

# The Effects of *Allium sativum* and *Piper Nigrum* on the Growth Performance and Packed Cell Volume of Broiler Chicks

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**Abstract:** This research was carried out to investigate the effect of *Allium sativum* (garlic) and *Piper nigrum* (black pepper) on growth performance and PCV of broiler chicks. Sixty *Abor acre* broiler chicks of mixed sexes at four weeks old were used in this research, they were randomly allocated to four treatments. Those in group A served as control and were given chick mash and water only, group B received 1g of garlic powder mixed in 100g of chick mash, group C also received 1g of black pepper powder mixed in 100g of chick mash while group D were fed 0.5g of garlic and 0.5g black pepper powder mixed in 100g of chick mash. The experiments lasted for eight weeks. At the end of the experiment, the result of the study revealed that birds fed with mixture of garlic (0.05g) and black pepper (0.5g) powder recorded a significant ( $P < 0.05$ ) mean weight 2005g, followed by those fed garlic powder with mean weight 1884g. Birds that were fed black pepper recorded mean weight 1589g while the control group produced the least mean weight of 1338g. Analysis of variance showed no statistically significant difference ( $P < 0.05$ ) between the Packed Cell Volume of birds fed with black pepper powder compared to those of control, garlic and mixture of garlic and black pepper group of broiler. Birds fed with black pepper powder had the highest PCV value of 40.979, followed by those fed with mixture of garlic and black pepper powder 38.593. Broilers fed with 1g of garlic powder recorded PCV level of 37.178 while control group recorded the least value of 35.692. The result of this research indicated that black pepper boosted PCV in broiler and its mixture with garlic also enhanced body weight when incorporated in the right proportion.

**Keywords:** Broiler Chicks, Garlic, Black Pepper, PCV and Growth Performance

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## 1. Introduction

Poultry is a major asset and key to poverty alleviation, providing income and market participation particularly for small holders and the poor, both in rural and urban areas [1]. Most of the poultry farmers are interested in broiler production due to its quick return, smaller marketing age, less space requirement, and high weight gains [2].

Broilers production involves keeping of chickens of heavy meat breeds for the purpose of getting good quantity meat products usually sold live or processed at ten to twelve weeks of age [3, 4]. Poultry meat and egg account for about 10% of total amount of all meat, eggs and milk produced in the world each year. Poultry, through the provision of meat and egg

continue to serve as an excellent and cheap source of animal protein for Nigeria. Despite the low growth in poultry sector for the past two decades, a huge gap exists between availability and requirement of poultry production [5]. According to World Health Organization [6], due to high population growth in Africa and growing income, the demand for eggs and poultry meat has significantly increased in recent years across large parts of the continent. With the increasing demand of poultry meat over the world, poultry farmers want to improve the productivity of their broiler chicken. They are interested in the type of feed that could achieve this in a good period of time [7]. In pursuit of improved broilers health and in order to fulfill consumer's expectation in relation to food quantity, poultry producers commonly apply natural feeding supplements,

mainly herbs [8].

Feed is the major component of total cost of poultry venture as 80% of the total expenditure is on procurement of feed. Feeding in poultry is based on the science of nutrition in which nutritional requirement are mostly known. High cost of feed and scarcity of essential raw material have necessitated poultry farmers to look out for systems which could help to identify feed ingredients of lower cost and sound biological values that can partly supplement the conventional protein and energy sources in broiler diet [9].

Feed additives are used in poultry feed to improved nutritive value and enhance performance. Antibiotics are used in broiler ration to improved productivity but have effects on animal and human health. Therefore, the use of antibiotics as growth promoters has not been encouraged. The alternatives to antibiotics as growth stimulative are numerous. Plant-derived additives used in animal nutrition to improve performance have been called “phytogenic feed additives” [10]. Phytogenic feed additives have shown promising effects with regard to weight gain, feed efficiency, lowered mortality and increased viability in poultry. As a result, the use of locally available and cheap feed ingredients has received particular attention as a viable alternative to the use of conventional feed [3]. Non-conventional growth enhancement are utilized in broiler nutrition to improve nutrient digestibility, control of pathogenic microorganism, facilitate a favourable intestinal microbial balance and enhancing absorption of calorogenic nutrients across the gut wall, its absorption capacity [11].

