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COMPARATIVE STUDY BETWEEN DIETARY SUPPLEMENTATION OF GRAPE POMACE AND VITAMIN E AS ANTIOXIDANT ON SOME PRODUCTIVE, REPRODUCTIVE AND PHYSIOLOGICAL PERFORMANCE OF MALE AND FEMALE AGED INSHAS STRAIN CHICKENS.

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ABSTRACT: This work was carried out to study the effect of dietary grape pomace and vit.E supplementation on some productive, reproductive and physiological performance traits of aged male and female Inshas strain chickens. A total number of 198 Inshas strain birds (180 laying hens and 18 cocks) 48-wks-old were used in this experiment up to 60 wks of age. All birds were individually weighed and randomly divided into 6 equal experimental groups (30 laying hens and 3 cocks of each) with three replicates (10 laying hens and 1 cock each) with nearly similar average initial live body weight of all groups. The 1st group was fed the basal diet without supplementation but the formula of diet contained 15 mg vit.E/kg diet (control) according to NRC, (1994), while the 2nd, 3rd and 4th and 5th groups were fed on the basal diet supplemented with 1,2,3 and 4% grape pomace respectively and the 6 th group was fed the basal diet supplemented with 150 mg vit.E/ kg diet. The results showed that, values of levels 3 and 4% grape pomace were better than values of vit. E for feed conversion, egg number, egg production percentage, egg mass, plasma superoxide dismutase, plasma glutathione peroxidase and plasma testosterone and the values had significant differences ($P \leq 0.05$) for the level of 4% grape pomace only compared to vit. E group. In general, the highest level of grape pomace (T5) exhibited the best values in all semen physical characteristics, fertility and hatchability traits studied, with significant ($P \leq 0.05$) differences compared to vit. E (T6) and control (T1) groups for traits sperm motility, live sperm percentage, sperm concentration, total sperm per ejaculate, total live sperm per ejaculate, total abnormal sperm per ejaculate, fertility and hatchability percentage of both total and fertile eggs and significant ($P \leq 0.05$) differences compared to control group only in ejaculate volume and abnormal sperm percentage. On the basis of these findings, we concluded a potential use of 4% grape pomace (natural source of antioxidant) as alternative to vit. E (synthetic source of antioxidant) in diets of male and female aged birds of Inshas strain.

Key words: grape pomace, vit. E, productive performance, semen quality.

INTRODUCTION

The free radical theory of aging is one of the most popular theories of aging based on age associated with increasing free radical and the later doing lipid peroxidation which is leading to excessive loss in membrane fluidity, reduction in membrane potential and increase it's permeability to ions which leading to cellular damage and thereby decreased physiological performance and increased susceptibility to diseases (Yu and Yang, 1996), for example, Alzheimer's disease and Parkinson's disease which contributes to increasing in lipid peroxidation and decreased antioxidants in the central nervous system during aging advanced (Spiteller, 2001 and Schipper, 2004). Activities of both antioxidant enzymes such as superoxide dismutase, glutathione peroxidase, catalase and non-enzymic antioxidants like grape seed extract-supplemented, vitamin E and vitamin C, had significant potential to decrease lipid peroxidation in striatum, cerebral cortex, spinal cord and the hippocampus regions of aged rats when compared to young rats (Balu et al., 2005).

Research for new bioefficient antioxidants has focused on antioxidants from natural sources (plants) like grape pomace to respect the consumer concerns over safety from toxicity, easily obtained from natural sources and efficiently prevent lipid oxidation in food products compared to Vitamin E which consider antioxidant from synthetic origin with its limited 1) bioefficiency when polyunsaturated fatty acids in bird's diet is too high; 2) potential antioxidant action and 3) homogeneous spread between tissues. (Mukai et al., 1993, Allard et al., 1997 and Brenes et al., 2008).

Grape pomace which collected during stems isolation, grape crushing, and pressing for skins, seeds, and lees (Llobera and Can˜ ellas, 2007), is rich in a wide range of polyphenols (Bonilla et al., 1999; Alonso et al., 2002; Torres et al., 2002). and had many properties, including antioxidant, antifungal, antiviral, anti-inflammatory and anticancer activities, prevention of atherosclerosis, platelet aggregation inhibiting, improvement of ischaemic cardiovascular disease, metal chelating properties (Yamakoshi et al., 1999; Cos et al., 2003) moreover, antimicrobial potential which consequently, may positively influence growth (Lichovnikova et al., 2015). Previous studies found an increase in the antioxidant activity of broiler's diet, excreta, and meat due to dietary administration of grape pomace concentrations (Gon˜ I et al. 2007 and Brenes et al. 2008). And thereby comparative study is required concerning the effects of different sources of antioxidants on aged birds. Therefore, the objective of the present study was to compare between grape pomace at levels 1, 2, 3, and 4% as a natural source of antioxidant and 150 mg vit E./kg diet as a synthetic source on some productive, reproductive and physiological performance of male and female aged Inshas strain chickens.

