www.roavs.com EISSN: 2223-0343
RESEARCH OPINIONS IN ANIMAL & VETERINARY SCIENCES

Effect of cinnamon, red pepper, ginger and cumin on broilers performance

[1]*Ebrahimi, M., [2]Hoseini, A., [1]Palizdar M.H., [1]Mohamadian-Tabrizi, H.R. and [1]Porelmi, M.R.

[1]Department of Animal Science, Faculty of Agriculture, Islamic Azad University, Chalous Branch, Mazandaran, Iran; [2]Animal Science Research institute, poultry Nutrition. Alborz-Karaj

Abstract

In this study, the effects of cinnamon, red pepper, ginger and cumin on the performance was determined. A total of 1200 broiler chicks (Cobb 500) were randomly distributed into five treatments and each treatment was further divided into four replicates. Treatments included a control (Ctrl), Ctrl +2.5 g/kg of cinnamon, Ctrl +2.5 g/kg of red pepper, Ctrl +2.5 g/kg of ginger and Ctrl +2.5 g/kg cumin. The chicks were fed the diets for 35 days. The amount of dietary metabolisable energy, crude protein, calcium, phosphorous and essential amino acids were similar. Performance characteristics of live weight, feed intake, feed conversion ratio (weekly) and mortality (at the end of the experiment) were recorded. The results revealed that Cinnamon significantly improved body weight on day 28. Feed intake was significantly low in Cumin and Ginger fed groups on day 14 of the experiment. Similarly, feed conversion ratio was also significantly high in Cumin and Ginger fed birds on day 14. The mortality percentage did not differ between the treatments. The results of this experiment showed that the use of Cinnamon in the diets caused a higher weight gain on day 28 of the experiment. It was also observed that Ginger and Cumin treatments resulted in improved feed conversion and feed intake on day 14.

Keywords: Cinnamon; red pepper; ginger; cumin; broilers; performance

To cite this article: Ebrahimi M, A Hoseini, MH Palizdar, HR Mohamadian-Tabrizi and MR Porelmi, 2013. Effect of cinnamon, red pepper, ginger and cumin on broilers performance. Res. Opin. Anim. Vet. Sci., 3(5), 131-135.

Introduction

The use of antibiotics in animal feeds as antimicrobial growth promoters undoubtedly is beneficial to improve animal performance parameters and avoids diseases. However, the bio-security threat to human health and animal is because of increasing resistance of pathogens to antibiotics and antibiotic residues accumulation in animal products and environment, it caused extensive objections to remove antibiotics from animal feeds. Anti-microbial growth promoters used in European countries and many other countries have been banned since January 2006 (European Commission, 2003). Consequently, the demand for products that can replace antibiotics as prophylactic agents and growth stimulants has been increased recently. Based on alternative combinations, nutritionist suggested prebiotics, probiotics, organic acids, enzymes, herbs and essential oils from herbs as replacements for antibiotics (Thomake, 1998). Herbs have a particular value in terms of providing health care and disease prevention and in many countries are used for medicinal purposes (Asadollahi et al., 2010). One way to increase efficiency and productivity in the poultry meat industry is the use of growth stimulants like herbs and medicinal plants. The benefits of using medicinal plants include easy to use, no adverse effects on animal performance and their harmful residues staying beyond the products (Beheshti and Nobakht, 2010). Medicinal herbs improve feed intake and feed conversion ratio (Botsoglou, 2003). Herbal extracts have a role in stimulating digestive enzymes and may have an influence on lipid digestion and metabolism (Platel and srinivasan, 1996). Due to anti-bacterial and antioxidant properties of herbal extracts, they traditionally used for treatment and control of certain diseases (Hernandez, 2004). Alçiçek et al. (2003) demonstrated that the essential oils of some plants

Corresponding author: Ebrahimi M, Department of Animal Science, Faculty of Agriculture, Islamic Azad University, Chalous Branch, Mazandaran, Iran.

could improve animal's efficiency. It was shown that plant extracts could be used in poultry diets as well (Craig, 1999). Therefore, the objective of this research was to investigate the herbs (cinnamon, pepper, ginger and cumin) to improve the performance of broiler chickens.

