J. Agr. Sci. Tech. (2012) Vol. 14: 127-134

The Effects of Different Levels of Ginger (*Zingiber officinale* Rosc) and Turmeric (*Curcuma longa* Linn) Rhizomes Powder on Some Blood Metabolites and Production Performance Characteristics of Laying Hens

M. Malekizadeh[1], M. M. Moeini[1*], Sh. Ghazi[1]

ABSTRACT

An experiment was conducted to investigate the effects of using different levels of Ginger rhizome powder (GRP) and Turmeric rhizome powder (TRP) on production performance and some blood metabolites in laying hens. Ninety 103-week old laying hens were divided into 5 treatments in a completely randomized design with 3 replicates and 6 birds in each cage. The birds were fed a corn-soybean meal based diet containing different concentrations of GRP (1 and 3%) and TRP (1 and 3%) and control (0 %). During 9 weeks of experimental period, the data of production parameters were collected. Some blood serum metabolites including, total cholesterol, glucose, uric acid, Alanine aminotransferase (ALT) and Aspartate aminotransferase (AST), Calcium (Ca) and Phosphorous (P) were measured. Results indicated that the inclusion of GRP into the diets increased egg production percent, egg mass, feed intake whereas it decreased serum total cholesterol, AST and ALT significantly (P<0.05). Adding TRP at the 3% concentration to the diets significantly decreased serum total cholesterol, AST and ALT (P<0.05) but increased feed intake and egg production. The reduction of total cholesterol, AST and ALT (P<0.05) and blood uric acid (P>0.05) implied the non-toxic effect of GRP and TRP treatments on hepatic and renal tissues. As a result of this study, supplementation with ginger (GRP3%) might have some positive effects on production performance and some blood metabolites of the laying hens.

Keywords: Blood serum metabolites, Ginger, Laying hens, Performance, Turmeric

INTRODUCTION

Natural dietary agents including fruits, vegetables and spices have drawn a great deal of attention from both the scientific community and the general public due to their various health promoting effects (Shukla and Singh, 2007). Plants of the Zingiberaceae family have been widely used in dietary cuisines and in traditional oriental medications without any serious adverse reactions. Some phenolic substances present in Zingiberaceae plants generally possess strong anti-inflammatory and anti-oxidative properties and exert substantial anti-carcinogenic and anti-mutagenic activities (Lee and Surh, 1998). These plants also accumulate pharmacologically important active metabolites in their rhizomes at high levels (Ahumada *et al*, 2006). Ginger (*Zingiber officinale* Rosc) has been used as a spice for over 2000 years (Stoilova *et al,* 2007) and has been utilized frequently in traditional oriental medicine for the treatment of a wide range of diseases (Badreldin *et al*, 2008). Dietary supplementation of ginger improved antioxidant status of rats' liver (Manju and

[1] Department of Animal Science, College of Agriculture, Razi University, Kermanshah, Islamic republic of Iran.

[*] Corresponding author, email: mmoeini@razi.ac.ir

Nalini, 2005) and broiler chickens blood serum (Zhang *et al,* 2009). The rhizome powder of turmeric (*Curcuma longa* Linn), another member of the Zingiberaceae family, has been extensively used for imparting color and flavor to foods and also for the treatment of a variety of inflammatory conditions and other diseases (Deshpande *et al,* 1997). The most important components in ginger responsible for their various pharmacological properties are the 6-gingerol and its derivatives whereas the important components of turmeric are the curcuminoids (Badreldin *et al*, 2008; Chattopadhyay *et al,* 2004).

Ginger is generally considered as a safe herbal medicine [Weidner and Sigwart, 2000]. Fortunately the safety of turmeric and its yellow coloring agent, curcumin, are approved by many organizations and researchers (WHO, 1987; Hallagan *et al*, 1995). However, there have been few reports dealing with the effects of dietary supplementation of ginger and turmeric in laying hens. The objective of this study was to investigate the efficacy of different levels of ginger rhizome and turmeric rhizome powder on production performance and blood serum metabolites of laying hens.

