GROWTH AND SENSORY EVALUATION OF BROILER CHICKEN FED WITH PIGEON PEA AND SUPPLEMENTED WITH ORIENTAL HERBAL NUTRIENTS

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ABSTRACT This study was conducted to determine growth and sensory evaluation of broiler chicken fed with pigeon pea and supplemented with Oriental herbal nutrients. This was a double factor study using Factorial Experiment in Completely Randomized Design (F-CRD).Based on the Analysis of Variance (ANOVA), on the final weight of broilers, Factor 1 (representing the levels of pigeon pea) showed significant effect at 5% level of significance and Factor 2 (representing the levels of OHN) showed no significant effect. On the weight gain of broilers, Factor 1 (representing the levels of pigeon pea) showed a highly significant effect and Factor 2 (representing the levels of OHN) showed no significant effect. In terms of feed intake, Factor 1 (representing the levels of pigeon pea) showed significant effect at 1% level of significance and Factor 2 (representing the levels of OHN) showed no significant effect. As to water intake, both Factor 1 (representing the levels of pigeon pea) and Factor 2 (representing the levels of OHN) showed a highly significant effect. While on feed conversion efficiency, both Factor 1 (representing the levels of pigeon pea) and Factor 2 (representing the levels of OHN) showed a highly significant effect. Furthermore, based on the sensory evaluation, the tenderness, taste and the general acceptability are highly significant only in the respondents and not in both factors 1 and 2. Odor was significant only in the respondents while the textures (fresh and cooked) were not significant in both factors 1 and 2 as well as in the respondents. All interaction means show no significant effect to the growth and sensory evaluation. Broilers fed with treatment B (10% pigeon pea) had a significant effect on the final weight. It is highly significant in the weight gain and feed conversion efficiency. However, it is insignificant in the feed and water intake, since the results found that broilers not fed with pigeon pea showed significant effect. On the other hand, broilers supplemented with OHN at 20ml/1L H2O showed a highly significant effect in water intake. Broilers supplemented with treatment Y (15ml OHN in 1L H2O) had showed a highly significant effect in the feed conversion efficiency. Combinations of pigeon pea and Oriental Herbal Nutrients (OHN) have no significant effect in the growth and sensory evaluation of broilers.

Keywords: Growth performance, Broiler, Pigeon pea meal, Oriental Herbal Nutrients

INTRODUCTION

Broiler is a tender meat young chicken of male of female that grows from a hatch weight of 40 grams to a weight over approximately around 1.5 kg-2 kg in about 6 weeks' time period only. Broilers today has emerged as the one of the fastest growing poultry segment with the increase acceptance of the broiler chicken meat in cities, towns and villages, the demand and consumption of broiler chicken is increasing day by day in a fast pace.(agrifarming.in/broiler-farming, 2015)

Pigeon pea (Cajanuscajan) is an important grain legume commonly grown and consumed in tropical and subtropical regions of the world (ICRISAT, 1986). Pigeon pea occupies an important aspect in human nutrition as a source of dietary proteins in several countries. Pigeon pea contains a high level of crude protein ranges from 21-30% (Udedibie and Igwe, 1989; Amaefule and Onwudike, 2000).

The major item of cost in poultry production is feed; one of the first manifestations of this problem for feeding animals is the competition for feedstuff that can commonly be used by human and livestock. Consequently there is a worldwide interest in the search for the new plant species. The source of protein for poultry feed are expensive and they constitute about 30-35% of their diet.

Objectives of the Study

Generally, this study was conducted to determine growth and sensory evaluation of broiler chicken fed with pigeon pea and supplemented with Oriental herbal nutrients. Specifically, this sought:

1.To determine the growth performance of broilers fed with Pigeon pea meal and supplemented with Oriental Herbal Nutrients in terms of:

a. final weight;
b. weight gain;
c. feed intake;

d. water intake; and
e. feed conversion efficiency;

2. To determine the sensory analysis of the broilers fed with Pigeon pea meal and supplemented with Oriental Herbal Nutrients (OHN)in terms of:

a. Tenderness
b. Odor
c. Texture
d. Palatability
e. General Acceptance

3. To determine the significant difference between the growth performance of broilers fed with Pigeon pea meal and supplemented with Oriental Herbal Nutrients in terms of:

a. final weight;
b. weight gain;
c. feed intake;
d. water intake; and
e. feed conversion efficiency;

4. To determine the effective amount of feeds with Pigeon pea meal on the growth performance of broilers and dose of OHN in terms of:

a. final weight;
b. weight gain;
c. feed intake ;
d. water intake; and
e. feed conversion efficiency;

5.To determine the significant difference on the sensory analysis of the broilers fed with Pigeon pea meal and supplemented with OHN in terms of:

a. Tenderness
b. Odor
c. Texture
d. Palatability
e. General Acceptance

MATERIALS AND METHODS

Research Design and Lay-out

The study have utilized experimental research design to determine the growth and sensory performance of broiler chicken fed with pigeon pea supplemented with organic herbal nutrients laid out in factorial Complete Randomized Design (f-CRD). The experiment has 27 variates, composed of two factors, five treatments replicated three times. Factor 1 are the locally mixed feed with different levels of pigeon pea and factor 2 are oriental herbal nutrients in different concentration. Each variates have 3 chicken per cage.

