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Effect of Yucca Schidigera Addition to Ducks Diet on Productive Characteristics and Economical Evaluation Through Summer Conditions

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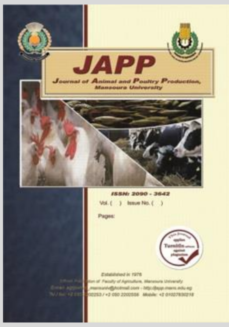

ABSTRACT

The current research assessed for dietary desiccated Yucca Schidigera (YS) addition effects on ducks productivity features as well as economical evaluation at summer time. Used 300 Domyati ducks, 26-weeks-old (240 females and 60 drakes), that split to egalitarian three empirical groups at random in a completely randomized design. The first one was considered as control and consumed the basal diet; while the second and third empirical groups were consumed the basal diet after adding 150 and 300 mg YS/kg respectively, through 26-37 weeks of age. The results summarized that, ducks fed on both YS levels had superior ($p < 0.001$) values of egg number and mass, and feed conversion ratio as well as low feed consumed amount compared with those fed the basal diet without any addition through the entire tested period. Spermatozoa concentration and live spermatozoa (%) were ($p < 0.001$) elevated for drakes fed on 300 mg YS/kg diet, in addition to lower dead sperms (%) than those fed the basal diet. Females fed diet added with YS produced eggs that ($p < 0.001$) higher in hatching features compared to the control. Adding YS to ducks diet caused a greater haemoglobin, RBC, Serum total cholesterol, liver ALT and AST enzymes and MDA were significantly attenuated by dietary 300 mg YS/kg. Conclusively**,** adding 300 mg YS / kg diet produced an advantageous effects of ducks productivity characteristics as well as economical evaluation through summer conditions.

Keywords: ducks, hatching traits, egg production, semen quality, Yucca Schidigera

INTRODUCTION

Proceeded antibiotics uses in modern poultry industry could to increment disease resistance, however preventing, restricting or decreasing their uses might induced to undesirable changes, particularly on conversion efficiency (Awad *et al*., 2021). Increased consumer attention with health problems, as well as craving to restrict or forestall antibiotics uses for their adverse consequence, the insiders in poultry industry are compelled for look a nature replacements proverb phytogenic feed additives so as to help the challenge of poultry diseases in their farms. Phytogenic materials getting prominence currently in poultry farming in addition to health alertness schemes established on their broader useful functions as advancing productivity, immune improving properties, and maintaining life (Dhama *et al*., 2015; Hassan *et al*., 2016).

Yucca Schidigera is gorgeous in the biological steroid saponins that add profitable worth. It deems a greatly pharmaceutical benefits for their saponins and polyphenols content (Patel, 2012). *Yucca Schidigera* is consumed as a biological supplement, flavor enhancer for livestock feed industry (Sahoo *et al*., 2015). It's a biological and defensive effects like boosting poultry immune obligations owing to motivating particular cytokines levels (Bhardwaj *et al*., 2014), antioxidant characteristics, anti-bacterial and stimulating activities of health (Ashour *et al*., 2014). Also**,** using YS could be diminish NH_3 concentration in farms that reflect improving the poultry productivity (Ayasan *et al*., 2005). Ducks are kept under intense farming in greatly occupied herds to achieve huge intensities of economic value as it is one of the tremendously successful and rapid generating business that provides great protein (Farghly *et al*., 2017; Awad *et al*., 2021). Thus, the chief purposes of the contemporary investigation were to assess the impact of dietary dried YS addition on ducks productivity, hatching measurements and blood parameters at summer time.

MATERIALS AND METHODS

The contemporary investigation was executed at El–Serw water fowl investigation location, animal production research institute, ministry of agric., Egypt. Used 240 females and 60 drakes of Domyati ducks (Egyptian original breed), 26-weeks-old and were remained for 12 weeks, balanced (body weight; 1750±15.2g for females and 2750.0±40.5g for drakes) and accidentally distributed on 3 tentative groups, (rate of lay; 25%), in an entirely randomized plan. Every group had of 100 birds (80 females and 20 drakes) and ensured 5 repeats (16 females and 4 drakes; 5 replicates/group). All groups were exposed to 16 L:8 D light plan with 10-20 lux/m^2. Feeds, mash form, and clean water were reachable. Dried YS powder was added to the basal diet with 0, 150 and 300 mg/ kg diet. The basal diet constituents and structure are demonstrated in Table 1.

Rates of surrounding temperature and proportional humidity were recorded through each studied interval, then temperature-humidity index (THI) was computed. Temperature-humidity index was calculated as shown by Marai *et al*. (2001) as follows: THI=db C^o-{(0.31-0.31 PH)(db C^o-14)g, where db C^o=dry bulb temperature and PH= proportional humidity %.

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Both egg number and feed consumption were monitored, whereas egg mass was evaluated for each repeat then averaged per duck at 26-29, 30-33, 34-37 and 26-37 wks of age. Feed efficiency (g feed/ g eggs) was evaluated during the same times.

