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Full length Research paper

Cadaver, limb Weights and Egg value Characteristics of Guinea poultry Layers Feed unstable Levels of fat soar Pea folio (*Centrosema pubertal*) food.

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This examination was led to research the impacts of various protein levels on development of guinea fowl keets (*Numidia meleagris*) of a similar age under escalated framework in a normal poultry house from sixth week to twelfth seven day stretch of age. They were nourished business oven starter for about fourteen days and kept up on same eating routine of 18% rough protein for 5 weeks of age and given water not indispensable. The winged animals were isolated into three pens. One hundred and twenty old guinea fowls were relegated at producer period on 3 dietary protein levels of 14, 16 and 18% rough protein (CP) on same metabolizable vitality level of 2800 kcal/kg. The investigation directed at the Poultry Unit of Teaching and Research Farm, Edo State Polytechnic was utilized to test the exhibition of the guinea fowl layer flying creatures. The flying creatures were murdered at the proprietor's ranch by carving the neck through the jugular vein. There was noteworthy contrast (P<0.05) in feed admission between the three medicines. The inside organs for the medications were not altogether extraordinary.

Keywords:cadaver, limb Weights, Egg value, Guinea Poultry Layers, fat soar Pea folio (*Centrosema* ***pubertal***) Food.

INTRODUCTION

Guinea fowl (*Numidia meleagris)* originated in Africa (Embury 2001). There are two types of guinea fowl species namely; *Numidia ptilorhycha* and *Numidia meleagris*. The *Numidia ptilorhycha* is indigenous to the deciduous rain forest zone of southern Nigeria while *Numidia meleagris* is currently domiciled in the northern part of Nigeria but it is spreading to other smallholder farming areas (Ayorinde, 1991). This indigenous species makes significant contributions to animal protein through cheap meat and eggs which serve as a buffer to shortages of poultry products. This in turn provides sustenance to the rural populace which is dominated by poor and low income earners (Osagie and Oga, 2017).

In general, it is believed that guinea fowls are more resistant to most diseases of chicken and has greater capacity to scavenge for grains and insects than chickens (Betu, 2018a). Due to these comparative advantages, there is an increase interest in guinea fowl rearing and production in Nigeria.The major problem of the poultry production in Nigeria is that of low productivity and inefficiency in resource allocation and utilization (Ahaotu, 2018b). The poultry industry in Nigeria is characterized by high production costs, low profit margins and high feed bills. Ahaotu (2018c) showed that increase in livestock production in Nigeria derives mainly from average expansion rather than higher intensification and productivity of resources. This implies that the present production and supply chain is inadequate (Ahaotu and Agunnanne, 2017), hence the need to provide present and intending farmer with useful information that will assist and sustain poultry industry in Nigeria.

Poultry play significant role in the provision of animal protein required by man to meet his daily protein intake. Capital invested in poultry business is quickly returned, because birds reproduce quickly, highly prolific, efficient feed utilization and birds are not discriminated against bother ligiously and nutritionally. The feed crises facing

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poultry industry in Nigeria strongly indicate the need to investigate and utilize cheap and easily obtainable nonconventional feed resources. One of such nonconventional feed resources is leaf meal. The protein from leaves may be recovered and be fed to farm animals as solution in form of leaf protein concentrates (Ayo-Enwerem *et al.,* 2017).

Eggs and poultry meat can play a significant role in overcoming protein malnutrition which is a common problem in many African countries (Ahaotu *et al.,* 2017b). High yielding exotic poultry have ability to adopt climatic conditions of these countries and also have considerable potential in fulfilling this protein gap (Onyekwere *et al.,* 2016). Continuous rising cost of poultry feeds is a major problem for developing countries, feed cost is about 65 - 80% of total cost of production (Ahaotu *et al.,* 2017a) and it is very high as compared to developed countries where it comes about 50 - 60% only (Ahaotu et al., 2017c). Therefore, there is a need of finding out some locally available, affordable and relatively all year round available alternate protein supplementation of unconventional protein, which can reduce cost of production. Various leaf meals have been used in poultry diets, including those of leucaena (Ayo-Enwerem *et al.,* 2008), amaranthus (Ahaotu *et al.,* 2015), Centrosema (Ahaotu *et al.,* 2018a), and cassava (Ezeafulukwe *et al.,* 2017). Ahaotu *et al.,*(2018b) recommended 5.0 and 10.0% dietary inclusion levels of leaf meals for broiler chicks and laying hens, respectively. Onumajuru (2017)recommended 2% *Mimosa in visa* and *Puerairiaphaseoloides* leaf meals for broiler chickens and 2.5%*Centrosemapubescens* for broiler starters and finishers.

