RESEARCH NOTE:

SWEET POTATO (*Ipomea batatas l.*) TUBER COMBINED WITH MALUNGGAY (*Moringa oleifera*) LEAF MEAL FOR FREE RANGE CHICKEN

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ABSTRACT

The study was conducted to evaluate the effect of sweet potato (*Ipomea batatas l.*) tuber meal (SPTM) combined with malunggay (*Moringa oleifera*) leaf meal (MLM) as fed diets for free range chicken. Ninety (90) two-week-old chicks were distributed to three treatments replicated trice following the Completely Randomized Design. The treatments were: formulated ration alone (T1); formulated ration with 7.5% SPTM and 5% MLM (T2); formulated ration with 15% SPTM and 5% MLM (T3). Results of the study revealed significant (P<0.05) differences on body weight and gain in weight of broilers fed diet with SPTM combined with MLM. Adding SPTM with 5% MLM in broilers' diet positively improved weight gain. However, no significant differences were observed on feed consumption and feed efficiency. Regarding economic return, T3 had the highest return of PhP190.53 followed by T2 with PhP184.04 and the least was T1 with Php178.44. The results showed that formulated ration with 15% SPTM enriched with 5% MLM improved body weight and weight gain of broilers under free-range production system and also gave higher economic return than formulated ration without SPTM and MLM.

Key Words: chicken, feed efficiency, growth performance, malunggay, sweet potato

INTRODUCTION

Poultry is an important source of protein for the ever-expanding population in the country especially in the rural areas. Livestock producers are forced to meet the growing demand for high value animal protein. However, the cost of feed has been indicated as the major constraint in poultry production. The cost of basal feed ingredients such as corn, which makes 50 - 65 % of the current poultry feeds, is very high. For this reason, there is a need to explore low-cost energy feedstuffs that are available locally.

The use of locally available feedstuff in feeding poultry is a subject relatively unexplored in tropical countries. This is in spite the fact that tropical plants are locally available and of low cost, which is in contrast with the scarcity and often high cost of commercial feeds.

Sweet potato tuber has high energy values with above 90% digestibility (Ravindran, 1995) but has trypsin inhibitor activity ranging from 20 to 90% (Woolfe, 1992). However, considering its energy value, sweet potato is a good source of energy and consequently may reduce feed cost. On the other hand, malunggay leaves contain 27.51% protein, 43.88% carbohydrates, 19.25% crude fiber, 7.3% ash and are rich in carotene, ascorbic acids with good profile of amino acids (Oduro et al., 2008). Many studies had shown that the inclusion of malunggay in poultry ration significantly improved weight gain in poultry. Therefore, malunggay at 5% inclusion rate could enrich the nutritive value of sweet potato

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based diet.

This study was conducted to evaluate the performance of range chicken fed with sweet potato and malunggay in terms of weight gain, rate of growth, feed consumption, and feed efficiency. The income over feed and chick cost was also examined.

MATERIALS AND METHODS

Ninety (90) heads of two-week-old Bounty Fresh colored broiler chicks were housed in portable experimental pens provided with at least 40 square meters range area. Each experimental unit was provided with a divisional fence made up of plastic netted screen to protect the birds from predators and to avoid mixing of birds. The birds were randomly distributed into three treatments following a Completely Randomized Design (CRD). There were three replications for every treatment with 10 birds per replication. Three treatment diets were formulated to contain 0%, 7.5% and 15% sweet potato tuber meal (SPTM), respectively. Only treatments 2 and 3 were combined with 5% malunggay leaf meal (MLM).

The broiler chickens were raised under free-range system and fed *ad libitum* with isocaloric and isonitrogenous experimental starter diet (Table 1). Fresh and clean water was made available at all times. The birds were subjected to similar management practices throughout the duration of the study.

The performance of the broiler chicken was evaluated based on average weekly body weight, gain in weight, feed consumption, and feed conversion efficiency. The income over feed and chicken cost was estimated to determine the economic profitability. All data gathered were subjected to Analysis of Variance (ANOVA) following a completely Randomized Design (CRD). Comparison of treatment means was done using Least Significance Difference (LSD).

