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Effect use ginger (*Zingiber officinale*), black pepper (*Piper Nigrum L*) powders on performance, some blood parameters and antibody titer against new castle vaccine on broiler chicks

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ABSTRACT

For investigation the effect of use of ginger, black pepper on performance of broiler chicks a total 240 one day broilers chicks were divided into 4 groups of 15 birds each and assigned to 4 treatment diets. Chicks were fed by basal diet as control diet, 2% ginger (T_1), 2% black pepper (T_2) and 1% ginger + 1% black pepper powders (T_3). At the end of trial 4 birds from each group were slaughtered. In addition feed intake (FI), body weight gain (BW), feed Conversion ratio (FCR) were compared together. Some blood parameters such as Calcium, Phosphorus, Cholesterol and Triglyceride were determined. And they were taken for antibody titer against new castle vaccine evaluation on 22, 36 and 42 days old chicks. Data showed that use of T_1 , T_2 and T_3 increased FI significantly in comparison to control diets ($p < 0.05$). Chicks were fed with T_2 diet was higher BW among others groups. Data from this study showed that amounts of triglyceride were lower when chicks used T_3 diets and cholesterol was lower in T_1 group. Blood calcium decreased when chicks used T_1 , T_2 , T_3 respectively and amount of Phosphorus was higher when chicks used T_2 diet ($p < 0.05$). New Castle Vaccine Antibody titer tests showed that antibody titers at 21, 35 and 42 days were significantly higher when broilers fed with T_1 , T_2 , T_3 than control ($p < 0.05$). Drumstick % was increase were broilers fed with T_1 , T_2 , T_3 and Breast meat % was higher than others for T_3 ($p < 0.05$). Data that showed of gizzard % was higher in the T_2 and it was at the lowest in control group ($p < 0.05$). Weight % of liver was higher in control group and for borsal.f was higher in T_3 ($p < 0.05$). In conclusion it seem that inclusion of ginger and black pepper powders in broiler chicks diet at level of 2% can be useful and have significantly effects on performance, blood biochemical and immunity parameters.

Abbreviations: FI, Feed intake; BW, Body weight; FCR, Feed conversion ratio. T_1 , basal diet with 2% added Ginger powder; T_2 , basal diet with 2% added black pepper powder; T_3 , basal diet with 2% added mixed of ginger and black pepper powders.

Key words: Ginger, Black pepper, Performance, Broilers, Blood parameters. HI test.

INTRODUCTION

Ginger, *Zingiber officinale* Roscoe is one of the most widely used spices and it is a common additive in large number of compounded foods and beverages due to its flavor and pungency. The rhizome of this plant is one of the most commonly used medicinal herbs as well as one of the most commonly used condiments in Chinese cuisine.

Folk people have long used the soup of ginger root to warm the human body in winter. Though spicy and hot in nature, the rhizome of ginger has been used to treat symptoms and signs including pale feature, cold extremities (Al-Harthi, M.A.2002). Several pharmacological effects of the Zingiber plant had been reported such as antiulcer effect, antioxidant effect, potent antibacterial activity, potent antifungal activity and anthelmintic activity (Akoachere, J.F et al.2002; Demir, E., S. Sarica et al .2003; Great head, H. 2003).Black pepper *Piper Nigrum L* is known as the spices due to its pungent quality (Hassan, M.S.H.2007). Black pepper is a member of family Piperaceae (Herati and Marjuki,2011; Hosseini Mansoub. N.2011).Efficiency compounds of pepper consist: cupsaesin, cupsisin and cupsantine that some of them allay rheumatic aches. Piperine is one of compound of black pepper which has antiache effect (Mahady, G.B et al.2008).in addition the bioactive molecule, piperine, present in pepper has major pharmacological impacts on the nervous and neuromuscular systems, exercises it can helps in digestion (Sarica, S.1995).Many researchers that proved an increase in BW and decrease in FCR, when using this herbal plants in broilers diets (Great head, H. 2003; Iqbal, Z.2011).Undoubtedly ginger and black pepper which are considered as herbal plants have a wide range of potential uses. The objective of this study was to explore the potential uses of ginger and Black pepper as growth promoters on performance in broilers.