Table 1. Treatments Combination

	Factor 2		
Factor 1	X	Y	Z
A	AX	AY	AZ
B	BX	BY	BZ
C	CX	CY	CZ

Table 2. Experimental Lay-out

AY	AX	CZ
CY	BY	BZ
BX	BX	CY
AX	BZ	BY
BY	CZ	BX
CX	CY	AY
CZ	AZ	AX
AZ	CX	CX
BZ	AY	AZ

Legend:

FACTOR 1 - Locally mixed feeds with different levels of Pigeon pea
Treatment A-Control (No Pigeon pea)
Treatment B-10% Pigeon Pea
Treatment C-15% Pigeon Pea

FACTOR 2 – Oriental Herbal Nutrients (OHN) at different levels
Treatment X-Control (Pure water) 1L H2O
Treatment Y-15ml OHN/L of H2O
Treatment Z-20ml OHN/L of H2O

Materials, Tools, Equipment and Supplies

The following are the materials used for the construction of cages: bamboo poles, assorted nails, ruler, 25 watts incandescent bulb, speaker wire, newspapers and rice hulls. Major D was used as disinfectant.

The tools and equipment are the following: weighing scale (digital and clock type), bull jars, step-in feeders and feeding troughs. These were used as feeds and feed ingredients: chick booster mash, corn grits, corn bran, cassava meal, rice bran, copra meal, fish meal, pigeon pea meal, salt, lime. Others were used to replenish and maintain the health of the chicks like vetracin gold and electrolytes powder. Water is also important in the study. 90 heads of broilers were used in the study.

The following were utilized in making Oriental Herbal Nutrients (OHN): garlic, onion, ginger, siling labuyo, lemon grass, molasses, beer, coconut vinegar, unprinted Manila paper, pail, weighing scale, rubber, stirring rod and dropper.

Experimental Design

This was a double factor study using Factorial Experiment in Completely Randomized Design (F-CRD). There were composed of nine (9) treatments which are the combination of the two factors: Factor 1-locally mix feeds with different levels of Pigeon pea: Treatment A-control (No Pigeon pea); Treatment B-10% pigeon pea; and Treatment C-15% pigeon pea. Factor 2-Oriental Herbal Nutrients (OHN) at different levels: Treatment X-Control (pure water); Treatment Y-15ml/L of H2O; and Treatment Z-20ml/L of H2O. Each of the treatment was replicated three (3) times making a total of 27 variates. There were three (3) experimental birds per replication plus nine (9) heads as reserved stocks with a total of 90 heads of broilers.

Construction of the Poultry Cages

The housing for broiler chickens were deep litter system: the floor was covered with 5 to 10 cm deep layer of rice hull. During brooding period, the day old chicks were confined in a brooder cage measuring 3 meters by 1.5 meters. During the rearing period, the birds were fully confined in a cage. Each bird required a floor space of 1.2 ft. by 1 ft. The fully enclosed poultry system had protected the birds from thieves and predators and is suitable for specially selected commercial breeds of egg or meat-producing poultry (layers, breeder flocks and broilers). This had also minimized the risk of coccidiosis and tunnel ventilation allows a certain degree of control of the in-house environment, thus, limiting stress factors that would predispose the birds from disease.

Preparation of Feed Ingredients

The feed ingredients are mixed one week before the actual feeding to the broiler chickens. And another batch is mixed again whenever the feed stock can't sustain the feeds needed by the chicks. Factor 1 was the locally mixed feeds which was composed of the following treatments: Treatment A-Control (No Pigeon pea); Treatment B-10% pigeon pea was incorporated in the local feed formulation; Treatment C-15% pigeon pea was incorporated in the local feed formulation.

Preparation of Oriental Herbal Nutrients (OHN)

Oriental Herbal Nutrients (OHN) was made from plants with fungicidal and pesticidal properties. These are Garlic, Ginger, Onion, Hot Pepper and Lemon grass. These plants were fermented in order to maintain their properties.

Steps:

1) 1 kg of the chosen herbs were chopped and combined.
2) It was placed in a pail.
3) Beer was added to the level of the ingredients.
4) The pail was covered and kept in a dark, cool place.
5) After 12hrs, 250 mL of Molasses was added and covered with Manila paper.
6) It was kept in a cool, dark place. It was fermented for 7 days.
7) 3 liters of Coconut Vinegar was added, equivalent to 3x the amount of Beer that was used on day1.
8) It was covered again and kept in a dark, cool place.
9) After 3 days, the same volume of Gin or Coconut Vinegar that was added was harvested on top.

You may repeat from step5 onwards for 3 cycles. The sludge may be fed to your animals.

Booking and Selection of Stocks

The stocks are booked one week before the actual study in a Commercial Hatchery. The chicks (Arbor Acre) were paid on cash bases after delivery at Php 38/head. The chicks were carefully selected to ensure healthy stocks. The chicks that were utilized for the study had the following characteristics: chicks look active and have dry and fluffy feathers, bright eyes (clear eyes) and well-healed navels, no nasal discharges, good appetite, and free of defects and abnormalities.

