Journal of Natural and Allied Sciences
Vol. III No. 1, pp. 28-35, January – December 2019

Utilization of Raw Wild Yam (*Dioscorea dumetorum*) As Feed Supplement for Broiler Chickens

Ramon F. Samonte
BS Agriculture, Faculty Member,
Catanduanes State University, Panganiban Campus
Panganiban Catanduanes
Gmail: ramonsamonte21@gmail.com

ABSTRACT

Abstract - *Sixty, 14-days-old broiler chicks were used in the experiment to evaluate the effect of raw wild Yam (Dioscorea Dumetorum) on the Growth Performance, feed conversion efficiency of Broilers chickens. The bird was randomly assigned to four dietary treatments in Complete Randomized Design (CRD) and each treatment group was sub divide into three replications. The birds were fed Adlibitum with four formulated broiler grower ration at dietary levels of 0%, 5%, 10% and 15% wild Yam representing treatments 1, 2, 3 and 4 respectively. Performance criteria were weekly cumulative weight gains, feed consumption and Feed Conversion Efficiency (FCE). Results revealed that in all measurements 0 % , 5%, 10% and 15% dietary levels had no significant differences at (P<.05) Tabular value. There were no significant differences in weight gain, weekly feed consumption and feed conversion efficiency among birds in T1, T2, T3 and T 4 dietary levels. Further test of differences in the treatment using Q Statistic for Tukey's HSD post hoc test revealed slight differences in all experimental treatments indicates that all dietary levels had the same feeding value.*

Keywords*: Broiler Chicks, Dietary Wild Yam, (Dioscorea Dumetorum) feed supplement, Growth Rate, Feed Conversion Efficiency.*

INTRODUCTION

Increased production costs had led livestock raisers province wide to find ways in utilizing crops and tubers for feed supplement. In fact, feed shortages were experienced by poultry raisers in this province because of its geographic location, suffering cut off in feed supply during stormy weather. Hence, poultry raisers are trying out alternative feed ingredients and feeding method that will improve the performance of poultry by means of supplementing commercial feeds with locally available feedstuffs which may be processed as feeds.

Tubers such as yam or Indigenous Wild (Bitter) Yam (*Dioscorea dumetorum*) locally known as "Namo" are abundant in the forest range in the province and are potential feed substitute in producing chickens. Yams are essentially carbohydrate foods with relatively high protein and ascorbic acid contents (Burkill, 1985). These are also used in animal feed as the growth promoters (Hahn, 1984). With the prohibition of most of the antimicrobial growth promoters in animal feed because of their residual effects, plant extracts (e.g. yam family) are becoming more popular as dietary feed supplement for animal (Hahn, 1984: Tipu, Akhtar, Anjum, & Raja 2006).

ISSN 2599-4646 (Print) *www.psurj.org/jonas* ISSN 2599-4654 (Online)

In addition, in vitro and in vivo experiments have demonstrated the good digestibility of the starch and the easy bioavailability of its protein and other nutrients. Likewise, comparative metabolic studies on rats and school age children with diets based on instant flour from D. Dumetorum or D. rotundata have shown a higher nutritional efficiency of the former. Mbome, & Egbe, (1994).

Moreover, nutrient composition of the edible portion of fresh tuber are: energy 439 kJ/100 g; water 72.4 per cent; protein 2.4 per cent; fat 0.2 per cent; carbohydrate 24.1 per cent; fibre 0.6 per cent; calcium 22 mg/100 g; iron 0.8 mg/100 g; thiamine 0.09 mg/100 g; riboflavin 0.03 mg/100 g; niacin 0.5 mg/100 g; ascorbic acid 10 mg/100 g. (Root Crops (2nd edition) (NRI, 1987, 308 p.)

Since the feed crisis will no doubt continue to be with us, utilization of these indigenous crops for the expanded feed demand is one local solution to obtain additional energy for our poultry.

Hence, the study utilized the wild yam, *D. Dumetorum*. As supplement in feeding broiler chicken

MATERIALS AND METHODS

A total of 60 straight run, 14 days old broiler chicks were randomly distributed to four dietary treatments: 0%, 5%, 10% and 15% wild Yam representing treatments 1, 2, 3 and 4 respectively with three replications consisting of five heads per replication using Complete Randomized Design (CRD). Each treatment consists of four cages measuring50 x 50 square centimeters. Initial weighing of the birds individually was done; each was marked by tying a plastic straw to the legs to facilitate the recording of the individual weights. They were marked by corresponding colors as follows: replication 1 Blue; replication 2. Orange; replication 3. Yellow. Trial and error method of feed formulation was used in this study.

Collection, Gathering, Preparation of Materials and Mixing of feeds.