MATERIALS AND METHODS

This experiment was executed at Inshas Poultry breeding Station, Animal Production Research Institute, Agricultural Research Center.

grape pomace, vit. E, productive performance, semen quality.

Experimental design

A total number of 198 Inshas strain birds (180 laying hens and 18 cocks) 48-wks-old were used in this experiment up to 60 wks of age. All birds were individually weighed and randomly divided into six equal experimental groups (thirty laying hens and three cocks of each) with three replicates (ten laying hens and one cock each) with almost similar initial average body weight. The 1st group was fed the basal diet without supplementation (control group), while 2nd, 3rd and 4th and 5th were fed on the basal diet supplemented with 1,2,3 and 4% grape pomace respectively and the 6 th group was fed the basal diet supplemented with 150 mg vit.E/ kg diet.

Management and feeding:

All birds were kept under the same managerial hygienic and environmental conditions. Birds were exposed to 16 hours light/day up to the end of experiment period (60 wks of age). Feeding was on layer's diet which contains (16.5% CP and 2700 Kcal) according to NRC (1994). The composition and calculated analysis of the basal diet are shown in table (1). Water was provided for *ad libitum* consumption during the experimental period.

Chemical composition of grape pomace and vit.E were determined according to (A.O.A.C., 1990) in Table (2).

Measurements:-

Laying performance traits:

Birds body weights were individually recorded at the beginning (48 weeks of age) and the end of the experiment (60 weeks of age). Feed intake (FI, g diet/hen/day) and feed conversion ratio (FCR, g feed/g egg mass/day), and egg production (%), egg weight (EW, g) and egg mass (EM, g/90 day) was calculated as (number of eggs x egg weight) in replicate basis at the end of each month from (48 up to 60 wks) of age.

Blood biochemical analysis:

At the end of experiment (60 weeks of age), blood samples were collected. Five hens from each treatment group were randomly selected for taking blood samples (3cm/hen) from the right brachial vein using a sterilized syringe; in heparinized test tubes then centrifuged at 3000 rpm for 20 minutes. The separated plasma was stored at -20°C for until being assayed for plasma superoxide dismutase (SOD), glutathione peroxidase (GPX), testosterone and Iron (Fe) concentrations according to the manufacture recommendations of commercial kits.

Semen quality:

Semen samples were randomly collected from eighteen cocks (three cocks of each treatment) at 60 weeks of age using the massage method. Semen samples were checked for the following characteristics, according to Kalamah *et al*. (2000).

1-The ejaculate volume was determined to the nearest 0.01 ml. using 1.00 ml. tuberculin syringe.

2-Mass motility score (from 1 to 5 grades).

3-Percentage of live and abnormal sperm was determined after staining with eosine and nigrosine.

4-Sperm concentration was determined by using Thomes – Zeis haemocytometer.

5-Total sperm/ejaculate x 10^9 = (ejaculate volume x sperm concentration).

6-Total abnormal sperm/ejaculate x 10^9 = (abnormal sperm% x total sperm/ejaculate /100).

7-Total live sperm/ejaculate x 10^9 = (live sperm% x total sperm/ejaculate /100).

Fertility and hatchability percentages:

At 60 weeks of age, each treatment contained 3 replicates, each replicate contains of 10 hens and 1 cock. The cocks and hens were placed on the floor and supplied with the same previous treatments. Eggs from each treatment were daily collected for two weeks, and then incubated to determine fertility and hatchability percentages of both fertile and total eggs set.

Statistical analysis:

Data were analyzed by one-way analysis of variance using SAS (2000). Differences among means were determined by using Duncan's multiple range test (Duncan, 1955). The percentage values were transferred to percentage angle using arcsine equation before analyzed by statistical analysis, and then actual means are presented. The following model was used:

$Y_{ij} = G + T_i + e_{ij}$.

Where, Yij = observation for each dependent variable; G = General mean;

Ti = Treatment effects (i = 1,2... and 5); eij = Random error.

