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NGALOY, ANGELINE T. MAY 2013. Growth Performance of Broiler Given Fish Amino Acid Extract. Benguet State University, La Trinidad, Benguet.

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ABSTRACT

This study was conducted at the Benguet State University (BSU) Poultry Experimental House located at Balili, La Trinidad Benguet from March to April 2013 to determine the effect of fish amino acid extract of growth, feed consumption, morbidity and mortality, and also to evaluate the return on cash expenditure from the different treatments.

A total of 120 two-week-old broiler chicks were randomly distributed into four treatments which were replicated three times, consisting of ten birds per replicate to make a total of thirty birds per treatment. The treatment were the following: Broiler given commercial feeds and water only (T_0); Broiler given commercial feeds and water with 15 ml fish amino acid (FAA) extract per liter (T2), Broiler given commercial feeds and water with FAA extract per liter (T3) and broiler given commercial feeds and water with 45 ml FAA extract per liter (T4).

Results of the study revealed no improvements attributed to the inclusion of FAA in terms of initial weight, final weight, gain in weight, feed consumption, feed conversion ratio, feed cost per kilogram gain in weight and dressing percentage of the broilers. There was no morbidity and mortality recorded throughout the study. The return on cash expenses obtained was highest in the control group which can be directly accounted for by the lesser expense due to non-inclusion of FAA.

It is therefore concluded that FAA at 15 to 45 ml diluted per liter of water administered for 31 days did not produce any significant improvement on the growth of broilers.

INTRODUCTION

The Philippines is an agricultural country where most of the Filipinos derive their income from farming. Poultry farming is one of the major enterprises favorable in our country due to the consistent high demand for chicken meat and eggs. Chicken is the cheapest source of high demand for high quality protein due to the fact that they multiply fast and are very efficient converters of feed into meat and eggs.

Therefore, there is a need to accelerate the development of the poultry industry. However, production is controlled by the increasing cost of production which is disproportionate with the price of poultry meat. One aspect to consider is how to produce poultry with the least expense without necessarily lowering the quality of the product.

Organic farming is becoming a trend worldwide which aims to avoid the use of antibiotics and other chemicals in the production of poultry and livestock. Therefore, while in the process of transition, it is proper to start raising poultry with the minimal use of antibiotics. In place of antibiotics, fermented supplements like sweet potato leaves extract can be used (Polig, 2008).

Unregulated use of antibiotics can result in the weakening of the bird's natural ability to fight-off the real pathogenic bacteria and most cases breeds within the system some antibiotic-resistant strains of these disease-causing bacteria. The sad part is that, these some bacteria can be harmful to human (A.P. Inocencio Farms, 1997).

This study hopes to advocate minimal use of antibiotics by utilizing alternatives such as fish amino acid made from cheap resources like bangus processing by-products. At the same time, the procedure in making FAA is easy to follow and can be adopted by anybody even those without technical background.

Milkfish (*Chanos chanos*) usually cultured and grown in pens near the shore. It can grow for about 71 inches but usually harvested at about 20 inches (Broad, 2003). It is being sold here in the Philippines as fresh, dried, or deboned. Also, some companies process milkfish into sardines. The waste from deboning and processing, adds to the bulk of garbage in the wet market. But this useless waste can be turned into Fish Amino Acid.

The result of this study may provide helpful information in improving the industry of broiler production. Raisers and growers may benefit from this study by minimizing their capital on the use of antibiotics and feed additive supplements given to their animals. Vendors of Bangus can gain profit in this study. If found feasible, extract from fermented Bangus processing by-products can replace the role of antibiotics as an immune booster in broiler.

This study generally aimed to determine the performance of broilers given FAA made from Bangus processing by-products. Specifically, it aimed to:

1. determine the effects of FAA made from Bangus processing by-products on gain in weight, feed efficiency, mortality rate and morbidity rate and,

2. determine the profitability of raising broilers given FAA made from Bangus processing by-products in terms of feed cost per kilogram broiler, cost of production, net profit and return in investment.

This study was conducted at the BSU Poultry Experimental Station from February to April 2013.

REVIEW OF LITERATURE

Fermented foods as those have been subjected to the action of the microorganisms or enzymes so that the desirable biochemical change causes significant modification to the food (Campbell-Platt, 1987).

Natural farming system (NFS) is a technology for agriculture that uses environmentally sound technique for raising crops and livestock that are free from most pesticide, growth hormone and antibiotics. NFC farmers typically rely on farm inputs like pesticide, fungicide and fertilizers derived from plants, animal waste, and minerals (Tinoyan, 2006).