Five drakes per each group were taken and trained for semen collection according to Kammer *et al*. (1972). Semen was mustered each week (at immediate sunrise) through the examined time, and then semen size was verified (in milliliter) by exploiting characterized mustering elastic pipes. Advanced motility was judged clearly once semen mustering. Spermatozoa concentration was assessed by running a haemocytometer. Dead, total abnormalities, and live of spermatozoa's were judged according to Bakst and Cecil (1997).

Hatching eggs collected for 10 sequential days throughout each studied period and reserved in a cool moist zone during collection, then put in the 'Econom' incubator for hatching. Infertile eggs and early dead embryos were removed and counted at the 10th day of incubation. Subsequently, hatched chicks and late dead embryos (un-hatched eggs) were computed at the end of hatch, then, hatchability and embryonic mortality proportions were appraised. After hatch, ducklings per each group were kept up to 21 day-old and fed starter diet (Table 1) without YS addition to appreciate YS dietary addition to breeder ducks diet on posterior duckling's growth parameters.

At 35 wks-old, blood samples were collected from the wing vein in pipes containing EDTA as anticoagulant from 7 randomly ducks per group to confirm hematologic parameters, hemoglobin, RBC and WBC cells, while neutrophils (N) and lymphocytes (L) were determined in blood stains to evaluate N/L ratio. Also, at 37 weeks-old, another blood samples were gotten from 7 ducks per group without anticoagulant and reserved at normal room temperature for 1 h to coagulate. Pipes were centrifuged at 3000 rpm for 15 minutes to detach clear serum, and afterward serum total protein, albumin, triglycerides, total cholesterol, HDL, liver enzymes ALT and AST, blood GSH and MDA level were estimated using commercial kits.

Economically parameters were calculated (Roland *et al*., 1998) at the whole period using feed ingredients price, yucca powder price (600 LE/kg), egg sales (1.50 LE/ one egg) at the study time.

Table 1. Composition and calculated analysis of the basal diet

Ingredients %	**Starting period (from hatch up to 21 d-old)**	**Laying period (from 26 up 37 wks-old)**
Yellow corn	66.08	65.05
Soya bean meal (44%)	30.20	25.95
Di-cal – phos.	01.53	01.61
Limestone	01.49	06.74
Vit and Min. premix[1]	00.30	00.30
NaCl	00.30	00.30
dl.methionine (97%)	00.10	00.05
Total	100	100
Calculated Analysis[2]		
CP, %	19.00	16.99
ME (Kcal / kg)	2888	2757
Cal., %	1.00	3.00
Av. Pho., %	0.42	0.42
Price (LE/ kg)	5.242	4.857

[1]Each 3 kg of Vit. and Min. contained: 100 mill IUVit A;2 mill IU Vit.D_3;10 g Vit.E; 1 g Vit.K_3; 1 g Vit B_1; 5 g Vit B_2 ;10 mg Vit.B_{12} ; 1.5 g Vit B_6; 30 g Niac. ;10 g Pant. acid ;1g Fol. acid;50 mg Biot. ; 300 g Cho. Chlo; 50 g Z.; 4 g Cop.; 0.3 g Iod. ; 30 g Ir.; 0.1 g Sel.; 60g Man. ;0.1 g Cob.; and carrier $CaCO_3$ to 3000 g .
[2] NRC (1994).

Data gotten were assessed via the general linear pattern of SPSS (2008), like this: $Y_{ik} = \mu + S_i + e_{ik}$ Where: Y_{ik}= performance, μ= General average, S= impact of YS inclusion level, i= (1, 2, and 3), and e_{ik}= unplanned error. The meaningful alterations amid group's means were confirmed by Duncan's multiple range examination (Duncan, 1955).

RESULTS AND DISCUSSION

Data presented in Table 2 shows the THI during the various investigational phases. The calculations achieved are considered like this: < 27.8 = absence of overheat concern, 27.8 to < 28.9 = sensible overheat concern, 28.9 to < 30.0 = severe heat concern and 30.0 and further = more severe overheat concern.

Table 2. Means and standard errors of internal ambient temperature (AT), proportional humidity (PH) and calculated temperature-humidity index (THI) at the empirical time

empirical time,	**AT (^{0}C)**		**PH (%)**		**THI**	
wks	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**
26- 29	36.4±0.3	26.8±0.4	60.3±1.6	37.5±1.5	33.7±0.2	23.8±0.4
30- 33	35.7±0.2	26.1±0.1	61.5±1.4	36.3±0.9	33.2±0.1	23.6±0.1
34- 37	32.2±1.1	24.8±0.6	53.5±1.5	31.5±0.6	29.7±0.9	22.6±0.4

Productive performance:

A significant (p < 0.001) changes were showed in all studied laying traits except for FC at 16-2- and 30-33 wks-old as a result of YS addition (Table 3). Data displayed greater averages of EN and EM for groups fed YS diets than the control group. The superior EN and EM recorded for group fed 300 mg YS/kg when competed with 150 mg YS/ kg diet.