RESULTS

Productive performance traits:

Body weight, body weight gain, total feed intake, feed conversion, egg number, egg production percentage, egg weight and egg mass of Inshas laying hens during the period from 48 to 60 weeks of age affected by dietary supplementation of grape pomace or vit. E are presented in Table (3). Adding different levels of grape pomace (except the level of 1%) or vit. E to laying hen's diet increased hen productive performance significantly ($P \leq 0.05$) in terms of egg number, egg production percentage and egg mass and without significant effects on body weight gain and egg weight compared to control group (T1) although, total feed intake had comparable values (slight increase) among all experimental groups compared to control group (T1). Moreover, values of levels 3 and 4% grape pomace were higher than values of vit. E for traits feed conversion, egg number, egg production percentage and egg mass and the differences were significantly ($P \leq 0.05$) for the level of 4% grape pomace only.

physiological performance traits:

I) Blood biochemical analysis:

Data of some blood constituents of laying hens affected by experimental treatments are presented in Table (4). Adding grape pomace or vit.E to laying hens diet significantly ($P \leq 0.05$) increased plasma superoxide dismutase, glutathione peroxidase and testosterone concentrations comparing to untreated group (control) except 1% grape pomace for plasma testosterone only and the highest level of plasma superoxide dismutase, glutathione peroxidase and testosterone was recorded for the highest level of 4% grape pomace (T5) in laying hens diet. While, adding different levels of grape pomace (T2, T3, T4 and T5) or vit. E (T6) to laying hens diet did not significantly affect plasma Iron (Fe) concentrations compared to the control group (T1) but, slight gradual decrease (without bad effects on performance traits studied) was observed with increasing dietary levels of grape pomace.

II) Semen quality:

Data of the semen physical characteristics at 60 wks of age affected by dietary supplementation of grape pomace or vit. E are shown in Table (5). Supplementation of grape pomace to cock's diet at different levels or vit. E caused significant (P≤0.05) effect on all semen physical characteristics studied except semen pH at 60 wks of age. The values of ejaculate volume (E.V), sperm motility (S.M), live sperm percentage (L.S%), sperm concentration (S.C), total sperm per ejaculate (TS/E) and total live sperm per ejaculate (TLS/E) were increased but abnormal sperm percentage (Ab.S%) and total abnormal sperm per ejaculate (TAbS/E) were decreased as the levels of grape pomace in cocks diet increased compared to cocks of control group (T1). The highest level of grape pomace (T5) exhibited the best values in all semen physical characteristics studied with significant (P≤0.05) differences compared to vit. E (T6) and control (T1) groups for traits sperm motility, live sperm percentage, sperm concentration, total sperm per ejaculate, total live sperm per ejaculate and total abnormal sperm per ejaculate and significant (P≤0.05) differences compared to control group only in ejaculate volume and abnormal sperm percentage.

III) Fertility and Hatchability percentage:

Fertility and hatchability percentage of both total and fertile eggs of Inshas laying hens affected by dietary supplementation of grape pomace or vit. E at 60 wks of age are presented in Table (6). In general the values of fertility and hatchability percentage of both total and fertile eggs were increased gradually by increasing dietary grape pomace levels. The highest values with significant (P≤0.05) differences for fertility and hatchability percentage of both total and fertile eggs were recorded for the highest level of grape pomace (T5) compared to vit. E (T6) and control (T1) groups.

