IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 8, Issue 1 Ver. I (Jan. 2015), PP 88-91
www.iosrjournals.org

Performance Characteristics and Carcass Yield of Indigenous Turkeys Fed Indomie Waste-Based Diets

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Abstract: *This study evaluated the performance of turkey poults fed indomie waste (IW) based-diet. A total of one hundred and forty-four (144) local strain of turkey poults were allotted to four dietary treatments in which indomie waste was used to replace maize at 0%, 33.33%, 66.67%, and 100% levels, representing treatments one to four (T1- T4) respectively. Each treatment was replicated three times with 12 poults per replicate using the Completely Randomized Design (CRD). The study lasted for eight weeks. The initial weights of the poults were taken while the final weight record was taken at the end of the study. The feed intake record was taken daily and computed as total feed consumed per bird at the end of the study while weight gain, feed conversion ratio and feed cost were calculated. Three birds were randomly selected from each replicate for carcass and organ evaluation and were expressed as percentages of the body weight. The result showed that the IW significantly ($p< 0.05$) affected the average weight gain and improved feed conversion ratio. The cost of feed per kg decreased with increasing levels of IW in the diet. Significant differences were not observed in the carcass and organ except in the breast yield. The lowest cost of feed was obtained at 100% inclusion level. The reduction in feed cost is an advantage to the farmer who desires low cost of production. It was evident that IW could be incorporated into the diet of local strain of turkey poults up to 100% level without any deleterious effect on the performance of the turkeys, however, the 66.67% replacement which led to higher final body weight and better feed conversion is recommended.*

Key words: *Performance, characteristics, indigenous, turkey, indomie waste*

I. Introduction

In order to be able to provide protein in adequate quantity and quality, the rearing of poultry which represents more than 80% of the total livestock production in Africa [1] appears to be a way of meeting this need which is occasioned by the rapid growth in population. To meet the high demand for animal protein, farmers as well as Scientists are looking out for birds which have sufficient potentials to domesticate and supplement the availability of this essential protein at cheaper cost. Turkey production plays an important role in this aspect globally [2].

There had been a steady increase in the cost of conventional feed ingredients such as maize, millet, groundnut cake, soybean meal, fish meal in the past years and this has led to the increase in the prices of animal feed and consequently animal protein sources [3]. In order for monogastric animals to be produced in large quantities, they must be provided with balanced diets with all the nutrients both quantitatively and qualitatively.

Over the years, the bulk of research work on livestock and especially poultry, had been on ways to reduce the cost of feeding animals through the utilization of agro-industrial by-products and other materials that seem to be unimportant to man. Various agro-industrial by-products had been investigated and found to be useful for livestock feeding [4,5]. Brewer's dry grain, wheat offal, corn offal, rice bran, cassava seviate and peels to mention but a few had been widely tested and incorporated into livestock feeding [6-8]. These ingredients can be incorporated into the diets of monogastric animals without any deleterious effect on the performance and health of the animals and thereby reducing the cost of feeding which takes about 60-75% of the total cost of production [9]. However, seasonal variations in the availability of these agro-industrial by-products have pushed animal nutritionists into the investigation of non-conventional feed ingredients with the same intention of reducing the cost of production in order to make animal protein affordable to the populace [10]. Waste products from food factories have been considered as ingredients that can be utilized by monogastrics. Examples are cassava meal, wheat and corn flour, biscuit wastes, sorghum sprout, poultry offals and indomie waste [11].

Indomie noodles is very popular in Nigeria as a fast food for both the young and adults. It is well balanced with reasonable metabolizable energy, digestible protein and good aroma during and after cooking. Indomie waste is a by-product obtained from the production of indomie produced by Dufil Prima Foods Limited, Choba, Port Harcourt. They constitute the broken particles that drop off during the production process

and are usually milled before discarding by the company. It contains wheat flour, vegetable oil, iodized salt, sodium polyphosphate, sodium carbonate, guargum, tartraizine Cl 19140 and tertiary butyl hydroquinone (TBHQ) antioxidant. Tertiary butyl hydroquinone (TBHQ) was developed for stabilizing various vegetable oils, fats and foods against oxidative deterioration, thus extending the storage life of foods (http://www.tbhq.org/tbhq.htm). Indomie waste is a suitable energy source containing 3464 metabolizable energy (ME) kcal/kg, 94.7% dry matter, 8.75% crude protein (CP), 1.5% crude fibre (CF), 16.35% fat and 13.6% ash [11]. The objective of this research was to investigate the replacement value of indomie waste for maize in turkey poults diet in terms of performance, feed cost and carcass yield.

