Effect of Different Levels of Grape Pomace on Performance Broiler Chicks

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ABSTRACT

The present trial was conducted to investigate the effect of grape pomace on performance in broiler chicks. A total of 450 day-old mixed sex broiler chicks (Ross 308) were randomly allotted to 6 dietary treatments with 5 replicates of 15 birds in a completely randomized design. Dietary treatments consisted of a control diet and diets contain in 3, 6, 9, 12 and 15% grape pomace which fed during a 39 d trial period. Average daily feed intake (ADFI), average daily gain (ADG) and feed conversion ratio (FCR) were measured during starter (10-25 d), grower (25-36 d) and finisher (36-49 d) phases. Results of this study indicated that experimental treatments had significant effect on ADFI of broiler chickens in starter phase ($P<0.05$). In this regard, there were no significant differences between birds fed control diet and birds fed diets supplemented with grape pomace. Also Dietary inclusion of 3% grape pomace was shown too resulted in the highest ($P<0.01$) daily gain starter (10-25 d) trial period. Experimental treatments had significant effect on FCR of broiler chickens in starter, grower ($p<0.01$), finisher ($P<0.05$) and during trial period ($p<0.001$) phases. The best FCR was observed for treatment containing 3% grape pomace and control. From the present results, it seems that dietary utilization of grape pomace could improve growth performance and feed efficiency.
Key words: Broilers chicks, Grape pomace and Performance.

1. INTRODUCTION

Grape (*Vitis vinifera*) is one of the largest fruit crops in the world, with an approximate annual production of 61 million metric tons. The main by-products are collected during destemming (stems), grape crushing, and pressing (skins, seeds, and lees). Grape pomace consists mainly of peels, stems, and seeds and accounts for about 20% of the weight of the grape processed into wine. Recent investigations have stressed the importance of by-products from wine processing as plant materials particularly rich in a wide range of polyphenols Grape skins and seeds are rich sources of flavonoids including monomeric phenolic compounds,

such as (+)- catechins, (−)-epicatechin, and (−)-epicatechin-3-*O*-gallate and dimeric, trimeric, and tetrameric procyanidins. Studies have shown flavonoids have the capacity to act as powerful antioxidants by scavenging free radicals and terminating oxidative reactions (Brenes et al, 2008). The composition of grape pomace major constituents, Peels and seeds, has been reported by several authors, with high polyphenolic as well as dietary fibre (DF) contents. The seed oil has high unsaturated fatty acid levels, over 80%, linoleic acid being predominant (Llobera & Canellas, 2007). Goni et al (2007) at his reports showed that, increasing concentration of GP in the chicken diets did not impair growth performance (BW, feed consumption, and feed efficiency) compared with those birds fed the unsupplemented and supplemented vitamin E diets.

The objective of current experiment was to investigate the effects grape pomace as corn and soybean alternatives on performance of broiler chickens.

2. MATERIALS AND METHODS

All experimental procedures were approved by the Animal Research Ethics Committee of the Islamic Azad University, Khorasgan branch, Isfahan, Iran.

Grape Pomace

Grape pomace was obtained from Koohrang juicer factory, shahrekord, Iran, in fall 2010. The grape pomace was provided after milling added to dietary treatments.

Bird Management and Diets

Four hundred fifty day-old unsexed broiler chicks (Ross 308) were randomly assigned to 6 treatments with 5 replicates and 15 chicks per each replicate pen at a 39-d study. Dietary treatments consisted of a control diet and diets contain in 3, 6, 9, 12 and 15% grape pomace. A basal diet was formulated as control according to Ross recommendations (2007) for starter (10-25 d), grower (25-36 d), and finisher (36-49 d) periods. The required amount of growth stimulating additives under study was added to the basal diet. All diets were provided as a coarse mash. Birds raised on floor pens. They received feed and water ad libitum. Light was provided continuously (24 h) throughout the experimental period and the initial room temperature was set at approximately 32°C and then gradually reduced based on normal management practices until reaching 22°C. ADFI, ADG and FCR were measured during starter, grower and finisher phases.

Statistical Analysis

Data were subjected to analysis of variance in a completely randomized design using the General Linear Models (GLM) procedure of SAS® (SAS Institute, 2004), and when treatment means were significant ($P<0.05$), Duncan's multiple range test (Duncan, 1955) was used. Single degree of freedom contrasts were

made among treatment means to compare control versus grape pomace-fed groups.

3. RESULTS AND DISSCUSION

The effects of treatments on performance (ADFI, ADG and FCR) of broiler chickens are shown in Tables 1, 2 and 3.

Results of this study indicated that no significant reaction on ADFI of broilers was found by treatments as compared with control group on ADFI of broiler at grower, finisher and during trial period phases (P>0.05). But, experimental treatments had significant effect on ADFI of broiler chickens in starter phase (P<0.05). In this regard, there were no significant differences between birds fed control diet and birds fed diets supplemented with grape pomace. As numerically the highest (96.96 g.day-1 per bird) and the lowest (87.89 g.day-1 per bird) amounts of ADFI are related to birds fed with diets containing grape pomace at 15% and control, respectively. These results are in line with those of some researchers (Goni et al, 2007; Brenes et al, 2008).