MATERIALS AND METHODS

Ninety 103 week old single comb white leghorns Hyline (W-36) were divided into five treatment groups, each treatment having three replicates. Each replicate of 6 hens was kept in a cage, provided with 16 hours of daylight. All birds were fed isoenergetic (isocaloric) mash diets for 9 weeks. The diets were formulated to meet or exceed the nutrient requirements of laying hens for ages older than 103 weeks and egg production percentage was less than 70 % [HyLine International, 2007]. Treatments were, GRP1 (1 % ginger rhizome powder), GRP3 (3% ginger rhizome powder) and TRP1 (1% of turmeric rhizome powder), TRP3 (3% turmeric rhizome powder) and no supplementation (control). The composition of the experimental diets is shown in Table 1. Feed and water were provided *ad libitum* throughout the experiment. Weekly feed consumption was recorded and feed efficiency (feed consumption/egg mass (g/g)) was calculated during the 9 weeks of the experimental period.

Daily egg production and egg weights were recorded and egg mass was calculated. Blood samples were collected weekly, beginning at the 7th day of the experiment from the wing vein using sterilized syringes and needles. Blood samples were centrifuged and serums were separated 2 to 3 hours after blood collection. Serum samples were maintained at -20 C for up to 3 days until biochemical analysis. Blood serums were analyzed for serum total cholesterol, glucose, uric acid, alanine aminotransferase (ALT) and aspartate aminotransferase (AST), Ca and P using an auto analyzer [Technicon RA1000, Bayer Diagnostics] and using the commercial diagnostic kits (Pars Azmun Co. INC, Tehran, IRAN).

Statistical Analysis

Data were analyzed in a one-way ANOVA using the General Linear Models procedure of SAS based on a completely randomized design (CRD) (SAS, 2000). From each pen, 3 birds were used as the experimental unit for performance and serum chemistry data. Differences among diets, when significant, were also ordered using Duncan's test. Statements of statistical significance were based on a P value at the level of 0.05 probability.

RESULTS AND DISCUSSION

Layer Performance

Feed efficiency and egg weight were not affected by dietary supplementation at different levels of Ginger rhizome powder (GRP) and Turmeric rhizome powder (TRP)

Table 1. Composition of experimental diets (%).

	Diets				
	C	GR P 1	GR P 3	TR P 1	TR P 3
Ingredient					
Corn	65.60	65.35	64.50	65.25	64.49
Soybean meal	13.35	13.39	13.33	13.38	13.47
Wheat Bran	2.03	1.32	--	1.31	--
Fish meal	5.00	5.00	5.00	5.00	5.00
Soybean oil	1.70	1.70	1.70	1.70	1.70
GRP	–	1.00	3.00	-	-
TRP	–	-	-	1.00	3.00
Dicalcium phosphate	0.59	0.66	0.69	0.60	0.63
Oyster shell	10.87	10.87	10.86	10.87	10.86
Vitamin-mineral mixture [a]	0.25	0.25	0.25	0.25	0.25
Common salt	0.38	0.38	0.34	0.38	0.34
DL-Methionine	--	0.01	0.01	--	--
L-Lysine	--	--	0.06	--	0.01
Analysis results**:**					
ME, kcal.kg^{-1}	2796	2773	2771	2804	2815

(P> 0.05) (Table 2). Addition of 1 % GRP increased egg production percent, the amount of egg mass and feed consumption in comparison with those of hens in other dietary treatments (P<0.05). There is profound evidence that dietary consumption of ginger at 0.5 and 1 ٪ improved the feed consumption compared with the untreated control group in rats (Dias et al., 2006)**.** The digestion stimulating effect of this spice became known a long time ago. The stimulating effect on peptic juices, such as gastric juice, bile, pancreatic and intestinal juices in rats was discovered (Palatel and Srinivasan, 2000)**.** Moreover, dietary supplementation of ginger improves antioxidant status of rats (Manju and Nalini, 2005) and broiler chickens (Zhang et al., 2009). Addition of ginger may cause an improvement in digestive tract performance in laying hens and improve the egg production. Omage et al. (2007) evaluated the effect of various levels of ginger waste meal (10, 20, 30 and 40 % after extraction of oleoresin using ethanol) on growth performance in an 8 week study on growing rabbits. They reported no significant differences in ADG, final live weight and FCR among the treatments, but ADFI increased, significantly. Dietary supplementations of ginger waste meal leads to an increase in diet fiber content and subsequently decreases the feed energy concentration (Omage et al., 2007). Zhang et al. (2009) investigated the effect of dried

Table 2. Effects of dietary ginger and turmeric rhizome powder on the performance of laying hens. [a]

