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REDUCING THE AMOUNT OF EXCRETA OUTPUT VIA MINIMIZING THE FEED CONSUMPTION OF LAYING HENS

H.M.R. Elsherif[1] and K.G El-Iraqi[2]

[1]Animal Production Department, Faculty of Agriculture, Cairo University, 12613, Giza, Egypt
[2] Veterinary Hygiene and Management Department, Faculty of Veterinary Medicine, Cairo University, 12211, Giza, Egypt

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SUMMARY

Two hundred and sixty of Hi-Sex brown laying hens 34wks old were allocated in 2-deck batteries in open system house with ceiling fans (31to 40 C° temperature degree) for 12 wks. to investigate the decreasing of feed intake amounts to decrease the excreta output. Hens were randomly divided into 5 groups of 52 hens of 4 replicates with 13 hens each. Feed in constant weight were offered according to the daily nutrients intake to meet the requirements of Hi-Sex brown laying hens during the experimental period (110.0, 107.2, 104.5, 102.0 and 99.0 g/hen/day, respectively). All measured parameters either productive (egg production, egg weight, egg mass, FCR and the change of body weight) or egg quality (shell weight, % and thickness; shape index, Haugh units, albumen index and yolk index) not affected significantly ($P \leq 0.05$) by the different treatments except feed consumption which was gradually decreased. The decreasing of laying hens feed consumption significantly ($P \leq 0.05$) decreased the average amount of excreta output and insignificantly improved either dry matter or organic matter digestibility. It could be concluded that decreasing the feed consumption with maintaining the nutrients intake of laying hens can decrease the environmental pollution via decreasing the excreta voided amount without any adverse effect on hens performance and egg quality parameters.

Keywords: *laying hens, feed consumption, environmental pollution, laying performance, egg quality.*

INTRODUCTION

Commercially, the feeding programs of laying hens during egg production phase are mainly depending on the feed consumption amounts. Almost, all companies recommended range of 100 to 125 gram according to diet nutrients condensation. The dietary nutrients requirements for growth, maintenance and productive have been balanced, under ideal conditions, may minimize fecal waste, thus, minimize environmental pollution (Nahm, 2007). Therefore, nutrient utilization could be improved and environmental pollution from poultry wastes could be decreased if the poultry feeding operation should be recognized and corrected (Nahm, 2007). For this objects, new techniques of poultry litter and manure should be followed. In general, there is a 1.5% increase in manure N and P content for each 1% increase in feed wastage (Ferket *et al.*, 2002). Balancing diets to improve the performance and to reduce the environmental impact caused by poultry waste has been the subject of researchers object in recent years. This fact has generated considerable amount of waste which can contaminate the environment as a result of high levels of nitrogen and some minerals in the feces of birds (Nagata *et al.*, 2011). Modern poultry production requires the reduction of costs and waste output, and the increment of animal performance (Martins *et al.*, 2013). Lately, Elsherif *et al.* (2016) concluded that highly negative relation between amounts of feed consumption and broiler excreta voided. Thus, an attempt to reduce the excreta of laying hens via feeding manipulation was investigated.

MATERIALS AND METHODS

A study to investigate the reduction of feed consumption with the same nutrients intake via nutrients condensation in diets on productive performance, egg quality, economic efficiency and excreta output of laying hens under Egypt summer conditions was carried out from June to September 2015 at the Poultry Research Unit, Faculty of Agriculture, Cairo University.

Experimental diets and treatments:

The chemical compositions of experimental diets are presented in Table (1). The control diet was formulated to meet the nutrient requirements of Hi-Sex brown laying hens from 34-45 wks. old and the feed were daily offered in constant weight being 110 gram/hen/day with 3.80% calcium content. The other experimental diets were gradually increased in calcium content being 3.90, 4.00, 4.10 and 4.20, respectively and the other nutrients were adjusted to meet the same intake of calcium and other nutrients with lower feed intake being 107.2, 104.5, 102.0 and 99.0 g/hen/day, respectively.

Table (1): Chemical composition of layer experimental diets.