Nwafor and Onyebuchukwu (2017) noted that major constrains of leaf meal utilization in non-ruminants nutrition are relatively high fibre, low energy, anti-nutritional factors and reduced feed in take.*Centrosema pubescens* is vigorous, trailing, twining and climbing perennial herb with trifoliate leaves(Amajioyi, 2017). The authornoted that green matter yield of *C. pubescens* variedfrom 13.5 to 40t/ha/year. Amajioyi (2017) further reported that biomass and dry matter yield of *C.pubescens* was 7.34-7.56 and 3.75-3.78t/ha/year, respectively. However, the use of Centrosema leaf meal (CLM) as protein supplement, inpullet chicks and growing pullets nutrition is limited,unlike other leguminous and non-leguminous leaf meals (*Gliricidia sepium, Leucaena leucocephala,Tridax procumbens and Manihot esculenta*). *Centrosema pubescens* is in abundance in humid tropical environment.The objectives of this study are to evaluate the performance of guinea fowl (*Numidia meleagris*) layers feed CLM supplement and assess the laying ability of CLM supplementation on guinea fowl (*Numidia meleagris*) layers.

MATERIALS AND METHODS

The experiment was carried out at the Teaching and Research Poultry Unit of Imo State Polytechnic Umuagwo, Nigeria. This experiment lasted for a period of five weeks. The mean annual rainfall recorded was 1398mm while mean monthly temperature of 22.71ºC and average monthly relative humidity of 75.54% were also recorded (IMLS, 2016). A total of 60guinea fowl layers were used in the experiment. Tender leaves of *Centrosema pubescens were* harvested from and around the paddocks in Teaching and Research Poultry Unit of Imo State Polytechnic Umuagwo, Nigeria. The leaves were detached from the stems and were air and sun-dried for 2-3 days to a moisture content of about 12%. The dried leaves were milled using a hammer mill with a sieve/screen size of 2.0-3.0mm. Samples of the leaf meals were collected for proximate and chemical analyses, while some were incorporated into the diets. Diets A,B,C, D and E contained 0,20, 30,60and 80/kg feed of each forage meal respectively.

The 60guinea fowl layers fed *Centrosema pubescens* (CLM) leaf meal supplement had four treatments each which contained 0, 3, 6, 9 and12 g/kg CLM. The diets were formulated according to (Nwafor and Onyebuchukwu, 2017) and ingredients were constant, except the test ingredient (the leaf meal), soybean meal and groundnut cake. The test ingredient replaced some percentages of soybean and groundnut cake in each experiment weight for weight. Proximate composition of the diet is shown in Table 1 while Gross composition of control diets is presented in Table 2. The birds were randomly allotted to the aforementioned dietary treatments in each experiment. Each treatment was replicated three times in a completely randomized design. Data onfeed intake were taken on daily basis, while weight gains were taken on weekly basis.

Routine management practices and medication were taken as and when due. Proximate and mineral composition of the test ingredients were determined by the methods of (AOAC, 1990) while their metabolism able energy (ME) and gross energy were determined (Hetland*et al.,* 2017). Phytate was determined by the technique of (Igbedioh *et al.,* 1994) while tannin and oxalate were evaluated by the method outlined (Hagerman and Lerl, 1983). Data on feed intake feed, weight gain and feed conversion ratio were subjected to one-way ANOVA analysis of variance procedure of (SAS, 2002). Duncan's Multiple Range Test (Steel and Torrie, 1980) was used in assessing the significant differences among the treatments.