Arrival of Stocks

One (1) hour before the arrival of the stocks the electric bulbs inside the brooder were switched-on to make the floor and wall heated and to have the desired brooding temperature. Bull jars were filled with clean and potable drinking water. Upon arrival, the chicks were placed inside the brooder, and kept them undisturbed for more than four (4) hours.

The broiler chicks were provided with electrolytes in their drinking water upon arrival. The purposed of adding electrolytes in their water is that it will help replenished the depleted energy in the chicks due to long period of transportation. It had also stimulated the chicks to consume feed. Sweet water can also loosen up the impacted intestine and prepares the gut linings of chicks for the incoming feeds. Thereafter, they had given fresh feeds and water.

Brooding Management

Broiler chicks do not produce adequate body heat during the first few days of their lives. Consider brooding period as the time from hatching to 15 days which is the most critical and important time in a birds life. Desired amount of Vetracin gold was diluted in drinking water to ensure that the birds will develop a stronger immunity. For them to grow healthy and active, we attained all the brooding requirements.

A heated area is highly advisable in handling chicks at this stage. The stocks were put in a disinfected brooder cage with 4 incandescent light bulb (25 watts each) that had provided the amount of heat they needed. The incandescent light bulbs were placed above eight inches from the litter materials. The brooding ratio is one is to one (1:1), one bird is to one watt to attain their brooding temperature.

Pre-conditioning of the Bird

During the 13th day, the birds were distributed in each cages, randomly. Three (3) days before the actual application of the treatments, the birds were pre-conditioned. Minimal amount of the combined treatments were given to the birds as shown in the Table 5 and 6 below. This had given the birds enough time to entirely adopt the treatments during the study. After three (3) days the desired amounts of different treatments were fully given.

Table 5.Pre-confor FACTOR 1 (Levels of Pigeon pea)

	AGE IN DAYS		
TREATMENT	13th	14th	15th
A	25% of LMF (No pigeon pea) and 75% of CF	50% of LMF (No pigeon pea) and 50% of CF	75% of LMF (No pigeon pea) and 25% of CF
B	25% of LMF (10% pigeon pea) and 75% of CF	50% of LMF (10% pigeon pea) and 50% of CF	75% of LMF (10% pigeon pea) and 25% of CF
C	25% of LMF (15% pigeon pea) and 75% of CF	50% of LMF (15% pigeon pea) and 50% of CF	75% of LMF (15% pigeon pea) and 25% of CF

Table 6.Pre-con table for FACTOR 2 (Levels of OHN)

	AGE IN DAYS		
TREATMENT	13th	14th	15th
X	Pure H2O	Pure H2O	Pure H2O
Y	3.75 ml OHN in 1 L H2O	7.5 ml OHN in 1 L H2O	11.25 ml OHN in 1 L H2O
Z	5 ml OHN in 1 L H2O	10 ml OHN in 1 L H2O	15 ml OHN in 1 L H2O

Light Management

Light is an important aspect of an animal's environment. In this study the light program was based on the table below.

Table 7.Light program for Broilers.

Age of Chicks	Hours of light
0-3	23 hours
4-7	16 hours
8-14	12 hours
14-28	8 hours

The proper temperature was maintained inside the brooding house to make the chicks feel comfortable. The behavior of the broiler chicks in the brooder was used as a practical guide in determining adequate brooder temperature. During night time the birds were provided with enough light in order for them to eat and drink well.

Water Management

Water is the most important nutrient for poultry. Although the necessity of providing a plentiful supply and sufficient access is well understood, the importance of water quality on performance is often misunderstood or neglected. Providing a clean and safe water supply is critical to ensure that broilers perform at their best. Water quality takes on an increasingly valuable role as public concern over antibiotic use in animal feed. This study is intended to shift the poultry industry away from the use of antibiotics.

The experimental birds were provided with drinking water diluted with Vetracin gold for 12 days of brooding period using bull jars. On the 13th day was the pre-conditioning period as stated in Table 6. During the rearing period, OHN was added to the water to strengthen their immune system. Factor 2was the Oriental Herbal Nutrients (OHN) at different levels: Treatment X-Control (1L pure water), Treatment Y-15 ml OHN/L of H2O, and Treatment Z-20 ml OHN/L of H2O.

Table 8.Daily and weekly water requirements per chicken per day.

Age (week)	Liters/day	Liters/week
1	0.54	3.8
2	0.82	5.8
3	1.08	7.6
4	1.40	10.0
5	1.86	13.0
6	2.28	16.0
7	2.40	17.0
8	2.80	21

Feeding Management

Proper nutrition plays a vital role in broiler performance. The genetic potential of broiler chickens can be expressed only if proper nutrition and management will provided to them. The experimental birds were fed in Ad libitum system of feeding. From day 1-12 days old, step in feeders were used and chicks were fed with chick booster mash in the brooding cage. They were pre-conditioned during the 13th-15th days as shown in Table 5before fully administering the treatments or whenever you changed the feeds. In 8 days (16-23 days), the birds were fed with one hundred percent (100%) locally mixed starter feeds; in 15 days (27-36 days), the birds were fed with one hundred percent (100%) locally mixed grower feeds. (see appendices table 1 and 2)

Disease Prevention and Control

Hygiene and sanitation is one of the critical factors that determine successful brooding of broiler chicks. From brooding to the entire period of the study strict hygiene and sanitation was observed. One (1) week after the construction of cages, the building and materials was disinfected using Major D disinfectant. This kept the building free from contamination.