Enhancement of EN recorded was 12.18 and 15.74%, while EM was elevated by 15.59 and 18.71% for birds fed 150 and 300 mg YS/kg diet, respectively at entire empirical phase. Amelioration of YS groups could owing to the useful effects of YS contents like polyphenolic complexes (like resveratrol; which can defend ducks from infections due to its antioxidant, antiviral and anti-inflammatory capabilities) and steroidal Saponins; which can motivate excretion of cytokines and activate inherent protection (Alagawany *et al*., 2018; Su *et al*., 2016). Also, YS preserves as a worthy antioxidant for ducks and its dietary incorporation increased the total antioxidant capacity (Gumus and Imik, 2016). Amelioration the number of egg producing could owing to the betterment digestion, sucking, and utilization of alimentary in the digestive duct of YS groups could owing to the useful effects of YS contents like polyphenolic complexes (Almuhanna *et al*., 2011) due to saponins ammonia-inhabiting interest (Su *et al*., 2016). Likewise, the enhancement in egg production performance may be linked to constructive impacts of steroid

Saponins appear in YS on nutrient captivation from the gastrointestinal area (Alagawany *et al*., 2018). The complexes found in YS have antimicrobial, antioxidant, anti-inflammatory, anti-carcinogenic, antifungal and antiviral properties (Ashour *et al*., 2014). The contemporary findings were supported by those of Kutlu *et al.* (2001) and Ayasan *et al.* (2005) who found that both egg production (%) and egg weight were enhanced by dietary YS addition for quails. Also, Wang and Kim (2011) stated that adding 120 mg YS extract/kg diet had helpful influences on egg mass and FCR. On the other wise, Chepete *et al.* (2012) stated adding YS by 50 up to 200 mg did not change egg performance of laying hens. Birds consumed diets supplemented with both YS levels recorded lower (p < 0.001) feed consumption than those fed the basal diet without YS supplement through the entire empirical phase (Table 3).

Table 3. Egg number and mass, feed consumption and feed conversion as affected by dietary YS addition to Domyati ducks through summer season.

Age, weeks	YS, mg/kg diet 0.0	150	300	MSE	Probability
	Egg number (duck/period)				
26 – 29	16.86 ^{B}	19.29^{A}	19.32 ^{A}	0.32	0.001
30 – 33	16.26 ^{B}	17.62 ^{A}	17.91 ^{A}	0.21	0.001
34 – 37	13.43 ^{C}	15.31 ^{B}	16.39 ^{A}	0.34	0.001
26 – 37	46.55 ^{B}	52.22 ^{A}	53.72 ^{A}	0.88	0.001
	Egg mass, g (duck/period)				
26 – 29	1076.0 ^{B}	1278.7 ^{A}	1272.0 ^{A}	26.2	0.001
30 – 33	1029.0 ^{B}	1137.0 ^{A}	1155.2 ^{A}	16.5	0.001
34 – 37	901.8 ^{C}	1059.8 ^{B}	1142.3 ^{A}	28.2	0.001
26 – 37	3006.8 ^{B}	3475.5 ^{A}	3569.5 ^{A}	68.4	0.001
	Feed consum., g (duck/period)				
26 – 29	4241.7	4147.1	4188.1	20.4	0.169
30 – 33	4339.1	4244.1	4205.1	47.6	0.090
34 – 37	4464.1 ^{A}	4314.3 ^{B}	4234.3 ^{B}	32.1	0.003
26 – 37	13044.9 ^{A}	12705.5 ^{B}	12627.5 ^{B}	84.4	0.012
	Feed conver. ratio (g feed : g egg mass)				
26 – 29	3.94 ^{A}	3.26 ^{B}	3.30 ^{B}	0.088	0.001
30 – 33	4.31 ^{A}	3.74 ^{B}	3.65 ^{B}	0.092	0.001
34 – 37	4.95 ^{A}	4.07 ^{B}	3.74 ^{C}	0.142	0.001
26 – 37	4.34 ^{A}	3.65 ^{B}	3.54 ^{B}	0.100	0.001

A,B,C means in the same row having different letter (s) are significantly different at P≤0.05.

The diminished feed amount recorded 2.60 -3.20% for groups fed YS diet when compared with the control group through 26-37 wks old. The current results disagree with Kutlu *et al.* (2001) and Gurbuz *et al.* (2011) who stated, laying hens consumed diets comprising YS no alteration in FC. Whereas, birds consumed YS diets recorded best (p < 0.001) feed efficiency compared to those fed basal diet without YS supplement through the entire empirical phase (Table 3). Feed conversion ratio was improved by 15.90 and 18.43% in birds fed 150 and 300 mg YS/kg diet, respectively during 26-37 wks old. The improvement in feed efficiency could related to the decrease feed consumption as well as beneficial YS effects in gastrointestinal conduct (Ashour *et al*., 2014). Ayasan *et al.* (2005) found that adding YS to Japanese quail diet managed to enhance FCR. On contrary, Kaya *et al.* (2003) found that FCR didn't affected with adding YS to laying quail diets.