The tubers of edible wild yam (*Dioscorea Dumetorum*) were obtained from individual farmers in the locality. The tubers were gathered by digging with iron bar, bolo and other sharp objects. Peeling, chopping and slicing the fresh tubers and put in a jute sack and left in a running water for 3to 5 days.

Addition of salt to remove poisonous and or bitter compounds that are believed to be injurious to health. Finally, cleaning of filths, air drying for 4-5 days and grinding was done. Aside from raw wild yam, locally available feed ingredients such as Corn Meal, Rice bran D1, Soybean meal; Fish Meal, Copra meal, vitamins/ minerals and salt was utilized and purchased from accredited raw material supplier.

Management of Birds.

Upon the arrival of the broiler chicks, proper health care was introduced to minimize mortality. Feeding of the birds under experiment was Adlibitum, that is, enough feeds and water were provided the whole day throughout the duration of the experiment. Formulated ration was given after brooding (14) days up to the end of the experiment. Recommended poultry practices were strictly observe throughout the experiment.

Data Gathering Procedure

Every day the amount of feeds rations to the chickens were weighed in grams. The weight of left over feeds was deducted from the weight of the feeds given. The data were all recorded throughout the experiment. Body weight was

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determined every week and the weights of birds in each cage for every treatment were documented. After determining the total weight gain and the total feed consumption, feed conversion efficiency was computed.

All pertinent data were subjected to statistical analysis to find out significant differences among the treatments in relation to the effect of the different treatments on the performance of broiler chickens.

The researchers used the one way analysis of variance (One way ANOVA) where the independent variable is the growth performance level of birds and the dependent variable is the four treatments.

Likewise, to further test the significant results of one way ANOVA, the researcher used the post hoc test-Tukey HSD or Least Significance Difference (LSD) to confirm where the differences occurred between groups.

RESULTS AND DISCUSSION

Table1 shows the average cumulative weekly weight of the chicks at the start of the experiment and the average weekly gain in weight in every treatment. It is reflected in the table that there are weight gains among the treatments. Birds in T1 had mean initial weight of 210.0 grams; T2- 232.6 ;T3- 223.7 and T4 -217.0 These were the weights of the birds before they are subjected to dietary treatments. Birds under Treatment-1 (0%) wild yam reveals the highest weight gains of 1939.3 grams followed by T2 (5%WY), that is 5 kilograms for every 100 kilograms of formulated feeds had weight gains of 1,419.6; T3 (10 %wild yam) with the average of weight gain of 965.33; and T4 (15% wild yam) recorded the lowest weight gain of 838.50.

Table 1 Total Average Cumulative Weekly Weight of Broilers Feed With Different Levels of Wild Yam

Age in Weeks	T1-0% WY		T2-5% WY		T3-10 WY		T4-15 %WY	
	Weekly	Cumulative	Weekly	Cumulative	Weekly	Cumulative	Weekly	Cumulative
1	210.0		232.6		223.7		217.0	-
2	662.3	452.3	667.1	434.5	561.0	337.3	531.5	314.5
3	1479.9	485.6	1062.7	395.6	776.2	215.2	744.1	212.6
4	1945.1	465.2	1417.0	354.3	993.6	217.4	940.9	196.8
5	2481.3	536.2	1181.5	235.2	1189.0	195.4	1055.5	114.6
Total		**1939. 3**		**1419.6**		**965.3**		**838.5**

Average gained in weight at the end of the experiment revealed that T1 shows a rapid growth early from 1st week to 5th week while in T2, 3 and 4 weekly cumulative declines at the 2nd week and as broilers get older. However, statistical analysis using the F-test reveals no significant differences among the initial weights of birds under experimental rations observe among the replication. These differences conforms with the study of Ndubuisi; et.al (2009) that feed intake and body weight gains of the birds decreased with increasing levels of wild yam inclusion.

Moreover, table 2 reveals the amount of feed consumption in grams by birds in all treatments. Treatment 1- 0% wild yam showed feed consumptions of 2754.54 grams which was considered the highest cumulative feed

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consumption. T2 -2706.90 while T3 -2450.60 Further, T4 -2257.40. Based from the data, the weekly increase in the body weight, feed consumption varied during the 3rd and the last week of the experiment.

The results showed that birds on Treatment 2, 3 and 4 fed with different levels of wild yam consumed lesser amounts of feeds .It was observed that the increased level of inclusion of wild yam the lower the feed consumption. Statistical analysis of F- Test showed no significant differences among the treatment with regards to weekly feed consumption fed with different levels of wild yam.

