BIBLIOGRAPHY

CAWAYAN, WILAN A. APRIL 2013. The Effect of Commercial Feed Supplemented with Lima Bean (*Phaseolus lunatus*) Meal on the Carcass Yield and Quality of Colored Broiler. Benguet State University, La Trinidad Benguet.

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ABSTRACT

This study was conducted to find out the effect of lima bean on the carcass yield and quality of colored broiler. Specifically, this study aimed to measure and compare the carcass yield of colored broilers fed with lima beans in terms of slaughter weight, carcass weight and dressing percentage, weight of major cuts, weight of minor cuts, and weight of giblets; It likewise aimed to, evaluate the carcass characteristics in terms of appearance, aroma, tenderness, juiciness, taste and acceptabilility through a preference test.

The result of statistical analysis showed that lima bean meal had no effect on the carcass yield as well as the sensory characteristics of the cooked meat in each treatment.

It is therefore concluded that lima bean meal added to the commercial ration from 100g to 200g is safe as it did not produce any detrimental effect on the carcass yield and sensory characteristics of colored broiler meat. It may be used by the raisers upon their own discretion.

INTRODUCTION

Broiler chicken is one of the most important animal protein sources of the people because the price is relatively achievable for the low income people. The growth of broiler chicken is relatively faster with a shorter life cycle compared with other meat-producing livestock. At the age of 5 to 6 weeks, broiler can reach slaughter weight of 1.5 to 2.0 kg. In terms of its quantity, broiler is generally raised in a large number from thousand to hundreds of thousands per farm for the period of two months or six periods per year. Thus, broiler meat production is competitively enough to supply the demand for meat which continuously increases as the human population also increases together with the requirement for high quality food. However, the use of some chemically based feed additives, such as antibiotics and growth promoters, have been widely applied by broiler industries. These feed additives are used by the poultry industries to improve health and productivity of chicken flocks (Ramos, 2012).

An increasing number of consumers are going into health and natural foods thus they favored organically raised livestock. Organic livestock farming is claimed to be environmentally friendly and sustainable for the animal's health. It is high in quality but with greater attention to animal welfare. The survival rate of animal feed grown without pesticides or artificial fertilizers is at least 80%. The higher guarantee of the absence of residue is certain, but the effect of organic farming on qualitative characteristics of the products is unknown. This study sought to contribute to the knowledge of qualitative traits of broiler carcass and meat products that are organically raised. A poultry carcass should produce highly nutritious value, flavor, texture and eating quality of meat as commodity. It has to meet the requirements of the costumer in terms of bright and attractive appearance

of the product offered. Other characteristics of meat should include the nutritive value, high satiety value, color and especially free from chemical residue. Keeping the bleed animal suspended by its hind legs throughout the dressing operations greatly increases the efficiency of converting an animal into carcass and by products (MILLER, 2001).

The study was conducted to find out the effect of Lima Bean Meal to the carcass yield and quality of colored broiler. The result of the study can serve as reference to the other researcher to come up with follow- up researches.

Generally, the study was conducted to determine the effect of lima bean meal on the carcass yield and quality of colored broiler.

Specifically, it aimed to:

1. measure and compare the carcass yield of colored broiler fed with lima beans in terms of slaughter weight, carcass weight, dressing percentage, weight of major cuts, weight of minor cuts, weight of giblets; and,

2. evaluate carcass characteristics through a taste test in terms of appearance, aroma, tenderness, juiciness, taste and acceptabilility.

The production phase of this study was conducted at Belong, Ambassador, Tublay, Benguet while carcass yield evaluation and organoleptic test was done at Meat Laboratory, Department of Animal Science, College of Agriculture, Benguet State University.

REVIEW OF LITERATURE

Sometimes called "butter beans" because of their starchy yet buttery texture, lima beans have a delicate flavor that complements a wide variety of dishes. Although fresh lima beans are often difficult to find, they are worth looking for during summer and fall when they are in season. Dried and canned lima beans are available throughout the year. The pod of the lima bean is flat, oblong and slightly curved, averaging about three inches in length. Inside the pod are two to four flat kidney- shaped seeds which are called lima beans. The seeds are generally cream or green in color, but there are certain varieties that colored white, red, purple, brown or black (Wood, 1988).