	Treatment[1]				
Ingredient[3]	1	2	3	4	5
Yellow Corn, Grains	60.890	61.660	59.040	56.530	53.250
Soybean meal 44%	25.000	19.300	18.820	18.890	19.110
Soybean oil	0.750	0.800	2.150	3.450	5.050
Corn gluten meal (62.0%)	2.200	6.600	8.000	9.000	10.000
Lime stone	9.300	9.560	9.820	9.870	10.290
Mono Calcium Phosphate	1.140	1.220	1.270	1.320	1.350
Premix[2]	0.300	0.308	0.316	0.324	0.320
Common salt	0.300	0.308	0.316	0.324	0.320
DL. Methionine (100%)	0.124	0.080	0.070	0.073	0.070
L. lysine HCL (78.5%)	0.000	0.162	0.200	0.219	0.240
Total	100.0	100.0	100.0	100.0	100.0
Chemical analysis (calculated):					
CP %	17.6	18.07	18.53	19.00	19.45
ME (k.cal. / kg)	2750	2822	2895	2966	3040
Ca %	3.80	3.90	4.00	4.10	4.20
Av. Pho %	0.38	0.39	0.40	0.41	0.42
Lys. %	0.853	0.872	0.895	0.917	0.940
Meth. %	0.431	0.436	0.446	0.464	0.475
Meth. + Cys. %	0.73	0.75	0.77	0.79	0.81

[1]*The experimental treatments were control according to Hi-Sex nutrition guide requirements to has 3.8% calcium, and the other experimental diets were increased gradually in calcium content to be 3.9, 4.0, 4.1 and 4.2%, respectively whereas the other nutrients were adjusted to meet the same nutrients intake for all groups.*[2]*Each 1 kg basal diet contains vitamin A 10,000 IU, vitamin D_3 2,500 IU, vitamin E 20 mg, vitamin K_3 [3].0 mg, vitamin B_1 1.0 mg, vitamin B_2 5.0 mg, vitamin B_6 3.0 mg, Vitamin B_{12} 0.015 mg, pantothenic acid 10.0 mg, nicotinic acid 30 mg, folic acid 1.0 mg, Biotin 0.05 mg, manganese 100 mg, zinc 60 mg, iron 33 mg, copper 9 mg, iodine 1.0 mg, selenium 0.3 mg and cobalt 0.20 mg.*

[3]*Chemical analyses of feedstuffs were according to NRC (1994).*

Birds and management:

Two hundred and sixty of Hi-Sex brown laying hens 34wks old were allocated in 2-deck batteries of clean wire-mesh cages, with cage dimensions of 25×45×30 cm in open system house with ceiling fans. The hens were individually randomly divided into 5 groups of 52 hens of 4 replicates with 13 hens each. Feed, in mash form, were presented in constant weight according to the daily nutrients intake to meet the requirements of Hi-Sex brown laying hens during the experimental period (12 wks.), under total daily continuous light of 16 hours. The temperature degrees were ranged from 31 to 40 C° during the experiment period.

Measured parameters:

Performance parameters:

Hen day egg production (HD) percentage was recorded every four wks. intervals from 34 to 45wks old. Eggs were collected for continuous two days of production and were weighed every four weeks during the laying period. Egg mass, EM, (g/hen/day) were calculated from HD and egg weight (EW) values according to this equation: EM=HD*EW/100. Feed intake (g/hen/day), FI, was calculated every four weeks. Feed conversion ratio (FCR) was calculated from egg mass and feed consumption records according to this equation: FCR=FI/EM. Hens were weighed at the beginning and at the end of experiment to calculate body weight change (g).

Egg quality:

Two eggs from each replicate were randomly taken to measure the following measurements: Shape index%= egg width/ egg height *100, Shell thickness was determined using a dial pipe gauge. Dry shell with membranes was weighed to the nearest 0.1 g. Haugh units (HU) were calculated based on the height of albumen determined by a Vernier Caliber and egg weight according to **Eisen *et al.* (1962)**. Albumen index (AI) = height/diameter mean x 100. Yolk index was calculated according to Funk (1948) where, Yolk index = (yolk height (mm)/yolk diameter (mm) x 100. The yolk height and diameter readings were measured by Vernier Caliber to the nearest mm.

Digestion trial:

At the end of trial, a digestion trial was carried out. Twenty hens of the experiment, 4 per each treatment, were randomly housed in digestion cages. Feed and water were offered *ad-libitum* during preliminarily and collection period. The feed consumed was recorded and quantity of excreta, were collected every 24 hrs. The collected excreta were dried at 60 ºC until constant weight, then, excreta weighed, ground, mixed well and stored for analysis according to A.O.A.C. (1990) The parameters recorded were; Excreta weight (Ex.W) (g/bird/d), Excreta weight % (Ex.WP), dry matter digestibility (DMD), organic matter digestibility (OMD). Regression coefficient between feed intake and Ex.W, Ex.WP, DMD and OMD was interpreted.

Economic efficiency:

Relative economical efficiency (REE) of egg production as percentage was calculated. The prices of the experimental diets and eggs produced were used to calculate REE. The values of REE were calculated as the net revenue per unit of total costs multiply by 100.

