Egyptian Poultry Science Journal

http://www.epsaegypt.com

ISSN: 1110-5623 (Print) – 2090-0570 (On line)

ROLE OF DIFFERENT LEVELS OF ENZYMES SUPPLENTATION ON PRODUCTIVE PERFORMANCE AND EGG QUALITY OF BREEDER HENS

A. I. El-Faham[1]; Nematallah G. M. Ali[1]; Tork M. Dorra[2]; and Reham A. M. Ali[3]

[1]Poult. production Dept., Fac. of Agric., Ain Shams univ., Egypt.

[2]Poult. Prod. Dept. Fac. of Agric., Mansoura Univ., Egypt.

[3]Animal and Poult. Prod. Dept. Fac. of Agric., and Natural Resources, Aswan Univ., Egypt.

Corresponding author: Ahmed El - Faham; E-mail:ahmedelfaham@ymail.com

Received:24/04/2016 Accepted: 20/05/2016

ABSTRACT: A total number (15000 females + 1500 males) of Arbor ACRES strain broiler breeder at 54 wks old were used to study the effects of exogenous enzyme preparation (phytabex plus) on the productive performance, egg components, egg chemical composition, egg shell quality, fertility and hatchability. Birds were divided randomly into 3 treatments (broiler breeder basal diet supplemented with 0, 100g and 200g/ton with phytabex plus) and housed on deep litter at open house system under commercial conditions. Each treatment replicated 4 times. The results showed no significant differences among dietary treatments on productive performance including (body weight gain, egg production, egg weight, egg mass, feed consumption and feed conversion ratio), egg components and chemical composition and egg shell quality. In addition, birds fed diet supplemented with 200 g/ton phytabex plus recorded higher fertility and hatchability percentages during experimental period (20 wks) than other treatments ($p<0.05$). It could be concluded from this study that supplementation of 200 g / ton phytabex plus is recommended for enhancement of the fertility and hatchability percentages of broiler breeding.

Key Words: Enzyme Complex - Broiler Breeder - Egg Components - Hatchability.

INTRODUCTION

Modern Poultry production involves the use of broiler breeder flocks that give high quality eggs and feed formulations that ensure optimum number of fertile eggs besides, both male and female are an important for achieving reproductive success (Abudabos, 2010). For improving and maximizing the potentiality of reproduction of breeder flocks, manipulating the nutritional, physiological and environmental factors are necessary (Hassanien et al., 2015).

In addition, feed additives have beneficial effects on improving poultry performance and playing role in metabolic and physiological processes (Abd El-Fatah, 2013)

The possibility of using exogenous enzymes in poultry diets has provided nutritionists with very important tool to improve feed digestibility (Bedford, 2000 and Sun, 2007), reduce environmental pollution (Officer, 2000; Broz and Ward 2007) and lower feed costs (Hassanien et al., 2015), thus allowing more flexibility in diet formulation (Zakaria et al., 2010; Cowieson and Adeloa, 2005).

Currently, multi-enzyme preparations have been used as a feed supplement in diets of different classes of poultry to enhance the utilization of phytin phosphorus from plant – based diets (Simons, et al, 1990 and Ghazalah et al., 2006) and improving the energy value of corn /soybean – based diets (Jalal et al., 2007; Ghazalah et al, 2011) with a much attention being paid to proteins and amino acids (El-Faham and Ibrahim, 2004).

Although the efficacy of carbohydrases, proteases, amylases, xylanases, lipases, cellulases and phytases in poultry diets have been well established, there is still a large amount of uncertainty regarding the modes of action of exogenous enzymes. Furthermore, the countless interactions between enzymes and the host animal, its microflora and the digestion of ingredients are not yet fully understood.

On the other hand, there is not enough available published literature dealing with feeding diets supplemented with enzymes preparation to breeder hens compared with those by layers or broiler. Therefore, the aim of this study was to evaluate impacts of phytabex® plus (multienzyme preparation) supplementation to broiler breeder diet on their productive and reproductive performance, and egg physical characteristics.