Materials and Methods

Chicks, diets and rearing conditions

In this experiment, 1200 one-day-old Cobb broiler chicks (male and female) with similar average weight were used. In a randomized complete design, birds were divided into five treatments, 4 replicate and 60 chicks in each replicate. Dietary treatments were as follows: control (Ctrl), Ctrl +2.5 g/kg of cinnamon, Ctrl +2.5 g /kg of red pepper, Ctrl +2.5 g/kg of ginger and Ctrl +2.5 g/kg cumin. A corn-soybean meal based diet (control diet) was prepared to meet or exceed the NRC (1994) requirements (Table 1), including 22.04% CP and 3,019 kcal/kg of ME (1 to 14 d), 21.07% CP and 3,063 kcal/kg of ME (14 to 28 d) and 18.05% CP and 3,158 kcal/kg of ME (28 to 35 d). The chickens were fed and raised on floor pens (10 birds/m^2) for 6 weeks. The ambient temperature was gradually decreased from 23 to 33°C on day 21 and was then kept constant. The lighting program consisted of a period of 23 h light and 1 h of darkness from 1-28 d and a period of 22 h light and 2 h of darkness from 28-35 d.

Performance traits

Body weight was determined on 1, 7, 14, 21, 27, 35 and 35 days of age and mean body weight for each group was calculated. Feed consumption was recorded daily and feed conversion ratio (feed intake/weight gain) was determined. All the pens were checked for mortality twice a day and the birds that died during the experiment from every group were weighed and feed intake was adjusted accordingly.

Statistical analysis

Data analyses for performance traits were subjected to ANOVA as a completely randomize design and performed using GLM procedure of SAS (2000). Means were compared using Duncan multiple range test. Statements of statistical significance are based on $P<0.05$.

Results and Discussion

Body weight and feed intake

The effects of experimental treatments on the performance of broilers are presented in Table 2. Body weight was not significantly influenced by the dietary treatments on 1, 14 and 21 day of age. Body weight gain was affected significantly by the dietary treatments on day 28 ($P<0.05$). Chickens fed cinnamon diet have higher body weight on day 28 ($P<0.05$), however, compared to other treatments, there was no significant difference between control diet and diet containing pepper, ginger and cumin in relation to body weight. Similar to our results, higher body weight in broilers fed diets containing 3.0% cinnamon powder was reported (Park, 2008). Chen et al. (2008) reported that broiler given cinnamon extract added diets had significantly higher average daily gain and lower feed to gain ratio in the whole (6 week) period compared with the control. On the other hand, Lee et al. (2003) did not find any significant differences in performance parameters in broilers fed a diet supplemented with cinnamaldehyde, but in a another experiment, the authors noted that inclusion of 100 ppm cinnamal-dehyde in female broilers diet could partially compensate the weight reduction induced by carboxymethyl cellulose (Lee et al., 2004).

Table 1: Ingredients and composition of the control diet fed from 1-35d

Diet composition (%)	(1–14 days)	(14–28 days)	(28–35 days)
Corn	53	56.19	64.69
Soybean meal	38.6	36	27.5
Salt	0.3	0.3	0.3
Soybean oil	4	4	4
Oyster sell	1.7	1.5	1.5
Concentrate	2.4	2	2
Calculated chemical composition			
Metabolizable energy (kcal/kg)	3019	3063	3158
P Non Phytate, %	0.48	0.42	0.41
Methionine + cysteine,%	0.89	0.80	0.67
Lysine, %	1.23	1.15	0.96
Analyzed composition			
Crude protein, %	22.04	21.07	18.05
Calcium, %	1.05	0.12	0.9