Reproductive traits:

The superior drake ejaculate size, spermatozoa's concentration, live spermatozoa's and advanced motility % were recorded for group fed 300 mg YS/kg followed by 150 mg YS/ kg diet when competed with the control (Table 4).The enhancement in semen traits may related to YS, where it considered exporter of numerous types of biologically energetic items like steroidal saponins and stilbenes (Alagawany *et al*., 2018) .Also, YS content from antioxidant could betterment semen quality (Miah *et al*., 2004). Contemporaneous noticing are similar with Balazi *et al.* (2013) who explained, dietary YS inclusion boost sperms concentricity and motility. Chaudhary *et al.* (2019) found that, semen magnitude, motility and live enumeration sperms (%) were augmented, while dead spermatozoa number (%) was lowered by saponins. Generally, fertility is influenced by diverse issues for instance mating frequency, flocks age, laying rate and ecological conditions (Daikwo *et al*., 2011). Supplementing YS as a naturalistic antioxidant could participate an imperative part for poultry propagation via continuing antioxidant resistances of the sperms and fetal tissues (Surai *et al*., 2006).

Table 4. Semen quality traits as affected by dietary YS addition to Domyati drakes through summer season.

Traits	YS, mg/kg diet 0.0	150	300	MSE	Probability
Ejaculate size, ml	0.234^{B}	0.264^{A}	0.288^{A}	0.008	0.005
Spermatozoa's concentration $x10^{6}$/ mm	2.004^{B}	2.629^{A}	2.907^{A}	0.120	0.001
Live spermatozoa's , %	85.60^{B}	86.15^{B}	90.16^{A}	0.79	0.022
Dead spermatozoa's, %	14.40^{A}	13.85^{A}	9.84^{B}	0.79	0.022
Spermatozoa's motility, %	72.39^{C}	76.30^{B}	80.08^{A}	0.99	0.001
Abnormal spermatozoa's, %	13.84^{A}	13.28^{A}	10.03^{B}	0.51	0.001

A,B,C : means in the same row having different letter (s) are significantly different at P<0.05.

All studied hatching traits of fertile eggs were influenced owing to dietary YS addition (Table 5). Eggs produced from females consumed diet incorporated with both 150 and 300 mg YS/kg exhibited the greatest hatching measurements and the least dead embryos proportions.

Table 5. Hatching traits as affected by dietary *Yucca Schidigera* (YS) addition to Domyati drakes through summer season.

Traits, %	YS, mg/kg diet 0.0	150	300	MSE	Probability
Fertility	85.60^{B}	94.50^{A}	91.27^{A}	1.72	0.050
Hatchability of fertile eggs	70.53^{B}	78.81^{A}	81.04^{A}	1.88	0.021
Early embryonic mortality	8.23	6.60	6.01	0.51	0.181
Late embryonic mortality	21.24^{A}	14.59^{B}	12.96^{B}	1.52	0.029
Total embryonic mortality	29.47^{A}	21.19^{B}	18.96^{B}	1.88	0.021

A,B,C : means in the same row having different letter (s) are significantly different at P<0.05.

Actually, there are two expectations for increasing fertility and hatchability, the first , decreasing atmospheric NH3 which reflect increasing egg production with improving internal quality like egg albumen goodness which are powerfully linked to hatchability outcomes, whilst the 2nd hypothesis could owing to semen property amelioration that advantageous linked with cocks fecundity then subsequently eggs hatchability (Enaiat *et al*., 2009). These observations are analogous with those of Chaudhary *et al.* (2019) who explained that hatching parameters of fertile eggs ameliorated by saponins addition, while embryonic death was attenuated. However, YS addition with 120 mg/kg diet did not change hatchability of fertile eggs in quails (Ayasan, 2013).

Subsequent growth traits for hatched ducklings:

All studied parameters for hatched ducklings were not (P<0.05) varied except of duckling's feed consumption and feed conversion due to YS addition to ducks diet (Table 6). Feed consumption was (P<0.005) attenuated for hatched ducklings by adding 150 or 300 mg YS/kg to breeder ducks diet, moreover, FCR for ducklings was get better by YS addition to laying ducks diet. Our findings explained that feeding YS through laying period, resulted in a cumulative YS components like saponins and phenols in egg. *Yucca schidigera* addition may affect energy breakdown across altering hormone excretions and reducing energy composites in the animal (Kucukkurt and Dundar 2013). These noting's are similar with reports explained that dietary YS inclusion could yield hopeful outcomes for BW (Sahoo *et al*., 2015), FC and FCR (Wang and Kim, 2011; Ayasan, 2013).

Table 6. Some productive measurements for hatched ducklings from eggs produced from laying ducks fed YS in their diet

Traits	YS, mg/kg diet			MSE	Probability
	0.0	150	300		
Duckling wt at hatch, g	46.45	47.44	47.58	0.26	0.151
Duckling wt at 21 d-old, g	727.27	760.70	751.01	6.99	0.130
BWG, g (0-21 d-old)	680.83	713.26	703.43	6.90	0.144
Feed consumption/ one duckl.(0-21 d-old)	1231.50^{A}	1141.66^{B}	1113.74^{B}	17.47	0.005
Feed conver. ratio	1.810^{A}	1.602^{B}	1.583^{B}	0.033	0.001

A,B : means in the same row having different letter (s) are significantly different at P<0.05.

