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Effect of Using Grape Seeds on Productive Performance and Nutrients Utilization for Broiler Chicks during Fattening Period

Tag El-Din, T. H.[1]; A. L. Awad[2] and A. A. Sherief[1]
[1]Poultry Production Dept., Fac. of Agric., Damietta Univ
[2]Anim. Prod. Res. Inst., Agric. Res. Centre, Egypt

ABSTRACT

A total of 216 day old broiler chicks (Arbor Acers) were weighed and distributed into equal 4 experimental groups of three replicates for each to explore the effect of dietary grape seeds (0, 0.5, 1.0 and 1.5%) addition on growth parameters, nutrients utilization and carcass characteristics as well as economic efficiency during fattening period (1-35 days of age). The results indicated that live body weight, body weight gain , feed conversion ratio and production index traits significantly ($P \leq 0.05$) improved for chicks fed diet contained 1.0% grape seeds (GS), while these parameters recorded non-significant improvement by 0.50 and 1.5%GS levels compared with chicks fed the control diet during the entire experimental period (0-35 days of age). Using GS in broilers diet recorded non-significant improvement for nutrients digestibility than the control except for fiber digestibility which was significantly improved. Feeding value improved ($P>0.05$) for chicks by dietary grape seeds addition. Total edible parts (%) insignificantly elevated by feeding different GS diets than the control. Chicks fed 1.0% GS diet recorded the best economic efficiency compared with the control at the entire experimental period. Therefore, it might be concluded that feeding diet contained 1.00% GS for broiler chicks might be used to improve growth performance and nutrients utilization as well as economic efficiency during the fattening period.

Keywords: broilers, grape seeds, growth, nutrient digestibility, carcass traits)

INTRODUCTION

Worldwide, creation of poultry meat and eggs and global consumption of poultry products, especially poultry meat, have expanded regularly over the years, and this pattern is required to proceed. Chick's meat and product have numerous attractive dietary qualities, for example, low lipid substance and relatively high concentrations of polyunsaturated fatty acids (Bourre, 2005). In addition, poultry meat is relatively low-priced compared to other meats.

Grapes (Vitis vinifera) are one of the world biggest fruit crop with yearly creation of 77 million metric tons (FAO, 2013). Processing of grapes for ethanol, fruit juice and wine creation results in tremendous quantities of by-products including stems, skins, seeds and peels, which approximately 20% of the weight of the grape used in making wine (Llobera and Canellas, 2007). These by-products are wealthy in polyphenols like flavonoids, monomeric phenolic compounds, catechins, and epicatechins (Dorri *et al*., 2012). The grape polyphenols could play as powerful antioxidants by scavenging free-radicals and ending oxidative reactions (Brenes *et al*., 2016). When considering the different separate parts of grape pomace (seed and skin), the proportion of seeds ranges from 38% to 52% of the dry material and record for around 17% of the fresh grape pomace (Fernandes etal., 2013; Toscano *et al*., 2013). Grape seeds composition point out the content of fiber (40%), essential oil (16%), protein (11%) and complex phenolic compounds (7%) like tannins and other substances like sugars and minerals (Campos *et al*., 2008). Grape seeds have plentiful fat, mostly linoleic acid, followed by oleic, palmitic, stearic and myristic acids (Bravo and Saura-Calixto, 1998).

Grape by-products have been widely debated as antimicrobial activities and feed additives because they rich in polyphenols compounds, grape by-products has been shown to change the intestinal microflora status of chickens (Xia *et al*., 2010). Dietary polyphenols-rich grape products could be effective in expanding the growth of beneficial bacteria while intensely barring certain pathogenic bacteria, so grape by-products addition to broilers diet can be beneficial for producers (Viveros *et al*., 2011). Dietary grape seed extract have positive effects on the growth performance of broilers when added at low levels to the diets (Wang *et al*., 2008; Brenes *et al*., 2010). In a newfangled review, grape seeds extract (GSE) have decrease plasma lipid components (El-Damrawy, 2014), reinforce antioxidant and immunostimulant status (Katiyar, 2015). However, the addition of GSE with very high levels resulted in growth depression, Hughes *et al*. (2005) found that grape seed extract (GSE) addition with 30 g/kg diet depress the performance of chickens, while Goni *et al*. (2007) and Brenes *et al*. (2008) stated that supplementing grape pomace by 30 g/kg improved antioxidant status without any noxious effect on the performance of chickens.

