

INFLUENCE OF ENZYME SUPPLEMENTATION IN THE DIET ON EGG PRODUCTION, EGG QUALITY AND SOME BLOOD CONSTITUENTS OF MATROUH HENS.

By

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Abstract: *The present study was conducted to evaluate the effect of two types of commercially available enzymes (Avizyme[®] and Kemzyme[®]) on laying hens performance. A total of 200, forty weeks old, Matrouh laying hens were randomly selected and divided into 4 groups (5 replicate pens of 10 hens each). The first group received unsupplemented basal diet and served as a control group. The second and the third groups were fed basal diet supplemented with Avizyme[®] or Kemzyme[®] (1 g/kg diet of either) respectively. The fourth group was fed the basal diet supplemented with Avizyme[®] plus Kemzyme[®] (0.5 g/kg diet of each). The number of eggs produced every day for each group was recorded. Eggs were weighed twice weekly. Egg quality measurements were recorded every 10 days from the start of the experiment. Blood samples were obtained every month to determine calcium, phosphorus, total cholesterol, ALT and AST levels. The obtained results showed that hen-day egg production and total egg mass of the Avizyme[®] and Kemzyme[®] groups were not significantly different from the control group. However, when Avizyme[®] and Kemzyme[®] were added together, the hen-day egg production and egg mass were significantly higher than both the control and the Kemzyme[®] groups. In all enzyme treated groups, relative shell weight and egg shell thickness were significantly higher than the control group. Relative albumen weight of the Avizyme[®] group and the Avizyme[®] plus Kemzyme[®] group were not significantly different from the controls. The Kemzyme[®] group has significantly ($p \leq 0.05$) lower relative albumen weight as compared to the controls. The yolk color scores of all enzyme treated groups were significantly higher than the control group. Plasma phosphorus concentrations of all treated groups were not significantly different from the*

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control group. When Avizyme[®] and Kemzyme[®] were added together, plasma total cholesterol concentration increased significantly ($p \leq 0.05$) over the control group. Also when Avizyme[®] and Kemzyme[®] were added together plasma ALT concentration was significantly lower than the control group. On the other hand Avizyme[®] supplementation significantly ($p \leq 0.01$) decreased plasma AST concentration compared to the control group.

INTRODUCTION

Dietary enzyme supplementation is used widely in poultry diets in attempts to improve nutrient utilization and health. It is used also to improve product quality and to reduce pollution as well as to increase the choice and content of ingredients which are acceptable for inclusion in diets (Acamovic, 2001).

Addition of enzymes such as amylase and xylanase are useful in the utilization of the non-starch polysaccharide component of the diet ingredients. Others, such as proteases supplementation may enhance the utilization of dietary protein. Therefore, enzymes supplementation increase the effectiveness of nutrient utilization resulting in improved performance (Acamovic, 2001).

Many enzymes have been found to be beneficial when added to poultry diets containing carbohydrate or protein sources. Finnfeeds International has developed Avizyme[®] specifically for use in poultry diets containing low viscosity grains such as corn and sorghum and containing significant levels of soybean meal. This product contains amylase (improves corn starch utilization), xylanase (reduces viscosity and breaks down cereal cell walls), and protease (targets soybean meal antinutritional factors and storage proteins). Avizyme[®] may also be effective in improving energy utilization in corn-soy diets (Michael, 2002). These data suggested a slight improvement in protein and amino acid utilization. In addition the Avizyme[®] destroys anti-nutritional factors and increases the digestibility of indigestible nutrients. Thus the utilization of enzyme systems saves energy and improves amino acid digestibility (Lyons, 1995; Silversides and Bedford, 1999).

On the other hand, Kemzyme[®] supplementation, in the wheat based diets, helps to improve the feed digestibility and nutrient absorption by reducing the foregut digesta viscosity and breaking the bonds between non-starch polysaccharides (NSP) (Adams and Pough, 1993). It was also reported that Kemzyme[®] supplementation enhance weight gain of treated birds (Adams and Pough, 1993). Similar results were also reported by

Graham and Pettersson (1992) and Brenes *et al.* (2002). Kemzyme® addition to wheat based rations significantly, improve birds weight gain (Graham and Pettersson, 1992).

