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Impact of ginger and garlic powder supplementation on carcass yield and cut up parts performance of broiler chickens

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Abstract

A feeding experiment was conducted to study the effects of Ginger and Garlic feed supplements on carcass traits, of broilers. For this purpose, 200 day old broiler chicks (Cobb) were randomly allocated into four groups with two replicates of 25 chicks each. The treatment group (T₀) served as control while in other treatments Ginger and Garlic supplements were added. The results of the experiment indicated that dietary inclusion of Ginger and Garlic in broilers showed that dressed and cut up yields were significantly increased in feed supplemented group. This is beneficial and cost effective for poultry farmers.

Keywords: Cut up yield, dressed yield, garlic and ginger

Introduction

The increase in average income and urban populations has causes a tremendous increase in the poultry demand and increase in consumption over the years. The consumption of poultry meat in India was found to be over 3.9 million metric tons in 2020. The poultry population in India has grown at rapid pace. But the poultry sector has grown a lot comparatively ever since in 2019. The population of poultry in country was over 800 million and this was a 16 percent increase over the last five years. The biggest challenge of commercial poultry production is the availability of good quality feed with stable prices instead of this challenge, commercial poultry production ranks among the highest source of animal protein. In India, poultry production accounts for 0.66 percent of GDP and 7.72 percent GDP from the livestock sector. The per capita availability of poultry meat is 2.8 kg; against recommended level of 11 kg. The increase in size of the poultry industry has faster as compared to other food- producing animal industries. The trade volume of poultry products has also increased to rapid growth of world poultry meat and egg production. In Poultry Feed is the major component of the total cost of production in the poultry industry to ensure more net return and to minimize high expenditure on feed, many research strategies have practiced such as using feed supplements. Thus, broiler poultry farming is being promoted for sustainability of poultry production and upliftment of economic condition of Indian farmers. Both garlic and ginger essential oils have gained importance due to their wide range of properties not only in improving performance of broilers but, many other ways where the almost aim is to improve nutritive value of poultry meat products (Bamidele and Adejumo, 2012) [3]. Several studies have identified the separate use of this plants extracted oils in broiler nutrition as natural feed additives, the present study was conducted to evaluate the single and combined effect of garlic (*Allium sativum*) [3] and ginger (*Zingiber officinale*) on the performance of broiler chickens and meat quality of broiler chicks. Ginger and Garlic as natural growth promoters can be potential alternatives for growth promoters likes antibiotics (Demir *et al.*, 2003) [5]. Ginger is the rhizome of plant *Zingiber officinale*, consumed as a delicacy, medicine and spice. The research indicates that nine compounds found in ginger bind to serotonin receptors which may affect gastrointestinal function. Research showed that in- vitro shows that ginger extract control the quantity of free radicals and the peroxidation of lipids (AI-Amin *et al.*, 2006) [1] and have anti-diabetic properties. Garlic (*Allium sativum*) [3] has used as spice and medicine. It has possessed antibacterial, antifungal, antiparasitic, antiviral, antioxidant, anticholesteremic, anti-cancerous, and vasodilator characteristics (Hanieh *et al.*, 2010) [7].

Ginger and garlic supplements in broiler chicken diets have known for their strong stimulating effect on the immune and digestive systems in birds (AI- Shuwali *et al.*, 2015) [2].

Recent research works on ginger and garlic formulations as feed additives have shown encouraging results in weight gain, lowered mortality, feed efficiency and increased livability in poultry birds. However, detail studies are required to assess the efficacy of *Ginger* and *Garlic* powder on the productive performance and immunity of different varieties of chicken. Hence, a study was done on the efficacy of *Ginger* and *Garlic* powder at graded levels on the performance of broiler chickens with objective of effect of feeding *Ginger* & *Garlic* powder on carcass quality and Cut up parts of broiler chickens.