Therefore, this study was designed to investigate the effects of dietary ground grape seeds addition on growth performance, nutrients utilization and carcass traits as well as economic efficiency for broiler chicks during fattening period (1-35 days of age).

MATERIALS AND METHODS

This study was carried out in a private ranch close near Kafr Saad city, Damietta Governorate, Egypt, during the period between the 17th of October and 22th of November 2018. A 216 day old unsexed commercial broiler chicks (Arbor Acers), were weighed and distributed into equal 4 experimental treatments of three replicates. Experimental groups were arranged as: the 1st group fed on the basal experimental diet (control), the other three groups were fed diets contained ground grape seeds by 0.50, 1.0 and 1.50%, respectively during the entire experimental period (35 days of age). Experimental groups were fed the starter diet during 1-14 days, then the grower diet from 14-28 days, while the finisher diet was used from 28-35 days of age. Experimental diets were similarly formulated to be isocaloric and nitrogenic to meet the broiler requirements according to NRC (1994). Diets composition and calculated analysis are available in Table 1.

Experimental chicks were raised under similar conditions. Feeds and fresh water were accessible adlibitum through the experimental period. Chicks were kept under 23 hours light and one hour dark per day at the experimental period. Chicks immunized against Newcastle (NDV) disease virus and infectious broncheitis (IB) at the first week of age, while Gumboro disease was vaccinated at the second week of age in drinking water. The anti-microbial drugs and vitamins were not used during the experimental period for all groups.

Table1. Experimental diets composition and calculated analysis

Ing., %	Starter diets				Grower diets				Finisher diets			
	GS, %				GS, %				GSs, %			
	0.0	**0.50**	**1.0**	**1.50**	**0.0**	**0.50**	**1.0**	**1.50**	**0.50**	**0.50**	**1.0**	**1.50**
Corn	54.0	53.55	53.0	52.5	61.0	60.4	59.7	59.0	66.2	65.6	64.9	64.2
Soybean (42%)	28.5	28.45	28.42	28.38	25.0	25.0	25.0	25.0	20.0	20.0	20.0	20.0
Gluten (62%)	10.0	10.0	10.0	10.0	5.6	5.6	5.6	5.6	4.5	4.5	4.5	4.5
Grape seed	0.0	0.5	1.0	1.5	0.0	0.5	1.0	1.5	0.0	0.5	1.0	1.5
Mono. Cal	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Limestone	1.6	1.6	1.6	1.5	1.6	1.6	1.6	1.6	1.65	1.65	1.65	1.65
Men. Vit. premix	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Salt	0.35	0.35	0.35	0.35	0.30	0.30	0.3	0.3	0.35	0.35	0.35	0.35
Bicarbonate sodium	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Methionine	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Soya oil	1.3	1.3	1.38	1.42	2.2	2.3	2.5	2.7	3.0	3.1	3.3	3.5
Lysine	0.15	0.15	0.15	0.15	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Molasses (dry matter basis)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Calculated analysis											
CP,%	23.01	23.00	23.00	23.00	19.45	19.46	19.46	19.45	17.11	17.11	17.11	17.11
ME kcal/kg	3040	3029	3022	3013	3106	3100	3100	3100	3188	3179	3181	3181
Ca, %	0.96	0.96	0.96	0.96	0.95	0.95	0.95	0.96	0.95	0.96	0.96	0.96
Phos., %	0.46	0.46	0.46	0.46	0.45	0.45	0.45	0.45	0.44	0.44	0.44	0.44
CF.,	3.18	3.35	3.53	3.70	3.09	3.26	3.44	3.60	2.86	3.03	3.20	3.37
Cost of one kg, LE	6.862	6.840	6.827	6.809	6.576	6.569	6.572	6.575	6.286	6.279	6.282	6.285