MATERIALS AND METHODS

For determine the effect of use ginger and black pepper on performance of broiler chicks a total 240 one day male broilers chicks Ross 308 were divided into 4 groups of 15 birds each and assigned to 4 treatment diets. The experiment was carried out in 42 days. ginger & black pepper purchased from local market and grounded separately to a fine powder and then mixed with the basal diet (Table 1) .In addition feed and fresh water were provide *ad libitum* during this experiment. Treatments were basal diet as control diet, 2% ginger (T₁), 2% black pepper (T₂) and 1% ginger + 1% black pepper powders (T₃) that they were balanced according to their requirement as shown in (NRC,1994) for poultry The live body weight gains of birds were measured individually and feed consumption and feed conversion efficiency were measured weekly. At the end of experimental plan 4 birds form each groups (Totally 64 birds) were slaughtered and to compare body parts were separated and weighted. blood samples from each bird were collected and stored at refrigerator at +4°C for 24 h, the blood samples were subjected to biochemical for determine their cholesterol, triglycerides with (Ellefson and Graway.1967) analysis methods Some blood samples were collected and antibody titers against New Castle Vaccine Were measured by Haemagglutination inhibition test (HI).Then data were collected and analyzed by using the general, linear model procedure of (SAS,2001) and different means Duncan's multiple ranges test was used to detect the differences at level (p<0.05)

Table 1 – Composition of the experimental diets for broiler chicks

Ingredients %	0-14 (days old)	15-29 (days old)	29-42 (days old)
Corn grain	51.64	56.61	60.37
Soybean meal	37.74	32.30	27.81
Wheat grain	5	5	5
Vegetable Oil	1.40	2.03	2.84
DCP	1.56	1.47	1.39
Oyster shells	1.17	1.13	1.08
Methionine D-L	0.30	0.29	0.27
Lysine-L	0.13	0.13	0.30
Edible Nacl	0.26	0.24	0.14
Vitamin Premix*	0.3	0.3	0.3
Mineral Premix*	0.3	0.3	0.3
Ginger, Black pepper or Mixed	0.2	0.2	0.2
Calculated nutrient content			
ME(Kcal/Kgr)	2.850	2.950	3.050
CP (%)	22	20	18.5
Ca (%)	0.90	0.85	0.80
Available Phosphorus (%)	0.45	0.42	0.40
Lysine (%)	1.35	1.20	1.16
Na (%)	0.16	0.15	0.15
Methionine+Cystine (%)	0.97	0.87	0.85

Supplied Per Kilogram Of Feed: 7,500 IU of vitamin A, 2000IU vitamin D3, 30 Mg vitamin E,1.5 µg vitamin B12,2Mg B6,5 Mg Vitamin K,5 Mg vitamin B2,1 Mg vitamin B1,40 Mg nicotinic acide,160µg vitamin Bioline,12 Mg Calcium pantothenate,1MgFolic acid 20 Mg Fe,71 Mg Mn,100µg Se,37Mg Zn,6 Mg Cu,1.14 Mg I,400 µg Cu.

