

## BIBLIOGRAPHY

KALINGGAN, GRAYGORY D. APRIL 2011. Carcass Yield and Sensory Evaluation of Sunshine Chicken Fed with Garlic (*Allium sativum*). Benguet State University, La Trinidad.

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## ABSTRACT

This study was conducted to determine the effect of garlic on the carcass yield and sensory properties of the sunshine chicken.

It aimed to find out the effect of garlic on the dressing percentage, weight of skin, lean, bone, abdominal fats, bone to lean ratio, and sensory properties traits produced from sunshine chicken through organoleptic test. The treatments used were as follows: T<sub>0</sub> (Commercial Feeds with antibiotic in the water), T<sub>1</sub> (15 grams of garlic / kg of CF), T<sub>2</sub> (30 grams of garlic / kg of CF), T<sub>3</sub> (Commercial Feeds with no antibiotic premix). A total of 16 birds from each replication were slaughtered for the evaluation.

Result revealed that there was no significant difference between treatments in terms of slaughter weight, dressed weight, weight of the skin, weight of the bones, dressing percentage, percent of skin, percent of bones, and bone to lean ratio.

On the other hand, significant differences were noted in terms of percent of lean, percent of abdominal fats. In sensory properties there were significant differences in terms of appearance, juiciness, tenderness, flavor, and acceptability. Generally, sunshine chicken



given diets supplemented with garlic had a higher percentage, thinner abdominal fats, and improves sensory properties produced from sunshine chicken.



## INTRODUCTION

Consumption of poultry meat is increasing because of the growing population, and because it has a high protein value which helps human body for growth and maintenance. In our locality we prefer to buy poultry meat because it is cheaper than those meats coming from different livestock animals. But because of the low level supply of animal protein due to the poor performance of livestock, it has attributed factors such as inadequate nutrition, high price and poor quality of feeds and inefficiency in production and distribution in the feed industry. That's why some livestock and poultry raisers undergo organic farming because it is environmentally friendly and sustains the animal in good health.

Ever since herbal is widely used to maintain and improve health for humans and now it is also used as feed supplement. As according to Gardzielewska *et al.*, 2003, garlic (*Allium sativum*) has been recognized for its strong stimulating effect on the immune system and has very rich aromatic oil that enhances digestion of birds. And also, trials have been evaluated garlic as an alterative of growth promoters in livestock and it was measured its effect on growth digestibility and carcass traits (Bampidis *et al.*, 2005;Tatara *et al.*, 2005).

This research aims at producing a reference in the use of garlic in improving the carcass quality and the general health of food such as sunshine chicken. This was conducted also to discourage the rampant use of synthetic supplements in food animals if it is proven effective. Furthermore, it hopes to promote the use of natural products such as garlic in improving the carcass quality and the general health of food animals such as sunshine chicken.



Generally, this study aims to determine the effect of the garlic on the carcass and sensory of the sunshine chicken. Specifically, it aimed to find out the effect of garlic on the carcass yield of sunshine chicken under La Trinidad, Benguet and to determine the sensory traits of carcass produced from broilers fed with garlic through organoleptic test.

The experiment used a total 16 sunshine chicken, which was subjected to 52 days feeding period. Meanwhile, carcass evaluation and organoleptic taste was done at the Department of Animal Science Laboratory.



## REVIEW OF LITERATURE

Garlic (*Allium sativum* L.) has been widely used as a foodstuff since antiquity and has acquired a reputation in the folklore of many cultures as a therapeutic agent. It has been known as an herbal remedy to prevent and treat a variety of heart diseases and metabolic diseases, such as atherosclerosis, thrombosis, hypertension, dementia, cancer, and diabetes (Agarwal, 1996; Konjufca *et al.*, 1997; Amagase *et al.*, 2001).