1.Vit and Min.(3 kg) contains: Vit A 10 MIU, Vit. D 2 MIU, Vit E 10 g, Vit. K 2 g, Thi. 1 g, Ribo. 5 g, Pyrid. 1.5 g, Niac. 30 g, Vit. B12 10 mg, Panto. 10 g, Fol. 1.5 g, Biot.50 mg, Cho. Chl. 250 g, Man. 60 g, Zin. 50 g, Iro. 30 g, Cop. 10 g, Iod. 1g, Sel.0. 10 g, Cob. 0.10 g. and carrier CaCO3 to 3000 g.

2.NRC (1994).

3.Ingredients price (one kg, LE) at experiment time : corn , 3.90 ; Soy-bean meal, 9.20; gluten , 13.20 ; Mono-calcium Phosphate,16.50 ; limestone, 0.25 ; Vit&Min.premx,60.0 ; Nacl,0.80, Lysine, 35.0 ; Methio.,80.0 ; soya oil (one liter) , 14.00 and Molasses, 3.0 LE ; grape seed, 0.50 LE as well as manufacture process, 200.0 LE/ton live bodyweight before slaughter.

Measurements and estimated parameters:

1. **Growth parameters**: Live body weight and feed consumption recorded weekly per each replicate of broiler chicks. Also, number of dead chicks was recorded during the whole experimental period. Weight gain , feed efficiency and production index were calculated at 1-14, 14-28, 28-35 and 1-35 days of age per replicate, while viability percentage of chicken's was calculated during the overall experimental period.
2. **Digestion trial:** At 32 days of age, feed consumption was recorded per each replicate, and excreta was pooled and thoroughly mixed per replicate for each treatment for three days. Feed and excreta samples were dried immediately for chemical analysis. Digestibility coefficients of DM, OM, CP, CF, EE and NFE were decided according to Jakobsen *et al.* (1960) ; Abou- Raya and Galal (1971), while TDN % and ME (kcal/kg) were calculated.
3. **Carcass traits:** At the end of experiment, four chicks per treatment were randomly taken and representing the average body weight of each treatment, they fasted for 8 h and weighed individually before slaughter and after bleeding. Then, feather plucking and evisceration performed. Eviscerated carcass, giblets and abdominal fat were removed and weighed. Relative weights of carcass traits were communicated as a percentage of live bodyweight before slaughter.
4. **Economic efficiency:** Feeding cost was calculated using existing market prices of one kg of starter, grower and finisher diet consumed per each treatment, total costs calculated as a ratio of feeding cost (Singh *et al*., 2015).Sales revenue was determined by using the price of the poultry stock exchange for the kilo of current living weight at the experiment time.
5. **Statistical analysis:** Data were statistically analyzed according to SAS (2004) computer program using the following model:

$$Y_i = \mu + T_i + e_i$$

Where: Y_i = The observation; μ = Overall mean;

T_i = Effect of treatments (i = 1, 2, 3,4); e_i= Random error.

The differences between means were tested using Duncan's New Multiple Range Test (Duncan, 1955)