The aim of this study was to evaluate the effect of using Avizyme® (xylanase, α -amylase and protease) and/or Kemzyme® (protease, α -amylase, lipase, cellulase and β -glucanase) on egg production, egg quality and blood chemistry of Matrouh laying hens.

MATERIALS AND METHODS

This study was carried out at Inshas Poultry Research Station, Sharkia Governorate, Animal Production Research Institute, Agriculture Research Center, Egypt. A total of 200, 40 weeks old Matrouh laying hens with an average weight of 1400 g, were randomly divided into 4 groups (5 replicate pens of 10 hens each). Birds were placed in an open sided house, under natural environmental conditions of the season, with a temperature range of 16°C during January to 38°C during May and relative humidity range from 65% to 75%. Birds were exposed to 16 hr of light and 8 hr darkness. Water and feed were provided *ad libitum*. Birds were vaccinated against Avian Influenza at the time of placement.

EXPERIMENTAL DESIGN:

Throughout the experimental period, control group was fed basal diet without any additives. Basal diet was a commercial layer diet (16% protein and 2700 Kcal ME/Kg). The basal diet was supplemented with required vitamins, minerals and amino acids according to the NRC (1994). In the second and 3rd treatments, birds were fed basal diet supplemented with 1 g Avizyme® or Kemzyme® per Kg of diet respectively. The fourth treatment, birds were fed basal diet supplemented with 0.5 g Avizyme® + 0.5 g Kemzyme® per Kg of diet.

MEASUREMENTS OF EGG PRODUCTION AND QUALITY:

Eggs were weighted twice weekly for all eggs produced during these two days for each replicate group. The number of eggs was recorded every day for each group. Egg quality measurements were recorded every 10 days from the start of the experiment. Egg shape index was calculated according to Panda (1996), yolk index was calculated according to Amer (1959), Haugh units were calculated according to Haugh (1937) and yolk color was calculated using the Roche yolk color fan (the industry standard for rating the color of egg yolks). The fan ranges from a pale yellow at rating of 1 to a dark orange at rating of 15 (Vuilleumier, 1969).

BLOOD CHEMISTRY:

Blood samples were obtained from the brachial vein in heparinized plastic tubes. Blood samples were then centrifuged (4,000 rpm) for 10 minutes, and the plasma were decanted and stored at -20 °C until analysis. Plasma phosphorus (mg/dl) determination was performed using biodiagnostics kit from Bio-Diagnostics Company, according to El-Merzabani, *et al.* (1977). In addition, plasma Calcium (mg/dl) determination was performed using Spectrum Diagnostics kit from Spectrum Diagnostic Company, Independence, OH, US, according to Young, (1990). Plasma total cholesterol (mg/dl) determination was performed using Stanbio kit from Stanbio Laboratory Company, (Boerne, TX, US), according to Finley *et al.* (1978). Colorimetric determination of aspartate aminotransaminase (AST/GOT) and Colorimetric determination of alanine aminotransaminase (ALT/GPT) activity were performed using Spectrum Diamond Diagnostics kit from Spectrum Diagnostic Company, according to Reitman and Frankel (1957).

STATISTICAL ANALYSIS:

Analysis of variance for the overall data was performed using the SAS General Linear Model Procedure (SAS Institute, 2000). Mean values were compare using Duncan's Multiple Rang Test, (Duncan, 1955) when significant differences existed. The significance level was set at 5%.

RESULTS AND DISCUSSION

When all the data were analyzed, for weekly or periodically basis, no trends were observed. Thus the overall means for treatment groups were used in the final analysis.

A) EGG PRODUCTION AND EGG QUALITY MEASUREMENTS:

A-1) Total egg production:

The results displayed in Figure (1) indicate that Avizyme® did not significantly affect egg production in Matrouh hens. These results are in agreement with Roberts, (2003) who reported that egg production, from 55 to 65 weeks of age, was not affected by dietary enzyme supplementation, with production being slightly lower for the Avizyme® treatment. Also Michael, (2002) indicated that when Avizyme® was supplemented on the top of the basal diet it did not improve egg production. However, these results were inconsistent with the finding of Jalal *et al.*, (2007) who observed that a Leghorn strain [Hy-Line W-36] showed improvement egg production when Avizyme® was supplemented to a low ME diet.

