

Effect of Dietary Supplementation with L-Arginine and Vitamin C on Reproduction Performance and Economical Efficiency for Matrouh Strain Hens under Egyptian Summer Conditions

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Abstract

The present work was aimed to study the effect of dietary L-arginine level, vitamin C, and their interaction between them on some reproductive performance and economical efficiency of Matrouh laying hens during the summer season. A 4X3 factorial treatment arrangement was carried out including four levels of dietary L-Arg (0.0, 0.4, 0.8, and 1.2 g/kg diet) and three VC concentrations (0, 150, and 300 mg/kg diet). A total number of 108 Matrouh hens and 36 cocks (Egyptian local strain) aged 64 weeks were randomly distributed into twelve treatment groups (three replicate each). The results obtained showed non-significant ($p < 0.05$) effect in fertility percentages due to dietary L-Arg or VC supplementation through all the experimental periods. The interaction effects between dietary L-Arg and VC levels had a major influence ($p < 0.05$) on fertility percentage. Dietary L-Arg levels had significant ($P < 0.05$) effects on the hatchability percentages of total eggs set and fertile egg during all periods of estimation. The VC supplementation didn't have any significant effects on fertility and hatchability of fertile eggs percentage. The interaction effects between dietary L-Arg and VC levels had a major influence ($p < 0.05$) on the hatchability percentages of total eggs set during all the interval periods. In conclusion, it could be concluded that Matrouh laying hens supplemented diet with L-Arg at a level of 0.4 g and VC at a level of 150 mg/kg diet, seemed to be adequate to achieve the favorite results and is recommended.

Keywords: L-arginine, vitamin C, laying hens, fertility percentage, hatchability.

Introduction

The aims of the poultry industry are to increase the efficiency of the transformation from feed to animal proteins for consumers and to reduce the nitrogen excretion pollution. At present, synthetic amino acids are added to low-protein diets to obtain a well-balanced feed. L-arginine (ARG), like most amino acids traditionally noted for their role in protein synthesis, is metabolized by arginases to L-ornithine for polyamine biosynthesis, and by nitric oxide synthases (NOS) to L-citrulline and nitric oxide (NO) (Yuan *et al.*, 2016). However, there exist differences in the L-Arg requirement because most mature mammals are able to synthesize L-Arg to meet their requirements while uricotelic species like birds cannot synthesize L-Arg due to an incomplete urea cycle (D'Amato and Humphrey, 2010).

Arginine helps to avoid the harmful effects of excessive free radicals produced during body metabolism (Atakisi *et al.* 2009) as well as growth and reproduction (Fernandes *et al.* 2009). Arginine is essential for sperm motility, metabolism, capacitation, acrosome reaction, and is a precursor for producing putrescine, spermine, and spermidine (Ko and Sabangh, 2014). Spermidine is synthesized from putrescine and is a precursor of spermine. Daily L-Arg supplementation improves sperm concentration and motility (Scibona *et al.*, 1994).

On the other hand, poultry are unable to synthesize ARG due to the lack of variant enzymes of the urea cycle (Fernandes *et al.*, 2009).

Ascorbic acid is an antioxidant and water-soluble vitamin that is found intra- and extra cellular as ascorbate (Chihuailaf *et al.*, 2002). In addition, it is a natural antioxidant that prevents the increased production of free radicals induced by oxidative damage to lipids and lipoproteins in various cellular compartments and tissues (Erdogan *et al.*, 2005). Ascorbic acid supplementation at 200 ppm is beneficial for enhancing the immunity, performance, and exploiting the broilers' full genetic potential (Lohakare *et al.*, 2005).

Ascorbic acid can be used as an anti-stress agent to minimize embryonic heat stress effects and have positive effects on embryos development and hatchling body weight under thermoneutral or heat stress conditions. (Kutlu, 2001, and Nowaczewski *et al.*, 2012).

