PRODUCTIVE AND PHYSIOLOGICAL PERFORMANCE OF TWO LOCAL STRAINS OF CHICKENS AT EARLY PERIOD OF LAYING AS AFFECTED BY ENZYME SUPPLEMENTATION UNDER SUMMER CONDITIONS OF EGYPT
2-AVIZYME[1500] ENZYME

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Abstract

A total of 360 pullets at 22 weeks of age from two local strains (Mandarah and Dokki-4) 180 birds each, were used to study the effect of dietary Avizyme 1500 supplementation on productive and physiological performance of two local strains of chickens during early period of laying under summer conditions. The experiment continued for 12 weeks from 22 up to 34 weeks of age. The birds were randomly distributed into six treatments each of two replicates (fifteen of each strain). Two corn-Soybean basal diets formulated to provide normal ME (2,890 cal/kg) or low ME (2,805 kcal/kg) were combined with or without three levels of Avizyme 1500 supplementation (0,1 and 2 g/kg diet).The experimental treatments were in 2(Stains) x 2 (ME levels) x 3 (Avizyme 1500 levels) factorial design.

Egg production, egg quality, plasma Ca, P, cholesterol, total protein, albumin and globulin were studied. The results indicated that:

Enzyme supplementation had a significant positive effect on feed conversion and body weight gain. Hens fed 2,890 kcal/kg diets supplemented with Avizyme 1500 (1 or 2 g/kg of diet) gave higher body weight gain (BWG) and significantly improved feed conversion (FC) as compared with the hens fed 2,890 or 2,805 kcal/kg diets without enzyme supplementation.

- Enzyme supplementation significantly affected egg production (EP) in each strain. Mandarah hens laid eggs of greater weight when fed normal ME diets compared with eggs from the Dokki-4, which were heavier from hens on the low ME diet. Hens fed 2,890 kcal/kg diets diets supplemented with Avizyme 1500 (1 or 2 g/kg of diet), showed significant ($P \leq 0.05$) increase in egg weight, egg mass and an improvement in some egg quality parameters in Mandarah strain compared to Dokki-4 strain. However, hens fed 2,890 kcal/kg diets performed better than those fed 2,805 kcal/kg diets for egg production and feed conversion.

- Enzyme supplementation had a significant positive effect on nitrogen, calcium and phosphorus retention but no effect was obtained on AME or digesta viscosity.

- Hens of the two strains, fed 2,890 kcal/kg diets supplemented with Avizyme 1500 (1 or 2 g/kg of diet), showed an increase in plasma calcium, phosphorus, total protein, albumin and globulin, but there was a decrease in plasma cholesterol as compared with other groups.

In conclusion, Mandarah and Dokki-4 laying hens fed low ME diet, whether supplemented or not with Avizyme 1500 performed less efficiency for egg production and feed conversion than those fed the 2,890 kcal/kg diets supplemented with Avizyme 1500.Additionally, it would appear that Mandarah laying hens had better performance than Dokki-4 laying hens irrespective to energy or enzyme levels.

INTRODUCTION

High environmental temperature during summer season in Egypt caused highly detrimental effect on broiler production. Feed consumption, growth rate, mortality and other economic traits governing the prosperity of the industry are adversely affected by high ambient temperature. Other consequence of high environmental temperature is its effects on the development of a specific immune response in the chicken.

Leeson and Summers (1976) reported that, a very high moisture content of a corn harvest, which necessitated high temperature and retention drying conditions, reduced ME value of corn by as much as 3% compared to the expected value. More recently, corn variability and feeding value have been a subject of research focus for a number of scientific groups. Although the majority of the data suggest that an average improvement in nutrient utilization of 3 – 5% can be obtained with Avizyme 1500, the individual responses to addition of the product may be variable. A possible reason for this effect may be in the feeding value variability of corn/sorghum and soybean meal. However, other factors such as the microbial proliferation in the gut, which affects birds performance might also play an important role.

Soybean meal is known for its value as a protein source in poultry diets, but can have a high degree of variability in its nutritional content. This variability is found not only in the protein and amino acid composition but also among the antinutritional factors such as trypsin inhibitors and lectins. Several attempts have been made to increase the nutritional value of soybean meal by adding protease and carbohydrates, either before or after processing. There are 2 main approaches when considering incorporation of enzymes into corn-soybean meal type poultry rations. The simplest is "over the top" addition to an existing formulation to achieve economic improvements in layer performance. The second approach is to change the feed formulation to reduce the nutrient content of feed "specified down", and then add enzymes to restore the nutritional value of the feed.

The development of Avizyme 1500 (a commercial preparation enzymes) has been continued since its introduction in 1998 as the first enzyme product specifically intended for use in corn/sorghum soy-based poultry diets.