Meanwhile, the results obtained indicated that Kemzyme® did not affect egg production significantly. These results are in agreement with Roberts, (2003) who reported that egg production from 55 to 65 weeks of age was not affected by dietary enzyme supplementation, with production being slightly lower for Kemzyme® treatment. However, these results were not consistent with the findings of Abdel Ghany *et al.* (1997) and Shehata, (2000). Their findings indicated that Kemzyme® addition, at a level of 0.5 kg/ton to layer diets, improved egg production significantly.

When Avizyme® and Kemzyme® were added together (at a rate of 0.5 gm/kg/each), the egg production was significantly higher than the control and Kemzyme® groups. No literature was found indicating the addition of both these supplements simultaneously to layers diets.

A-2) Egg weight:

The results indicated that Avizyme® did not significantly affect egg weight (52.4 gm) compared to the control group (52.0 gm). These results are in agreement with Scheideler *et al.*, 2001, who reported that Avizyme® supplementation had no effect on egg weight. Also Jalal *et al.*, (2007) did not observe that Avizyme® had an effect on egg weight. Similar results were also reported by Fabijańska *et al.*, (2005). They stated that Avizyme®, at a level of 1kg/ton diet, had no effect on egg weight.

Also, Kemzyme® did not significantly affect egg weight (52.2 gm) as compared to the control group. El-Deek *et al.*, (2003) and Choct, (2004) reported that egg weight was not influenced by 0.1% Kemzyme®, addition. However, Roberts, (2003) stated that egg weight was significantly lower with Kemzyme® supplementation (500-1000g/ton diet).

These results are inconsistent with the findings of Abd El-Maksoud, (2006). He reported that egg weights were significantly ($P < 0.05$) improved by Kemzyme® supplementation. Findings of Abdel Ghany *et al.* (1997) and Shehata, (2000) were also similar. They demonstrated that egg weight increased, significantly, as Kemzyme® supplementation was raised up to 1.0 kg/ton diet.

When Avizyme® and Kemzyme® were added together, the egg weights (51.9 gm) were not significantly different from the control group.

A-3) Total egg mass (kg/hen):

The results displayed in Figure (2) indicate that Avizyme® did not significantly affect egg mass compared to the control group. These results are in agreement with Jalal *et al.*, (2007). They stated that Avizyme®

supplementation did not have a significant effect on egg mass. On the other hand, most recent research, with laying hens, has shown improved egg mass among varying laying hen strains when Avizyme[®] was used (Zanella *et al.*, 1999; Douglas *et al.*, 2000; Sohail *et al.*, 2003 and Scheideler *et al.*, 2005). The results indicate that Kemzyme[®] did not significantly affect egg mass compared to the control group in Matrouh hens. However, when Avizyme[®] and Kemzyme[®] were added together, the egg mass was significantly higher than the control group or Kemzyme[®] group.

B) EGG QUALITY:

B-1) Relative shell weight:

The results presented in Figure (3) indicate that both Avizyme[®] or Kemzyme[®] significantly increased relative shell weight (%) in Matrouh hens. These results are in agreement with Roberts, (2003) who reported that shell weight was significantly higher after Kemzyme[®] treatment than the control, Biofeed Wheat or Avizyme[®] groups.

However, these results are not consistent with the findings of Abd El-Maksoud, (2006) who reported that Kemzyme[®] supplementation did not significantly affect the relative shell weight. Attia *et al.* (1997), also reported that the relative shell weight was not affected significantly by Kemzyme[®] supplementation (1 gm/kg diet) in laying Bandarah diets.

When Avizyme[®] and Kemzyme[®] were added together, relative shell weight showed a significant increase as compared to the control group in Matrouh hens. However, there were no significant differences between this group and the other groups receiving the Avizyme[®] or Kemzyme[®] separately.

B-2) Relative Albumen Weight:

The results presented in Figure (4) indicate that Avizyme[®] supplementation did not change the relative albumen weight. These results are in agreement with Jalal *et al.* (2007), who reported that Avizyme[®] supplementation had no significant effect on relative albumen weight.

The results obtained indicate that Kemzyme[®] supplementation has significantly ($p \leq 0.05$) decreased the relative albumen weight. These results disagree with those of Abd El-Maksoud (2006), who reported that Kemzyme[®] supplementation did not affect significantly albumen weight percentage. Similarly, Attia *et al.* (1997) found that the relative albumen weight was not affected by Kemzyme[®] supplementation (1 g/kg diet) in laying Bandarah diets. However, when Avizyme[®] and Kemzyme[®] were added together, relative albumen weight was not significantly affected.

