

Response of Layer Birds to The Efficacy of Commercial and Locally Formulated Vitamin-Mineral Premixes Diets in Zaria- Kaduna State, Nigeria.

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Abstract

An experiment was conducted to test the response of layers to commercial and locally formulated vitamin-mineral premixes diets in Zaria metropolis of Kaduna state, Nigeria. In the experiment, locally formulated premixes 1 and 2 were used to compound layer diets using ingredients of natural and locally made source in the locality. These were compared with one prominent commercial vitamin-mineral premix sold in Zaria in compounding the feeds. There were seven treatments; each of the treatment was replicated three times (making a total of 21 replicates in the study) in a Complete Randomized Design CRD). Two hundred and ten (210) layers were used in the experiment, with 10 birds in each of the 21 replicates. Results obtained for the layers study showed that birds fed CVMP and LFVMP 2 diets performed significantly ($P < 0.05$) better in terms of final weight, body weight gain, daily feed conversion, feed conversion efficiency, percent hen-day egg production and hen-house egg production than those birds fed LFVMP 1 and the control diets. The birds fed CVMP and LFVMP 2 diets were significantly ($P < 0.05$) better in terms of Income Above Feed Expenses (IAFE), which is a measure of profitability. One of the recommendations proffered is that further studies should be carried out so that LFVMPs should be graded into layer premixes.

Keywords: Commercial Vitamin Mineral Premix, Layers, Locally Formulated Vitamin – Mineral Premix, Performance

INTRODUCTION

In the poultry business, farmers are quick to implicate feed when problems arise in their farms. On many occasions the problems may not emanate from the feed, feed constitutes over 70% of the cost of production and farmers are very sensitive and critical about the quality of feed they buy (Akinmutimi, 2003; Toleun & Igba, 2007 and kperegbayi & Onwumere, 2007). Several factors may be responsible for poor performance in a flock. These may include poor handling practices, poor water quality, poor litter management, irregular feeding intervals, poor health of the birds, poor sanitation in the poultry house and environment, poor supervision of staff and poor quality of premixes used in feed formulations among other factors (Najime, 2003; Asaduzzaman *et al*, 2005; Oladuntoye *et al*, 2005; Abeke. *et al.*, 2008).

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Commercial vitamin-mineral premixes are compulsory in poultry diets, however, they are very expensive and sometimes of doubtful potency. They may also not be readily available when critically needed. This current situation cannot be left to continue, efforts should be made by all and sundry within and outside the Nigerian premix industries to check this unwholesome development. Two of such efforts necessitated the objectives of this study, which was designed to lead to the production of improved, readily available and cost-effective locally formulated vitamins and minerals for laying hens and invariably the provision of quality and affordable animal protein in Nigeria. And also to compare the efficacy of a commercial and two different locally formulated vitamin-mineral premixes from natural sources in the performance of layers in Zaria metropolis, Kaduna state of Nigeria (Maikano, 2015)

MATERIALS AND METHOD

Experimental site

This study was carried out in Kuregu-Wusasa situated in Zaria Local Government Area of Kaduna state, Nigeria from February to May, 2013. Kuregu-Wusasa is geographically located between latitude 11°5'N and longitude 7°41'E at an altitude of 747m above sea level (Nigeria Google Satellite map, 2013).

Diet preparation

An experiment was carried out to compare the effect of CVMP layer's mashes with two LFMVP 1 and 2 on the performance of layers. For the layer study, CVMP layers' mash was formulated to contain 16% crude protein and 2600 kcal/kg of metabolizable energy and was also compared with two LFMVP 1 and 2 layers' mashes. The laboratory analyses of the commercial and locally formulated vitamin-mineral premixes (proximate, vitamins and minerals) were carried out according to (AOAC, 1990) procedure.

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Table 1: Composition of Experimental Layer's Diets

Feedstuff	Diets						
	1	2	3	4	5	6	7
Maize	60.25	60.13	60.00	57.95	55.65	57.95	55.65
Groundnut cake	13.00	13.00	13.00	13.00	13.00	13.00	13.00
Soybean meal	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Fish meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Rice offal	5.40	5.40	5.40	5.40	5.40	5.40	5.40
Bone meal	3.70	3.70	3.70	3.70	3.70	3.70	3.70
Limestone	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Common salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Lysine	0.20	0.20	0.20	0.20	0.20	0.20	0.20
*CVMP	0.00	0.13	0.25	0.00	0.00	0.00	0.00
*LFVMP 1	0.00	0.00	0.00	2.30	4.60	0.00	0.00
*LFVMP 2	0.00	0.00	0.00	0.00	0.00	2.30	4.60
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Calculated Analysis							
M.E. Kcal/Kg	2600.00	2600.00	2600.00	2600.00	2600.00	2600.00	2600.00
Crude Protein (%)	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Crude Fibre (%)	4.82	4.81	4.81	4.76	4.69	4.76	4.69
Calcium (%)	3.74	3.74	3.73	3.70	3.70	3.70	3.70
Phosphorus (%)	0.89	0.89	0.89	0.88	0.88	0.88	0.88
Lysine (%)	0.94	0.94	0.94	0.93	0.93	0.93	0.93
Methionine (%)	0.47	0.47	0.47	0.46	0.46	0.46	0.46
Meth + Cystein (%)	0.72	0.72	0.72	0.71	0.70	0.71	0.70
Cost ₦/Kg	62.76	62.90	63.04	62.65	62.54	62.87	62.99

