

The Effects of Different Levels of Ginger and Turmeric Rhizomes Powder on Productive Performance Characteristics of Laying Hens

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Abstract :

This study was conducted to investigate the effects of using different levels of Ginger rhizome powder (GRP) and Turmeric rhizome powder (TRP) on production performance 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. The results indicated that the inclusion of GRP into the diets increased egg production percent, egg mass, feed intake. As a result of this study, supplementation with ginger (GRP1%) might have some positive effects on production performance of laying Hens.

Keywords: Ginger, Laying hens, Performance, Egg mass, Turmeric.

Introduction:

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) and also they accumulate pharmacologically important active metabolites, at high levels in their rhizomes (Ahumada *et al*, 2006). Ginger (*Zingiber officinale* Rosc) has been utilized frequently in traditional oriental medicine for the treatment of wide range of diseases (Badreldin *et al*, 2008). 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 reduction of total cholesterol, Aspartate aminotransferase AST, Alanine aminotransferase ALT and blood uric acid implied the non-toxic effect of GRP and TRP treatments on hepatic and renal tissues (Malekizadeh, 2010). The objectives of this study were to investigate the efficacy of different levels of ginger rhizome and turmeric rhizome powder on production performance of laying Hens.

Materials And Methods :

Ninety five, 103 weeks old single comb white leghorns Hyline (W-36) were divided into five treatments groups. Each treatment had three replicates. Each replicate of 6 hens were kept in each cage, provided with 16 hour of daily light. 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 age 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 compositions of the experimental diets were shown in Table 1.

Table 1 Composition of experimental diets (%)

	C	GRP 1	GRP 3	TRP 1	TRP 3
Ingredient					
Corn	65.62	65.25	64.50	65.25	64.49
Soybean meal	13.35	13.39	13.33	13.38	13.47
Wheat Bran	2.03	1.28	--	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 mixture¹	0.25	0.25	0.25	0.25	0.25
Common salt	0.38	0.34	0.34	0.38	0.34
DL-Methionine	--	0.01	0.01	--	--
L-Lysine	--	--	0.06	--	0.01
Total :	99.8	99.8	99.8	99.8	99.8
Nutrient contents					
ME, kcal/kg	2796	2763	2771	2804	2815
Crude protein (%)	14.64	14.92	14.71	14.71	14.98
Calcium (%)	4.48	4.57	4.61	4.52	4.53
Available Phosphorous (%)	0.33	0.30	0.33	0.31	0.34
Methionine(%)	0.29	0.30	0.31	0.30	0.32
Lysine (%)	0.78	0.73	0.75	0.72	0.76

¹Provided per kilogram of diet: vitamin A (retinyl palmitate), 1,200 IU; cholecalciferol, 2,500 IU; vitamin E(dl- α -tocopheryl acetate), 20 IU; vitamin K3, 4.0 mg; thiamin, 1.5 mg; riboflavin, 50.0 mg; pantothenic acid, 10.0mg; niacin, 30 mg; pyridoxine, 4.0 mg; choline chloride, 250 mg; folic acid, 0.5 mg; biotin, 220 μ g; vitamin B12,12 μ g ; BHT, 250 mg; manganese, 48 mg; zinc, 40 mg; iron, 24 mg; copper, 16 mg; iodine, 0.6 mg; , selenium,0.12 mg; and DL-methionine, 50 mg.

GRP=Ginger rhizome powder TRP=Turmeric rhizome powder

Feed consumption was recorded weekly and feed efficiency was calculated during the 9 weeks experimental period. Daily egg production (Hen-day) and egg weights were recorded and egg mass was calculated. Data were analyzed in a one-way ANOVA using the General Linear

Models procedure of SAS (2006) based on completely randomized design (CRD). Differences among diets, when significant, were also ordered using Duncan test. Statements of statistical significance were based on a P value at the α level of 0.05 probabilities.

Results And Discussion :

Feed efficiency and egg weight were not affected by dietary supplementation of different levels of Ginger rhizome powder (GRP) and Turmeric rhizome powder (TRP) ($P > 0.05$) (Table 2). Addition of 1 % GRP increased the egg production percent, the amount of egg mass and feed consumption were significantly increased ($P < 0.05$) in comparison with those of hens in other dietary treatments. There were profound evidence that dietary consumption of ginger at 0.5 and 1 % improved the feed consumption compared with untreated control group in rats [Dias *et al*, 2006]. The stimulating effects on peptic juices, such as gastric juice, bile, pancreatic and intestinal juices in rats were discovered. Moreover, dietary supplementation of ginger improves antioxidant status of rats and broiler chickens. Addition of ginger may cause an improvement in digestive tract performance in laying hens and improved the egg production. Omaye *et al*, (2007) in an eight weeks study, on growing rabbits, evaluated the effect of various levels of ginger waste meal (10, 20, 30 and 40 % after extraction of oleoresin using ethanol) on growth performance. They reported no significant differences in average daily gain (ADG), final live weight and feed conversion ratio (FCR) among the treatments, but average dry feed intake (ADFI) increased, significantly. Dietary supplementations of ginger waste meal lead to increasing of diet fiber content and subsequently decreasing the feed energy concentration. Zhang *et al*, (2009) investigated the effect of dried ginger root on growth performance of broilers and stated that supplementation with ginger powder lead to better production performance compared with those of control. In a 3 weeks study on broiler chickens, Gowda *et al*, (2008) reported that FCR, body weight gain and ADFI were not affected with 0.5 % TRP. In another study on broilers with different levels of TRP (0.25, 0.50 and 0.75 %), Emadi and Kermanshahi (2007) reported no significant difference in ADFI, weight gain and FCR. Hens fed 1 % TRP had lower feed consumption which resulted in numerically reduction of egg production and egg mass compared with control diet. The lower egg production and egg mass might be related to the lower feed consumed by laying hens fed 1% TRP. Chattopadhyay *et al* (2004) reported that turmeric powder has beneficial effect on the stomach due to increasing mucin secretion in rabbits and might act as gastro-protectant against irritants. There was a decreasing the feed intake, egg production and egg mass in group TRP 3% which was more than TRP 1% treatment group.

Table 2. Effects of dietary ginger and turmeric rhizome powder on performance of laying hens¹

Diets	Egg production (hen /d)	Egg Weight (g)	Egg Mass ² (g/d per hen)	Feed Intake (g/d per hen)	FCR ³
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 ($P < 0.05$).

1. Means represent 6 pens per treatment, 3 birds per pen averaged over 7 week.

2. Egg mass = (egg production × egg weight)/100. 3. Feed conversion ratio = feed intake/egg mass (g/g).

Conclusions :

As a results of this study, supplementation with GRP and TRP as herbal additives might have some positive effects on production performance 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 ($P > 0.05$).

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