B-3) Egg Shell Thickness:

The results presented in Figure (5) indicate that Avizyme[®] supplementation increased shell thickness significantly. These results are not consistent with the finding of Aderemi, *et al.* (2006), who reported that shell thickness showed no significant changes due to Avizyme[®] treatment. It has been established that there is a reduction in shell thickness with the advance of the hen age. Thus its percentage of egg weight should be reduced by advancing age.

Also, Kemzyme[®] significantly ($p \leq 0.5$) increased shell thickness. These results are also not consistent with the findings of Abd El-Maksoud, (2006). He reported that Kemzyme[®] supplementation didn't affect egg shell thickness. Also, Attia *et al.* (1997) found that egg shell thickness was not affected by Kemzyme[®] (1 g/kg diet) supplementation in laying Bandarah diets. However, Fabijańska, *et al.* (2005) stated that enzyme (β -glucanase) supplementation is not necessary and may decrease shell quality. Cowan, (1993); Bedford and Schulze, (1998); Jaroni *et al.* (1999) and Silversrides *et al.* (2006) all reported that Kemzyme[®] supplementation did not affect shell thickness. When Avizyme[®] and Kemzyme[®] were added together, the shell thickness increased significantly ($p \leq 0.5$) in Matrouh hens.

B-4) Yolk Color Score:

The results obtained presented in Figure (6) indicate that Avizyme[®] and Kemzyme[®] significantly ($p \leq 0.05$) increased yolk color score over the control group. These results are not consistent with the findings of Roberts (2003). He observed that yolk color score was significantly lower for Avizyme[®] than Kemzyme[®] treated hens. On the other hand, it was reported that Kemzyme[®] supplementation didn't affect yolk color (Cowan, 1993; Bedford and Schulze, 1998; Jaroni *et al.*, 1999; Silversrides *et al.*, 2006).

When Avizyme[®] and Kemzyme[®] were added together, yolk color score was significantly ($p \leq 0.05$) higher than the control group and the Kemzyme[®] treated group. However, it was similar to the Avizyme[®] treated group.

C) BLOOD CONSTITUENTS:

C-1) Plasma Phosphorus Level:

The results displayed in Figure (7) indicate that Avizyme[®] and Kemzyme[®] treatment did not affect plasma phosphorus concentration comparing to the control group. However when Avizyme[®] and Kemzyme[®] were added together, plasma phosphorus concentration was significantly ($p \leq 0.05$) higher than the group receiving Avizyme[®] alone.

C-2) Plasma Calcium Level:

The results obtained indicate that Avizyme[®] and Kemzyme[®] did not significantly affect plasma calcium levels (12.5 mg/dl) as compared to the control group (13.4 mg/dl). These results are not consistent with the findings of Roberts (2003), who reported that calcium levels were high for birds receiving Avizyme[®] and low for those receiving Kemzyme[®].

When Avizyme[®] and Kemzyme[®] were added together, the plasma calcium level was high (14.5 mg/dl). However, this level was not significantly different from any of the other treatments.

C-3) Total Cholesterol Level:

The results displayed in Figure (8) indicate that Avizyme[®] supplementation did not affect plasma total cholesterol levels as compared to the control group. These results are in agreement with Attia *et al.* (2001a & b), and Shakmak, (2003). They reported that Avizyme[®] addition to the feed had no effect on total cholesterol level. Also Zeweil, *et al.* (2005) reported that enzymes (xylanase, protease and α -amylase) had no significant effect on Japanese quail plasma cholesterol levels.

However, these results are not consistent with the findings of Salem, *et al.*, 2008. They reported that Avizyme[®] inclusion (500 g/ton) to layers diet significantly ($P \leq 0.05$) increased plasma cholesterol concentration by about 14.7% over the nonsupplemented group. This was also in agreement with results obtained by Abou El-Wafa *et al.* (2002), who reported that there was a significant increase in plasma total cholesterol with the addition of Avizyme[®], (1 Kg/ton) to corn-soy broiler diet. The increase in plasma cholesterol concentrations due to the added Avizyme[®], may be due to increased nutrient digestion by the enzymes that increases nutrient availability, absorption and metabolic rates.