The entrance was strictly monitored. Authorized persons were only allowed to enter the research area. The foot bath was placed at the entrance that contained major D solution to avoid the entry of infectious agents which can affect the broilers. Cleanliness of the experimental area was maintained. The disinfection of the foot bath was conducted once a week. The feeding troughs and bull jars was cleaned before administering the new feeds and water. The floor, dropping, board and garbage was managed properly as well as the waste disposal and litter materials.

To enhance the chicks' vigor and resistance against microbial infections and diseases, Vetracin gold was added to their drinking water. Burlap sacks or used G.I sheet was hanged at the grills to protect the birds from abrupt changes

of climatic conditions and to maintain the temperature of the experimental area.

During one (1) week of age, the birds were vaccinated with New Castle Disease (NCDB1B1) vaccine. The birds which are weak and diseased will be quarantined and treated to avoid the spread of disease to other birds.

Gathering of Data

The data were gathered every five (5) days, except the average initial weight which was taken before the distribution of chicks. The data gathered were as follows: average final weight, average weight gain, average feed intake, average water intake, feed conversion efficiency, incremental weight, and sensory evaluation. Where:

Weight gained

= average final weight – average initial weight

Feed intake

= Amount of feeds given daily – Amount of remaining feeds

Water intake

= Amount of water given daily – Amount of remaining water

$$\text{F. C. E.} = \frac{\text{Feed consumed}}{\text{Weight gained}}$$

Sensory Evaluation

Sensory evaluation was done to test the tenderness, odor, texture, and taste of meat of broilers fed with pigeon pea and supplemented with Oriental Herbal Nutrients. Twenty seven (27) meat samples (breast parts) were taken and tested following the ratings below.

Tenderness

Rating	*Description*	*Chew count*
4.21-5.00	Very tender	1-5
3.41-4.20	Tender	6-10
2.61-3.40	Just Tender	11-15
1.81-2.60	Tough	16-20
1.00-1.80	Very tough	21-25

Odor

Rating	*Description*
4.21-5.00	Extremely desirable chicken odor
3.41-4.20	Moderately desirable chicken odor
2.61-3.40	Just normal chicken odor
1.81-2.60	Slightly undesirable chicken odor
1.00-1.80	Extremely undesirable chicken odor

Texture

Rating	*Description*
4.21-5.00	Extremely rigid
3.41-4.20	Moderately rigid
2.61-3.40	Rigid
1.81-2.60	Loose
1.00-1.80	Extremely loose

Palatability (Taste)

Rating	*Description*
4.21-5.00	Extremely desirable chicken taste
3.41-4.20	Moderately desirable chicken taste
2.61-3.40	Just normal chicken taste
1.81-2.60	Slightly undesirable chicken taste
1.00-1.80	Extremely undesirable chicken taste

Composition of Testing Panelists

The testing panelist for sensory evaluation of meat was composed of five professionals, five students and five farmers. Before the evaluation started, there was a short briefing for them to be informed about the rating of the samples.

Statistical Analysis of Data

The data gathered were analyzed using Two-Way Analysis of Variance (ANOVA), which determined the tabulated F at 5% and 1 % levels of significance of Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Average Initial Weight

The second column of Table 12 presents the average initial weight of chicks at the start of the study. For factor 1 (representing the levels of Pigeon pea), the highest mean was obtained by treatment C (15% pigeon pea/kg LMF) which is 521.9633 g, followed by treatment B (10% pigeon pea/kg LMF) which is 520.8889 g and treatment A (Control-No pigeon pea) got the lowest mean which is 517.4444 g.

For factor 2 (representing the levels of OHN), the highest mean was obtained by treatment Z (20ml OHN/L H2O) which is 527.8156 ml , followed by treatment X(Control-Pure H2O) which is 527.2589 ml and treatment Y (15ml OHN/L H2O) got the lowest mean which is 505.2222 ml.

For treatment combination, data shows that treatment AX has 1573 g, treatment AY has 1500.66 g and treatment AZ has 1583.34 g. Treatment BX has 1605.33 g, treatment BY has 1536 g and treatment BZ has 1546.67 g. Treatment CX got 1567 g, treatment CY got 1510.34 and treatment CZ got 1620.33 g.

Average Final Weight

The third column of Table 12 presents the average final weight obtained by the birds at the end of the study. For factor 1 (representing the levels of pigeon pea), the data show that the highest mean of 1004.11g was obtained by treatment B (10% pigeon pea), followed by treatment C (15% pigeon pea) that obtained 964.29g and the lowest mean was obtained by treatment A (Control) that has 908.66g.Analysis of variance showed significant effect of pigeon pea to the final weight of broilers at 5% level of significance.

DMRT shows that the broilers with different levels of pigeon pea have higher final weights compared to broilers not supplemented with pigeon pea. Among treatments, treatment B (10% pigeon pea) had significant effect.

