

Comparison of Effects of Using Nettle (*Urtica dioica*) and Probiotic on Performance and Serum Composition of Broiler Chickens

Navid Hosseini Mansoub

Islamic Azad University, Malekan Branch, Malekan, Iran

Abstract: The objective of this study was to evaluate the effects of nettle and Probiotic on performance and serum composition of broiler chickens. In this study that started 1 day following until 42 days. At first 225 one day old broiler chicks were divided to 15 groups of 15 chicks each. Each 3 groups randomly assigned to one of the 3 treatments. Experimental groups included T1, control group, T2, basal diet containing 1% probiotic (*L. acidophilus* and *L. casei*) 1-28, T3, received 1.5% nettle. As compared to the control group with the other groups observably to give improve performance in all of the experimental ($P < 0.05$). According to the results, total cholesterol (Chol), triglyceride (TG), HDL and LDL were measured in blood samples of day 42. The amount of total Chol and triglyceride (TG) in the serum showed significant differences, but HDL was not significantly different among groups.

Key words: Cholesterol • Broiler • Nettle • Probiotic • Broiler

INTRODUCTION

It is conceivable that herbal agents could serve as safe alternatives to antibiotic growth promoters due to their suitability and preference of the broiler meet consumers, reduced risks and minimal health hazards. After many years, the long term side effects of these products like microbial resistance and increase of the blood cholesterol level in the livestock lead to the ban of these commercial antibiotics [1, 2]. Nowadays, there are a lot of concerns to finding non-synthetic alternatives for antibiotics among the scientists. The positive effect of herbal plants on broilers have been reported by many studies [2, 3].

Nettle (*Urtica dioica*) is widely grown in different parts of the world and has been used to promote health. Numerous analyses of nettle have revealed the presence of more than fifty different chemical constituents. It has been extensively studied and found to contain starch, gum, albumen, sugar and two resins. Histamine, acetylcholine, choline and serotonin are also present. In a study an anti-coagulant was isolated from nettle leaves. Terpene diols, terpene diol glucosides and alpha-tocopherol were also detected. Five new monoterpenoid components were found, as well as 18

phenolic compounds and eight lignans, some of which were previously unknown. An acetylcholine synthesizing enzyme, choline acetyl-transferase, was found and it appears that nettle is the only plant to have this enzyme. The phenolic compounds of nettle like carvacrol and thymol exhibit considerable antimicrobial and antifungicidal activity [4]. In pigs the use of nettle extract had positive effects on meat quality, improving oxidative stability and the polyunsaturated/saturated fatty acid ratio [5]. In broilers the use of nettle extract as growth promoter can not be as an alternative for antibiotics [6]. In laying hens the use of nettle extract via lymphocyte proliferation can stimulate the innate cell mediated immune response [7]. Addition 2% of nettle to broilers diets had positive effects on their body weight gain [8].

To date, probiotics are one of major food supplements for poultry industry. According to concerns about cholesterol, there are a lot of attempts to produce foods with low cholesterol. It has been reported that *L. acidophilus* can absorb cholesterol from *in vitro* system and this phenomenon can decrease the cholesterol level of medium [9, 10]. There are reports that probiotics can reduce the cholesterol level of blood in broiler chickens [11, 12]. Panda *et al.* [13] reported that probiotics cause

the reduction of serum and yolk cholesterol and also increase of egg production. Probiotics prescription is a good alternative for antibiotics for several reasons: suitable function, nonexistence of residue in poultry productions, environmental protection and also prohibition of antibiotics usage in Europe union [13, 14].

The objective of this study was to investigate the interaction effects of supplementation of probiotic (*L. acidophilus* and *L. casei*) and nettle (*Urtica dioica*) on the performance and blood chemistry of broiler chickens under commercial conditions.

