

Growth Performance and Carcass Quality of Broilers (*Gallus domesticus*) Fed with Aguingay (*Rotboellia cochinchinensis*) and Azolla (*Azolla pinnata*) Supplements

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Citation: Ruel B (2020) Growth Performance and Carcass Quality of Broilers (*Gallus domesticus*) Fed with Aguingay (*Rotboellia cochinchinensis*) and Azolla (*Azolla pinnata*) Supplements. J Vet Sci Ani Husb 8(2): 202

Received Date: December 15, 2020 Accepted Date: December 28, 2020 Published Date: December 30, 2020

Abstract

Recently, there are unaffordable and dangerous commercial feeds that endanger health and financial aspects of both consumers and producers. Thus, this study was conducted in order to have affordable, quality enhanced and healthy feeds. This investigates the potential of Azolla (*Azollapinnata*) meal and the reliability of Aguingay (*Rotboellia cochinchinensis*) Inflorescence meal to have improvement of growth performance and carcass quality supplemented to the Broiler chicken. The methods involves the Completely Randomized Design with T0 (control group without supplements), T1 (ration with 10% Azolla meal), T2 (ration with Aguingay inflorescence meal). The results showed in this study that T0 has the best growth performance and T1 has the best carcass quality. It is therefore concluded that commercial broilers have the best growth performance and azolla meal yield best carcass quality of broilers.

Keywords: Meat Quality; Broiler; Growth Performance; Aguingay; Azolla Supplementation

Introduction

Rationale

Currently, farmers all over the world are raising broilers as they are source of meat production in poultry since it growth during the 1960s in the global production [1]. The total chicken inventory as of January 1 is about 186.37 million birds. It increased 6.03% compared to the last year which is 175.77 million birds. Broilers had growths of 7.20% [2]. In the Philippines, chicken is the most economically important as source of meat and egg [3]. Chicken meat, specifically broilers, which are chickens raised for meat and are part of the Filipino diet since it is one of the sources of animal protein (Nicolas, 2017). Many farmers raised broilers as there means of livelihood and leisure. Consumers also demands broiler as the source of protein and vitamins. Recently, many farmers injected certain chemicals and commercial feeds to the broilers in order to increase the carcass quality and there growth performances. Feed additives have also been used today to increase growth performance and carcass quality [4]. This causes our health to be endangered since us as consumers consume the cooked broilers. This also causes the decrease of general performance of broiler production since the prices of commercial feeds are expensive; which some farmers cannot afford.

As according to Sundrum, 2010 [5], the increasing number of consumers with increasing demands of livestock farming through organic production than the conventional production as it is healthy and environmental friendly. Many researchers have tried to research this system with different organic and alternative components into the foods. One of the research studies relating to this system, stated that any attempt to Improve the performance of poultry production or broiler through the use of locally available feedstuff is needed [6,7]. Through the use of locally available products we can lower the cost of the feeds in order to increase production and performance of broilers. At the same time, this would guarantee the safety of our health since there would be no additives or chemicals involved to the feedstuff.

Azolla Meal (*Azollapinnata*) is an unconventional feed. It belongs to Azollacea and order Pteridophyta. It has six species. It is commonly found in tropic and sub-tropic regions. It grows naturally in stagnant water of drains, canals, ponds, hoars-boars, marshy lands, and rivers. It is also recorded that it contains high crude protein [8]. Several studies have established that the Azolla as part of feed ration and feed substitute. Aguingay (*Rotboellia cochinchinensis*) is a weed grass in tropical and sub-tropical region where it was considered as a troublesome plant on these regions [9]. It is commonly found in the Philippines especially in rice fields since Philippines belong in the tropical region. Many studies have established about the prevention of its germination against other important crops. It is not commonly studied or considered as a feed substitution nor part of feed ration. However, some

studies have already been established about it relating to its part of feed supplements. Another study was conducted in Pakistan where supplementation is needed and it also doesn't have the enough nutritive requirements for animals [10]. Thus, this study presents the growth performance and carcass quality of broilers fed with varying levels of Azolla meal and Aguingay Inflorescence meal since Azolla provides high crude protein and Aguingay is commonly found here in the Philippines and also in order to make Aguingay have a reliable usage rather than a nuisance.

