GROWTH PERFORMANCE OF BROILERS FED WITH HOMEMADE DIET SUPPLEMENTED WITH MALUNGGAY (Moringa oleifera Lam) EXTRACT

Maravillas, Richard C.

Richard C. Maravillas, Bachelor of Science in Agriculture, Davao Oriental State University – Cateel Extension Campus, Cateel, Davao Oriental, Philippines

ABSTRACT

The study evaluated the effects of different levels of copra meal and varying concentrations of malunggay extract on the growth performance of broilers fed with homemade diet. Homemade ration with 20% and 30% copra meal (CM) and 60 ml, 90 ml and 120 ml mature malunggay stalk extract as supplement were used.

Growth parameters which include final weight, weight gain, average daily gain and feed conversion ratio were evaluated and statistically analyzed. In addition, cost and return analysis of the study was determined. Analysis of Covariance (ANCOVA) was used.

The result showed that broilers fed with 20% copra meal (CM) significantly performed better with the highest average final weight of 840.83 g compared to broilers fed with 30% CM diet with an average of only 595 g. Furthermore, the weight gain, average daily gain and cost and return analysis of the study followed the same significant trend.

Moreover, results showed that varying concentrations of malunggay leaf extract given 60 ml, 90 ml and 120 ml supplements did not affect the final weight, weight gain and average daily gain of broilers.

Keyword: *Growth Performance of Broilers, Malunggay (Moringa oleifera Lam) Extract, Copra Meal*

1 INTRODUCTION

Raising broiler is one of the most promising business opportunities today. It captures much attention among animal producers; hence, poultry products and by products are widely accepted among Filipinos and almost in all races. In addition, it serves as primary source of protein nutrient that satisfy human need. In such case, perennial problems on nutrition are reduced; hence, economic stability is attained. Additionally, the progressing broiler industry showcases various labor and entrepreneurial skills that help alleviate unemployment rate of the country. However, despite these vast prospects and opportunities, the industry is being challenge to produce quality and much safer products in volume of quantity. This is to address the prime need of the ever-increasing population of the country as well as the necessity to produce safe and good quality broiler meat and its by-products for human consumption.

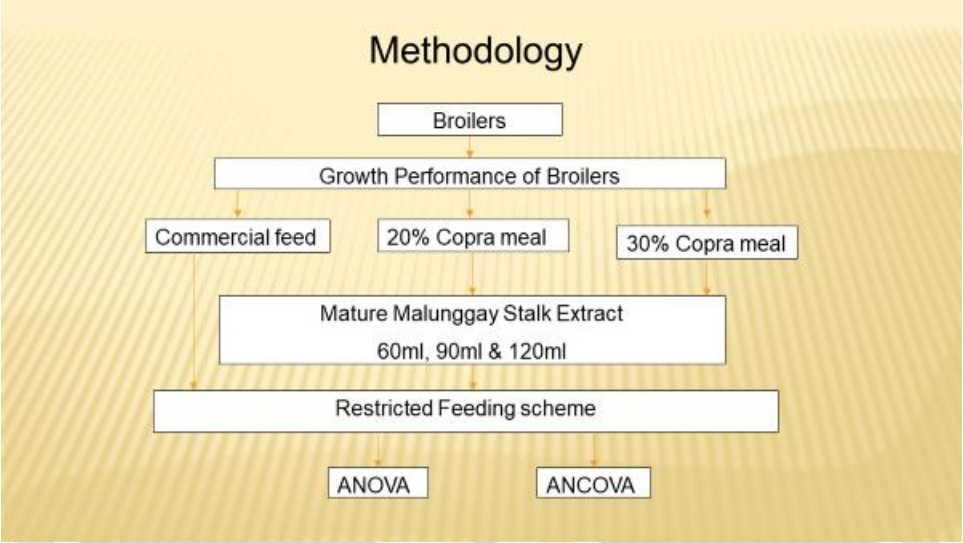
Presently, the use of malunggay as poultry feed supplement was intensively studied. Moringa leaves are known to have high content of protein, minerals and vitamins, hence an ideal nutritional supplement, (Oluduro, 2012). In addition, Malunggay (Moringa oleifera Lam) is one of the herbs containing bioceutical agents that could substitute synthetic growth enhancers and supplements in broiler and other livestock production (Portugaliza, et al. 2012).