RESULTS

Data of feed intake, broiler weight and FCR are in (Table 2). Data showed no significant difference about Feed intake in trial groups. Chicks were fed with T₂ diet was higher BW among others groups. This result showed that all treatments have better final result in compare with control groups. This can be caused from the effects of dietary and nutrition increase. Some experts reported that red ginger has characteristic as stimulant for feed digestion and conversion which increase body weight gain. For describes depression on body weight in T₄ group some Scientific evidence demonstrated that many of herbal plants do have medicinal properties that alleviate symptom and may prevent diseases and also high use of them may cause poisoning due to its strong bitter test and reduce feed intake in T₁,T₂,T₃ groups (Herati and Marjuki.2011; Hosseini Mansoub. N.2011; Ficker, C.E.2003).Improvement on BW in T₁, T₂ lead to lower FCR in these groups and in T₁ was lower than others groups ($p<0.05$). The pathogenic microbial flora in the small intestine compete with host for nutrients while at the same time inhibiting the binding of the bile acids to the pertinent substances, they decrease the digestion of fats and fat-soluble vitamins. This leads to a decrease in performance and increase in disease rate. Antibiotics in herbal plants which have been used as an additive in poultry feed for a long time, improve the growth performance by stabilizing the microbial flora in the intestine and preventing some specific intestine pathogens.

Table 2 – The effect of added experimental diets on broilers performance

Treatments	FI(g/d)	BW(g/d)	FCR	FI(kg)	Pre-slaughter weigh(g)
Control	89.23 ^a	40.92 ^d	2.17 ^a	3767.33 ^b	1720.96 ^c
T ₁	90.19 ^b	40.93 ^c	2.12 ^b	3785.67 ^b	1774.84 ^b
T ₂	91.20 ^a	42.64 ^a	2.10 ^b	3824.00 ^a	1813.62 ^a
T ₃	91.32 ^a	41.98 ^b	2.09 ^b	3831.64 ^a	1919.21 ^a
MSE	0.011	0.04	0.14	171.5	13.12

*Means within row with no common on letter are significantly different ($p<0.05$).

Data from this study showed that liver percentage was significantly decrease were broilers fed with T₁,T₂,T₃ and the lowest decrease was for T₃ ($p<0.05$). There were no significant differences in for Heart percentage. The use of T₁,T₂ and T₃ lead to reduce abdominal fat percentage statistically ($p<0.05$). Drumstick percentage was increase were broilers fed with T₁,T₂,T₃ ($p<0.05$). Breast meat percentage was higher for T₂ than others, but there were no significant effects observed. Data from table 3 showed that percentage of gizzard was higher in the T₂ groups and it was at the lowest in control groups ($p<0.05$). Borsal.f weight percent was higher on T₃ groups and at the lowest on control groups. In spite the abdominal fat decreased when broilers used T₁,T₂,T₃ and it was higher when they used control diet. These observations are correlated with the data published by some authors (Galib A. M. Al-Kassie.2011; Hassan, M.S.H.2008; Herati and Marjuki.2011).

Table 3 – The effect of added experimental diets on percentage some part of chicks' bodies

Treatments	Liver (%)	Abdominal Fat (%)	Drumstick (%)	Breast Meat (%)	Gizzard (%)	Heart (%)	Borsal.f (%)
Control	2.92 ^a	3.16 ^a	21.24 ^b	25.21 ^a	2.62 ^c	0.20 ^a	0.110 ^a
T ₁	2.75 ^b	2.93 ^b	23.6 ^a	25.13 ^a	2.76 ^b	0.18 ^a	0.117 ^b
T ₂	2.67 ^c	2.70 ^c	23.14 ^a	26.16 ^a	2.86 ^a	0.17 ^a	0.115 ^b
T ₃	2.64 ^c	2.55 ^d	23.05 ^a	25.90 ^a	2.78 ^b	0.17 ^a	0.121 ^a
MSE	0.05	0.015	0.451	1.67	0.005	0.194	0.018

*Means within row with no common on letter are significantly different ($p<0.05$).

Table 4 – The effect of added experimental diets on some blood parameters

Treatments	Triglyceride(Mg/dl)	Cholesterol (Mg/dl)	Ca(Mg/dl)	P(Mg/dl)
Control	72.13 ^a	129.56 ^a	8.20 ^a	9.79 ^c
T ₁	66.42 ^c	120.45 ^b	7.51 ^b	9.89 ^{bc}
T ₂	69.44 ^b	131.52 ^a	7.08 ^c	1.42 ^a
T ₃	65.42 ^d	123.92 ^b	7.15 ^c	1.20 ^b
MSE	0.159	6.48	0.060	0.061

*Means within row with no common on letter are significantly different ($p<0.05$).