In the present study, the active ingredient of cinnamon (Cinamaldhyde) may possibly result in increased digestion and absorption of dietary fat by stimulating the secretion of bile and pancreatic enzymes. Besides the positive effects of cinnamon on diet digestibility and availability of nutrients (Esmaieli et al., 2010) and reduce the pathogens, cinnamon could improve the body weight gain. Significant effects on body weight and FCR was not found when cumin and prebiotics were fed to broilers during starter and finisher period while in grower period the difference between treatments was significant (Golian et al., 2010). Cumin also increases bile acid synthesis and secretion (Platel and Sernivisan, 2000). Cumin in high concentrations could cause the secretion of digestive enzymes from the pancreas and small intestine (Platel

Table 2: Effect of experimental diets on performance of broilers at different ages

Items	Dietary treatments						
	Ctrl	Cinnamon	Pepper	Ginger	Cumin	SEM	P value
Body weight (g)							
0	43.8	43.5	43.4	43.3	43.5	0.14	0.16
7	168.4	167.7	168.5	163.8	168.5	1.01	0.58
14	410.5	427.3	418.3	412.7	420.9	3.05	0.56
21	826.3	831.4	830.8	835.9	832.4	4.30	0.97
28	1526.0^{ab}	1593.7^{a}	1432.5^{b}	1375.2^{b}	1402.2^{b}	0.02	0.04
35	1839.3	1857.8	1870.9	1893.8	1839.6	10.50	0.44
Daily feed intake (g/day)							
0–14 days	550.6^{a}	579.9^{a}	556.6^{a}	497.9^{b}	504.4^{b}	8.68	0.0008
0–28 days	1310.2	1315.3	1359.1	1338.6	1350.2	7.50	0.16
0–35 days	3185.5	3371.8	3268.9	3206.4	3218.6	36.19	0.53
Feed: gain (g:g)							
0–14 days	1.20^{a}	1.22^{a}	1.19^{a}	1.06^{b}	1.07^{b}	0.01	0.0001
0-28 days	1.31	1.31	1.35	1.33	1.35	7.50	0.16
0-35 days	1.73	1.73	1.74	1.69	1.69	0.01	0.20
Mortality	1.66	2.91	3.33	3.33	2.58	0.77	0.77

Mean values within a row with different superscript letters (a, b) were significantly different (P<0.01), (P<0.05).

and Sernivisan, 2000; Milan et al., 2008). Research on the use of thyme and cinnamon in different levels in broiler diets caused significant effects on body weight, feed intake and feed conversion ratio (AL-Kassie, 2009). This study concluded that improvement in body weight gain and feed conversion raito is due to the presence of active ingredients (Cinamaldhyde and Eugenol) of cinnamon, which lead to increase feed intake and growth (AL-Kassie, 2009).

Feed conversion ratio

Feed conversion ratio was influenced by treatments at 14d (P<0.05). Treatments containing ginger and cumin improved feed conversion compared to the control treatment. Our results is consistent with the findings of ADymula et al. (2009) who used the mixture of two vegetable oils (garlic and ginger) at the level of 1.5 and 0.02 percent in the basal diet and observed a significant effect on feed conversion ratio. In the study of Lee et al. (2003) the effects of herbal essential oils in the diet appeared when chickens were exposed to non-optimal conditions such as low digestible diet or lack of clean environment. Ginger lowers cholesterol in rats via intestinal sterol uptake (Srinivasan and Sambaiah, 1991) via bile acids production. Colic and dioxycolic bile acids are made from cholesterol by the hepatic cells and could correspondingly combine with glycine and Taurin. These acids are absorbed directly into the small intestine and will transfer to the liver to recycle. Reducing bile acids recycling could eventually lead to decreased serum cholesterol levels, which could be used for the synthesis of bile acids. Ginger rhizome has been shown to contain a high level of plant proteolytic enzyme (Thompson et al., 1973; Ziauddin et al., 1995; Naveena et al., 2004) that could help birds digest dietary protein upon ingestion. Reduction of protein oxidation in the liver of rats fed a diet containing ginger was also reported (Kota et al., 2008). Although in the current study, we did not measure bile acid synthesis to verify the above hypothesis, we suggest that improvement in feed conversion ratio in ginger and cumin treatments was due to increased digestibility of fat probably through improved secretion of bile acids, protein and energy retention (Jamroz et al., 2005).