The chemical composition of lima beans: the dried pulp contains about 12.6%, 20.7% protein, 1.3% fat, 57.3% carbohydrate, 4.3% fiber, and 3.8% ash. The green beans contain about 66.5% water, 7.5% protein, 0.8% fat, 22.3% carbohydrates, 1.5 % fiber, and 1.7% ash. The mature beans contained the glucoside phaseolutanin, which gives them their characteristic flavor. Under damp condition or when tissues are broken down by chewing or grinding, an enzyme present in the seeds causes the liberation of hydrocyanic acid. Large lima beans of Inca type and small limas of Hopi type contains 25 to 55 p.p.m. HCN which is far below to the tolerance set by law in the United States of 100 p.p.m HCN. Carib type beans contain dangerous quantities of HCN and a wild lima bean in Puerto Rico gave 997 p.p.m. HCN. The HCN content is greater in colored beans; white seed types are relatively free, but over 100 p.p.m. HCN has been recorded in a few cases (Mackie, 1943 and Heiser, 1965).

Lima bean nutritional values are touted for their high fiber content. Not only does fiber control and stabilize blood sugar from rising too quickly after eating, but it also

provides a slow and steady complex carbohydrate energy burn. One cup of lima beans provides 65.8 percent of the daily fiber value requirements; 24.9 percent of the required iron; and 48.5 percent of the daily requirement of manganese, which plays an important role in antioxidant defenses and energy production. Lima beans and other legumes may be used as a meat substitute. When combined with a whole grain source, lima beans provide a low-fat whole protein source, with 29.3 percent of the daily protein recommendation in one cup. Cyanide compounds are present in lima beans and they should therefore not be eaten raw unless they are among the low- cyanogen varieties. Western countries, such as the United States, restrict commercially grown lima bean production to those with low cyanogen levels. In some other countries, including Java and Burma, these legumes have 20 to 30 times more the cyanogen than is permitted in most Western countries. These high-cyanogen beans require longer cooking times to drive out the hydrogen cyanide gas (Ambler, 1994).

Lima bean health benefits per 100 g are 338 cal energy and 21.46 g or 38% of protein. In addition, lima beans are rich source of antioxidants, vitamins, minerals, and plant sterols. The beans, fresh or dried, contain substantial amounts of dietary fiber (50% per 100g RDA). Dietary fiber functions as bulk laxative, which helps to protect the mucous membrane of the colon by decreasing its exposure time to toxic substances as well as by binding to cancer causing chemicals in the colon. Dietary fiber has also been shown to reduce blood cholesterol levels by decreasing re- absorption of cholesterol binding bile acids in the colon. Unlike soybeans, lima contain very small amounts of isoflavones. Isoflavone such as genistein and daidzein have been found to protect breast cancer in laboratory animals. However, they are plentiful in plant sterols (phytosterols) especially -

help lower cholesterol levels in the body. Fresh as well as dry lima are excellent source of folates. 100g dry mature beans provide 395 µg or 99% of folates. Folate along with vitamin B-12 is one of the essential components of DNA synthesis and cell division. Adequate folate in the diet around conception and during pregnancy may help prevent neural-tube defects in the newborn baby. Lima as well as thin butter beans are very rich source of many vitamin B, especially vitamin-B6 (pyridoxine), thiamin (vitamin B-1), pantothenic acid, riboflavin, and niacin. Most of these vitamins functions as co- enzymes in carbohydrate, protein, and fat metabolism. In addition, lima and butter beans are one of the excellent sources of minerals like molybdenum, iron, copper, manganese, calcium, magnesium. They have more potassium than red kidney beans (1359 mg), broad beans (1062 mg), black beans (1483 mg). Potassium is important electrolyte of cell and body fluids. It helps counter pressing effects of sodium on heart and blood pressure. Manganese is used by the body as a co- factor for the powerful anti- oxidant enzyme, superoxide dismutase (Ensminger, 1986).

MATERIALS AND METHODS

Materials

The different materials are: 16 head of 60 days old colored broiler from a previous growth study on the effect of lima bean on the growth performance of colored broiler, gas stove, stainless steamer, knives, containers, digital weighing scale, and Ziploc bags. A digital camera, record book and ballpen were used in the documentation of the activities.