Data from this study that showed the triglyceride, calcium and phosphorus changed with use experimental diets (Table 5). Amount of triglyceride was lower when chicks used T₃ diets .in this case increasing of use ginger and black pepper in broilers diet cause to significant decrease blood triglyceride content but they increased amount of

blood cholesterol of broilers chicks significantly ($p < 0.05$). Blood calcium decreased when chicks used T_1, T_2, T_3 respectively and amount of phosphorus was lowest when chicks used control diet ($p < 0.05$).

Antibody titers against new castle vaccine were measured and data from (Table 6) showed that antibody titers were significantly higher when broilers were fed by T_1, T_2, T_3 ($p < 0.05$). It was determined that antibiotic, Zingiber and black pepper powders had significant effects on some digestion system parameters compared to control group ($p < 0.05$).

Table 5 – The effect of experimental diets on antibody titers against new castle vaccine

Treatments	28 days _(log2)	35 days _(log2)	42 days _(log2)
Control	2.63 ^c	2.90 ^c	4.01 ^c
T ₁	2.74 ^b	3.01 ^b	4.16 ^b
T ₂	2.71 ^b	3.05 ^{ab}	4.14 ^b
T ₃	2.80 ^a	3.10 ^a	4.21 ^a
MSE	0.010	0.13	.012

**Means within row with no common on letter are significantly different ($p < 0.05$).*

Piperine is an excellent bactericidal activity against all the gram positive and gram negative bacteria tested. In many studies the alkaloids like piperine, piperidine, volatile oil and resins might be responsible for the antibacterial activity. The mechanism of antibacterial action appears to be loss of control over cell membrane permeability (Galib *et al* .2011; Hosseini .M. N.2011; Khalaf, A.N.2008). In addition several pharmacological effects of the Zingiber plant had been reported such as antiulcer effect, antioxidant effect, and potent antibacterial activity (Akoachere, J.F.2002).

DISCUSSION

(Hossein Mansob, 2011) showed that black pepper increases digestion through arousing digestive liquids of stomach and eradication infectious bacteria. Black pepper affects the absorption power, decrease material transit velocity and increase digestive enzymes acts and increased chicks dietary and weighs gain. (Galib *et al* .2011) showed that according to the level of black pepper used that reflects the high activity of Piperazine citrate included in the broilers diet which may have affected the flow of digestive juices across the stomach. (Herati and Marjuki.2011) showed that increase ginger in the ration up to 2% showed lower feed intake and total weigh gain. In spite of the low consumption compared with other by the fact that is help herbal plant may provide some compounds that enhance digestion and absorption of some nutrients in these diets.

Other researchers proved that there is an increase in BW, FCR with decreasing hematological values of some important blood parameters using of ginger or black pepper in broiler diets (Iqbal, Z.2011).

Zingiber have been extensively studied for a broad range of biological activities including antibacterial, anticonvulsant, analgesic, anti ulcer, gastric anti secretory, antitumor, antifungal, antispasmodic, antiallergenic, and other activities. Ability to increase digestive fluids, plus absorb and neutralize toxins and stomach acid. It has been shown to increase bile secretion, as well as increase the action and tone of the bowels (Akoachere, J.F.2002).

(Al-Harhi *et al* .2002) who founds that broiler chicks fed diets supplemented with hot pepper showed improved feed conversion ratio. It may be due to its stimulant, carminative, digestion and anti microbial properties. The findings of these researchers in this case are in agreement with the other Scientifics' findings (Galib A. M. Al-Kassie.2011; Hassan, M.S.H.2008; Herati and Marjuki.2011).