This study had emphasized on the growth performance of broilers fed with homemade diet supplemented with malunggay extract. As such, this supplement embarked lower production cost as the materials are locally available. With this, profitability of the industry could be increased, thereby uplifting the economy of the industry.

2 MATERIALS AND METHODS

Mature stalk of malunggay was selected and extracted while still fresh. The fresh malunggay stalk extract was added with water at 1:2 extract to water ratio. This supplement was diluted using fresh and clean water at 60 ml/1L, 90 ml/1L and 120 ml/1L water.

Homemade ration using 20% and 30% copra meal was used in feeding broilers. The study was laid out in Completely Randomized Design with seven treatments and three replications.



3 RESULTS AND DISCCUSSIONS

3.1. Initial Weight of Broilers

The initial weight of broilers was analyzed through Analysis of Variance (ANOVA). Result showed that initial weight of broilers fed with commercial feed T1 showed a significant difference to T5 with 30% copra meal (CM) and 60 ml supplement as well as to T6 with 30% CM and 90 ml extract but not significant to other treatments. The result is attributed to positive response of the bigger birds on feeds at the start of the experiment; hence, these birds have high level of feed intake than small birds. In addition, initial weight significant result is attributed to the gradual feed changes at 11th day of birds. This is primarily to prepare the animals for full feed shifting in the 15th day. However, this 4-day feed adjustment on birds had significantly affected its weight resulting to initial weight variation on the onset of the study. Further, T2 is not significant to T3, T4, T5 and T7 but significant to T6. This is attributed to varying feed consumption actually consumed by birds even at the early 11th day of study. Broilers at T2 with 20% CM consumed more feeds compared to T6 with 30% CM, hence, results differ significantly. On the other hand, T3 to T7 are not significant with mean weight of 381.67 g, 365.41 g, 350.83 g, 337.08 g and 382.50 g, respectively.

Table 1. Initial weight of broilers used in the experiment (g).

Treatments		R_1	R_2	R_3	Mean*
T_1=	Commercial Feed without malunggay extract	425.00	400.00	402.50	409.16[a]
T_2=	20% CM and 60 ml malunggay extract/ liter of water	403.75	397.50	402.50	401.25[ab]
T_3=	20% CM and 90 ml	385.00	402.50	357.50	381.67[abc]

	malunggay extract/ liter of water				
T_4=	20% CM and 120 ml malunggay extract/ liter of water	353.75	372.50	370.00	365.41^{abc}
T_5=	30% CM and 60 ml malunggay extract/ liter of water	345.00	332.50	375.00	350.83^{bc}
T_6=	30% CM and 90 ml malunggay extract/ liter of water	330.00	352.50	328.75	337.08^{c}
T_7=	30% CM and 120 ml malunggay extract/ liter of water.	375.00	350.00	422.50	382.50^{abc}

CV=5.35%

Means having common letter superscript are not significantly different at 5% level of probability.

3.2. Final Weight of Broilers

The final weight of broilers was analyzed through Analysis of Covariance (ANCOVA). Results showed that commercially fed broiler has the highest mean of 1,588.33 g compared to T2-T7 with 817.50 g, 840.83 g, 765 g, 553.17 g, 542.50 g and 595 g respectively. This is attributed to positive response of birds with the commercial feed without malunggay extract. As such, there is high feed consumption level of commercially fed broilers with no left-over. In addition, water consumption of these broilers are higher compared to all other treatments. Hence, an excellent growth performance was observed and found highly significant compared to other treatments.

Moreover, Group 2 (T5-T7) had the highest left-over followed by Group 1 (T2-T4), hence, growth is poor due to less consumption of feed. Furthermore, T2-T4 with 817.50 g, 840.83 g and 765 g are highly significant from T5-T7 with 553.17 g, 542.50 g and 595 g, respectively. This is attributed to varying level of copra meal in the ration with T2-T4 of 20% CM while T5-T7 of 30% CM. With this, broilers with 20% CM performed better compared to birds fed with 30% CM. This was confirmed by the study of Jacome et al, 2002, Sundu et al., 2004, 2005 and 2006 which showed that there is a decrease of birds' performance at inclusion levels higher than 10-20%.