Food intake is regulated in birds based on energy and food so they consume the energy required is provided. Because feed intake in birds fed dried grape pomace is probably due to the high fiber diets containing grape pomace is dried, so the birds receive the required energy, more food was consumed.

Table 1: The effect of treatments on ADFI of broiler chickens (g.day^{-1} per bird)

treatment	11-25 days	26-36 days	37-49 days	11-49 days
Control	87.89^{b}	158.33	193.03	142.81
Grape Pomace 3%	94.24^{a}	164.19	187.47	147.71
Grape Pomace 6%	95.43^{a}	162.67	204.14	150.63
Grape Pomace 9%	96.45^{a}	161.97	203.43	151.47
Grape Pomace 12%	96.01^{a}	166.09	195.60	152.01
Grape Pomace 15%	96.96^{a}	171.02	206.60	151.64
Independent comparison				
Control	87.8890^{b}	158.3340	193.0340	142.8070^{b}
Grape Pomace	95.7760^{a}	164.9950	198.8780	150.4780^{a}
		***P*-value**		
Treatment[1]	0.0188	0.2303	0.1066	0.2092
Control of the Grape Pomace	0.0003	0.0960	0.3835	0.0148
SEM	0.85	1.18	1.47	1.06

[1]*P*-value was calculated for studied treatments on broiler birds.
[a–c] within each column Means with no common superscript are significantly ($P < 0.05$) different.

Results of this study indicated that experimental treatments had significant effect on ADG of broiler chickens at starter period (P<0.01). Also, the highest (46.98 g.day-1 per bird) and the lowest (41.52 g.day-1 per bird) amounts of ADG are related to birds fed with diets containing 3% level of grape pomace and grape pomace at 15%, respectively. In this regard, there were no significant differences between birds fed control diet and birds fed diets supplemented with grape pomace at during trial period, finisher and grower phases (P>0.05). These results are in line with those of some researchers (Goni et al, 2007; Brenes et al, 2008).

Table 2: The effect of treatments on ADG of broiler chickens ($g.day^{-1}$ per bird)

treatment	11-25 days	26-36 days	37-49 days	11-49 days
Control	43.92^{bc}	64.61	70.53	59.84
Grape Pomace 3%	46.98^{a}	67.36	67.90	59.44
Grape Pomace 6%	44.47^{b}	67.18	68.44	58.86
Grape Pomace 9%	43.96^{bc}	64.88	65.55	56.61
Grape Pomace 12%	42.39^{bc}	61.52	63.70	56.10
Grape Pomace 15%	41.52^{c}	60.90	64.17	53.56
Independent comparison				
Control	43.9220	64.6120	70.5340	59.8440
Grape Pomace	43.8620	64.5270	66.0420	57.0830
		***P*-value**		
Treatment[1]	0.0023	0.1812	0.6498	0.0861
Control of the Grape Pomace	0.9622	0.9770	0.2007	0.1709
SEM	0.56	0.93	1.15	0.80

[1]*P*-value was calculated for studied treatments on broiler birds.
[a–c] within each column Means with no common superscript are significantly ($P < 0.05$) different.

Results showed that experimental treatments had significant effect on FCR of broiler chickens in starter, grower (p<0.01), finisher (P<0.05) and during trial period (p<0.001) phases. The best FCR at all phases was observed for treatment containing grape pomace 3% and control. Also, the worst FCR at all phases was observed for treatment containing grape pomace at 15%. Results of this experiment are in disagreement with those of Goni et al (2007) and Brenes et al (2008) who reported that grape pomace have not significant effect on FCR of broilers.

Differences in feed conversion in all breeding periods between treatments receiving dried grape pomace with control treatments can be consumed more food without increasing the weight ratio, high-fiber diet that is justified. Perhaps there tannin and lignin and anti-nutritional factors in dried grape pomace on feed conversion is effective.

Table 3: The effect of treatments on FCR of broiler chickens (g of feed g^{-1} of gain)

treatment	11-25 days	26-36 days	37-49 days	11-49 days
Control	2.01^{c}	2.40^{c}	2.76^{b}	2.40^{c}
Grape Pomace 3%	1.98^{c}	2.44^{c}	2.77^{b}	2.49^{c}
Grape Pomace 6%	2.15^{bc}	2.44^{c}	2.99^{ab}	2.56^{bc}
Grape Pomace 9%	2.19^{ab}	2.50^{bc}	3.13^{a}	2.68^{ab}
Grape Pomace 12%	2.26^{ab}	2.70^{ab}	3.08^{a}	2.71^{ab}
Grape Pomace 15%	2.34^{a}	2.81^{a}	3.22^{a}	2.83^{a}
Independent comparison				
Control	2.0061^{b}	2.4007	2.7597	2.3968^{b}
Grape Pomace	2.1843^{a}	2.5686	3.0249	2.6428^{a}
		***P*-value**		
Treatment[1]	0.0017	0.0026	0.0119	0.0007
Control of the Grape Pomace	0.0488	0.1725	0.0524	0.0097
SEM	0.15	0.17	0.20	0.15

[1]*P*-value was calculated for studied treatments on broiler birds.
[a–c] within each column Means with no common superscript are significantly ($P < 0.05$) different.

4. CONCLUSIONS

From The present results, it appears that the utilization of grape pomace in broiler diets could use up to 6% without significant effect on the growth performance. Also, economically grape pomace is a good alternative for corn and soybeans.

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