MATERIALS AND METHODS

The trail was conducted at a private local broiler breeder farm and the chemical analysis was completed at the laboratory of Poultry Production Dept. of Faculty Agriculture, Ain Shams University.

Husbandry and experimental design: A total number (15000 females + 1500 males) of Arbor Acres strain broiler breeder were used at 54 weeks old of production period. During the experimental period, which lasted 20 weeks, breeder hens were randomly distributed into three group of equal number (5000 females and 500 males each in 4 replicates). The birds were allocated in littered floor poultry houses and fed experimental basal laying breeder diet (Table 1). During the experimental period, which lasted 20 weeks, hens were fed the three experimental diets as follows:

Diet 1 : Basal diet served as a control
Diet 2 : Basal diet + phytabex plus, 100g/ton (Enzymes 100)
Diet 3 : Basal diet + phytabex plus, 200g/ton (Enzymes 200)

All layers were reared under the same environmental and hygienic conditions. Lighting program was (15L + 9D) during the experimental period. Feed was presented in an automatic jumbo drinkers, both feed and water were provided. Vaccinations and hygiene programs were performed at the recommended ages according to the vaccination program. Body weight was recorded at the start as initial weight (at 54 wks of age) and at the end of the experiment (74 weeks old). Egg production traits of

laying breeder hens included hen egg production percent (H.D.%), egg weight (g), egg mass (g/d), feed consumption (g/d) and feed conversion ratio (Kg feed/Kg egg) were recorded and calculated on a daily basis.

Egg components and chemical composition:

From each experimental treatment, 30 eggs were used for determination of egg components during the last period of the experiment and were stored overnight at 10°C. On the next day, eggs were individually weighed to the nearest 0.1 g, broken, the yolk separated from the albumen and the albumen discarded. The yolk was then rolled on a damp paper towel to remove any adhering albumen and yolk was weighed besides, the shell was washed carefully to remove albumen and dried. Subtracting yolk weight and dry shell weight from the initial whole egg weight was applied to calculate the albumen weight. Shell, albumen and yolk weights percentages were calculated. Routine chemical analysis (protein, fat and ash) for inner egg components (yolk + albumen) was determined according to AOAC (1990) by using 12 eggs from each treatment.

Egg shell quality were evaluated using the following parameter:

Egg dimensions were majored (mm) by using a digital caliper, then shape index was calculated as follows:

$$* \text{ Egg shape index} = \frac{\text{width}}{\text{length}} \text{ x } 100$$

Shell thickness (ST) was obtained at 3 locations of each egg without membrane using micrometer.

Shell surface area (SA) and shell weight per unit surface area (SWUSA) were calculated for each egg using the following equation suggested by Nordstrom and Qusterhout (1982):

* SA (Cm^2) = $3.9782 \times EW^{0.7056}$

* SWUSA (mg/cm) = SW (mg) /SA (cm^2)

Where: 3.9782 = constant factor, EW = egg weight (g)

Shell density (SD) in g/Cm^2 was estimated for each egg using the following equation suggested by Curtis et al. (1985):

* SD = Sw (g)/SA (cm^2) × ST (cm).

Fertility and hatchability of eggs:

At 60, 66 and 72 weeks of breeder age, three hatches were taken from all treatments and incubated to determine the fertility and hatchability. Fertility percentage was estimated as percentages of total egg set in the incubator. Hatchability was calculated as percentage of hatched eggs to egg set or fertile eggs.

Statistical analysis: Data were statistically analyzed according to ANOVA procedures of SAS (SAS institute, 1996), Means differences were compared using Duncan's Multiple Range Test (Duncan, 1955). The statistical model used was: $Y_{ij} = \mu + T_i + E_{ij}$ where, Y_{ij} is the experimental observation, μ is overall mean, T_i is the effect of the dietary treatments and E_{ij} is random error.