Statistical methods:

The pooled data by the experiment were analyzed by General Linear Model procedures described by SAS Institute, 2004. The treatments differences means were subjected to significances by Duncan's Multiple Range-test (Duncan, 1955), where the statistical model was:

$Y_{ij} = \mu + T_i + e_{ij}$ Where:

Y_{ij} = Observed value of a given dependent variable.

μ = Overall adjusted mean.

T_i = Fixed effect of treatments, where i=1, 2… etc.

e_{ij} = Random error associated to each observation.

RESULTS AND DISCUSSION

Productive performance:

The effect of experimental treatments on egg production %, egg weight, egg mass, feed consumption (FC), feed conversion ratio (FCR) and the change of live body weight is shown in Table (2). No significant differences among treatments were detected on all productive performance parameters except FC where there was gradual decreased with the condensation of nutrients in the diets of laying hens.

These findings herein mainly attributed to the condensation of all nutrients in all experimental diets via the control one. The condensation of nutrients leads the hens to decrease the consumption of feed to meet their energy needs and therefore the feed consumed were decreased gradually to be 105.8, 101.5, 100.6, 97.2 and 94.4g with treatments which had 2750, 2822, 2895 2966 and 3040 k.cal./kg diet, respectively. Therefore, all recorded performance parameters were not significantly affected by the nutrients except the feed consumption. These results confirmed that obtained by Ribeiro *et al.* (2014) who found that laying hens regulate their feed consumed relative to dietary AMEn level. Also, in the present study found by Ribeiro *et al.* (2014) and Wu *et* *al.* (2005) confirmed that feed consumption was reduced 1% as the energy increased 39 kcal/kg. Ribeiro *et al.* (2014) fed gradual levels of energy (2700 kcal/kg; 2775 kcal/kg; 2850 kcal/kg; 2925 kcal/kg; and 3000 kcal/kg) to commercial laying hens. They reported that increasing AMEn levels had a negative effect on egg production and egg mass values. But, AMEn levels did not influenced body weight, egg weight, or livability. Although, Increasing AMEn levels increased feed intake and feed conversion ratio. Jalal *et al.* (2006) noticed no differences in feed consumption, egg production, body weight, or egg weight of young laying hens (21 weeks old) fed diets with gradual AMEn levels (2800,2850, and 2900 kcal/kg). Also, body weight, weight gain, feed intake, egg weight, egg production, and egg mass were not affected by two energy levels as AMEn to be 2810 and 2900 k. cal/kg feed (Jalal *et al.*, 2007). The previous findings were depending on increasing the energy level without adjustment the other nutrients. Therefore, the results attributed to the levels of energy, but this study the other nutrients levels were taken into our consideration. However, Shim *et al.* (2013) demonstrated that dietary protein level was a limiting factor for body weight, feed intake, egg weight and hen day egg production where the previous parameters were affected by the protein level. Dietary energy and protein levels increment to brown laying hens at second production cycle did not enhance performance (Junqueira *et al.*, 2006). Swiatkiewic *et al.* (2015) reported that egg production, egg weight, feed intake, feed conversion ratio not affected by the level of Ca in the diet (3.20, 3.70 and 4.20%).

Table (2): Effect of experimental treatments on productive performance of laying hens from 34 to 45 wks. of age.

Treatments*	Parameters						
	Egg production %	Egg weight (g)	Egg mass (g)	Feed Intake (g)	FCR	The change in body weight (g)/hen	
						Per period	Per day
Treatment 1	90.5±0.87	57.6±0.44	52.1±0.39	105.8^{a}±0.37	1.94±0.08	39.2±12.4	1.0±0.33
Treatment 2	90.8±1.55	57.0±0.89	51.7±0.65	101.5^{b}±0.42	1.96±0.03	96.8±8.4	2.4±0.21
Treatment 3	89.9±1.41	57.0±1.10	51.3±1.45	100.6^{b}±0.55	1.97±0.07	96.5±19.2	2.4±0.48
Treatment 4	89.3±0.89	57.6±0.58	51.4±0.84	97.2^{c}±0.49	1.89±0.04	82.5±14.8	2.1±0.37
Treatment 5	91.4±1.48	57.4±0.98	52.5±1.00	94.4^{d}±0.46	1.80±0.04	61.6±27.0	1.5±0.66
P value	0.8391	0.9791	0.8919	<.0001	0.3096	0.1806	0.1869

** The experimental treatments were control according to Hi-Sex nutrition guide requirements to has 3.8% calcium, and the other experimental diets were increased gradually in calcium content to be 3.9, 4.0, 4.1 and 4.2%, respectively whereas the other nutrients were adjusted to meet the same nutrients intake for all groups. a, b, c and d Means in each column bearing the same superscripts are not significantly different (P<0.05).*

Egg quality:

The influence of experimental treatments on external (egg shell weight, egg shell percentage, egg shell thickness and shape index %) and internal (Haugh units, yolk index %, albumen index %) egg quality are presented in Table (3). The external and internal egg quality parameters were not affected by the condensation of nutrients in laying hens diets from 34 to 45 wks of age.