Blood constituents:

Table 7 shows blood hematological and serum constituents for ducks fed dietary YS addition. Blood hemoglobin, red blood cells and lymphocytes cells (%) were (p < 0.001) elevated, but neutrophils cells (%) and neutrophils / lymphocytes ratio recorded (p < 0.001) minimized values for ducks fed YS diet when compared with the control. Blood metabolites were impacted (p < 0.001) by YS addition except for total protein and triglycerides (Table 7). Albumin was (p < 0.001) elevated by YS addition compared to control. Total cholesterol was lessened with YS addition. HDL-cholesterol was increased in YS groups as compared to the control one. Ducks ate diet included 300 mg YS diet exhibited the summit concentricity for HDL. AST and ALT activities were (p < 0.01) weakened of birds fed the high YS level compared to control. Serum GSH value was (p < 0.01) augmented for birds eat 300 mg YS diet, but MDA level was reduced (p < 0.001) than the control.

Blood metabolites are usually linked to health status of an animal. These traits are good indicators of pathological, physiological and nutritional status the birds (Mahrose *et al*., 2016). Birds exposed to heat stress, induced oxidative harm which diminished the stimulation of L and constrain their multiplying, reduce macrophage movement and motility as well as lessen cytotoxicity and naturalistic destroyers (Farghly *et al.*, 2018). YS may influence the immune response as evidenced by lymphocyte responses (Oelschlager *et al*., 2019). The positive effects of YS could owing to their biological antioxidant content like phenolic hydroxyl factions substance that depressing and constraining the creation of hydroxyl peroxide (Hashemipour *et al*., 2013).

Dietary inclusion of YS may progress the immune scheme owing to the proliferation in immunoglobulin intensities of layers ate YS against to the control since it decreases blood ammonia-N which negatively affects health in birds (Ashour *et al*., 2014). Valuable outcomes for YS could accredited to its saponins content that influence intestines wall penetrability. These outcomes are in line with those of Alagawany *et al*. (2018) who explained that, dietary YS addition elevated serum protein and albumin. Lipid disruption might be accredited to the augmented biosynthesis and gathering of cholesterol in liver and/or decreased biliary job (Ashour *et al*., 2014). Our outcomes could related to YS saponins content that can change lipid digestion of birds, and can lessen hypercholesterolemia by diminishing it diffusion into mucous membrane cells (Milgate and Roberts, 1995). Also, saponins could lessen the cholesterol captivation and ease neuter sterols emission (Jenkins and Atwal, 1994), that lessening it absorption and hepatic substance. The current results showed that YS saponins attenuated serum cholesterol and agreed with Aslan *et al*. (2004) in laying hens and Morehouse *et al*. (1999) in rabbits. Cholesterol level was diminished by adding 120 mg YS/kg for laying hens diet (Kutlu *et al*., 2001). Also, Chaudhary (2017) stated a diminishing serum cholesterol, while an augmentation in HDL cholesterol as a result of added feed additives that rich with saponin.

Table 7. Some blood parameters as affected with adding YS to Domyati ducks diet at summer time

Traits	YS, mg/kg diet			MSE	Probability
	0.0	150	300		
Hb , g/dl	14.04^{C}	15.83^{B}	17.57^{A}	0.42	0.001
RBCs, x 10^6	4.429^{B}	5.086^{A}	5.629^{A}	0.151	0.001
WBCs, x 10^3	18.71	18.43	18.29	0.36	0.896
Neutrophils (N), %	29.71^{A}	17.57^{B}	14.43^{B}	1.63	0.001
Lymphocytes (L),%	67.57^{B}	77.71^{A}	80.86^{A}	1.42	0.001
N/L	0.446^{A}	0.227^{B}	0.178^{B}	0.029	0.001
Serum constituents					
T. protein, g/l	3.629	3.943	4.043	0.098	0.192
Alb., g/l	1.786^{A}	1.571^{B}	1.586^{B}	0.121	0.001
Triglycerides, mg/dl	107.14	95.71	97.86	14.27	0.295
Total cholesterol, mg/dl	144.14^{A}	112.86^{B}	10..00^{B}	5.35	0.001
HDL cholesterol, mg/dl	34.00^{B}	38.29^{A}	36.00^{AB}	0.80	0.084
AST, UI	69.37^{A}	69.01^{A}	67.49^{B}	0.35	0.054
ALT, UI	17.39^{A}	16.77^{B}	16.43^{B}	0.14	0.011
GSH , U/dl	31.00^{B}	32.14^{B}	38.43^{A}	1.33	0.040
MDA, nmol/ml	4.30^{A}	4.00^{B}	3.93^{B}	0.05	0.005

A,B,C : means in the same row having different letter (s) are significantly different at P<0.05.

Poultry species yield free radicals in usual physiological activities as superoxide anion radicals (O2-·) and hydroxide radical (·OH). Extra radicals will harm the construction and role of sugars, proteins, nucleic acids and other organic macro particles and membrane, causing practical and metabolic complaints (Su *et al*., 2016). Serum MDA level, a result of lipid peroxidation, is a pointer for assessing antioxidant schemes (Hassan *et al*., 2016). The current positive effects for YS addition could owing to YS phytochemicals content (Alagawany *et al*. 2015; Su *et al*., 2016). Resveratrol and methanol extract of YS showed an influential scavenging action versus free radicals caused by stresses and could construct stimulation of the key transcription aspects that control the reaction to antioxidants (Su *et al*., 2016). Our outcomes are agreed with Ashour *et al*. (2014) and Alagawany *et al*. (2018) who showed that phytogenic interior content lead to a condensation of antioxidant that act a reduction in MDA level.