On the other hand, birds with the same inclusion rate of 20% CM as assigned in T2-T4 with mean of 817.50 g, 840.83 g and 765 g were found statistically not significant. In the same manner, birds fed with 30% CM in the diet with 553.17 g, 542.50 g, 595 g were statistically not significant. These results are basically due to the same levels of copra meal in the ration within group as well as birds consumability of the formulated ration.

Moreover, to determine the effect of CM and malunggay extract on birds an orthogonal contrasting mean on final weight was used. The result showed that commercially fed broiler is highly significant compared to other treatments (T2-T7). As such, commercially fed broiler is highly significant to Group 1 (T2-T4) as well as to Group 2 (T5-T7). This is attributed to positive response of broilers on commercially produced feed as observed on its high level of feed consumption and water intake compared to T2-T7 with high level of left-over especially at 30% CM diet.

Highly significant differences were observed with the varying levels of copra meal. Further, 20% CM with T2 = 817.50 g, T3 = 840.83 g and T4 = 765 g showed better performance as to effect on growth with an average mean weight of 807.77 g than 30% CM with T5 = 553.17 g, T6 = 542.50 g and T7 = 595 g based diet in the ration with an average mean weight of 563.55 g; hence, the result is highly significant. This means that copra meal at 20% has positive influence on final weight of broiler. Furthermore, to determine the effect of malunggay supplement on the growth performance of birds' final weight, various means of comparison were obtained. Generally, the result showed that when the average of two levels of copra meal (20% CM and 30% CM) formulation were computed and compared to 60 ml, 90 ml, and 120 ml supplement, the result is not significant. This indicated that the supplement did not influenced to the final weight of the broilers.

Moreover, T2 & T5 with 60 ml supplement had shown no significant difference from T3 & T6 with 90 ml extracted supplement. Hence, the broiler's final weight was not influenced by the varying concentrations of malunggay as supplement. This is attributed to low water consumption of birds given the 60 ml and 90 ml supplement. With this,

the supplement was not efficiently utilized; hence, the expected effect of supplement on the growth of birds was not realized.

Further, T2 & T5 of 60 ml supplement had shown no significant difference compared to T4 & T7 of 120 ml supplement. This result is attributed to less water & supplement utilization of broilers; hence, it did not influence on its final weight. Furthermore, T3 & T6 of 90 ml supplement had shown no significant difference compared to T4 & T7 of 120 ml. This indicated that even with the higher concentrations of malunggay as to 90 ml and 120ml, the birds' final weight were still not affected. This is attributed to less supplement and water intake of birds when given the concentrations; hence, the result is not significant.

Moreover, interaction between copra meal and malunggay extract has shown non-significant difference. This means that the interaction between two factors (copra meal and malunggay) did not influenced on final weight of broilers.

Table 2. Weight of broilers at 35 days as fed with homemade diet supplemented with malunggay (Moringa oleifera Lam) extract (g).

Treatments		R_1	R_2	R_3	Mean**
T_1=	Commercial Feed without Malunggay extract	1575.00	1620.00	1570.00	1588.33[a]
T_2=	20% CM and 60 ml malunggay extract/ liter of water	865.00	715.00	872.50	817.50[b]
T_3=	20% CM and 90 ml malunggay extract/ liter of water	832.50	890.00	800.00	840.83[b]
T_4=	20% CM and 120 ml malunggay extract/ liter of water	797.50	745.00	752.50	765.00[b]
T_5=	30% CM and 60 ml malunggay extract/ liter of water	555.00	532.00	572.50	553.17[c]
T_6=	30% CM and 90 ml malunggay extract/ liter of water	560.00	532.50	535.00	542.50[c]
T_7=	30% CM and 120 ml malunggay extract/ liter of water.	570.00	537.50	677.50	595.00[c]

CV=5.37%

Means having common letter superscript are not significantly different at 1% level of probability.