DISCUSSION

Adding different levels of grape pomace (except the level of 1%) or vit. E to laying hen’s diet increased hen productive performance significantly (P≤0.05) in terms of egg number, egg production percentage and egg mass and without significant effects on body weight gain and egg weight compared to control group (T1) although, total feed intake had comparable values (slight increase) among all experimental groups compared to control group (T1) could be attributed to better utilization and absorption of the nutrients in the gastro-intestinal tract, which leading to better feed conversion efficiency and thereby increasing hen performance which may be through three probable reasons; 1) grape pomace increased villus height: crypt depth ratio, this lengthening of the villus result in an increase in absorptive surface area which lead to increasing nutrient absorption thus, enhancing feed conversion and hen performance (Viveros *et al*. 2011). 2) phenolic compounds of grape pomace had potential to decrease ileal *E. coli* populations, coliforms, *Propionibacteria*, *Bacteroides*, and *Clostridia* because it decrease the adhesion of these bacteria to cells of the intestinal tract (O¨ zkan et al., 2004 and Papadopoulou et al., 2005), through two possible mechanisms, First) the outer cell membrane or cytoplasmic membrane of a bacterium is essentially composed of a phospholipid bilayer and proteins which is the major site of interaction with antimicrobial compounds, gallic acid esters in epicatechin and epigallocatechin gallate (phenolic compounds of grape pomace) have bad effects on the lipid bilayer membrane which results in loss of cell structure and function, thus leading to bacterial death (Perumalla and Hettiarachchy, 2011). And Second) major phenolic constituents in grape pomace like epicatechin, caffeic acid, benzoic acid and syringic acid alter the osmotic pressure of the bacteria cell, thereby rupture the cytoplasmic membrane causing leakage of cell constituents leading to bacterial death (Sivarooban et al. 2008). On the other hand, these phenolic compounds of grape pomace had a positive effect on the content of *Lactobacillus* and *Bifidobacteria* in the lower part of the ileum because *Lactobacillus* has the ability to metabolize phenolic compounds as nutritional substrates, thus supplying energy to cells and positively affecting the bacterial metabolism, these positive alter in intestinal bacteria composition considered a good environment for better absorption of nutrients in the intestine lumen (García-Ruíz et al. 2008). This concept is confirmed by (Viveros et al. 2011) who concluded that dietary polyphenols compounds in grape by-products modify gut morphology and increase the biodiversity of intestinal bacteria in broilers. And 3) Both grape pomace and vit. E had potent antioxidant activity through the following mechanisms First) protecting molecules of nutrients from possible oxidative damage during digestion by scavenging the free radicals through modulates the expression of genes that are required by free radical signaling. (Frank, 2005; Silbergberg et al., 2006; Gon˜ i et al., 2007). and thereby allowing to these nutrients for more digestion thus increasing bird's productivity; Second) preserving the intestinal epithelium from potential oxidative damage caused by dietary factors or bacterial metabolism (Scalbert and Williamson, 2000; Gon˜ i and Serrano, 2005). And thereby, leading to improving the antioxidant status of tissue thus, reflect on better utilization and absorption of the nutrients in the gastro-intestinal tract, which in accordance with (Gon˜ i and Serrano, 2005) who found that inclusion of grape flavonoids causes a diminution of tissue lipid peroxidation and considerable antioxidant activity within the large intestine and Third) protect the liver cells from lipid peroxidation of it's cell membrane thus liver cells continues doing its function of synthesis the very low density lipoprotein and vitellogenin which consider egg yolk precursors and increasing deposition of them during yolk formation (Bollengier-Lee et al., 1998 and 1999 and Puthpon-Gsiriporn et al., 2001), thereby increasing egg production, which in line with (Rodrigo et al., 2002, 2005), who found improving of the antioxidant defense potential in kidney and liver of rats by flavonol rich red wine Forth) oxidative processes leading to conformational modifications of protein leading to dietary protein resistance to digestion. Consequently, the presence of anti-oxidants (vit.E) could partially interfere with oxidative protein denaturation and thereby improving its digestibility thus reflect on hen productivity (Ciftci et al., 2005), which parallel with (Brenes et al., 2010), who illustrated that adding graded concentration of grape seed extract to broiler diet caused a significant increase of ileal protein digestibility (up to 4%; linear effect) at 21 days of age compared to birds which fed control diet. Our results are in harmony with the finding of (Wang et al., 2008), who demonstrated that grape seed proanthocyanidin extract in broiler's diet had an antioxidant effect to improve the performance of broiler chickens.

Concerning to feed intake, the slight increase in total feed intake for any level of grape pomace compared to control group may be because the phenolic compounds in grape pomace like tannin and proanthocyanidin etc. had appetite stimulating effect (Tekeli et al., 2014).

Regarding to treatments comparison, values of levels 3 and 4% grape pomace were higher than values of vit. E for traits feed conversion, egg number, egg production percentage and egg mass, but the values exhibited significant ($P \le 0.05$) differences for the level of 4% grape pomace only may be because the antioxidant potential (free radical scavenging capability) of grape seed is fifty and twenty fold greater than vitamins C and E respectively, caused from increased levels of polyphenols proanthocyanidins and oligomers of flavan-3-ol units, especially catechin and epicatechin present in grape pomace (Shi et al., 2003 and Yilmaz and Toledo, 2004). These results added credence to the conclusion of (Gon˜ I, et al., 2007), who found that the activity of antioxidant in vit. E and grape pomace diets exhibited significantly higher scavenging free radical capacity 3.4 and 6.6 times than control diets using ABTS method {2, 2-azinobis (3-ethilenzotiazolin)-6-sulfonate}respectively Moreover, antioxidant activity of grape pomace in diet and ileal content up to 3.3 and 2.0 times compared to vit. E respectively (Brenes et al., 2008).