Many studies indicate that allicin is the potentially active component of garlic. These compounds provide garlic its characteristic odor and flavor as well as most of its biological properties and have been identified as having the hypocholesterolemic effect in human and animal products (Silagy and Neil, 1994; Konjufca *et al.*, 1997; Chowdhury *et al.*, 2002).

Over the past years, it has been observed that besides providing flavor to foods, spices also possess antimicrobial activity. Thus, studies utilizing spices as antimicrobial agents are increasing. Among the spices that possess antimicrobial properties, garlic presents great potential since garlic is commonly used as a condiment in the preparation of poultry as food. The antimicrobial activity of garlic is identified as allicin, a compound that presents more bacteriostatic than bactericidal activity against gram-positive and gram negative (Cavallito and Bailey, 1944).

The anti-oxidative influence of the garlic in meat becomes more imperative in less developed nations, considering storage problems and increasing use of alternative feed resources without due consideration for meat quality (Onibi *et al.*, 2007).



Animal studies suggested that garlic paste (3.8%), solvent-extracted fractions (petroleum ether, methanol, and water in sequence), or garlic oil equivalent reduced the amount of serum cholesterol by 18 and 23% in broilers and 12-wk-old Leghorn pullets, respectively, when diets were fed for 4 wk (Qureshi *et al.*, 1983).

Apart from the inadequate supply and consumption of animal protein, there has been a resurgence of interest in improving the sensory properties of meat, as well as its storage life. In pursuit of improved chicken healthiness and in order to fulfill consumer expectations in relation to food quality, poultry producers more and more commonly apply natural feeding supplements, mainly herbs (Gardzielewska *et al.*, 2003).

According to Paris (1998) a poultry carcass should produce high yield of meat of good nutritional value and eating quality. As commodity, it has to meet the requirement of the customer in terms of attractive color and appearance of the product offered. Also, include the nutritive and the smell and especially free from chemical residues.

Level of feeding during the animal growing phase plays an important role in the tenderness of meat. Animal fed with feeds produced more tender and juicy meat than other animals with restricted feeding. Therefore feeding the animal *ad libitum* has an important positive effect on meat quality (Coma, 2000).

Gill (2000) stated that to produce a good quality of meat, it is the best to use organic feeds which are formulated ration without using synthetic chemicals. Formulated ration such as organic feeds are more economical than commercial feeds. Organic chicken refers to animal reared in semi out-door conditions and feed diets without using chemicals.

According to USDA Nutrient database, the nutrient values of 100g raw garlic are as follows:



Nutritional value per 100 g (3.5 oz)

<u>Energy</u>	623 kJ (149 kcal)
<u>Carbohydrates</u>	33.06 g
- <u>Sugars</u>	1.00g
- <u>Dietary fiber</u>	2.1 g
<u>Fat</u>	0.5 g
<u>Protein</u>	6.39 g
- <u>beta-carotene</u>	5 µg (0%)
Thiamine_(Vit. B1)	0.2 mg (15%)
Riboflavin_(Vit. B2)	0.11 mg (7%)
Niacin B.3)	0.7 mg (5%)
<u>Pantothenic acid (B5)</u>	0.596 mg (12%)
Vitamin B6	1.235 mg (95%)
<u>Folate (Vit. B9)</u>	3 µg (1%)
<u>Vitamin C</u>	31.2 mg (52%)
<u>Calcium</u>	181 mg (18%)
<u>Iron</u>	1.7 mg (14%)
<u>Magnesium</u>	25 mg (7%)
<u>Phosphorus</u>	153 mg (22%)
<u>Potassium</u>	401 mg (9%)
<u>Sodium</u>	17 mg (1%)
<u>Zinc</u>	1.16 mg (12%)
<u>Manganese</u>	1.672 mg
<u>Selenium</u>	14.2 µg



## METHODOLOGY

### Materials

The materials and equipment that was used in the study are 16 of 52 days of old sunshine chicken, butcher knives, weighing scale, containers, stove, water, basin, and digital camera to document the process while the record notebook was used in entering the data being gathered.