Fish is a rich source of vitamins, particularly vitamin A and D from fatty species as well as thiamine, riboflavin and niacin (vitamin B1, B2 and B3). Vitamin A from fish is more readily available to the body than from plant foods. Vitamin A is required for the normal vision and for bone growth. Fatty fish contains more vitamin A than lean species. Studies have shown that mortality is reduced for children under five with good vitamin A status. As sun drying destroys most of the available vitamins better processing methods are required to preserve this vitamins. Vitamin D present in fish liver and oils is crucial for bone growth since it is essential to the absorption and metabolism. If eaten fresh, fish also contains a little vitamin C which is important for proper healing wounds, normal health of body tissue and aids in the absorption of iron in the human body (Lachica, 2003).

Olivo (1990) cited that the proximate composition of fish is as follows: 61.43% crude protein, 6.94% ether extract, 2.23% crude fiber, 6.23% ash, 15.72% nitrogen free extract, 90.32% dry matter, 1.80% potassium, 1.50% sodium, o.89% calcium, 1.19% phosphorus, 0.30% magnesium. He also cited that proteins are important for growth and development of the body, maintenance and repairing worn out tissues for production of enzymes and hormones required for many body processes. The importance of fish in providing easily digested protein of high biological value is well documented.

The lipids associated with fish are highly unsaturated and highly susceptible to be oxidized. Amino acid quality of fish is excellent, but excessive heating during the drying process can reduced digestibility of the protein fraction and complex some of the amino acids, so that they are not available. The oils associated with fish meal contain highly unsaturated and are oxidized easily.

Fish amino acid (FAA) is a fermented fish bones, spines, head and entrails with the use of the crude protein or molasses with a weight ratio of 1:1. FAA contains nutrients and various types of amino acid. The leftover bones can be turned into a good water-soluble calcium phosphate when further decomposed. Also, FAA helps activate helpful microorganisms.

Organic acids inhibit the growth of bacteria through several proposed mechanism. One of the accepted mechanisms involves the disruption of cell membrane transport function that allow the bacteria to maintain relatively state of equilibrium with their environment by absorbing nutrients and excreting waste. In addition to reducing the growth of pathogenic bacteria, organic acids facilitate the growth of Lactobacillus and Bifid bacteria throughout the digestive tract of poultry and other animals. These bacteria improve gut health by producing lactic, acetic, propionic and butyric acid, organic acids that further limit the growth and colonization of pathogenic bacteria throughout the digestive tract (Poultry International, Inc. 2006)

The effect of different levels of probiotics (Lactobacillus acidophilus, Streptococcus faecium and Yeasacc 1026) supplementation on the growth performance of broiler chickens were evaluated using 144-1 day old commercial broiler chicken, for a period of 8 weeks. The feed intake and feed efficiency were statistically insignificant at 6 and 8 weeks of age among the treatment groups. The mortality percentage was affected by the treatments. Cost of production of broilers was lower in the 0.025 and 0.05 % probiotic supplementated groups at 6 and 8 weeks of age, respectively. It was concluded that probiotic supplementation in the standard broiler ration at a lower level is significant in the early stages of growth (Sabiha and Jalalundeen, 2005).

According to De Faria (2006), probiotics are a technically viable alternative to antimicrobial growth promoters in broiler feeding.

Administrations of probiotics through drinking water have beneficial effects on broiler performance. In the field trials, probiotic treatment significally improve feed conversion. In each field trial total final body weight was increased by supplemental probiotics, ranging from 0.74 to 1.64%. Mortality was reduced by the addition of probiotics ion the drinking water (Timmerman, 2006).

Many poultry nutritionist in Europe and other part of the world are not using antibiotics; agree the organic acids can replace their growth promoting properties of the antibiotics in the poultry feeds. In addition to enhancing and maintaining the performance, organic acids have shown to improve the meat quality, reduce the impact of poultry production in the environment and enhance the welfare of poultry (Poultry International, Inc. 2006).

Banning antibiotics as standard additive to poultry feed has cause a lot of turmoil especially among broiler growers. Producers, as well as manufacturers of feed additive hastily looking for alternatives. Result shows from study works shows that, to a large extent, Lactic acid can take over the growth promoting properties of antiniotics (Poultry International, Inc. 2006)

The reason why the poultry and livestock farmers giving daily feed supplements and other substance to their animals is to minimize production cost and also to improve feed efficiency and the animal's appetite (Francisco 1992).

Based on the study conducted by Banut (2010), birds given 20 and 40 ml FFE supplementation had heavier weights at the end of the study and had higher gain in weight compared to the control group. Increasing, however, the level of FFE supplementation to 60ml per liter of water did not result to a further increase in final weight and gain in weight of the birds.