On the other hand, Kemzyme[®] did not affect plasma total cholesterol significantly compared to the control group. These results are not consistent with the findings of Abou El-Wafa *et al.* (2002). They observed that Kemzyme[®] supplementation (500 g/ton), to corn-soy diet, significantly increased plasma total cholesterol. When Avizyme[®] and Kemzyme[®] were added together, the plasma total cholesterol increased significantly ($p \leq 0.05$) over the control group in Matrouh hens.

C-4) Plasma (ALT/GPT) concentration:

The results presented in Figure (9) indicate that Avizyme® did not significantly affect plasma (ALT/GPT) concentration compared to the control group. These results are in agreement with Salem, *et al.* (2008). They reported that Avizyme® supplementation had no significant effect on plasma alanine aminotransaminase (ALT/GPT) concentration. These results are also in agreement with those of Abou El-Wafa (1993); Abd El-Fattah *et al.* (2003) and Ibrahim *et al.* (2005).

Kemzyme® supplementation did not affect plasma (ALT/GPT) concentration significantly. These results are consistent with the findings of Salem, *et al.* (2008). They reported that Kemzyme® supplementation had no significant effect on plasma alanine aminotransaminase (ALT/GPT) concentration. These results are also in agreement with those of Abou El-Wafa (1993), Abd El-Fattah *et al.* (2003) and Ibrahim *et al.* (2005). On the other hand El-Gendi *et al.* (2000) found that chicks fed Kemzyme® had the highest average (7.51 u/l) glutamic pyruvic transaminase. However, when Avizyme® and Kemzyme® were added together, plasma (ALT/GPT) concentration was significantly lower than the control group. No literature was found indicating the addition of both of these supplements simultaneously to layers diets.

C-5) Plasma (AST/GOT) concentration:

The results presented in Figure (10) indicate that Avizyme® supplementation significantly ($p \leq 0.01$) decreased plasma (AST/GOT) concentration as comparing to the control group. These results are in agreement with those of Abou El-Wafa (1993), Abd El-Fattah *et al.* (2003) and Ibrahim *et al.* (2005). However, these results are not consistent with the findings of Salem, *et al.* (2008), who reported that Avizyme® supplementation had no significant effect on plasma aspartate aminotransaminase (AST/GOT) concentration.

Kemzyme® did not significantly affect plasma (AST/GOT) concentration. Also when Avizyme® and Kemzyme® were added together, plasma (AST/GOT) concentration was not significantly affected.

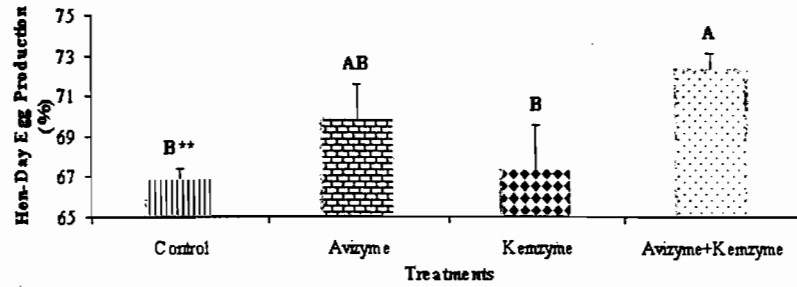


Figure 1: Effect of Avizyme and Kemzyme on hen-day egg production (%) in Matrouh hens.*
 * Average of 10 birds, over 24 weeks of production, from 40 to 64 weeks of age.
 ** Means with different letters, differ significantly ($P < 0.05$).

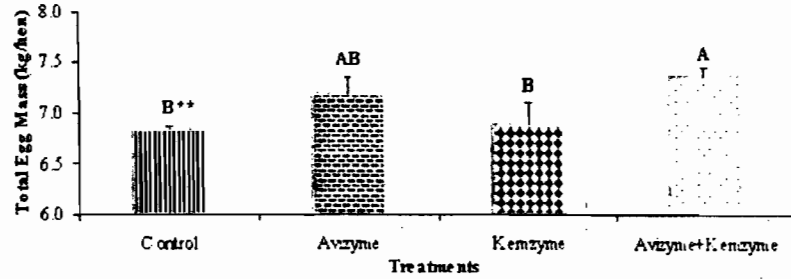


Figure 2: Effect of Avizyme and Kemzyme on total egg mass (kg/hen) in Matrouh hens.*
 * Average of 10 birds, over 24 weeks of production, from 40 to 64 weeks of age.
 ** Means with different letters, differ significantly ($P < 0.05$).