Question or Problems being addressed

The commercial feeds are unaffordable and injected chemicals to broilers to increase carcass quality endanger the health of the consumers.

Goals/Expected Outcomes/Hypothesis

1. To determine the growth performance of broilers as affected by supplementation of Azolla meal and Aguingay inflorescence meal
2. To determine the carcass quality of broilers as affected by supplementation of Azolla meal and Aguingay inflorescence meal
3. To help our community and environment to be more sustainable

Review of Related Literatures

Azolla (*Azolla pinnata*)

Azolla Meal (*Azollapinnata*) is an unconventional feed. It belongs to Azollacea and order Pteridophyta. It has six species. It is commonly found in tropic and sub-tropic regions. It grows naturally in stagnant water of drains, canals, ponds, hoars-boars, marshy lands, and rivers. It is also recorded that it contains high crude protein (20.0-25.5%), essential amino acids, growth promoters, carotinoids, vitamins, and minerals [8]; which is the reason it is included in this study. Azolla is a free-floating water fern. It is a common bio fertilizer in rice crop. The blue-green algae (*Anabaena azollae*) grow in symbiotic association with this fern and are responsible for nitrogen fixation [11]. It physically characterizes the thin roots which spreads to the water's surface and its leaves are small, delicate, touchy and has different colors depending on what period of time [12].

Common studies have been conducted with these plants as part of the feed ratio with the common reason is to lessen the cost of feeds for livestock production since Azolla is a plant-protein source. Common findings are that 5% inclusion of Azolla in feeds can have great overall performance of broilers. This includes feed conversion ratio, feed cost, weight gain, energy and protein efficiency [8,13,14]. However, *Cherryl et al, (2015)* [15] found out that 20% of Azolla inclusion in Swine ration is beneficial and Alalde and Iyayi, 2006 stated that 10% of Azolla inclusion has profound effects on the performance of egg-type chicks. *Anitha et al 2016* [16] stated that 3% inclusion of Azolla can be included in broiler rabbit diets.

Aguingay (*Rotboellia cochinchinensis*)

Aguingay inflorescence meal (*Rotboellia cochinchinensis*) is a weed grass in tropical and sub-tropical region where it was considered as a troublesome plant and an invasive species on these regions. It was brought from the Old world and introduced in the new world [9]. It is also known to have many names which are; corn weed, prickle grass, rice grass, itch grass, Guinea fowl grass, sugarcane weed, Kokomagras, Raoulgrass, Shamvagrass, lisofya, and jointed grass [17]. It is commonly found in the Philippines especially in rice fields since Philippines belongs in the tropical region. Many studies have established about the prevention of its germination against other important crops. It is not commonly studied or considered as a neither feed substitution nor part of feed ration.

Broilers Production

The total chicken inventory as of January 1 is about 186 .37 million birds. It increased 6.03% compared to the last year which is 175.77 million birds. Broilers had growths of 7.20% [2].

Broilers (*Gallus domesticus*) are chickens that are raised for meat. It is commonly produced in livestock production in the world for its meat and vitamins, minerals and proteins. Many farmers all over the world commonly struggle with the production of broilers because of high price of commercial feeds which causes the low production performance of broilers. Contributing to this struggle is the increasing demand of consumers of broilers. Another struggle in not just broiler but the poultry and livestock industry is the involvement of the usage of chemicals in order to attain quality and desirable traits. This causes the endangerment of the health of the individuals Researchers commonly find ways and methods in order to increase production of broilers and to attain affordable feeds for access for farmers.

Alternative feeds and feedstuff, which some researchers took from natural and locally available resources have been studied to attain efficient feeds with affordable costs. *S.A. Abdel-Fattah et al, 2008* stated that organic acid such as citric acids and acetic acid have improved immune response, physiology and morphology of organs. It also improved carcass and body weight gain and feed intake combining it with plant extracts, vegetable essential oil, and mineral salts [18]. *Demir et al, 2005* [19] concluded that herbal

natural feed additives such as oregano, du-sacch, garlic and thyme power organic can substitute to conventional feed additives.