RESULTS AND DISCUSSION

Productive performance

Initial body weight and body weight gain

The initial body weight and body weight gain of breeder hens as affected by dietary treatments are illustrated in Table (2). It is clear that the initial live body weight of breeder hens at 54 weeks of age was nearly similar among all the experimental groups and the corresponding values ranged between 3250 and 3430 (g), the differences were statistically not significant. In addition, during the whole experimental period (20 wks), chicken fed basal diets + different levels of enzymes mixture gave lower weight gain compared to those fed control basel diet. The corresponding figures were 483.3, 475.0 and 455.0 respectively, the differences failed to be significant ($p<0.05$).

Egg production:

Egg production, egg weight and daily egg mass productive performance of chickens as affected by experimental treatments have been illustrated in Table (2). The obtained data showed that there were insignificant differences in egg production, egg weight and daily egg mass among

treatments during the studied period (20 wks). Moreover, feeding enzymes 100 diet gave the lowest egg production (64.15%), highest egg weight (71.50 g) and daily egg mass (45.89 g/d) compared with that fed other dietary treatments without any significant differences.

These findings are agreement with those reported by Michael (2002), Roberts (2003) and Elmenawey et al. (2010) who reported that egg production was not affected by dietary enzyme supplementation. In the same order, Scheideler et al. (2001), Jalal et al. (2007), Fabijańska et al. (2005), El-deek et al. (2003) and Choct (2004) they stated that enzymes preparation had no effect on egg weight

However, these results were inconsistent with the finding of Jalal et al. (2007), Costa et al. (2008) who reported that egg production was improved as enzyme mixture was added to the diets. Contrary to that, Abd El-Maksoud (2006) concluded that egg weight were significantly improved by enzymes mixture supplementation.

Daily feed consumption and feed conversion ratio:

Data in Table (2) indicated that daily feed consumption per breeder hen (g/d) increased by feeding Enzymes (100) or Enzymes (200) diets compared with those fed control diet. The corresponding figures were 163.60 and 163.34 versus 163.23 (g/d), without any significant differences. In the same trend, the figures of feed conversion ratio indicated insignificant differences between breeder hen fed either enzymes (100) or enzymes (200) compared with those fed control diet, the best figures had detected for those fed [enzymes 200] (3.58)compared with those fed control diet (3.66) or fed [enzymes 100] (3.67).

Egg components and chemical composition of egg:

The results in Table (3) show the relationship between dietary treatments and egg components and chemical composition. The percentage of egg yolk in relation to egg weight for breeder hens fed control diet reflect insignificant lowest figure, however, birds fed Enzymes 100 or 200 had higher values. The corresponding figures were 32.87 versus 33.68 and 33.19 (%) respectively. without any significant differences.

On the contrary, the best figures of shell and albumen percentages were seen when breeder hens fed control diet and the corresponding values were 10.38 and 56.75% for shell and yolk respectively, but the differences between treatments were insignificant. These findings are in agreement with those reported by Attia et al. (1997), Abd El-Maksoud (2006), Jalal et al. (2007), and Elmenawey et al. (2010) they reported that different enzymes mixture did not significantly affect on egg composition. The contents of dry matter, fat and ash were relatively similar and the overall mean were 25.03%, 39.01% and 3.42% in dry matter basis contrary to that, the values of protein percentages of egg (without eggshell) ranged between 49.31% and 46.50% and the differences were significant.

Egg shell quality: Treatments had no significant effect upon most of egg shell quality traits included in this study as shown in Table (4). Shell thickness ranged between 0.34 and 0.39 (mm) and breeder hens fed control diet gave the lowest figure, while hens fed Enzymes 100 or 200 gave higher values being the same figure (0.39 mm), however, the differences failed to be insignificant.

In the same order, shell surface area and shell density figures showed the same trend, in which control treatment reflected the lowest figures compared with other treatments and the corresponding figures being 81.04 cm^2 and 3.0 g/cm^2 respectively and in all cases, differences between treatments were insignificant. These findings are in agreement with those reported by Cowan, 1993, Bedford and Schulze, 1998, Jaroni et al, 1999, and silversides et al., 2006, who reported that

kemzyme supplementation did not affect shell thickness. Contrary to that, Elmenawey et al., 2010 reported that when Avizyme and Kemzyme were added together, relative shell weight showed increased significantly as compared to the control group in Matrouh hens. No significant differences were observed on shell weight per unit of surface area and shape index due to different levels of enzyme preparation supplementation to basal diets compared with control. It is worth to note that in most cases, the breeder hens fed control diet reflected the lowest insignificant figures concerning egg quality parameters compared with other treatments.

