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Effect of Onion Extract in Drink Water on Performance and Carcass Traits in Broiler Chickens

Majid Goodarzi*, Shahram Nanekarani

Department of Animal Science, Borujerd Branch, Islamic Azad University, Borujerd, Iran.

Abstract

This experiment was conducted to evaluate the effect of onion extract and antibiotic on growth yield, and carcass characteristics, in broiler chicks. **A total of one hundred and ninety two 1-day old** mixed sex broiler chicks (Ross 308) were randomly assigned to four experimental groups. Each treatment was included of 4 replicate. Experimental groups included control group (C), the group receiving 300 g/ton Virginiamycin (A), the group receiving basal diet + onion extract as 1 % in drink water (B) and the group receiving basal diet + onion extract as 2 % in drink water (D). Body weight and feed intake of broilers were measured at d 1, 21, and 42 and feed conversion ratio (FCR) was computed. For measurement of carcass and organ weights, two birds per pen were slaughtered at day 42. The results showed that the use of antibiotic and onion had significant increase ($p < 0.05$) in yield traits. Maximum daily weight gain (46.74gr/day), body weight (2003.07gr), feed intake (87.76gr/day), and the lowest feed conversion ratio (1.88) was related to group B. In general, the results of this experiment showed that onion extract as 1% in drink water can improves the functional parameters of broilers.

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* Corresponding author. Tel.: +98-916-665-3248.

E-mail address: majidgoodarzi117@gmail.com.

1. Introduction

For several decades, some feed additives such as antibiotics have been vastly used in the poultry rations (Miles et al., 1984; Harms et al., 1986; Rosen, Eyssen and Desomer, 1963; 1996; Engberg et al., 2000). Due to the potential for bacterial resistance and antibiotic residues in animal products (Nasir and Grashorn, 2006) and drug residue in the body of the birds (Burgat, 1999), nowadays, some attempts have been made to replacing these additives with herbs. Thus, use of antibiotics as a feed additive is no longer acceptable and it is prohibited in developed countries. As a consequence, it has become necessary to develop substitute material and strategies for animal growth advancement and disease prevention. Plant extracts and spices as single or mixed compounds can be used as a promotion of performance and health condition of the animal (Goodarzi et al., 2014).

The onion (*Allium cepa*) belong the *Allium* genus. *Allium* is derived from the Greek word for garlic. In addition to use of onion for nutrition it use for treatment of some illness as herbal medicine. Onion is a bulbous plant greatly tilled for thousands of years in majority countries of the world. It originated in the Near East and Central Asia (Ebesunun et al., 2007). This plant contain plenty organic sulphur compounds such as Spropylcysteine sulfoxides, S-methyl-cysteine sulfoxide, Trans-S-(1-propenyl) cysteine sulfoxide, and cycloallicin, flavinoids, phenolic acids, sterols including cholesterol, b-sitosterol, saponins stigma sterol, sugars and very small amount of volatile oil compounds (Melvin et al., 2009). Numerous health benefits have been attributed to the vegetable, including antibacterial, antiviral, antiparasitic and antifungal properties. In addition, onions have antihypertensive, hypoglycemic, antithrombotic, antioxidant antihyperlipidemic, and anti inflammatory property (Lampe, 1999).

Furthermore, Aji et al. (2011) reported the useful influence of onion bulbs on growth yield of broiler chickens. Goodarzi et al. (2013) reported the using of onion bulbs in broiler diet can decrease triglyceride and total cholesterol in blood serum. Contrary to these findings, there has been a deficiency of information on the effect of onion extract on performance and carcass characteristics compared with an antibiotic as growth exciter in broilers. This experiment was conducted to compare the effect of various levels of onion extract on growth yield and carcass traits in broilers when used in the drink water.

2. Material and Method

2.1. Animals and Diets

One hundred and ninety two 1-day old mixed sex broiler chicks (Ross 308) were randomly assigned to four treatments. Each treatment was included of 4 repetitions. Experimental groups included control group (C), the group receiving 300 g/ton Virginiamycin (A), the group receiving basal diet + onion extract as 1 % in drink water (B) and the group receiving basal diet + onion extract as 2 % in drink water (D).