RESULTS AND DISCUSSION

Significant differences were observed among ranged broilers starting from the second week up to the last week of the study (Table 2). Broilers fed with SPTM enriched with MLM significantly ($P<0.05$) obtained heavier weight than those broilers fed without SPTM and MLM. Broilers fed with 7.5% and 15% SPTM did not vary with each other in terms of the body weight. This finding showed that the different levels of SPTM combined with MLM improved body weight of broiler chicken. The result of this study was in agreement with the findings of Muhammad et al. (2012) on broiler chicken fed with partially cooked sweet potato meal.

This also implies that the significantly higher body weight was attributed to the high energy value and high digestibility of sweet potato tuber meal as reported by Ravindran (1995). Further, the SPTM nutritive value was improved by the addition of MLM containing high nutritive value as reported by Fahey (2005) and Oduro et al. (2008). Thus, both SPTM and MLM contributed to the increased body weight and weight gain of broilers.

Table 1. Composition and calculated analysis of the formulated feeds.

Composition (%)			
Ingredients	**T_1**	**T_2**	**T_3**
1. Sweet potato tuber	0.00	7.50	15.00
2. Malunggay Leaf Meal	0.00	5.00	5.00
3. Corn Meal	55.70	49.00	39.50
4. Fish Meal	5.50	6.0	6.00
5. Rice Bran	10.00	5.00	5.00
6. Soybean Meal	25.40	23.80	25.10
7. Coconut oil	0.00	0.60	1.30
8. Salt	0.50	0.30	0.30
9. Limestone	1.30	1.20	1.20
10. Dicaphos	1.00	1.00	1.00
11. Min/Vit Premix	0.50	0.50	0.50
12. Methionine	0.10	0.10	0.10
TOTAL	100.00	100.00	100.00
Calculated Analysis (%)			
Nutrients	**T_1**	**T_2**	**T_3**
Crude Protein	20.11	20.06	20.05
Metabolized Energy	2968.20	2910.60	2908.80
Calcium	0.87	0.84	0.84
Phosphorus	0.43	0.43	0.43
Lysine	1.14	1.08	1.10
Methionine	0.43	0.41	0.41

Insignificant differences among treatments on the first two weeks of the feeding trial were noted on the weekly and cumulative feed consumption of ranged broilers (Table 4). On the 3rd, 4th and 5th week of the study, birds in Treatments 2 and 3 significantly consumed more feeds than those birds in Treatment 1. However, the cumulative feed consumption revealed no significant difference among the treatments which implies that the formulated ration with and without SPTM and MLM have the same palatability.

Results from this study was in agreement with the findings of Ayuk (2004) and Maphosa et al (2003), that sweet potato tuber meal did not influence feed intake. Sweet potato root meal could be included in broiler finisher diets at 50 % maize replacement without adversely affecting productivity (Maphosa et al. 2003). Previous studies on SPTM that were conducted as replacement of corn at 10 to 100% replacement indicated that sweet potato can safely replace up to 50% without deleterious effect on weight gain, total feed intake and feed conversion ratio as reported by Ayuk (2004) and Maphosa et al. (2003).

Table 2. Initial and Weekly Body Weight of the Birds (g).

Age, in weeks	TREATMENT			C.V.(%)
	1 Formulation alone	2 7.5% SPTM and 5% MLM	3 15%SPTM and 5%MLM	
Initial	353.33	355.67	357.57	1.43
1st	647.33	665.33	668.00	2.21
2nd *	988.00^{b}	1071.67^{a}	1064.00^{a}	2.51
3rd **	1428.83^{b}	1492.83^{a}	1516.57^{a}	0.94
4th *	1733.67^{b}	1799.83^{a}	1838.33^{a}	1.65
5th*	1923.17^{b}	1960.00^{ab}	1995.00^{a}	1.04

Means in the same row with different superscript are significantly different (P<0.05)* (P<0.01)**

Table 3. Weekly and Cumulative Feed Consumption of the Birds (g).