Hatching performance: The percentage of fertility and hatchability of eggs laid by hens fed the different experimental diets are shown in Table (5). The results showed significant differences between dietary treatments for both fertility and hatchability percentages. Fertility and hatchability of total or fertile eggs percentages of eggs laid by breeder hens fed enzymes 200 diet were the highest significantly (85.33%, 77.00% and 90.23%, respectively) compared with other treatments. These findings are in contrast with the results obtained by Ramos, 2011, who reported that inclusion of enzyme mixture in nutritionally marginal broiler breeder diets did not improve fertility or hatchability variables.

On the other hand, Hassanien et al. 2015, showed that fertility % was increased from 82.2 to 85.1% and hatchability from 71.9 to 77.9% in groups of Hubbard breeders supplemented with 500 g/ton enzymes mixture.

Moreover, Neuman et al., 2002 reported that improved fertility due to increase sperm concentration by some dietary supplementation and the decrease sperm lipid peroxidation or its antioxidant properties that may preserve sperm membranes in roosters, thereby extending the life span of sperm.

Mortality rate:

Data presented in Figure (1) showed the effect of different experimental diets on mortality rate for both females and males during experimental period. It is worth to note that mortality rate for females reflected the lowest figures (1.55 to 5.72%) compared with males (8.28 to 14.86%) during experimental period (20 wks of age). Moreover, birds fed Enzymes 100 diet showed the lowest mortality rate for females (1.55%) while, birds fed control diet had the lowest figures for males (8.28%). In the same order, birds fed Enzymes 200 diet showed the highest mortality rate for both sexes being 5.72% and 14.86% respectively compared with that fed other dietary treatments.

Conclusion: Phytabex plus as an enzymes mixture have been documented to overcome the poor performance of poultry and from the present results, it could be concluded that supplemented basal broiler breeder diet with (0.2 kg phytabex plus / ton diet) would have a positive effect on the fertility and hatchability percentages without any adverse effect on productive performance, egg components, egg chemical composition or egg shell quality. In the light of these findings, it is thought that these additive may be economically beneficial when used in broiler breeder hens.

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

Ingredients	%
Yellow corn	66.58
Soybean meal (44%)	20.45
Corn gluten meal (60%)	1.00
Wheat bran	2.00
Di Calcium Phosphate	1.70
Limestone	7.50
Salt (NaCl)	0.40
Premix*	0.30
DL-methionine	0.07
Total	100
Calculated analysis**	
Crude protein %	15.04
ME, K cal/kg	2750
Calcium %	3.20
Av. Phosphorus %	0.44
Lysine %	0.78
Methionine %	0.36
Methionine % + cystine %	0.64

* Each 3 kg of vitamin and minerals premix HY-MIX broiler breeder containing: 15.000.000 IU Vit. A, 3.300.000 IU Vit. D3, 80.000 mg Vit. E, 4.000 mg Vit. K_3, 2.200 mg Vit. B_1, 12.000 mg Vit. B2, 5.500 mg Vit. B6, 20 mg Vit. B12, 20.000 mg Pantothenic acid, 40.000 mg Nicotenic acid, 1500 mg Folic acid, 300 mg Biotin 1000 g Choline 100 g Manganese, 80 g Zinc, 60 g Iron, 10 g Copper, 2 g Iodine, 0.3 g Selenium, 0.1 g Cobalt, and CaCo3 (Add to 3 kg).

** Calculated analysis of the experimental diet was done according to (NRC, 1994).

Table (2): Effect of dietary treatments on performance of laying breeder hens.