3.3. Weight gain of Broilers

The results showed that the weight gain of broilers fed with commercial feed has highly significant difference from all other treatments (T2-T7). As such, commercially fed birds based on weight gain has the highest mean of 1,179.17 g compared to T2-T7 with 416.25 g, 459.17 g, 399.58 g, 203.33 g, 205.43 g and 212.5 g, respectively. This is basically due to high feed consumption level of commercially fed broilers with no left-over given 400 g per day per replication. In addition, water consumption of commercially fed broiler is higher compared to all other treatments. With this, it has been determined that commercially fed broilers consumed 4.75 liters of water per treatment daily, hence, an average of 396 ml of individually consumed water was observed. On the other hand, T2-T7 consumed only 1.44 liters of water with supplement per treatment daily.

Further, broilers with 20% CM as assigned in T2, T3 and T4 with mean of 416.25 g, 459.17 g and 399.58 g were found statistically not significant. In the same manner, birds fed with 30% CM in the diet with 203.33 g, 205.43 g and 212.50 g were found not significant. These results are basically due to the same levels of copra meal in the ration within group that the birds consumed.

Furthermore, to determine the effect of malunggay supplement on the weight gain of birds several means of comparison were obtained. Generally, the result showed that when the average of two % CM (20% CM and 30% CM) formulations were computed and compared to 60 ml, 90 ml, and 120 ml supplements, there was no significant difference. This signifies that the supplement did not influenced to the weight gain of broilers.

Moreover, interaction between copra meal and malunggay extract has shown non-significant difference given a probability value of 0.67, respectively. This means that the interaction between two factors (copra meal and malunggay) did not influence on weight gain of experimental birds.

Table 3. Weight gain of broilers from day 15-35 as fed with homemade diet supplemented with malunggay (Moringa oleifera Lam) extract (g).

Treatments		R_1	R_2	R_3	Mean**
T_1=	Commercial feed without malunggay extract	1150.00	1220.00	1167.50	1179.17[a]
T_2=	20% CM and 60 ml malunggay extract/ liter of water	461.25	317.50	470.00	416.25[b]
T_3=	20% CM and 90 ml malunggay extract/ liter of water	447.50	487.50	442.50	459.17[b]
T_4=	20% CM and 120 ml malunggay extract/ liter of water	443.75	372.50	382.50	399.58[b]
T_5=	30% CM and 60 ml malunggay extract/ liter of water	210.00	202.50	197.50	203.33[c]
T_6=	30% CM and 90 ml malunggay extract/ liter of water	230.00	180.00	206.25	205.41[c]
T_7=	30% CM and 120 ml malunggay extract/ liter of water.	195.00	187.50	255.00	212.50[c]

CV=9.97%

Means having common letter superscript are not significantly different at 1% level of probability.

3.4. Average Daily Gain

The results showed that ADG of broilers fed with commercial feed has highly significant difference from all other treatments (T2-T7). As such, commercially fed birds has the highest mean of 58.75 g compared to T2-T7 with 20.81 g, 22.95 g, 19.97 g, 10.16 g, 10.27 g and 10.62 g respectively.

Further, T2-T4 with 20.18 g, 22.95 g, and 19.97 g are significantly different from T5-T7 with 10.16 g, 10.27 g and 10.62 g, respectively. This is attributed to varying levels of copra meal in the ration with T2-T4 of 20% CM and T5-T7 of 30% CM. With this, experimental birds with 20% CM performed better compared to birds fed with 30% CM.

Furthermore, to determine the effect of malunggay supplement on the average daily gain of birds various means of comparison were obtained. Generally, the result showed that when the average of two % CM (20% CM and 30% CM) formulations were computed and compared to 60 ml, 90 ml, and 120 ml supplements, there was no significant difference. This indicated that the supplement did not influence to the weight gain of the broiler birds.

Moreover, interaction between copra meal and malunggay extract has shown non-significant difference. This means that the interaction between two factors (copra meal and malunggay) did not significantly influenced on average daily gain of broilers.

Table 4. Average daily gain of broilers from 15th day to 35th day of feeding homemade diet supplemented with malunggay (Moringa oleifera Lam) extract (g).