II. Materials And Methods

The experiment was carried out in the Poultry Unit of Michael Okpara University of Agriculture Teaching and Demonstration Farm, Umudike, Nigeria. A total of one hundred and forty four (144) day old local strain of turkey poults were used in the study. They were randomly divided into four experimental groups of 36 poults each with 3 replicates (12 poults per replicate).

To ascertain the nutrient content of the test ingredient (indomie waste), proximate analysis was conducted to obtain the analyzed values of crude protein (CP), either extract, crude fibre (CF), ash, dry matter and energy using the method of [12] while the nutrient content of the diets were calculated (TABLES 1,2). The turkeys were fed four experimental diets with graded levels of indomie waste (IW) replacing maize at 0%, 33.33%, 66.67% and 100% for 8 weeks. Feed and water were provided ad-libitum throughout the experimental period. All routine vaccination and management practices were duly followed. On arrival of the poults, they were weighed and randomly assigned into the treatments (T) in a Completely Randomized Design (CRD). The initial weight of the individual poult was recorded and the final weight was taken at the end of the study. The feed left-over was subtracted from the quantity offered to determine the daily feed intake which was computed as the total feed consumed per bird, while feed conversion ratio (total feed consumed per bird/total weight gain per bird) was computed at the end of the experiment. Mortality record was kept daily. The feed cost per treatment was computed from the cost of feed and feed intake.

Three birds were randomly selected per replicate for carcass and organ evaluation. They were fasted for 8 hours, bled, scalded, de-feathered, eviscerated and dissected for the determination of carcass and organ weights. Cut parts and organs were weighed on fresh basis using a sensitive scale (Metler balance) but were recorded as percentages of the life weight.

All the data collected were subjected to analysis of variance using [13]. Significant differences between the means were separated using Duncan's Multiple Range Test [14].

III. Result

The result of the performance of the poults and the economics of production are presented in TABLE 3. There were significant differences ($p<0.05$) in the performance (feed intake, final weight, weight gain and feed conversion ratio) and the cost of feed per treatment. The birds that were fed the 66.67% indomie waste had the highest body weight (1250g/bird), followed by those fed the 33.33% and 100% IW. Those fed the control diet had the least body weight (1100g/bird). The weight gained by the poults followed similar trend. The birds fed the 66.67% IW had the best feed conversion ratio while those fed 33.33% was better than the 100% and the control. The cost per kilogramme feed was less in the IW based diet and highest for the control diet. The mortalities of birds were not significantly different in the treatments.

Only the breast yield of the birds showed significant difference ($p<0.05$). The other carcass and organ weights expressed as the percentage of the live weight were not significantly different ($p > 0.05$) in the various treatments (TABLE 4).

IV. Discussion

The final weight and weight gain of the turkey poults fed indomie waste-based diets were significantly higher (($p<0.05$) compared with the turkeys fed the control diet. The result therefore suggests that wheat (the major component of indomie) is thermolabile, thus supporting the observation by [15] who reported increased availability of protein, energy and degradation of anti-nutritional factors during wheat processing which improved the performance of broilers. The higher temperature involved in feed processing might have significantly contributed to the reduction of the detrimental effects associated with non-starch polysaccharides (NSP) contained in the wheat by-products. Heat processing had been reported to affect physical characteristics of NSPs [16,17]. Thus the utilization of wheat in the diet of livestock depend upon its NSP content, the degree and type of NSP present in the diet, that is soluble [18] or insoluble [19]. The mortalities recorded occurred within the 2 days of arrival and could be attributed to the stress of transportation.

The significant difference recorded in the breast of the birds feed the 66.67% replacement of indomie waste-based diet could be as a result of the highest final weight recorded in the treatment. This confirmed that

the relative body composition of turkey changes throughout the growing phase because the body components do not increase in size at a uniform rate [20,21]. It also supported the findings of [22] who observed that the increase in the proportion of breast meat is primarily due to an accelerated increase in the depth of the breast, as the relative length and width remain fairly constant with increasing body size.