Table 2.Total Cumulative Feed Consumption (In Grams) per bird given Adlibitum Dietary Treatment

Age in Weeks	**T1-0% WY**		**T2-5% WY**		**T3-10% WY**		**T4-15 %WY**	
	Weekly	Cumulative	Weekly	Cumulative	Weekly	Cumulative	Weekly	Cumulative
1	483.1	-	450.2	-	430.60	-	435.5	-
2	480.1	903.2	465.4	915.6	445.20	875.8	450.0	885.7
3	510.2	1413.5	520.5	1436.1	415.0	1320.8	410.0	1136.2
4	590.3	2003.8	600.1	2036.2	540.0	1860.0	420.0	1506.5
5	750.7	2754.54	670.2	2706.9	590.0	2450.6	380.3	2257.4

Table 3 on the final weight comparison in replication 1 between two groups on T1 (0%) WY and
T3 (10%WY); likewise, T2 (5%) WY; T4; (15% WY) shows significant differences. Further, in replication 2, T1; compared T3, T1; T4; T2; T4 reveals significant Differences.

Similarly, in replication 3, comparison between T1 and T3; T1 and T4; T2 and T4. All the results of final weight disclose significant differences using Q Statistic for Tukey's HSD post hoc test.

Likewise, these variations corroborates the study of (ECNdubuisi, FC et.al (2009) on the Performance of finisher broilers fed the wild yam (Anchomanes difformis) tuber reveals that feed intake and body weight gains of the birds decreased with increasing levels of wild yam inclusions.

Table 3 Further Test of Differences in the treatment in terms of the Utilization of Wild Yam (Dioscorea Dumetorum) on the Growth Performance of Broilers chicken Using Q Statistic for Tukey's HSD post hoc test. (Final Weight)

Research Hypothesis Comparison Between two Treatment		Mean for Column 1st Group	Mean for Column 2nd Group	Difference of Column 1 & 2 Groups	Q Statistic	Results/ Interpretations
Replication 1						
Treatment 1	Treatment 2	1938	1633	305	1.87	Not Significant
Treatment 1	Treatment 3	1938	1267	671	4.12	Significant
Treatment 1	Treatment 4	1938	1117	821	5.04	Significant
Treatment 2	Treatment 3	1633	1267	366	2.25	Not Significant
Treatment 2	Treatment 4	1633	1117	516	3.17	Not Significant

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Treatment3	Treatment 4	1267	1117	150	0.92	Not Significant
Replication 2						
Treatment 1	Treatment 2	1924	1540	384	2.81	Not Significant
Treatment 1	Treatment 3	1924	1111	813	5.96	Significant
Treatment 1	Treatment 4	1924	979	945	6.93	Significant
Treatment 2	Treatment 3	1540	1111	429	3.14	Not Significant
Treatment 2	Treatment 4	1540	979	561	4.11	Significant
Treatment 3	Treatment 4	1111	979	132	0.97	Not Significant
Replication 3						
Treatment 1	Treatment 2	1956	1604	352	2.50	Not Significant
Treatment 1	Treatment 3	1956	979	977	6.93	Significant
Treatment 1	Treatment4	1956	1050	906	6.43	Significant
Treatment 2	Treatment 3	1604	979	625	4.44	Significant
Treatment 2	Treatment4	1604	1050	554	3.93	Not Significant
Treatment 4	Treatment3	1050	979	71	0.50	Not Significant

Table 4 Summary results showed that birds on T3 and 4 fed with different levels of wild yam consumed fewer amounts of feeds. It was also observed that the increased level of inclusion of wild yam decreased palatability and lowers the feed consumption. Statistical analysis of F- Test showed no significant differences among the treatment with regards to weekly feed consumption fed with different levels of wild yam.

Feed Conversion Efficiency as Influenced by the Different Levels of Wild Yam. The data revealed in distinctive values for T1- 2.00; T2- 2.28; T3- 3.30;T3- 4.04 at 42 days old broilers. As a result, feed efficiency is much better in the first weeks of the experiment and then declines when the chicken is in marketable age. Thus, the lower the number the more efficient in converting the feed supplied into body mass. However, based from F test showed insignificant results, that all levels of wild yam used in the study had the similar feed conversion efficiency.

According to Leeson Steve (2000) Feed efficiency of broilers is affected by bird age, sex, health and environmental temperature, although the major factor is usually diet energy concentration. The key to preventing Feed Conversion Efficiency problems is ensuring that throughout the brooding and grow-out period, good management practices are in place so that bird performance is optimized.

The data gathered for all dietary treatment were computed using one-factor ANOVA and probability of F-Distribution, it comes up with a computed F value of 0.06 that are lesser than the tabular values of 3.24 at .05 probability with the degrees of freedom of 6/16 and therefore the null hypothesis is to be accepted.

However, based from F test showed insignificant results, that all levels of wild yam used in the study had the similar feed conversion efficiency.

Based from research data revealed that there are no significant difference in the in the Average gain in weight, Feed Consumption, and Feed conversion Efficiency of Broilers in dietary levels of 0% WY, 5% WY, 10% WY, 15% WY.