The birds were selected to have more or less the same weight. Four birds from each of the four treatments from the previous study were taken. Each bird represents one replication, making a total of 4 replicates per treatment. The treatments administered to the birds during the growth study were as follows:

T_0- Control (pure commercial feeds)

T_1- 100 grams lima bean per kilogram commercial feeds

T_2- 200 grams lima bean per kilogram commercial feeds

T_3- 300 grams lima bean per kilogram commercial feeds

Slaughtering of the Birds

Prior to dressing, the birds were confined in cages and fasted for 8 hours, but water was provided *ad libitum*. The live weight of birds was taken individually before dressing (Figure 1). At the time of slaughtering or dressing, the birds will be secured by holding both shanks with one hand and both wings with the other hand and to prevent struggling .With the help of an assistant, bleeding by cutting the large blood vessel of the neck at the lateral side below the mandible. Complete bleeding accomplished by raising the bird approximately 45^0 so that the caudal part will be higher than the head (Figure 2).

Figure 1. Slaughter weight being taken


Figure 2. Bleeding

After bleeding, each bird was immersed into hot water for 4 seconds or more after which its feather were plucked. After plucking (Figure 3), the birds were washed thoroughly and made ready for evisceration. Evisceration was done by laying the bird in dorsal recumbence. The esophagus and wind pipe will be pulled out the base of mandible. For easy insertion of the fingers, a slit was made around the vent then down to the keel. The two fingers were inserted into the slit in the abdominal cavity to the abdominal attachment on the entrails. After entrails were pulled out, the liver, heart, and gizzards with proventiculus were separated. The head was detached from the atlanto- occipital joint, which accomplish by severing the skin, muscle and ligaments at the said joints with a sharp knife.

Carcass Yield Evaluation

Each dressed bird was placed on the pan of the weighing scale and weights were recorded in kilograms (Figure 4). The carcass was observed.

Carcass Quality Evaluation

The breast part of the carcasses from the different treatments were steamed for 35 minutes in an aluminum steamer (Figure 5). After steaming, these (Figure 6) were sliced into 1 square inch sizes. A panel of tasters was invited to evaluate the samples and mark their description in the evaluation sheets. A panel of tasters was composed (Figure 7) of 20 individuals aging from 20 to 40 who was randomly invited.

Figure 3. Plucking

Figure 4. Dressed weight being taken

Figure 5. The steamer used by the researcher

Figure 6. Meat samples being steamed

Figure 7. The taste panel during sensory evaluation

Data Gathered

The following parameters were gathered from the study:

1.Slaughter weight (kg). This was the weight of the colored broiler before slaughter time.

2.Dressed weight (kg). This refers to the actual weight of slaughter bird after plucking the feathers, removing the head, feet and entrails.

3. Length of GIT (inch).This refers to the length of gastro intestinal tract.

4. Meat appearance, tenderness, juiciness, flavor, aroma and acceptability. This was obtained through organoleptic testing of a panel of tasters composed of 20 individuals from ages 20 to 40 randomly invited.

5. Weight of major cuts: This includes the weight of the breast, wings, back, drumstick and thigh.

6. Weight of giblets: This includes the weight of the liver and spleen, gizzard, feet, and neck.

Data Computed

1. Dressing percentage (%). This was obtained by dividing the carcass weight by the slaughter weight then multiplied by 100.

Sensory Traits of the Carcass

1. Appearance of the product. This evaluated using the score below:

Score	Remarks
1	Desirable
2	Moderately Desirable
3	Slightly Desirable
4	Slightly Undesirable
5	Undesirable

2. Aroma, Juiciness and Acceptability. This evaluated using the score below:

Score	Remarks
1	Like Very much
2	Like Moderately
3	Dislike
4	Dislike Moderately
5	Dislike Very Much

3. Tenderness. This evaluated using the score below:

Score	Remarks
1	Very Tender
2	Moderately Tender
3	Not Sure
4	Slightly Tender
5	Tough

4. Taste. This evaluated using the score below:

Score	Remarks
1	Very Good
2	Good
3	Not Sure
4	Poor
5	Very Poor

Data Analysis

Data gathered were analyzed using the Analysis of Variance for Completely Randomized Design and treatment means were compared using Duncans Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Slaughter Weight, Dressed Weight and Dressing Percentage

Table 1 presents the slaughter weights of the birds after 8 hours of fasting. The birds given plain commercial feeds, 100 grams lima bean per kilogram commercial feeds, 200 grams lima bean per kilogram commercial feeds and 300 grams lima bean per kilogram commercial feeds were homogenous in terms of slaughter weight and dressing percentage. This was expected because the birds for slaughter were purposely selected to have more or less similar weights.