MATERIALS AND METHODS

In this experiment that started 1 day following until 42 days that there are three treatments, at first 225 one day old broiler chicks were divided to 15 groups of 15 chicks each. Each 3 groups randomly assigned to one of the 3 treatments. Thus, amounts forementioned to basal diet was formulated according to Table 1 Experimental groups included T1. Control group, T2. basal diet containing 1% probiotic (*L. acidophilus* and *L. casei*)1-28, T3.Using 1.5% nettle supplementation in both starter and grower.

Performance Parameters: During days 0-42, unbound water and dietary was in poultries' access. Dietary and chick weigh were going on weekly. Feed consumed was recorded daily, the uneaten discarded and feed conversion ratio (FCR) was calculated (total feed: total gain). At the end of experiment, some analyses was done via SAS [15] (Statistical Analyses Software) in the statistical level of 5% according to data gathered from dietary, average of FCR, weight of rearing period and carcass yield.

Measurement of Serum Indices: On 42 day of experimental period, 3 ml of blood was collected from brachial vein from one bird of each penpen (from four birds of eachtreatment). Serum was isolated by centrifugation at 3,000×g for 10 min.The serum concentrations of total triglyceride, cholesterol, highdensity lipoprotein (HDL) cholesterol and low-density lipoprotein (LDL) ratio in serum samples were analyzedby an automatic biochemical analyzer (Clima, Ral. Co, Spain). VLDL cholesterol was calculated from triglycerides by dividedthe factor 5 [16].

Table 1: Ingredients and chemical analyses composition of the starter and grower diets

Ingredients (g/kg)	1-28	29-42
Maize	557.00	300.00
Wheat	--	330.00
Soybean meal	370.00	300.00
Soybean oil	30.00	40.00
Fish meal	20.00	--
Limestone	10.00	--
Oyster shell	--	12.00
Dicalcium phosphate	5.00	15.00
Vitamin-mineral mix ²	5.00	5.00
dl-methionine	1.00	1.00
Sodium chloride	2.00	2.00
Vitamin E (mg/kg)	--	100.00
Zn	--	50.00
Analyzed chemical composition (g/kg)		
Dry matter	892.20	893.50
Crude protein	222.30	200.70
Fat	62.40	62.90
Fiber	36.10	35.60
Ash	61.70	57.00
Calcium	8.22	8.15
Phosphorus	5.48	5.57
Selenium (mg/kg)	0.53	0.58
ME by calculation (MJ/kg)	12.78	12.91

¹Starter diet fed to birds from 0 to 21 days. ²Provides per kilogram of diet: vitamin A, 9,000 IU; vitamin D3, 2,000, IU; vitamin E, 18 IU; vitamin B1, 1.8 mg; vitamin B2, 6.6 mg B2.; vitamin B3, 10 mg; vitamin B5, 30 mg; vitamin B6, 3.0 mg; vitamin B9, 1 mg; vitamin B12, 1.5 mg; vitamin K3, 2 mg; vitamin H2, 0.01 mg; folic acid, 0.21 mg; nicotinic acid, 0.65 mg; biotin, 0.14 mg; choline chloride, 500 mg; Fe, 50 mg; Mn, 100 mg; Cu, 10 mg; Zn, 85 mg; I, 1 mg; Se, 0.2 mg

RESULTS AND DISCUSSION

Table 2 shows the effect of different dietary on performance of boiler chickens. According to comparisons of this table it has been proven that three-way interaction between dietary treatments were observed for Dietary (P<0.05) Average of feed conversion Ratio (FCR) (P<0.01) and Average of Weight (P<0.05) in the experiment. The result showed that both the treatments have better final result in compare with control treatment.In an experiment the addition 2% of nettle to broiler diet led to increase their body weight. They showed that addition 2% of nettle to broilers diets had positive effects on their body weight gain. This difference between the results of present experiment and reported above can be the results of different causes such as