Items	Treatments			Significance
	Control	Enzymes 100	Enzymes 200	
Egg production (H.D. %)	64.17±1.56	64.15±3.42	64.51±1.61	NS
Egg weight (g)	69.69±0.70	71.50±1.23	71.09±1.66	NS
Daily egg mass (g/d)	44.69±1.04	45.89±2.56	45.77±1.16	NS
Daily feed consumption (g/d)	163.23±1.66	163.60±2.38	163.34±1.72	NS
Feed conversion ratio (kg feed/kg egg)	3.66±0.07	3.67±0.24	3.58±0.08	NS
Body weight (g):				
Initial	3333±40.1	3250±28.1	3430±14.5	NS
Final	3816±60.1	3725±13.3	388.5±13.5	NS
Gain	483.3±16.7	475±14.3	455±14.2	NS

NS= Non-Significant.

Table (3): Effect of dietary treatments on egg components and chemical composition of egg (Yolk and albumen) during experimental period (20 wks).

Items	Treatments			Significance
	Control	Enzymes 100	Enzymes 200	
Egg Components:				
Egg weight (g)	71.70±1.82	73.46±1.20	73.41±1.65	NS
Shell (%)	10.38±0.37	10.30±0.20	10.31±0.34	NS
Yolk (%)	32.87±0.78	33.68±0.90	33.19±0.62	NS
Albumen (%)	56.75±0.83	56.01±0.79	56.51±0.48	NS
Chemical composition (On dry matter basis):				
Dry matter (%)	25.36±0.11	24.75±0.65	24.99±0.69	NS
Protein (%)	48.04±0.87^{ab}	46.50±0.43^{b}	49.31±0.61^{a}	*
Fat (%)	39.08±0.42	38.51±0.32	39.43±0.77	NS
Ash (%)	3.46±1.21	3.49±0.88	3.31±0.70	NS

a,b,… Values in the same row not followed by a common letter are significantly different at ($p<0.05$). NS= Non-Significant; *= $p<0.05$.

Table (4): Effect of dietary treatments on egg shell quality of laying breeder hens during experimental period (20 wks).

Items	Treatments			Significance
	Control	Enzymes 100	Enzymes 200	
Shape index %	74.51±0.60	76.36±1.40	75.63±2.32	NS
Shell thickness (mm)	0.34±0.008	0.39±0.02	0.39±0.03	NS
Shell surface area (cm^2)	81.04±1.45	82.47±0.95	82.40±1.33	NS
Shell weight per unit of surface area (mg/cm^2)	92.0±3.0	92.0±2.0	92.0±3.0	NS
Shell density (g/cm^2)	3.0±0.1	4.0±0.2	4.0±0.3	NS

NS= Non-Significant.

Table (5): Effect of dietary treatments on fertility and hatchability of laying breeder hens during experimental period (20 wks).

Items	Treatments			Significance
	Control	Enzymes 100	Enzymes 200	
Fertility, %	$81.67±0.97^b$	$83.56±0.34^a$	$85.33±0.29^a$	**
Hatchability, % from setting eggs.	$72.89±1.18^b$	$72.89±1.12^b$	$77.00±1.38^a$	*
Hatchability, % from fertile eggs.	$89.25±1.08^b$	$87.23±0.73^b$	$90.23±1.05^a$	*

a,b,… Values in the same raw not followed by a common letter are significantly different at ($p<0.05$). *= $p<0.05$; **= $p<0.01$.