The previous results are mainly attributed to the similar nutrients intake for all groups because of the adjustment of diets to meet the right required amounts of nutrients. The same findings by Jalal *et al.* (2007) who documented that egg quality parameters, such as egg shell thickness, yolk and albumen percentages, and yolk solids content, were not affected by two energy levels (2810 and 2900 kcal/kg feed). There were no differences in albumen height, yolk total solids content, or egg component percentages (Ribeiro *et al.*, 2014). Egg quality parameters (percent yolk, and Haugh units) were the same with different protein levels from 19-74 wks age of Bovans white laying hens (Shim et al, 2013). Dietary energy and protein levels increment to brown laying hens at second production cycle did not enhance egg quality (Junqueira *et al.*, 2006). Swiatkiewic *et al.* (2015) reported that egg shell quality parameters not affected by the level of Ca in the diet (3.20, 3.70

and 4.20%). The internal and external egg quality parameters did not influenced by low CP diets (Novak *et al* ., 2008).

Table (3): Effect of experimental treatments on egg quality parameters of laying hens from 34 to 45 wks of age.

Treatments*	Parameters						
	Egg Shell (%)	Egg shell weight (g)	Egg shell thickness (mm)	Haugh units (%)	Shape index (%)	Yolk index (%)	Albumen Index (%)
Treatment 1	10.7±0.15	6.17±0.06	0.429±0.004	85.5±2.06	78.1±0.53	46.0±0.39	12.1±0.37
Treatment 2	10.6±0.18	6.23±0.13	0.446±0.006	88.2±1.27	80.6±0.34	45.4±0.55	12.2±0.35
Treatment 3	10.1±0.38	6.07±0.13	0.447±0.015	91.5±1.11	79.3±0.63	46.6±0.94	13.4±0.37
Treatment 4	10.1±0.09	6.08±0.07	0.447±0.005	90.7±1.69	78.1±1.01	45.4±0.93	13.0±0.64
Treatment 5	10.2±0.16	6.17±0.09	0.431±0.011	90.6±1.51	79.0±0.79	44.8±0.45	12.6±0.55
P value	0.1524	0.8013	0.4555	0.0695	0.1000	0.3342	0.2982

**The experimental treatments were control according to Hi-Sex nutrition guide requirements to has 3.8% calcium, and the other experimental diets were increased gradually in calcium content to be 3.9, 4.0, 4.1 and 4.2%, respectively whereas the other nutrients were adjusted to meet the same nutrients intake for all groups.*

Economic efficiency:

Economic efficiency (EEf) and relative economic efficiency (REE) are exhibited in Table (4). The EEf and REE were went down as the experimental diets were more condensed where the values were 0.94, 0.93 0.82, 0.78 and 0.78 for EEf and 100.0, 99.3, 87.7, 83.2 and 83.2 for REE, respectively. These results because the gradually levels increment of nutrients in the experimental diets that cause the increment of diets prices and increasing the oil and corn gluten levels.

Table (4): Effect of experimental treatments on relative economic efficiency.

Treatment[2]	Parameter[1]							
	Input			Output			EE	REE (%)
	FC	PF	TFC	TEP	TR	NR		
Treatment 1	8.887	4.855	43.15	76.0	83.6	40.47	0.94	100.0
Treatment 2	8.526	5.094	43.43	76.3	83.9	40.47	0.93	99.3
Treatment 3	8.450	5.394	45.58	75.5	83.1	37.49	0.82	87.7
Treatment 4	8.165	5.677	46.35	75.0	82.5	36.16	0.78	83.2
Treatment 5	7.930	5.988	47.48	76.8	84.5	36.97	0.78	83.0

*[1]FC= feed consumed/hen (kg), PF= price of 1 kg feed (LE), TFC = total feed cost (FC*PF) (LE), TEP = total egg produced (number), TR=Total revenue = TEP * price of one egg (1.50 LE), NR = net revenue = TR-TFC (LE), EE = NR/TFC and REE = relative economic efficiency = EE of treatment/EE of control treatment.[2]The experimental treatments were control according to Hi-Sex nutrition guide requirements to has 3.8% calcium, and the other experimental diets were increased gradually in calcium content to be 3.9, 4.0, 4.1 and 4.2%, respectively whereas the other nutrients were adjusted to meet the same nutrients intake for all groups.*