As regard to some blood plasma measurements, adding grape pomace to laying hens diet significantly ($P \le 0.05$) increased plasma superoxide dismutase, glutathione peroxidase and testosterone concentrations but slight gradual decrease plasma Iron (Fe) concentrations (without bad effects on performance traits) with increasing dietary levels of grape pomace comparing to untreated group (control) may be because procyanidins in grape pomace had potential to affect the gene expression of antioxidant enzymes by interacting with element promoter in DNA (Puiggross et al., 2005), thus leading to increasing both superoxide dismutase which scavenging superoxide radicals and glutathione peroxidase which react directly with reactive oxygen species (ROS), and the later widely produced by cell metabolism and react with double bonds of polyunsaturated fatty acids to yield lipid hydro peroxides thus cause tissue damage (Halliwell and Gutteridge 1984 and Arthur, 2000). For this, these enzymes considered the enzymatic defense system against free radicals and protecting cells against oxidative damage (Vertuani, et al., 2004) also, reflect on increasing plasma testosterone concentrations because reduced the levels of enzymatic and non-enzymatic antioxidants in Leydig cells (testis's interstitial cells), resulted in decrease the secretion of testosterone (Cao et al., 2004). The slight gradual decrease plasma Iron concentrations (without bad effects on performance traits) may partially explain the antioxidant activity of grape pomace (Chamorro, et al., 2013). Our findings paralleled with earlier work by (Priya, et al., 2012), who found that testosterone concentration increased by supplementing 1% grape seed powder to broiler breeder's diet from 32 to 37 weeks of age during the second and third week of treatment period, which significantly declined from the first week of post treatment period.

Respecting to semen quality, increasing sperm motility by dietary supplementation of grape pomace or vit. E may be because 1) grape pomace facilitated glucose transport by GLUT -5 gene expression in sperm (Ajit, 2007). 2) Increase glutathione peroxidase activity by dietary supplementation as mentioned above enhanced the protection of polyunsaturated fatty acids (PUFA) component in cock's semen against lipid peroxidation. These PUFA exist with large amounts in sperm cells and allow them to maintain flexibility relating to motility, (Surai et al. 2001) and 3) vit.E decreases semen homocysteine which is a defective amino acid formed from demethylation of methionine, increasing homocysteine blocks intra-cellular protein-carboxyl methylation reactions results in inhibition of sperm motility (Sonmez et al., 2007). Our results are similar to the conclusions drawn by Lin et al. (2005) who found that increasing level of vit.E from 40 to 160 mg/kg diet for Taiwan native cocks at 39 week of age significantly improving semen traits, particularly sperm livability and motility. Significant ($P \leq 0.05$) decrease of abnormal sperm percentage and increase sperm concentration by dietary supplementation of grape pomace or vit. E compared to control group may be due to the ability of grape pomace or vit. E as antioxidants to resist the oxidative DNA damage and genetic alterations in the spermatozoa thus decrease abnormal sperm percentage (Bagachi et al., 1997). Moreover, grape pomace or vit. E increase testosterone hormone as mentioned in our results (Table 4), and the latter is required to complete meiosis and spermatids differentiation (Sharpe, 1994), therefore increasing sperm production and concentration (Fernandez, 2008). This concept is confirmed by Jianguo and Zhinian, (1990) who said that testosterone concentration in serum was positively correlated with semen quality.

As regard to fertility and hatchability traits, values of fertility and hatchability percentage of both total and fertile eggs were increased by dietary grape pomace and vit.E compared to control group may be because grape pomace and vit.E increase sperm motility as mentioned above (table 5) and the motility is essential for sperm to traverse the vagina and reach the sperm storage tubules which is important for increasing fertility moreover, reduce lipid peroxidation in seminal plasma through reducing dexamethasone thus maintains an adequate viability of sperm which helping to complete the fertilization process (Eid et al., 2006). Also, grape pomace and vit.E through improving antioxidant status resulted in improving hatchability because oxidative metabolism increases during embryo development at hatchability process especially in the last

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few days before hatch, due to normal respiration related to embryo growth results in increasing the production of free radicals that doing lipid peroxidation leading to tissue damage and hatchability decline (Freeman and Vince, 1974). This concept is confirmed by (Benzie, 2003) who said that although Oxygen is vital for most organisms but, simultaneously, considered a damage key for biological sites and this damage is met by antioxidants substances.