***Premixes supplied the following per Kg diet (mg/kg):** CVMP Vit. A 76.75, vit. B₂ 1255.67, vit. B₆ 746.38, vit. B₉ 1.97, vit. E 186.13. Calcium 10.00, phosphorus 0.01, sodium 3.28 potassium 1.42, copper 1.16, zinc 1.29, iron 9.92, manganese 8.46, **LFVMP 1** vit. A 17.80 vit. B₂ 0.04, vit. B₆ 573.38, vit. B₉ 1.78, vit. E 303.91. Calcium 15.04, phosphorus 0.01, sodium 1.02, potassium 0.62, copper 0.05, zinc 0.11, iron 0.61, manganese 0.16. **LFVMP 2** vit. A 19.70, vit. B₂ 0.05, vit. B₆ 635.79, vit. B₉ 1.78, vit. E 329.05. Calcium 29.62, phosphorus 0.03, sodium 1.14, potassium 1.06, copper 0.03, zinc 0.35, iron 20.19, manganese 0.23

Birds and Management

The study had seven treatments formulated to contain CVMP (layer), LFVMP1 and LFVMP 2 at 0.0, 0.125, 0.25, 2.30, 4.60, 2.30 and 4.60% respectively. All the CVMPs and LFVMPs treatments were at half and full doses based on the manufacturers' recommendations. Each of the seven treatments was replicated three times in a completely randomized design. There were 10 birds per replicate in the study. The birds were fed *ad-libitum* throughout the period of the experiment which lasted 12 weeks. The weights of the layers were taken at the beginning and at the end of the experiment. Records collected for the layer study included egg production, which was recorded daily, feed intake, which was recorded weekly and mortality, which was recorded at it occurred.

Analytical Procedure

All data collected were subjected to the analysis of variance and test of significance (where appropriate) using Duncan's New Multiple Range Tests according to the general linear model (SAS, 2002).

RESULTS AND DISCUSSION

Performance Characteristics of Birds Fed Experimental Diets

The results of the performance of layers are presented in Table 2. The results showed that final weights of birds were significantly ($P < 0.05$) higher in CVMP (0.25%) and LFMVP 2 (4.60%) treatments. The same pattern was observed for the percentage change in body weight. Similarly, half doses of all the premixes followed the same pattern with CVMP (0.25%) and LFMVP 2 (4.60%) performing better than other treatments and resulting into better egg production, higher weights of eggs produced for the laying period. Feed intake was significantly ($P < 0.05$) different across the treatments, but the control diet which had no premix was similar with half dose of premixes diets. Birds on CVMP diets significantly ($P < 0.05$) performed better in terms of hen-day and hen-housed production, percent production at peak and average egg weight than birds on LFMVP 2 diets followed by LFMVP 1 diets. All the three premixes performed better than the control diets at half or full doses. Performance was same on full dose for all the three premixes, which means that for laying hens any of the premixes can be used in the absence of CVMP (layer). Income above feed expenses (IAFE) was found to be significantly ($P < 0.05$) higher for the birds on the premix diets than birds on the control diet. As the level of premixes increased in the diet to full doses, there was a corresponding increase in the profit margin. IAFE was best for full dose of CVMP (layer) at ₦404.42 per dozen of eggs followed by full dose of LFMVP 2 with ₦389.88 and that of LFMVP 1 with ₦383.09. The least was on the control diet with ₦350.84 per dozen of eggs. There was no significant ($P > 0.05$) difference on mortality recorded across the treatments throughout the laying phase.

