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Effects of Increasing Blood Meal and Reducing Synthetic Lysine in the Diet on Performance of Layers

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Abstract

A total of seventy-two (72), thirty-three weeks old Nera black strain of laying birds were used to study the effects of increasing blood meal and reducing synthetic lysine in the diet on the performance of layers in a completely randomized design experiment. The birds were divided into three treatment groups of 24 birds each and each group was further divided into 3 replicates of 8 birds per replicate. Three experimental diets (T₁, T₂ and T₃) were used. T₁ contained 2.200 % blood meal and 0.250 % synthetic lysine; T₂, 3.600 % blood meal and 0.125 % synthetic lysine; and T₃, 5.000 % blood meal and 0.000 % synthetic lysine. Lysine contribution from blood meal and synthetic lysine alone in T₁, T₂ and T₃ diets were 0.448 %, 0.449 % and 0.450 %, respectively. The crude protein content of the diets ranged from 17.800 – 18.509 % while the energy content ranged from 10.915 to 11.061 MJ/Kg ME. The birds were reared on deep litter following conventional practice. Feed and water were provided *ad-libitum*. Eggs were collected and recorded daily on the replicate basis. At the end of the experiment, two eggs from each replicate were weighed and used to calculate average egg weight. Cost of feed production was calculated and used to calculate feed cost per dozen eggs. Results showed that birds with 5.0 % blood meal without synthetic lysine converted feed to eggs more efficiently than the other groups despite lower feed cost recorded by this group. It was concluded that laying birds can be fed up to 5.0 % blood meal in their diets without synthetic lysine to enhance economic gains.

Keywords: Blood meal, synthetic lysine, poultry feed, layers, egg

Introduction

Poultry industry has become the predominant protein source in the diet of the people of most developed and developing countries. Poultry eggs constitute one of the most valuable sources of animal protein recommended for human consumption, and offers means of solving the problems of animal protein shortage especially in rural areas in many African countries (Olawoyin, 2006). There is, however, low level of animal protein consumption in Nigeria (Oluyemi, 1996). The level is estimated at 8.27 g per caput per day as against the recommended 35 g per caput per day. Poultry products (meat and eggs) are sure options for reducing the incidence of malnutrition, particularly protein deficiency in diets of Nigerians (Omoikhoje *et al.*, 2017). Poultry meat and eggs are widely accepted for human consumption and the industry has quick returns on capital investment (Alabi *et al.*, 2016).

Poultry production enterprises are the fastest growing industries in the animal production sub-sector particularly in tropics and sub-tropics (Ajakaiye *et al.*, 2010). However, a problem encountered in modern poultry production is its capital-intensive nature occasioned by high feed prices. Approximately 70 – 80 percent of the variable cost of poultry production is contributed by feed alone (Esonu, 2000). This leads to high cost of poultry products and consequent reduction in their demand. This problem may, however, be mitigated by the use of relatively cheaper feedstuffs in feeding poultry. This will boost egg production and make eggs available to all and sundry.

The incorporation of synthetic amino acids (such as lysine) in poultry diets in order to achieve the required balance in essential amino acid profile is one practice which increases feed cost. In Nigeria, however, synthetic lysine is imported and expensive and may not be within the reach of local farmers. Natural locally available and less expensive sources of animal protein supplements that are rich in lysine should, therefore, be incorporated in poultry feeds to supply lysine as a replacement for synthetic lysine. Blood meal is an example of such feedstuffs (Odukwe and Njoku, 1987). It has 80% protein (Olomu, 1995) and 8.98% lysine (NRC, 2001). Blood from which blood meal is prepared abounds in Nigerian abattoirs and can be freely collected (Awonorin, 1991). It may be more profitable to include blood meal in diets for broiler chickens than crystalline lysine. The inclusion of blood meal at 5% level would cancel the necessity for synthetic lysine supplementation, especially in broiler finisher production (Egenuka *et al.*, 2015).

The objective of this study was, therefore, to investigate the effects of increasing blood meal and reducing synthetic lysine in the diet on performance of layers.

Materials and Methods

This study was carried out at the poultry unit of Teaching and Research Farm of Federal University of Technology, Owerri, Imo State, Nigeria. The blood meal, synthetic lysine and other feedstuffs used in this study were procured from a commercial feedstuff dealer in Owerri. The blood meal was the sun-dried type.