CONCLUSION

Improving female egg production and male fertility of aged birds are the major goals of scientists. Supplementation of the highest level of grape pomace (4%) were the most effective for all traits studied with significant ($P \leq 0.05$) values for some hen productive performance traits (feed conversion, egg number, egg production percentage and egg mass), some blood biochemical analysis (plasma superoxide dismutase, glutathione peroxidase and testosterone), some semen quality traits (sperm motility, live sperm percentage, sperm concentration, total sperm per ejaculate, total live sperm per ejaculate and total abnormal sperm per ejaculate) and fertility and hatchability traits (fertility and hatchability percentage of both total and fertile eggs) compared to vit. E group. On the basis of these findings, we concluded a potential use of 4% grape pomace (natural source of antioxidant) as alternative to vit. E (synthetic source of antioxidant) in diets of male and female aged birds of Inshas strain, and deserves serious attention through future researches to get better understanding the role of grape pomace in promoting productive and reproductive performance of aged birds and their implications in human health before arriving at final conclusions.

Table (1): Composition and calculated analysis of the experimental basal diet.

Ingredients	**Percentage (%)**
Yellow corn	61.57
Soya bean 44%	17.00
Wheat bran	6.70
Corn gluten 60%	4.50
Di Ca Phosphate	1.39
Lime stone	8.16
Salt	0.37
*Premix	0.30
DL Methionine	0.01
Total	100.00
Calculated values (%) **	
Crude protein	16.5
Metabolizable energy (M.E.)	2700
Crude fiber (C. F.)	3.5
Ether extract	3.0
Calcium	3.4
Available Phosphorous	0.40
Total Phosphorous	0.60
Sodium	0.16
Lysine	0.70
Methionine	0.34
Methionine & cysteine	0.62

*premix added to the 1 kg of diet including Vit.A 10000 I.U; vit. D3 2000 I.U; vit. E 15 mg; vit. K3 1 µg; vit B1 1mg; vit. B2 5mg; vit. B12 10 µg; vit B6 1.5mg; Niacin 30mg; Pantothenic acid 10mg; folic acid 1mg; Biotin 50 mg; choline 300 mg; zinc 50mg; copper 4mg; iodine 0.3 mg; iron 30mg; selenium 0.1mg; manganese 60mg; cobalt 0.1mg and carrier $CaCo_3$ up to 1kg.
** Calculated according to NRC. (1994).

Table (2): Chemical composition of grape pomace % (on Dry Matter basis).

Item	Ash	OM	CP	EE	CF
grape pomace	23.70	76.30	13.9	9.14	14.26

(OM=Organic Matter); (CP=Crude Protein); (EE= Ether Extract); (CF= Crude Fiber).

Table (3): Effect of dietary grape pomace and Vit.E supplementation on the performance of Inshas laying hens during the experimental period.

Item	T1	T2	T3	T4	T5	T6	SEM
Initial body weight (g)	1498.11	1506.43	1487.31	14-91.54	1484.92	1509.04	19.11
Final body weight (g)	1569.09	1573.61	1581.52	1588.73	1586.55	1574.96	18.19
body weight gain (g)	70.98	67.18	94.21	97.19	101.63	65.92	21.24
Total feed intake (g/hen/period)	8112.58	8113.22	8124.81	8145.28	8169.47	8139.83	31.18
Feed conversion (g feed/g egg mass)	3.48^{a}	3.34^{ab}	3.23^{bc}	3.14^{c}	2.94^{d}	3.24^{bc}	0.13
Egg number (egg)	46.32^{d}	48.38^{cd}	49.97^{bc}	51.23^{b}	54.87^{a}	49.85^{bc}	1.13
Egg production (%)	55.13^{d}	57.60^{cd}	59.48^{bc}	60.98^{b}	65.32^{a}	59.35^{bc}	1.24
Egg weigh (g/day)	50.25	50.33	50.36	50.61	50.64	50.46	0.25
Egg mass (g/period)	2327.31^{d}	2434.23^{cd}	2516.67^{bc}	2592.18^{b}	2778.39^{a}	2515.14^{bc}	61.21

$^{a, b….}$ Means within each row have no similar letter(s) are significantly different ($P \leq 0.05$).