Ginger contains volatile oils like borneol, camphene, citral, eucalyptol, linalool, phenllandrene, zingberine, zingiberol, gingerol, zingironeand, shogaol and resin. Ginger's have medicinal properties are chemicals responsible for the taste, the most noteworthy being gingerol and shogaol. Ginger speeds digestion, and enhances by a protein digesting enzyme (zingibaine) found in ginger. It has antibacterial and anti inflammatory actions, and ginger rhizome is known to lower blood cholesterol level in man (W.B. Zomrawii.2012; S.R.S. Ferreira.1999).

Serum cholesterol was low when broilers feed by T_1 . This effect may be attributed to the ginger possesses anti-hypercholesterolemia activity. De conjugation of gallbladder acids in small intestine can affects control of serum cholesterol, while de conjugated acids are not capable to solve and absorb fatty acids as conjugated

acids. As a consequence, they prevent from absorption of Cholesterol. The pungent compound of piper nigrum especially piperine increases the production of saliva and gastric secretions (Herati and Marjuki.2011).

Furthermore, the ingestion of peppercorn increases the production and activation of salivary amylase. The digestive enzymes production by the ingestion of piper nigrum probably the stimulate liver to secrete bile, which Furth digests food substances (Sarica, S.1995; W.B. Zomrawii.2012; Yoshikawa, M.S.1994).

Also free gallbladder acids attach to bacteria and fibers and this can increase the excretion of them. This is consistent with the well-observed effect of ginger on lowering blood cholesterol level (Ravindran PN.2002; Soumyanath, A.2006; S.R.S. Ferreira.1999; W.B. Zomrawii, .2012).

Piper Nigrum has medicinal uses and have been common medicines for various disorders of humans in traditional Indian families (Ficker, C.E .2033; Mahady, G.B. 2008).

These results proved that Zingiber and Pepper additives though being less effective- performed like antibiotic to certain extent and have a great potential to be utilized as an alternative. Black pepper also prevent the intestine induced oxidative stress, inhibit lipid per oxidation, arresting different radicals such as hydroxyl and super oxides radicals (Sarica, S., A.1995).

(Weiner.1994) reported that some plants or specific combinations of herbs in formulations may act as antioxidants by exerting superoxide scavenging activity or by increasing superoxide dismutase activity in various tissue sites.

CONCLUSION

We could be explained some benefit acts by using ginger and black pepper on performance for broilers chicks. This improvement on growth and health may be due to the biological functions of ginger and black pepper to improve growth or that may be due to its role as stimulant, enhanced digestibility, anti-oxidant, anti-helmitic and anti-microbial, anti-fungal activities and properties and the prevention of gastric toxicity. Also Further tests are needed to explore and more detail explanation.