Test of differences in the treatment using Q Statistic for Tukey's HSD post hoc test revealed slight differences in all experimental treatments indicates that all dietary levels had the same feeding value.

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Table 4 Summary of Data Observation on the Performance of Broilers from 14 -42 Days Old As Influenced By Feeding Diets 0f Wild Yam

Variables	DIETARY LEVELS OF WILD YAM			
	T1-0% WY	T2-5% WY	T3-10% WY	T4-15% WY
Average Initial Body weight of chicks after brooding (grams)	210.0	232.6	223.7	217.0
Average Final Weight (grams)	1939. 30	1419.60	965.30	838.50
Average Gained in Weight at the end of the experiment (grams)	1,729.3	1,187.0	741.6	621.25
Average feed Consumption (grams)	2754.54	2706.90	2450.6	2257.40
Feed Conversion Efficiency	2.00	2.28	3.30	4.04

Table 5 presented the trial and error method of feed formulation of experimental diets of wild yam using the requirement in broiler grower (ME-2800; CP-20; P-.42; C-.84)

Ingredients	Parts by Weight(Kg)			
	0 –WY	5 kg. WY	10 kg. WY	15 kg. WY
Wild Yam	0	5	10	15
Corn	60.4	51	50.4	45.4
Copra Meal	5	8	6	6
Soybean Meal	19	19.4	18	19
Rice Bran D1	7	8	7	6
Fish Meal	8	8	8	8
Vit. & Minerals	0.3	0.3	0.3	0.3
Veg. oil	0.15	0.15	0.15	0.15
Salt	0.15	0.15	0.15	0.15
Total	100	100	100	100

Table 6 Presented the calculated analysis of experimental diets of wild yam using trial and error method indicates the nutrient requirement of broiler type chicken from starter to finisher ration. The energy adequacy of 2800 Kcal/kg is based on Digestible Energy (DE) Metabolizable Energy (ME), Net Energy (NE) and Total Digestible Nutrients (TDN). Adequacy of Proteins with the range of 20.0- 18.70 respectively was based on the total protein (TP) and or Total Amino Acids. Taking into account the utilization by the animal during digestion and absorption.

Minerals among the macro nutrients more attention was given to Calcium ranging from 0.84-0.78 and Phosphorous, Avail. % 0.42-0.39, respectively, however, if calcium is deficient and phosphorous is sufficient adds limestone or oyster shells, if phosphorous is deficient add tricalcium phosphate dicalcium phosphate to meet the requirements. Proper calcium and phosphorous ratio is important

ISSN 2599-4646 (Print) *www.psurj.org/jonas* ISSN 2599-4654 (Online)

because excess calcium maybe harmful by interfering with the availability of other nutrients. Micro minerals and vitamins are normally added to the ration in the premix form. (The Philippine Recommends for Livestock Feed Formulation (2003)

Table 6 Calculated Analysis of Formulated Feed

Nutrient content	Parts by Weight(Kg)			
	0 –WY	5 kg. WY	10 kg. WY	15 kg. WY
Crude Protein	19.5	19.88	18.72	19.5
Calcium	0.84	0.84	0.84	1.87
Phosphorous	0.50	0.52	0.42	0.77
ME (Kcal/g)	2800	2756.35	2642.3	2800.00

SUMMARY AND CONCLUSION

This experiment was conducted at the Catanduanes State University, Research Development Services (RDS) Poultry Research Project from May 2 to June 10, 2015. The study aimed primarily to determine the effect of wild Yam (Dioscorea Dumetorum) upon the growth of broilers. Results of the experiment revealed that the broilers fed with different levels of raw Wild Yam at 0 %, 5 %, 10 % and 15 % shows good effects in all treatments with an average weight of 1.1 kg at 42 days old, average feed consumption of 2.6 kg with feed conversion efficiency of 2.1

The insignificant differences among body weights, weekly feed consumption and feed conversion efficiency as shown by broilers fed with different levels of Wild Yam indicates that the experimental rations used in the study have the same feeding value.

This study further revealed that all treatments used in the study had only slight differences in all statistical analysis with regards to growth rate among broilers fed with different levels of Wild Yam. Mortality was recorded in treatment C and D with 10% and 15% wild yam.

RECOMMENDATIONS

Since the result of this study were not significant as to the effect of raw Wild Yam tested in dietary rations can be recommended to poultry raisers.

Tubers of these crops (wild Yam)(Dioscorea Dumetorum) are not easily digested in their natural state and should be cooked and finally dried before they were given to animals. Cooking improves their digestibility, promotes palatability and improves their storage quality as well as making the roots safer to feed to animals.

The researchers further recommend another study on the feeding value of wild Yam to mallard ducks and hogs because wild yam contains more nutrients than other locally available roots and tubers so that animals does not compete food for humans.

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