Table 2: The effect of different treatments on the performance of broiler chicks

Experiment Treatments ¹	Dietary (G)	Average of FCR	Average of Weight
T1	87.6 ^a	1.84 ^a	1991.6 ^a
T2	81.2 ^b	1.43 ^b	2364.5 ^b
T3	85.8 ^a	1.46 ^b	2189.4 ^c
SE	0.94	0.04	38.6
P-value	0.04	0.004	0.03

a-c Means with in columns with different superscript differ significantly

Table 3: Effect of different supplementation on serum constituents of broiler chicken

Experiment Treatments ¹	Total cholestrol	HDL	LDL	Triglycerides
T1	171.5 ^a	58.22	79.12 ^a	153.74 ^a
T2	132 ^{ab}	60.12	42.21 ^{ab}	121.46 ^b
T3	114 ^c	64.63	73.15 ^a	125.82 ^b
SE	5.32	3.22	5.21	13.06
P-value	0.004	0.3	0.001	0.03

Means with in columns with different superscript differ significantly

the nettle variety or chickens used, farm management and operations used in the rearing of broiler chickens [8]. Recent studies in broilers showed that using nettle in blend with other medicinal plants had positive effects on performance, carcass traits, blood biochemical and immunity parameters [4, 8].

The results of this study were expected about feed probiotic conversion ratio in control group. Endens *et al.* [17] reported that probiotics improved digestion, absorption and availability of nutrition accompanying with a positive effect on intestine activity and increasing digestive enzymes. Jin *et al.* [18] reported that in low levels of *Lactobacillus* culture (0.05, 0.01%), feed intake rate have been increased, while Timmerman *et al.* [18] found inconsistent results, maybe because of type of diet ingredients which can affects probiotic's growth or their metabolites.

The mean values of serum constituents in broiler chicken fed different supplemented diets are shown in Table 3. The serum total cholesterol and Triglycerides concentration were significantly reduced by dietary with nettle compared to the control group. (P < 0.05). These results supported with the work of Sandru *et al.* [19].

The cholesterol level of serum significantly decreased in groups supplemented with probiotics in compared to control group (Table 3). There are many reports that are in agreement with presented results in the current study. *L. acidophilus* is capable to deconjugate glycocholic and taurocholic acids under anaerobic condition. Deconjugation of gallbladder acids in small intestine can affects control of serum cholesterol, while deconjugated acids are not capable to solve and absorb fatty acids as

conjugated acids. As a consequence, they prevent from absorption of cholesterol. Also free gallbladder acids attach to bacteria and fibres and this can increase the excretion of them [20].

There is a significant decrease in the serum level of triglycerides between control group and groups treated with *L. acidophilus* and *L. casei* supplemented in male broiler diet in combination with water or alone. Moharrery *et al.* [21] reported that fat digestion rate is linked to rate of gallbladder acids in digestion latex and subsequently the lipid concentration. *L. acidophilus* and *L. casei* in diet or water cause a decrease in gallbladder acids in digestion latex and this resulted in a reduction in ability of fat digestion and therefore decreasing lipid level of blood.

REFERENCES

1. Mansoub, N.H., 2010. Effect of Probiotic Bacteria Utilization on Serum Cholesterol and Triglycerides Contents and Performance of Broiler Chickens. *Global Veterinaria*, 5(3): 184-186.
2. Tekeli, A., L. Çelik, H.R. Kutlu and M. Gorgulu, 2006. Effect of dietary supplemental plant extracts on performance, carcass characteristics, digestive system development, intestinal microflora and some blood parameters of broiler chicks; XII European Poultry Conference, Italy, pp: 10-14.
3. Osman, N.E., G. Talat, C. Mehmet, D. Bestami and U.G. Simsek, 2005. The effect of an essential oil mix derived from Oregano, Clove and Anise on broiler performance. *Int. J. Poult. Sci.*, 4: 879-884.

