EFFECTS OF FEEDING GRADED LEVELS OF ALTERNATIVE LOCALLY PRODUCED NATURAL VITAMIN PREMIX ON THE PERFORMANCE OF LAYING HENS.

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Received 02 February 1998; Accepted 07 July 1998.

ABSTRACT

One hundred and twenty (120) Harco laying hens were randomly allocated to diets containing graded levels (0.5, 1.0, 1.5 and 2.0%) of locally produced Natural vitamin premix (LPNVP) with the sole objective of assessing its influence on the laying performance of the hens. Feed intake, percentage Hen-day production (HDP), feed utilization efficiency (FUE), egg weight (EW), egg specific gravity (ESG), egg shell thickness (EST), Haugh unit (HU) and estimated gross profit. (EGP) were not influenced (P<0.05) by the type of premix used (synthetic or natural). Inclusion of LPNVP in layers' feed at dietary levels 0.5, 1.0 and 1.5% resulted in better egg quality and estimated economic returns than observed in birds fed with the diet containing reference synthetic vitamin premix (SVP).

Key words: Natural Vitamin Premix, performance laying hens

INTRODUCTION

Feed is the most important single item in animal production both in terms of cost and livestock profitability (Aduku, 1992). As a direct method of cost reduction and consequently improved profitability different unconventional locally available alternative feedstuffs have been sourced to totally or partially substitute the expensive and relatively unavailable macro-ingredients (i.e protein and energy feedstuffs).

Whereas concerted efforts had been made in recent times to source for the alternative macro-ingredients with tremendous success, the issue of the micro-ingredients has not received the same attention from both the farmers and researchers in spite of the fact that these feedstuff constitute an expensive item on the cost of feed production.

Vitamin premix is an essential micro-ingredient in livestock feed since it is the major source of the vitamin need of livestock. The current emphasis in animal production is the production of feeds that is free as much as possible of synthetic products due to the deleterious side effects (accumulation of non-biodegradable residues) on both the animal, their products, and consumers. To replace these synthetic products in general and dietary vitamin in particular in livestock feeds, natural and locally available substitute has been used with a correspondingly better performance observed (Aduku, 1992, Venkataraman *et al;* 1993).

This study is one of the pioneering works in the areas of unconventional feedstuff addressing the issue of alternative vitamin premix for livestock.

MATERIALS AND METHODS

One hundred and twenty (120) Harco layer at 49 weeks of age and about 30 weeks in lay were weighed and allocated to five (5) dietary treatments (Table 1) in a completely randomized block design. The graded levels of the LPNVP used were 0.5, 1.0, 1.5 and 2.0%.

Product Preparation

The natural ingredients used were carrot, (*Daucus carota*), Ethiopian pepper *(Xylopia aetiopica)*, Red pepper (*Capsicum annuum*), Baobab leaf (*Adansonia digitata*), fish by-product oil and poultry offal (containing cleaned viscerals). They were all collected within Ilorin locality. Fish by-products comprising mainly the abdominal fat and liver were fried under a very mild heat for about 5 minutes to extract the oil, stored in the refrigerator (-4oC) for 3 days before incorporation into the LPNVP formulation. The poultry rendering (offal) was heat sterilized (100°C) for 10 minutes and later airdried for 30 minutes before oven drying for 3 hours at 60°C. Other natural vitamin sources were purchased from the open market and were reduced to convenient particle size (1mm sieve) before usage in LPNVP formulation.

Feeding and Management of Birds.

Bird in each treatment groups were fed in the morning and evening (approx 0900 and 1600 hrs) at a fixed rate of 140 g/bird/day and given water ad libitum. The birds were acclimatized to the cages and other experimental conditions for a period of three (3) weeks prior to conducting the study. They were dewormed during the second week of acclimatization with piperazine and orally medicated with broad spectrum antibiotics viz neoterramycin and neoceryl.