Table 2: Response of Laying Hens to different dietary levels of Commercial Vitamin - Mineral Premix and Locally Formulated Vitamin - Mineral Premixes Diets

Parameters	Levels of Premixes							SEM
	CVMP			LFVMP1		LFVMP 2		
	1	2	3	4	5	6	7	
Initial wt. (g/bird)	1508.00	1506.00	1506.00	1508.00	1506.00		1506.00	0.02
Final wt. (g/bird)	1870.83 ^c	1985.67 ^b	2088.00 ^a	1895.00 ^c	2010.50 ^b	1957.67 ^b	2058.83 ^a	1.33
Change in body wt (%)	24.06 ^{ab}	31.85 ^b	38.65 ^a	25.66 ^{ab}	33.50 ^b	29.83 ^b	36.71 ^a	1.45
Feed intake (g/bird/day)	134.25 ^c	134.87 ^{bc}	136.51 ^a	134.50 ^{cd}	135.00 ^{bc}	134.85 ^b	135.97 ^a	0.77
Feed cost/ dozen egg (₦)	189.35 ^c	182.72 ^a	180.09 ^a	195.78 ^d	190.45 ^c	190.85 ^{ac}	183.29 ^b	25.7
% hen day production	69.11 ^c	76.19 ^a	77.38 ^a	75.60 ^b	76.00 ^a	75.38 ^b	76.79 ^a	1.60
% hen housed production	71.43 ^c	76.19 ^a	77.38 ^a	75.60 ^b	78.57 ^b	77.98 ^a	79.37 ^a	1.62
% hen day at peak	75.85 ^c	76.65 ^b	78.30 ^a	76.00 ^b	78.00 ^a	76.10 ^b	78.10 ^a	1.64
Average egg weight (g)	58.85 ^c	61.42 ^b	62.30 ^a	61.38 ^b	62.13 ^a	61.43 ^b	62.20 ^a	0.06
IAFE at ₦23.00 / egg	350.84 ^c	383.96 ^a	404.42 ^a	381.39 ^b	383.09 ^a	379.97 ^b	389.88 ^a	89.3
Mortality (%)	3.33	0.00	0.00	0.00	3.33	3.33	3.33	1.47

Means within the same row with different superscripts are significantly different (P<0.05)

SEM - Standard Error of Means, g - Gramme, Kg - Kilogramme, ₦/kg - Naira per kilogramme

IAEF - Income Above Feed Expenses, g/bird - gramme per bird, g/b/day - gramme per bird per day

The results of this study compares favourably with the results reported by Malik *et. al.* (2010) who fed diets containing commercial vitamin premix (CVP) and locally formulated vitamin premix (LFVP) and observed that the final weight and weight gain of CVP diets were better than the LFVP diets. Most of the comparative studies using CVMP and LFVMP were done with broiler chicks, for the simple reason that they respond faster to different premixes than pullet chicks. Bolu and Balogun (2001, 2003 & 2004) studied the comparative performance and carcass evaluation of broilers fed LFVMP and CVMP and reported that LFVMP compete favourably with CVMP. Ogunbawo *et al.* (2010) reported that broilers fed CVMP (finisher) performed better in all productive parameters measured than birds fed locally prepared premix. Oyewole *et al.* (2013) fed diets containing CVMP (starter and finisher) and LFVMP to broilers; they reported that birds on CVMP full dose performed better than those on LFVMP full dose in all productive parameters measured.

Bolu and Balogun (1998) reported that laying hens fed graded levels of LFVMP did well in terms of final weights, change in body weights, better egg production. Therefore, LFVMP can be a suitable substitute for CVMP. Asaduzzaman *et. al.* (2005) reported that qualitative premixes significantly (P<0.01) enhanced egg production. Treatments without premix caused the poorest egg production, these results might occur due to the continuous absence of essential vitamins and minerals in the control group. Banerjee (1988) reported that diets continuously deficient in any one of the required vitamins will seriously affect egg production of chickens. Sato *et al.* (1994) observed that vitamin A deficiency lowered the egg production but recommended levels of the said vitamin improved egg production rapidly.

The better performance observed for layers fed CVMP diets in terms of weight gain, feed conversion efficiency, percent hen-day and hen-housed egg production may be attributed to better ingredient combination or inclusion of other performance enhancers for which information was concealed by the manufacturers, (Aduku, 2004., Asaduzzaman *et al*, 2005 & Avitech, 2007). Premix constitute a vital component of feed, LfVMP is a little bit cheaper than the CVMP. Therefore, improved ways of enhancing the quality of LfVMP is paramount because this will invariably reduce the cost of feed production which constitute over 70%. Premix been a significant component of the feed, if formulate from natural and locally source ingredients it will come a long way in reducing the feed cost, Maikano, 2015. The authors pointed out that this is the best way forward for the poultry industry in the 21st century. Being mindful that most of the conventional feed ingredients use in feed formulation is highly competitive as food to humans.

CONCLUSION

Feed quality is very paramount in the performance of poultry birds, where premixes constitute an important component of the feed. However, not all commercially formulated premixes in the market are adequate for optimum performance of layers. This study has shown that a well formulated and properly mixed local premix may lead to some reduction in the cost of poultry production thereby improving profit margin in poultry enterprise. Hens fed with feed that contained locally formulated vitamin-mineral premix 2 in terms of their growth and egg production performance was comparable to that of the hens fed CVMP diets. All the three premixes performed better than the control diets at half or full doses. Further studies should be carried out so that LfVMPs should be graded into layer premixes.

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