

EFFECT OF FEEDING DIETS CONTAINING GRADED LEVELS OF SWEET POTATO (*Ipomea batatas*) MEAL ON MORPHOMETRIC AND EGG QUALITY TRAITS OF LOHMAN BROWN LAYERS

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ABSTRACT

The study was conducted to assess the effect of sweet potato meal on morphometric and egg quality parameters in Lohman Brown layers. A total number of thirty-six birds were housed in battery cages at the poultry section of Teaching and Research Farm of the Department of Animal Science, Bayero University Kano. Diets were formulated with varying levels of sweet potato (0%, 5%, 10%, 15%) and fed for twelve weeks. The morphometric traits were body length, wing length, neck length, back length, shank length, tight length, chest depth, heart girth and tight circumference while the egg quality traits were egg weight, egg shape index, egg diameter, egg circumference, egg length, yolk volume, albumen volume and shell weight and thickness. The results from the study showed that inclusion of potato meal in diets had a significant ($p < 0.05$) effect on some of the traits measured; these includes, body weight, wing length, heart girth, tight length, tight circumference, egg weight, yolk volume, albumen volume and shell weight. The results revealed that sweet potato meal (SPM) can be utilized by layers at 10% to 15% level of inclusion for better performance and without any retrogressive effect, it is thereby recommended.

Key words: Sweet potato meal, morphometric traits, egg quality traits, nutrition and breeding

INTRODUCTION

Feed consumption and its efficient utilization is one of the major concern in commercial table egg production as feed cost is one of the major of total cost of production. Better utilization of feed and avoiding unnecessary feed wastage could be the leading factors in minimizing total cost of production (Elwardary *et al.*, 1998). Feed consumption is a variable phenomenon and is influenced by several factors such as strain of the bird, energy content of the diet, ambient temperature and density of birds in the shed, hygienic condition and rearing environment. Sweet potato is among the five most important food crops in developing countries in terms of total production (Horton, 1988). It is interesting to note that 43% of the production is used as animal feed (Sankaran *et al.*, 2012). Sweet potato contain higher contents of carbohydrates, various vitamins, minerals and protein than some feed materials. It also contain higher pro-vitamin A, vitamin C and minerals than rice or wheat (Hua *et al.*, 2015). The tubers can be fed fresh, chopped, dried and silage (Ogandi *et al.*, 2010), the vines makes good feed for ruminant livestock without restriction (Sankaran *et al.*, 2012) although its anti-nutrition factor (trypsin) could be given heat treatment or silage making to deactivate the compounds, therefore, it is safe as energy source for livestock (Sankaran *et al.*, 2012). The study aimed to determine the optimum level of inclusion of SPM for layer birds, due to the high cost of energy source (Maize) usually used in feed formulation.

MATERIALS AND METHODS

The study was conducted at the Teaching and Research Farm of the Department of Animal Science, Bayero University Kano. Kano is located between latitude 10°33' and 12°27' north of the equator and longitude 7°34' and 9°29' east of the Greenwich meridian (KNARDA, 2001). A total number of thirty-six (36) thirty (30) weeks old layers were used for the study. The birds were housed in a battery cage throughout the period of the study. They were intensively managed and given feed and water ad-libitum. The diets were formulated with inclusion of sweet potato meal as part of the energy source at 0%, 5%, 10% and 15% levels of inclusion. Data were collected on morphometric and egg quality characteristics on a weekly bases. These includes body weight, wing length, body length, chest depth,

neck length, back length ratio, shank length, heart girth, tight length and tight circumference, others were egg weight, egg shape index, egg circumference, egg diameter, yolk weight, shell weight, albumen weight, shell thickness, shell surface area and Haugh unit. The study was laid in a completely randomized design with four treatments (nine birds each) and three replicate (three birds each). Data were analyzed using GLM procedures of SAS (SAS, 2000) and DMRT was used for means separation.