The role of vitamin C in the improvement of egg laying has not been sufficiently elucidated although various researchers indicate its involvement in the process of maturation of egg vesicles (Kolb and Seehawer, 2001). The beneficial effect on egg production of vitamin C added to feeds for laying hens was particularly evident when the birds were exposed to stress caused by high air temperature or increased stocking rate of birds per unit area (Njoku and Nwazota, 1989; Kontecka *et al.*, 1997). Peebles and Brake (1985) were among those researchers who reported the influence of vitamin C added to the feed on the improvement of hatchability in broiler chickens. In addition, vitamin C was also reported to

have a positive impact on the hatchability of Pekin ducks (KontECKA *et al.*, 2001). Abdelfattah (2019) indicated that the rate of embryonic mortality was decreased remarkably due to treatment with ascorbic acid and thus increased hatching rate.

Therefore, the objective of the present study was planned to investigate the beneficial effects of dietary supplementation of L-arginine and ascorbic acid on some reproductive performances during the summer seasons for Matrouh chickens as local strain hens

Materials and Methods

The latest research was conducted at the Inshas Poultry Breeding Research Station, Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture, Giza, Egypt, during the period from May 2018 to August 2018. The chemical analysis was carried out at the Laboratories of the Animal Production Research Institute, Ministry of Agriculture. The experimental design of this work was planned to study the effect of adding different levels of L-arginine and vitamin C dietary supplementations on reproductive performances of Matrouh local strain from 64 to 75 weeks of layers age during the summer season of Egypt. A total number of 108 laying hens and 36 cocks of Matrouh local strain, 64 weeks old, were randomly chosen from a large commercial flock. All selected hens and cocks were approximately of an equal body weight and similar performance. All birds of the experimental treatments were individually housed in wire-caged batteries (45×30×35cm). All birds were reared under the same management and hygienic condition and fed a basal laying ration formulated according to the recommendation of NRC (1994). Feed ingredients and chemical analysis of the experimental basal diet are presented in Table (1). The photoperiod during the experimental period was fixed at 16 hrs daily. Hens were fed ad-libitum and the fresh water was available all the time during the experimental period (12 weeks). All selected birds were randomly distributed into twelve groups (9 hens and 3 cocks / each). A 4 x 3 factorial arrangement design was used in this experiment of design with four levels of L-arginine (0, 0.4, 0.8 and 1.2 g/kg diet) and three levels of Vitamin C (0, 150 and 300 mg/kg diet) and their interaction were tested from 64 to 75 weeks of age. Cocks were used to collect semen and artificially inseminated to hens for two times per week. Experimental birds were divided into two groups. Birds of the first group fed either the basal diet only and conceded as control group or supplemented with 0, 0.4, 0.8 or 1.2 g L-arginine /kg diet and the second group fed diet supplemented diet with Vitamin C (VC) at a level of 0, 150 or 300 mg/kg diet, respectively. Small amounts of the basal diet were mixed at first with the respective amount of any supplement as a small batch, and then gradually mixed with a larger amount of the basal diet until the total amount of the respective diet was

reached, finally the mixture was thoroughly homogenized mixed. At 68, 72 and 75 weeks of age, 30 eggs from each treatment group were chosen randomly at every four weeks and stored at 18^o C temperature and 65% relative humidity. Eggs were incubated in an automatic computerized hatchery at the Poultry Breeding Station in Inshas. After hatching, the chicks were counted and non-hatched eggs were broken to determine the percentages of fertility and hatchability. Fertility was calculated as the percentage of the number of fertile eggs relative to the number of total eggs according to the following formula:

$$\text{Fertility \%} = \frac{\text{Number of fertile eggs}}{\text{Number of all setting eggs}} \times 100$$

Hatchability was estimated as the percentage of the number of hatched chicks to the number of fertile eggs or the number of total eggs set as follows: -

$$\text{Hatchability of total eggs set \%} = \frac{\text{Number of hatched eggs}}{\text{Number of total eggs set}} \times 100$$

$$\text{Hatchability of fertile eggs \%} = \frac{\text{Number of hatched eggs}}{\text{Number of fertile eggs}} \times 100$$

