BIBLIOGRAPHY

DAVID, RINALYN L. APRIL 2012. Growth Performance of Broilers as Affected by Different Levels of Galiang Tubers Meal as Feed Supplement in Commercial feeds. Benguet State University. La Trinidad, Benguet.

Adviser: Marlene B. Atinyao, Ph.D.

ABSTRACT

This study was conducted to determine the effect of supplementing broiler ration with 100g, 200g, and 300g with galiang during the finishing period on growth rate, feed intake, feed conversion ratio and return on investment in broilers. A total of 160 cobb's broiler chickens were randomly distributed into four treatments. The four treatments were replicated four times with 10 birds per replication a total of 40 birds per treatment.

Results of the study revealed no significant differences among the treatments in terms of initial weights taken at day 27 and final weights taken at day 38, total and daily gain in weight and feed conversion ratio. The average initial weight of birds was 0.146 kg while the final weight taken at day 38 was 1.249 kg. Average daily gain and feed conversion ratio obtained in this study were 0.036 kg and 2.134 kg respectively.

The average daily feed intake of birds given 300g galiang tuber meal/kg of commercial ration was significantly higher than those given pure commercial ration and100g, and 200g, galiang/kg commercial ration. The mean feed intake of bird given 300g galiang tuber meal/kg commercial ration was 0.081 kg while those given pure

commercial ration, and those birds given pure commercial ration had mean feed intakes of 0.071kg, birds given 100g galiang/kg of commercial ration had mean feed intake of 0.075 kg, birds given 200g galiang/kg of commercial ration had mean feed intake of 0.079 kg.

For the return on investment (ROI), the highest ROI was obtained from birds given pure commercial ration supplemented with 300g galiang tuber meal of 23.29%. Birds given pure commercial ration had the ROI of 22.23%. ROI of 19.94% was obtained in 200g galiang tuber meal and birds given 100g galiang tuber meal had the ROI 19.93 % from day 27 up to day 38.

INTRODUCTION

Poultry production is said to be characterized by tradition and small-scale systems of farming and operated pre-dominantly by small and low-income farmers. Nowadays, poultry is being raise in large and medium scale systems not only in the Philippines but in the whole world as well. The products of poultry serve as sources of income, employment, and proper nutrition of families (Tegui-ing, 2008).

The tremendous growth in human population has affected the cost of feeds needed to fed poultry and livestock's animals. The decreases in production of these animals causes scarcity of meat supply in the market due to high cost of feeds and high demand for human consumption. Due to these problems researchers has to search for alternative cheap energy sources to substitute for commercial feeds.

Researcher on possible feed supplements found some novel feed resources such as fruit and vegetables, tubers and leaves cheaper than commercial feeds. However, appropriate technology has to be developed to improve the skills of the users through proper training and maximum utilization of environmental feed resources for sustainable poultry (Reddy and Quadratullah, 2006).

Poultry meat producers in both the large and small scales farming are concerned with how to obtain the optimum growth performance of chickens through efficient and low cost of rations. One way of reducing the cost of production is the use of galiang tubers meal as feed supplement. The use of non-marketable tubers can lessen the expenses.

Galiang (*Alocasiamacchorrhiza*) is an herb and commonly available in semi-temperate places. Its tuber is a good source of energy and the leaves is used as vegetable.

Galiang has leaves that are 1 to 2 meters long, erect petiole and an arrow-shaped blade. The plants rarely flowers and never set seed. This is propagated by removing the upper half inches of the corm with the shoot or via smaller auxiliary corms.

According to Tegui-ing (2008), about 10 % of the world population use galiang as staple food in the diet and for 100 million people this is an important daily food. The Alocasiamacchorrhiza is a very common crop for wet soils in the humid tropics. The chief food from these plants is the "corm", an erect, starchy, underground stem which grows to be over a foot long, but leaves are also consumed.

Galiang tubers meal which is sun-dried will be utilized in this study. This is in line with the report of Agwunobi and Abdulrashid (2009) that sundried galiang is more effective in gained in weight of chickens than boiled alone.