RESULTS AND DISCUSSION

Growth performance:-

Dietary grape seed (GS) addition had significant effect on live body weight (LBW) of broiler chicks at different ages (Table 2). Broilers LBW was significantly improved by 7.86% for broilers fed diet contained 10.0% GS , while it insignificantly improved by 5.08 and 2.71% for those fed 5.0 and 15.0 % GS diets compared with those the control group at 35 days of age. On the other hand, body weight gain (BWG) was improved by feeding diets contained GS with or without significant effect (Table 2). Broilers BWG was significantly improved by about 8.05% for broilers reared on 10.0% GS diet, while it insignificantly improved by 5.22 and 2.78% for those fed 5.0 and 15.0% GS diets, respectively comparing to the control group at the entire experimental period (0- 35 days of age). These findings are agreement with Abdallah *et al*. (2017) who reported that increasing grape seed addition to broilers diet resulted an increase in their final BW and BWG. Pascariu *et al*. (2017) found that LBW of broiler chicks fed 0.50 % GS in the diet recorded higher (P<0.01) increase than those fed diet contained grape pomace (10, 20 g/kg) and the control diet. Abu Hafsa and Ibrahim (2018) found that feeding diets containing 20 g GS/kg for broiler chicks had effective in enhancing growth performance. Also, body weight and body weight gain improved by dietary GS addition for broiler chickens (Brenes *et al*., 2008) and growing rabbits (Fawzia *et al*., 2014)on. However, the inclusion of GS in chicken diets did not change growth performance (Nardoia, 2016). These improvements may be due to grape seed could be increased villus height, absorptive surface area, enzymes expression and transport systems of nutrient which resulted an improved body weight gain (Viveros *et al*. 2011).Or they may be due to natural antioxidants in GS such as phenolic compounds can protect the intestinal mucosa from oxidative damage and pathogens as well as limit peristaltic activity in digestive disorders and reduce intestinal movement which lead to better nutrients absorption (Ismail *et al*., 2003).

Feed consumption (FC) was significantly affected due to feeding diet contained GS during different experimental period except for the periods of 14-28 and 1-35 day of age (Table 2). It was significantly increased by 8.18-12.85% for broilers fed different GS diets than the control at 1-14 days of age, while it was (P≤0.05) attenuated by 9.92% for broilers reared on 10.0 % GS diet than the control at 28-35 days of age. Generally, broilers FC amount was numerically similar among different experimental groups at 1-35 days of age. The present results are agreement with Aditya *et al*. (2018) who showed that dietary dried grape pomace supplementation didn't affect on feed consumption for broiler chicks. Abu Hafsa and Ibrahim (2018) concluded that, grape seeds addition by 20 g/kg diet did not affect feed intake than the control. However, El-Kelawy *et al*. (2018) found that supplementing natural sources of polyphenols as grape seed (0.5 and 1.0%) had increased feed consumption. This result could be broilers able to regulate feed intake according to their energy requirements as well as the experimental diet had similar metabolizable energy.

Feed conversion ratio (FCR) was significantly improved by 8.18- 10.06% for broilers fed different GS diets than the control at 1-14 days of age, while it significantly improved by 11.48% for broilers fed 10.0 % GS diet than the control at 14-28 days of age only (Table 2). Generally, broilers fed diet contained GS recorded the best FCR than the control during the entire experimental period, it was improved by 4.17, 7.81 and 3.65% for broiler fed 5.0, 10.0 and 15.0 % GS diet than the control, respectively.

Table 2. Effect of grape seeds on growth parameters for chicks during fattening period