The economic efficiency (EE.) of egg production was calculated from the input and output analysis based upon the differences in egg production and feeding cost (Heady and Jensen, 1954). The REF were calculated as the net revenue per unit of total costs. Where:

$$\text{EE} = (\text{Net revenue/hen, LE} / \text{Total cost/hen, LE}) \times 100.$$

*Price of 1kg L-Arg = 320 (LE)

* Price of 1Kg VC = 300 (LE)

*Price of 1Kg gluten = 12.5 (LE)

LE= Egyptian pound. *According to the price prevailing at the local market at the experimental time. Data were statistically analyzed on factorial design (4x3) basis according to ANOVA procedures of SAS (SAS, 2012). Means differences were compared using Duncan's multiple range test (Duncan, 1955).

Results and Discussion

1. Fertility percentage.

Results obtained in Table (2) showed that dietary L-arginine supplementation different levels had no significant effect on fertility percentages at all periods of estimation. Hens fed the 0.4 g/kg diet L-arginine showed the higher average of fertility percentage, (87.30%) when compared with different levels applied of L-arginine and control group. Results obtained agreed with those reported by Ezzat *et al.*, (2015) affirmed that hatchability of fertile eggs were highest ($P \leq 0.05$) with 4.0 g L-arginine injection in air sac (90.62%) in Japanese quails. Also, Youssef *et al.*, (2015) observed that significant increase in fertility and hatchability % as compared with control group in local chicken. Dietary Vitamin C supplementation had

no significant effect on average fertility percentages at all periods estimation. The higher average of fertility percentage (86.50%) was attained by hens fed diet supplemented with 150mg V.C/kg diet. The interactions between dietary L-arginine and V.C supplementation were significant ($P<0.05$) on average fertility percentages during the interval periods, except at the period from 72--75 weeks of age. The higher averages of fertility percentage (90.48%) was recorded in the hens feed diet supplemented with 1.2g L-arginine /kg diet without V.C supplementation (table,2). While, the lower ones (76.18%) was observed in the hens recorded diet 1.2 g L-arginine /kg diet and 300mg V.C /kg diet when compared with different treatment.

2. Hatchability percentage of total eggs set.

Results obtained in Table (3) revealed that dietary L-arginine supplementation of different level had significant ($P<0.05$) effect on hatchability percentages of total eggs set during all the experimental periods. The higher hatchability percentage of total eggs set (35.97%) was recorded in hens fed diet supplementation with 1.2 g L-arginine /kg diet. This is due to l-arginine stimulates release of gastrointestinal hormones encouraging cell division, protein synthesis and tissue growth. And also increased villi heights in duodenum and ileum of birds resulting from in ovo injection of L-arginine. Dietary V.C supplementation had significant ($P<0.05$) effects on hatchability percentages of total eggs set at all the experimental periods studied, except at the period from (64-67) wks of age. The higher hatchability percentage (35.71%) of total eggs set was shown by hens fed diet supplemented with 150mg V.C /kg diet. The interactions between dietary L-arginine and V.C supplementation had significant ($P<0.05$) on hatchability percentage of total eggs set at all the interval periods. The higher averages of hatchability percentage (50.79%) of total eggs set were recorded in hens fed diet supplementation with 1.2g L-arginine without V.C supplementation, While, the lowest one (20.63%) was observed in the hens received diet supplementation 0.8 g L- arginine without V.C supplementation, when compared with different treatment.