Records were kept of mortality, average hen-day production (HDP), feed utilization efficiency (i.e. cost

TABLE 1: COMPOSITION OF EXPERIMENTAL DIETS (kg/100kg)

Item	Treatment 1	2	3	4	5
Basal Ingredients	99.75	99.50	99.00	98.50	98.00
Agricare[2]	0.25	-	-	-	-
LPNVP*	-	0.50	1.00	1.50	2.00
Total	100.00	100.00	100.00	100.00	100.00
Analysed Nutrient Content:					
Crude protein (%)	16.20	16.00	15.96	15.92	15.80
Ether Extract (%)	2.75	2.74	2.73	2.70	2.70
Crude Fibre (%)	7.27	7.24	7.22	7.23	7.22
Estimated vitamin content per kg feed[3]					
Vitamin A (i.u)		586.94	850.48	1094.0	1247.5
Thiamin (mg)		3.489	3.475	3.477	3.478
Riboflavin (mg)		2.69	2.70	2.72	2.74
Niacin (mg)		55.82	55.89	55.96	56.04
Pyridoxine(mg)		4.605	4.610	4.616	4.62
Pantothenate (mg)		13.79	13.80	13.82	13.82
Folic acid(mg)		0.717	0.718	0.719	0.72
Biotin		0.280	0.280	0.281	0.282
Cholecal* ciferol (i.u)		33.6	67.2	100.0	134.0
Menadione(mg)		0.12	0.24	0.36	0.48
Tocopherol(iu)		7.24	7.26	7.28	7.31
Cyanocobalam* in (mg)		0.037	0.0076	0.011	0.0158
Choline		1,454	1,454	1,454	1,454

1. Contained
Maize: 20,00; Maize offal, 20.00; Brewers' dried grain, 13.40; Full fat soya bean, 21.00 ' Dl methionine,0.1' Bone meal 2.00 ; oyster shell, 8.00 and salt 0.25kg.

2. Provides the vitamin requirement for this class of poultry, it also had in addition, anticaking substances and yold colorant.

3. On as calculated basis.
*at 0.5kg/100 kg diet mineral composition (mg/100kg/feed): Manganese, 3178.8; Sodium , 22.19; Copper, 2295; Selenium, 23.45; Zinc, 2344.2.

of feed needed to produce a dozen eggs), Gross profit (difference between the selling price of a dozen eggs and feed utilization efficiency), egg weight (average weight of eggs laid by each group for three (3) days of each week); Haugh unit, Yolk index, shell thickness, body weight gained egg specific gravity and yolk colour.

The experiment lasted for six (6) weeks and data collected were subjected to analysis of variance and differences between treatment means determined by Duncan's (new) Multiple Range Test (Steel and Torrie, 1980).

Chemical Analysis

Proximate composition of the feed was determined according to the procedure outlined by AOAC, (1980).

RESULTS

Table 2 and 3 show the effect of the various grade level of the LPNVP on the performance of the laying hens and the economic efficiency of the feeds when compared with the control diet.

The feed intake and weight gain were not significantly ($P>0.05$) influenced by dietary treatments.

The values obtained for egg internal qualities were similar ($P>0.05$). However, increasing the dietary inclusion of LPNVP up to 1.5% gave optimum internal qualities than did higher levels of inclusion of the natural premix or the control

TABLE 2: EFFECT OF GRADED LEVELS OF LOCALLY PRODUCED VITAMIN PREMIX ON INTERNAL QUALITIES OF EGGS.

Dietary Level%	Egg specific gravity (gcm^{-3})	Egg yolk index	Egg shellthickness(mm)	Haugh unit	Yolk color
0	1.087	0.410	0.33	65.90	4
0.5	1.069	0.416	0.40	66.18	2
1.0	1.086	0.430	0.40	67.00	3
1.5	1.086	0.409	0.40	67.16	2
2.0	1.087	0.409	0.40	67.16	3
	NS	NS	NS	NS	

TABLE 3: EFFECT OF GRADED LEVEL OF LOCALLY PRODUCED VITAMIN PREMIX ON EGG ECONOMIC PARAMETER.

Dietary Level	Feed intake kg/week	Weight gained g $bird^{-1}$	Henday production (%)	Egg weight (g)	FUE*	Gross profit (N)+
0	16.51	25.13	71.08	58.62	12.20	23.90
0.5	16.71	25.38	73.13	58.89	11.26	24.62
1.0	16.77	27.13	75.80	58.75	11.63	24.09
1.5	16.68	23.63	76.29	60.03	11.03	25.09
2.0	16.76	25.75	71.73	59.21	12.26	23.62
	NS	NS	NS	NS	NS	NS

* Feed utilization efficiency (The unit price of an egg was taken to be N3.00)
+Per dozen egg.

synthetic premix.