T1= Control; T2 = 1% grape pomace; T3 = 2% grape pomace;

T4 = 3% grape pomace; T5 = 4% grape pomace; T6 = 150 mg vit.E/kg diet

Table (4): Effect of dietary grape pomace and Vit.E supplementation on some blood plasma measurements of Inshas laying hens at 60 weeks of age.

Item	T1	T2	T3	T4	T5	T6	SEM
Plasma SOD (U/mL)	126.47 ^{e}	132.11 ^{d}	135.42 ^{cd}	137.87 ^{bc}	143.74 ^{a}	136.51 ^{bc}	0.21
Plasma GSH-Px (U/mL)	163.34 ^{d}	169.47 ^{c}	172.14 ^{bc}	174.76 ^{ab}	178.01 ^{a}	171.98 ^{bc}	0.48
Testosterone (ng/ml)	2.36 ^{d}	2.59 ^{cd}	2.97 ^{bc}	3.22 ^{ab}	3.68 ^{a}	2.98 ^{bc}	0.32
Plasma Fe (mg/dl)	311.60	310.90	309.20	307.60	305.80	309.90	4.70

$^{a, b\ldots}$ Means within each row have no similar letter(s) are significantly different ($P \leq 0.05$).
T1= Control; T2 = 1% grape pomace; T3 = 2% grape pomace;
T4 = 3% grape pomace; T5 = 4% grape pomace; T6 = 150 mg vit.E/kg diet
Fe= Iron; SOD= superoxide dismutase; GSH-Px = glutathione peroxidase

Table (5): Effect of dietary grape pomace and Vit.E supplementation on semen quality traits of Inshas cocks at 60 weeks of age.

Item	T1	T2	T3	T4	T5	T6	SEM
Ejaculate volume (ml)	0.35 ^{b}	0.37 ^{b}	0.40 ^{a}	0.41 ^{a}	0.42 ^{a}	0.40 ^{a}	0.03
Semen pH	7.61	7.54	7.68	7.65	7.59	7.62	0.28
Sperm motility (1-5)	2.53 ^{d}	2.91 ^{cd}	3.12 ^{c}	3.77 ^{ab}	4.03 ^{a}	3.41 ^{bc}	0.32
Live sperm %	74.51 ^{d}	78.33 ^{c}	81.96 ^{b}	82.82 ^{b}	88.14 ^{a}	81.97 ^{b}	1.83
Abnormal sperm %	14.26 ^{a}	12.41 ^{bc}	11.32 ^{cd}	10.37 ^{de}	9.54 ^{e}	10.88 ^{de}	1.12
Sperm concentration (x 10^{9})	2.78 ^{c}	3.12 ^{b}	3.31 ^{b}	3.42 ^{b}	3.97 ^{a}	3.38 ^{b}	0.31
Total sperm/ejaculate	0.97 ^{d}	1.15 ^{c}	1.33 ^{b}	1.40 ^{b}	1.67 ^{a}	1.35 ^{b}	0.15
Total live sperm/ejaculate	0.72 ^{d}	0.90 ^{c}	1.09 ^{b}	1.16 ^{b}	1.47 ^{a}	1.11 ^{b}	0.21
Total abnormal sperm/ejaculate	0.148 ^{a}	0.145 ^{a}	0.144 ^{ab}	0.140 ^{bc}	0.138 ^{c}	0.144 ^{ab}	0.031

$^{a, b\ldots}$ Means within each row have no similar letter(s) are significantly different ($P \leq 0.05$).
T1= Control; T2 = 1% grape pomace; T3 = 2% grape pomace;
T4 = 3% grape pomace; T5 = 4% grape pomace; T6 = 150 mg vit.E/kg diet

Table (6): Effect of dietary grape pomace and Vit.E on fertility and hatchability% of Inshas laying hens at 60 wks of age.