Table 1: Diets Formulated with Sweet Potato Meal Inclusion Levels

Ingredients	T1	T2	T3	T4
Maize	52.00	47.00	42.00	38.00
Sweet potato meal (SPM)	0.00	5.00	10.00	15.00
Wheat offal	9.00	9.00	9.00	9.00
Maize bran	2.00	2.00	2.00	2.00
Soybean meal	11.00	11.00	11.00	11.00
Groundnut cake	12.50	12.50	12.50	12.50
Fish meal	0.75	0.75	0.75	0.75
Bone meal	3.50	3.50	3.50	3.50
Limestone	8.00	8.00	8.00	8.00
Salt	0.30	0.30	0.30	0.30
Vit/min premix	0.25	0.25	0.25	0.25
Methionine	0.30	0.30	0.30	0.30
Lysine	0.40	0.40	0.40	0.40
Total	100	100	100	100

RESULTS AND DISCUSSION

Table 2 and 3 show the results of the study on morphometric and egg quality characteristics. There were significant difference among the treatments ($p < 0.05$) on body weight, wing length, heart girth, tight length and tight circumference. On egg quality, there were significant difference among treatments ($p < 0.05$) on all the parameters measure indicating that SPM could be a favourable replacement for maize in diets for layers. From the obtained results, the birds responded significantly ($p < 0.05$) to the inclusion of SPM in the diets at various degrees with 10% and 15% levels of inclusion showing better performance. These results were in agreement with study of Habib and Saeed, (2020) who used SPM as energy source on performance and carcass characteristics of broiler birds. The results were also in line with the report of Ajayi *et al.* (2016) and Olaifa *et al.* (2019) on broiler birds using unpeeled SPM as a partial substitute for maize. Inclusion of potato slightly reduced the feed cost. Afolayan *et al.* also reported that 20% replacement of maize in the diets of laying hens with sweat potato meal led to no significant differences in the feed costs per kg of egg production and laying performances.

Table 2: Morphological Traits of Lohman Brown Layers fed Sweet Potato Meal

Variable(cm)	T1(0%)	T2(5%)	T3(10%)	T4(15%)	SEM	
LOS						
Body weight(g)	1216.92 ^{ab}	1111.58 ^{ab}	1240.92 ^a	1050.42 ^b	6.38	*
Wing length	16.33 ^a	15.92 ^{ab}	16.17 ^{ab}	15.00 ^b	0.38	*
Body length	22.08	22.42	22.75	21.83	0.49	NS
Chest depth	16.42	16.25	16.42	16.33	0.26	NS
Neck length	16.17	16.08	16.25	16.33	0.23	NS
Shank length	9.33	9.17	9.25	9.08	0.19	NS

Heart girth	28.33 ^a	28.17 ^a	25.58 ^b	25.00 ^b	1.01	*
Thigh length	15.00 ^a	14.17 ^c	14.83 ^{ab}	14.25 ^{bc}	0.21	*
Thigh cir	13.00 ^a	12.50 ^b	13.00 ^a	12.17 ^b	0.41	*

LOS=Level of significance, SEM=Standard error of mean, *=p>0.05, cir = circumference

Table 3: Egg Quality Traits of Lohman Brown Layers fed Sweet Potato Meal

Variable	T1(0%)	T2(5%)	T3(10%)	T4(15%)	SEM	
LOS						
Egg weight (g)	47.75 ^a	44.89 ^b	47.38 ^a	44.89 ^b	0.84	*
Egg length (cm)	55.74	54.90	55.68	55.07	0.28	*
Egg cir (cm)	14.09	14.32	14.25	13.99	0.10	*
Egg diameter (cm)	7.04	7.16	7.08	7.03	0.06	*
Yolk vol (ml)	13.91 ^b	15.67 ^a	14.30 ^b	15.00 ^a	0.52	*
Albumen vol (ml)	38.27 ^a	35.83 ^b	35.90 ^b	35.81 ^b	0.70	*
Shell weight (g)	4.36 ^b	4.92 ^{ab}	4.50 ^b	5.46 ^a	0.40	*
DW (g)	4.00 ^b	3.92 ^b	3.70 ^b	4.64 ^a	0.39	*
EWD (cm)	43.18	43.25	42.85	42.62	0.16	NS

LOS=Level of significance, SEM=Standard error of mean, *=p>0.05, cir = circumference

CONCLUSION AND RECOMMENDATION

It can be concluded from the study that SPM can replace maize up to the inclusion level of 10-15% without any adverse effect and thereby recommended.

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