For factor 2 (representing the levels of OHN) treatment Z (20ml OHN) got the highest mean of 972.52ml, followed by treatment Y which got 954.77ml and treatment X (pure H2O) obtained the lowest mean of 949.77ml. Analysis of variance shows that levels of OHN had no significant effect to the final weight of birds.

For the treatment combination, the data shows that treatment BX has the highest mean which is 3055.32g, followed by BZ has 3010.99g, BY has 2970.66g, CY got 2933.99g, CZ has 2907.66g,followed by treatment CX which got 2836.99g, AZ has 2833.99g, treatment AY has 2688.32g and treatment AX got the lowest mean which got 2655.66g. Based on the analysis of variance there is no significant effect in the interaction of treatments to the final weight of broilers. Coefficient of Variance is 6.7%.

Average Weight Gain

The fourth column of Table 12 presents the average weight gained by the birds for the whole period of the study. For factor 1 (representing the levels of pigeon pea), it shows that the highest mean of 1,450.63g was obtained by treatment B (10% pigeon pea), followed by treatment C (15% pigeon pea) that obtained 1,319.22g and treatment A (control) got the lowest mean which obtained 1,137g. Analysis of variance showed highly significant effect of pigeon pea to the weight gain of broilers in both 1% and 5% levels of significance.

DMRT shows that the broilers with different levels of pigeon pea have higher weight gained compared to broilers in control group which is not supplemented with pigeon pea. Among treatments, treatment B (10% pigeon pea) had a highly significant effect.

For factor 2 (representing the levels of OHN extract) treatment Y (15ml OHN) got the highest mean of 1,341.85, followed by treatment Z (20ml) got 1, 297.44, treatments X (control) got the lowest mean which is 1, 267.56. Analysis of variance shows that levels of OHN had no significant effect to the weight gain of birds.

For the treatment combinations, the data show that treatment BZ got the highest mean which is 1464.33g, followed by BX which has 1450.01g, then treatment BY which has a mean of 1437.56g, followed by CY which has a mean of 1400.32g, CZ which has a mean of 1287.33g, CX which has a mean of 1270g, next is treatment AY which has a mean of 1187.68g, AZ which has a mean of 1140.65g and treatment AX got the lowest mean which has 182.67g. Analysis of variance shows that the treatment interactions had no significant effect to the weight gain of the birds. Coefficient of Variance is 12.5%.

Average Feed Consumption

The fifth column of Table 12 presents the average feed consumption of broilers during the entire period of the study. For factor 1 (representing the levels of pigeon pea), it shows that treatment C (15% Pigeon Pea) got the highest mean 114.66g, followed by treatment B (10% Pigeon Pea) which got 113.75g and the treatment A (control) which got the lowest mean of 97.19g feed consumption. Analysis of variance showed significant effect of pigeon pea in feed consumption at 1% level of significance.

DMRT shows that the broilers with no pigeon pea have lower feed consumption compared to broilers supplemented with pigeon pea. Among treatments, treatment A-control (no pigeon pea) has a significant effect.

For Factor 2, (representing the levels of OHN) the highest mean of 113.46 feed consumption was obtained by treatment X (control), followed by treatment Z (20ml) that obtained 107.59, followed by treatments Y(15ml) which got the lowest mean of 104.54 in terms of feed consumption. Analysis of variance showed no significant effect of the OHN to the feed consumption of broilers.

For the treatment combinations, treatment BX got the highest mean which is 370.63g, followed by treatment CX which got a mean of 363.32g, treatment CZ has a mean of 339.12g, then CY which has a mean of 329.5g, BY which has a mean of 326.8g, BZ which got 326.33g, AZ has a mean of 302.89, AX which got 287.18g and treatment AY got the lowest mean which is 287.18. Analysis of variance showed no significant effect in the treatment interactions to the feed intake of the birds. Coefficient of variance is 13.7%.

Average Water Intake

The sixth column of Table 12 presents the average water intake of broilers. For factor 1 (representing the levels of pigeon pea), it shows that treatment C (15% pigeon pea) got the highest mean 845.51ml, followed by treatment B (10% pigeon pea) that obtained 790. 59ml, followed by treatment A (control-no pigeon pea) which got the lowest mean of 656.55ml. Analysis of variance showed highly significant effect of pigeon pea in water intake in both 1% and 5% levels of significance.

DMRT shows that the broilers with no pigeon pea have lower water intake compared to broilers supplemented with pigeon pea. Among treatments, treatment A (Control-no pigeon pea) has a highly significant effect.

For Factor 2, (representing the levels of OHN) the highest mean of 794.32ml water intake was obtained by treatment X (control), followed by treatment Y (15ml) that obtained 755.35ml, followed by treatment Z (20 ml) which got the lowest mean which obtained 742.98ml. Analysis of variance showed highly significant effect of the OHN to the water intake of broilers in both 1% and 5% levels of significance.

DMRT shows that the broilers supplemented with OHN have lower water intake compared to broilers not supplemented with different levels of OHN. Among treatments, treatment Z(20ml OHN in 1L H2O) had a highly significant effect.

For the treatment interactions, treatment CX got the highest mean which is 852.673ml, followed by CY which got 850.8333ml, BX got 842.8166ml, CZ has 833.0233ml, BZ has 785.3233ml, BY has 743.6333ml, followed by AX which has a mean of 687.4833ml, AY which got 671.5833mland treatment AZ got the lowest mean of 610.6ml. Analysis of variance showed no significant difference to the treatment interactions in the average water intake of broilers. The coefficient of Variance is 3.9%.