Economic evaluation:

The YS cost was ($p < 0.001$) elevated by increasing YS level addition (Table 8). Total sales were augmented ($p < 0.001$) by 13.50 and 15.64% for birds fed 150 and 300 mg YS/kg diet. Net return and economical efficiency ratio for ducks were hiked by mounting YS level in laying ducks diet compared to those fed the basal diet. The present findings of the economic evaluation might related to the diminished feed consumed and better FCR as well as increasing of number produced.

Table 8. Economic evaluation parameters as affected with YS addition to Domyati ducks diet at summer time

Parameters	YS, mg/kg diet			SEM	Probability
	0.0	150	300		
Feed cost (LE)[1]	63.84^{A}	61.71^{B}	61.33^{B}	0.41	0.012
Yucca cost (LE)[2]	0.00^{C}	1.14^{B}	2.27^{A}	0.25	0.001
Total cost (LE)[3]	63.84	62.85	63.60	0.32	0.439
Total sales (LE)[4]	69.82^{B}	79.25^{A}	80.74^{A}	1.33	0.001
Net return (LE)[5]	5.98^{B}	16.39^{A}	17.13^{A}	1.40	0.001
Economical efficiency[6]	0.094^{B}	0.261^{A}	0.270^{A}	0.02	0.001

A,B,C : means in the same row having different letter (s) are significantly different at P<0.05.
1-feed amount x 4.857 LE)
2-yucca amount, g x 0.6 LE
3-total cost = feed cost + yucca cost
4-produced EN x 1.50 LE)
5-net return = total sales – total cost
6- net return / total cost

CONCLUSION

Adding Yucca Schidigera with 300 mg/kg diet for Domyati ducks could be recommended a substitutional procedure to elevate the productive and profitable performance without untoward effects, as well as economical efficiency at summer time.

REFERENCES

Alagawany M., Abd El-Hack M.E., Farag M.R., Elnesr S.S., El-Kholy M.S., Saadeldin I.M., Swelum A.A. (2018). Dietary supplementation of Yucca schidigera extract enhances productive and reproductive performances, blood profile, immune function, and antioxidant status in laying Japanese quails exposed to lead in the diet. Poult. Sci. J., 97: 3126–3137.

Alagawany M.M., Farag M.R., Dhama K., El-Hack M.E., Tiwari R., Alam G.M. (2015). Mechanisms and beneficial applications of resveratrol as feed additive in animal and poultry nutrition: a review. Inter. J. Pharmacol., 11: 213–221.

Almuhanna E.A., Ahmed A.S., Al-Yousif Y.M. (2011). Effect of air contaminants on poultry immunological and production performance. Inter. J. Poult. Sci., 10: 461–470.

Ashour E.A., Alagawany M., Reda F.M., Abd El-Hack M.E. (2014). Effect of supplementation of *Yucca schidigera* to growing rabbits diets on growth performance, carcass characteristics, serum biochemistry and liver oxidative status. Asian J. Anim. Vet. Adv., 9: 732–742.

Aslan R., Dundar Y., Eryavuz A., Bulbul A., Kucukkurt I., Fidan A.F., Akıncı Z. (2004). Effects of different dietary levels of *Yucca schidigera* powder (deodorase) added to diets on performance, some hematological and biochemical blood parameters and total antioxidant capacity of laying hens. Revue Med. Vet., 156: 250–255.

Awad A., Fahim H., El-Shhat A., Mahrose K., Shazly S. (2021). Dietary *Echinacea purpurea* administration enhanced egg laying performance, serum lipid profile, antioxidant status and semen quality in duck breeders during summer season. J. Anim. Physiol. Anim. Nutr., DOI: 10.1111/jpn.13488.

Ayasan T. (2013). Effects of dietary *Yucca schidigera* on hatchability of Japanese Quails. India. J. Anim. Sci., 83: 641–644.

Ayasan T., Yurtseven S., Baylan M., Canogullari S. (2005). The effects of dietary yucca schidigera on egg yield parameters and egg shell quality of laying Japanese quails (*Coturnix coturnix japonica*). Inter. J. Poult. Sci., 4: 159–162.

Bakst M.R., Cecil H.C. (1997). Determination of sperm concentration II. Establishing a standard curve. Pages 11–19 in Techniques for Semen Evaluation, Semen Storage, and Fertility Determination. M. R. Bakst and H. C. Cecil, ed. Poult. Sci. Association, Inc. Savoy, IL, USA.

Balazi A., Foldesiova M., Chrastinova L., Sirotkin A.V., Chrenek, P. (2013). Effect of the herbal additive Yucca on rabbit spermatozoa characteristics. J. Microbiol. Biotechnol. Food Sci., 2: 1829–1837.

Bhardwaj J., Chaudhary N., Seo H.J., Kim M.Y., Shin T.S., Kim J.D. (2014). Immunomodulatory effect of tea saponin in immune T-cells and T-lymphoma cells via regulation of Th1, Th2 immune response and MAPK/ERK2 signaling pathway. Immunopharmacol. Immunotoxicol., 36: 202–210.