The dressed weight however varied. The birds given 300 grams lima bean per kilogram commercial feeds had lower dressed weight compared to the three groups. However, it was at par in terms of dressing percentage.

This shows that using lima bean supplement did affect the dressing percentage of the birds. It can be observed that the dressing recovery of the selected samples are within the industry standard of 60- 65% dressing recovery for broilers.

Table 1. Slaughter, dressed weight and dressing percentage of the birds

TREATMENT	SLAUGHTER WEIGHT(kg)	DRESSED WEIGHT(kg)	DRESSING PERCENTAGE(%)
100% commercial feed (CF)	1.950[a]	1.261[a]	64.67
100 g lima beans / kg CF	1.900[a]	1.209[ab]	63.63
200 g lima beans / kg CF	1.850[a]	1.171[ab]	63.30
300 g lima beans / kg CF	1.825[a]	1.095[a]	60.00

Means with the same letter superscript are not significantly different

Major Cuts

Table 2 shows the weight of major cuts. The weight of back, breast, wings and legs did not vary across treatments. The weight of back ranged from 240 to 278.75 grams which is less than industry standards. Meanwhile, the breast yield of the broilers was observed to be from 328.75 to 383.75 grams, the wings shared about 158.75 to 171.25 grams of the slaughter weight which did not vary considerably between treatments. The drumstick portion was at 192.5 to 227.5 grams while the thigh was at 175 to 197.5 grams.

The weight of the drumstick of colored broiler supplemented with lima bean was significantly lower.

Table 2. Weight of back, breast, wings, drumstick and thigh of the birds

TREATMENT	BACK(g)	BREAST(g)	WINGS(g)	DRUMSTICK(g)	THIGH(g)
100% commercial feed (CF)	278.75[a]	383.75[a]	171.25[a]	227.50[a]	197.50[a]
100 g lima beans / kg CF	276.25[a]	360.00[a]	171.25[a]	211.25[ab]	191.25[a]
200 g lima beans / kg CF	270.00[a]	367.00[a]	160.00[a]	188.75[b]	187.50[a]
300 g lima beans / kg CF	240.00[a]	328.75[a]	158.75[a]	192.50[b]	175.00[a]

Means with the same letter superscript are not significantly different

Weight of Giblets

The feet, neck, head, liver with spleen and gizzard were considered giblets. Statistical analysis showed in Table 3 that there were no significant differences among all treatments on the feet, neck, head, and liver with spleen. This means that broilers supplemented with plain commercial feed, 100 grams lima bean per kilogram commercial feeds, 200 grams lima bean per kilogram commercial feeds, and 300 grams lima bean per kilogram commercial feeds were more or less alike.

Interestingly, the weight of gizzard of the birds given 300g lima bean per kilogram commercial feeds was lower compared to the other treatments. This may mean that there was atrophy which could be a result of the diet given.

Table 3. Weight of giblets

TREATMENT	FEET (g)	NECK (g)	HEAD (g)	LIVER and SPLEEN (g)	GIZZARD (g)
100% commercial feed (CF)	107.25[a]	86.25[a]	57.50[a]	55.00[a]	62.50[a]
100 g lima beans / kg CF	106.25[a]	91.25[a]	52.50[a]	51.25[a]	51.25[ab]
200 g lima beans / kg CF	90.00[a]	81.25[a]	51.25[a]	50.00[a]	65.00[b]
300 g lima beans / kg CF	100.00[a]	73.75[a]	55.00[a]	43.75[a]	42.50[b]

Means with the same letter superscript are not significantly different

Sensory Traits of the Carcass

Appearance. Table 4 shows that the appearance of cooked meat samples from the birds supplemented with lima beans were desirable in appearance while the meat samples from the birds given with plain commercial feed was moderately desirable. The tasters

found the appearance of cooked carcass produced by colored broiler fed with lima bean to be more desirable than that of the control.

Aroma. Table 5 shows that all treatments did not produce any effect on the aroma of meat produced by the birds based on the result of the meat evaluation through organoleptic test. The meat from the control group and the groups given with lima bean are the same. It is interesting to note that the panel liked the cooked meat from the birds lima bean as a supplement.

Tenderness. Table 6 focuses on the tenderness of the meat samples which ranged from 1.00 to 1.49 for the numerical rating and very tender for the verbal rating.