Three experimental diets were formulated and fed to the birds. Diet 1 (T₁) which is the control diet contained 2.2 % blood meal and 0.25 % synthetic lysine; diet 2 (T₂) contained 3.6 % blood meal and 0.125 % synthetic lysine and diet 3 (T₃) contained 5.0 % blood meal and 0.0 % synthetic lysine. The ingredient and calculated chemical composition of the experimental diets are presented in table 1. The calculated lysine contribution from blood meal and synthetic lysine supplementation alone in T₁, T₂ and T₃ diets were 0.448 %, 0.449 % and 0.450 %, respectively.

Seventy-two (72), 33 weeks old Nera Black breed of laying birds procured from a commercial poultry dealer in Owerri, were used in this experiment. They were bought at 32 weeks of age and were given anti-stress and antibiotics on arrival. In addition, they were given a proprietary layer mash for one week. They were then divided into three treatment groups of twenty-four (24) layers each. Each treatment group was further divided into three (3) replicates of 8 birds each in a completely randomized design experiment. The birds of each replicate were kept in a pen measuring 1 m x 1 m with wood shavings spread on the floor as the litter material. Feed and water were offered to them *ad-libitum*. Eggs from each replicate were collected and recorded daily. Antibiotics, multivitamins and vaccinations were administered when necessary. The experiment lasted 12 weeks and was terminated when the birds were 45 weeks of age.

Table 1: Ingredient and calculated chemical composition of the experimental layers diet.

Ingredients	Treatments		
	T1	T2	T3
Maize	38.500	38.500	40.000
Palm kernel cake	26.000	27.000	25.000
Soybean meal	3.000	3.000	3.000
Blood meal	2.200	3.600	5.000
Fish meal	3.000	2.000	1.000
Brewer's dried grain	10.500	9.225	9.450
Wheat offal	7.000	7.000	7.000
Bone meal	5.000	5.000	5.000
Limestone	3.500	3.500	3.500
*Vitamin/mineral premix	0.250	0.250	0.250
Salt	0.250	0.250	0.250
Lysine	0.250	0.125	0.000
Methionine	0.250	0.250	0.250
Total	100.000	100.000	100.000
Calculated composition (%)			
Crude protein	17.800	18.152	18.509
Crude fibre	6.114	6.082	5.916
Crude fat	4.853	4.760	4.629
Calcium	3.347	3.320	3.290
Phosphorus	1.406	1.385	1.366
Calculated total lysine	0.831	0.908	0.983
Metabolizable energy (MJ/Kg)	10.915	11.061	11.000

*AGRITED: A complete range of vitamins and trace minerals formulated to provide; Vitamin A – 10,000,000 iu; Vitamin D3 – 2,000,000 iu; Vitamin E – 12,000 iu; Vitamin K – 2 iu; Thiamin (B1) – 1.5 gm; Riboflavin (B2) – 5 gm; Pyridoxin (B6) 1.5 gm; Vitamin B12 – 10 mg, biotin – 20 mg; niacin – 15 gm; Pantothenic acid – 5 gm; Folic acid – 0.6 gm; manganese – 75 gm; zinc – 50 gm; iron – 25 gm; copper – 5 gm; iodine – 1 gm; selenium – 100 gm; cobalt – 300 mg; B. H. T. – 125 gm; Cholin chloride – 150 gm.

The birds were weighed at the end of the experiment to get the final weight. Feed intake for each replicate was recorded every morning as the difference between the quantity of feed offered in the morning and the leftover feed the next morning. The quantity of eggs collected from each replicate was recorded daily and used to calculate hen-day egg production. At the end of the experiment, two eggs from each replicate were weighed and used to calculate average egg weight. Cost of feed production was calculated based on the prevailing cost per kilogram of feed ingredients at the time the experiment was conducted. This was then used to calculate the cost of total feed consumption and the cost per dozen eggs.

All data collected were subjected to analysis of variance (ANOVA). Significantly different means were separated using Least Significant Difference (Steel and Torrie, 1980) at 5 % level of probability.