MATERIALS AND METHODS

The materials that were used in this study are 120 day-old Cobb straight-run chicks, commercial feeds, vaccine, brooding rearing cages, weighing scale, old newspaper, electric bulb, feeding and drinking troughs. For the production of fermented fish processing by-products (internal organs, bones and scales), the following materials were used: fresh Bangus processing by-products, molasses, plastic pail and clean sheet of paper to cover the pail.

A week before the arrival of chicks, the cages including all the necessary materials needed were cleaned and disinfected. The brooder was provided with 100-watt electric bulbs. The floor of the brooders was covered with old newspaper sheets to help conserve heat during the brooding period. This will help prevent stripping of birds into the mesh wire holes and at the same time serve as feed receptacles during the first few days of brooding.

Upon arrival, the chicks were randomly distributed into four treatments with three replications each following the Completely Randomized Design. Water with FAA and feed was made available at all times. The treatments were:

T_0 = control

T_1 = 15 ml of FAA per liter of water

T_2 = 30ml of FAA per liter of water

T_3 = 45ml of FAA per liter of water

Controlled feeding was employed from the start until the end of the study. Chick booster were given to the chicks up to two weeks of age then gradually shifted starter ration on the 15th day and finisher ration on the 31st day until the end of the study. Shifting of feeds was done gradually by mixing 25% of new feeds on the first day, 50% on the second day and 75% on the third day so that on the fourth day the birds was totally fed with the new type of feed.

Preparation of the Fermented Bangus
Processing By-Products

The following procedure was followed in preparing the FAA:

1. Bangus processing by-products were gathered from the wet market.

2. One kilogram of unwashed Bangus processing by-products was mixed with one kilogram molasses.

3. This mixture was placed in a plastic pail then covered with clean paper and fastened with rubber strip.

4. The materials were fermented for 14 days.

5. The juice was collected after 14 days and placed in clean containers ready for use.

Data Gathered

The data gathered are the following:

1. Initial weight (kg). This was obtained by weighing birds individually at day 14.

2. Final weight (kg). This was obtained by weighing the birds individually at day 42.

3. Feed left-over (kg). This refers to the amount of feeds not eaten by the birds.

4. Water consumption (l). This refers to the amount of water not consumed by the birds.

5. Cost of production (Php). This includes the cost of feeds, medication and other expenses that was used in the study.

6. Number of sick birds. This refers to the number of sick birds.

7. Number of dead birds. This refers to the number of dead birds.

8. Number of birds at the end of the study. This refers to the number of birds at the end of the study.

From the data gathered above, the following were computed:

1. Feed consumption (kg). This was obtained by adding the amount of feeds consumed by the birds in each treatment all throughout the study.

2. Gain in weight (kg). This was obtained by subtracting the final weight from the initial weight.

3. Feed conversion ratio. This was computed by dividing the feed intake by the gain in weight of the birds.

4. Feed cost per kilogram of broiler produced. This was obtained by using the formula:

$$FC = FCR \times \text{Price per kilogram of feeds}$$

5. Mortality rate (%). This was computed per replicate by dividing the number of dead birds by their initial number, multiplied by 100.

6. Morbidity rate (%). This was computed per replicate by dividing the number of sick birds by their initial number, multiplied by 100.

7. Net profit. This was obtained per replicate by subtracting the total cost from total sales.

8. Return on cash expenses (ROCE). This is computed by taking the net income divided by the production cost and then multiplied by 100.

9. Dressing percentage (%).This is computed by taking the carcass weight divided by the slaughter weight and then multiplied by 100.

Data Analysis

Analysis of Variance appropriate for a Completely Randomized experiment was used and the Duncan Multiple Range Test was used to compare the means.

RESULTS AND DISCUSSION

Initial Weight

Table 1 shows the mean initial weight of the broiler in the different treatments. The control group had a mean of 0.191 kg while the 15 ml, 30 ml and 45 ml groups had means of 0.185 kg, 0.184 kg, and 0.183 kg, respectively.

Statistical analysis revealed that there were no significant differences on the means of the different treatments because the birds were all subjected to the same management in the pre-experimental phase of the study. It was also expected because the birds were of the same age and strain.

Final Weight

The mean final weight of the birds at 45 days of age is shown in Table 2. A numerical increase in the average final weight can be observed from the control group to the group given 30 ml FAA per liter of water. As the level was increased to 40ml, the numerical mean dropped. This result coincides with Banut (2010) which featured that FAA should be given at levels not to exceed 40 ml per liter of water. Despite numerical variation, statistical analysis revealed no significant differences between the means of the four treatments. The increase was not enough to come up with a significant result.