Feeds and water were supplied *ad-libitum.* Routine management practices and medication were carried out accordingly. The birds were raised on deep litter floor covered with wood shavings. Each pen measured 1.5 m by 2 m. Data on feed and water intake were taken on daily basis, while weight gain was recorded on weekly basis and feed conversion ratio (FCR) was calculated based on the data from feed intake and weight gain. An

Table 1 Proximate Chemical Composition of Centrosome(*Centrosome Pubescens*) leaf meal

Fraction	**(% on Dm basis)**
Dry matter	88.00
Crude protein	22.45
Ether extract	3.00
Crude fibre	6.43
Ash	7.74
Nitrogen free extract	60.38
Gross energy (Kcal/kg)	+ 4402
Phosphorus	0.53
Calcium	0.80
Potassium	0.72
Magnesium	0.30
Sodium	0.20

+Estimated by procedure of Peiretti (2005)

Table 2. Gross Composition of Experimental Guinea Fowl Layer Diets

	Dietary Treatments				
	A	**B**	**C**	**D**	
Ingredients					
Maize	44.00	44.05	44.00	44.00	43.00
Com bran	18.05	19.00	18.00	17.00	17.00
Soybean	20.60	17.60	16.50	15.50	13.50
Groundnut Cake	10.00	9.00	8.15	7.15	7.15
CLM level	0.00	3.00	6.00	9.00	12.00
Fish meal	4.00	4.00	4.00	4.00	4.00
Bone meal	2.60	2.60	2.60	2.60	2.60
Vitamin/ mineral premix*	0.30	0.30	0.30	0.30	0.30
Salt	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10
Calculated Analysis					
Crude Protein (%)	22.28	21.50	21.45	21.15	21.04
Crude fibre (%)	4.72	4.46	4.29	4.25	4.27
MetabolizableEnergy Kcal/kg)	2997	2983	2966	2947	2918

economic appraisal of the study was done to highlight the efficiency of the CLM in terms of profits margin.

RESULTS AND DISCUSSION

The final body weight (FBW), mean body weight gain (MBWG),total feed intake (TFI), feed conversion ratio (FCR), daily protein intake (DPI), protein efficiency ratio (PER) were significantly (p<0.05) affected by the dietary inclusion of the CLM for PC. The results of final body weight (FBW), mean body weight gain (MBWG) and feed conversion ratio (FCR) are significantly different (P<0.05) and progressively decreased with increased dietary concentrations of CLM (Table 3). Similar observation was made by Nwafor and Onyebuchukwu (2017) when guinea fowl layers were fed graded levels of CLM and Amajioyi (2017) when guinea fowl layers were fed more than 5% dietary inclusion of CLM. The value of the FCR (2.46 – 3.15) in this study was higher (2.03 – 2.13) than the reports of Ahaotu *et al*., (2018b). The results of this trial agreed with earlier observation that dietary inclusion of leaf meals of *L. leucocephala,* G. *sepium,* C. *cajon, S. sesban* and *M. esculenta* depressed growth, feed intake, FCR and growth rates of chicks at levels ranging from 75 - 100g/kg (Ayo Enwerem *et al.,* 2017; Amajioyi, 2017, Ahaotu *et al*., 2015). However, results of the present study clearly represented that inclusion of 3% and above

Table 3 Mean (± Standard deviation) Carcass Characteristics of Guinea Fowls reared under Intensive Management Systems

Carcass traits	**Intensive**
Body weight before slaughter	$1110^{a} \pm 93$
Dressed weight	$838^{a} \pm 77$
Dressing percentage	75.4
Total edible meat (TEM)	$443^{a} \pm 66$
1PDW	52.9
Flesh to bone ratio	1.6^{b}
Cut parts (g)	2^{a}
Neck	$65.5^{a} \pm 5.3$
Skin	$73.9^{a} \pm 9.3$
Thigh	$131.7^{a} \pm 15.5$
Drumstick	$105.6^{a} \pm 11.1$
Breast	$260.8^{a} \pm 33.0$
Wing	$121.3^{a} \pm 10.7$
Back	$130.0^{a} \pm 15.3$
Muscle of cut parts (g)	
Thigh	$100.4^{a} \pm 12.6$
Drumstick	$73.9^{a} \pm 8.9$
Breast	$179.6^{a} \pm 30.7$
Wing	$56.2^{a} \pm 9.5$
Back	$34.1^{a} \pm 7.3$
Bones of cut parts (g)	
Thigh	$18.6^{a} \pm 1.3$
Drumstick	$24.5^{a} \pm 2.3$
Wing	$45.1^{a} \pm 4.5$
Back	$78.1^{a} \pm 7.1$
Breast	$55.4^{a} \pm 4.9$

