EVALUATION OF PERFORMANCE INDICES OF LAYERS FED DIETS PREPARED FROM FOUR COMMERCIAL PREMIXES

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ABSTRACT

Nowadays, vitamin/mineral supplements for chickens are commercially produced, thus there is a need to evaluate these premixes. Four commercial premixes were coded A, B, C and D and used to formulated four experimental diets at their respective recommended inclusion level. 180 birds were randomly allotted to the four experimental diets with three replicates of fifteen birds each. Parameters considered were initial weight, final weight, weight gain, age at first egg, weight of the first egg, feed intake, average Hen Day Production (HDP), egg weight, Feed Conversion Ratio (FCR), mortality and economy of gain. The results revealed that there were significant ($p < 0.05$) differences across the treatments for egg production, final weight and feed conversion ratio. Average egg production and final weight of birds fed diet prepared from premix A had the highest values (79.83% and 1.43kg, respectively) while those fed treatment 3 had the lowest values (48.93% and 1.33kg, respectively). FCR of treatment D (2.96) was the lowest ($p < 0.05$) and significant to 5.58 recorded for treatment 3. Age at first egg, weight of first egg and age at 20% HDP were not significantly ($P<0.05$) affected by the treatment, however birds fed diet that was prepared with premix C had the poorest values (143days, 40.43g and 160.75days, respectively). Values recorded for premixes A, B and D were similar ($p < 0.05$). Premixes A, B and D adequately supported egg production as all the performance indices considered were appropriate while premix C did not support egg production optimally.

Keywords: Egg production; Feed Conversion Ratio; Layers; Performance and Premixes

INTRODUCTION

Nutrient is any feed constituent or group of feed constituents or a pure chemical compound that aids in the support of life. These consist of carbohydrates, protein, fat and oil, minerals, vitamins and water (Church and Pond, 2007. Although, vitamin and mineral nutrition play small part relative to complete nutrition, they have a crucial role in bird's well-being and performance, along with supporting crucial body functions e.g. performance, growth, fertility, immunity (Ewing and Charlton, 2007). Classical deficiency signs and non-specific parameters (for example, lowered production and reproduction rates) are associated with vitamin deficiencies or excesses.

Finished feed is incomplete in the absence of supplemented vitamins and minerals. Most feedstuffs (typically plant-based) are rich in protein and energy, but lack sufficient amounts of trace elements or certain vitamins (www.biomin.net>species>poultry). A premix must be added to poultry diets in order to achieve the sufficient level of vitamins and minerals and prevent birds from becoming malnourished.

Premixes are nutritional feed supplements added into the feed of farm animals to enhance their productivity and growth and it is combination of vitamins, minerals and some other chemicals (Leeson and Summer, 2005). Minerals are the inorganic elements of a bird's diet. They are required in small amounts to organic elements, but even so, they have a sizeable impact on the bodily functions of avian species. Appropriate amounts of different minerals are needed in poultry diets in order to maintain critical life functions, improve performance and deliver additional benefits (Kirchgeßner, 2004).

The various types of minerals in poultry diets have different effects and functions. Macro minerals are often components of structural tissue (e.g. bone, muscle, organs, soft tissue) or body fluids. They play a key role in the maintenance of the acid-base balance and osmotic pressure. In case of nervous transmission, muscle function and membrane electric potential, they are very crucial. Micro minerals include components of hormones, metallo-enzymes and enzyme factors, a few vitamins and amino acids. They are also related to adequate immune response and play a main role in the control of cell replication and differentiation ((Tanatarov, 1986; Church and Pond, 1988). Se, Mn, Zn, Cu, cobalt and iodine have to be supplemented to poultry diets, because the levels found in different feed raw

materials are often too low for reaching expected performance levels (Ewing and Charlton, 2007).

Macro-minerals are the major minerals found with more than 50 mg per kg body weight, examples are Calcium (Ca), Phosphorus (P), Sodium (Na), Potassium (K), Magnesium (Mg), Chlorine (CI) and Sulphur (S). Na, K and CL are also known as electrolytes (Jeroch et al., 2008}

Vitamins are active, organic compounds that are essential for body functions and have a crucial impact with only small amounts in the feed to maintain physiological functions. A few vitamins play a role as co-enzymes (e.g. B-vitamins), also as precursors of co-enzymes, in metabolic processes. The difference between vitamins and minerals is that vitamins do not provide energy (e.g. P is necessary for building up ATP, which is the energy source in the living organisms), nor act as building substances (e.g. Ca – bones, eggshells, teeth) (Jeroch et al., 2008 and Ewing and Charlton, 2007).

Vitamin and minerals are very essential in the diets and their main dietary inclusion is usually through premixes. There are so many premixes used in egg production chicken in Oyo State, Nigeria with varying results. Evaluation of those premixes is essential to be able to recommend the most appropriate premix (es) for optimum egg production results. This study was designed to evaluate four premixes used in egg producing chickens in Oyo State.

MATERIALS AND METHODS

The experiment was carried out at the poultry Unit, Teaching and Research Farm of Oyo State College of Agriculture and Technology Igboora. One hundred and eighty (180) point of lay birds were purchased from a reputable farm. The birds were grouped into 4 treatments (each group represented a premix) with three replicates of fifteen birds each. The experimental design adopted was completely randomized design and the deign abides strictly with Animal ethics. The four premixes were coded A, B, C and D and used to formulated the four experimental diets at their respective recommended inclusion level as shown in table 1. Parameters considered were initial weight, final weight, weight gain, age at first egg, weight of the first egg, age at 20% egg production, feed intake, average egg production, egg weight, Feed Conversion Ratio (FCR), mortality and economy of gain. Data obtained were subjected to analysis of variance using SAS (2000) package and where there were differences in the means, Duncan multiple range tests was used to separate the means.