3. Hatchability percentage of fertile eggs.

Data presented in Table (4) showed the averages of hatchability percentage of fertile eggs different groups of layers at all periods of estimation. Results obtained showed significant ($P<0.05$) effect of dietary L-arginine levels on hatchability percentage of fertile eggs at all period. It could be noticed that percentages of hatchability were increased with increasing dietary

L-arginine level. Hens fed diet with 1.2 g L-arginine level had record the higher average (42.02%) of hatchability percentage of fertile egg. No significant effect of dietary V.C supplementation was observed on hatchability percentages of fertile eggs during all the experimental periods studied, except during the period from 72-75 weeks of hens age which showed significant ($P<0.05$) effect on hatchability percentages of fertile eggs. Hens fed diet supplemented with 150mg V.C /kg recoded the higher average of hatchability percentage (41.32%). Similar results were reported by **Abdelfattah (2019)** who declared that treatment with ascorbic acid increased hatching rate compared with the untreated group. Dietary L-arginine and V.C supplementation interactions had significant ($P<0.05$) effect on hatchability of fertile eggs percentages at all periods of the experiment. The higher hatchability percentages (55.69%) were observed in the interaction between 1.2 g dietary L-arginine/kg diet without V.C supplementation. Whereas, the lowest percentage (26.59%) was observed in the interaction between 0.8 g dietary L-arginine level without V.C supplementation.

4. Economical efficiency.

Results obtained revealed that the 0.4 g dietary L-arginine level recorded the best relative economical efficiency (EEf) being 440 % and diet supplemented with 150mg V.C /kg diet attained the higher relative (EEf) value, being 133 %. When compared with different treatments applied and control group (Table 5). The higher average of EEf (680%) was found in the interaction between 1.2 g dietary L-arginine level with 300mg V.C /kg diet, whereas, the lower one (20%) was shown due to dietary supplementation with 300mg V.C /kg diet without L-arginine supplementation. These results were agreed with those stated by **Ezzat et al., (2015)** who demonstrated that the highest net revenue chicks and best economic efficiency (EEF) values were recorded for fertile eggs injected with 4% L-arginine in air sac followed by those 1% L-arginine followed by 2% L-arginine at 1 days of incubation when compared with other treatments.

Conclusion

In conclusion, the results of this study indicate that feeding Matrouh laying hens on diets containing 0.4 g L-arginine or 150mg V.C /kg diet /kg diet and the interaction between dietary 1.2 g L-arginine with 300mg V.C /kg diet improved the reproductive performance and economical efficiency of Matrouh laying hens.

Table 1. Feed ingredients and chemical analysis of the basal laying diet.

Ingredients	%
Yellow corn (8.5 %)	62.80
Wheat Bran (15.7%)	Corn gluten meal (60%) 10.00
Soybean meal (44 %)	9.40
	8.00
Limestone (CaCO ₃)	6.70
Di-calcium phosphate	3.32
Salt (NaCl)	0.34
DL-Methionine 99%	0.03
L-Lysine HCL	0.11
Vit + Min. premix*	0.30
Total	100
Chemical analysis: -	
a-Calculated analysis **:-	
ME, Kcal/kg.	2728
Crude protein, %	16.00
Crude fiber, %	3.14
EE	3.05
Calcium, %	3.33
Ash %	3.14
Available phosphorus, %.	0.73
Lysine, %.	0.53
Methionine, %	0.72
Arginine	0.75
b- Determined analysis ***:-	
Crude protein, %.	16.00
Crude fiber, %.	3.14
Ash %.	3.14

*Vit. Min. premix: Each 2 kg of vitamin and mineral premix (Commercial source AGRIVET Co.) contains Vit. A. 12000000 IU, Vit. D₃ 2000000 IU, Vit. E. 10000 mg, Vit. K₃ 2000 mg, Vit. B₁ 100 mg, Vit. B₂ 5000 mg, Vit. B₆ 1500 mg, Vit. B₁₂ 10 mg, Biotin 50 mg, Choline chloride 250000 mg, Pantothenic acid 10000 mg, Nicotinic acid 3000 mg, Folic acid 1000 mg, Manganese 60000 mg, Zinc 50000 mg, Iron 30000 mg, Copper 10000 mg, Iodine 1000 mg, Selenium 100 mg, Cobalt 100 mg, Carrier (Ca CO₃) add to 2kg.