1PDW- Total edible meat as a percentage of dressed weighta-bMeans with different superscripts across rows differ ($p < 0.05$)

CLM depressed growth rate. The present results on weight gain are contrary to the submission of Omeje *et al*., (1997) who concluded that 5 -10 percent CLM resulted to elevation of weight gain in broiler chickens.

The crude protein (CP)value of CLM in this study is higher than the report of Aletor and Omodara (1994) (12.50%), but similar to the submission of Nworgu *et al*. (2005). The calcium and phosphorus concentrations for CLM in the present study are higher than that reported by Raharjo *et al*. (1986) whose values were 0.72 and 0.23% for calcium and phosphorus, respectively.

However, in the present study 2-6% of CLM resulted to depression of growth of the pullet chicks. This result is contrary to that reported by Omeje *et al*.(1997) who concluded that 5.0-10.0% of CLM resulted to elevation of weight gain and Nworgu (2004) who recommended 2.5-5.0% CLM for broiler chicks and broiler finishers.

cadaver composition

cadaver composition of guinea fowls (Table 3) indicate that the guinea fowls reared under intensive management had significantly higher ($p < 0.001$) body weight, dressed weight and total edible meat than those under the semi-extensive management system. In addition, the weights of all the dissected parts, muscles and bones, except for the skin of guinea fowls under intensive management system were higher ($p < 0.05$) than those of the semi-extensively reared group.

The dietary protein level did not influence increase in dressing percentage, weight of heart, spleen, liver, empty gizzard and kidney (Table 4). The length of the oviduct was not influence by increased dietary protein.

All parameters except body weight (live weight) were not significantly different. Body weight increased significantly ($_{p}$<0.05) with increased dietary protein. Ayorinde (1991) reported very low live body weights of 245.20 to 726 g at 12 weeks of age as compared with this study which reported 1.21 to 1.47 Kg at 12 weeks of age. However, heart weight, spleen weight and oviduct length tended to decline with increased protein level. Guinea fowl are reported to grow slowly and utilize feed less efficiently than chickens (Olomu, 1983). The problems of growth in guinea fowls can be associated with nutrition and selection. One cannot be sure that the birds were fed optimally. Though guinea fowls have similar gastrointestinal tract is may not be correct that it translate into similar nutrient requirements. There are other factors as genetics which contribute to the nutrient requirements. Various researchers have recommended high protein levels of 15-26% for good performance of guinea fowl with reduction as bird's mature (Nwagu and Alawa, 1995). Sales et *al.*, (1997) reported live weight of 1.56 at 12 weeks of age and it is higher than what it was

Table 4 Effects of Organ Weight parameters of guinea fowl fedvarying levels of crude protein

Parameters	14%CP	16%CP	18%CP	LOS
Body weight (Kg)	1.21[a]	1.37[b]	1.47[c]	*
Dressing percentage (%)	87.5	87.6	87.5	ns
Heart weight/kg live weight (g)	3.89	3.86	3.85	ns
Spleen weight/kg live weight	1.98	1.94	1.94ns	
Empty gizzard weight (kg) live weight	26.53	27.50	26.48	ns
Liver weight g/kg live weight	22.13	22.21	22.20	ns
Abdominal fat g/kg live weight	21.13	21.16	21.22	ns
Small intestine (cm)	130.23	130.45	130.43	ns
Oviduct length (cm)	8.75	8.74	8.73	ns
Kidney g/kg live weigh	4.56	4.63	4.59	ns