Age , days	Grape seeds ground , % 0.0	0.50	1.00	1.50	Pooled SEM	Sig.
Live body weight (LBW) , g						
One day	44.63	44.44	44.82	44.44	0.12	NS
14 d	438.52^{b}	518.96^{a}	540.19^{a}	520.37^{a}	12.46	**
28 d	1263.70^{b}	1381.0^{ab}	1479.2^{a}	1382.8^{ab}	2.54	**
35 d	1859.26^{b}	1953.80^{ab}	2005.50^{a}	1909.63^{ab}	23.27	*
Body weight gain (BWG), g						
1-14	393.89^{b}	474.51^{a}	495.37^{a}	475.93^{a}	12.46	**
14-28	825.19^{b}	862.04^{ab}	938.98^{a}	862.41^{ab}	16.26	*
28-35	595.56	572.80	526.33	526.85	15.61	NS
1-35	1814.63^{b}	1909.35^{ab}	1960.68^{a}	1865.19^{ab}	23.22	*
Feed consumption, g/chick						
1-14	625.7^{b}	676.9^{a}	706.1^{a}	694.1^{a}	10.4	*
14-28	1724.4	1733.0	1736.4	1722.0	12.8	NS
28-35	1137.6^{a}	1096.7^{ab}	1024.7^{b}	1030.6^{ab}	19.8	*
1-35	3487.7	3506.6	3467.2	3446.7	19.6	NS
Feed conversion ratio (FCR), g feed/ g BWG						
1-14	1.59^{a}	1.43^{b}	1.43^{b}	1.46^{b}	0.02	**
14-28	2.09^{a}	2.01^{ab}	1.85^{b}	2.00^{ab}	0.03	*
28-35	1.91	1.92	1.95	1.97	0.03	NS
1-35	1.92^{a}	1.84^{ab}	1.77^{b}	1.85^{ab}	0.02	*
Production index (LBW, kg/FCR*100)						
1-14	27.61^{b}	36.40^{a}	37.90^{a}	35.69^{a}	1.28	**
14-28	60.48^{b}	68.91^{b}	80.06^{a}	69.26^{b}	2.47	**
28-35	97.37	102.12	102.93	97.77	2.40	NS
1-35	96.75^{b}	106.57^{ab}	113.43^{a}	103.40^{ab}	2.44	*
Viability, %						
1-35	92.59	96.30	96.30	96.30	1.15	NS

a,b, and c : Means in the same row having different letters are significantly different at P ≤0.05; NS= not significant ; * = P ≤ 0.05; **=* = P ≤ 0.01; SEM = standard error mean

These results are agree with Chamorro *et al*. (2013) who concluded that dietary grape seeds extract up to 2.5 g/kg diet had better FCR for chickens. Pascariu *et al*. (2017) reported that broilers received diet contained 5 g/ kg grape seeds, 10 and 20 g/kg grape pomace has achieved a better FCR than the control. Also, El-Kelawy *et al*. (2018) reported that dietary natural sources of polyphenols supplementation had better feed conversion ratio than control groups. Abu Hafsa and Ibrahim (2018)found that, grape seeds addition by 20 g/kg of broiler diet improved feed conversion ratio than the control. However, Aditya *et al*. (2018) found that dietary addition with dried grape pomace (5 up to 10 g/kg) for commercial broilers didn't effects (P > 0.05) on feed conversion ratio than the control during the overall period.

The improvement in FCR is associated with decreasing FC and increasing LBW value which may be attributed to improve BWG of ducklings, or natural antioxidants in grape seeds can protect the intestinal mucosa from oxidative damage and pathogens as well as limit peristaltic activity in digestive disorders and reduce intestinal movement which lead to better nutrients absorption (Ismail *et al*., 2003).

A significant difference was observed among the experimental treatments in production index (PI) by dietary GS addition during different experimental intervals except of 28-35 days of age (Table 2). Broilers PI was significantly improved by 37.27, 32.37 and 17.24%, respectively for broilers fed diet contained 10.0% GS at 1-14, 14-28 and 1-35 days of age comparing to the control group. These findings in the same line with Hajati *et al*. (2015) who showed that birds fed 300 mg GSE/kg diet had higher production efficiency. El-Kelawy *et al*. (2018) reported that dietary natural sources of polyphenols addition of broiler had higher production index compared to Vit. E and control groups. The improvement in PI is associated with improving FCR and increasing LBW value as well as this might be due to the presence of flavonoids in GS which exhibit strong as antioxidant properties (Dorri *et al*., 2012). Also, grape seeds have antimicrobial activity against pathogenic bacteria (Cabuk *et al*., 2003)

Broiler viability (%) was insignificantly higher by using different GS levels in the diet than the control during the entire experimental period. These results are agreement with Wang *et al*. (2008) who reported that the lowest mortality for chicks fed diet supplemented with grape seed proanthocyanidin extract (10 to 20 mg/kg) than the control group. This may be due to GS which plays a vital role as antimicrobial in alleviates remarkably the intestine microbial populations and prevents the lysis of amino acids which is used in proteinic tissues (Lee *et al*., 2001). Also, it may be due to the biological function of phenolic compounds in GS as well that show antioxidant activity which decrease oxidative damage (Xia *et al*., 2010).