Zanella *et al.* (1999) reported that enzyme (AVI 1500) supplementation to corn/soy diet produced significant improvement (1.9%) in body weight (BW) and 2.2% improvement in feed conversion (FC). On the other hand, Ali *et al.* (2006) indicated that feeding hens on Wheat Bran-diet supplemented With 0.1 % Avizyme 1500 (AVI) improved egg number, egg mass, feed conversion and improved hatchability percentage compared to the birds fed the control diet.

The objective of the present study was conducted to investigate the effects of Avizyme 1500 supplementation in corn-soybean meal rations formulated two ME levels (over top) using 2 local strains. Parameters studied were hen performance, egg components, and nutrient retention.

MATERIALS AND METHODS

The experimental work of the present study was carried out at Sakha Poultry Breeding Research Station, Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Kafr El-Shiekh Governorate. The experimental period was 12 weeks from 22 up to 34 weeks of age. This work was carried out during summer season (from June to September).The average ambient temperature ranged from 30 -38ºC, whereas relative humidity ranged between 50 and 65 %. A total of 360 Mandarah and Dokki-4 laying hens were used in this study,180 hens of each strain were divided equally into six treatments each of two replicates (fifteen birds each). Two corn-soybean meal basal were formulated, one to provide a normal level of ME (2,890kcal/kg) and the other with a low ME (2,805 kcal/kg). Each ration was supplemented with three levels of Avizyme 1500 (0 ,1 and 2 g/ kg diet).Avizyme 1500 is a multi-enzyme preparation containing amylase 400, xylanase 300, protease 4000 U/g .The experimental diets were formulated to meet National Research Council (1994) nutrient requirements of laying hens, for phase I the low ME diets were formulated to provide an energy content 3% the NRC recommendations (Table 1). Diets were formulated to be iso nitrogenous and equal in essential amino acids, calcium, and available phosphorus. The experimental treatments were as follows.

- Treatment 1: normal ME diet (2,890 kcal/kg).
- Treatment 2: low ME diet (2,805 kcal/kg).
- Treatment 3: T1 with Avizyme 1500 (1g/ kg diet).
- Treatment 4: T1 with Avizyme 1500 (2g/kgdiet).
- Treatment 5: T2 with Avizyme 1500 (1g/ kg diet).
- Treatment 6: T2 with Avizyme 1500 (2 g/ kg diet).

Hens of both strains were taken and housed in open system floor pens and submitted to the same managerial conditions throughout the experimental period. Feed and water were supplied *ad-libitum* to the hens weighted at 22 weeks of age and at the end of the experiment (34 wks of age).

Productive performance and egg production traits

Productive performance was recorded at the beginning (22 wks of age) and at the end of the experiment (34 wks of age) measuring live body weight (BW), feed intake (FI), feed conversion (FC), egg production (EP), egg weight (EW) and egg mass (EM). At 34 weeks of age, 120 eggs (20 eggs per treatment) randomly were taken to measure shell thickness, yolk , albumen percent and Haugh units.

Digesta Viscosity and Nutrient Digestibility

At 28 wk of age, hens of all groups were fed chromium oxide (0.03%) marked feed for 5 d, and on the fifth day approximately 400 g of clean excreta (free of feed and visible feather contaminants) was collected from each treatment groups to determine nutrient digestibility (calcium, phosphorus and nitrogen) according to (AOAC, 1994). Analysis for gross energy was by Parr adiabatic oxygen bomb calorimeter and the energy (AME) values were determined using the following equation: AME (kcal/kg of diet) = gross energy (GE) of diet − [GE excreta/digest × (marker diet/marker excreta/digest)]. One hen from each treatment was euthanized by cervical dislocation, the intestinal tract was removed, and the contents of the tract from Meckel's diverticulum to the ileal-cecal-colonic junction were collected to determine digest supernatant viscosity. Approximately 1.5 g of homogenized digsta sample were collected, immediately placed in centrifuge at 12,700 × *g* for 5 min for determination of viscosity. Viscosity was directly measured on 0.5 mL of supernatant using a Brookfield viscometer, viscosity was expressed in centipoise units (cP).

Blood plasma metabolites

At the end of the experimental period, six hens per treatment (3 per replicate) were randomly taken and blood samples (3 ml from wing vein) were collected in a sterile heparinized centrifuge tubes. Blood pH was determined by pH meter equipment. The samples were then centrifuged for 10 minutes at 3000 r.p.m and plasma was separated. Plasma content of calcium, phosphorus, total protein, albumin and globulin were determined using the suitable commercial kits according to the recommendations of the manufacturer.

Statistical analysis

Data were subjected to Analysis of variance using SAS (1986), for a randomized complete block design with a 2 × 2 × 3 factorial arrangement of treatments. The data were tested for main effects of dietary ME, hen strain, and enzyme supplementation and for interaction effects.