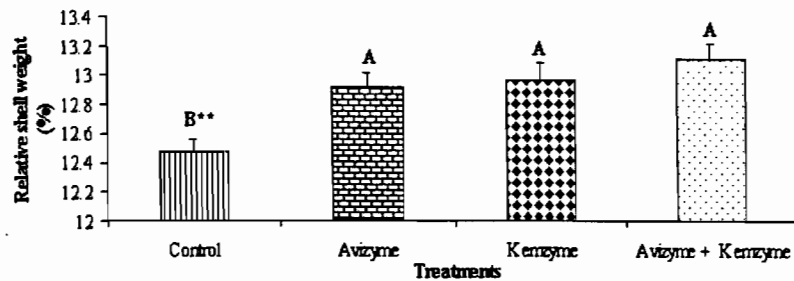


Figure 3: Effect of Avizyme and Kemzyme on the relative shell weight (%) in Matrouh hens.*
 * Average of 10 birds, over 24 weeks of production, from 40 to 64 weeks of age.
 ** Means with different letters, differ significantly ($P < 0.05$).

Egg Production, Egg Quality, Blood Chemistry, Avizyme, Kemzyme.

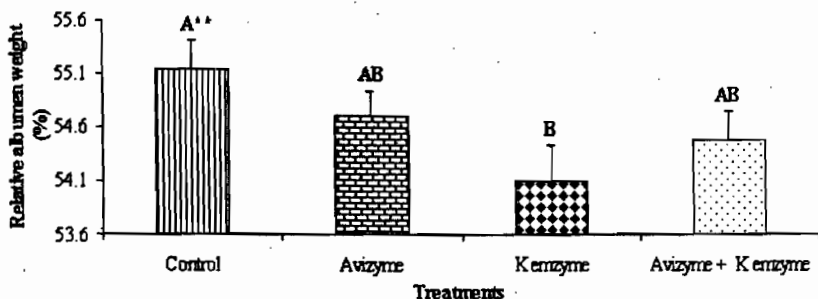


Figure 4: Effect of Avizyme and Kemzyme on the relative albumen weight (%) in Matrouh hens.*

* Average of 10 birds, over 24 weeks of production, from 40 to 64 weeks of age.

** Means with different letters, differ significantly ($P < 0.05$).

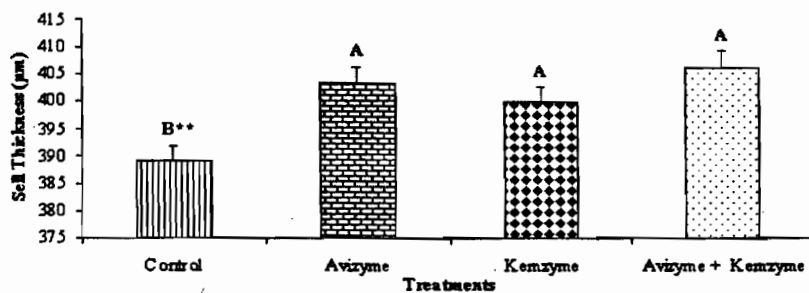


Figure 5: Effect of Avizyme and Kemzyme on shell thickness (µm) in Matrouh hens.*

* Average of 10 birds, over 24 weeks of production, from 40 to 64 weeks of age.

** Means with different letters, differ significantly ($P < 0.05$).

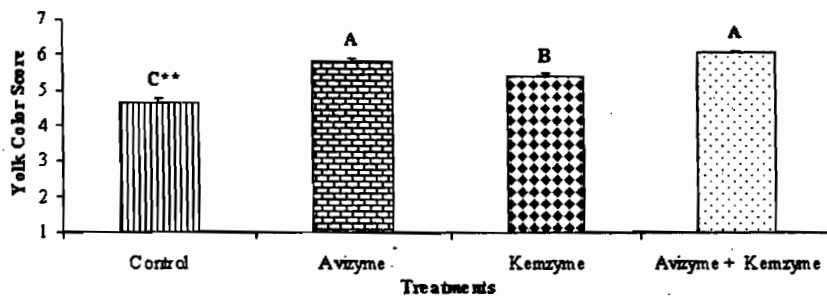


Figure 6: Effect of Avizyme and Kemzyme on yolk color score in Matrouh hens.*

* Average of 10 birds, over 24 weeks of production, from 40 to 64 weeks of age.