This reveals that the tenderness of the meat samples derived from the birds was not affected by the treatments. On the other hand, birds were of the same ages hence the result.

Table 4. Appearance of the cooked meat samples

TREATMENT	VERBAL DISCRIPTION
100% commercial feed (CF)	Moderately Desirable
100 g lima beans / kg CF	Desirable
200 g lima beans / kg CF	Desirable
300 g lima beans / kg CF	Desirable

Table 5. Aroma of the cooked meat samples

TREATMENT	VERBAL DISCRIPTION
100% commercial feed (CF)	Like Very Much
100 g lima beans / kg CF	Like Very Much
200 g lima beans / kg CF	Like Very Much
300 g lima beans / kg CF	Like Very Much

Table 6. Tenderness of the cooked meat samples

TREATMENT	VERBAL DISCRIPTION
100% commercial feed (CF)	Very Tender
100 g lima beans / kg CF	Very Tender
200 g lima beans / kg CF	Very Tender
300 g lima beans / kg CF	Very Tender

Juiciness and Taste. For juiciness of the meat samples, there were no significant differences among the treatments as shown in Table 7.

The different treatments obtained a verbal rating of very juicy. This reveals that the juiciness of the meat samples derived from the birds in the different treatments was more or less the same. It also reveals that the inclusion of lima bean did not affect on the juiciness of the meat samples produced by birds. The differences in flavor of the meat samples were not different among the treatments as shown in Table 8.

Acceptability. Based on the result of organoleptic test, the panel of tasters liked very much the meat samples from the birds supplemented with lima bean (Table 9). This implies that lima bean can be incorporated in the feeds of the birds without affecting the acceptability of the resulting meat product.

Table 7. Juiciness of the cooked meat samples

TREATMENT	VERBAL DISCRIPTION
100% commercial feed (CF)	Very Juicy
100 g lima beans / kg CF	Very Juicy
200 g lima beans / kg CF	Very Juicy
300 g lima beans / kg CF	Very Juicy

Table 8. Taste of the cooked meat samples

TREATMENT	VERBAL DISCRIPTION
100% commercial feed (CF)	Very Good
100 g lima beans / kg CF	Very Good
200 g lima beans / kg CF	Very Good
300 g lima beans / kg CF	Very Good

Table 9. Acceptability of the cooked meat samples

TREATMENT	VERBAL DISCRIPTION
100% commercial feed (CF)	Like Very Much
100 g lima beans / kg CF	Like Very Much
200 g lima beans / kg CF	Like Very Much
300 g lima beans / kg CF	Like Very Much

SUMMARY, CONCLUSIONS AND RECOMMENDATION

Summary

This study was conducted to determine the effect of lima bean on the carcass yield and quality of colored broiler. The birds used on the study were 16 heads 60-days old colored broilers which were raised using 100 grams lima bean meal, 200 grams lima bean meal and 300 grams lima bean meal.

Specifically, the study aimed to determine the effect of the lima bean mean on the carcass yield and quality of colored broilers through organoleptic test under La Trinidad condition, and to determine the effect on slaughter weight, carcass weight and dressing percentage. The treatments were as follows: (T_0) Pure commercial feeds (control); (T_1) 100 grams lima bean meal; (T_2) 200 grams lima bean meal and (T_3) 300 grams lima bean meal.

The result of statistical analysis showed no significance differences in terms of slaughter weight. While there was a reduced dressed weight on the birds fed with 200g lima bean per kilogram commercial feeds. The dressing recovery was observed to be homogenous across treatments.

In terms of carcass yield, no significant differences was observed in the weight of breast, back, thigh and 300g lima bean were notably lower.

The weight of feet, head, neck and liver with spleen also did not vary across treatments. The gizzard of the birds fed with 300g was found to be smaller.

In terms of sensory traits, the appearance of the cooked samples from the birds fed with 100g lima bean were appreciably better in appearance than that from the control group. All other sensory traits were comparable across treatments.

Conclusions

It is therefore concluded that lima bean could be a potential feed supplement as it did not affect the carcass yield and sensory characteristics of the cooked meat. However, caution should be observed in giving 300g lima bean per kilogram feed as it was found to have reduced the drumstick and gizzard yield of the experimental birds.

Recommendation

Based on the study, lima bean meal may be used as feed supplement upon the discretion of the raiser. It is also recommended to conduct a further study using lima bean meal with higher concentration to find out the efficacy or effect on the meat yield and quality.

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