The following statistical model was used

$Yijknl = M + Rl + \alpha i + \beta j + \gamma k + (\alpha\beta)ij + (\alpha\gamma)ik$

$+ (\beta\gamma)jk + (\alpha\beta\gamma)ijk + \varepsilon ijkl$

where, Yijknl = variable measured, M = overall mean, Rl = Block, αi = effect of dietary ME, βj = effect of strain, γk = effect of enzyme, $(\alpha\beta)ij$ = interaction between dietary ME and strain, $\alpha\gamma ik$ = interaction component for dietary ME and enzyme, $(\beta\gamma)jk$ = interaction component for strain and enzyme, $(\alpha\beta\gamma)ijk$ = interaction component for dietary ME, strain, and enzyme, $\varepsilon ijknl$ = random component

RESULTS AND DISCUSSION

Productive performance

Results in Table 2 show that the strain of hen was the only factor to significantly affect feed intake (FI), with the Dokki-4 consuming 2.9 g more feed per day than the Mandarah ($P \leq 0.05$). The findings in this study support the common theory that hens respond to a low ME diet with increased consumption to meet their energy needs (Babcock, I. S. A. Division of ISA Breeds 2002). The normal ME diet (Table 2) improved feed conversion from (from 4.15 to 3.52) compared with the reduced ME ration. The birds fed ME (2,890 kcal/kg) diet, followed by ME 2,805 kcal/kg diet supplemented with Avizyme 1500 had a significant increase on body gain (BWG) and best feed conversion (FC) compared with those fed control diets throughout the entire experimental period. Hens of Mandarah strain showed significantly ($P\leq 0.05$) higher BWG and feed conversion (FC) than those of Dokki-4 strain. These differences in BW between the two strains may be due to the genetic differences. Treatments had significant ($P\leq 0.05$) increase on BW, since BW in all treatments was improved in the two strains compared with the control groups. Also, the values of BWG and FC were improved in all birds fed normal ME (2,890 kcal/kg) diet supplemented with Avizyme 1500 at a level of 2g/kg compared with the birds fed low-ME (2,805 kcal/kg) diet supplemented with Avizyme 1500 at a level of 1g/kg diet and control groups for both strains. There was significant ($P\leq 0.05$) effects of dietary supplementation with Avizyme 1500 on feed intake (FI), feed conversion (FC), body gain (BWG) between the birds fed high level of Avizyme 1500 (2g/kg of diet) which had higher (BWG) and (FC) compared to control birds.

These results agreed with the findings of Jamroz *et al.* (1992) who reported that Avizyme 1500 enzyme addition improved body weight gain and feed conversion.

Egg production

Data presented in Table 3 show that egg production (EP), egg weight (EW) and egg mass % were significantly ($P\leq 0.05$) affected by dietary ME level. Mandarah strain had a higher production rate of 51.4 % compared with 47.4 % for the Dokki-4 strain ($P\leq 0.05$). Hens fed normal ME diet achieved significantly ($P\leq 0.05$) greater egg weight, egg mass and egg production % than those fed diets with low-ME. The average of egg production (%) for birds fed the normal ME diet during the entire experimental period was 50.3%. It was higher by about 3% than that attained by those fed the low ME diet. Avizyme 1500 had significant ($P \leq 0.05$) effects on egg production and egg mass compared to unsupplemented diets during the whole experimental period. As for the whole experimental period, using Avizyme 1500 gave higher egg production traits specially Mandarah strain with using the normal ME (2,890 kcal/kg) diet compared with other treatments. Egg production % was significantly ($P \leq 0.05$) affected by enzyme supplementation with advantage over the control during the entire experimental period. Hens fed normal ME (2,890 kcal/kg) diet supplemented with Avizyme 1500 (2g /Kg) had an average egg production of 57.2 % compared to 48.2% for control birds. The obtained results agree with the findings of Sohail *et al.* (2003) and Scheideler *et al.* (2005) showed improved FI, egg production, and egg mass, especially among varying laying hen strains.

Besides, A 3-way interaction of strain × dietary ME × enzyme showed significant ($P<0.05$) effect on egg weight , egg mass and egg production %. Hens fed normal ME (2,890 kcal/kg) with or without supplements of Avizyme 1500 significantly surpassed those fed the low ME (2,805 kcal/kg) diet in egg weight, egg mass and egg production %.Even though the beneficial effect of these dietary supplements was more pronounced on the performance of hens fed the low ME, they still performed significantly less than their counterparts fed the normal ME as shown in Table 3.

