, 4, 5, 6 and 7.

Table 2 Represent the effect of Solid Waste Products of Sugar Industry (SWAPSI) on weekly body weight gain in Noiler birds. SWAPSI meal-based diet significantly ($P<0.05$) affected body weight gain of Noiler birds at weeks 1, 2, 5, and 6. At weeks 1 and 2, T2 had significantly ($P<0.05$) higher body weight gain (161.88±6.52). However, at week 5, T6 had significantly higher body weight gain while at week 6, T3 (150.90±8.37 g) Shows significantly ($P<0.05$) higher body weight gain compared to other treatments.

DISCUSSION

The significant effect of Solid Waste Products of Sugar Industry (SWAPSI) on body weight of Noiler birds as obtained in this study agrees with the findings of Amao *et al.* (2019) who reported that diet

Table 1: Solid Waste Products of Sugar Industry (SWAPSI) Meal-Based Diet on Body weight of Noiler birds

Age	T_1	T_2	T_3	T_4	T_5	T_6	SEM	P-value
Week 0	144.61	145.50	140.67	146.08	146.96	143.50	1.26	0.795^{NS}
Week 1	249.02	282.13	229.38	230.42	262.00	246.75	5.90	0.064^{NS}
Week 2	376.38^{b}	462.96^{a}	304.33^{d}	331.67^{c}	375.38^{b}	350.21^{c}	10.64	0.000*
Week 3	466.08^{bc}	592.06^{a}	407.89^{d}	457.33^{c}	510.26^{b}	477.14^{bc}	13.17	0.000*
Week 4	616.88^{b}	731.32^{a}	530.53^{c}	585.00^{b}	636.78^{b}	613.25^{b}	13.91	0.000*
Week 5	693.82^{b}	805.56^{a}	581.95^{c}	655.90^{d}	719.31^{b}	721.40^{b}	14.87	0.000*
Week 6	807.02^{b}	887.80^{a}	732.83^{cd}	728.82^{d}	780.37^{bc}	787.61^{b}	12.55	0.000*
Week 7	893.36^{abc}	960.26^{a}	832.62^{d}	859.37^{bc}	883.63^{abc}	920.08^{ab}	12.60	0.035*

NS= Not Significant, *=Significant, $^{abc=}$ value within the same row with different superscripts are significantly different from each other. T1=treatment 1 and T2=treatment 2(no addition of SWAPSI), T3=treatment 3 and T4=treatment 4(processed cooked SWAPSI), T5=treatment 5 and T6=treatment 6 (cooked and rumen liquor fermented SWAPSI).

Table 2 Solid Waste Product of Sugar Industry (SWAPSI) Meal-Based Diet on Bodyweight gain of Noiler birds

Age	T_1	T_2	T_3	T_4	T_5	T_6	SEM	P-value
Week 1	83.42^{b}	161.88^{a}	113.71^{b}	87.84^{b}	110.05^{b}	108.25^{b}	6.52	0.001*
Week 2	127.36^{a}	126.83^{a}	49.96^{b}	96.25^{a}	113.38^{a}	103.46^{a}	6.49	0.000*
Week 3	89.71	129.10	103.56	125.67	134.88	126.93	6.16	0.233^{NS}
Week 4	150.80	139.26	122.64	127.67	126.53	136.12	4.13	0.411^{NS}
Week 5	76.94^{bc}	74.24^{bc}	51.42^{c}	70.90^{bc}	82.53^{ab}	108.15^{a}	4.80	0.011*
Week 6	113.20^{ab}	82.24^{bc}	150.90^{a}	72.92^{bc}	61.06^{c}	66.21^{c}	8.37	0.002*
Week 7	86.34	72.46	99.80	130.55	103.26	132.47	9.69	0.440^{NS}

NS= Not Significant, *=Significant, $^{abc=}$ value within the same row with different superscripts are significantly different from each other. T1=treatment 1 and T2=treatment 2(no addition of SWAPSI), T3=treatment 3 and T4=treatment 4(processed cooked SWAPSI), T5=treatment 5 and T6=treatment 6 (cooked and rumen liquor fermented SWAPSI).

adjustments, particularly with increased non-conventional feed materials, significantly improved body weight in poultry. Furthermore, the higher body weight gain observed agrees with the research by Oladunjoye and Ojebiyi (2010), who found that early growth in poultry can be optimized through nutrient-dense diets. This research Contradict with the findings of Ekunseitan *et al.* (2018) who had reported that genetic factors might outweigh dietary adjustments in influencing body weight across certain poultry breeds. Their findings highlight breed predisposition as a primary determinant of growth, which implies that dietary impact might vary according to the bird strain. However, hundred percent inclusion of solid waste product of sugarcane promoted body weight gain at different growth stages. Non utilization of SWAPSI had a notable effect in early week's growth performance this finding agrees with the report of Adeola *et al.* (2021), who highlighted that growth-promoting diets often result in higher early-stage gains but tend to slow down over time. It also aligns with earlier research by Adedokun and Adeola (2005), who reported that growth patterns in poultry respond differently to dietary adjustments across development phases but contradict with the report Hernandez *et al.* (2004) observed uniform weight gain across all stages in poultry, suggesting that a diet alone may not cause phase-specific changes, implying a potential interaction with other factors, such as bird management and environmental conditions.

CONCLUSION

Solid Waste Products of Sugar Industry (SWAPSI) meal-based diet had significant effect on body weight and body weight gain of broiler chicken. The body weight gain pattern was significantly higher at week 6 were inclusion of SWAPSI at treatment 3 demonstrated significantly higher body weight gain compared to other treatments. From the findings of this study, it was recommended that cooked Solid Waste Products of Sugar Industry (SWAPSI) could be used to replace maize in Noiler production to reduce the cost of feed.

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