Average Feed Conversion Efficiency

The seventh column of Table 12 presents the average feed conversion efficiency of birds or the required amount of feeds per bird to gain a kilo of live weight. For factor 1 (representing the levels of pigeon pea), it shows that the most efficient feed conversion was obtained by treatment B which has a mean of 0.714g, followed by treatment A (Control) that obtained 0.7799g and treatment C(15% pigeon pea) got the highest feed conversion efficiency which obtained 0.7859g. Analysis of variance showed highly significant effect of pigeon pea to the feed conversion efficiency of broilers

in both 1% and 5% levels of significance.

DMRT shows that among treatments, treatment B (15% pigeon pea) had a highly significant effect in the feed conversion efficiency.

For factor 2 (representing the levels of OHN) treatment Y (15ml OHN) that obtained 2.1529g was the most efficient in feed conversion, followed by treatment Z (20ml OHN) with a mean of 2.2581g and treatment X (pure H2O) got the highest feed conversion efficiency which has a mean of 2.4285g.Analysis of variance showed that the levels of OHN have a highly significant effect to the feed conversion efficiency of birds in both 1% and 5% levels of significance.

DMRT shows that among treatments, treatment Y (15ml OHN) had a highly significant effect in feed conversion efficiency.

For the interaction of treatments, analysis of variance for feed conversion shows significant results. The most efficient feed conversion efficiency was obtained by treatment B which got a mean of 0.71g, followed by treatment A that obtained 0.77 g and treatment C obtained 0.78 g. Based on the analysis of variance there is a significant effect of treatment combinations to the feed conversion efficiency of broilers. The coefficient of variance is 3.95%.

Table 12. Summary of all means on the initial weight, final weight, weight gained, feed intake, water intake, feed conversion efficiency and incremental data.

Treatments	Initial Wt. (g/ml)	Final Wt. (g/ml)	Wt. Gained (g/ml)	Feed Intake (g/ml)	Water Intake (ml)	F.C.E (g/ml)
FACTOR 1						
A	517.4444	908.66b	1137c	97.19b	656.55b	0.7799
B	520.8889	1004.11a	1450.63a	113.75a	790.59ab	0.714
C	521.9633	964.29ab	1319.22b	114.66a	845.51a	0.7859
F-Test		*	**	*	**	**
FACTOR 2						
X	527.2589	949.77	1267.56	113.46	794.32	2.42.85
Y	505.2222	954.77	1341.85	104.54	755.35	2.1529
Z	527.8156	972.52	1297.44	107.59	742.98	2.2581
F-Test		Ns	Ns	Ns	**	**
CV %		6.7%	12.5%	13.7%	3.9%	3.9%

Sensory Evaluation

Tenderness. For factor 1 (representing the levels of pigeon pea) the lowest mean of chew count was obtained by treatment A (no pigeon pea) which has 22 chew counts, followed by treatment B (10% pigeon pea) which obtained 23 chew counts and treatment C (15% pigeon pea) got the highest mean which is 25 chew counts. Analysis of variance (ANOVA) showed no significant effect on the tenderness of meat of broilers supplemented with pigeon pea. The remarks showed that the meat was just tender.

For factor 2 (representing the levels of OHN) the lowest mean of chew count was obtained by treatment X (pure H2O) and Z (20ml OHN)which both had 23chew counts and treatment Y (15 ml OHN) got the highest mean which is 24 chew counts. Analysis of variance (ANOVA) showed no significant effect on the tenderness of meat of broilers supplemented with OHN. The remarks showed that the meat was just tender.

For the respondents, the highest mean was obtained by the professionals which is 38 and remark showed that it was tough, followed by the students which has a mean of 20 and they remarked the meat as just tender, and the farmers got the lowest mean which is 12 and the meat got a tender remark. Analysis of Variance (ANOVA) showed a highly significant effect on the respondents. The coefficient of variance is 21%.

Odor. For factor 1 (representing the levels of pigeon pea), the highest mean was attained by treatment A (no pigeon pea) and C (15% pigeon pea) which both got 3.20 and treatment B (10% pigeon pea) got the lowest mean of 3.08. Analysis of variance (ANOVA) showed no significant effect on the meat odor of broilers supplemented with pigeon pea. The remarks showed that the meat odor was just normal.

For factor 2 (representing the levels of OHN) the highest mean was obtained by treatment Z (20 ml OHN) which is 3.29, followed by Y (15 ml OHN) which has a mean of 3.16 and treatment X (pure H2O) got the lowest mean of 3.02. Analysis of variance (ANOVA) showed no significant effect on the meat odor of broilers supplemented with OHN. The remarks showed that the meat odor was just normal.

For the respondents, the lowest mean was obtained by the students which has a mean of 2.94, followed by the farmers which has a mean of 3.26 and the professionals got the highest mean of 3.28. The Analysis of Variance (ANOVA) showed significant effect on the respondents in the meat odor of broilers. The Coefficient of Variance is 15%. The remarks showed that the meat odor was just normal.