Egg quality

Data presented in Table 4 show significant differences between treatments in some egg quality parameters. Percentages of egg albumen differed significantly among the various diets or strains (Table 4).Yolk percentage increased in eggs from hens fed the normal ME compared with reduced ME diet (29.2 vs. 27.2, $P \leq 0.05$). Percentage yolk was also affected by strain of hen, being greater in eggs from the Mandarah (28.9) vs. Dokki-4 eggs (27.5) ($P \leq 0.05$). Shell percentage showed a significant strain × ME × enzyme interaction at $P \leq 0.05$ (Table 4).Using dietary supplementation with Avizyme 1500 at a level of (1or 2g /kg diet) in the diets of Mandarah and Dokki-4 laying hens significantly increased yolk index %, shell thickness and Haugh unit (Table 4). However, the egg quality parameters did not differ in the control groups of the two strains. Also, the results in Table 4 show that there were significant ($P<0.05$) differences in quality traits of eggs due to the effects of dietary supplementation with Avizyme 1500. Eggs from Mandarah hens had a higher Haugh unit compared with eggs from Dokki-4 hens (72.7 vs. 69.3, $P \leq 0.05$). A strain × ME interaction showed a significant ($P \leq 0.05$) effect on Haugh units with Mandarah eggs having greater values when laid by hens fed the normal ME ration. Hens fed normal

ME (2,890 kcal/kg) diet supplemented with Avizyme 1500 (2g /kg) achieved greater egg quality parameters than those fed the same diet supplemented with (1g/kg) of Avizyme or those fed control diets. Several investigators reported a beneficial effect of dietary supplementation with Avizyme on egg shell quality (Graham and Aman 1991).

Digesta viscosity and nutrient digestibility

Results in Table (5) show that enzyme supplementation had a significant positive effect on nitrogen retention ($P \leq 0.05$) with an increase of nearly 4%. Cone *et al.* (1994) suggested that xylanase treatment improves nitrogen solubility in soybean meal by causing cell-wall degradation, leading to release proteins, as well as by some proteolytic activity in the crude enzyme preparation. Energy level of the diet (ME) had a significant effect on nitrogen retention, normal ME diets showed better protein use than reduced ME diets (53.8 vs.48.6%). Excreta calcium retention was significantly ($P \leq 0.05$) affected by enzyme supplementation, which increased from 29.8 to 37.5% with enzyme supplementation (Table 5). Strain and dietary ME had were effect on calcium and phosphorus retention. Wyatt (1992) postulated that cell wall disruption and the release of cell-bound nutrients might be the mechanism of improvement in digestibility values associated with addition of feed enzymes. An enzyme × ME interaction was also significant ($P \leq 0.05$), and hens on the unsupplemented normal ME diet showed higher levels of phosphorus retention compared with hens on the reduced ME diets. Hens fed normal ME (2,890 kcal/kg) diet supplemented with high-Avizyme 1500 (2g /kg) achieved higher levels of nitrogen, calcium and phosphorus retention than those fed the same diet supplemented with (1g/kg) of Avizyme or those fed control diets. Dietary energy levels had the only significant effect on AME (Table 5), AME was higher for hens fed the normal ME diet than for those on the reduced ME diet (4.36 vs. 3.43, $P \leq 0.05$). Enzyme supplementation did not improve AME in excreta or ileum, contrary to the results found for mature roosters by Rotter *et al.* (1990). Gut viscosity measurements did not show any differences among the various diets or strains (Table 5). The findings of the present study are in agreement with those of Marsman *et al.* (1997), who reported that chime viscosity was not altered by addition of enzymes (protease and carbohydrase) to soybean meal.

Plasma parameters

The data in Table 6 show that Mandarah and Dokki-4 laying hens fed normal ME (2,890 kcal/kg) diet supplemented with Avizyme 1500 at a level of 1 or 2g/kg diet had significantly increased plasma calcium, phosphorus, total protein, albumin, globulin and decreased plasma cholesterol compared to those fed the low ME (2,805 kcal/kg) diet or control group at the end of the experimental period. In this connection, EL-

Husseiny *et al.* (1994) cleared that harmful effect on total protein was observed by feeding laying hens on radicel. Hens fed normal ME (2,890 kcal/kg) diet supplemented with high-Avizyme 1500 (2g/kg) increased plasma total protein, albumin, and globulin, while plasma cholesterol was decreased, than those fed the same diet supplemented with 1g/kg of Avizyme or those fed control diets (Shakmak, S., 2003).

In conclusion, the present study indicated that the strain of hen had the most significant effect on EP parameters, with the Mandarah hens consuming lower feed but larger eggs than the Dokki-4 hens. Strain affected hen response to ME level of the diet and enzyme supplementation. Enzyme supplementation improved apparent nutrient nitrogen, protein, calcium and phosphorus retention. It is worthy to note that using Avizyme 1500 (1g /kg) of diets improved the productive performance and physiological response compared with control group, but with lower degree of success than the high level- Avizyme 1500 (2g /kg). Such improvement was more pronounced on Mandarah laying hens than Dokki4 laying hens under the conditions of the present study.

Table 1. Composition and calculated analysis of the basal diet.