Nutrients digestibility coefficients:-

Non-significant differences in all studied nutrient digestibility coefficient and feeding value for broiler chicks by feeding GS diet except of crude fiber (Table 4). Crude fiber digestibility was significantly improved by 33.31, 31.22 and 47.81% for broiler fed diet contained 0.50, 1.00 and 1.5 % GS than those fed the control diet. In the other hand, dry and organic matter, crude protein, ether extract and nitrogen free extract digestibility's were insignificantly improved by feeding diet contained different GS than the control. Also, feeding value was insignificantly improved by different GS diets comparing to the control. These results are agree with Brenes *et al*. (2008) who found that grape pomace (GP) addition to broilers diet didn't effect on digestibility of CP, while ether extract digestibility was reduced in birds fed control and GP diets compared with birds fed vitamin E. Brenes *et al*. (2010) showed that dietary GSE addition (0.6 up to 3.6 g/kg) increased ileal digestibility of crude protein at 21 days of age. Similarly, Aditya *et al*. (2018) found that nutrients digestibility were did not affect (P > 0.05) due to grape pomace (GP) addition with 5.0 up to 10.0 g/kg, except for digestibility of ash than the control, while chicks fed 5.0 or 7.5 g GP/kg diets recorded the highest digestibility of DM, CP and EE than other treatment. These results could be due to the improvements in nutrients enzymatic digestion, a high absorption capacity of the intestinal epithelium and enhanced fermentation activity of intestinal microflora. Also, grape seeds could increase intestinal villus width and height which results in an increase in absorptive surface area, enzymes expression, nutrient transport systems, and an improved nutrient digestibility (Viveros *et al*., 2011).

Carcass traits:-

Both eviscerated carcass and total edible parts (%) were numerically similar for broiler chicks in different experimental groups by feeding different grape seeds diets at 35 days of age (Table 3). Relative eviscerated carcass weight was insignificantly increased by 2.53, 2.08 and 1.28% , while total edible parts (%) was increased by 2.36, 1.87 and 0.81%, respectively for chicks fed diet contained 0.50, 1.00 and 1.5% GS comparing to the control group at 35 days of age. Also, feeding diets contained GS can effect on relative weights of some body organs with or without significant effect. Moreover, abdominal fat (%) was insignificantly elevated by feeding GS diet comparing to the control. These findings are in the same line with Brenes *et al*. (2010) who showed that dietary GSE addition didn't effect on relative weights of pancreas, liver and liver as well as abdominal fat compared with the control for broiler chicks. Also, dietary supplementation of GSE didn't affect the percentage of edible carcass, liver and abdominal fat of birds (Hajati *et al*., 2015). Similarly, Aditya *et al*. (2018) reported that carcass traits for commercial broilers were not significantly affected by GP addition (5, 7.5 and 10 g/kg) compared with the control. Dietary grape pomace (5, 7.5 and 10%) addition had no significant effect on relative weights of carcass, abdominal fat, liver and heart for broilers (Ebrahimzadeh *et al*., 2018). El-Kelawy *et al.* (2018) found that natural sources of polyphenols supplementations to broiler chickens diet increased percentage of dressing and total edible parts compared with control. However, Abu Hafsa and Ibrahim (2018) found that dietary grape seed (GS) addition with 20 g/kg diet had significant elevation of carcass yield, dressing and gizzard %, while 40 g/kg of GS resulted a significant reduced of abdominal fat % than the control. The increase of eviscerated carcass and total eating parts percentage may be due to decreasing un-edible parts as a result of GS addition to the diet. The decrease of abdominal fat (%) may be due to GS prevents fatty tissue buildup, decreases the calorie requirement and increases the tolerance to effort because it may plays as antioxidant material which elevates the β-oxidation of these fatty acids in order to generate adenosine triphosphate (ATP) energy and increase energy utilization by reduce the amount of long-chain fatty acids for esterification to triacylglycerols and storage in the adipose tissue.