Known worldwide, black pepper (*Piper nigrum*) is commonly used as a seasoning or ingredient in alternative medicine, because of its active ingredient called piperine. This compound has potential application as a natural additive directed to animal production, as it has several advantages, among which highlight the fact that it is a natural product that can be found in large quantities at low production cost [12]. [13], further highlighted that the administration of piperine directly in the diet for broiler do not cause mortality or chemical changes in the general condition of the animals. More so [14], stated that black pepper in broiler nutrition improves health status, increase absorption of selenium, vitamin B complex, enhances the thermogenesis of lipids and accelerates energy metabolism in the body. One of the most recognized plant species used for organic production is garlic [15]. Garlic (*Allium sativum*) has been widely used as a herbal supplement in broiler chicken diet because of its strong stimulating effect on the immune system and the very rich aromatic oils which enhance feed digestion [8]. In broiler it was also reported that garlic, as a natural feed additive, has improved broiler growth and enhance feed conversion ratio, and decreased mortality rate. In addition garlic has a great impact on haematological parameters, which affects physiological, pathological and nutritional status of poultry [16, 17]. Reported that haematological constituents demonstrate a physiological respond of birds to its internal and external environment such as type of feed and feeding pattern.

These blood parameters which shown to be major indices of physiological, pathological and nutritional status of an organism and changes in the constituent compound when compared to normal values could be used to interpret the metabolic stage of animal as well as the feed consumed [3]. Therefore, evaluating the PCV of the broiler chicks will indicate the effectiveness of garlic and black pepper meal administered to them.

## 2. Materials and Methods

### 2.1. Procurement of Experimental Animal

A total of 60 broiler chicks at four weeks old were used for the experiment. The birds were randomly selected into four (4) treatment groups of five birds each. The stocking density is five birds per meter square. Each group was replicated three times. The animals were maintained under standard laboratory condition, that is, a well aerated room with alternating, light and dark cycle of 12 hours each. They were allowed to acclimatize with the environment for one week before the commencement of the experiment.

### 2.2. Experimental Treatments

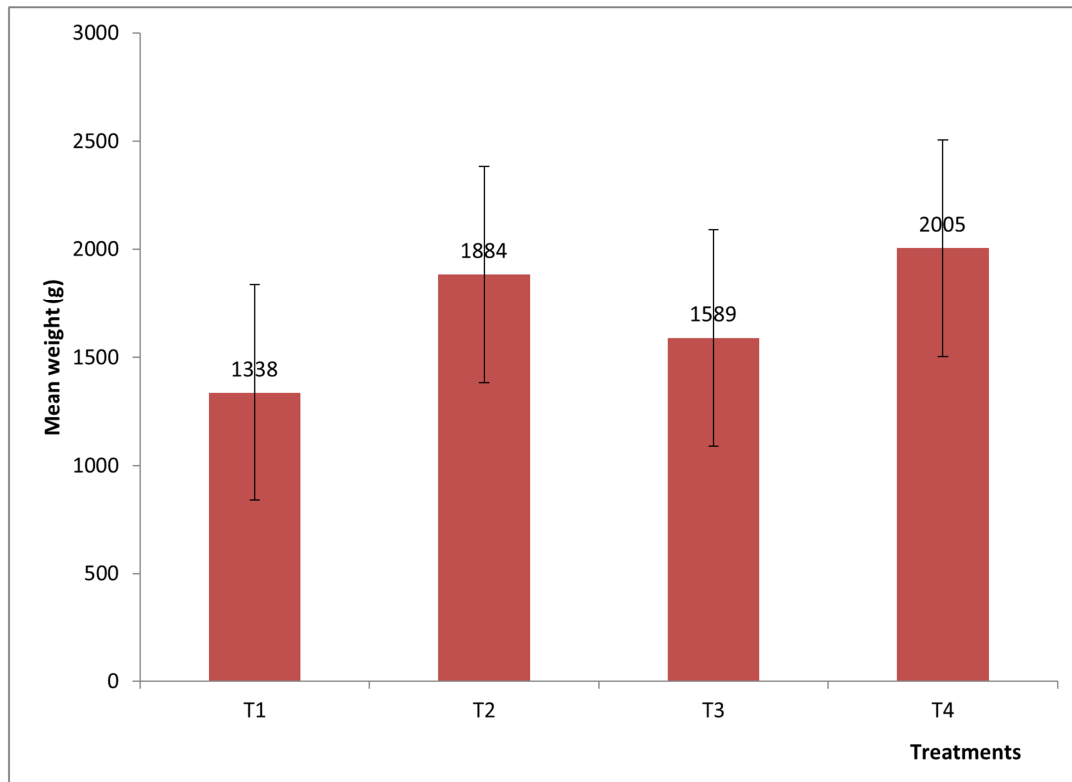
The broiler chicks used for the experiment were randomly assigned to four treatments. T<sub>1</sub> was the Control which contained only Chick mash (Topfeed®) and this was used to feed broilers in cage A, T<sub>2</sub> contained 1g of garlic powder mixed with 100g of chick mash and was used to feed broilers in cage B, T<sub>3</sub> contained 1g of black pepper powder mixed with 100g of chick mash and was fed to broilers in cage C and T<sub>4</sub> contained 0.5g of garlic powder and 0.5g of black pepper powder mixed with 100g of chick mash and was used to feed broilers in cage D. The birds were fed twice daily at 8:00am and 6:00pm throughout the period of study. The experiment lasted for eight weeks.