Ingredients	Normal ME (Control)	Reduced ME
Yellow corn	56.7	58.1
Soybean meal 44%	27.7	27.6
Tallow	3.4	3.0
Corn oil	1.0	--
Di-calcium phosphate	1.8	1.9
Limestone	7.2	7.2
Oyster shell	1.5	1.5
Salt (NaCl)	0.34	0.39
DL-Methionine	0.11	0.11
Trace minerals[1]	0.1	0.1
Vitamin premix[2]	0.05	0.05
Total	100.00	100.00
Calculated analysis:		
ME (Kcal / Kg)	2890	2805
Crude protein%	17.0	17.0
Calcium, %	3.8	3.8
Available P., %	0.44	0.44
Lysine, %	0.90	0.95
Total sulfur amino acids, %	0.66	0.66

1Trace mineral premix provided per kilogram of diet: Mn, 88 mg, Cu, 6.6 mg, Zn, 88 mg, Se, 0.30 mg.

2Vitamin premix provided per kilogram of diet: vitamin A, 6,600 IU, cholecalciferol, 2,805 IU, vitamin E, 10 IU, vitamin K, 2.0 mg, riboflavin, 4.4 mg, pantothenic acid, 6.6 mg, niacin 24.2 mg, choline, 110 mg, vitamin B12, 8.8 mg, ethoxyquin,1.1 mg.

Table 2. Effect of dietary treatments on feed intake, egg production, feed conversion, and body weight gain .

Strain and diet	Diet ME	Diet Enzyme (g)[1]	Feed intake (g/d)	Feed conversion (feed/g egg)	body weight gain (g)
Mandarah (M					
1	2890	0	95.6	4.05	210.2
2	2890	1	98.5	3.17	225.6
3	2890	2	94.8	2.89	241.4
4	2805	0	97.9	5.32	187.1
5	2805	1	94.2	3.64	198.5
6	2805	2	96.7	3.56	206.7
Dokki-4 (D-4)					
1	2890	0	101.2	4.39	178.6
2	2890	1	103.3	3.50	185.4
3	2890	2	97.4	3.15	192.8
4	2805	0	99.5	6.10	165.2
5	2805	1	96.1	3.79	170.3
6	2805	2	98.2	3.46	182.3
±SEM			0.87	0.03	16.23
Diet average					
1	2890	0	98.4	2.24	194.4
2	2890	1	96.1	2.09	205.5
3	2890	2	95.2	1.96	217.1
4	2805	0	100.9	2.42	176.2
5	2805	1	98.7	2.21	181.4
6	2805	2	97.5	2.10	194.5
Strain average					
M			96.3	3.61	211.6
D-4			99.4	4.10	179.1
ME average					
2890			96.6	3.52	205.7
2805			99.1	4.15	185.0
Enzyme average					
0			99.6	4.96	185.3
1g			91.4	3.52	194.9
2g			96.3	3.00	205.8
Statistical probabilities					
Main effects					
Strain			**	**	**
ME			**	**	**
Enzyme			**	**	**
Interaction effects					
ME x enzyme			NS	NS	NS
Strain xME			NS	NS	NS
Strain xenzyme			NS	NS	NS
Strain xME xenzyme			NS	NS	NS

1Avizyme 1500, Finnfeeds International, Marlborough, England.

Table 3. Effect of dietary treatments on egg production, egg weight and egg mass.

Strain and diet	Diet ME	Diet Enzyme (g)[1]	Egg production (%)	Egg weight (g)	Egg mass (g hen/g feed)
Mandarah (M					
1	2890	0	48.3	50.5	26.2
2	2890	1	52.6	52.9	31.3
3	2890	2	57.2	56.3	34.6
4	2805	0	44.7	48.8	21.5
5	2805	1	50.2	49.2	27.5
6	2805	2	54.5	52.2	30.2
Dokki-4 (D-4)					
1	2890	0	45.1	47.3	23.7
2	2890	1	47.4	49.7	28.8
3	2890	2	51.3	51.9	30.5
4	2805	0	43.8	45.1	18.2
5	2805	1	46.5	46.2	26.2
6	2805	2	50.2	50.6	27.3
±SEM			0.73	0.63	0.82
Diet average					
1	2890	0	46.7	48.9	24.9
2	2890	1	50.0	50.9	30.1
3	2890	2	57.6	54.1	32.8
4	2805	0	44.5	46.9	19.8
5	2805	1	50.2	50.1	26.8
6	2805	2	53.9	50.2	28.7
Strain average					
M			51.4	51.7	28.6
D-4			47.4	48.5	25.8
ME average					
2890			50.3	51.3	29.0
2805			48.3	48.3	25.3
Enzyme average					
0			45.5	47.9	22.4
1g			49.2	49.5	28.2
2g			53.6	52.7	30.9
Statistical probabilities					
Main effects					
Strain			**	**	**
ME			**	**	**
Enzyme			**	**	**
Interaction effects					
ME x enzyme			NS	NS	NS
Strain xME			NS	NS	NS
Strain xenzyme			NS	**	NS
Strain xME xenzyme			**	NS	**

1Avizyme 1500, Finnfeeds International, Marlborough, England.