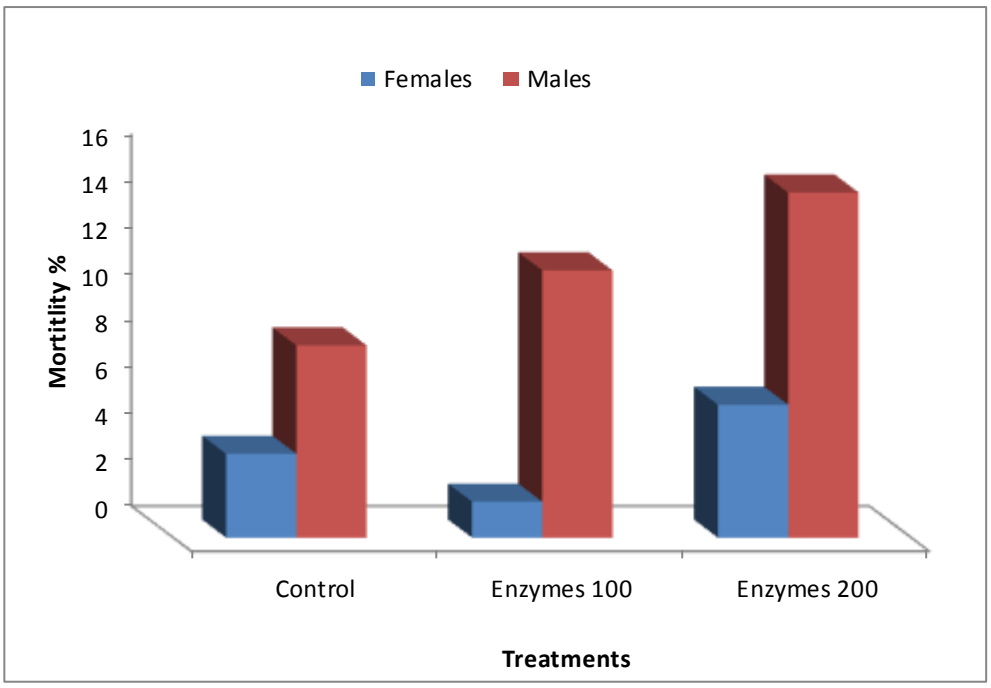

Fig. (1): Effect of different experimental diets on mortality rate for both females and males during experimental period (20 wks of age)

REFERENCES

Abd El-Maksoud, A. A. A., 2006. Effect of different levels of olive pulp without or with Kemzyme supplementation on laying hens performance. Egypt Poult. Sci., 26(3): 991-1010.

Abdel-Fattah, S. A., 2013. Some immune physiological responses of japanse quail to dietary L-Carnitine supplementation. Egypt. J. Nutri. Feeds, 16(1): 141-149.

Abudabas, A., 2010. The effect of broiler breeder strain and parent block age on hatchability and fertile hatchability. Int. J. Poult. Sci., 9(3): 231-235.

AOAC, 1990. Association of official Analytical Chemists. Methods of Analysis 15th Edition, Assoc. office. Anal. Chem Arlington, USA.

Attia, Y. A.; Abd EI-Ghani, A. I.; EL-Ganzory, E. H.; and Abd EI-Hady, S. B., 1997. Responses of Bandarah local breed to some pronutrient additions. Egypt. Poult. Sci. J., 17(11): 1-22.

Bedford, M. R., 2000. Exogenous enzymes in monogastric-Their current value future benefits. Anim. Feed Sci. Tech., 86: 1-13.

Bedford, M. R.; and Schulze, H., 1998. Exogenous enzymes for pigs and poultry. Nut. Res. Rev., 11: 91-114.

Broz, J.; and Ward, N. E., 2007. The role vitamins and feed enzymes in combating metabolic challenges and disorder. J. Appl. Poult. Res., 16: 150-159.

Choct, M., 2004. Enzymes for the feed industry. Past, present and future. XXII World's Poult. Cong. 8-13 June, Istanbul. Turkey.

Costa, F. G. P., Oliveira, C. F. S.; Goulart, C. C.; Figueiredo, D. F.; and Neto, R. C. L., 2008. Use of Exogenous Enzymes on Laying Hens Feeding During the Second Production Cycle, Int. J. Poult. Sci., 7(4): 333–338.

Cowan, W. D., 1993. Understanding the manufacturing, distribution, application and overall quality of enzymes in poultry feeds. J. Appl. Poult. Res., 2: 99-99.

Cowieson, J.; and Adeloa, O., 2005. Carbohydrases, Protease, and Phytase Have an Additive Beneficial Effect in Nutritionally Marginal Diets for Broiler Chicks. Poult. Sci., 84:1860-1867.

Curtis, P. A.; Gardner, F. A.; and Mellor, D. B., 1985. A comparison of selected quality characteristics of brown and white shell eggs. 1-shell quality. Poult. Sci., 64: 297-301.