Means bearing different superscripts are significantly different (P<0.05)

Table 5. External Egg Quality Characteristics of Guinea fowl

Parameter	Naked	Normal	Dwarf
Egg weight (g)	49.79a±0.28	48.21a±0.34	41.32b±0.36
Egg length (cm)	5.27a±0.02	5.31a±0.03	5.05b±0.03
Egg width (cm)	4.10a±0.01	4.06b±0.01	3.77c±0.01
Shape index (%)	78.04a±0.31	76.80b±0.38	74.87c±0.39
Shell weight (g)	5.82a±0.16	6.17a±0.19	4.85b±0.20
Shell content (%)	11.72± 0.32	12.84±0.38	11.76±0.41
Shell thickness (mm)	0.38b±0.006	0.41a± 0.007	0.38b±0.007
Egg surface area (cm3)	67.74a±0.40	67.48a±0.47	59.63b±0.50

Means with different superscripts within a row are significantly different from each other (P≤0.05)

found in this study. The live body weights of the birds were between 1.21 to 1.47kg at 12 weeks of age. Nsoso *et al.,* (2006) reported low growth rates of 1.29kg and 1.22kg respectively. The authors further reported very low body weight of three breeds of guinea fowls at 0.510kg, 0.466kg and 0.478kg respectively as compared to this study which recorded 1.21, 1.37 and 1.47kg of body weight during 12 weeks of growth. There was no difference in length of oviduct of the birds fed the different protein levels at 12 weeks of age. There was no mortality in the dietary treatment groups.

External egg quality traits

There were no significant differences in egg weight, egg length, egg shell weight and egg surface area among the guinea fowls (Table 5). The egg weight, egg length, egg shell weight and egg surface area of the guinea fowl layers were however significantly higher than those of their age-matched (Chukwu et al., 2013). Similar egg weight between the naked neck and normal strains of Tswana chickens is consistent with Ahaotu and Agunnanne (2017) however reported significantly heavier eggs in the naked neck than in the normal strain of Nigerian indigenous guinea fowls. The egg shell content (expressed as a ratio of eggshell weight to total egg weight) did not differ significantly.

DISCUSSION

The management systems had effects on growth and carcass yield of guinea fowls; this was most likely due to differences in feed composition and intake levels. The mean percentage of CP (14.8%) obtained inthis study is higher than that obtained from village chicken crop contents of about 9.4%CP (Roberts, 1999). However, the quality of the feed consumed was compromised by the intake of a high proportion of pebbles observed in the crop and gizzard contents and is lower than their requirements for optimum meat yield (Okonkwo and Ahaotu, 2014). The high proportion of pebbles is associated with the pecking of feed on the ground, which also resulted in high ash content (43.2%) of the diet. The high level of pebbles could improve the digestion of feed in the gizzard in free ranging birds. Research carried out in Nigeria and elsewhere revealed that guinea fowls under intensive management perform well when fed a diet containing 200 g CP /kg DM and 12.11 MJ/kg DM from 5 to 8 weeks and 160 g CP /kg DM and 12.53 MJ/kg DM from 9 to 16 weeks of age (Embury 2001). The energy level of guinea fowl diets under semi-extensive management of 9.38 MJ ME /kg DM is much lower than their requirements considering that there is need for more energy for movement in search of food and running away from predators.

The sub-optimal nutrition obtained by scavenging guinea fowls was evidenced by inferior weight gains and carcass yield. Body weights of intensively managed flocks at 12 weeks of age of 807 g and 1072 g at 16 weeks of age were comparable with those of improved guinea fowl breeds of 774.8 g (Ayeni*et al.,* 1983) and 985.04 g (Ayorinde, 1991), respectively. However, the exotic guinea fowl weights at 12 weeks, which ranged between 1208 and 1550 g (Ayorinde, 1991) are higher than those of the current breeding stock in Nigeria.