The birds used in the study were taken from a previous growth study which utilized the following treatments:

T<sub>0</sub> = Commercial Feeds with antibiotic premix in the water (Control)

T<sub>1</sub> = 15 g Garlic / kg of Commercial Feeds

T<sub>2</sub> = 30 g Garlic / kg of Commercial Feeds

T<sub>3</sub> = Commercial Feeds with no antibiotic premix

### Slaughtering of Birds

Prior to dressing, the birds were confined in the cages for 8 hours and water was provided ad libitum (Figure 1). The live weight of birds was taken individually before dressing (Figure 2). At the time of slaughtering, the bird was secured by holding both shanks with one hand and both wings, to prevent struggling. With the help of an assistant, sticking was done by severing the large blood vessel of the neck at the lateral side below the mandible then the bird was hanged to allow for complete bleeding. After sticking, each bird was immersed in hot water about 30 seconds to make the feathers easy to pluck. After plucking, the birds was washed thoroughly and made ready for evisceration.





Evisceration was done by laying the bird in dorsal recumbence. The esophagus and pipe was then pulled out the base of mandible. For easy insertion of the hand, a slit was made around the vent then down to the keel. The hand was inserted into the slit in the abdominal cavity and the abdominal attachment on the entrails. After entrails were pulled out, the liver, heart, and gizzard with proventriculus was separated. The head was detached from the alanto-occipital joint, which was accomplished by severing the skin, muscle and ligaments at the said joints with a sharp knife.

### Carcass Yield Evaluation

The dressed birds were placed on the pan of the weighing scale and weight was recorded in kilograms (Figure 3). The birds were carefully worked on as a whole to separate the lean (Figure 4), skin (Figure 5), bone (Figure 6) and abdominal fat (Figure 7). Then it was weighed in the weighing scale for record.