V. Conclusion

The finding of this study revealed that local strain of turkeys fed the indomie waste-based diets performed better than those fed the control diet and had a reduction in feed cost. It was evident that IW could be incorporated into the diet of local strain of turkey poults up to 100% replacement with maize however, the 66.67% replacement which led to higher final body weight and better feed conversion is recommended.

Table 1: Proximate analysis of indomie waste

Nutrient	Percentage composition
Crude protein	9.50
Ether extract	3.00
Crude fibre	2.50
Ash	1.10
Dry matter	95.50
Gross energy (MJ/Kg)	13.69

Table 2: Composition of the Indomie waste-based turkey diet feed from 0 to 8weeks

Ingredients (%)	T1 (0% IW)	T2 (33.33% IW)	T3 (66.67% IW)	T4 (100% IW)
Maize	50.00	33.33	16.67	0.00
Indomie waste (IW)	0.00	16.67	33.33	50.00
Soyabean meal	25.00	25.00	25.00	25.00
Wheatbran	14.00	14.00	14.00	14.00
Fish meal	5.00	5.00	5.00	5.00
Bone meal	3.00	3.00	3.00	3.00
Oyster shell	1.70	1.70	1.70	1.70
Vitamin premix	0.50	0.50	0.50	0.50
Salt	0.40	0.40	0.40	0.40
Lysine	0.10	0.10	0.10	0.10
Methionine	0.30	0.30	0.30	0.30
Total	100	100	100	100
Calculated analysis				
Crude protein (%)	26.98	27.03	27.04	27.02
Crude fibre (%)	3.69	3.76	3.78	3.81
ME (MJ/Kg)	13.34	13.31	13.28	13.26

*Vitamin-mineral premix (2.5 kg/1000 kg); vitamin A (10,000,000 IU), vitamin D3 (3,000,000 IU), vitamin E (30,000 IU), vitamin K (2.3 g), vitamin B1 (2.0 g), Riboflavin (5.0 g), Pyridoxine (3.0 g), vitamin B12 (160 g), Biotin (60 g), Niacin (31 g),Panthotenic acid (8 g), Folic acid (1 g), Mamganese (85 g), Zinc (50 g), Copper (6 g), Iodine (1 g), Swlenium (120 g), Cobalt (220 g), Chloride (200 g), Antioxidant (125g).

Table 3: Growth performance and cost benefit of local strain turkeys fed indomie waste-based diets (0-8 weeks)

Parameters	T1 (0% IW)	T2 (33.33% IW)	T3 (66.675% IW)	T4 (100% IW)	SEM
Initial weight (g/bird)	36.67	36.00	36.50	36.00	0.02
Final weight (g/bird)	1100.00^{c}	1160.00^{b}	1250.00^{a}	1163.33^{b}	1.14
Weight gain (g/bird)	1063.33^{c}	1124.00^{b}	1213.50^{a}	1127.33^{b}	1.14
Total feed consumed (g/bird)	3366.67	3356.67^{bc}	3370.00^{a}	3403.33^{c}	2.53
Feed conversion ratio	3.17^{a}	2.99^{c}	2.78^{d}	3.02^{b}	0.01
Cost per kg feed (N/kg)	107.61^{a}	98.44^{b}	96.26^{b}	94.09^{b}	2.69
Mortality (%)	0.00	4.15	0.00	4.15	0.86

abc = Means on the same row having different superscript are significantly different
SEM = Standard error of mean

Table 4: Carcass and organ yield of local turkeys fed indomie waste-based diet

Parameters (%LW)	T1 (0% IW)	T2 (33.33% IW)	T3 (66.675% IW)	T4 (100% IW)	SEM
Final weight (g/bird)	1100.00^{c}	1160.00^{b}	1250.00^{a}	1163.33^{b}	1.14
Breast	16.92	17.23	19.10	17.24	0.84
Thigh	14.55	15.31	16.97	15.53	0.93
Wings	10.01	10.94	11.31	10.98	0.39
Back	13.48	14.55	15.67	14.73	0.78
Neck	4.04	4.48	4.89	4.56	0.67
Drumstick	9.72	9.89	10.44	10.01	0.48
Kidney	0.18	0.19	0.19	0.19	0.01

Liver	1.80	1.85	1.92	1.86	0.03
Heart	0.42	0.48	0.49	0.48	0.03
Gizzard	3.78	3.80	3.82	3.81	0.04

abc = Means on the same row having different superscript are significantly different *%LW = Percentage Live weight
SEM = Standard error of mean

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