Digestion trial:

Effect of experimental treatments on average excreta weight output (AEW), average excreta percentage of feed consumed (AEP) dry matter digestibility as dry matter basis (DMD), organic matter digestibility as dry matter basis (OMD) and primary moisture percentage of fresh excreta (PMP) are presented in Table (5). A significant decrease ($P \leq 0.05$) was observed on AEW affected by treatments (Figure 1) where, AEW= 6.05 + 0.24 FC; R^2= 0.72.While, no effect on AEP was noticed due to treatments (Figure 2). No significant differences on either DMD or OMD were detected due to treatments (Figures 3 and 4). Insignificant decrease of PMP was detected due to treatments. Generally, the decreasing of feed consumption may lead the hens to decrease the excreta output amounts voided and PMP and may slight improvement in DMD and OMD that can alleviate the environmental pollution caused by the excreta outputted. These results are in accordance with Elsherif *et al.* (2016) who noticed high relation between the amount of feed consumed and AEW, AEP, DMD and OMD.

Table (5): Effect of experimental treatments on excreta weight & percentage, dry matter digestibility (DMD) and organic matter digestibility (OMD).

Treatment	Parameter				
	Excreta weight g/bird/d	Excreta percentage %	DMD %	OMD %	% Primary moisture of excreta
Treatment 1	31.6[a]	29.9	76.0	74.9	77.9
Treatment 2	29.1[b]	29.4	76.4	74.9	78.7
Treatment 3	28.7[b]	29.6	76.6	75.2	77.9
Treatment 4	28.0[b]	30.2	76.7	75.3	77.1
Treatment 5	26.8[c]	30.3	77.1	75.5	76.2
SEM	0.29	0.55	0.35	0.48	0.61
P value	<.0001	0.8174	0.0586	0.9321	0.1441

**The experimental treatments were control according to Hi-Sex nutrition guide requirements to has 3.8% calcium, and the other experimental diets were increased gradually in calcium content to be 3.9, 4.0, 4.1 and 4.2%, respectively whereas the other nutrients were adjusted to meet the same nutrients intake for all groups. a, b and c Means in each column bearing the same superscripts are not significantly different (P<0.05).*

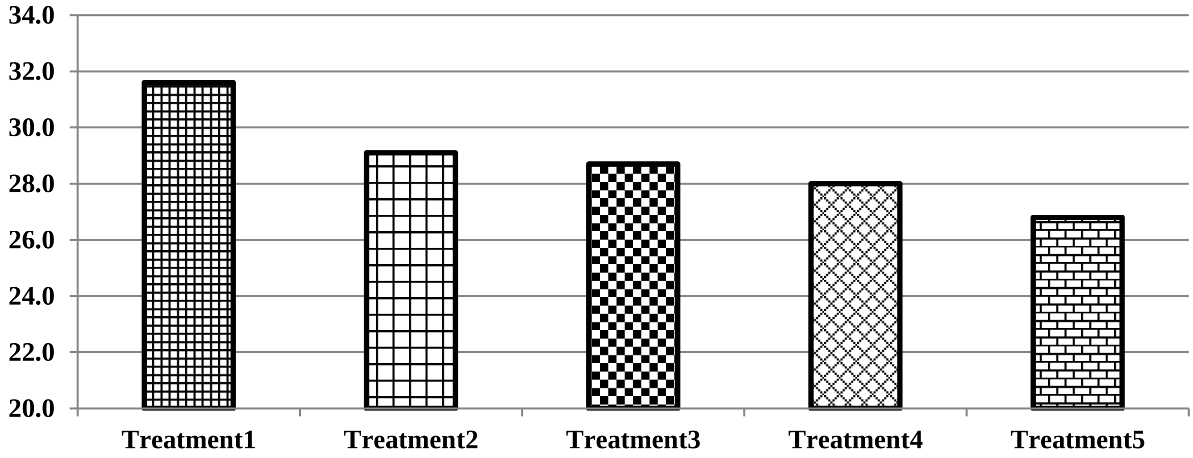

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Figure (1): Effect of experimental treatments on excreta output (g).