Week	TREATMENT			C.V.(%)
	1 Formulation alone	2 7.5% SPTM and 5% MLM	3 15%SPTM and 5%MLM	
1st	510.17	519.83	517.50	1.59
2nd	624.30	632.50	625.33	1.53
3rd *	648.33^{b}	658.33^{a}	668.33^{a}	0.86
4th **	690.00^{b}	699.33^{a}	700.00^{a}	0.37
5th**	701.83^{b}	713.67^{a}	716.83^{a}	0.32
Cumulative	3176.63	3223.67	3246.17	0.45

Means in the same row with different superscript are significantly different (P<0.05)* (P<0.01)**

The average gain in weight, feed conversion ratio and efficiency of ranged broilers are shown in Table 4. Results showed significant differences among treatments in terms of gain in weight. The gain in weight of broilers fed with 15% SPTM enriched with MLM significantly differ with those broilers fed without SPTM but not with those broilers fed with 7.5% SPTM enriched with 5% MLM. The superiority of the birds fed with SPTM was probably due to the more than 90% digestibility of SPTM as reported by Ravindran (1995) and the addition of 5% MLM with high nutritional quality as stated by Oduro et al. (2008).

In terms of feed conversion ratio of the broilers fed with and without sweet potato tuber and malunggay leaf meal, the result was not significant. This finding corroborates the report of Afolayan et al. (2012), Ayuk (2004) and Maphosa et al. (2003), but it disagrees with the observation of Muhammad et al. (2012). The dietary effect on feed efficiencies as observed by Muhammad et al. (2012) may be attributed to the partial cooking which in turn improved digestibility of nutrients and reduced trypsin inhibitors present in sweet potato.

Table 4. Growth performance characteristics of broilers fed SPTM enriched with MLM.

Parameters	TREATMENTS			C.V. (%)
	1 Formulation alone	2 7.5% SPTM and 5% MLM	3 15%SPTM and 5%MLM	
Initial weight (g)	353.33	355.67	357.57	1.43
Final weight (g)	1923.17[b]	1960.00[ab]	1995.00[a]	1.04
Feed consumption (g)	3176.63	3223.67	3246.17	0.45
Gain in weight (g)*	1569.83[b]	1602.67[ab]	1645.00[a]	1.40
FCR	2.02	2.01	1.97	1.36
FCE (%)	49.50	49.72	50.70	1.44

Means in the same row with different superscript.

Table 5. Income over feed and chicken cost.

Item	Treatment		
	1 Formulation alone	2 7.5% SPTM and 5% MLM	3 15%SPTM and 5%MLM
Ave. Body Weight per Broiler (g)	1923.17	1960.00	1995.00
Return per Broiler (PhP)	288.48	294.00	299.25
Amount of Feeds Consumed,g	3176.63	3223.67	3246.17
Cost of Feeds per kilogram, PhP.	22.05	21.70	21.17
Cost of Feeds Consumed, PhP	70.04	69.95	68.72
Cost of two weeks old chick,PhP	64.55	64.55	64.55
Income Over Feed & chick Cost, PhP	153.89	159.50	165.98

It was found out that ranged broilers fed with 15% SPTM enriched with 5% MLM had the highest return of Php165.98, followed by the broilers fed with 7.5% SPTM enriched with 5% MLM with a return of 159.50 and the least was those broilers fed without SPT and MLM with PhP 153.89 (Table 5). This means that the significant increase in total body weight of broiler fed diet with SPTM combined with 5% MLM improved feed cost efficiency.

CONCLUSION AND RECOMMENDATION

Based on the results of the study, the 15% sweet potato tuber gave the heaviest body weight and gain in weight in broilers. It is therefore concluded that sweet potato tuber meal combined with malunggay leaf meal significantly affects the body weight and gain in weight of broilers in a free-range system and gives high economic gains.

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