** Calculated in accordance with **NRC (1994)**.

*** Determined according to the styles of **AOAC (2005)**.

Table 2. Least square means and standard error ($\bar{X} \pm SE$) for fertility percentage as affected by dietary supplementation.

Items	Fertility percentage (%) at wks				
	64-67	68-71	72-75	Average (64-75)	
L-arginine levels (g/kg diet)	NS	NS	NS	NS	
0.0	85.71±3.78	82.53±2.71	83.36±4.33	83.87±2.58	
0.4	88.88±2.53	87.30±2.52	85.71±4.60	87.30±2.35	
0.8	82.54±2.06	76.19±2.30	88.88±2.91	82.54±1.64	
1.2	85.71±3.99	80.95±3.75	85.71±3.33	84.12±3.18	
Vitamin C levels (mg/kg diet)	NS	NS	NS	NS	
0	85.71±3.22	83.33±2.57	82.76±4.12	83.93±2.25	
150	88.09±2.30	83.33±2.16	88.09±3.09	86.50±1.78	
300	83.33±2.64	78.57±3.11	86.90±2.34	82.93±2.36	
Interaction effects:					
L-arginine levels (g/kg diet)	Vitamin C levels (mg/kg diet)	*	*	NS	*
	0	71.43±2.75 ^d	85.71±2.85 ^{ab}	73.91±0.79	77.01±1.93 ^{ab}
0.0	150	95.23±0.64 ^a	85.71±3.89 ^{ab}	85.71±12.10	88.89±5.25 ^{ab}
	300	90.47±2.37 ^{ab}	76.19±5.92 ^{ab}	90.47±2.34	85.71±3.28 ^{ab}
	0	95.23±1.56 ^a	85.71±4.61 ^{ab}	80.95±14.43	87.30±6.27 ^{ab}
0.4	150	85.71±5.81 ^{abc}	90.47±3.75 ^a	90.47±2.76	88.89±2.81 ^{ab}
	300	85.71±3.28 ^{abc}	85.71±5.76 ^{ab}	85.71±3.92	85.71±4.08 ^{ab}

0.8	0	80.95±3.66 ^{bcd}	71.43±3.07 ^b	90.47±3.62	80.95±0.62 ^{ab}
	150	85.71±4.65 ^{abc}	76.19±3.98 ^{ab}	85.71±6.68	82.54±4.10 ^{ab}
	300	80.95±2.92 ^{bcd}	80.95±3.95 ^{ab}	90.47±6.05	84.13±3.55 ^{ab}
1.2	0	95.23±1.07 ^a	90.47±2.20 ^a	85.71±8.79	90.48±3.61 ^a
	150	85.71±5.21 ^{abc}	80.95±1.05 ^{ab}	90.47±1.00	85.71±2.04 ^{ab}
	300	76.19±8.48 ^{cd}	71.43±8.52 ^b	80.95±5.71	76.18±7.16 ^b

$(\bar{X} \pm SE)$ = Average \pm standard error

^{a,b, and c} means having different letters at the same column are significantly ($P \leq 0.05$) different.

* = ($P \leq 0.05$); NS= Not significant

Table 3. Least square means and standard error ($\bar{X} \pm SE$) for hatchability (%) of total eggs set as affected by dietary supplementation.