Results and discussion

The results of the experiment showed significant ($p < 0.05$) differences across the treatments for Hen Day Production (HDP), final weight and feed conversion ratio as shown in table 2. However, feed intake, initial weight and weight gain were not significantly affected by the dietary treatments. It was discovered that the result of HDP for T1, T2 and T4 were similar ($p>0.05$), while the highest value (79.84%) was obtained in T1, the lowest percentage production was observed in T3 that recorded 48.93% egg production.

Result of the final weight also showed significant differences ($p<0.05$) across the treatments. The final weight of T1 and T4 were similar ($p>0.05$), so also T2 and T3, however, T3 recorded significant ($p<0.05$) lowest value (1.33kg/bird). The best feed conversion ratio (2.96) was obtained in T4 but similar values were recorded on birds fed T1 and T2 (3.18 and 3.46, respectively), while those fed diet prepared with premix C recorded the highest value (5.58).

Table 1: Gross composition of the four experimental diets

Premixes/ Ingredients	Treatment 1 Premix A	Treatment 2 Premix B	Treatment 3 Premix C	Treatment 4 Premix D
Premixes	5	2.5	0.3	0.3
Maize	50	50	54	54
Soya	20	22	22	22
Wheat offal	10	10	10	10
Corn bran	6	8	3	3

Oyster shell	9	7.5	8	8
Bone	-	-	2	2
Salt	-	-	0.3	0.3
Methionine	-	-	0.15	0.15
Lysine	-	-	0.15	0.15
Mycofix	-	-	0.1	0.1
Calc. Energy	2552	2547	2550	2550
Calc. Protein	16.91	16.26	16.03	16.03

Age at first egg, weight of first egg and age at 20% HDP were not significantly (P<0.05) affected by the treatment effects, however birds fed diet that was prepared with premix C had the poorest values (143days, 40.43g and 160.75days, respectively). The result of feed intake showed no significant (P > 0.05) difference across the treatment with the highest feed intake (125.86g/bird/day) obtained in T4, while the lowest feed intake (112.16g/bird/day) was recorded with the birds that were fed with T3. The result of the weight gain showed no significant (p > 0.05) difference across the treatments with the highest numerical value (0.31kg/bird) noticed in T1, while the lowest weight gain (0.23kg/bird) was discovered in T2. Mortality was not significantly affected as all the treatments recorded 0% mortality.

Premixes are nutritional feed supplements added into the feed of farm animals to enhance their productivity and growth and it is combination of vitamins, minerals and some other chemicals (Leeson and Summer, 2005). The results obtained from this study revealed that premix A, B, and D supported egg production of the experimental birds and showed that though, vitamin and mineral nutrition play small part relative to complete nutrition but they have a crucial role in bird well-being and performance, along with supporting crucial body functions e.g. performance, growth, fertility, immunity (Ewing and Charlton, 2007).

Table 2: Performance of Layers fed feed prepared with the four different vitamins and minerals Premixes

Premixes/ Ingredients	**Treatment 1 Premix A**	**Treatment 2 Premix B**	**Treatment 3 Premix C**	**Treatment 4 Premix D**	**SEM**	**R. value**
Egg production (%)	79.84[a]	78.92[a]	48.93[b]	78.92[a]	4.21	0.01
Initial weight (kg)	1.12	1.14	1.10	1.15	0.17	0.62
Final weight (kg)	1.43[a]	1.37[bc]	1.33[c]	1.40[ab]	0.14	0.01
Weight gain (kg)	0.31	0.23	0.24	0.25	0.02	0.57
Age at first egg (days)	140.00	141.00	143.00	141.00	1.01	072
Weight of first egg (g)	43.43	41.52	40.43	40.45	0.98	0.65
Age at 20% hen-day production (%)	155.00	153.75	160.75	150.33	0.87	0,06
Feed intake	118.48	112.66	112.16	125.86	10.14	0.42
Mortality (%)	0.00	0.00	0.00	0.00	0.00	0.00
Feed conversion ratio	3.18[a]	3.46[a]	5.58[b]	2.96[a]	0.36	0.07

[a,b,c] means in the rows with different super script are significantly different (p< 0.05)

Similar performance of treatments A, B and C might be as a result of optimum enzymes and other additives in the premixes. Finished feed is incomplete in the absence of supplemented vitamins and minerals. Most (typically plant-based) feedstuffs are rich in protein and energy, but lack sufficient amounts of trace elements or certain vitamins (Kirchgeßner, 2004).

Poor performance of the experimental birds fed premix C was due to poor egg production of the birds fed the premix because other performance indices are functions of egg production (Oluyemi and Robert, 2000). Ewing and Charlton (2007) stated that a premix must be added to poultry diets in order

to achieve the sufficient level of vitamins and minerals and prevent birds from becoming malnourished, however, right premix with appropriate content should be added for optimum production as revealed in this study.

CONCLUSION

Premixes A, B and D adequately supported egg production as all the performance indices considered were appropriate while premix C did not support egg production optimally. The poor performance of premix needs further study to known if it was due to batch problem, adulteration or poor content.

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