Another method that researchers study is the organic production method which is a strategy in livestock production wherein it does not use chemicals, growth promoters, commercial feeds or any additives into a livestock (Castellini *et al*, 2005). A study of Grashorn & Serini, 2006 [20] concluded that organic broiler meat has a more palatable taste than conventional broiler meat.

Synthesis of the study

Overall, the similarities between our study to the others is the common reason of finding ways in order to have an effective feed with affordable price. Another similarity is the usage of Azolla (*Azollapinnata*) in the study due to its high crude protein.

However, what makes our study unique from other studies is the usage of Aguingay (*Rotboelliacochinchinensis*) in the study. We choose to use this plant since it is very rich in tropical areas and considered to be an invasive species. We observed some birds eating the Aguingay. Knowing all of these things, we saw a potential of it as a feedstuff in broilers. It can cause decreasing of price to an affordable cost since it is very abundant in the Philippines which is a tropical country.

Materials and Methods

Research Design

The inclusion of 10% Azolla and Aguingay Inflorescence meal into the commercial ration was used as follows;

T0 – commercial ration without supplementation (Control)

T1 – commercial ration with 10% Azolla meal (AM)

T2 – commercial ration with 10% Aguingay inflorescence meal (AIM)

A total of 27 birds was randomly assigned to three treatments and three replicates times with three birds per replication was laid out in Completely Randomized Design (CRD) set up as follows;

T ₀ R ₃	T ₁ R ₁	T ₂ R ₃
T ₂ R ₁	T ₀ R ₁	T ₁ R ₃
T ₁ R ₂	T ₂ R ₂	T ₀ R ₂

Research Locale

The study took place at the VSUIHS Nursery in the lower campus of Visayas State University Visca, Baybay City, Leyte since it the only available and most accessible facility we can use.

Research Instruments

A total of 27-day-old chicks was bought at JM Poultry House Baybay City, Leyte as used as experimental animals for the study. Each treatment cage was provided with drinking water and specific treatment design. The Azolla and Aguingay inflorescence meal was started on the third week old. Fresh water was provided at all times and vitamins were added to the drinking water. The Hedonic Scale was used to assess the color acceptability, flavor acceptability, juiciness acceptability, tenderness acceptability, and general acceptability.

Data Gathering Procedure

Preparation of Azolla meal & Aguingay meal: The Azolla and the Aguingay inflorescence was gathered in the different areas of the Visayas State University. The Azolla and Aguingay inflorescence was sundried and milled as shown in Table 1.

Drying methods can be broadly classified into natural and artificial methods of drying. The natural method of drying utilizes the solar energy to remove the moisture content in the food, with a disadvantage of dependence on weather condition and poor operational performance [21]. The main objectives of drying include to preserve foods and increase their shelf life by reducing the water content and water activity [22].

Data Gathered

1. Growth Performance – the data gathered included initial body weight, weekly body weight, and final body weight at day 30.
2. Sensory Characteristics – where the color acceptability, flavor acceptability, juiciness acceptability, tenderness acceptability, and general acceptability.

Data/Statistical Analysis

The data of the growth performance were subjected to the Analysis of Covariance (ANCOVA) as we believed that the initial body weight has some influence by the treatment effect as measured by the weekly body weight.

The data of the carcass quality were subjected to the Friedman's test due to the data being in an ordinal scale and the ratings are being done repeatedly done by the same raters across the treatments.

Results and Discussion

Growth Performance of Broilers

Table 1 shows the 30 day-growth performance of broilers based on the body weights of broilers in different treatment per replicate. In week 1, T0 has the highest mean bodyweight while T1 falls to second and T2 is third. This is the same trend of the second week. In week 3, the trend is the same but T0 has the most observable growth of chicks with a huge increase of bodyweight from the second week; from its bodyweight 387g to 606.33g. Meanwhile, the other two treatments have small increase of bodyweight. This trend is still consistent throughout week 4 and its final bodyweight (Table 1). This might be so due to the cell wall fraction of AZM contained, NDF (Neutral Detergent Fiber), ADF (Acid Detergent Fiber), hemicellulose, cellulose and lignin which is a limiting factor to effective utilization of monogastric animals [23-27].