Items	Hatchability percentage of total eggs set (%) at wks				
	64-67	68-71	72-75	Average (64-75)	
L-arginine levels (g/kg diet)	*	*	*	*	
0.0	47.61±3.95 ^b	34.92±2.90 ^{ab}	18.77±3.34 ^a	33.77±2.42 ^{ab}	
0.4	47.61±3.15 ^b	38.09±3.01 ^a	9.52±1.58 ^b	31.74±1.33 ^b	
0.8	41.27±3.83 ^b	34.92±3.41 ^{ab}	23.81±5.24 ^a	33.33±3.50 ^{ab}	
1.2	55.55±3.34 ^a	30.15±5.14 ^b	22.22±5.124 ^a	35.97±4.2 ^a	
Vitamin C levels (mg/kg diet)	NS	*	*	*	
0	48.80±4.05	36.90±3.62 ^a	15.27±4.25 ^b	33.66±3.48 ^{ab}	
150	47.61±3.21	35.71±2.12 ^{ab}	23.81±2.92 ^a	35.71±1.69 ^a	
300	47.61±2.87	30.95±3.61 ^b	16.66±3.83 ^b	31.74±2.32 ^b	
Interaction effects:					
L-arginine levels (g/kg diet)	*	*	*	*	
Vitamin C levels (mg/kg diet)					
0.0	0	42.85±4.74 ^{cde}	28.57±1.82 ^{cd}	8.69±2.73 ^d	26.71±1.85 ^{fg}
0.0	150	61.90±2.01 ^{ab}	42.85±4.84 ^{ab}	19.04±1.71 ^{bc}	41.27±1.59 ^b
	300	38.09±1.59 ^{de}	33.33±4.64 ^{bcd}	28.57±4.993 ^{ab}	33.33±3.33 ^{cde}
	0	52.38±0.23 ^{bc}	47.62±4.31 ^a	9.52±2.64 ^d	36.50±1.35 ^{bcd}
0.4	150	38.09±2.82 ^{de}	33.33±0.73 ^{bcd}	14.28±0.33 ^{cd}	28.57±0.87 ^{efg}
	300	52.38±6.61 ^{bc}	33.33±4.66 ^{bcd}	4.76±0.43	30.16±1.01 ^{def}
	0	33.33±3.06 ^e	23.81±2.45 ^{de}	4.76±1.56 ^d	20.63±0.55 ^h
0.8	150	38.09±2.75 ^{de}	38.09±3.72 ^{abc}	38.09±4.28 ^a	38.09±3.57 ^{bc}
	300	52.38±7.81 ^{bc}	42.85±4.69 ^{ab}	28.57±3.77 ^{ab}	41.26±3.32 ^b
	0	66.66±5.17 ^a	47.62±5.14 ^a	38.09±5.28 ^a	50.79±1.35 ^a
1.2	150	52.38±1.83 ^{bc}	28.57±2.08 ^{cd}	23.81±2.73 ^b	34.92±1.71 ^{bcd}
	300	47.62±2.44 ^{cd}	14.28±2.69 ^e	4.76±0.36 ^d	22.22±1.48 ^{gh}

$(\bar{X} \pm SE)$ = Average \pm standard error

^{a,b,c,d and e} means having different letters at the same column are significantly ($P \leq 0.05$) different.

* = ($P \leq 0.05$); NS= Not significant

Table 4. Least square means and standard error ($\bar{X} \pm SE$) for hatchability (%) of fertile eggs as affected by dietary supplementation.