Figure 1. Birds confined in the cages for 8 hours fasting



Figure 2. Taking the live weight



Figure 3. Dressed weight

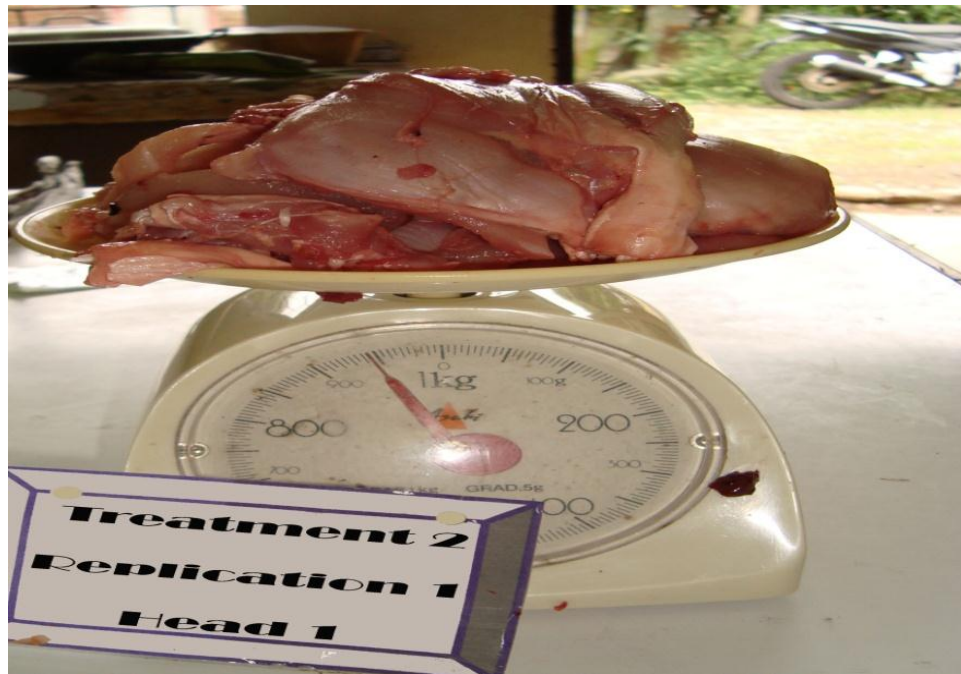


Figure 4. Weighing of lean from the slaughtered birds



Figure 5. Weighing of skin from the slaughtered birds



Figure 6. Weighing of bones from the slaughtered birds

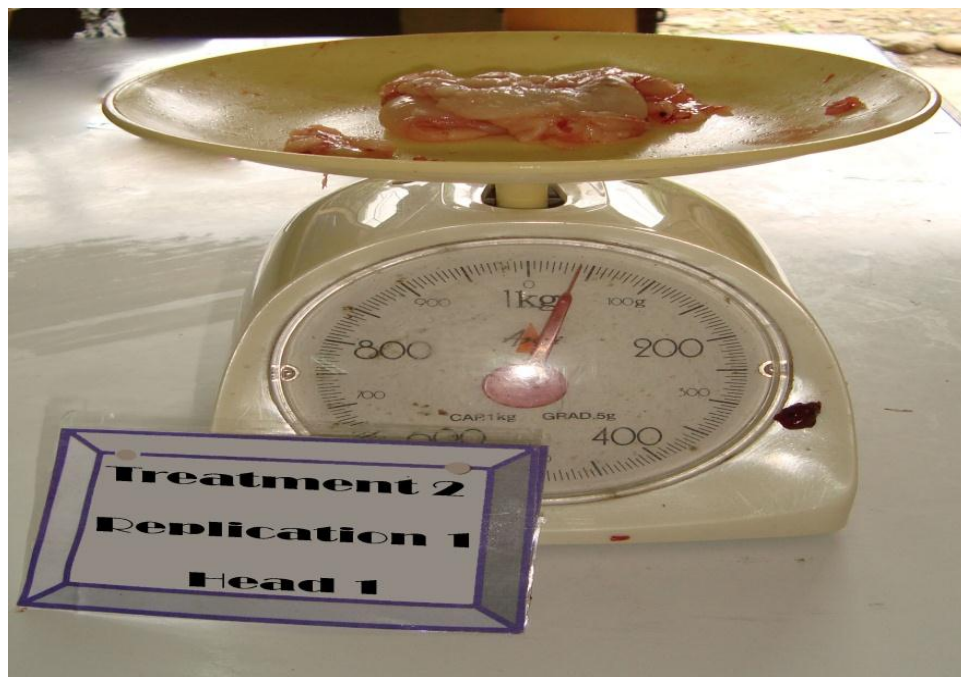


Figure 7. Weighing of the abdominal fats from the slaughtered birds

## Sensory Evaluation

The chicken meat sample for taste test was taken from the breast portion of the carcass. The meat was sliced into bite sizes and was cooked in the same kind of stainless cooking pot in four cups of water for 45 minutes without adding salt or any spice ingredients. The meat was placed on a plate then presented to a panel of tasters for them to give their evaluation on the sensory traits of the cooked meat. To minimize residues of the sample meat tasted by each panel taster that might affect the rating on the succeeding samples, each taster were requested to drink water before in after tasting each sample. Panels of tasters composed of 20 persons were invited randomly to taste the cooked samples. A score sheet was provided for the panel to mark their evaluation.

## Data to be Gathered

The following parameters were gathered from the study:

1. Slaughter weight (kg). This is the weight of the broiler before slaughter time.
2. Dressed weight (kg). This is the actual weight of slaughter bird after plucking the feathers, head, feet, and entrails off.
3. Weight of the skin (g). This is the weight of the skin removed from each carcass.
4. Weight of the bones (g). This is the weight of the bones of each carcass after deboning.
5. Weight of the lean (g). This is the weight of all lean that was separated from each carcass after deboning.
6. Weight of the abdominal fat (g). This was obtained by taking the weight of the abdominal fats remove from each carcass.