This study was centered on the growth performance of the chicken fed with commercial ration. Three levels of galiang tubers meal were used to supplement with commercial ration.

The study was conducted to determine the effects of the different levels of sun-dried galiang tubers meal on the growth performance, feed intake, feed conversion ratio of broiler chicken and to determine the effect of supplementing broiler ration with galiang in the cost of production.

The study was conducted at Namon-ao, Gadang, Kapangan, Benguet from November 2011 to January 2011 for a period of 38 days.

REVIEW OF LITERATURE

Galiang has high starch content and on this account is very nutritious. The leaves and petioles of galiang are also used as vegetables, and both leaves are very good source of calcium, phosphorus and iron (Maranon, 1985). The corms, petioles and leaf blades are not only excellent as to taste but also rich in minerals. It is also a fair source of vitamin B (Hermano and Sepulveda, 1984).

Chemical analysis shows that sun-dried galiang tuber contain 11.98% moisture, 4.26% ash (gravimetric method), 1.22% crude fat (soxhlet method), 5.01% crude protein (kjeldal method), 77.62% carbohydrate and 341 kcal energy (DOST, 2002).

Johnston (2000) stated that galiang can replace almost all of the grain in the diets with little reduction in performance, inclusion of levels up to 65 % (preferably pelleted) do not seem to affect health carcass quality or overall performance when diet are carefully balanced.

According to Reddy and Quadratullah (2006), due to severe shortage of cereals use in poultry feed and similarly the cost of conventionally employed vegetable oil meals and animal protein are highly prohibitive and their supply is inconsistent. Continuous search of some novel energy and protein sources of food of poultry farming such as roots, tubers, molasses, mango seed, kernel, and salseed meal used by rural household units and scavenging birds in various regions of developing countries.

According to Bagano (1986), galiang feed meal significantly increased the weight, improves the feed conversion efficiency and reduced the cost of feeds to produce a kilogram gain in weight. Birds feed with 15% galiang had the highest final weight and

gain in weight had better conversion ratio and incurred the lowest cost to produce a kilogram gain in weight.

According to Ullibac (2002), birds fed with 10% ground gabi had higher fed consumption ratio and lower feed cost per unit gain in weight as compare to those fed with 5% ground gabi and commercial feeds.

According to Sipol (2004), sasso given 7.5g ground galiang as partial feed substitute was the most efficient in converting feed into gain (FCR of 2.52), followed by birds given 15g and 22.5g ground galiang as feed substitute (FCRs of 3.10 and 3.17, respectively).

According to Agwunobi and Quadratullah (2009), the overall result showed that birds consumed higher and gain higher weight in sun-dried galiang and gain in weight in sun-dried galiang due to heat treatment of drying while bird consumed lower in raw galiang due to toxic effect of unboiled galiang. Sun-drying was more effective than boiling drying alone in reducing the level of anti-nutritional factors (phyate, oxalate, tannins, and saponin). Boiling decreased the level of anti-nutritional factors which in turn enhances digestibility and metabolism of feed taken by the animals.

MATERIALS AND METHODS

This study used 160 straight-run day old broiler cobb's chicks, commercial feeds, disinfectant, brooding and rearing pens, weighing scale, feeding and drinking troughs, electric bulb, newspapers, empty sacks, cleaning materials, and chopped galiang.

A week before the arrival of the chicks, the brooding house and cages were cleaned and disinfected. The feeding troughs and waterers were thoroughly scrubbed with disinfectant. The disinfectant brooders, feeders and waterers were dried, in order to remove and expose irritable odor of the disinfectant use.

A day before the chicks arrive, clean newspaper were spread over the floor of the brooding-rearing cages to serve as mats that prevented feet injury to young birds. The walls were cover with clean feed sacks to protect the birds from the ill-effects of adverse weather conditions, and to aid in the conservation of heat and avoid draft likewise; electric bulbs were installed to provide heat to the house birds.

Upon arrival of the chicks, they were place inside the brooder house where they were feed broiler starter feeds. Water will be available to them at all times. They were fed adlibitum.