4. Gülçin, I., K. Küfrevioğlu, M. Oktay and M.E. Büyükkuroğlu, 2004. Antioxidant, antimicrobial, antiulcer and analgesic activities of nettle (*Urtica dioica L.*). *J. Ethnopharmacol.*, 90: 205-215.
5. Hanczakowska, E., M. Wiytkiewicz and A. Szewczyk, 2007. Effect of dietary nettle extract on pig meat quality. *Med. Wet.*, 63: 525-527.
6. Khosravi, A., F. Boldaji, B. Dastar and S. Hassani, 2008. The use of some feed additives as growth promoter in broilers nutrition. *Poult. Sci.*, 7: 1095-1099.
7. Sandru, C., F. Brudasca and M. Spniu, 2007. Vegetal extraction induced innate cell- mediated immune response in vaccinated hens. *Luc. Sci. Med. VET. XL.*, pp: 601-605.
8. Kwieciën, M. and W. Mieczan, 2009. Effect of addition of herbs on body weight and assessment of physical and chemical alterations in the tibia bones of broiler chickens. *J. Elem.*, 14: 705-715.
9. Gilliland, S.E. and M.L. Speck, 1977. Enumeration and identity of lactobacilli in dietary products. *J. Food Prot.*, 40: 760-762.
10. Gilliland, S.E., C.R. Nelson and C. Maxwell, 1985. Assimilation of Cholesterol by *Lactobacillus acidophilus*. *Appl. Environ. Microbiol.*, 49: 377-381.
11. Khani, M.M. and S.M. Hosseini, 2008. Effect of supplemented *Lactobacillus acidophilus* and *Lactobacillus casei* diet or water on serum cholesterol and triglyceride and performance of broilers 1st Mediterranean Summit of WPSA. 22nd of February 2008. Thessaloniki. Book of Proceeding, pp: 740-744.
12. Mohan, B., R. Kadirvel, A. Natarajan and M. Bhaskaran, 1996. Effect of probiotic supplementation on growth, nitrogen utilization and serum cholesterol in broilers. *Br. Poult. Sci.*, 37: 395-401.
13. Panda, A.K., M.R. Reddy, S.V. Ramarao and N.K. Praharaj, 2003. Production performance, serum/yolk cholesterol and immune competence of white leghorn layers as influence by dietary supplementation with probiotic. *Tropical Animal Health and Production*, 32(2): 85-94.
14. Timmerman, H.M., A. Veldman, E. Van Den Elsen, F.M. Rombouts and A.C. Beynen, 2006. Mortality and Growth Performance of Broilers Given Drinking Water Supplemented with Chicken-Specific Probiotics. *Poultry Sci.*, 85: 1383-1388.
15. SAS Institute, 2001. SAS user guide: Statistics. Version 8.2 ed. SAS Institute Inc., Cary, NC.
16. Toghyani, M., M. Tohidi, A.A. Gheisari and S.A. Tabeidian, 2010. Performance, immunity, serum biochemical and hematological parameters in broiler chicks fed dietary thyme as alternative for an antibiotic growth promoter; *African J. Biotechnol.*, 9(40): 6819-6825.
17. Endens, F., 2003. An alternative for antibiotic use in poultry: probiotics. *Rev. Bras. Cienc. Avic.*, 5: 44-51.
18. Jin, L.Z., Y.M. Ho, Abdullah and N.S. Jalaludin, 1998. Growth performance, intestinal microbial populations and serum cholesterol of broilers fed diets containing *Lactobacillus* cultures. *Poultry Sci.*, 77: 1259-1265.
19. Sandru, C., F. Brudasca and M. Spniu, 2007. Vegetal extraction induced innate cell- mediated immune response in vaccinated hens. *Luc. Sci. Med. VET. XL.*, pp: 601-605.
20. Corcoran, B., C. Stanton, G. Fitzgerald and R. Ross, 2005. Survival of probiotic lactobacilli in acidic environments is enhanced in the presence of metabolizable sugars. *Appl. Environ. Microbiol.*, 71: 3060-3067.
21. Moharrery, A., 2006. Comparison of performance and digestibility characteristics of broilers fed diets containing treated hulled barley or hullless barley. *Czech. J. Anim. Sci.*, 51: 122-131.