** Means with different letters, differ significantly ($P < 0.05$).

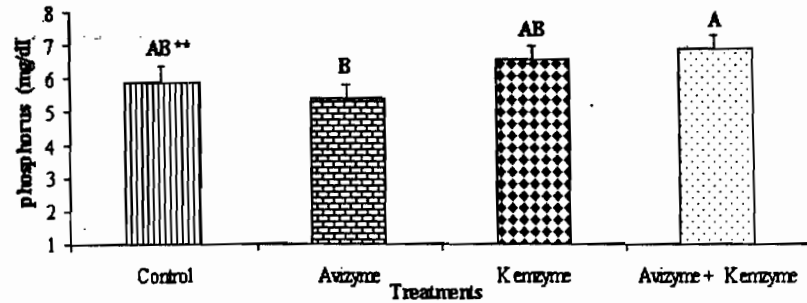


Figure 7: Effect of Avizyme and Kenzyme on phosphorus (mg/dl) in Matrouh hens.*

* A average of 10 birds, over 24 weeks of production, from 40 to 64 weeks of age.

** Means with different letters, differs significantly (P < 0.05).

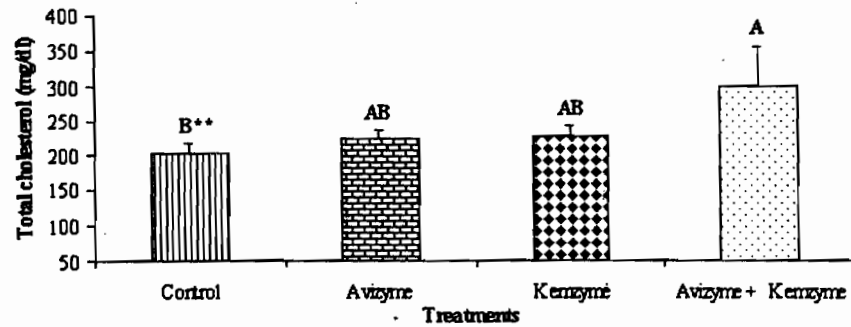


Figure 8: Effect of Avizyme and Kenzyme on total cholesterol (mg/dl) in Matrouh hens.*

* A average of 10 birds, over 24 weeks of production, from 40 to 64 weeks of age.

** Means with different letters, differs significantly (P < 0.05).

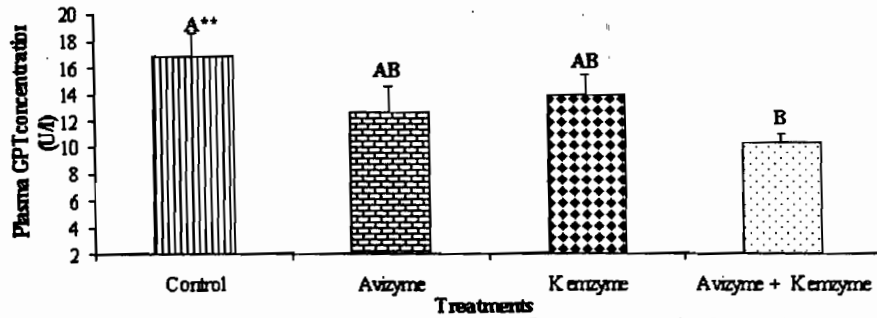


Figure 9: Effect of Avizyme and Kenzyme on plasma GPT concentration in Matrouh hens.*

* A average of 10 birds, over 24 weeks of production, from 40 to 64 weeks of age.