After 27 days, the experimental birds were weigh to obtain their initial weight and were distributed at random into four treatments following the completely randomized design (CRD) each treatment were replicate four times with 10 birds per replicate making a total of 40 birds per treatment.

Sun-dried galiang tubers were substitute parts of commercial as specified in the treatment as follows:

T_o = Pure Commercial Ration (CR)

T_1 = 100g Ground Galiang / kg CR

T_2 = 200g Ground Galiang / kg CR

T_3 = 300g Ground Galiang / kg CR

The experimental birds in all the treatments were given the same care and management except the different levels of galiang meal as partial feed supplement for commercial feeds in treatment 1, 2 and 3. The birds were fed with broiler starter rations from the first to the 4th week and broiler finisher ration, from the 5th to the end of the study.

Galiang tubers were collected at Namon-ao, Gadang, Kapangan, and Benguet. The tubers were washed, peeled, chopped into cubes and sundried about 5 days. The galiang meals were mixed with commercial feeds in accordance with the specified level per treatment.

Data Gathered

1. Initial weight (kg). This was taken by weighing the initial weight of birds at 27 days.

2. Final weight (kg). This was taken by weighing the final weight of birds at 38 days.

3. Feed offered (kg). This refers to the total amount of feeds consumed by the birds from day 27 to day 38 of the experimental animals.

4. Feed rejected/left-over. This refers to the weight of the feeds left in the feeding troughs taken every morning before feeding.

5. Number of dead birds. This refers to the number of dead birds during day 21 to 38 day of the experimental animals or during the finishing period.

6. Number of sick birds. This refers to the number of sick birds during the day 21 to day 38 of experimental animals.

7. Feed cost. This refers to the cost of commercial feeds and the galiang tubers meal.

8. Other cost of production. This included the cost of the following; vaccine, disinfectants, brooding and rearing pens, weighing scale, feeding and drinking troughs, electric bulbs, newspapers, empty sacks, and cleaning material.

From the above data the following were computed:

1. Total gain in weight (kg). This was compute subtracting the initial weight from the final weight.

2. Average daily gain (kg).This was obtained dividing the total gain by the experimental period.

3. Total feed intake. This was obtained per replicate by adding the amount of feed offered after the feed left-over has been subtracted.

4. Feed conversion ratio. This was obtained dividing the total feed intake by the total gain in weight.

5. Feed cost per kilogram of broiler produced. This was computed by multiplying the FCR by the average feed cost per kg.

6. Percent (%) mortality. This was obtained by dividing the total number dead birds in each replicate by the number of birds in one replicate multiplied by 100%.

7. Percent of morbidity %. Number of sick birds divided by the original number of birds per replicate multiplied by 100.

8. Net returns. This was obtained by subtracting the total cost of production from the total sales per replicate.

9. Harvest rate. This was computed using the formula:

$$HR = \frac{\text{No. of Bird Alive at the End of the Study}}{\text{Initial Number of Birds}}$$

10. Production efficiency factor. This was obtained using the formula:

$$PEF = \frac{\text{Harvest recovery (\%) x Average live weight (kg)}}{\text{Harvestable age (days) x Feed conversion ratio}} \times 100$$

11. Return on Investment (ROI). This was computed using the following formula:

$$ROI = \frac{\text{Sales-Total Cost of Production}}{\text{Total Cost of Production}} \times 100$$

RESULTS AND DISCUSSION

Initial Weight and Final Weight

The initial and final weight of birds taken at day 27 and day 38 respectively are shown in Table 1. Statistical analysis showed no significant differences in the initial weight of birds given pure commercial ration and those birds given commercial ration supplemented with 100g, 200g, or 300g galiang from day 27 to 38 days of age. The average initial weight of birds is 0.856 kg for 11 days. This indicates that the experimental units were homogenous at the start of the study. The average weight of birds at day 27 was 750g.

Similarly, there were no significant differences in the final weight of birds given pure commercial ration and those birds given commercial ration supplemented with 100g, 200g, or 300g galiang from day 27 to 38 days of age. The average final weight of birds is 1.241 kg for 11 days. This implies that supplementing commercial broiler ration at the rate of 100 to 300g/kg with galiang did not improved nor adversely affects the final weight of birds.