Table 4. Effect of dietary treatments on egg quality.

Strain and diet	Diet ME	Diet Enzyme (g)[1]	Albumen (%)	Yolk (%)	Shell (%)	Yolk index (%)	Shell thickness(mm)	Haugh unit (%)
Mandarah (M								
1	2890	0	53.4	26.2	8.41	43.4	0.40	71.6
2	2890	1	58.8	31.8	8.58	46.5	0.42	73.1
3	2890	2	62.3	32.4	8.97	49.5	0.44	75.3
4	2805	0	51.2	25.7	8.29	42.7	0.35	69.8
5	2805	1	54.1	28.1	8.52	44.3	0.37	72.4
6	2805	2	56.3	29.7	8.60	45.8	0.39	73.9
Dokki-4 (D-4)								
1	2890	0	52.9	26.3	8.59	42.5	0.36	67.4
2	2890	1	55.7	28.9	8.65	45.4	0.39	70.7
3	2890	2	56.2	30.2	8.92	46.2	0.40	72.3
4	2805	0	50.1	25.1	8.21	41.1	0.31	66.5
5	2805	1	53.5	27.1	8.49	43.2	0.35	68.8
6	2805	2	54.6	27.5	8.51	44.5	0.36	69.9
±SEM			0.78	0.44	0.18	0.63	1.23	1.41
Diet average	2890	0						
1	2890	1	53.2	26.3	8.5	42.9	0.38	69.5
2	2890	2	57.2	30.2	8.7	45.9	0.40	71.9
3	2805	0	59.4	31.3	8.9	47.8	0.42	73.8
4	2805	1	50.7	25.4	8.2	41.9	0.33	68.1
5	2805	2	53.8	27.8	8.5	43.7	0.36	70.6
6			55.6	28.6	8.6	45.1	0.38	71.9
Strain average								
M			56.1	28.9	8.6	45.4	0.39	72.7
D-4			53.9	27.5	8.6	43.8	0.36	69.3
ME average								
2890			56.4	29.2	8.7	45.6	0.40	71.7
2805			53.5	27.2	8.4	43.6	0.35	70.2
Enzyme average								
0			51.9	25.6	8.4	42.4	0.35	68.8
1g			55.2	29.0	8.6	44.8	0.38	71.3
2g			57.7	30.1	8.7	46.5	0.40	72.9
Statistical probabilities								
Main effects			**	**	**	**	**	**
Strain			**	**	**	**	**	**
ME			**	**	**	**	**	**
Enzyme								
Interaction								
effects			**	NS	NS	**	**	NS
ME x enzyme			**	NS	**	NS	**	**
Strain xME			**	**	NS	**	**	NS
Strain xenzyme			**	**	**	**	**	**
Strain xME xenzyme								

1Avizyme 1500, Finnfeeds International, Marlborough, England.

Table 5. Effect of dietary treatments on digest viscosity and nutrient digestabiltiy.

Strain and diet	Diet ME	Diet Enzyme (g)[1]	Nitrogen (%)	Ca (%)	Ph (%)	AME (kcal/kg)	Viscosity (cP)
Mandarah (M							
1	2890	0	53.7	38.3	26.2	4.23	2.31
2	2890	1	54.2	43.6	28.3	4.42	2.43
3	2890	2	56.2	46.8	31.7	4.61	2.68
4	2805	0	47.6	25.4	19.8	3.19	2.52
5	2805	1	50.4	29.7	20.2	3.56	2.21
6	2805	2	51.2	32.2	24.4	3.61	2.46
Dokki-4 (D-4)							
1	2890	0	51.2	32.1	22.9	4.11	2.21
2	2890	1	52.9	38.9	24.6	3.31	2.45
3	2890	2	54.6	41.2	27.3	4.49	2.51
4	2805	0	43.8	23.5	17.5	3.22	2.30
5	2805	1	48.1	26.7	19.4	3.45	2.29
6	2805	2	50.4	29.8	21.8	3.56	2.28
±SEM			1.13	3.69	2.36	24.52	0.35
Diet average	2890	0					
1	2890	1	52.4	35.2	24.5	4.22	2.26
2	2890	2	53.6	41.1	26.4	4.40	2.44
3	2805	0	55.4	44.0	29.4	4.60	2.59
4	2805	1	45.7	24.5	18.6	3.20	2.41
5	2805	2	49.2	28.2	19.8	3.50	2.25
6			50.8	31.0	23.1	3.60	2.37
Strain average							
M			52.2	36.0	25.1	3.93	2.44
D-4			50.2	32.0	22.2	3.85	2.34
ME average							
2890			53.8	40.1	26.6	4.36	2.43
2805			48.6	27.8	20.5	3.43	2.34
Enzyme average							
0			49.1	29.8	21.6	3.68	0.35
1g			51.4	34.7	23.1	3.93	0.38
2g			53.1	37.5	26.3	4.10	0.40
Statistical probabilities							
Main effects							
Strain			**	**	**	NS	NS
ME			**	**	**	**	NS
Enzyme			**	**	**	**	**
Interaction effects							
ME x enzyme			**	**	**	NS	NS
Strain xME			NS	NS	**	NS	NS
Strain xenzyme			NS	**	NS	NS	NS
Strain xME xenzyme			NS	**	NS	NS	NS