Items	Hatchability of fertile eggs (%) at wks				
	64-67	68-71	72-75	Average (64-75)	
L-arginine levels (g/kg diet)	*	*	*	*	
0.0	55.70±4.03 ^b	42.36±2.87 ^b	21.85±3.67 ^a	39.97±1.69 ^a	
0.4	53.51±3.08 ^b	43.76±3.41 ^a	11.03±1.71 ^b	36.10±1.62 ^b	
0.8	50.10±3.90 ^b	45.42±3.94 ^a	27.09±6.03 ^a	40.87±3.83 ^a	
1.2	64.53±2.41 ^a	35.97±4.91 ^b	25.54±5.92 ^a	42.02±3.88 ^a	
Vitamin C levels (mg/kg diet)	NS	NS	*	NS	
0	56.54±3.41	43.71±3.47	18.30±4.81 ^b	39.52±3.28	
150	53.74±3.32	43.03±2.79	27.19±3.59 ^a	41.32±1.89	
300	57.60±3.13	38.89±3.86	18.65±4.24 ^b	38.38±2.41	
Interaction effects:					
L-arginine levels (g/kg diet)	Vitamin C levels (mg/kg diet)	*	*	*	*
0.0	0	60.00±2.62 ^{ab}	33.33±3.78 ^c	11.76±1.72 ^{de}	35.03±1.17 ^{de}
	150	65.00±6.34 ^{ab}	50.00±1.84 ^{ab}	22.22±5.49 ^{bcd}	45.74±1.13 ^{bc}
	300	42.10±1.83 ^d	43.75±3.23 ^{abc}	31.58±5.49 ^b	39.14±1.64 ^d
0.4	0	55.00±3.43 ^{bc}	55.55±3.86 ^a	11.76±1.86 ^{de}	40.77±2.97 ^{cd}
	150	44.44±4.80 ^{cd}	36.84±4.13 ^c	15.79±2.16 ^{cde}	32.36±1.60 ^{ef}
	300	61.11±2.87 ^{ab}	38.89±1.66 ^{bc}	5.55±0.71 ^e	35.18±1.32 ^{de}
0.8	0	41.17±2.17 ^d	33.33±1.53 ^c	5.26±0.58 ^e	26.59±0.85 ^f
	150	44.44±0.40 ^{cd}	50.00±6.77 ^{ab}	44.44±2.93 ^a	46.30±3.16 ^{bc}
	300	64.70±3.89 ^{ab}	52.94±5.16 ^a	31.58±5.44 ^b	49.74±3.15 ^b
1.2	0	70.00±4.22 ^a	52.63±3.98 ^a	44.44±5.77 ^a	55.69±0.97 ^a
	150	61.11±1.73 ^{ab}	35.29±2.73 ^c	26.31±3.73 ^{bc}	40.91±1.75 ^{cd}
	300	62.50±5.14 ^{ab}	20.00±0.52 ^d	5.88±1.08 ^e	29.46±1.96 ^{ef}

($\bar{X} \pm SE$) = Average ± standard error

a,b,c,d,e and f means having different letters at the same column are significantly (P≤0.05) different.

* = (P≤0.05); NS= Not significant

Table 5. Economical efficiency of egg production of Matrouh layers as affected by dietary L-arginine levels, Vitamin C and them interactions at the end of the experimental period (at 75 weeks of age).

Items	Egg number (hen/period)	Price/egg (LE)	Total revenue hen (LE)	Total feed intake/hen(kg)	Price /Kg feed (LE)	Total feed cost/hen (LE)	Fixed / hen price (LE)	Total cost hen (LE)	Net revenue/hen (LE)	Economical efficiency (EEf)	Relative Eef %		
L-arginine levels (g/kg diet)													
0.0	33.64	1.00	33.64	7.84	3.763	29.50	2.40	31.90	1.74	0.05	100		
0.4	38.16	1.00	38.16	7.39	3.891	28.75	2.40	31.15	7.01	0.22	440		
0.8	35.71	1.00	35.71	6.83	4.019	27.44	2.40	29.84	5.87	0.19	380		
1.2	37.75	1.00	37.75	6.99	4.147	28.98	2.40	31.38	6.37	0.20	400		
Vitamin C levels (mg /kg diet)													
0	34.98	1.00	34.98	7.22	3.763	27.16	2.40	29.56	5.42	0.18	100		
150	36.46	1.00	36.46	7.14	3.763	26.86	2.40	29.26	7.20	0.24	133		
300	37.50	1.00	37.50	7.43	3.763	27.95	2.40	30.35	7.15	0.23	128		
Interaction effects:													
L-arginine levels (g/kg diet)	Vitamin C levels (mg /kg diet)	0	31.57	1.00	31.57	7.35	3.763	27.65	2.40	30.05	1.52	0.05	100
		150	35.34	1.00	35.34	7.82	3.763	29.42	2.40	31.82	3.52	0.11	220