This finding also showed that the performance of the broiler was analogous regardless of the treatment. Therefore, it can be deduced that the potential of the birds for growth was not adversely affected by the supplementation of the fish amino acid extract.

Table 1. Mean initial weight of birds at 14 days of age (kg)

TREATMENT	INITIAL WEIGHT (kg)
Commercial feeds + water only	**0.190[a]**
Commercial feeds + 15 ml FAA per liter of water	**0.184[a]**
Commercial feeds + 30 ml FAA per liter of water	**0.183[a]**
Commercial feeds + 45 ml FAA per liter of water	**0.182[a]**

Means with the same superscript are not significantly different ($P \geq 0.05$) DMRT

Table 2. Final weight of the birds given fish amino acid extract at 45 days of age (kg)

TREATMENT	FINAL WEIGHT (kg)
Commercial feeds + water only	**1.471[a]**
Commercial feeds + 15 ml FAA per liter of water	**1.599[a]**
Commercial feeds + 30 ml FAA per liter of water	**1.601[a]**
Commercial feeds + 45 ml FAA per liter of water	**1.527[a]**

Means with the same superscript are not significantly different ($P \geq 0.05$) DMRT

Total Gain in Weight

Table 3 shows the mean total gain in weight of birds from 14 to 45 days old. Following a similar trend with that of final weight, the control group had a mean of 1.329 kg while the broilers given 15 ml, 30 ml and 45 ml fish amino acid extract had a mean of 1.414 kg, 1.418 kg, and 1.367 kg respectively.

Statistical analysis revealed no significant differences between the mean of the four treatments. This means that fish amino acid extract did not alter the gain in weight of the broilers. The birds on the four treatments comparably gained more or less one

Table 3. Total gain in weight of the broilers given fish amino acid extract from 14 to 45 days of age (kg)

TREATMENT	TOTAL GAIN (kg)
Commercial feeds + water only	**1.328[a]**
Commercial feeds + 15 ml FAA per liter of water	**1.414[a]**
Commercial feeds + 30 ml FAA per liter of water	**1.418[a]**
Commercial feeds + 45 ml FAA per liter of water	**1.367[a]**

Means with the same superscript are not significantly different ($P \geq 0.05$) DMRT

kilogram of body weight in a span of four weeks. This also shows that the birds had relatively the same rate of gaining weight regardless of the treatment administered.

Feed and Water Consumption

A total of 35.9 kg was consumed per treatment for the whole duration of the study. Since controlled feeding is employed, the feeding troughs were always emptied and there was no feed left-over through-out the study.

Table 4 presents the water consumption of the birds in the different treatments during the 31-day experimental period. Statistical analysis revealed that there was no significant difference in the control and treatment groups which ranged from13.091 – 13.146 liters. This implies that FAA extract did not affect the water consumption of the birds. It also means that the experimental birds in all the treatments consumed more or less the same amount of water.

Feed Conversion Ratio (FCR)

The mean feed conversion ratios of the birds in the different treatments are shown in Table 5. The FCR obtained from this study are low considering the genetic potential of

Table 4. Water consumption of the birds given fish amino acid extract in 31 days of age

TREATMENT	WATER CONSUMPTION (l)
Commercial feeds + water only	**13.091[a]**
Commercial feeds + 15 ml FAA per liter of water	**13.140[a]**
Commercial feeds + 30 ml FAA per liter of water	**13.132[a]**
Commercial feeds + 45 ml FAA per liter of water	**13.146[a]**

Means with the same superscript are not significantly different (P≥0.05) DMRT

Table 5. Feed conversion ratio of the birds given fish amino acid extract at 45 days of age

TREATMENT	FEED CONVERSION RATIO
Commercial feeds + water only	**2.731[a]**
Commercial feeds + 15 ml FAA per liter of water	**2.539[a]**
Commercial feeds + 30 ml FAA per liter of water	**2.547[a]**
Commercial feeds + 45 ml FAA per liter of water	**2.627[a]**

Means with the same superscript are not significantly different (P≥0.05) DMRT

broilers today. Despite the provision of sufficient feeds, the feed: gain efficiency of the birds was slow with or without FAA in the water. Across treatments, the differences are deemed too small to cause statistical significance.

Feed Cost per Kilogram Gain in Weight

Table 6 shows the mean feed cost to produce a kilogram gain in weight of the birds in all the treatment ranging from PhP 63.490 observed from the birds given 15ml FAA extract to PhP 68.277 observed from the control group.