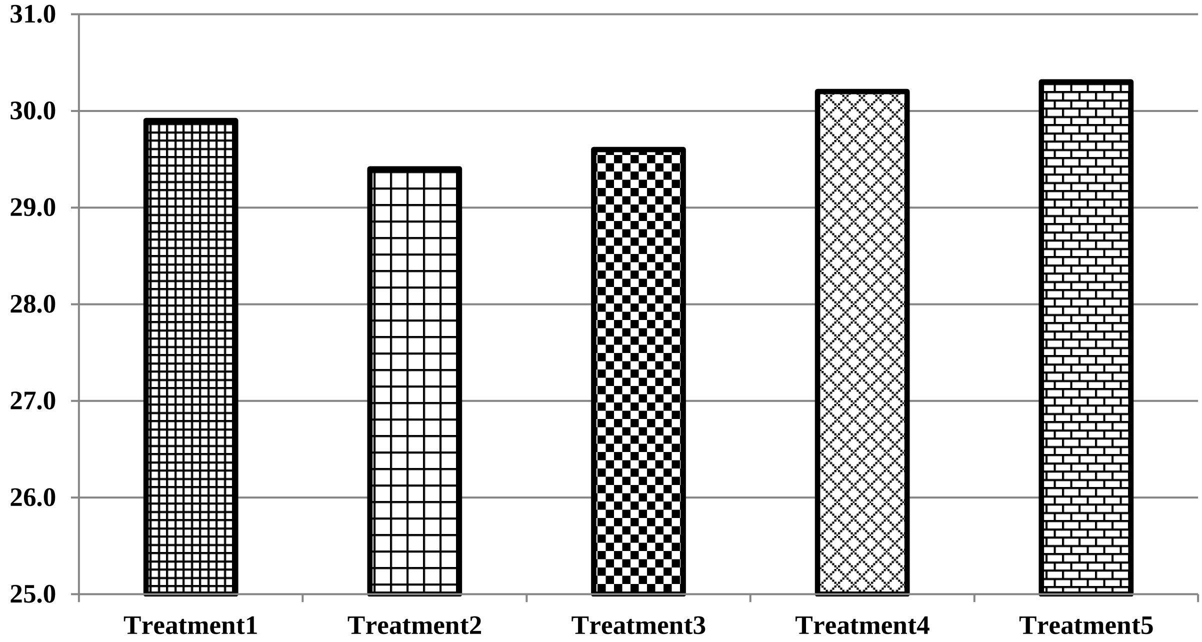

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Figure (2): Effect of experimental treatments on excreta output (%).