The result of this study contradicts the study of Sipol (2004) who substituted commercial ration with; 7.5g, 15g, 22.5g of galiang in one kg of feed from day 30 to day 60 who reported that final weight of birds significantly decreased when a part of the commercial feed was substituted with galiang. Differences in the result were due to different duration of the study wherein Sipol substituted galiang at 30 days with sasso chicken.

Table 1. Initial weights at 27 days old and final weights of birds at 38 days old (kg)

TREATMENT	INITIAL WT	FINAL WT
Control	0.856[a]	1.271[a]
100g galiang per kg of commercial ration	0.857[a]	1.226[a]
200g galiang per kg of commercial ration	0.834[a]	1.205[a]
300g galiang per kg of commercial ration	0.863[a]	1.291[a]

Means with the same letter are not significantly different at 5% level DMRT.

Gain in Weight

Table 2 presents the total gain in weight and the daily gain in weight of birds. Statistical analysis showed no significant differences in the gain in weight of birds given pure commercial ration supplemented with 100g, 200g, or 300g galiang from day 27 to 38 days of age. Birds given commercial ration supplemented with 300g galiang had a daily gain of 0.039 kg and those birds feed with pure commercial ration had a daily gain of 0.038 kg while birds given commercial ration supplemented with 100g and 200g galiang had a daily gain of 0.034 kg.

The result of this study does not concur the study of Sipol (2004) who reported that birds fed pure commercial ration have higher gain in weight than birds given rations where 7.5g, 15g and 22.5g of galiang was use to substitute same amount in 1000g of commercial feeds from day 30 to day 60.

On the other hand Bagano (1986) who substituted 5%, 10%, and 15% of galiang with commercial feeds from day 28 to day 45 reported that birds fed with 15% galiang had a higher gain in weight.

Table 2. Gain in weights of birds from 27 to 38 days old (kg)

TREATMENT	TOTAL GAIN IN WEIGHT	AVERAGE DAILY GAIN
Control	0.415[a]	0.038[a]
100g galiang per kg of commercial ration	0.369[a]	0.034[a]
200g galiang per kg of commercial ration	0.370[a]	0.034[a]
300g galiang per kg of commercial ration	0.427[a]	0.039[a]

Means with the same letter are not significantly different at 5% level of DMRT.

Feed Intake

The daily feed intakes and total feed intake of broilers taken at day 38 respectively are shown in Table 3. Statistical analysis showed significant differences in the feed intake of birds given pure commercial ration and those birds given commercial supplemented with 100g, 200g, or 300g galiang from day 27 to 38 days of age. This means that galiang significantly increased the feed intake of birds. Birds given pure commercial ration had a daily feed intake of 0.071 kg and the daily feed intake of those birds given commercial ration supplemented with 100g, 200g, and 300g galiang were 0.075 kg, 0.079 kg and 0.081 kg respectively.

The result of the study was the same with the result of Bagano (1986) who obtained highly significant increase in the feed intake of birds given galiang from day 30 to day 60. However, this contradicts with the study of Sipol (2004) who obtained highly significant decrease with the substitution of commercial feeds with galiang from day 28 up to day 45. The feed intakes of birds were computed combining the commercial ration and galiang tubers meal used.

Feed Conversion Ratio

The feed conversion ratio (FCR) of broilers from day 27 to 38 days of age in different treatment is presented in Table 4. Statistical analysis showed no significant differences among treatments. The FCR of birds given pure commercial ration was 1.875 kg and those birds given commercial ration supplemented with 100g, 200g, or 300g galiang were 2.247 kg, 2.335 kg, and 2.077 kg, respectively.

Table 3. Feed intake of birds from 27 to 38 days old (kg)

TREATMENT	TOTAL FEED INTAKE	DAILY FEED INTAKE
Control	0.778[d]	0.071[d]
100g galiang per kg of commercial ration	0.829[c]	0.075[c]
200g galiang per kg of commercial ration	0.864[b]	0.079[b]
300g galiang per kg of commercial ration	0.887[a]	0.081[a]

Means with the same letter are not significantly different at 5% level of DMRT.