Treatments		R_1	R_2	R_3	Mean**
T_1=	Commercial feed without Malunggay extract	57.50	61.00	58.37	58.95[a]
T_2=	20% CM and 60 ml malunggay extract/liter of water	23.06	15.87	23.50	20.81[b]
T_3=	20% CM and 90 ml malunggay extract/liter of water	22.37	24.37	22.12	22.95[b]
T_4=	20% CM and 120 ml malunggay extract/ liter of water	22.18	18.62	19.12	19.97[b]
T_5=	30% CM and 60 ml malunggay extract/ liter of water	10.50	10.12	9.87	10.16[c]
T_6=	30% CM and 90 ml malunggay extract/ liter of water	11.50	9.00	10.31	10.27[c]
T_7=	30% CM and 120 ml malunggay extract/ liter of water.	9.75	9.37	12.75	10.62[c]

CV=9.97%

Means having common letter superscript are not significantly different at 1% level of probability.

3.5. Feed Conversion Ratio

The results showed that commercially fed broilers had shown the most efficient converting ratio with a mean of 1.59 kg compared to T2-T7 with 3.62 kg, 3.14 kg, 3.47 kg, 4.77 kg, 4.88 kg and 5.44 kg, respectively. The result is attributed to positive response of broilers fed with the commercially formulated feed without malunggay extract.

Highly significant differences were observed with the varying levels of copra meal. Further, 20% CM showed better performance and effect on birds Feed Conversion Ratio (FCR) than 30% CM based diet in the ration. This means that copra meal has an influenced on the FCR of broilers. Moreover, T2 with 20% CM is statistically not significant to T5 with 30% CM in the ration. This means that malunggay extract has partially influenced the FCR of birds. However, T3 with 20% CM is significant to T6 with 30% CM. This is attributed to less feed consumption of broilers given 30% CM compared to T3 with 20% CM. Further, T4 with an average mean FCR of 3.47 kg is highly significant to T7 with 5.44 kg average feed conversion ratio. This is attributed to varying levels of copra meal in the

ration given 20% and 30% CM; hence, birds' ability to consume feed is varied resulting into highly significant difference.

Furthermore, to determine the effect of malunggay extract as supplement on the Feed Conversion Ratio of birds various means of comparison were obtained. Generally, the result showed that at 60 ml extract, CM showed no significant effect on FCR. This is attributed to low concentration of malunggay extract on 60 ml supplement in the drinking water, hence, this concentration is not enough to influence on birds FCR. Moreover, when the average of two CM levels formulated was computed and compared to 60 ml, 90 ml and 120 ml mixture, result showed no significant difference except for 90 ml and 120 ml wherein the effect of the supplement was found. This indicated that malunggay extract beyond 90ml partially influenced the growth performance of broilers by counteracting the negative effect of high levels of copra meal.

Moreover, interaction between copra meal and malunggay extract has shown non-significant difference. This means that the interaction between two factors (copra meal and malunggay) did not influence on feed conversion ratio of broilers, hence, the result is not significant.

Table 5. Average Feed Conversion Ratio (FCR) of broilers fed with homemade diet supplemented with malunggay (Moringa oleifera Lam) extract (kg).

Treatments		R_1	R_2	R_3	Mean**
T_1=	Commercial feed without Malunggay extract	1.62	1.55 1.61	1.59[a]	
T_2=	20% CM and 60 ml malunggay extract/ liter of water	3.18	4.47 3.23		3.62[b]
T_3=	20% CM and 90 ml malunggay extract/ liter of water	3.26	3.12 3.03		3.14[b]
T_4=	20% CM and 120 ml malunggay extract/ liter of water	3.27	3.48 3.65		3.47[b]
T_5=	30% CM and 60 ml malunggay extract/ liter of water	4.84	4.82 4.67		4.77[bc]
T_6=	30% CM and 90 ml malunggay extract/ liter of water	4.59	5.24 4.83		4.88[bc]
T_7=	30% CM and 120 ml malunggay extract/ liter of water	5.88	5.68 4.76	5.44[c]	

CV= 10.00%

Means having common letter superscript are not significantly different at 1% level of probability.

3.6. Cost & Return Analysis

The result of the analyses is based on uniform price of broilers at P120.00 per kilogram live weight. The result showed that broilers fed with commercial feed had highly significant difference from all other treatments (T2-T7). As such, commercially fed birds based on benefit has the highest mean of P109.25 pesos per bird compared to T2-T7 with P29.57, P32.04, P23.49, P12.71, P9.14, P10.77, respectively. However, despite homemade based ration

fed broilers were inferior in terms of economic benefit compared to commercially fed; it has significant impacts on health since the produce was driven towards organic means of production. As such, giving safety margin to consumers. Hence, this study can served as initial reference for farmers venturing into organically-grown broilers for mass production.