Materials and Methods

Day old 200 Cobb broiler chickens were taken as the experimental birds divided in to 4 groups with two replicate group of each, having 25 broiler birds in every replicate in a Complete Randomized Design. The broiler birds used in this research were obtained from Ambedker Nagar. The broiler birds were weighed and transferred to experimental shed in the farm itself with standard health care and management practices. The treatment were as follows: T₀ (Control)- Basal Diet, T₁ Basal Diet + 0.5% *Ginger*, T₂- Basal Diet + 0.5% *Garlic* and T₃- Basal Diet + 0.5% *Garlic* + 0.5% *Ginger*. The *Ginger* and *Garlic* used in this experiment was fresh, washed and sliced. The sliced *Ginger* and *Garlic* was sundried and ground into powder. The powdered *Ginger* and *Garlic* was sealed in air tied container before incorporation into the feed. Carcass Characteristics, Dressed weight with viscera - The oil gland from vent region, the head from occipital joint and feet from hock. Wings - The wings were cut first. The wing was pulled away from the body by giving a cut. The cut was on the wing side of the joint and not on the breast side, the wing includes entire wing with all muscles and skin intact. The weights of both the wings were recorded as wing weight. Neck- The neck was separated from carcass at the shoulder joint. The individual weight of neck of each bird was recorded as neck weight. Back - The back of the carcass was cut by hand saw. The back includes scapula, vertebra, vertebral ribs, pelvic bones with all skin and muscle intact. The individual weight of the back of each bird was recorded as back weight. Breast - The breast was separated from back of the carcass by a cut at shoulder joint across the junction of vertebral and sternal ribs and its includes keel bone also. The individual weight of breast of each bird was recorded as breast weight. Drumstick- The drumstick were separated from the thigh by giving a cut through the knee joint. The two drumsticks were recorded as drumstick weight. Thighs -The thighs of the carcass were separated from the thigh by a cut through the knee joint. The thighs of the carcass were separated at the knee and hip joint. The weight of the thighs was recorded as thigh weight. All the weights of the carcass and cut-up parts of bird were subjected for analysis to get their percentage yield. The joint were severed and removed. Dressed Weight- Weight of the carcass with edible viscera like liver, heart, gizzard and abdominal fat was recorded as dressed weight. Processing of Giblets- Liver - Liver was clipped from the viscera with a scissor by holding with a forcep. Gall bladder was removed carefully without breaking it. Heart - The heart was removed

from viscera with a scissor. The arteries were trimmed off the heart. The outer thin membrane as pericardium was removed. The heart was washed and weighed in pan. Gizzard-The gizzard was removed first by cutting the esophagus just or below the proventriculus and beginning of the duodenum. Both the openings of the gizzard were cleaned. The gizzard was cut opened with scissors. The inner serous lining was removed. The weight was recorded in a perforated pan.

Different Cut-up Parts and weights

After carcass weight of each bird, the different cut-up parts were weighed. All the weights of the carcass and cut –up parts broiler bird were subjected for analysis to get their percentage yield. The calculations were done by Standard procedure. Statistical analysis the data generated in trial were statistically analyzed with standard software.

Results and Discussion

A feeding experiment was conducted to study the effects of incorporation of feed supplements *Ginger* and *Garlic* on carcass traits of broilers. This study was for six weeks. At the end on 42nd day, two poultry birds from each replicate (4 birds/ treatment) were randomly sacrificed for the study of carcass yield and cut up parts.

Dressed yield

The effects of feed supplements on dressed yield (without or with giblet) of broilers have been presented in Table -1 and Fig-1. The average values of dressed yield without giblets of different groups of broilers *viz.*, T₀ to T₃ were 70.67±0.57, 72.99±0.74, 75.12±0.63 and 75.28±0.55. percent in broilers of T₀ to T₃ groups respectively. Maximum 75.28±0.55 percent dressed yield without giblets was found in T₃ group followed by T₂, (75.12±0.63), T₁ (72.99±0.74) and T₀ (70.67±0.57) of broilers. All the broilers of feed supplemented showed significantly (*p*<0.05) higher dressed yield as compared to T₀ group. Minimum dressed yield without giblets was observed for T₀ (Control). However, there were no significant differences in dressed yield without giblet between T₂ and T₃. Mean values of dressed yield with giblets of different groups of broilers *viz.*, T₀ to T₃ were 73.63±0.55, 75.97±0.45, 78.96±0.30 and 79.25±0.16 percent, respectively. Maximum 79.25±0.16, percent dressed yield with giblet was found in T₃ group followed by T₂ (78.96±0.30), T₁ (75.97±0.45) and T₀ (73.63±0.55) of broilers. All the broilers of feed supplemented showed significantly (*p*<0.05) higher dressed yield with giblets compared to the T₀ (control). Minimum dressed yield with giblets was observed for T₀ (control). However, there were no significant difference in the dressed yield with giblet between T₂ and T₃ groups of broilers. Results of the experiment on carcass yield were similar with the findings of Fadlalla *et al.* (2010) [6] showed that *Garlic* at 0.3% in broiler feed causes significant effect on carcass yield. Zhamg *et al.* (2009) [8] and Bampidis *et al.* (2005) [4] reported that *Garlic* an alternative of growth promoters in poultry showed its excellent effects on carcass characteristics and growth. Higher dressed yield in *Ginger* and *Garlic* diet supplemented groups may be due to better fleshing and favourable meat to bone ratio as a result of increased availability of nutrients in the treated groups.