The basal diet (table 1) was formulated agreeing with nutrient requirements of broilers recommended by National Research Council (NRC, 1994). The experimental period include starter (0 to 21 day) and grower (22 to 42 day). The birds were grown on floor pens (120 × 100 × 80 cm) for 42 days and in total periods had free availability to feed and water. At during the experimental period, chicks were exposed to 23hr light and 1hr dark. The house temperature was kept at 32oC for the first week and it was reduced by 3oC in following weeks until it was stabilized at 22oC.

2.2. The method of onion extraction

A simple extraction procedure was performed for preparation of onion extract and was not used any

solvent for this work. First, the bulbs of onion layers were separated and washed. Second, the onion bulbs were put in particular container, and kept in freezer at -20°C for two days. This leads to the comfortably destroy of the cells and make it easier for extraction. After 48 h the onion bulbs were removed from the freezer and were defrosted in 30 minutes. Finally, the aqueous extracts were obtained with a filter and poured into particular containers (Wilson et al., 1997).

Table 1. The basal diet formulation for starter and grower

Item	Starter	Grower
Ingredient, g/kg		
Corn	615.0	690.8
Soybean meal	287.5	225.0
Fish meal	60.0	48.3
Soybean oil	9.4	00.0
DCP	6.6	12.3
CaCO ₃	11.9	15.8
NaCl	3.7	2.6
mineral and vitamin premix ¹	0.5	0.5
DL-Methionine	0.9	0.2
Metabolizable energy (kcal/kg)	3,000	3,000
Crude protein (g/kg)	215	187
Calcium (g/kg)	10	12
Available phosphorus (g/kg)	4.3	4.8
Methionine + cysteine (g/kg)	10.2	10.0
Lysine (g/kg)	11.8	10.9

1- Ingredients per kg diet: Mg, 56 mg; Fe, 20 mg; Cu, 10 mg; Zn, 50 mg; Co, 125 mg; I, 0.8 mg, vitamin A, 10,000 IU; vitamin D₃, 2000 IU; vitamin E, 5 IU; vitamin K, 2 mg; riboflavin, 4.20 mg; vitamin B₁₂, 0.01 mg; pantothenic acid, 5 mg; nicotinic acid, 20 mg; folic acid, 0.5 mg; choline, 3 mg.

2.3. Performance and carcass components

Body weights and feed intake of birds were measured at d 1, 21, and 42 of age and daily body weight gain and feed conversion ratio (FCR) were computed. The weight and the time of bird death were recorded and were used to modifying the total number of birds to determine the total feed intake per bird and FCR. In the end of period two birds from each pen were selected randomly and were slaughtered. Different parts of the body were separate and measured. Finally, the weight percentage of some organs (such as liver, pancreas and abdominal fat) relative to the weight carcass was calculated.

2.4. Statistical analysis

To analysis of experimental data SAS and MINITAB software were used. The mean differences among experimental treatments were compared by Duncan's multiple range tests. *Statements of statistical significance were based on $P < 0.05$.*

3. Results and discussion

Impact of experimental treatments on growth performance in different periods is given in Table 2. The using of onion extract in diet increased average daily feed intake (ADFI) in grower and total period significantly, but in starter it was not significant. ADFI during grower and total period was greater for broilers supplemented with onion extract as 1 % in drink water compared with control birds, but had not

Table 2. Effect of treatments on performance parameters of broilers

Performance parameters	Experimental groups				SEM ⁵
	C	A	B	D	
DFI ¹					
0-21 d	32.44	32.97	33.39	32.95	0.271
21-42 d	138.80c	140.43b	142.15a	140.75ab	0.363
0-42 d	85.60b	86.76ab	87.76a	86.87ab	0.285
DWG ²					
0-21d	20.76	21.63	21.98	22.00	0.258
21-42d	65.25b	69.88ab	71.50a	69.65ab	0.400
0-42d	44.50b	45.64ab	46.74a	45.94a	0.277
FCR ³					
0-21 d	1.56	1.52	1.53	1.50	0.012
21-42 d	2.03	2.01	1.99	2.02	0.009
0-42 d	1.92a	1.90ab	1.88b	1.89ab	0.008
BW ⁴ (g)					
21d	457.97	494.17	501.57	501.99	5.40
42 d	1909.15b	1961.54ab	2003.10a	1964.60a	11.24

Values in the same row not sharing a common superscript differ significantly ($P < 0.05$).