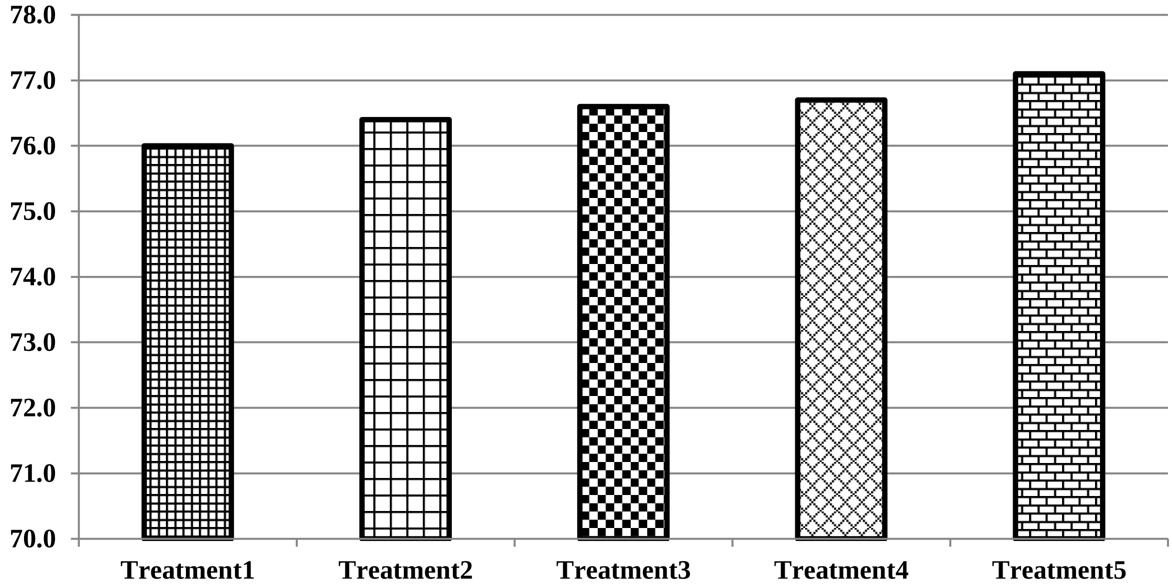

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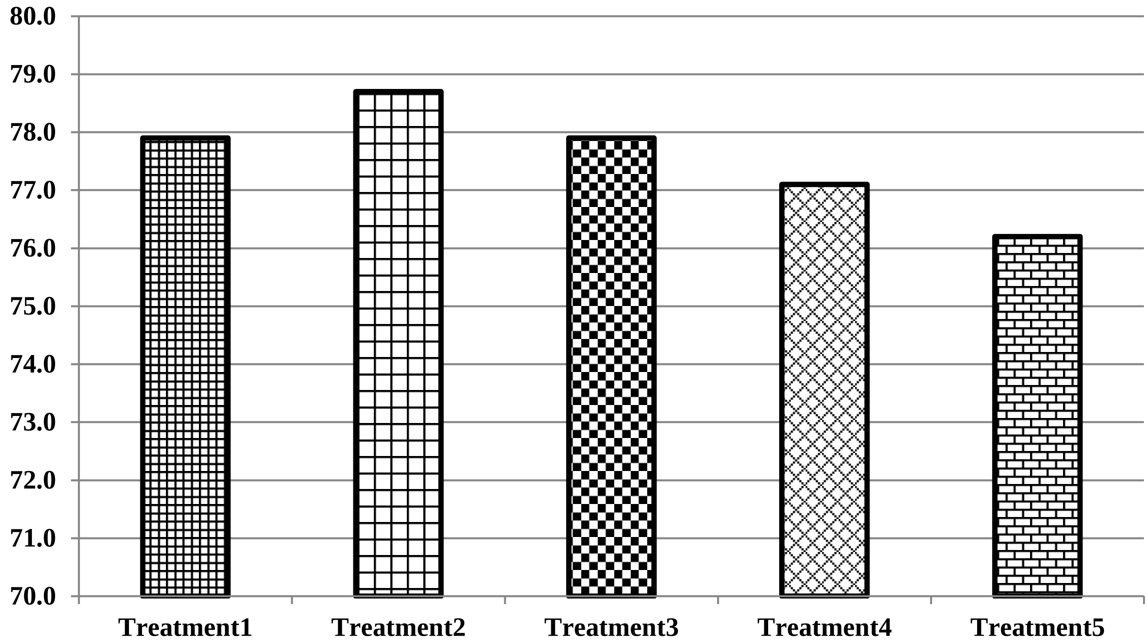
Figure (3): Effect of experimental treatments on dry matter digestibility (%).



The experimental treatments were control according to Hi-Sex nutrition guide requirements to has 3.8% calcium, and the other experimental diets were increased gradually in calcium content to be 3.9, 4.0, 4.1 and 4.2%, respectively whereas the other nutrients were adjusted to meet the same nutrients intake for all groups.

Figure (4): Effect of experimental treatments organic matter digestibility (%).

CONCLUSION:

The results confirmed the view of the excreta voided by the bird could be decreased as the amount of feed consumption decreased with maintaining the nutrients intake without any adverse effect on either laying hens performance or egg quality parameters.

REFERENCES

A.O.A.C. (1990). Official Method of analysis 15th edition. Published by the Association of Official Agricultural Chemists,, Washington, D.C.

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

Eisen, J.E.; B.B. Bohren and E.H. Mckean (1962). The Haugh units as a measure of egg albumen quality. Poult. Sci., 41: 1461-1468.

Elsherif, H.M.R.; El-Iraqi K.G. and F.A. Wahba (2016). Manipulating feed consumption to improve performance and reduce environment pollution from broiler manure during starter and grower periods. 9th Inter. Poult.Con.7-10 Nov.

Ferket, P.R.; E. van Heugten; T.A.T.G. van Kempen and R. Angel (2002). Nutritional strategies to reduce environmental emissions from nonruminants.J. Anim. Sci. E (Suppl. 2), E168–E182.

Funk, E. M. (1948). The relationship of the yolk index determined in natural position to the yolk as determined after separating the yolk from the albumen. Poult. Sci., 27: 367.

Jalal, M.A.; S.E. Scheideler and D. Marx (2006). Effect of bird cage space and dietary metabolizable energy level on production parameters in laying hens.Poult. Sci.; 8: 5306–311.

Jalal, M.A.; S.E. Scheideler and E.M. Pierson (2007). Strain response of laying hens to varyingdietary energy levels with and without avizyme supplementation. Jour. of App. Poult. Res.; 16: 289-295.

Junqueira, O.M.; A.C. de Laurentiz; R. da Silva Filardi; E.A. Rodrigues and E.M. Casartelli (2006). Effects of Energy and Protein Levels on Egg Quality and Performance of Laying Hens at Early Second Production Cycle. J. Appl. Poult. Res. 15:110–115.

Martins, B.A.B.; L.M.O. Borgatti; L.W.O. Souza; S.L.D.A. Robassini and R. Albuquerque (2013). Bioavailability and poultry fecal excretion of phosphorus from soybean-based diets supplemented with phytase. Rev. Bras. de Zoot., 42: 174-182.