Table 1: Effect of Ginger and Garlic Supplementation on Carcass Yield (% of live wt) of broiler chickens.

Treatments	Dressed yield without giblet	Dressed yield with giblet
T ₀	70.67a±0.57	73.63a±0.55
T ₁	72.99b±0.74	75.97b±0.45
T ₂	75.12c±0.63	78.96c±0.30
T ₃	75.28c±0.55	79.25c±0.16

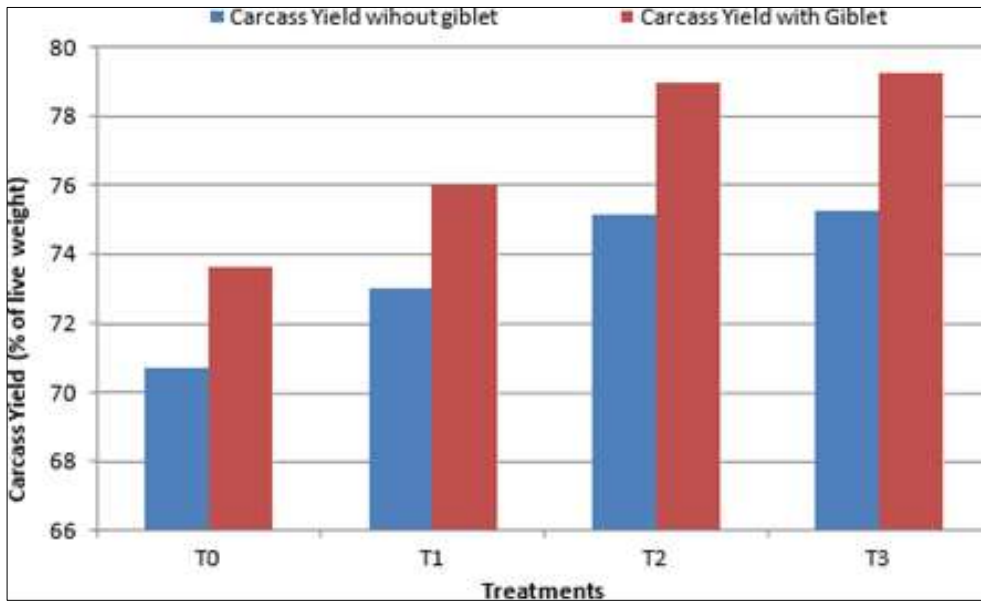


Fig 1: Effect of Ginger and Garlic Supplementation over Carcass Yield (% of live weight) of broiler

Cut-up parts

The effect of feed supplementations on the cut-up parts as back, breast, thigh, drumstick, wings and neck have shown in Table 2.0 and Fig.2.0. Mean values of back weight of different groups of broilers viz., T₀ to T₃ were 18.27±0.02, 19.56±0.04, 19.75±0.02 and 19.93±0.01 percent respectively. Maximum back weight of 19.93±0.01 percent

was found in T₃ group followed by T₂ (19.75±0.02), T₁ (19.56±0.04) and T₀ (18.27±0.02). All the broilers of supplemented groups showed significantly (*p*<0.05) higher back weight compared to the T₀ groups. Minimum back weight (18.27±0.02) percent was observed for T₀ group. However, there were nonsignificant differences in back weight among T₁, T₂, T₃.

Table 2: Effect of Ginger and Garlic Supplementation on Cut up Parts (% live weight) of broiler chickens

Treatments	Back	Breast	Thigh	Drumstick	Wing	Neck
T ₀	18.27a±0.02	17.45a±0.02	10.47a±0.02	9.72a±0.01	9.44a±0.03	4.58a±0.02
T ₁	19.56b±0.04	18.65b±0.03	10.99b±0.01	10.29b±0.02	9.98b±0.02	4.89b±0.04
T ₂	19.75b±0.02	18.71b±0.02	11.07b±0.03	10.36b±0.04	10.05b±0.03	4.95b±0.02
T ₃	19.93b±0.01	18.80b±0.03	11.18b±0.03	10.47b±0.04	10.12b±0.02	5.09c±0.04