1Avizyme 1500, Finnfeeds International, Marlborough, England.

Table 6. Effect of dietary treatments on some plasma parameters.

Strain and diet	Diet ME	Enzyme (g)[1]	Calcium (mg/dl)	Phosphorus (mg/dl)	Cholesterol (mg/dl)	Total protein (g/dl)	Albumin (g/dl))	Globulin (g/dl)
Mandarah (M								
1	2890	0	12.61	6.34	145.2	6.11	2.33	3.79
2	2890	1	15.32	7.41	112.9	7.59	3.74	3.85
3	2890	2	17.27	9.36	98.5	8.34	4.16	4.18
4	2805	0	9.43	3.25	173.5	4.21	1.81	2.40
5	2805	1	10.51	4.26	134.4	5.63	2.29	3.34
6	2805	2	11.49	5.32	115.6	6.71	3.15	3.56
Dokki-4 (D-4)								
1	2890	0	11.56	5.30	153.1	5.83	2.34	3.41
2	2890	1	12.28	6.31	124.4	6.12	3.01	3.12
3	2890	2	14.26	7.33	115.5	7.32	3.73	3.59
4	2805	0	7.13	3.18	171.5	4.31	1.98	2.33
5	2805	1	9.14	3.51	142.8	4.89	2.11	2.71
6	2805	2	10.16	4.30	123.4	6.23	2.71	3.52
±SEM								
Diet average								
1	2890	0	12.15	5.82	149.2	5.97	2.29	3.60
2	2890	1	13.80	6.86	118.2	6.86	3.36	3.49
3	2890	2	15.87	8.35	107.0	7.83	3.95	3.89
4	2805	0	8.28	3.22	172.5	4.26	1.89	2.37
5	2805	1	9.85	3.89	138.5	5.26	2.20	3.03
6	2805	2	12.26	4.81	119.5	6.47	2.93	3.54
Strain average								
M			12.76	5.94	130.1	6.43	2.91	3.52
D-4			10.79	3.98	138.5	5.77	2.65	3.11
ME average								
2890			13.92	6.84	125.0	6.88	3.21	3.67
2805			9.64	4.94	143.5	5.31	2.34	2.97
Enzyme average								
0			10.16	4.61	160.8	5.12	2.11	2.98
1g			11.81	5.37	128.6	6.00	2.79	3.25
2g			13.93	6.57	113.4	7.15	3.44	3.71
Statistical probabilities								
Main effects								
Strain			**	**	NS	**	NS	NS
ME			**	**	**	**	**	**
Enzyme			**	**	**	**	**	**
Interaction effects								
ME x enzyme			**	NS	NS	NS	NS	NS
Strain xME			NS	NS	NS	NS	NS	NS
Strain xenzyme			NS	NS	NS	NS	NS	NS
Strain xME xenzyme			NS	NS	**	NS	NS	NS

1Avizyme 1500, Finnfeeds International, Marlborough, England.

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الأداء الفسيولوجى والإنتاجي لسلالتين محليتين من دجاج البيض خلال المرحلة المبكرة من الإنتاج وتأثره باضافة الإنزيم تحت ظروف الصيف فى مصر
٢ – انزيم الأفيزيم

إيهاب احمد عبدالله ، رجاء السيد عبدالكريم عبدالله ، على ابراهيم السلامونى

معهد بحوث الانتاج الحيوانى – مركز البحوث الزراعية – وزارة الزراعة– الدقى – الجيزة

أجريت هذة الدراسة فى محطة بحوث تربية الدواجن بسخا – معهد بحوث الإنتاج الحيوانى بهدف تقييم تأثير استخدام مستويين من انزيم الأفيزيم١٥٠٠ (١ –٢ جم/كجم علف) على أداء نوعين من الدجاج البياض المحلى هما المندرة ودقى٤ المغذاه على علائق مختلفة فى محتواها من الطاقة (احداهما مستوى الكنترول وهو ٢٨٩٠ كيلوكالورى/كجم علف والثانية منخفضة فى محتواها من الطاقة وهى ٢٨٠٥ كيلوكالورى/كجم علف) بهدف تحسين معدل الاداء وزيادة إنتاج البيض. استخدم في هذه الدراسة عدد ٣٦٠ دجاجة عمر٢٢ أسبوع من السلالتين(١٨٠ دجاجة لكل سلالة) وقسمت الى ثلاث مجاميع بكل سلالة (٦٠ دجاجة / مجموعة) وكل مجموعة ٢ مكرره بكل منها ٣٠ دجاجة.