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

8. Percent of the skin (%). This was obtained by dividing the weight of the skin by carcass weight multiplied by 100.

9. Percent of the bones (%). This was obtained by dividing the weight of the bones by the carcass weight multiplied by 100.

10. Percent of lean (%). This was obtained by dividing the weight of the lean by the carcass weight multiplied by 100.

11. Percent of abdominal fats (%). This was obtained by dividing the weight of the abdominal fats by the carcass weight multiplied by 100.

12. Bone to lean ratio (%). This was obtained by dividing percent bone by the percent lean.

13. Meat appearance, flavor, juiciness, tenderness and acceptability. This was obtained through organoleptic testing of cooked samples.

### Data Analysis

Data was analyzed using the analysis of variance for Completely Randomized Design and treatment means was compared using Duncans Multiple Range Test (DMRT).



## RESULT AND DISCUSSION

### Mean Slaughter and Carcass Weights And Dressing Percentage

The mean slaughter and carcass weights and dressing percentage of 52 days old sunshine chickens under different treatments is shown in Table 1. After eight hours of fasting, analysis of variance revealed that there were no significant differences in terms of slaughter and carcass weight. This proves the homogeneity of birds used in the study. The weight of the birds ranged 1.9 to 2.0 kilograms. Moreover, there were no significant differences among slaughter weights because the birds used in the study were selected to be the same weight and sex.

Statistical analysis revealed that there were no significant differences among treatment means in terms of dressing percentage. As shown in Table 1, the dressing recovery from the birds regardless of treatment was comparable. This shows that using garlic as feed supplement does not affect the dressing percentage of the birds, still these result of the study reached the 70 % industry standard.

### Mean Weights of Skin, Lean, and Bone

Table 2 shows the mean weights of skin, lean and bone expressed as portion of the carcass weights as affected by different treatments. The table shows that there were no significant differences between treatments in terms of percent skin and bone. However, it was observed that the birds given diets with 30 and 15 grams of garlic had a mean of 63.55 and 62.81 which was significantly heavier than birds given diets without garlic as feed supplement with a mean of



61.76. This implies that supplementing of garlic to sunshine chickens could significantly increase the weight of lean.

Table 1. Mean slaughter and carcass weights and dressing percentage

TREATMENT	SLAUGHTER WEIGHT (KG)	CARCASS WEIGHT (KG)	DRESSING PERCENTAGE
Commercial Feeds (CF) with antibiotic premix in the water	1.98	1.43	72.25
15 g Garlic / kg of CF	1.95	1.43	73.25
30 g Garlic / kg of CF	1.98	1.48	74.75
Commercial Feeds with no antibiotic premix	1.98	1.40	71.00

\* Means with no letter superscripts are significantly different at 0.05 by DMRT

Table 2. Mean percentage of skin, lean, and bone

TREATMENT	SKIN	LEAN	BONE
Commercial Feeds (CF) with antibiotic premix in the water	13.85	61.76 <sup>c</sup>	20.63
15 g Garlic / kg of CF	13.77	62.81 <sup>ab</sup>	20.70
30 g Garlic / kg of CF	13.65	63.55 <sup>a</sup>	20.43
Commercial Feeds with no antibiotic premix	13.75	62.23 <sup>bc</sup>	20.71

\* Means with different letter are significantly different at 0.05 by DMRT





### Mean Weight of Abdominal Fats

Table 3 presents the mean weights of abdominal fats of the sunshine chickens. Statistical analysis revealed that there were significant differences among the treatments. Birds given antibiotic premix in the water with a mean of 3.51 and only commercial feeds with a mean weight of 3.30 were significantly having heavier abdominal fats than the birds given diets with 30 grams of garlic having a mean weight of 2.37. This implies that supplementing diet to sunshine chickens with garlic was affected lesser abdominal fat deposition.