Table 6. Feed cost per kilogram gain in weight of the broilers given fish amino acid extract

TREATMENT	**FEED COST PER KG WEIGHT (PhP)**
Commercial feeds + water only	**68.277[a]**
Commercial feeds + 15 ml FAA per liter of water	**63.490[a]**
Commercial feeds + 30 ml FAA per liter of water	**63.693[a]**
Commercial feeds + 45 ml FAA per liter of water	**65.693[a]**

Means with the same superscript are not significantly different (P≥0.05) DMRT

Statistical analysis revealed that there were no significant differences between treatment means. This implies that supplementing birds with different level of fish amino acid did not result to a significant reduction or increase in the feed cost per kilogram gain in weight of birds in all treatments.

Morbidity and Mortality Rates

No mortality among the birds in all treatments was incurred during the entire duration of the study inspite of the very cold weather conditions particularly at night time and the hot weather conditions during the middle of the day. This was because the birds was properly monitored and managed all throughout the study. There were no illnesses incurred by the birds that may be attributed to the use of FAA particularly digestive disturbances.

This indicates that supplementing the drinking water of the birds with FAA extract at level of 15 – 45 ml will not cause any adverse reaction on the birds. Instead, it may help protect the birds against diseases.

Dressing Percentage

Table 7 shows the mean dressing percentage of the birds in all treatments. The dressing percentage of the control group was 64.49% while the broilers given 15ml, 30ml and 45ml of FAA had a dressing percentage of 68.14%, 69.39% and 64.49% correspondingly.

Statistical analysis revealed that there were no significant differences between treatment means. This implies that administration of FAA in the drinking water of the birds did not alter the dressing percentage. The dressing percentages recorded were slightly lower than the industry standard of 70%. Due to minimal weight gain, the dressing percentages were relatively lower than the industry standard.

Table 7. Dressing percentage of broilers given fish amino acid extract at 45 days of age

TREATMENT	DRESSING PERCENTAGE (%)
Commercial feeds + water only	**64.487[a]**
Commercial feeds + 15 ml FAA per liter of water	**68.137[a]**
Commercial feeds + 30 ml FAA per liter of water	**69.383[a]**
Commercial feeds + 45 ml FAA per liter of water	**64.487[a]**

Means with the same superscript are not significantly different (P≥0.05) DMRT

Return on Cash Expenses

Table 8 shows the return on cash expenses of all the treatments. It was not statistically analyzed but the highest return of cash expenses was obtained on the control group (pure water) which was 6.14 %. The broiler given 15 ml FAA had a ROCE of 4.96% while the birds given 30 ml FAA obtained 3.78%. The birds given 40 ml FAA obtained 2.03% indicating lowest return due to the higher cost of the FAA extract.

Table 8. Return on cash expenses

TREATMENT	TOTAL SALES (PhP)	TOTAL COST OF PRODUCTION (PhP)	NET PROFIT (PhP)	ROCE (%)
Commercial feeds + water only	3,539.7	3,198.00	341.3	9.64
Commercial feeds + 15 ml FAA per liter of water	3,684.00	3,400.00	284.00	7.71
Commercial feeds + 30 ml FAA per liter of water	3,829.00	3,603.00	226.00	5.90
Commercial feeds + 45 ml FAA per liter of water	3,974.00	3,848.00	126.00	3.17

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

This research aimed to determine the effect of fish amino acid extract (FAA) on the growth performance of cob broilers when given at the level of 15ml, 30 ml, and 45ml per liter of drinking water.

Following the Completely Randomized Design (CRD), 120 broiler chicks were grouped into four treatments. Each treatment was replicated three times with ten birds per replication. Set of the birds in the different treatments were subjected to the same management from the start to the end of the study. The only difference was on the level of FAA supplementation given to them depending on what treatment were these birds assigned.

Results revealed that there were no significant differences between treatments in terms of initial weight, final weight, and gain in weight, feed and water consumption, feed conversion ratio, feed cost per kilogram gain in weight and dressing percentage.

Comparing the return on cash expenses in all treatments, control group has the highest value since there is no additional expense that was allotted in the drinking water. As for treatment group, additional expenditure was incurred for the purchase of raw materials used in the production of the fish amino acid.

Conclusion

Based on the results of the study, it is therefore concluded that administration of fish amino acid on the drinking water of the birds had no significant effect on the growth performance of the broilers.

Recommendation

Based on the statistical analysis, administration of the fish amino acid on the drinking water showed no significant effect on the growth performance of the broiler. The researcher recommends a further study on the chemical and microbial composition of the fish amino acid.

It is also recommended to decrease the level of FAA added to the drinking water considering that it attracts flies which may contaminate the drinking water of the broilers.

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