أ ستمرت التجربة لمدة ١٢ أسبوع مع اتباع نظام التغذية الحرة وتم تربية الدجاج فى كل المجاميع تحت نفس ظروف التهوية والإضاءة والحرارة فى عنابر مفتوحة على الأرض وأثناء فترة التجربة تم تقدير بعض الصفات الإنتاجية مثل معدل الزيادة فى وزن الجسم واستهلاك العليقة وكفاءة تحويل الغذاء وعدد ووزن البيض وجودة البيض وكذلك تم قياس بعض التقديرات الفسيولوجية بالدم.

وكانت أهم النتائج المتحصل عليها كالآتى:

- سجلت سلالة المندرة أعلى فى وزن الجسم من سلالة دقى٤ ، بينما وجد ان أضافة أنزيم الأفيزيم١٥٠٠ بأى مستوى للعليقة له تأثير معنوى واضح على زيادة وزن الجسم للسلالتين ، وكان التأثير أعلى عند أضافة الانزيم للعلائق المرتفعة فى محتواها من الطاقة (٢٨٩٠ كيلوكالورى/كجم) بالمقارنة بالمعاملات المختلفة و الكنترول .
- كانت النسبة المئوية لأنتاج البيض أعلى فى دجاج دقى ٤ عن دجاج المندرة داخل المعاملة الواحدة.
- كان لمستوى الطاقة أو الأفيزيم١٥٠٠ المضاف تأثيرُ واضحٌ على الغذاء المأكول فى كلتا السلالتين .
- الطيور المغذاة على علائق كنترول تحتوى على (٢٨٩٠ كيلوكالورى/كجم) أدت الى تحسن معدل الاداء فى زيادة وزن وكتلة البيض والكفاءة الغذائية عن الطيور المغذاة على مستوى منخفض من الطاقة (٢٨٠٥ كيلوكالورى/كجم) كما لوحظ زيادة واضحة لكل المجاميع التى تغذت على علائق كنترول (٢٨٩٠ كيلوكالورى/كجم) مضاف اليها (١ أو ٢ جم/كجم) من الأنزيم وكان التأثير واضحاً عند مستوى (٢ جم/كجم علف) بالمقارنة بالمجاميع الاخرى .

- أدت اضافة الأنزيم بالمستويين الى تحسن فى صفات جودة البيض وزيادة واضحة فى قيم كل من معامل الصفار وكذلك وحدات هاو وسمك القشرة فى كل المجاميع التى تغذت على علائق كنترول تحتوى على (٢٨٩٠ كيلوكالورى/كجم علف) فى كلتا السلالتين بالمقارنة بالمجاميع التى تغذت على مستويات منخفضة من الطاقة (٢٨٠٥ كيلوكالورى/كجم) .
- كان هناك ارتفاع واضح فى تركيز كل من الكالسيوم والفوسفور والبروتين الكلى والالبيومين والجلوبيولين وانخفاض فى الكوليستيرول ببلازما الدم وذلك للطيور التى غذيت على (٢ جم/كجم علف) من الأنزيم المضاف الى علائق عادية تحتوى على ٢٨٩٠ كيلوكالورى/كجم عن المستوى المنخفض من الأنزيم (١جم /كجم) بالمقارنة بباقى المجاميع فى كلتا السلالتين .

وملخص ما وصلت اليه الدراسة هو ان السلالات المحلية البياضة (المندرة ودقى٤) المغذاة على علائق منخفضة الطاقة سواء باضافة او بدون اضافة انزيم الأفيزيم أعطت معدلات أداء اقل بالنسبة لانتاج البيض و الكفاءة الغذائية بينما أدى اضافة الأنزيم بمعدل (١ أو ٢ جم/كجم) لعلائق عادية فى الطاقة (٢٨٩٠ كيلوكالورى/كجم) الى تحسين معدلات الأداء الانتاجى والفسيولوجى للدجاج البياض المحلى، وكان التحسن اعلى عند المستوى الاعلى من الأفيزيم (٢ جم/كجم علف) ويمكن استخدام الانزيم بمستوى ١ جم/كجم أيضا للحصول على نفس التأثير السابق ولكن بشكل أقل بالمقارنة بالدجاج المحلى المغذى على علائق خالية من الاضافات الانزيمية.