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REFERENCES

- [1] Al-Harthi, M.A. *Journal of Agriculture Science, Mansoura University*, **2002**; 27: 3531-3545.
- [2] Al-Harthi, M.A *Egyptian Poultry Science*, **2002**; 22:325-343.
- [3] Akoachere, J.F.; Ndip, R.N, Chenwi, E.B. *East Afr.Med.J.***2002**; 97.11:588-92.
- [4] AOAC.Official Methods of Analytical Chemist. 16th ed. Arlington, V.A.**2000**.
- [5] Damme, K. *World Poultry*.**1999**.15.27-30.
- [6] Demir, E., S. Sarica, M.A. Ozcan and M. Suicmez. *Br. Poultry Sci.***2003**; 44: 44-45.
- [7] Ellefson, R.D. and W.T. Garaway. Lipids and lipoproteins In: Fundamentals of clinical chemistry, Tietz, N.W. (Ed) Saunders, W.B. Company.**1967**.
- [8] Galib A. M. Al-Kassie, Mamdooh A. M. Al-Nasrawi, Saba J. Ajeena . *Roavs*, **2001**; 1.3., 169-173.
- [9] Ganong, W.F. Review of Medical physiology. 16th. Edn., Alange Medical Book, **2005**; 336-338.
- [10] Ghazalah, A.A., El-Hakim, A.S.A. and Refaie, A.M. *Egyptian Poultry Science*, **2001**; 27:53-57.
- [11] Gill, C. *Feed international*, 4: 20-23.
- [12] Great head, H., **2003**. *Proc. Nut. Soc.***1999**; 62: 279-290.
- [13] Hassan, M.S.H., Abo Taleb A.M., Wakwak, M. and Yousef, B.A. *Egyptian Poultry Science*, **J.2007**; 27, 11: 557-588.
- [14] Herati and Marjuki, *Inter.J.Poult.Sci.***2011**; 10, 12.983-986.
- [15] Hosseini Mansoub. N. *J.Basic .Appl.Sci.Res*, **2011**; 11.2425-2428.
- [16] Ficker, C.E.; Smith, M.L.; Leaman, D.L.; Irawati, C. & Arnason, J.T. *J. Ethnopharmacol.*, **2003**; 85: 289-293.
- [17] Iqbal, Z.; Nadeem, Q.K.; Kkan, M.N.; Akhtar, M.S. & Waraich, F. N. *Int.J.Agri. Biol.*, **2011**; 3:454-457.
- [18] Khalaf, A.N., Shakya, A.K., Al-Othman, A., El-Agbar,Z. and Farah, H. *Turkish Journal of Biology*, **2008**; 32: 51-55.

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- [19] Mahady, G.B.;Pendl, S.L.; Yun, G.S.; Lu, Z.Z. & Stoia, A. *Anticancer Research*, **2008**; 23: 3699-3702.
- [20] Malini, T., Arunakaran, J., Aruldas, M.M. and Govindarajulu, P. *Biochemistry and Molecular Biology International*, **1999**; 47:537-45.
- [21] Moorthy, M., Ravikumar, S. Viswanathan, K. and Edwin, S.C. *Inter Journal of Poultry Science*, **2009**;8: 779-782.
- [22] National Research Council, NRC. Nutrient Requirements of Poultry 9th Ed. National Academy Press. Washington, DC. Of Alletchs 10th Annual Symposium .Nottingham University Press. Nottingham, UK.**1994**
- [23] Philadelphia, pp: 512-514.Culling CF. Handbook of Histopathological and Histochemical Techniques, 3rd Edn, Butterworht and Co., London,**1974**; 37: 126-139.
- [24] Ravindran PN.Black pepper. Piper Nigrum L seires.Medicinal and aromatic plant industrial profile center for medicinal plant research .Kerala, india.**2000**.
- [25] SAS Institute, SAS/STAT User's Guide for Personal Computer .Release 6.12 SAS Institute, Inc., Cary, N.C., USA.**2001**.
- [26] Soumyanath, A., Yenkatasamy, R., Joshi, M., Faas, L.,Adejuyigbe, B. Drake, A.F., Hider, R.C. and Young, A.R. *Photochemistry and Photobiology*, **2006**; 82:1541-8.
- [27] Sarica, S., A. Ciftci, E. Demir, K. Kilinc and Y. Yildirim. *S. Afr. J. Anim. Sci.*, **1995**; 35: 61-72.
- [28] S.R.S. Ferreira, Z.L. Nikolov, L.K. Doraiswamy, M.A.A. Meireles, A.J. *Journal of Supercritical Fluids* **1999**; 14,235–245.
- [29] W.B. Zomrawii, KH.A. Abdel Atti, B.M. Dousa, and A.G. Mahala. *Online Journal of Animal and Feed Research*. **2012**; 1, 6: 457-460.
- [30] Weiner, M.A. *Journal of Orthomolecular Medicine*, **1994**; 9, 3:167-176.
- [31] Yoshikawa, M.S.; Yamagashi, K.; Kumini, H.; Matsuda, Y.; Okuno, J. & M urakami, N. *Chem. Pharma. Bull. Tokyo*, **1994**; 2: 226-230.