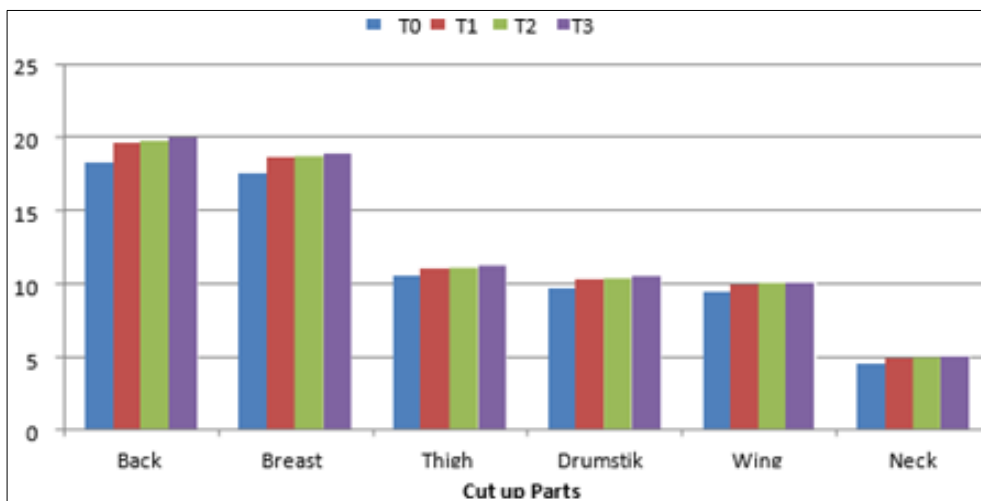


Fig 2: Effect of Ginger and Garlic Supplementation on Cut up Parts (% of live weight) of broiler

Mean values of breast weight of different groups of broilers viz., T₀ to T₃ were 17.45±0.02, 18.65±0.03, 18.71±0.02 and 18.80±0.03 percent respectively. Maximum breast weight of 18.80±0.03 percent was found in T₃ group followed by T₂ (18.71±0.02), T₁ (18.65±0.03) and T (17.45±0.02). All the broilers of supplemented groups have significantly ($p<0.05$) higher breast weight as compared to the T₀ groups. Minimum breast weight (17.45±0.02) percent was observed for T₀ group. However, there were nonsignificant differences in breast weight among T₁, T₂, T₃, Group of broilers. Mean values of Thigh weight of different groups of broilers viz., T₀ to T₃ were 10.47±0.02, 10.99±0.01, 11.07±0.03 and 11.18±0.03 percent respectively. Maximum Thigh weight of 11.18±0.03 percent was found in T₃ group followed by T₂ (11.07±0.03), T₁ (10.99±0.01) and T₀ (10.47±0.02). All the broilers of supplemented groups have shown significantly ($p<0.05$) higher thigh weight as compared to the T₀ groups. Minimum breast weight (10.47±0.02) percent was observed for T₀ group. However, there were nonsignificant differences in Thigh weight among T₁, T₂, T₃, group of broilers. Mean values of Drumstick weight of different groups of broilers viz., T₀ to T₃ were 9.72±0.01, 10.29±0.02, 10.36±0.04 and 10.47±0.04 percent respectively. Maximum Drumstick weight of 10.47±0.04 percent was found in T₃ group followed by T₂ (10.36±0.04), T₁ (10.29±0.02) and T₀ (9.72±0.01). All the broilers of supplemented groups have shown significantly ($p<0.05$) higher Drumstick weight as compared to the T₀ groups. Minimum Drumstick weight (9.72±0.01) percent was observed for T₀ group. However, there were non significant differences in Drumstick weight among T₁, T₂, T₃, group of broilers. Mean values of Wing weight of different groups of broilers viz., T₀ to T₃ were 9.44±0.03, 9.98±0.02, 10.05±0.03 and 10.12±0.02 percent respectively. Maximum Wing weight of 10.12±0.02 percent was found in T₃ group followed by T₂ (10.05±0.03), T₁ (9.98±0.02) and T₀ (9.44±0.03). All the broilers of supplemented groups have shown significantly ($p<0.05$) higher wing weight as compared to the T₀ groups. Minimum Wing Weight (9.44±0.03) percent was observed for T₀ group. However, there were non significant differences in wing weight among T₁, T₂, T₃, group of broilers. Mean values of Neck Weight of different groups of broilers viz., T₀ to T₃ were 4.58±0.02, 4.89±0.04, 4.95±0.02 and 5.09±0.04 percent respectively. Maximum Neck weight of 5.09±0.04 percent was found in T₃ group followed by T₂ (4.95±0.02) T₁ (4.89±0.04) and T₀ (4.58±0.02). All the broilers of supplemented groups have shown significantly ($p<0.05$) higher neck weight as compared to the T₀ groups. Minimum neck weight (4.58±0.02) percent was observed for T₀ group. However, there were nonsignificant differences in neck weight among T₁ and T₂ group of broilers. The higher cut up yields observed in supplemented groups may be due to more edible muscle mass in broilers in supplemented groups.

Conclusion

It may be concluded that supplementation of chicks with Ginger + Garlic @ 0.5 g/kg feed improved the performance of broilers in terms of dressed edible yields and carcass quality. It is beneficial and cost effective for broiler production.

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