Diets	Egg production (hen d^{-1})	Egg Weight (g)	Egg Mass [b] (gd^{-1} per hen)	Feed Intake (gd^{-1} per hen)	FCR [c]
Control	51.06[b]	65.11	33.23[b]	86.18[b]	2.61
1% Ginger rhizome powder	64.02[a]	66.12	42.37[a]	93.63[a]	2.21
3% Ginger rhizome powder	57.41[ab]	65.10	37.53[ab]	89.91[b]	2.43
1% Turmeric rhizome powder	46.96[b]	63.44	29.78[b]	80.37[c]	2.73
3% Turmeric rhizome powder	54.10[ab]	64.40	34.92[ab]	86.84[b]	2.54
p-value	0.0309	0.6758	0.0331	0.0001	0.2084
SE	2.959	0.541	1.438	2.240	0.072

Means with different superscripts in a column differ significantly (P <0.05).
[a] Means represent 6 pens per treatment, 3 birds per pen averaged over 9 week.
[b] Egg mass = (egg production × egg weight)/100.
[c] Feed efficiency (FCR) = feed intake/egg mass (gg^{-1}).

ginger root on growth performance of broilers and stated that supplementation with ginger powder led to better production performance compared with those of control.

In a 3 week study on broiler chickens, Gowda et al. (2008) reported that FCR, body weight gain and ADFI were not affected by 0.5 % TRP. In another study on broilers with different levels of TRP (0.25, 0.50 and 0.75%), Emadi and Kermanshahi (2006) reported no significant difference in ADFI, weight gain and FCR. The use of herbal extracts especially garlic improved FCR comparable to Virginiamycin in broilers. This effect could be attributed to the improvement of digestive enzymes secretion (Rahimi et al, 2011).

It was observed that hens fed with 1% TRP had lower feed consumption which resulted in numerical reduction of egg production and egg mass as compared with the control diet (P<0.05). The lower egg production and egg mass might be related to the lower feed consumed by laying hens fed with 1% TRP. Chattopadhyay et al. (2004) reported that turmeric powder has a beneficial effect on the stomach due to increasing mucin secretion in rabbits and might act as a gastroprotectant against irritants. However, there is controversy regarding anti-ulcer activity of *curcuminoid* containing extracts. Both anti-ulcer and ulcerogenic effects of *curcumin* have been reported but detailed studies are still lacking. Hemorrhage and cholangiolar cell hyperplasia were previously observed in mice fed with low doses of turmeric (0.1%) for two weeks but not seen in mice receiving higher a dose (0.5%). This was because of the anti-inflammatory and anti-proliferative effects of *curcumin* (Deshpandee et al., 1997). Similarly, turmeric feeding (2.5, 5.0 and 10%) in broiler chickens diet induced hepatic changes, independent of dose and time of feeding (AL-Sultan and Gameel, 2004)]**.** They found that histopathological changes in liver cells were less evident at higher doses of turmeric and that might be due to antioxidant properties of turmeric. There was a similar response observed in our results, so that decreasing the feed intake, egg production and egg mass in the TRP 3% group was less evident than TRP 1% treatment group.

Serum Chemical Parameters

The GRP and TRP treatments affected serum total cholesterol, AST and ALT levels, significantly (P <0.05). However, serum concentrations of glucose, uric acid, Ca and P were not altered by different levels of GRP and TRP (P>0.05) (Table 3). Supplementation with GRP (1% and 3%) reduced total cholesterol level compared with the control diet. The diet supplemented

Table 3. Serum chemistry of laying hens fed diets containing ginger and turmeric rhizome powder.

Blood parameters	Total cholesterol ($mg.dl^{-1}$)	Glucose ($mg.dl^{-1}$)	Uric acid ($mg.dl^{-1}$)	AST ($U.L^{-1}$)	ALT ($U.L^{-1}$)	Ca ($mg.dl^{-1}$)	P ($mg.dl^{-1}$)
Diets							
Control	254.67^{a}	214.67	5.40	227.33^{b}	9.67^{a}	31.89	5.17
1% Ginger rhizome powder	195.33^{b}	207.67	4.60	214.00^{bc}	9.00^{ab}	31.51	4.77
3% Ginger rhizome powder	182.33^{bc}	214.00	4.90	206.00^{c}	7.13^{c}	31.53	5.37
1% Turmeric rhizome powder	165.67^{c}	206.00	4.97	306.33^{a}	9.50^{ab}	28.70	5.67
3% Turmeric rhizome powder	174.00^{bc}	200.00	4.67	216.33^{bc}	7.83^{bc}	30.41	5.27
p-value	0.001	0.1878	0.6849	0.0001	0.0188	0.0594	0.3418
SE	8.866	2.210	0.158	10.098	0.340	0.414	0.134

Means with different superscripts in a column differ significantly (P <0.05).

with TRP (1%) reduced total cholesterol to a greater extent than those of hens fed with GRP diets treatments. Kermanshahi and Riasi (2006) reported that turmeric rhizome powder (0.05, 0.10, and 0.15) in laying hens decreased serum triglyceride, total cholesterol and LDL-cholesterol. They concluded that dietary supplementation of TRP improves some of good indices of serum blood components and can be applied for manipulating egg composition.