### 2.3. Data Analysis

The weight of the broiler chicks was taken weekly using a sensitive weighing balance. The PCV of the broiler chicks was obtained using haematocrit method. The result of the experiment was analyzed using Analysis of variance (ANOVA). The comparison of mean was separated using a post Hoc test (Least Significant Difference), [18].

## 3. Results

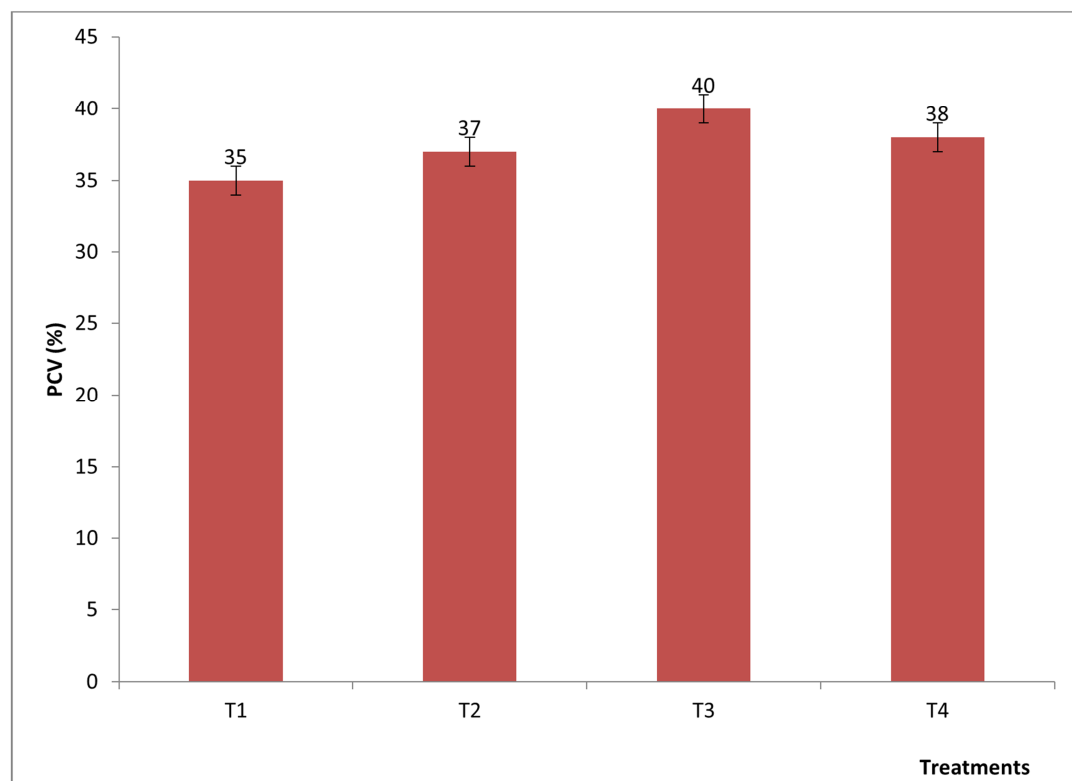
Figure 1 shows the mean weight of Broiler chicks fed with different dietary treatment, it was observed that treatment 1 which was a mixture of 0.5g of garlic and 0.5g black pepper powder recorded the highest mean weight ( $2005 \pm 130.84$ ), followed by 1g of garlic powder ( $1884 \pm 89.37$ ) then 1g of black pepper powder ( $1589 \pm 124.67$ ), all exceeded the control diet which was ( $1338 \pm 46.52$ ). Analysis of variance showed that there was a significant difference among the different treatments ( $P < 0.05$ ).



**Figure 1.** Mean weight of Briler Chicks.

Figure 2 shows that birds fed with 1g of black pepper powder, T3 had the best mean PCV  $40 \pm 0.979$ , followed by birds fed with mixture of garlic and black pepper powder  $38 \pm 0.597$ . Those that were fed with 1g of garlic powder had

$37 \pm 0.178$ , while the control group produced least PCV of  $35 \pm 0.697$ . Analysis of variance showed no significant difference ( $P > 0.05$ ).