Texture (fresh). For factor 1 (representing the levels of pigeon pea) the highest mean was obtained by treatment C (15% pigeon pea) with a mean of 3.12, followed treatment B (10% pigeon pea) which has a mean of 3.09 and treatment A (no pigeon pea) got the lowest mean of 3.08. The Analysis of Variance (ANOVA) showed no significant effect

of supplementing pigeon pea to the texture of the fresh meat of broilers. The remarks were all rigid.

For factor 2 (representing the levels of OHN) the lowest mean was obtained by treatment Y (15ml OHN) which has a mean of 3.03 followed by treatment X (pure H2O) which got a mean of 3.06 and treatment Z (20ml OHN) got the highest mean which is 3.20. Analysis of Variance showed no significant effect of supplementing OHN to the texture of fresh meat of broilers. The remarks were all rigid.

For the respondents, the highest mean was obtained by the students which has a mean of 3.17, followed by professionals with a mean of 3.08 and the farmers got the lowest mean of 3.03. Analysis of variance (ANOVA) showed no significant effect on the respondents to the texture of fresh meat of broilers. The coefficient of variance is 11%.The remarks were all rigid.

Texture (cooked). For factor 1 (representing the levels of pigeon pea) the highest mean was obtained by treatment C (15% pigeon pea) which has a mean of 3.39, followed by treatment B (10% pigeon pea) which got a mean of 3.29, and treatment A (no pigeon pea) got the lowest mean of 3.24. The Analysis of Variance (ANOVA) showed no significant effect of supplementing pigeon pea to the texture of the cooked meat of broilers. The remarks were all rigid.

For factor 2 (representing the levels of OHN) the highest mean was obtained by treatment Z (20 ml OHN) which has a mean of 3.44 and it is moderately rigid, followed by treatment Y (15 ml OHN) which got 3.31 and treatment X (pure H2O) got the lowest mean which is 3.11, both were rigid. The Analysis of Variance (ANOVA) showed no significant effect of supplementing OHN to the texture of the cooked meat of broilers.

For the respondents, the highest mean was obtained by the students which is 3.39, followed by the farmers which has a mean of 3.28 and the professionals got the lowest mean of 3.19. Analysis of variance (ANOVA) showed no significant effect on the interaction of treatments to the texture of cooked meat of broilers. The coefficient of variance is 12%.The remarks were all rigid.

Taste. For factor 1 (representing the levels of pigeon pea) the highest mean was obtained by treatment C (15% pigeon pea) which is 3.39, followed by treatment B (15% pigeon pea) which got a mean of 3.29 and treatment A (no pigeon pea) got the lowest mean of 3.24. The Analysis of Variance (ANOVA) showed no significant effect of supplementing pigeon pea to the taste of cooked of broilers. The remarks were all just normal.

For factor 2 (representing the levels of OHN) the highest mean was obtained by treatment Z (20 ml OHN) which got 3.37, followed by treatment Y (15 ml OHN) which has a mean of 3.32 and treatment X (pure H2O) got the lowest mean of 3.22. The Analysis of Variance (ANOVA) showed no significant effect of supplementing OHN to the taste of cooked of broilers. The remarks were all just normal.

For the respondents, the highest mean was obtained by the farmer which is 3.62 and they said that the meat has an undesirable taste, followed by the professionals which has a mean of 3.23, and the lowest mean was obtained by the students which is 3.06, both got a just normal remark. Analysis of variance (ANOVA) showed a highly significant effect on the respondents to the texture of fresh meat of broilers. The coefficient of variance is 11%.

General Acceptability

For factor 1 (representing the levels of pigeon pea) the highest mean was obtained by treatment C (15% pigeon pea) which got a mean of 3.26, followed by treatment A (no pigeon pea) which got 3.19, and treatment B (10% pigeon pea) got the lowest mean of 3.18. The Analysis of Variance (ANOVA) showed no significant effect of supplementing pigeon pea to the general acceptability of broilers. The remarks were all moderate.

For factor 2 (representing the levels of OHN) the highest mean was obtained by treatment Y (10 % OHN) which is 3.33, followed by treatment Z (15 ml OHN) which has a mean of 3.22, and treatment X (pure H2O) got the lowest mean which is 3.07. The Analysis of Variance (ANOVA) showed no significant effect of supplementing OHN to the general acceptability of broilers. The remarks were all moderate.

For the respondents, professionals got the highest mean which is 3.37, followed by the farmers which got 3.24 and students got the lowest mean of 3.01. The analysis of variance (ANOVA) showed a highly significant effect on the respondents to the general acceptability of broilers. The remarks were all moderate.