Table 4. Feed conversion ratio from day 27 to day 38 days old

TREATMENT	MEAN
Control	1.875
100g galiang per kg of commercial ration	2.247
200g galiang per kg of commercial ration	2.335
300g galiang per kg of commercial ration	2.077

Means with the same letters are not significantly different at 5% level DMRT.

As compare to the study of Bagano (1986) who substituted 5%, 10%, and 15% of galiang with commercial feeds from day 28 to day 45 reported that birds fed with 15% galiang had a higher gain feed conversion ratio. On the other hand, Sipol (2004) who substituted commercial ration with; 7.5g, 15g, 22.5g of galiang in one kg of feed from day 30 to day 60 significantly increased on those birds given pure commercial ration.

Results of this study collaborates with the study of Sipol (2004) who substituted galiang to commercial ration of sasso chickens and revealed a highly significant decrease in FCR of birds given pure commercial feeds. On the other hand, the result of this study contradicts the study of Bagano (1986) who reported significantly increased in FCR of birds given 15% galiang who used galiang to substitute commercial feed.

Feed Cost per Kilogram
of Broiler Produced

Table 5 presents the feed cost per kilogram of broiler produced. Birds given pure commercial ration was 72.800 kg and those birds given commercial ration from day 27 up to day 38 supplemented with 100g, 200g, and 300g galiang were 71.100 kg, 67.200 kg, and 52.379 kg from day 27 up to day 38 respectively.

Table 5. Feed cost per kilogram of broiler produced from day 27 to 38 days old

TREATMENT	MEAN
Control	72.800[a]
100g galiang per kg of commercial ration	71.100[b]
200g galiang per kg of commercial ration	67.200[c]
300g galiang per kg of commercial ration	52.379[d]

Means with the same letter are not significantly different at 5 % level of DMRT.

Production Efficiency Factor (%)

The production efficiency factors (PEF) of broiler were presented in Table 6. Statistical analysis showed no significant differences among treatments. The birds given 300 g of galiang tuber meal had the mean PEF of 97.500. Birds given 100 g of galiang tuber meal obtained a mean PEF of 151.579. Birds given commercial ration had the mean PEF of 147.435 and the birds given 200 g of galiang tuber meal obtained the mean PEF of 97.500 taken from day 27 up to day 38.

For harvest rate, the birds fed with 100g galiang per kg of commercial ration and birds fed with 300g galiang per kg of commercial ration supplemented from day 27 up to day 38 had obtained a mean of 97.5% and birds fed with pure commercial ration and birds fed with 200g galiang per kg of commercial ration had the same mean of 95%.

Table 6. Production efficiency factor (PEF) and harvest rate of the birds

TREATMENT	PEF	HARVEST RATE (%)
Control	147.435[a]	95.00[a]
100g galiang per kg of commercial ration	151.579[a]	97.50[a]
200g galiang per kg of commercial ration	133.981[a]	95.00[a]
300g galiang per kg of commercial ration	97.500[a]	97.50[a]

Means with the same letter are not significantly different at 5% level of DMRT.

Return on Investment

The cost and return analysis per treatment is shown in Table 7. The highest ROI of 23.29% was obtained in 300 g galiang tuber meal. Birds given pure commercial ration had the ROI of 22.23%. ROI of 19.94% was obtained in 200g galiang tuber meal and birds given 100 g galiang tuber meal had the ROI 19.93 % from 27 days old up to day 38.

The cost of production includes the following: cost of galiang, cost of commercial ration, cost of electricity, cost of stocks, transportation, and medication. The cost of broiler per kilogram is Php. 120/ kg of broiler meat and the cost of galiang is Php.8/kg.