Results and Discussion

The performance of the layers fed different levels of blood meal and synthetic lysine is shown in table 2. There was a significant difference ($p < 0.05$) in feed conversion ratio while all other parameters measured were similar ($p > 0.05$). The final body weight, average daily feed intake and hen-day egg production decreased from the control group in T₁ to the group in T₃. Average egg weight was higher in T₃ group

Table 2: Performance of layers fed different levels of blood meal and synthetic lysine

Parameters	Treatments			SEM
	T1	T2	T3	
Final body weight (g)	1500.00	1492.00	1491.70	36.68
Average daily feed intake (g)	116.67	109.00	104.33	3.24
Average egg weight (g)	36.07	34.32	39.61	1.75
Feed conversion ratio	3.25 ^a	3.18 ^a	2.64 ^b	0.10
Hen-day egg production (%)	67.34	64.75	62.38	1.80
Cost of total feed consumed (₦)	662.41	606.04	573.32	-
Feed cost (₦)/dozen egg	140.26	133.64	131.70	2.78

^{a, b} Means within a row with different superscripts are significantly different ($P < 0.05$).

This was followed by the control group and then T₂ group. Feed conversion ratio was better in T₃ group, than in T₂ and the control groups which had similar values. Feed cost per dozen eggs decreased across the treatment groups though the differences were similar ($p > 0.05$). Of all parameters measured, only the feed conversion ratio was significant ($p < 0.05$) while all other parameters were similar ($p > 0.05$). The improved feed conversion ratio recorded by the T₃ group of birds suggests that the layers efficiently converted higher blood meal diets and zero synthetic lysine to eggs despite the lower feed intake. This result supports earlier reports that it was more profitable to include blood meal in broiler diets than crystalline lysine (Egenuka *et al.*, 2015). The 5.0 % blood meal group also recorded higher but non-significant egg weight supporting the better performance of this group.

The decrease in feed intake with an increase in blood meal and reductions in synthetic lysine may have resulted in the decreased hen-day egg production observed across the groups. The non-palatability of blood meal may have resulted in the decreased feed intake. Donkoh *et al.* (2001) had also reported that sun-dried blood meal given at 4.5 % of the diet had a positive effect on layer performance (feed intake, live weight gain, egg weight and yolk colour).

Conclusion

Laying birds can be fed up to 5.0 % blood meal in their diets without synthetic lysine to enhance economic gains.

References

- Ajakaiye, J.J., Joamchim, J., Joseph, O.A. and Sunday, A.O. (2010). Effect of heat stress on some blood parameters and egg production of Shika Brown layer chickens transported by road. *Biol. Res.*, 43:183 – 189.
- Alabi, O.J., Adama, J.Y., Fasanya, O.O.A. and David, O.M. (2016). Response of finishing broiler chickens to diets containing rumen liquor fermented rice husk meal. *Nig. J. Anim. Prod.*, 43(1).
- Awonorin, S.O., Ekpe, E. and Oyewole, L.O. (1991). Production of livestock feeds from livestock wastes. *J. Agric. Sci. Technol.*, 1(2): 104 – 108.

- Egenuka, F.C., Omaliko, P.C., Aladi, N.O. and Okeudo, N.J. (2015). Effect of increasing dietary level of blood meal and reducing supplementary lysine on performance of broilers. *Intl J. of Agric. and Rural Dev.*, 18 (1): 2037 – 2042.
- Esonu, B.O. (2000). *Animal nutrition and feeding: A functional approach*. Rurkzed and Rucksons Associates, Owerri, Nigeria.
- NRC (2001). Nutrient requirement of dairy cattle, 7th Revised Edition. Committee on Animal Nutrition, Board on Agriculture and Natural Resources, National Research Council. National Academy Press, Washington DC.
- Odukwe, C.A. and Njoku, P.C. 1987. Evaluation of blood meal and its potentials as a supplementary source of lysine in laying chicken diets. *J. Anim. Prod. Res.*, 7(1): 9 – 18.
- Olawoyin, O.O. (2006). Evaluation of performance and adaptability of the local Nigerian and exotic Harco cockerels in the humid tropical zones. *Trop. J. Anim. Sci.*, 1: 63 – 71.
- Olayemi, J.K. (1996). Food security in Nigeria: The report of research study sponsored by Development Policy Centre, Ibadan, Nigeria.
- Olomu, J.M. (1995). *Monogastric animal nutrition: Principles and practice*. St. Jackson Pub., Benin City, Nigeria.
- Omoikhoje, S.O., Imade, J.E. and Odiase, M.O. (2017). Nutritive value of pigeon pea (*Cajanus cajan*) seeds soaked in wood ash extract as protein feedstuff for broiler chicken production. *Nig. J. Anim. Prod.*, 44(2): 101 – 111.
- Steel, R.G.D. and Torrie, J.H. (1980). *Principles and procedures of statistics. A biometric approach*, 2nd Ed. McGraw-Hill Books Co. Inc. New York.