	300	34.01	1.00	34.01	8.35	3.763	31.42	2.40	33.82	0.19	0.01	20
	0	39.31	1.00	39.31	7.52	3.891	29.26	2.40	31.66	7.65	0.24	480
0.4	150	37.17	1.00	37.17	6.89	3.891	26.80	2.40	29.20	7.97	0.27	540
	300	37.99	1.00	37.99	7.77	3.891	30.23	2.40	32.63	5.36	0.16	320
	0	32.59	1.00	32.59	6.78	4.019	27.24	2.40	29.64	2.95	0.09	180
0.8	150	37.27	1.00	37.27	6.86	4.019	27.57	2.40	29.97	7.30	0.24	480
	300	37.27	1.00	37.27	6.84	4.019	27.48	2.40	29.88	7.39	0.24	480
	0	36.45	1.00	36.45	7.24	4.147	30.02	2.40	32.42	4.03	0.12	240
1.2	150	36.05	1.00	36.05	6.99	4.147	28.98	2.40	31.38	4.67	0.14	280
	300	40.74	1.00	40.74	6.74	4.147	27.95	2.40	30.35	10.39	0.34	680

Total revenue = Egg number / hen X Price/egg (LE).

Net revenue/hen (LE) = Total revenue - Total cost/hen.

Fixed hen (LE) = Rearing cost.

EEf = Net revenue/hen (LE) / Total cost/hen (LE).

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تأثير التغذية بإضافة الأرجينين وفيتامين C للعليقة على الكفاءة التناسلية والاقتصادية لدجاج سلالة مطروح.

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أجرى هذا البحث لدراسة تأثير اضافة مستويات الحمض الأميني ال-أرجينين وفيتامين ج للعليقة والتداخل بينهم على الكفاءة التناسلية والاقتصادية لدجاج سلالة مطروح خلال فصل الصيف.

صممت التجربة كتصميم عاملي (3x4) ويتضمن أربع مستويات من ال-أرجينين (صفر & 0.4 & 0.8 & 1.2 جم/كجم عليقة) وثلاث مستويات من فيتامين ج (حمض الاسكوربيك) هي (صفر & 150 & 300 ملليجرام/ كجم عليقة). واستخدم عدد 108 دجاجة مطروح (كسلاله محليه) عمر 64 أسبوع اختيرت عشوائيا ووزعت الى 12 مجموعه (بكل مجموعه ثلاث مكررات).

أوضحت النتائج عدم وجود تأثيرات معنوية ($P < 0.05$) في نسبة الخصوبة خلال فترات التجربة نتيجة إضافة ال-أرجينين وفيتامين ج للعليقة. بينما كان للتداخل بين إضافة ال-أرجينين وفيتامين ج تأثير معنوي ($P < 0.05$) على نسبة الخصوبة خلال الفترة من 64-75 أسبوع من عمر الطيور. أدت إضافة ال-أرجينين للعليقة الي ظهور تأثير معنوي ($P < 0.05$) على نسبة الفقس للبيض الكلي طوال فترات التقدير. كان للتداخل بين إضافة ال-أرجينين وفيتامين ج تأثير معنوي ($P < 0.05$) على نسبة الفقس للبيض الكلي طوال فترات التقدير 64-75 أسبوع. كان لإضافة ال-أرجينين للعليقة تأثير معنوي ($P < 0.05$) على نسبة الفقس للبيض المخصب خلال فترات التجربة من 64-75 أسبوع من عمر الطيور. ولم يكن لإضافة فيتامين ج للعليقة أي تأثير معنوي على نسبة الفقس للبيض المخصب. خلصت هذه الدراسة الي ان تغذية دجاج سلالة مطروح على عليقة مضاف اليها الحمض الاميني ال- أرجينين بمعدل 0.4 جم / كجم او فيتامين ج بمعدل 150 ملليجرام / كجم عليقة قد سجلت أفضل النتائج ويمكن التوصية باستخدامها.

الكلمات الدالة: ال-أرجينين، فيتامين C، الدجاج البياض، نسبة الخصوبة، نسبة الفقس.