Dias et al (2006) reported that the total serum cholesterol levels were significantly decreased by dietary supplementation of 1% ginger extract meal in Wistar rats (P<0.05). They stated that ginger treatment can reduce total serum cholesterol by enhancing the activity of liver cholesterol-7-a-hydrolase or inhibition of hydroxyl-methyl-glutaryl-coenzyme-A (HMG-CoA) reductase, either by bile-acid conversion or fecal excretion of cholesterol.

Fuhrman et al (2000) suggested that polyphenolic flavonoids may prevent coronary artery disease by reducing platelet aggregation, by reducing damage from ischemia and reperfusion, by reducing plasma cholesterol levels or by inhibiting LDL oxidation, a process which is thought to play a key role in the pathogenesis of atherosclerosis. The antioxidant activity of the flavonoids is related to their chemical structure. Miquel et al (2002) suggested that curcumin and related antioxidants may complement the well established antiatherogenic action of tocopherol. They concluded that curcumin antioxidants might be especially useful as antiatherogenic agents in those processes linked to a marked increase in blood lipid peroxidation such as myocardial infraction. The above results are in agreement with our results that adding ginger and turmeric rhizome powder could be useful in the management of cardiovascular disease in which atherosclerosis is the most important factor. In addition, adding GRP and TRP at 3% level reduced serum AST and ALT concentrations which are consistent with previous studies (Dias *et al*. 2006; Emadi, and Kermanshahi, 2007), and demonstrate profound antioxidant, and hepatoprotective actions of ginger and turmeric rhizome powders (Shukla and Singh 2007; Manju and Nalini 2005).

CONCLUSIONS

The reduction of total cholesterol, AST, ALT (P<0.05) and blood uric acid (P>0.05) implied the non-toxic effect of GRP and TRP treatments on hepatic and renal tissues. As a results of this study, supplementation with GRP and TRP as herbal additives might have some positive effects on production performance and some blood metabolites of the laying hens. GRP treatments especially at the level of 1% increased egg production, egg mass, feed intake (P<0.05) and decreased FCR (P>0.05). Further studies would be helpful by adding different levels of GRP and TRP to clarify the nutritional, therapeutic and physiological effects of

ginger and turmeric on health status and production performance in laying hens. More trials are needed to clarify the effect of different medicinal levels on the performance of broilers with regard to varied management conditions, including different stress factors, dietary ingredients and nutrient content.