**Figure 2.** Mean PCV of Broiler Chicks.

## 4. Discussion

The result obtained from this study indicated that broilers fed with mixture of 0.5g garlic and 0.5g black pepper had a significantly ( $P<0.05$ ) higher performance in relation to mean weight (2005g), followed by birds fed 1g of garlic powder with mean weight (1884g). Broilers fed with 1g of black pepper recorded mean weight (1589g) while the control group produced the least mean weight (1338g). This result is in consistent with those of [15] who reported that birds supplemented with garlic, black pepper, and red hot pepper had significantly ( $p<0.05$ ) higher body weight and feed consumption. [14] Mentioned that, according to the level of black pepper used reflect the high activity of *Piperazine citrate* included in the broilers' diet which may have affected the flow of digestive juices across the stomach. [19] Showed that black pepper increases digestion through arousing digestive liquids of stomach and eradication of infectious bacteria. The improvement in weight gain of birds using black pepper may be due to the fact that black pepper affects the absorption ability. Again, investigation of [20] showed that dietary addition of garlic powder (0.5g/t) to broiler chicken led to increased final body weight, which is also in agreement with the findings of [21] who concluded that powdered garlic at 0.5% level may be incorporated as growth promoter in ration of Japanese Quails. Other previous similar studies [22; 23] opined that broiler body weight were improved when they were fed garlic at 1g/kg in basal diet. [24] reported higher weight gain in broiler fed rations supplement with garlic, which probably may be due to the fact that allicin, an antibiotics substance found in garlic, inhibit growth of intestinal bacteria. Furthermore, this research showed that birds fed with 1g of black pepper powder had significant ( $p<0.05$ ) lower mean weight compared to broilers fed with 1g of garlic powder and mixture of 0.05g of garlic and 0.5 of g black pepper powder. This is in conformity with the earlier report made by [7] who indicated that the reduction in live weight of boiler chickens at 1.0g level of black pepper at the starter phase signified that, at a higher level black pepper could become detrimental to growth, which is also in accordance with the findings of [25], who reported that overall feed intake was lowered in chicks fed higher level of black pepper thus supporting this work.

Analysis of variance of PCV values obtained from this study revealed that black pepper powder enhanced the broilers' PCV more than other treatments, although there was no significant difference among treatment groups ( $P<0.05$ ). However, these values are within the normal range for adult chicken as recorded by [3] who reported 26-45.2% PCV for adult chicken. Therefore, this suggests that additives used in this study had no significant increase or decrease on PCV of birds subjected to the treatments. This coincides with the findings of [26] who also revealed that the normal PCV in avian species is 35%-50%, therefore, concluded that the normal PCV and other haematological values portray the

nutritional status of the broiler chicken and thus indicating adequate nourishment for birds.

## 5. Conclusion and Recommendation

Based on the results obtained it was observed that addition of 0.5g of garlic and 0.5g of black pepper enhanced positive productive performances of the broiler chicken, followed by inclusion of 1g of garlic powder without any deleterious effect. Hence, the inclusion of black pepper and garlic should be in moderate amount so as to enhance better performance of broiler chicks.

## References

- [1] Mottet A. and Tempo G (2017). Global Poultry production: current state and function outlook and challenges. *World's Poultry Journal* 37 (2): 245-256.
- [2] Tipu M. A., Akhatarm. s., Anjum M. I and Raja M. I (2006). New dimension of medical plants as animal feed. *Pakistan Veterinary Journal* 26: 144-148.
- [3] Ufele A. N, Ogbu A. U, Ebenebe C. I and Akunne C. E (2015). The effect of locally produce blood meal on growth performance and packed cell volume. *American Journal of Agriculture and Forestry* 3 (3): 105-108.
- [4] Agbede, J. O., and Aletor V (2007). The performances of nutrients utilization and cost implication of feeding broiler finisher underutilized resources. *Applied Tropical Agriculture* 2: 57-62.
- [5] Singh V. P (2010). Poultry farming in Punjab: an economic evaluation competitiveness. *Punjab Agricultural University, Ludhiana* 1: 115.
- [6] WHO (2010). Technical report series: expert committee on medical assessment of nutritional status. *WHO, Geneva* pp 258.
- [7] Ndelekute E. K., Afolabi K. D., Uzegbu H. O., Unah U. L and Amaefula K. U (2015). Effect of dietary black pepper on performance of broiler. *Bangladesh Journal of Agriculture* 44 (2): 120-127.
- [8] Garzilewska J., Pudyszak K., Majewska T., Jakubowska M and Pomianowski J (2003). Effect of plant supplement feeding on fresh and frozen storage quality of broiler chicken meat. *Electron Journal of Polish Agricultural University* 6: 12.
- [9] Agboola B. E., Ologbo A. D., Adjumo I. O and Adeyemo G. O (2018). Response of broiler chickens to Carica papaya and Talinum triangulare leaf meal. *Annual Research and Review in Biology* 23 (4): 1-7.
- [10] Windish W., Schelle. C, Plitzner C and Kroismayr A (2008). Use of phytogenic product as feed activities of swine and poultry. *Journal of Animal Science* 8 (1): 140-149.
- [11] Al-Harhi M. A (2002). Efficiency of vegetable diets with antibiotics and different types of spices or their mixture on performance, economic efficiency and carcass traits of broiler. *Journal of Agricultural Science Mansoura University* 27: 3531-3545.