Duncan, D. B., 1955. The Multiple Range and F. Testes. Biometrics, 11: 1-45.

El-Deek, A. A.; Attia, Y. A.; and Amal, A. Soliman, 2003. Productive response of broiler breeder hens when fed practical or vegetable diets containing high levels of barley, sunflower meal or barley and sunflower meal without or with enzyme mixture supplementation. 3- barley and un-dehulled sunflower meal. J. Agric. Sci., Mansoura Univ., 28: 2525-2537.

El-Faham, A. I.; and Manar, T. Ibrahim, 2004. Effect of enzyme supplementation on performance, meat quality and economic evaluation of broiler chicks fed low protein diets. Anim. Agric., Mashtohor, 42(3): 1009-1026.

El-menawey, M. A.; Ali, A. H. R.; Galal, M. A. A.; and Stino, F. K. R., 2010. Influence of enzyme supplementation in the diet on egg production, egg quality and some blood constituents of matrouh hens. Egypt. Poult. Sci., 30(3): 661-678.

Fabijańska, M.; Boruta, M.; Sokół, J. L.; Hermanowska, A.; and Chojecka, M., 2005. Effect of naked oats and enzyme supplementation on performance of hens and quality traits of eggs. J. Anim. Feed Sci., 14(1): 439–442.

Ghazalah, A. A.; Abd-El same, M. O.; El-Manyalawi, M. A.; and Eman, S. Moustafa, 2006. Response of broiler chicks to microbial phytase

supplementation in diet differs in available phosphorus sources. Egypt. Poult. Sci. J., 26:1321-141.

Ghazalah, A. A.; Abd. Elsamee, M. O.; El-Manylawi, M. A. F.; and Omara, I. I., 2011. Performance and nutrient utilization of laying hens fed different apparent metabolizable energy and microbial phytase levels. Egypt. J. Nitri. Feeds, 14(2): 279-287.

Hassanien, M. S.; Ibrahim, S. A.; El-Faham, A. I.; and El-Safty, S. A., 2015. Studies on some factors affecting on productive performance of meat-type parent stocks. Ph.D. Thesis, Ain Shams University.

Hassanien, M. S; Ibrahim, S. A.; El-Faham, A. I.; and El-Safty, S. A., 2015. Evalution of growth performance and economic analysis of broiler chicks fed plant diets supplemented with some feed additives. Egypt. J. Nutri. Feeds, 18(2): 175-185.

Jalal, M. A.; Scheideler, S. E.; and Pierson, E. M., 2007. Strain response of laying hens to varying dietary energy levels with and without Enzyme supplementation. J. Appl. Poult. Res. 16:289-295.

Jaroni, D.; Scheideler, S. E.; Beck, M.; and Wyatt, C., 1999. The effect of dietary wheat middlings and enzyme supplementation. 1. Late egg production efficiency, egg yields, and egg composition in two strains of Leghorn hens. Poult. Sci., 78: 841–8.

Michael, A. E., 2002. Enzyme use in commercial layer production. Multi-State Poultry Meeting, May 14-16.

Neuman, S. L.; Lint, T. L.; and Hester, P. Y., 2002. The effect of dietary Carnitine on semen traits of White Leghorn roosters. Poult. Sci., 81: 495-503.

Nordstrom, J. O.; and Qusterhout, L. E., 1982. Estimation of shell weight and sheel thickness from egg specific gravity and egg weight Poult. Sci., 61: 1991-1995.

NRC, 1994. National Research Council. Nutrient Requirements of Poultry. 9th Ed. Composition of Poultry feedstuffs. National Academey Press, Washengton, DC, USA. P.P. 61-75.

Officer, D. I., 2000. Feed Enzymes, in: Mello, J.P.F. (Ed.) farm Anim. Met. Nut., pp. 405-426 (CABI International).

Ramos, M. A., 2011. Effects of Phyzyme XP and Avizyme 1502 on the Performance of Broiler Breeders and their Progeny. Animal Science and Poultry Science and Physiology. Raleigh, North Carolina.