Using natural premix in the diets of laying hens did not significantly ($P>0.05$) affect the egg economic parameters although dietary inclusion of LPNVP up to 1.5% resulted in better economic returns (at least N1.00/dozen eggs more) than obtained in birds fed diets containing synthetic premix.

Mortality observed during this study was 2.5% in birds fed the LPNVP based diets and the control. Post mortem examination of the dead birds revealed symptoms attributable to cage fatigue devoid of nutritional undertone. Symptoms of vitamin deficiencies e.g. ataxia, nasal and ocular discharges, thin shelled eggs etc. were not observed during the experimental period.

DISCUSSION

Feed intake observed is an indication to equal dietary acceptability, this is more in line with previous reports which tended to show that the first clinical sign of vitamin deficiency is anorexia NRC, (1994).

The value determined for internal qualities (Table 2) tend to indicate a favourable comparison of LPNVP and the synthetic vitamin premix.

The egg yolk index observed for the various treatments falls within the range of earlier reports for fresh eggs as 0.33 - 0.5, with a mean value of 0.42. Ngoddy and Ihenkoronye, (1985). That dietary treatment has no influence on this parameter has been reported by Olugboye, (1991).

The values of Haugh unit score obtained in this study agrees with the mean value of 65.75 earlier reported for high quality eggs. (Ngoddy and Ihenkoronye, 1985).

Generally, the internal qualities of egg measures post ovi position storability rather than response to dietary changes except the yolk colour. The yolk colour score tended to be higher for the eggs from the laying hens fed the reference synthetic vitamin premix diet. This expectedly might be due to the inclusion of yolk colorant e.g. esters of Lutein in the formulation this is in accordance with the findings of Schaefer et al., (1990) that Lutein accounts for 70% of the yolk pigment. Yolk colour is a major marketing strategy in most developed worlds. However, in the developing world, egg weight rather than yolk colour determine the prices of eggs. At the various

inclusion levels of the LPNVP, yolk colour was not affected since carotenoid was supplied in the material. Changes in carotenoid levels in the feed has been reported to be reflected in the yolk 9 - 10 days of deprivation. (Hamilton *et al.* 1990). The major carotenoid present in the LPNVP formulation is B-carotene, because of the green leaf used (Adansonia digitata). This observation in addition to earlier reports Hammon *et al*, (1994) that addition of cod-liver oil decreased yolk pigmentation might be responsible for the light yolk colour observed for LPNVP.

The shell thickness value obtained in this study seems to suggest adequacy of dietary vitamin D3 and better absorption and utilization of the same. The dietary levels of LPNVP employed seemed to furnish a more readily available vitamin D3 for eggshell formation and thickness. Fish liver oil is a potential source of vitamin D3 yielding approximately 25 - 270 iu/g (Fox et al, 1982).

Better feed utilization efficiency (FUE) observed in birds fed diets containing varying levels of LPNVP tends to suggest that the natural premix is a potential alternative for the reference synthetic vitamin premix. Henday production and egg size are two key determinants of profitability in egg production. Higher values of these parameters were observed in laying hens fed LPNVP than in the birds fed diets containing the synthetic vitamin premix. These parameters have been reported to be a function of the nutritional status of the hen, (Harvestein et al, 1990).

Generally, the use of LPNVP in the feeds of laying hens is expected to encourage profitability in egg production because the ingredients are available locally and its production by local technology. Further work could attempt to reduce its present cost of production with the sole aim of reducing feed cost.

The weight gained observed was slightly higher than the expected gain of 20g (NRC, 1994). This seems to suggest nutrient adequacy and availability for the laying hens. This seems to echo the view of Bamgbose, (1991) that weight gained although not a performance parameter in laying hens but that if laying hens gained weight at a particular time interval, it could only point to adequacy of nutrition for laying hens especially if egg production is not affected.

Perusal of the laying performance criteria employed in this study tips LPNVP as a potential vitamin premix in the diets of laying hens and also suggests dietary inclusion levels of 0.5 and 1.0%.

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