REFERENCES

1. Ahumada, M. D. C. R., Timmermann, B. N. and Gang, D. R. 2006. Biosynthesis of Curcuminoids and Gingerols in Turmeric (*Curcuma longa*) and Ginger (*Zingiber officinale*): Identification of Curcuminoid Synthase and Hydroxycinnamoyl-CoA thioesterases. *Phytochemistry*, **67 (18):** 2017–2029.
2. AL-Sultan, S. I. and Gameel. A. A. 2004. Histopathological Changes in the Livers of Broiler Chicken Supplemented with Turmeric (*Curcuma longa*). *Inter. J. Poult. Sci.*, **3 (5):** 333-336.
3. Badreldin, A., Blunden, G., Tanira, M. and Nemmar, A. 2008. Some Phytochemical, Pharmacological and Toxicological Properties of Ginger (*Zingiber officinale* Roscoe): A Review of Recent Research. *Food Chem. Toxicol.*, **46 (2):** 409-420.
4. Chattopadhyay, I., Biswas, K., Bandyopadhyay, U., and Banerjee, R. K. 2004. Review Articles: Turmeric and Curcumin: Biological Actions and Medicinal Applications. *Curr. Sci.*, **87 (1):** 44-53.
5. Deshpandee, S. S., Ingleb, A. D. and Maru, G. B. 1997. Chemopreventive Efficacy of Curcumin-free Aqueous Turmeric Extract in 7, 12-dimethylbenz [a] Anthracene-induced Rat Mammary Tumorigenesis. *Cancer Let.*, **123 (1):** 35–40.
6. Dias, M. C., Spinardi-Barbisan, A. L. T., Rodrigues, M. N. M., de Camargo. JL., Teran. E. and Barbisan, L. F. 2006. Lack of Chemopreventive Effects of Ginger on Colon Carcinogensis Induced by 1,2-dimethylhydrazine in Rats. *Food Chem. Toxicol.*, **44 (6):** 877-884.
7. Deshpande, S. S., Lalitha, V. S., Ingle, A. D., Raste, A. S., Gadre, S. G. and Maru, G. B. 1998. Subchronic Oral Toxicity of Turmeric and Ethanolic Turmeric Extract in Female Mice and Rats. *Toxicol. Let.*, **95 (3):** 183-193.
8. Emadi, M. and Kermanshahi, H. 2006. Effect of Turmeric Rhizome Powder on Performance and Carcass Characteristics of Broiler Chickens. *Inter. J. Poult. Sci*., **5 (11):** 1069-1072.
9. Emadi, M. and Kermanshahi, H. 2007. Effect of Turmeric Rhizome Powder on the Activity of Some Blood Enzymes in Broiler Chickens. *Int. J. Poult. Sci*., **6 (1):** 48-51.
10. Fuhrman, B., Rosenblat, M., Hayek, T., Coleman, R. and Aviram, M. 2000. Ginger Extract Consumption Reduces Plasma Cholesterol, Inhibits LDL Oxidation and Attenuates Development of Atherosclerosis in Atherosclerotic, Apolipoprotein e-Deficient Mice. *J. Nutr.*, **130 (5):** 1124-1131.
11. Gowda, N. K. S., Ledoux, D. R., Rottinghaus, G. E., Bermudez, A. J. and Chen, Y. C. 2008. Efficacy of Turmeric (*Curcuma longa*), Containing a known Level of Curcumin, and a Hydrated Sodium Calcium Aluminosilicate to Ameliorate the Adverse Effects of Aflatoxin in Broiler Chicks. *J. Poul. Sci.*, **87 (6):** 1125–1130.
12. Hallagan, J. B., Allen, D. C. and Borzelleca J. 1995. The Safety and Regulatory Status of Food, Drugs and Cosmetics, Colors Additives Exempt from Certification. *Food Chem. Toxicol.*, **33 (6):** 515-528.
13. Hy-Line International. 2007. Hy-Line W-36 Variety Commercial Management Guide, Publication of Hy-Line International, *1755 West Lakes Parkway, West Des Moines, Iowa 50266 U.S.A.*
14. Kermanshahi, H. and Riasi, A. 2006. Effect of Turmeric Rhizome Powder *(Curcuma longa)* and Soluble NSP Degrading Enzyme on Some Blood Parameters of Laying Hens. *Inter. J. Poult. Sci*., **5 (5):** 494-498.
15. Lee, E. and Surh, Y. J. 1998. Induction of Apoptosis in HL-60 Cells by Pungent Vanilloids, [6]-gingerol and [6]-paradol. *Cancer Let.*, **134 (2):** 163-168.
16. Manju, V. and N. Nalini. 2005. Chemopreventive Efficacy of Ginger, a Naturally Occurring Anticarcinogen during the Initiation, Post-initiation Stages of 1, 2 dimethylhydrazine-induced Colon Cancer. *Clinica Chimica Acta*, **358 (1-2):** 60-67.
17. Miquel, J., Bernard, A., Sempere, J. M., Diaz-Alperi, J. and Ramirez, A. 2002. The Curcuma Antioxidants: Pharmacological