Classification	Fertility%	Hatchability of total eggs (%)	Hatchability of fertile eggs (%)
T1	81.2 ^{c}	63.4 ^{d}	74.1 ^{d}
T2	82.4 ^{c}	65.9 ^{d}	76.7 ^{d}
T3	83.9 ^{c}	69.8 ^{c}	80.0 ^{c}
T4	88.5 ^{ab}	74.6 ^{b}	84.9 ^{b}
T5	91.3 ^{a}	81.2 ^{a}	90.8 ^{a}
T6	85.8 ^{b}	70.3 ^{c}	81.2 ^{bc}
SEM	1.04	1.22	1.08

a, b….Means within each column within each trait have no similar letter(s) are significantly different ($P \leq 0.05$).
T1= Control; T2 = 1% grape pomace; T3 = 2% grape pomace;
T4 = 3% grape pomace; T5 = 4% grape pomace; T6 = 150 mg vit.E/kg diet

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الملخص العربى

دراسه مقارنه بين اضافة تفل العنب و فيتامين E كمضادات للاكسده على الأداء الانتاجى والتناسلى والفسيولوجى لذكور و اناث دجاج انشاص المتقدم فى العمر

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أجريت هذه الدراسة فى محطة بحوث الانتاج الحيوانى بانشاص – الشرقيه – معهد بحوث الانتاج الحيوانى. بهدف دراسة تأثير اضافة مستويات مختلفه من تفل العنب أو مستوى واحد من فيتامين E الى العليقة الأساسية على الاداء الانتاجى و التناسلى لذكور و اناث دجاج انشاص البياض المتقدم فى العمر.
استخدم فى هذه الدراسة عدد 180 دجاجه بياضه و 18 ديك من سلاله أنشاص عمر 48 أسبوع وقسمت عشوائيا الى ست مجموعات متساوية العدد (30 دجاجه بياضه و 3 ديوك/ مجموعة) وكل مجموعة تم تقسيمها الى ثلاث مكررات متساوية العدد (10 دجاجه بياضه و 1 ديك /مكررة) وتم تغذية المعاملات الست كالتالى:
1- المعاملة الأولى: (كنترول) غذيت فيها الطيور على العليقة الأساسية بدون أى اضافة وتحتوى على فيتامين E بمعدل (15 مجم/كجم عليقة).
2 -المعاملة الثانيه: غذيت فيها الطيور على العليقة الأساسية مضاف اليها 1% تفل العنب.
3- المعاملة الثالثة: غذيت فيها الطيور على العليقة الأساسية مضاف اليها 2% تفل العنب.
4- المعاملة الرابعة: غذيت فيها الطيور على العليقة الأساسية مضاف اليها 3% تفل العنب.
5-المعاملة الخامسة: غذيت فيها الطيور على العليقة الأساسية مضاف اليها 4% تفل العنب.
6- المعاملة السادسه: غذيت فيها الطيور على العليقة الأساسية مضاف اليها 150 مللى جرام فيتامين E/ كجم عليقه
إستمرت التجربه حتى عمر 60 أسبوع وتتلخص أهم النتائج المتحصل عليها فيما يلى:
- سجلت الطيور التى تغذت على مستويات 3 ، 4 % تفل العنب قيما افضل من فيتامين E فى صفات معامل التحويل الغذائى و عدد البيض و النسبة المئوية لإنتاج البيض و كتلة البيض و كذلك فى تركيز كلا من انزيم سوبر اكسيد دس ميوتيز و انزيم جلوتاثيون بيروكسيديز وهرمون التستستيرون فى بلازما الدم و كانت الاختلافات معنويه فى مستوى 4% تفل العنب فقط مقارنة بفيتامين E.
- بصفه عامه سجلت الطيور التى تغذت على أعلى مستوى من تفل العنب (4%) أفضل النتائج فى الصفات الطبيعيه للسائل المنوى و الخصوبه و الفقس وكانت الاختلافات معنويه مقارنه بكلا من مجموعتى فيتامين E و الكنترول فى صفات الحركة الكلية للحيوانات المنوية- النسبة المئوية للحيوانات المنوية الحية- تركيز الحيوانات المنويه- العدد الكلى للحيوانات المنوية فى القذفة - العدد الكلى للحيوانات المنوية الحية فى القذفة- العدد الكلى للحيوانات المنوية الشاذه فى القذفة- النسبة المئوية للخصوبه- النسبة المئوية للفقس لكلا من البيض الكلى و البيض المخصب و بمعنويه مقارنه بمجموعة الكنترول فقط فى صفات حجم القذفة للسائل المنوى- النسبة المئوية للحيوانات المنوية الشاذه.
من هذه النتائج نستنتج أنه يمكن اضافة تفل العنب بمستوى 4% كمصدر طبيعى لمضادات الاكسده بدل من فيتامين E الذى يعتبر مصدر صناعى لمضادات الاكسده الى العليقة الاساسية لتحسين الأداء الانتاجى والتناسلى والفسيولوجى لذكور و اناث طيور سلالة أنشاص المتقدمه فى العمر