Feed intake

Feed consumption was significantly influenced by the dietary treatments (P<0.05) at day 14. Treatments containing ginger and cumin improved feed intake. Our results agree with the findings of AL-Kassie (2010) that cumin used at different levels in the diets of broiler chickens significantly affected feed intake. Yu et al. (1994) and Lee et al. (2003) showed that the vegetable oil can reduce or increase feed intake.

Mortality

Mortality was not affected by the use of medicinal plants. However, AL-Kassie (2010) reported that cumin used at different levels in the diets of broiler chickens resulted in significant difference in mortality.

Conclusion

The results of this experiment showed that the use of Cinnamon in the diets caused a higher weight gain on day 28 of the experiment. It was also observed that ginger and cumin treatment resulted in improved feed conversion and feed intake on day 14.

References

Alçiçek, A., Bozkurt, M. and abuk, M.Ç. 2003. The effect of an essential oil combination derived from selected herbs growing wild in Turkey on broiler

performance. *South African Journal of Animal Science*, 33: 89-94.

AL-Kassie, G.A.M. 2009. Influence of two plant extracts derived from thyme and cinnamon on broiler performance. *Pakistan Veterinary Journal*, 29: 169-173

AL-Kassie, G.A.M. 2010. Effect of Feeding Cumin (cuminum cyminum) on the Performance and Some and some Blood Traites of Broiler Chicks. *Pakistan Journal of Nutrition*, 9: 72-75.

Ade⁄mola, S.G., Farinu, G.O. and Babatunde, G.M. 2009. Serum lipid, growth and haematological parameters of broilers fed garlic, ginger and their mixtures. *World Journal of Agricultural Sciences*, 5: 99-104.

Asadollahi, K., Abassi N., Afshar N., Alipour, M. and Asadollahi, P. 2010. Investigation of the effects of Prosopis farcta plant extract on rat's aorta. *Journal of Medicinal Plants Research*, 4: 142-147.

Beheshti, Kh. D and Nobakht, A. 2010. Investigation the effects of using different mixtures of peppermint (Mentha piprita), thyme (Thymus vulgaris) and saturea (Satureia hortensis) medicinal plants on performance, egg quality, blood and immuily parameters of laying hens. The 4th Congress on Animal Science – September.

Botsoglou, N.A., Govaris, A., Botsoglou, E.N., Grigoropoulou, S.H. and Papageorgiou, G. 2003. Antioxidant activity of dietary oregano essential oil and alpha-tocopheryl acetate supplementation in long-term frozen stored turkey meat. *Journal of Agricultural and Food Chemistry*, 51: 2930- 2936.

Chen, A., Yang Xu, J, Hong, C. 2008. Effects of cinnamon extracts on growth performance and excreta urease activity and nitrogen loss in broilers: VIII Livestock Environment Conference, Iguassu Falls, Brazil, Pp: 331-338.

Craig, J.W. 1999. Health–promoting properties of common herbs. *American Society for Clinical Nutrition*, 70: 491-499.

European Commission, 2003. Regulation (EC) No. 1831/2003 of the European Parliament and of the Council of 22 September 2003 on Additives for Use in Animal Nutrition. Off. J. Eur. Union L: L268/29–L268/43.

Esmaieli, H., Vakili, R., Afzali, N., Omidi, A., Naemipor, H. and Nasimi, M. 2010. Effects of using cinnamon powder in the diet on growth performance of broilers chickens. The 4th Congress on Animal Science – September.