### Mean Percentage of Bone to Lean Ratio

The mean percentage bone to lean ratio is presented in Table 4. Bone to lean ratio is the relation of bone and lean of the sunshine chickens. The birds given diet with antibiotic premix in the water, 15 grams of garlic, 30 grams of garlic and pure commercial feeds with a mean of 1:2.34, 1:2.33, 1:2.32 and 1:2.33, respectively were more or less the same in the bone to lean ratio. Statistical analysis revealed that there were no significant differences in the bone to lean ratio of sunshine chicken indicates that the bone to lean ratio is not affected

Table 3. Mean percentage of abdominal fats

TREATMENT	MEAN*
Commercial Feeds (CF) with antibiotic premix in the water	3.51 <sup>a</sup>
15 g Garlic / kg of CF	2.72 <sup>b</sup>
30 g Garlic / kg of CF	2.37 <sup>b</sup>
Commercial Feeds with no antibiotic premix	3.30 <sup>a</sup>

\* Means with different letter are significantly different at 0.05 by DMRT

by supplementing diets with garlic.



## Sensory Quality Attributes

Appearance. Table 5 shows the evaluation of appearance as affected by different treatments. Results revealed that using garlic as feed supplement in birds resulted to numerical differences in organoleptic rating. The birds given with garlic and antibiotic premix in the water were rated very desirable while birds given only commercial feeds rated slightly desirable. Base on statistical analysis, there were significant differences between the birds given only commercial feeds compared to the birds given with garlic and antibiotic premix in the water.

Tenderness. Table 6 shows the tenderness of the meat samples. Meat samples of the bird given only commercial feeds rated slightly tender while birds given with garlic granules was rated very tender.

Statistical analysis shows significant differences among treatments. Results shows that the tenderness of the meat derived from the birds given with garlic granules were

Table 4. Mean percentage of bone to lean ratio

TREATMENT	MEAN*
Commercial Feeds (CF) with antibiotic premix in the water	1:2.34
15 g Garlic / kg of CF	1:2.33
30 g Garlic / kg of CF	1:2.32
Commercial Feeds with no antibiotic premix	1:2.33

\* Means with different letter are significantly different at 0.05 by DMRT

Table 5. Appearance of the cooked meat samples

TREATMENT	VERBAL DESCRIPTION
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Commercial Feeds (CF) with antibiotic premix in the water	Very Desirable
15 g Garlic / kg of CF	Very Desirable
30 g Garlic / kg of CF	Very Desirable
Commercial Feeds with no antibiotic premix	Slightly Desirable

\* Means with different letter are significantly different at 0.05 by DMRT

significantly differ from the birds not supplemented by garlic. Addition of garlic affect in the tenderness of the meat.

Juiciness. Table 7 shows juiciness of the meat as influenced by the treatments. The bird given only commercial feeds had a verbal description of slightly juicy while birds given with garlic and antibiotic premix in the water were rated very juicy, this indicates a difference among treatment based on verbal description.

Statistical analysis also revealed significant differences among treatments. This implies that the treatments are not similar in juiciness numerically.

Table 6. Tenderness of the cooked meat samples

TREATMENT	VERBAL DESCRIPTION
Commercial Feeds (CF) with antibiotic premix in the water	Very Tender
15 g Garlic / kg of CF	Very Tender
30 g Garlic / kg of CF	Very Tender
Commercial Feeds with no antibiotic premix	Slightly Tender

\* Means with different letter are significantly different at 0.05 by DMRT

Table 7. Juiciness of the cooked meat samples

TREATMENT	VERBAL DESCRIPTION
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Commercial Feeds (CF) with antibiotic premix in the water	Very Juicy
15 g Garlic / kg of CF	Very Juicy
30 g Garlic / kg of CF	Very Juicy
Commercial Feeds with no antibiotic premix	Slightly Juicy

\* Means with different letter are significantly different at 0.05 by DMRT

Flavor. Table 8 shows the flavor as affected by the different treatments. Birds given with garlic had a verbal rating of very good while birds given with antibiotic premix in the waster and only commercial feeds had a verbal rating of good. Statistical analysis showed that there were significant among treatments means. This implies that garlic had an effect on the flavor of the meat. This collaborates on the study cited by Silagy and Neil, 1994; Konjufca et al., 1997; Chowdhury et al., 2002. Many studies indicate that allicin is the potentially active component of garlic. These compounds provide garlic its characteristic odor and flavor as well as most of its biological properties and have been identified as having the hypocholesterolemic effect in human and animal products.