- [12] Ramon D. M., Frank G. G., Julmar D. C. F., Joao P. F. R., Lucas D. M and Dasmasceno J. L (2016). Black pepper in diets for laying hens on performance, egg quality and blood biochemical parameters. *Animal Science* 38 (4): 419-426.
- [13] Cardoso V. S, Lima C. A. R., Lima M. E. F, Dorneles L. E. G, Teixeira F. W. L., Lisboa S. R and Danelli M. G. M (2009). Piperine oral administration on broiler chickens. *Rural Science* 3915: 1521-1526.
- [14] Al-Kassie G. A. M (2009). Influence of the plant extracts derived from thyme and cinnamon on broiler performance. *Pakistan Veterinary Journal* 29: 132-169.
- [15] Puvaca N., Kostadinovic I. J, Ljubojevi D., Luka D., Popovic S., Dokmannovcb B and Stanacev V. (2014). Effect of dietary garlic addition on productive performance and blood lipid profile of broiler chickens. *Biotechnology in Animal Husbandry* 30 (4): 669-676.
- [16] Oleforuh- okoleh V. U., Ndofor-Foleng H. M., Olurunleke S. O and Uguru J. O (2015). Evaluation of growth performance, haematology and serum biochemical response of broiler chicken to aqueous extract of ginger and garlic. *Journal of Agricultural Science* 7: 167-174.
- [17] Esonu B. O., Emenalom O. O., Udedibie A. B. I., Herbert U., Ekpo C. F., Okoli J. C and ihekwueme F. C (2001). Performance and blood chemistry of weaner pig fed raw Mucuna (Velvet). *Tropical Animal Production Investigation* 4: 49-54.
- [18] William, A. C., and George, W. S. (2008). Statistical Methods, 6th Edition, the Iowa State University Press. Ames, Iowa, USA. Pp. 167-263.
- [19] Hossemi, M. N (2000). Comparison of using different level of black pepper with probiotics on performance and serum composition on broiler chicken. *Journal of Basic and Applied Science Research* 11: 2425-2428.
- [20] Fayad R. H., Aber H., Razek A and Jehan M (2011). Effect of dietary supplement on performance, carcass traits and meat quality in broiler chicken. *Parameters* 100: 1000-1004.
- [21] Onibi G. E., Oluwatoyin E., Adebisi A., Fayemisin N., Ayode V and Adetunde I (2009). Response of broiler chickens in terms of performance and meat quality to garlic supplement. *African Journal of Agricultural Research* 4 (5): 511-517.
- [22] Aji S. B., Ignatius K., Ado A. Y., Nuttu J. B and Abdulkani A (2011). Effect of feeding garlic and onions on some performance characteristics of broiler chicken. *Research Journal of Poultry Science* 2: 486-490.
- [23] Mansoub N. H (2011). Comparative effect of using garlic as probiotics on performance and serum composition of broiler chicken. *Animal Biology Ressearch* 2: 486-490.
- [24] Aham S (2005). Comparative effect of garlic, turmeric and kalongs as growth promoter in broiler. *Poultry Science* 4: 345-367.
- [25] Abasa M. I., Shehata M. A., Shoieb M. S and Hassan I. I (2008). Evaluation of some natural feed additives in growing chick's diets. *International Journal Poultry Science* 7: 872-879.
- [26] Tesfaheywet Z., Meseret A., Negassi A and Mengistuu (2017). Effect of supplementation of different levels of garlic on selected blood profile and immunity of white leghorn chicken. *Biotechnology in Animal Husbandry* 33 (3): 333-348.