Golian, A., Aami-Azghadi M., Kermanshahi, H. and Sedghi, M. 2010. Comparison of dietary supplementation with cumin essential oil and prebiotic Fermacto on humoral immune response, blood metabolites and performance of broiler chickens. *Global Veterinaria*, 4: 380-387.

Hernandez, F., Madrid, J., Garcia, V., oregano, J. and Megias, M.D. 2004. Influence of two plant extracts on broiler performance digestibilities and digestive organ size. *Poultry Science*, 83: 169-174.

Jamroz, D., Wiliczkiewicz, A., Wertelecki, T., Orda, J. and shorupinska, J. 2005. Use of active substances of plant origin in chiken diets based on maize and locally grown cereals. *British poultry Science*, 46: 485-493.

Kota, N., Krishna, P. and Polasa, K. 2008. Alterations in antioxidant status of rats following intake of ginger through diet. *Food Chemistry*, 106: 991-996.

Lee, K.W., Kappert, H.J. Frehner, M. Losa, R and Beynen, A.C. 2003. Effect of dietary essential oil components on growth performance, digestive enzymes and lipid metabolism in female broiler chicken. *Journal of Poultry Science*, 44: 450-457.

Lee, K.W., Everts, H., Kappert, H.J., Wouterse, H., Frehner, M. and Beynen, A.C. 2004. Cinnamaldehyde, but not thymol, counteracts the carboxymethyl- cellulose-induced growth depression in female broiler chickens. *International Journal of Poultry Science*, 3: 609-612.

Milan, K.S.M., Dholakia, H., Tiku, P.K. and Vishveshwaraiah, P. 2008. Enhancement of digestive enzymatic activity by cumin (Cuminum cyminum L.) and role of spent cumin as a bionuterient. *Food Chemistry*, 110: 675-683.

Naveena, B.M., Mendiratta, S.K. and Anjaneyulu, A.S. R. 2004. Tenderization of buffalo meat using plant proteases from Cucumis trigonus Roxb (Kachri) and Zingiber officinale Roscoe (Gingerrhizome). *Meat Science*, 68: 363-369.

Park, B.S. 2008. Effect of dietary cinnamon powder on savor andquality of chicken meat in broiler chickens. *Journal Korean of Food Science and Nutrition*, 37 (5): 618–624.

Platel, K. and srinivasan, K. 1996. Influence of dietary spices and their active principles on digestive enzymes of small intestinal mucosa in rats. *International Journal of Food Science and Nutrition*, 47: 55-59.

Platel, K. and Srinvasan, K. 2000. Influence of dietary spices and their active principles on pancreatic digestive enzymes in albino rate. *International Journal of Food Science and Nutrition*, 44: 41-46.

Thompson, E.H., Wolf, I.D. and Allen, C.E. 1973. Ginger rhizome: A new source of proteolytic enzyme. *Journal of Food Science*, 38: 652-655.

Thomke, S. and Elwinger, K. 1998. Growth promotants in feeding pigs and poultry. II. Mode of action of antibiotic growth promotants. *Annales de Zootechni*, 47: 153-167.

Srinvasan, K. and Sambaiah, K. 1991. The effect of spices on cholesterol 7 alpha-hydroxylase activity

and on serum and hepatic cholesterol levels in the rat. *International Journal of Vitamin and Nutrition Research*, 61: 364-369.

Yu, S.G., Abuirmeileh, N.M., Qureshi, A.A. and Elson, C.E. 1994. Dietary ionone suppresses hepatic 3-hydroxy-3 methylglutaryl coenzyme A reductase activity. *Journal of Agriculture and Food Chemistry*, 42: 1493-1496.

Ziauddin, S.K., Rao, D.N. and Amla, B.L. 1995. Effect of lacticacid, ginger extract and sodium chloride on electrophoretic patternof buffalo muscle proteins. *Journal of Feed Science & Technology*, 32: 224-226.