Elsewhere, free ranging guinea fowls aged between 15 and 20 week achieved 1 to 1.5 kg body mass (Belshaw, 1985), which is well above that recorded in this study for the semi-scavenging guinea fowls. This could be attributed to the differences in the growth potential of the guinea fowl stock, the scavenging resource base and feed supplementation. The numerically higher mortality of guinea fowls under semi extensive management system (16.7%) was mainly caused by predators and is characteristic of free-range village poultry production systems (Kusina*et al.,* 2012).

Mortality of guinea fowls under the intensive management system (3%) was mainly caused by internal parasites (round worms) and this could be attributed to inappropriate housing floor and bedding management. The carcass yield of guinea fowls under the semi-extensive management system (620 g) was inferior to that of birds reared under intensive management (838 g). The dressing percentage of the guinea fowls of 75.4% and 71.6% for the intensive and semi-extensive group, respectively, were higher than that of 68% reported by Ayorinde (1991), but were lower than the 87.4% reported by Adeyemo and Oyejola (2004) for 10 weeks old guinea fowl pullets. In addition, the birds under the intensive management system were well-fleshed, with a meat to bone ratio of 2:1 which was numerically higher than that obtained for the semi-extensively managed birds of 1.6: 1 but both were inferior to that of 2.3: 1 reported by Belshaw (1985). This variation could be attributed to differences in the diet of the guinea fowls and their management. The cadaver grades fell under classes B and C for the intensive and semi-extensive groups, respectively according to the poultry classification system (Panda, 1998).

The weight of cut parts and muscle tissue were directly related to the dressed carcass and total meat yields and the proportions are comparable to those reported by Ayeni *et al.* (1983) for guinea fowls and other poultry species. The average percentage crude protein (CP) of the guinea fowl meat from both management systems was within the range of 20 to 25% reported elsewhere in Europe and India (Belshaw, 1985 and Panda, 1998). Although management system did not significantly affect (p > 0.05) chemical composition of guinea fowls in this study, the cold dressed guinea fowl carcasses of the intensively reared guinea fowls had numerically lower percentages of DM and fat but had higher CP and ash (on DM basis) percentages than those of the semi-extensively managed group. This is consistent with the norm that the percentage moisture and protein is inversely related to fat content (Panda, 1998).

This also shows that birds under the semi-extensive management system were feeding to meet their energy requirements at the expense of weight gain leading to accumulation of more subcutaneous and intramuscular fat than in the intensive group. Although it was more profitable for smallholder farmers to rear the guinea fowls under a semi-extensive management system, there is need to supplement the energy component of the diet to balance the protein and energy levels. This could improve the fleshing of the guinea fowls which is necessary if the birds are sold as dressed carcasses for lucrative markets such as restaurants and hotels. Although the birds under intensive management gained more weight, the inherent low feed conversion efficiency of guinea fowls (Ayorinde, 1991; Adeyemo *et al.,* 2006, Adeyemo and Oyejola, 2004) and the high cost of conventional feeds in Nigeria does not warrant recommending this management system for smallholder guinea fowl farmers.

CONCLUSION

The results obtained from this study suggest that growth and carcass yield of guinea fowls under the semi-extensive management were suboptimal. However, it was more economical to rear the guinea fowls under the semi-extensive than under the intensive management system. Although the low input semi-extensive management system being practiced by the farmers is favoured economically the inferior carcass yield may not be suitable for lucrative commercial markets.

The body weight gain increased with increasing dietary protein. Average feed intake increased with increased dietary protein. Feed conversion ratio decreased with protein increase. It is interesting that no mortality occurred during the study. Guinea fowl production performance was influenced by location where significant differences were observed on the cumulative mortality, the amount of egg collected as well as on the number of egg sold per keeper. We could conclude that the productivity of guinea fowl did not depend only of the number of females but it might be due to others factors such as the location and the possibilities for selling the products.

Selection for higher egg weight in the guinea fowl is likely to lead to improvements in other egg quality traits such as egg length, egg width, egg volume, egg surface area, albumen weight and yolk weight and the greatest improvement in correlated egg quality traits.

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Figure1: Pearl guinea fowls in a deep litter house

Figure: Guinea Fowl Eggs

Figure 4: Guinea Fowl Layers