Economic evaluation:-

Economic evaluation parameters were illustrated in in Table 5. Total cost was decreased by GS addition to the diet with 10.0 or 15.0 % level. Total return at 35 days of age was improved by different GS addition levels than the control. Generally, net return and EEF values were elevated by feeding different GS diets than the control, EEF values were improved by 12.83, 23.81 and 10.90%for broilers fed diet contained 0.50, 10.0 and 15.0% GS, than those fed the control diet. It's clearly that the GS addition by 10.0% to broilers diet resulted in the best EEF during the entire experimental period for broilers.

Table 3. Effect of grape seeds addition on carcass parameters for chicks at 35 days of age.

Items	Grape seeds ground , %				Pooled SEM	Sig.
	0.0	0.50	1.00	1.50		
Carcass parameters						
LBW, g	1865.0	1935.0	2036.0	2014.0	38.9	NS
Eviscerated carcass, %	70.78	72.57	72.25	71.69	0.37	NS
Total giblets, %	4.22	4.20	4.15	3.92	0.08	NS
Total edible parts, %	75.00	76.77	76.40	75.61	0.37	NS
Abdominal fat, %	1.44	1.80	1.59	1.67	0.09	NS
Relative weights of some body organs						
Liver	2.49	2.54	2.32	2.12	0.08	NS
Gizzard	1.13 [b]	1.14 [b]	1.27 [a]	1.23 [ab]	0.02	*
Heart	0.59	0.53	0.57	0.57	0.02	NS
Spleen	0.12 [b]	0.13 [ab]	0.15 [a]	0.13 [ab]	0.003	*
Pancreas	0.26	0.23	0.20	0.21	0.018	NS

a,b, : Means in the same row having different letters are significantly different at P ≤0.05; NS= not significant ; * = P ≤ 0.05;
SEM = standard error mean

Table 4. Effect of grape seeds addition on nutrients digestibility and feeding value for chicks at 32 days of age.

Items	Grape seeds powder , %				Pooled SEM	Sig.
	0.0	0.50	1.00	1.50		
Dry matter, %	79.15	80.51	81.40	81.58	0.65	NS
Organic matter , %	81.43	82.43	83.81	83.34	0.58	NS
Ash- retention , %	39.88	42.50	44.23	40.81	1.99	NS
Crude protein, %	64.59	69.06	70.10	71.52	1.33	NS
Crude fiber, %	38.40 [b]	51.19 [a]	50.39 [a]	56.76 [a]	2.38	**
Ether extract, %	53.27	55.70	57.31	59.73	1.20	NS
Nitrogen free extract, %	90.80	90.45	92.07	90.65	0.39	NS
Feeding value						
TDN, %	80.91	82.61	84.14	85.19	0.72	NS
ME(kcal/kg)	3382.0	3453.2	3517.1	3560.8	3.00	NS

a,b, : Means in the same row having different letters are significantly different at P ≤0.05; NS= not significant ; ** = P ≤ 0.01;
SEM = standard error mean; TDN= total digestibility of nutrients; ME= metabolizable energy

Table 5. Effect of grape seeds addition on economic evaluation parameters for chicks at experimental period.