Acceptability. Table 9 shows the acceptability of the different birds. Birds given with garlic and antibiotic premix in the water rated like very much while bird given only commercial feeds rated as like. Statistical analysis revealed significant differences among treatments. Results shows that birds given with garlic and antibiotic premix on the water differ from the bird fed only commercial feeds.



Table 8. Flavor of the cooked meat samples

TREATMENT	VERBAL DESCRIPTION
Commercial Feeds (CF) with antibiotic premix in the water	Good
15 g Garlic / kg of CF	Very Good
30 g Garlic / kg of CF	Very Good
Commercial Feeds with no antibiotic premix	Good

\* Means with different letter are significantly different at 0.05 by DMRT

Table 9. Acceptability of the cooked meat samples

TREATMENT	VERBAL DESCRIPTION
Commercial Feeds (CF) with antibiotic premix in the water	Like Very Much
15 g Garlic / kg of CF	Like Very Much
30 g Garlic / kg of CF	Like Very Much
Commercial Feeds with no antibiotic premix	Like

\* Means with different letter are significantly different at 0.05 by DMRT



## SUMMARY, CONCLUSION AND RECOMMENDATION

### Summary

The study was conducted to determine the sensory and carcass yield of sunshine chicken fed with garlic in December 10, 2011 at Meat lab and ATEP 2 Laboratory Room, Benguet State University.

It was conducted generally to determine the effects of garlic on the carcass yield and sensory traits specifically, to determine the effect of garlic on the carcass weight, dressing percentage, bone to lean ratio and to determine the quality of carcass produced from sunshine chicken fed with garlic through organoleptic test. The treatment used was as follows; T<sub>0</sub> (commercial feeds with antibiotic premix in the water); T<sub>1</sub> (15 grams of garlic / kg of commercial feeds); T<sub>2</sub> (30 grams of garlic/ kg of commercial feeds); T<sub>3</sub> (commercial feeds with no antibiotic premix).

The result found that there were no significant differences in terms of slaughter weight, weight of bone, weight of skin, dressing percentage and bone to lean ratio as expressed as percent of carcass weight. However, weight of lean and abdominal fats had significant differences.

In terms of weight of lean, birds given diets with 30 grams of garlic garnered the highest lean percentage with a mean of 63.55, followed by birds given 15 grams of garlic with a mean of 62.81 and commercial feeds with no antibiotic premix had a mean of 62.23, respectively as compared to the birds given diets with antibiotic on the water having a mean of 61.76.

Additionally, the re result of statistical analysis showed that there were significant differences in organoleptic test of the different treatments. As for the verbal description



there were differences in terms of appearance, tenderness, juiciness and acceptability. Birds given with garlic and antibiotic premix in the water rated very desirable, very tender and very juicy, while only commercial feeds rated desirable, slightly tender, and slightly juicy in terms of appearance, tenderness and juiciness. As for flavor, birds given with garlic was rated very good while birds given with antibiotic premix in the water and only commercial feeds rated good. And for acceptability, birds given with garlic and antibiotic premix in the water rated like very much compared to the birds given only commercial feeds rated like.

### Conclusion

Based from the results and observations, it is therefore concluded that adding 30 grams of garlic improved the percent lean, abdominal fats and sensory properties of carcass from sunshine chicken.

### Recommendation

This study covered the effect of garlic on the carcass yield and sensory properties; it is interesting to know how garlic affects meat quality. This could be scope of a further study.



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