** Means with different letters, differs significantly (P < 0.05).

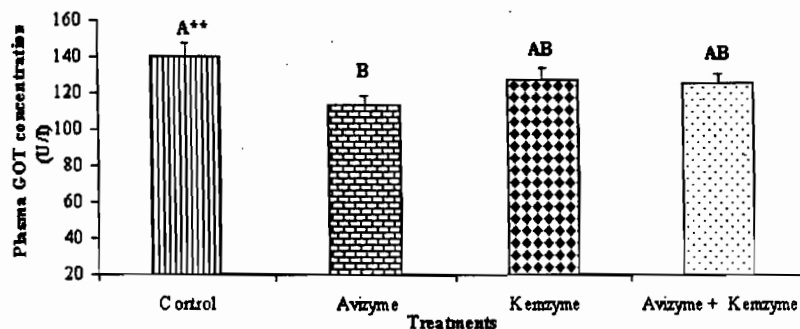


Figure 10: Effect of Avizyme and Kemzyme on plasma GOT concentration in Matrouh hens.*

* Average of 10 birds, over 24 weeks of production, from 40 to 64 weeks of age.

** Means with different letters, differ significantly ($P < 0.05$).

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الملخص العربي

تأثير اضافة الإنزيمات للعليقة على انتاج وجودة البيض وبعض مكونات الدم في دجاج مطروح

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** معهد بحوث الانتاج الحيواني - مركز البحوث الزراعية - وزارة الزراعة - الدقى

اجريت هذه الدراسة فى محطة بحوث انتاج الدواجن بانشاص بمحافظة الشرقية حيث تم استخدام عدد ٢٠٠ طائر من سلالة مطروح عند عمر ٤٠ اسبوع بمتوسط وزن (١٤٠٠ جم) وقسمت عشوائيا الى ٤ مجاميع كما يلى:

- ١ - المجموعة الاولى: وفيها غذيت الطيور على عليقة قياسية بدون اى اضافات (مجموعة المقارنة).
- ٢ - المجموعة الثانية: وفيها تم تغذية الطيور على عليقة قياسية مع اضافة مجموعة إنزيمات الأفيزيم بمعدل (١ جم/كجم).
- ٣ - المجموعة الثالثة: وفيها غذيت الطيور على عليقة قياسية مع اضافة مجموعة إنزيمات الكيمزيم بمعدل (١ جم/كجم).
- ٤ - المجموعة الرابعة: وفيها غذيت الطيور على عليقة قياسية مع اضافة مجموعة إنزيمات الأفيزيم والكيمزيم بمعدل (٠.٥ جم افيزيم + ٠.٥ جم كيمزيم /الكيلو).

ويمكن تلخيص النتائج كما يلى:

- لم يكن هناك اختلاف معنوى فى نسبة انتاج البيض وكتلة البيض نتيجة اضافة الأفيزيم والكيمزيم كلا على حده مقارنة بمجموعة المقارنة. بينما المجموعة التى استخدم فيها انزيم الأفيزيم والكيمزيم معا لوحظ ارتفاع معنوى فى نسبة انتاج البيض وكتلة البيض وذلك مقارنة بمجموعة المقارنة.
- زادت النسبة المئوية لوزن القشرة وايضا سمك القشرة فى كل المعاملات (معنويا) مقارنة بمجموعة المقارنة.
- لم تتأثر النسبة المئوية لوزن الالبومين فى البيضة معنويا نتيجة لإضافة الأفيزيم والأفيزيم والكيمزيم معا بينما فى المجموعة التى تم اضافة مجموعة انزيمات الكيمزيم لها فقد لوحظ أن النسبة المئوية لوزن الالبومين كانت اقل معنويا من مجموعة المقارنة.
- زاد دليل لون صفار البيض زيادة معنويه فى كل المعاملات مقارنة بمجموعة المقارنة.
- لم يتأثر تركيز الكالسيوم والفسفور فى الدم معنويا فى كل المعاملات مقارنة بمجموعة المقارنة.
- ارتفع تركيز الكولستيرول فى الدم معنويا فى المجموعة التى استخدمت انزيمات الأفيزيم والكيمزيم معا مقارنة بمجموعة المقارنة.
- انخفض تركيز انزيمات الكبد (AST/GOT) معنويا فى الدم نتيجة لمعاملة انزيمات الأفيزيم مقارنة بمجموعة المقارنة. اما تركيز (ALT/GPT) فى الدم فقد لوحظ ان معاملة انزيمات الأفيزيم والكيمزيم معا أدى الى انخفاض نسبته فى الدم مقارنة بمجموعة المقارنة.