Nagata, A. K.; P.B. Rodrigues; R.R. Alvarenga; M.G. Zangeronimo; K.F. Rodrigues and G.F.R. Lima (2011). Energy and protein levels in diets containing phytase for broilers from 22 to 42 days of age: performance and nutrient excretion. Rev. Bras. de Zoot., 40: 1718-1724.

Nahm, K.H. (2007). Feed formulations to reduce N excretion and ammonia emission from poultry manure. Bio-res Tech., 98, 2282–2300.

Novak, C. L.; H. M. Yakout, and J. Remus. (2008). Response to varying dietary energy and protein with or without enzyme supplementation on leghorn performance and economics. 2. Laying period. J. Appl. Poult. Res. 17:17–33.

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

Ribeiro, P.A.P.; J.B.I.I. Matos; L.J.C. Lara; L.F. Araujo; R. Albuquerque and N.C. Baiao (2014). Effect of Dietary Energy Concentration on Performance Parameters and Egg Quality of White Leghorn Laying Hens. Braz. Jour. of Poult. Sci.,16, 381-388.

SAS, Institute (2004). SAS/DSTAT User’s Guide. SAS Institute Inc., Cary, Nc.

Shim, M.Y.; E. Song; L.S. Billard; E. Aggrey; G.M. Pesti and P. Sodsee (2013). Effects of balanced dietary protein levels on egg production and egg quality parameters of individual commercial layers. Poult. Sci., 92 :2687–2696

Swiatkiewicz, S.; A. Arczewska-Włosek; J. Krawczyk; M. Puchała and D. Józefiak (2015). Effects on performance and eggshell quality of particle size of calcium sources in laying hens’ diets with different Ca concentrations. Arch. Anim. Breed., 58, 301–307.

Wu, G.; M.M. Bryant; R.A. Voitle and D.A. Roland (2005). Effect of dietary energy on performance and egg composition of Bovans White and Dekalb White hens during phase I. Poult. Sci., 84:1610-1615.

خفض كميات الزرق الناتجة من الدجاج البياض عن طريق خفض كميات الغذاء المستهلك

هانى محمد رمضان الشريف[١] و قاسم جبر قاسم العراقى[٢]

[١] قسم الإنتاج الحيوانى – كلية الزراعة – جامعة القاهرة

[٢] قسم الرعاية والصحة – كلية الطب البيطرى – جامعة القاهرة

تم تسكين عدد ٢٦٠ دجاجة بياض نوع هاى سكس بنى عمر ٣٤ أسبوع فى بطاريات هرمية ذات صفين فى عنبر مفتوح ذو مراوح سقف (تراوحت درجة الحرارة من ٣١ إلى ٤٠ درجة مئوية أثناء فترة التجربة) ولمدة ١٢ أسبوع وذلك لدراسة تأثير خفض كميات العلف المأكولة للطيور لتقليل كميات الزرق المتكونة. تم تقسيم الطيور عشوائيًا إلى ٥ مجاميع وكل مجموعة تحتوى ٥٢ دجاجة وتم تقسيم كل مجموع إلى ٤ مكررات وكل مكرر يحتوى على ١٣ دجاجة. تم تغذية الطيور على علف بكمية ثابتة يومياً تبعاً للمأكول اليومى من العناصر الغذائية لتحصل كل مجموعة على الإحتياجات الغذائية طبقًا لسلالة الهاى سكس البنى طوال فترة التجربة (١١٠، ١٠٧,٢، ١٠٤,٥، ١٠٢,٠ و ٩٩,٠ جم/طائر/يوم، على التوالى).

لم تتأثر القياسات معنويًا سواءاً الخاصة بالأداء الإنتاجى (إنتاج البيض اليومى، وزن البيضة، كتلة البيضة، كفاءة التحويل الغذائى و التغير فى وزن الجسم الحى) أو الخاصة بجودة البيضة (وزن ونسبة وسمك قشرة البيضة، دليل شكل البيضة، وحدات هاو، دليل البياض و دليل الصفار) بعلائق التجربة المختلفة ماعدا كمية العلف المأكول التى إنخفضت تدريجيًا. إنخفاض كمية العلف المأكول أثر معنوياً فى خفض كمية الزرق الخارج من الطائر وحسن بصورة غير معنوية سواءًا معامل هضم المادة الجافة أو معامل هضم المادة العضوية.

يمكن إستنتاج أن خفض كمية العلف المأكول للدجاج البياض مع الحفاظ على مستوى العناصر الغذائية الماكولة من الممكن أن يقلل من التلوث البيئى عن طريق خفض كمية الزرق الناتجة من الطيور مع عدم التأثير عكسيًا على الأداء الإنتاجى وجودة قشرة البيضة.