Treatment	W1	W2	W3	W4	FBW
T0	151	387	606.33	782	773.33
T1	127.33	267.33	341.33	504.33	433.33
T2	124.67	268.33	394	578	438
TOTAL	134.33	307.56	447.22	621.44	548.22

Table 1: Mean of Bodyweights of Broilers Using Different Treatments

Carcass Quality of Broilers

Color Acceptability: It is shown in the table below that color acceptability is non-significant. It is also shown that T1 and T2 got the highest acceptability of 89% while T0 got the lowest acceptability with 81%. This can be implied that broilers with Azolla meal and Aguinay inflorescence meal is comparable to the broilers with commercial feeds

Treatments	Percentage like of Color	p-value
0	81	0.7788 ^{NS}
1	89	
2	89	
	Percentage like of flavor	
0	77	0.4296 ^{NS}
1	81	
2	81	
	Percentage like of Juiciness	
0	64	0.0935 ^{NS}
1	92	
2	74	
	Percentage like of Tenderness	
0	69	0.1268 ^{NS}
1	89	
2	78	
	Percentage like of General Acceptability	
0	92	0.7711 ^{NS}
1	96	
2	85	

Table 2: Percentage like of Color, Flavor, Juiciness, Tenderness, and General Acceptability of Broilers Using Different Treatments

Flavor Acceptability: Flavor acceptability is not significant both T1 and T2 got the highest rating of acceptability with 81%. The lowest acceptability is T0 with 77%. This indicates that the flavor of broilers with aguinay inflorescence meal and azolla meal is more favorable than commercial broilers.

Juiciness Acceptability: Juiciness acceptability is not significant. T1 has the highest juiciness acceptability with 92% T2 is second with 74% and T0 is third with 64%. This indicates that broilers with azolla meal is more favorable in terms of juiciness and commercial broilers is least favorable.

Tenderness Acceptability: Tenderness acceptability is not significant. T1 has the highest acceptability, while T2 is second and T0 is third. This indicates that broilers with azolla meal is favorable in terms of tenderness acceptability, while commercial broilers are least favorable.

General Acceptability: General Acceptability is not significant. T1 has the highest acceptability while T0 is second and T2 is third. This indicates that the broilers with azolla meal is favorable in terms of General Acceptability, while broilers with aguingay inflorescence meal is least favorable.

Summary

This study investigated on the growth performance and carcass quality of the broiler supplementing with Aguingay (*Rotboellia cochinchinensis*) inflorescence meal and Azolla (*Azollapinnata*) meal. This study is conducted in order to resolve the financial problems and the health problems of both the producers and consumers of broilers. Our general aim of this study is to determine the growth performance and carcass quality of broilers supplemented with 10% of Aguingay inflorescence meal and 10% of Azolla meal. Specifically, our aim is to determine the growth performance of broilers as affected by the supplementation of Aguingay Inflorescence meal; and to determine the carcass quality of broilers as affected by the supplementation of Aguingay Inflorescence meal.

Completely randomized design (CRD) was used in this experiment. We assigned 27 day old chicks into 3 treatments; T0 as the control group or without supplementations T1 is with 10% Azolla meal and T2 with 10% Aguingay Inflorescence meal. The data for the growth performance were analyzed using analysis of covariance (ANCOVA) while the data for carcass were analyzed using the Friedman test.

Results showed that there is significance in week 3 and T0 (Control group) has the best growth performance over four weeks between the two treatments with great increase from the past 4 weeks. In the carcass quality, broilers with Azolla meal have the highest acceptability out of all the treatments.

Conclusion

Based on the results it is concluded that;

1. Commercial broilers yield best growth performance.
2. Azolla meal improves the carcass quality of broilers.

Recommendations

1. Obtain the average feed intake.
2. The broilers should be raised 45 days.
3. Increase concentration of azolla meal and Aguingay inflorescence meal.

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