1. Daily Feed Intake (g per bird/day). 2. Daily Weight Gain (g/day) 3. Feed Conversion Ratio (g/g). 4. Body Weight (g) 5. Standard error of mean.

significant difference with other treatments.

Broilers receiving 1 or 2 percent onion extract in drink water had higher daily weight gain (DWG) compared to control group during grower and total period ($P < 0.05$), but DWG of broilers in starter period was not affected. The differences between broilers that received onion extract and antibiotic were not significant. Broilers receiving 1 percent onion extract in drink water had lower FCR compared to control group during total period ($P < 0.05$), but FCR of broilers in starter and grower periods was not affected by experimental treatments. Also, the differences between broilers that received different levels of onion extract and antibiotic were not significant. Using different levels of onion extract and antibiotic showed significant effects ($p > 0.05$) on the weight gain in 42 days. The maximum amount of weight gain was related to the B and D groups but their difference with the A group was not significant.

The herbs and some compound in them could act similar to antibiotics. This compound reduced the growth of some harmful bacteria in the gastrointestinal tract of broilers. This can result in a higher efficiency in the feed utilization, and it can lead to a higher weight gain and better feed efficiency (Bedford, 2000). The effect of onion on broiler performance probably is due to antibacterial and antifungal effects originated from some of its compounds. These compounds by decreasing harmful microbial population in gut improve healthy level

and performance (Lee et al, 2003). **There are suggestions that essential oil can improve digestion. It may be reason that spices and herbs will positively affect food digestion. Body weight and other organs can increase by improving the nutrient absorption.** Also, as it mentioned the using of onion extract in drink water resulted in increasing of feed intake. This in turn can increase daily weight gain. The using onion in diet can reduce the blood glucose. Hypoglycemia can stimulate nervous system for higher feed intake (Goodarzi et al. 2013). **Onion contains sulfur organic compounds including *S-Methylcysteine sulfoxide* and *S-allylcysteine suloxide*. These compounds are related to decreasing of blood lipid, liver protein and glucose.** So in our trial it is possible onion could improve growth performance of chicks due to content of organosulphur compounds. Like to our results Aji et al. (2011) and Goodarzi et al. (2013) reported the positive influence in BW, FCR and ADFI of broilers fed diets containing fresh onion compared with broilers fed diet without any onion and antibiotics. Unfortunately, there are few reports on the effects of onion on broiler performance.

Table 3 shows the weight percentage of carcass, abdominal fat, liver and pancreas relative to the live weight at slaughter. Except for abdominal fat, carcass yield and relative organs weight were not markedly affected by dietary treatments. These results are agreeing with those reported by Aji et al. (2011) and Goodarzi *et al.*(2013). In another experiment, carcass and organ characteristics of broilers fed diets containing garlic were not affected by experimental treatments (Gbenga et al., 2009). Spices and their extracts have lipotropic effects. Some of the active components in spices affect lipid metabolism through fatty acid transportation. This can increase the lipid utilization and decrease abdominal fat (Cross and et al, 2007).

Table 3.Effect of treatments on carcass yield and relative organ weight at 42 d

Relative organ weight	Dietary treatments				SEM ¹
	C	A	B	D	
Carcass (%)	72.13	73.05	72.23	71.98	0.59
Liver (%)	3.38	3.03	3.20	3.33	0.12
Pancreas (%)	0.288	0.305	0.280	0.255	0.01
Abdominal fat (%)	2.48 ^a	2.10 ^b	2.15 ^b	1.95 ^c	0.06

1 - Standard error of mean.

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