Chaudhary S.K. (2017). Assessment of the performance of broiler breeders fed diet containing soapnut (*Sapindus mukorossi*) shell powder. M.V.Sc. Thesis, Deemed University, Indian Veterinary Reseaerch Institute, Izatnagar, pp. 78-80.

Chaudhary S.K., Mandal A.B., Bhar R., Gopi M., Kannan A., Jadhav S.E., Rokade J.J. (2019). Effect of graded levels of soapnut (*Sapindus mukorossi*) shell powder on reproductive performance in broiler breeders. Asian-Australian J. Anim. Sci., 32: 118-125.

Chepete H.J., Xin H., Mendes L.B., Li H., Bailey T.B. (2012). Ammonia emission and performance of laying hens as affected by different dosages of *Yucca schidigera* in the diet. J. Appl. Poult. Res., 21: 522–530.

Daikwo S.I., Dim N.I., Momoh M.P. (2011). Hatching characteristics of Japanese quail eggs in a tropical environment. Inter. J. Poult. Sci., 10: 876–78.

Dhama K., Latheef S.K., Mani A.S.H., Karthik K., Tiwari R., Khan R.U., Alagawany M., Farag M.R., Alam G.M., Laudadio V., Tufarelli V. (2015). Multiple beneficial applications and modes of action of herbs in poultry health and production—a review. Inter. J. Pharmacol., 11: 152–176.

Duncan D.B. (1955). Multiple range and multiple F tests. Biometrics, 11: 1-42.

Enaiat M.E.A., Eman M.A., Salem A., Al-Kotait A.H.A. (2009). Effect of *Yucca schidigera* extract and aluminum chloride on pen's atmospheric ammonia, productive, reproductive and physiology performance of silver Montazah cocks. Egypt. Poult. Sci. J., 29: 337–56.

Farghly M.F., Mahrose K.M., Galal A.E., Ali R.M., Ahmad E.A.M., Rehman Z., Ullah, Z., Ding C. (2018). Implementation of different feed withdrawal times and water temperatures in managing turkeys during heat stress. Poult. Sci., 97: 3076–3084.

Farghly M.F., Mahrose K.M., Ullah Z., Rehman Z., Ding C. (2017). Influence of swimming time in alleviating the deleterious effects of hot summer on growing Muscovy duck performance. Poult. Sci., 96: 3912-3919.

Gumus R., Imik, H. (2016). The effect of *Yucca schidigera* powder added to lamb feed on fattening performance, some blood parameters, the immune system, and the anti-oxidative metabolism of the hepatic tissue. Turkish J. Vet. Anim. Sci., 40: 263–270.

Gurbuz E., Balevi T., Kurtoglu V., Oznurlu, Y. (2011). Use of yeast cell walls and Yucca schidigera extract in layer hens' diets. Itali. J.Anim. Sci., 10: 134–138.

Hashemipour H., Kermanshahi H., Golian A., Veldkamp, T. (2013). Effect of thymol and carvacrol feed supplementation on performance, antioxidant enzyme activities, fatty acid composition, digestive enzyme activities, and immune response in broiler chickens. J. Poult. Sci., 92: 2059–2069.

Hassan F., Mahrose K.M., Basyony M.M. (2016). Effects of grape seed extract as a natural antioxidant on growth performance, carcass characteristics and antioxidant status of rabbits during heat stress. Arch. Anim. Nutr., 70: 141-154.

Jenkins K.J., Atwal, A.S. (1994). Effects of dietary saponins on fecal bile acids and neutral sterols, and availability of vitamins A and E in the chick. J. Nutr. Biochem., 5: 134–137.

Kammer D.M., Moreng R.E., Muller H.D., Hobbs H.W. (1972). Turkey semen evaluation for fertility prediction. Poult. Sci., 51: 77-82.

Kaya S., Erdogan Z., Erdogan S. (2003). Effect of different dietary levels of Yucca schidigera powder on performance, blood parameters and egg yolk cholesterol of laying quails. J. Vet. Med. Physiol. Pathol. Clin. Med., 50: 14–17.

Kucukkurt I., Dundar Y. (2013). Effects of dietary *Yucca schidigera* supplementation on plasma leptin, insulin, iodated thyroid hormones and some biochemical parameters in rats. Revue Med. Vet., 164, 362–367.

Kutlu H.R., Gorgulu M., Unsal, I. (2001). Effects of dietary *Yucca schidigera* powder on performance and egg cholesterol content of laying hens. J. Appl. Anim. Res., 20: 49–56.

Mahrose K.M., Elsayed M., Basuony H., Gouda, N. (2016). Effects of exposing ostrich eggs to doses of gamma radiation on hatchability, growth performance, and some blood biochemicals of hatched chicks. Environ. Sci. Pollut. Res., 23: 23017-23022.

Marai I.F.M., Ayyat M.S., Abd El-Monem U.M. (2001). Growth performance and reproductive traits at first parity of New Zealand White female rabbits as affected by heat stress and its alleviation under Egyptian conditions. Trop. Anim. Health Prod., 33: 1–12.