Roberts, J. R., 2003. Effects of commercial feed enzymes in wheat-based diets on egg and egg shell quality in imported strains of laying hen. In: Proceedings of the Australian Poultry Science Symposium. Sydney (D. J. Farrell, Ed.), 11: 139-142.

SAS, 1996. SAS procedure Guide version 6.12 Edition. SAS Institute I NC., Cary, NC, USA.

Scheideler, S. E.; Jalal, M. A.; and Pierson, E., 2001. Strain responses of laying hens to varying dietary energy with and without enzyme supplementation. Poult. Sci., 80(1): 49. (Abs).

Silversides, F. G.; Scott, T. A.; Korver, D. R.; Afsharmanesh, M.; and Hruby, M., 2006. A study on the interaction of xylanase and phytase enzymes in wheat-based diets fed to commercial white and brown egg laying hens. Poult. Sci., 85: 297-305.

Simons, P. C.; Versteegh, H. A.; Jongboed, A. W.; Kemme, P. A.; Slump, P.; and verschoor, G. J., 1990. Improvement of phosphorus availability by microbial phytase in broilers. Br. J. Nutri. 64:525-540.

Sun, X., 2007. Effect of Corn Quality and Enzyme Supplementation on Broiler performance Gastrointesinal Enzyme Activity, Nutrient Retention, Intestinal Mucin and Jejunal Gene Expression. Ph. D. Thesis, Fac. of the Virginia

Polytechnic Institute and State University Blacksburg, Virginia.

Zakaria, H. A. H.; Jalall, M. A. R.; and Abu Ishmais, M. A., 2010. The influence of supplemental Multi-enzyme feed additive on the performance, carcass characteristics and meat quality traits of broiler chickens. Int. J. Poult. Sci., 9(2): 126-133.

الملخص العربى

دور إضافة مستويات مختلفة من الإنزيمات على الأداء الإنتاجى وجودة البيضة لأمهات الدجاج

أحمد إبراهيم سليمان الفحام[١]، نعمة الله جمال الدين محمد على[١]، ترك محمد درة[٢]ورهام على محمد على[٣]

[١] قسم إنتاج الدواجن – كلية الزراعة – جامعة عين شمس – القاهرة – مصر

[٢] كلية الزراعة- جامعة المنصورة- قسم إنتاج الدواجن – مصر

[٣] كلية الزراعة- جامعة أسوان- قسم الإنتاج الحيوانى والدواجن والموارد الطبيعية- مصر

تم استخدام ١٥٠٠٠ دجاجة + ١٥٠٠ ديك من سلالة الاربرايكرز لأمهات التسمين عند عمر ٥٤ أسبوع لدراسة تأثير المستحضر الإنزيمى (الفيتابكس بلس) على الأداء الإنتاجى ومكونات البيضة وتركيبها الكيميائى وجودة قشرة البيض والخصوبة والفقس.

قسمت الطيور على ٣ معاملات غذائية بكل منها ٤ مكررات (عليقة أمهات التسمين الأساسية أضيف إليها صفر و ١٠٠ جم و ٢٠٠ جم/طن فيتابكس بلس) وسكنت الطيور على الأرض فى مزرعة تجارية مفتوحة. أوضحت النتائج عدم وجود فروق معنوية للمعاملات الغذائية على الأداء الإنتاجى (وزن الجسم وإنتاج البيض ووزن البيض وكتلة البيض واستهلاك العلف ومعامل التحويل الغذائى) ومكونات البيضة والتركيب الكيميائى (صفار + بياض) وجودة القشرة.

حيث أظهرت النتائج أن الطيور المغذاة على عليقة أساسية مضاف إليها ٢٠٠جم/طن فيتابكس بلس حسن معنوياً النسبة المئوية للخصوبة والنسبة المئوية للفقس أثناء فترة الإنتاج (٢٠ أسبوع).

لذا ينصح من هذه الدراسة بإضافة ٢٠٠جم من مخلوط الإنزيمات (الفيتابكس بلس)/طن علف لتحسين الأداء الإنتاجى لأمهات دجاج التسمين.