Items	Grape seeds ground , g/kg			
	0.0	5.0	10.0	15.0
Total feed cost, LE[1]	22.78	22.90	22.67	22.53
Total cost LE[2]	32.54	32.71	32.39	32.19
Total return LE[3]	50.20	52.75	54.15	51.56
Net return LE[4]	17.66	20.04	21.76	19.37
Economic efficiency LE[5]	0.543	0.612	0.672	0.602
EE of the control LE[6]	100.0	112.83	123.81	110.90

L.E. = Egyptian pound.
1-Total feed cost = the cost of starter, grower and finisher diet consumed.
2-Total cost calculated as total feed cost equal 70% of total cost (Singh *et al.*, 2015)
3-Total return = Live body weight * price of one kg at selling which was 27.0 L.E.
4-Net return = total return – total cost
5-Feeding economic efficiency (%) = Net revenue (L.E) / Total cost (L.E).
6-Assuming that the relative economic efficiency of control group which equal 100.

CONCLUSION

The obtained data showed that grape seed addition with 10.0% to broilers diet could be used to improve growth parameters, nutrient utilization and carcass parameters and economic efficiency under Egyptian environmental conditions.

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تأثير إستخدام مسحوق بذور العنب فى العليقة على أداء كتاكيت اللحم خلال فترة التسمين

تاج الدين حسن تاج الدين[١] ، عوض لطفى عوض[٢] و أحمد عبدالدايم شريف[١]

[١]جامعة دمياط - كلية الزراعة - قسم انتاج الدواجن

[٢]وزارة الزراعة- مركز البحوث الزراعية- معهد بحوث الانتاج الحيوانى

أستخدم عدد ٢١٦ كتكوت عمر يوم واحد وزنت ووزعت عشوائيا الى أربعة مجموعات تجريبية متساوية بكل منها ثلاث مكررات لبحث تأثير استخدام مسحوق بذور العنب (صفر ، ٠.٥٠ ، ١.٠٠ ، ١.٥٠ %) في علائق كتاكيت اللحم وتأثيرها على الأداء الإنتاجي وتمثيل العناصر الغذائية وصفات الذبيحة فضلا عن الكفاءة الاقتصادية خلال فترة التسمين (١ - ٣٥ يوم من العمر). تم تسجيل بيانات وزن الجسم والعليقة المستهلكة وكذلك تم إجراء تجربة هضم لتقدير معاملات هضم العناصر الغذائية وكذلك إختبارذبح لتقدير بعض صفات الذبيحة فضلا عن حساب الكفاءة الاقتصادية. وأوضحت النتائج أن تحسن وزن الجسم والزيادة المكتسبة له ومعامل التحويل الغذائى والدليل الانتاجى معنويا للكتاكيت التى تغذت على العليقة المحتوية على ١.٠ % مسحوق بذورالعنب وبدون معنوية لتلك التى تغذت على ٠.٥٠ ، ١.٥٠ % مسحوق بذورالعنب مقارنة بالمقارنة بالمجموعة الضابطة خلال الفترة الكلية للتجربة (١-٣٥ يوم). لوحظ تحسن معاملات الهضم لجميع العناصر الغذائية بدون معنوية بإستخدام مسحوق بذورالعنب فى العليقة فيما عدا الألياف الخام التى تحسنت معنويا بالمقارنة بالمجموعة الضابطة. كما لوحظ تحسن نسبة الأجزاء المأكولة للذبيحة للكتاكيت المغذاة على العلائق المحتوية على مسحوق بذورالعنب بالمقارنة بالمجموعة الضابطة كما تحسنت الكفاءة الاقتصادية لهذه الكتاكيت وكانت أفضل المجموعات تلك التى تغذت على ١.٠ % مسحوق بذورالعنب بالعليقة مقارنة بباقى المعاملات عند نهاية التجربة. وتشير النتائج إلى إمكانية إستخدام مسحوق بذور العنب فى علائق كتاكيت التسمين بمعدل ١.٠٠% لتحسين الأداء الانتاجى ومعاملات هضم العناصر الغذائية فضلا عن الكفاءة الاقتصادية خلال فترة النمو (١-٣٥ يوم من العمر).