Miah M.Y., Rahman M.S., Islam, M.K. (2004). Effects of saponin and L-carnitine on the performance and reproductive fitness of male broiler. Inter. J. Poult. Sci., 3: 530-533.

Milgate J., Roberts D.C.K. (1995). The nutritional & biological significance of saponins. Nutr. Res., 15: 1223–1249.

Morehouse L.A., Bangerter F.W., DeNinno M.P., Inskeep P.B., McCarthy P.A., Pettini J.L., Savoy Y.E., Sugarman E.D., Wilkins R.W., Wilson T.C., Woody H.A., Zaccaro L.M., Chandler C.E. (1999). Comparison of synthetic saponin cholesterol absorption inhibitors in rabbits: evidence for a non-stoichiometric, intestinal mechanism of action. J. Lipid Res., 40: 464–474

NRC. (1994). Nutrient Requirements of Poultry. 9th rev. ed. Natl. Acad. Press, Washington, DC.

Oelschlager M.L., Rasheed M.S.A., Smith B.N., Rincker M.J., Dilger R.N. (2019). Effects of *Yucca schidigera*-derived saponin supplementation during a mixed Eimeria challenge in broilers. Poult. Sci., 98: 3212–3222.

Patel S. (2012). Yucca: A medicinally significant genus with manifold therapeutic attributes. Natur. Prod. Bioprospect., 2: 231–234.

Roland D.A., Bryant M.M., Zhang, J.X. (1998). Econometric feeding and management. 1. Maximizing profits in Hy-Line w-36 hens by optimizing total sulfur amino acid intake and environmental temperature. J. Appl. Poult. Res., 7: 403-411.

Sahoo S.P., Kaur D., Sethi A.P.S., Sharma A., Chandra, M. (2015). Evaluation of *Yucca schidigera* extract as feed additive on performance of broiler chicks in winter season. Vet. World, 8: 556–560.

SPSS. (2008). SPSS User´s Guide Statistics. Ver. 17. Copyright SPSS Inc., USA.

Su J., Shi B., Zhang P., Sun D., Li T., Yan S. (2016). Effects of yucca extract on feed efficiency, immune and antioxidative functions in broilers. Braz. Arch. Biol. Technol., 59: e16150035. https://doi.org/ 10.1590/ 1678-4324-2016150035

Surai P.F., Fisinin V.I., Karadas, F. (2006). Antioxidant systems in chick embryo development. Part 1. Vitamin E, carotenoids and selenium. Anim. Nutr. J., 2: 1-11.

Wang J.P., Kim, I.H. (2011). Effect of caprylic acid and *Yucca Schidigera* extract on production performance, egg quality, blood characteristics, and excreta microflora in laying hens. Br. Poult. Sci., 52: 711–717.

تأثير إضافة اليوكا الى عليقة البط البياض على الصفات الإنتاجية والتقييم الإقتصادي خلال فصل الصيف

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هذا البحث يهدف دراسة تأثير إضافة اليوكا الى عليقة البط البياض على الصفات الإنتاجية والتقييم الاقتصادى خلال فصل لصيف . تم اختيار عدد 300 طائر بط دمياطى (240 أنثى 60 ذكر) عمر 26 أسبوع وتم تقسيمها عشوائيًا إلى ثلاثة مجموعات متساوية (فى خمسة مكررات) فى تصميم تام العشوائية. تم تكوين العليقة الأساسية (16.99٪ بروتين خام و 2757 كيلو كالوري طاقة ممثلة) وتمت تغذية المجموعة الأولى عليها كمجموعة للمقارنة بينما المجموعات الأخرى غذيت على العليقة الأساسية المضاف لها مسحوق اليوكا بمعدل 150 ، 300 ملجم / كجم عليقة على التوالي خلال الفترة من 26 – 37 أسبوع. أظهرت النتائج تحسن عدد البيض الناتج وكتلته وكفاءة التحويل الغذائى معنويًا بينما انخفضت كمية العليقة المستهلكة بإضافة اليوكا للعليقة مقارنةً بالكنترول خلال الفترة الكلية للتجربة (26-37 أسبوعً). كما ارتفع تركيز الحيوانات المنوية ونسبة الحيوانات المنوية الحيه معنويا بينما انخفضت نسبة الحيوانات المنوية الميتة معنويا فى السائل المنوى للذكور المغذاه على العليقة المضاف لها 300 ملجم يوكا / كجم مقارنةً بالكنترول. كما تحسنت نسبتى الخصوبة والفقس معنويا للبيض الناتج من البط المغذى على العليقة المضاف لها اليوكا مقارنةً بالكنترول. البط المغذى على العلائق المضاف لها اليوكا سجل اعلى قيم فى الهيموجلوبين وعدد كرات الدم الحمراء بينما انخفض معنويا محتوى الدم من الكوليسترول وانزيمات الكبد (AST & ALT) وكذلك MDA. لذا يمكن التوصية بإضافة مسحوق اليوكا الى عليقة البط البياض بمعدل 300 ملجم /كجم عليقة لتأثيرها الإيجابى على الصفات الانتاجية و الكفاءة الاقتصادية للبط خلال ظروف الصيف