Table 7. Return on Investment

TREATMENT	TOTAL SALE (Php)	TOTAL COST (Php)	NET INCOME (Php)	ROI (%)
T_0	6,794.68	5,284	1,400.75	22.23
T_1	6,528.97	5,228	1,292.97	19.93
T_2	6,539.95	5,236	1,515.68	19.94
T_3	6,799.95	5,284	1,491.95	22.29

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

This study was conducted to determine the effect of supplementing broiler ration with galiang during the finishing period on the growth performance of broilers. A total of 160 birds were randomly distributed into four treatments following the completely randomized design (CRD): T_0 = pure commercial ration (CR), T_1 = 100g galiang tuber meal/ kg of CR, T_2 = 200g galiang tuber meal/ kg of CR, and T_3 = 300g galiang tuber meal/ kg of CR.

Results of the study revealed no significant differences between treatments in final weight, average daily gain, feed conversion ratio, and production efficiency factor. A significant difference was observed on the total feed intake of birds given pure commercial ration from day 27 up to day 38 had a mean of 0.778 kg and those birds supplemented with 100g, 200g, and 300g galiang were 0.829 kg, 0.864kg, and 0.887 kg respectively.

The average final weight of birds was 1.249 kg and the average daily gain is 0.036 kg for 11 days. Likewise, the average feed conversion ratio and the average production efficiency factor were 2.134 kg and 150.65 for 11 days.

In terms of feed efficiency, birds given pure commercial ration were the most efficient with an feed conversion ratio (FCR) of 1.875 kg in contrast birds given 200g of galiang tuber meal were the least efficient with an FCR of 2.335 kg.

Regarding net returns profit, birds given 300g galiang tuber meal gave the highest net return of investment (ROI) of 22.29% and birds given pure commercial ration with an

ROI of 22.23% and birds given 200g and 100g galiang tuber meal with an ROI of 19.94% and 19.93% respectively.

However, in terms of feed cost per kilogram of broiler produced birds given pure commercial ration obtained a mean weight of 72.800 kg and birds given 100g galiang tuber meal with a mean weight of 71.100 kg. Birds given 200g and 300g galiang tuber meal were 67.200 kg and 52.379 kg.

Conclusion

Based on the above results adding a rate of 100g, 200g, and 300g/ kg of commercial ration did not improved the performance of broilers.

Recommendation

From the results, galiang may be used in supplementing at the rate of 100g to 300g/ kg of commercial ration. For further study, it is also recommended to determine the digestibility of birds fed with galiang and galiang can be used as an ingredient for formulating broiler ration.

LITERATURE CITED

AGWUNOBI, L.N. and ABDULRASHID, M. 2009. Poultry Pakistan Journal of Nutrition.P. 668-673.

BAGANO, A. 1986. Performance of broilers feed with different levels of Galiang Feed Supplement. BS Thesis.Benguet State University, La Trinidad, Benguet P14.

DEPARTMENT OF SCIENCE AND TECHNOLOGY.2002. Chemical analysis of galiang (*Allocasiamacrorrhiza*). Km. 6 La Trinidad, Benguet.

HERMANO, D.L. and SEPULVEDA, H.R. 1984. Vegetables and Rootcrops.Modern Agriculture and Industry.P. 11.

JOHNSTON, D.L. 2000. Performance of broiler fed with different levels of galiang as fed supplement. BS Thesis. Don Mariano Marcos Memorial State University.Bacnotan, La Union.

MARANON, J.C. 1985. Rootcrops.Modern Agriculture and Industry.Vol 1.P. 23.

REDDY, C.V. and QUADRATULLAH C. 2006.XX World Poultry Congress Journal.Department of poultry Science, College of Veterinary Science, A.P. Agricultural University, Hyderabad, India.

SIPOL, L.S. 2004. Performance of Sasso chicken feed with different levels of Galiang (*Allocasiamacrorrhiza*) tubers. BS Thesis. Benguet State University, La Trinidad Benguet.

TEGUI-ING, J.B. 2008. The growth Performance of crossbred piglets fed with varying levels of Taro Tuber Meal. BS Thesis. Kalinga- Apayao State College.BulanaoTabuk, Kalinga.

ULLIBAC, J.D. 2002.A study on broilers given with dried gabi roots as feed supplement.

BS Thesis. Benguet State University, La Trinidad, Benguet.P. 11