Significant difference was observed with the varying levels of copra meal. Result showed better benefits with 20% CM as to return with average mean of P28.37 than 30% CM with P10.87, respectively. This means that copra meal at 20% has economic advantage compared to 30%.

Furthermore, to determine the influence of malunggay as supplement on the cost and return of birds, several means of comparison were obtained. Generally, the result showed that when the average of two levels of CM (20% CM and 30% CM) formulation was computed and compared to 60 ml, 90 ml, and 120 ml supplement, there was no significant difference. This signified that the supplement did not significantly influence to the economic benefits of birds.

Moreover, interaction between copra meal and malunggay extract had shown non-significant difference given a probability value of 0.37. This means that the interaction between two factors (copra meal and malunggay) did not significantly influenced on cost and return analysis of the experimental birds.

Table 6. Cost and Return Analysis of broilers fed with homemade diet supplemented with malunggay (Moringa oleifera Lam) extract (Php).

Treatments		**R_1**	**R_2**	**R_3**	**Mean****
T_1=	Commercial feed without Malunggay extract	105.87	110.44	111.45	109.25[a]
T_2=	20% CM and 60 ml malunggay extract/ liter of water	35.31	18.58	34.84	29.57[b]
T_3=	20% CM and 90 ml malunggay extract/ liter of water	30.53	35.80	29.79	32.04[b]
T_4=	20% CM and 120 ml malunggay extract/ liter of water	25.56	23.31	21.62	23.49[b]
T_5=	30% CM and 60 ml malunggay extract/ liter of water	11.25	9.80	17.00	12.71[c]
T_6=	30% CM and 90 ml malunggay extract/ liter of water	9.77	9.37	8.30	9.14[c]
T_7=	30% CM and 120 ml malunggay extract/ liter of water	7.66	5.80	18.81	10.77[c]

CV=13.72%

Means having common letter superscript are not significantly different at 1% level of probability.

4 SUMMARY AND CONCLUSIONS

The study was entitled "GROWTH PERFORMANCE OF BROILERS FED WITH HOMEMADE DIET SUPPLEMENTED WITH MALUNGGAY (Moringa oleifera Lam) EXTRACT". Generally, the study was conducted to evaluate the effect of different levels of copra meal and malunggay extract as supplement on the growth performance of broilers fed with homemade diet

Furthermore, the study composed of seven (7) treatments with three (3) replications. With this, 21 experimental units were established on the area; hence, it is a factorial experiment. The study utilized eighty four (84) experimental birds which were randomly distributed into several treatments and replications. As such, there were twelve birds per treatment with four birds per replicate. The study utilized several parameters that determine the growth performance of broilers. These include, final weight, weight gain, average daily gain as well as the birds feed conversion ratio. In addition, cost and return analysis of the study was also determined.

Broilers were fed with commercial feed, homemade ration with 20% and 30% copra meal. The study specifically gave emphasis on the growing-finishing diets of broilers. Hence, it commenced on the 15th day of the birds. As such, since it has 20-day duration, it was terminated on the 35th day of birds. With this, the final weight of broilers was determined and the various parameters were calculated and evaluated. Moreover, Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) were used to determine significant differences among treatments.

Generally, it was concluded that T1 broilers fed with commercial feed had an excellent growth performance compared to all other treatments based on the various growth parameters evaluated. The study concluded that copra meal of 20% level has an influenced on the growth performance of broilers. Further, T2 to T4 with 20% copra meal had performed better compared to T5 to T7 with 30% copra meal; hence, the result is significant. It signified that a bird fed with 20% CM has much advantaged and effect on growth compared to birds fed with 30% copra meal. Furthermore, the study concluded that different concentrations of malunggay stalk extract as supplement at 60 ml, 90 ml and 120 ml had no influenced on the growth of birds as to final weight, weight gain and average daily gain of birds. Hence, the results of these parameters are not significant. However, it was further concluded that mature malunggay stalk extract beyond 90 ml partially influenced the Feed Conversion Ratio (FCR) by increasing the growth performance of broilers. This indicated that extract had a positive influenced on growth by counteracting the negative effect of high levels of copra meal.

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