Table 13. Sensory Evaluation

Dependent Variable	Respondents	Mean	Remarks	Factor 1	Mean	Remarks	Factor 2	Mean	Remarks
Tenderness	Professional	38	Tough	Feed 1	22	Just Tender	OHN 1	23	Just Tender
	Student	20	Just Tender	Feed 2	23	Just Tender	OHN 2	24	Just Tender
	Farmer	12	Tender	Feed 3	25	Just Tender	OHN 3	23	Just Tender
	f-test	*148.13***			*1.65*			*.27*	
	cv %	*21%*			*21%*			*21%*	
Odor	Professional	3.28	Just Normal	Feed 1	3.20	Just Normal	OHN 1	3.02	Just Normal
	Student	2.94	Just Normal	Feed 2	3.08	Just Normal	OHN 2	3.16	Just Normal
	Farmer	3.26	Just Normal	Feed 3	3.20	Just Normal	OHN 3	3.29	Just Normal
	f-test	*3.96**			*.35*			*1.49*	
	cv %	*15%*			*15%*			*15%*	
Texture Fresh	Professional	3.08	Rigid	Feed 1	3.08	Rigid	OHN 1	3.06	Rigid
	Student	3.17	Rigid	Feed 2	3.09	Rigid	OHN 2	3.03	Rigid
	Farmer	3.03	Rigid	Feed 3	3.12	Rigid	OHN 3	3.20	Rigid
	f-test	*.80*			*.07*			*1.26*	
	cv %	*11%*			*11%*			*11%*	
Texture	Professional	3.19	Rigid	Feed 1	3.34	Rigid	OHN 1	3.11	Rigid
Cooked	Student	3.39	Rigid	Feed 2	3.24	Rigid	OHN 2	3.31	Rigid
	Farmer	3.28	Rigid	Feed 3	3.29	Rigid	OHN 3	3.44	Moderate
	f-test	*1.64*			*.29*			*2.93*	
	cv %	*12%*			*12%*			*12%*	
Taste	Professional	3.23	Just Normal	Feed 1	3.24	Just Normal	OHN 1	3.22	Just Normal
	Student	3.06	Just Normal	Feed 2	3.29	Just Normal	OHN 2	3.32	Just Normal
	Farmer	3.62	Undesirable	Feed 3	3.39	Just Normal	OHN 3	3.37	Just Normal
	f-test	*9.97***			*.86*			*.91*	
	cv %	*11%*			*11%*			*11%*	
General	Professional	3.37	Moderate	Feed 1	3.19	Moderate	OHN 1	3.07	Moderate
Acceptability	Student	3.01	Moderate	Feed 2	3.18	Moderate	OHN 2	3.33	Moderate
	Farmer	3.24	Moderate	Feed 3	3.26	Moderate	OHN 3	3.22	Moderate
	f-test	*7.10***			*.27*			*2.27*	
	cv %	*11%*			*11%*			*11%*	

CONCLUSION

Based on the Analysis of Variance (ANOVA), on the final weight of broilers, Factor 1 (representing the levels of pigeon pea) showed significant effect at 5% level of significance and Factor 2 (representing the levels of OHN) showed no significant effect. On the weight gain of broilers, Factor 1 (representing the levels of pigeon pea) showed a highly significant effect and Factor 2 (representing the levels of OHN) showed no significant effect. In terms of feed intake, Factor 1 (representing the levels of pigeon pea) showed significant effect at 1% level of significance and Factor 2 (representing the levels of OHN) showed no significant effect. In terms of water intake, both Factor 1 (representing the levels of pigeon pea) and Factor 2 (representing the levels of OHN) showed a highly significant effect. In terms of feed conversion efficiency, both Factor 1 (representing the levels of pigeon pea) and Factor 2 (representing the levels of OHN) showed a highly significant effect.

For the sensory evaluation, based on the Analysis of Variance (ANOVA), the tenderness, taste and the general acceptability are highly significant only in the respondents and not in both factors 1 and 2. Odor is significant only in the respondents while the textures (fresh and cooked) are not significant in both factors 1 and 2 as well as in the respondents. Based also on the Analysis of Variance (ANOVA), all interaction means show no significant effect to the growth and sensory evaluation.

Based on the findings, the researchers concluded that broilers fed with treatment B (10% pigeon pea) had a significant effect on the final weight. It is highly significant in the weight gain and feed conversion efficiency. However, it is insignificant in the feed and water intake, since the results found that broilers not fed with pigeon pea showed significant effect. On the other hand, broilers supplemented with OHN at 20ml/1L H2O showed a highly significant effect in water intake. Broilers supplemented with treatment Y (15ml OHN in 1L H2O) had showed a highly significant effect in the feed conversion efficiency. Combinations of pigeon pea and Oriental Herbal Nutrients (OHN) have no significant effect in the growth and sensory evaluation of broilers. Both treatments behave independently.

RECOMMENDATIONS

Based on the study conducted, the researchers recommended the supplementation of 10% pigeon pea in the broiler ration. Supplementation of 10% pigeon pea in the locally mixed feeds showed a highly significant result on the weight gain and feed conversion efficiency and significant result in the final weight. These results can be a great help for the increase of production output with minimal operational expenses specifically on feeding broilers. Birds will have minimal feeding requirements but with efficient feed conversion and higher final weights if they will be supplemented with the recommended level of pigeon pea which is 10% in the locally mix feeds.

Furthermore, the researchers also recommended the supplementation of 20ml OHN/L of H2O as supported by a highly significant result in water intake and 15ml OHN/L of H2O as supported by a highly significant result in the feed conversion efficiency Increase in water intake can improve the digestive process. Efficient utilization of nutrients in feeds can be expected. To verify further these results, the researchers recommend that similar study must be conducted using different levels of OHN and pigeon pea in the locally mixed ration.

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