Effects and Prospects for Future Clinical Use. A review. *Archi. Geronto. Geriatrics*, **34 (1):**37-46.
18. Omage, J. J., Onimisi, P. A., Adegbite, E. K. and Agunbiade, M. O. 2007. The Effect of Ginger (*Zingiber officinale* Roscoe) Waste Meal on Growth Performance, Carcass Characteristics, Serum Lipid and Serum Cholesterol Profiles of Rabbit. *Pakistan. J. Nutr*., **6 (4):** 359-362.
19. Platel, K. and Srinivasan, K. 2000. Influence of Dietary Spices and Their Active Principles on Pancreatic Digestive Enzymes in Albino rats. *Nahrung*, **44 (1):** 42–46.
20. Rahimi, S., Teymouri Zadeh, Z., Karimi Torshizi, M. A., Omidbaigi, R. and Rokni, H. 2011. Effect of the Three Herbal Extracts on Growth Performance, Immune System, Blood Factors and Intestinal Selected Bacterial Population in Broiler Chickens *J. Agr. Sci. Tech.*, **13**: 527-539.
21. SAS Institute. 2006. SAS User's Guide: Statistics. *SAS Institute, Cary, NC*.
22. Shukla, Y. and Singh, M., 2007. Cancer Preventive Properties of Ginger: A Brief Review. *Food Chem. Toxicol.*, **45 (5):** 683–690.
23. Stoilova, I., Krastanov, A., Stoyanova, A., Denev, P. and Gargova, S. 2007. Antioxidant Activity of a Ginger Extract (*Zingiber officinale*). *Food Chem.,* **102 (3):** 764–770.
24. Weidner, M. S., and Sigwart, K. 2000. The Safety of a Ginger Extract in the Rat. *J. Ethnopharmacol*, **73 (3):** 513–520.
25. WHO, 1987. Principles for the Safety Assessment of Food Additives and Contaminants in Food, Environmental Health Criteria, Vol. 174 p, 70. *World Health Organization, Geneva*.
26. Zhang, G. F., Yang, Z. B., Wang, Y., Yang, W. R., Jiang, S. Z. and Gai G. S. 2009. Effects of Ginger Root (*Zingiber officinale*) Processed to Different Particle Sizes on Growth Performance, Antioxidant Status, and Serum Metabolites of Broiler Chickens. *J Poult. Sci.,* **88 (10):** 2159-2166.

بررسی اثر سطوح مختلف پودر ریشه زنجبیل و زردچوبه بر عملکرد تولیدی و برخی متابولیت‌های خون مرغان تخمگذار

م ملکی زاده، م. م. معینی و ش. قاضی

چکیده

در این آزمایش اثر جیره‌های حاوی سطوح مختلف زنجبیل و زردچوبه بر پارامترهای تولیدی و پارامترهای خونی مرغان تخمگذار مورد بررسی قرار گرفت. تعداد ۹۰ مرغ تخمگذارسویه لگهورن های لاینW-36 در هفته ۱۰۳ تخمگذاری به‌صورت تصادفی به ۵ گروه آزمایشی در ۳ تکرار و در هر تکرار ۶ قطعه تقسیم شدند. تیمارها شامل جیره پایه (شاهد)، جیره پایه + ۱٪ پودر زرد چوبه، جیره پایه + ۳٪ پودر زرد چوبه، جیره پایه + ۱٪ پودر زنجبیل و جیره پایه + ۳٪ پودر زنجبیل بودند .در طول مدت ۶ هفته، از خون پرندگان مورد آزمایش به‌صورت هفتگی نمونه‌برداری شد و آمارهای مربوط به تولید وکیفیت تخم مرغ‌ها به طور روزانه ثبت شدند. این مطالعه در قالب طرح کاملا تصادفی انجام شد. نتایج نشان دادند که افزودن زنجبیل و زردچوبه تاثیری بر غلظت گلوکز، اسید اوریک، کلسیم و فسفر خون

نداشت، اما موجب کاهش کلسترول، تری گلیسرید و LDL و افزایش HDL خون شد. تیمارهای زنجبیل و زردچوبه ۳ درصد موجب کاهش AST سرم شد اما سطح ۱ درصد زردچوبه موجب افزایش ASTنسبت به تیمار شاهد شد. استفاده از زنجبیل و زردچوبه تاثیری بر غلظت ALT سرم نداشت. نتایج تحقیق حاضر نشان دهنده اثرات مثبت استفاده از زنجبیل بر مصرف خوراک، درصد تولید تخم مرغ، توده تخم مرغ و ضریب تبدیل خوراک بود. استفاده از زردچوبه در دوره های مختلف تاثیری بر صفات عملکردی در دوره آزمایش نداشت. در پایان دوره آزمایش در تمام تیمارهای آزمایش تعداد لنفوسیت‌ها افزایش و هتروفیل‌ها کاهش یافت و همچنین کاهش نسبت هتروفیل به لنفوسیت در مقایسه با تیمار شاهد مشاهده شد. تحت شرایط این آزمایش مصرف پودر ریشه این گیاهان در سطح ۱ درصد و ۳ درصد تاثیر منفی بر عملکرد تولیدی، کبد، کلیه و در سلامت عمومی مرغان تخمگذار نداشت. افزودن ۳ درصد زنجبیل به‌طور معنی‌داری باعث بهبود عملکرد تولید و برخی متابولیت‌های خونی در مرغان تخمگذار شد.