

PRODUCTIVE AND PHYSIOLOGICAL PERFORMANCE OF GOLDEN MONTAZAH MALE CHICKENS AS AFFECTED BY FEED RESTRICTION AND ANIZYME SUPPLEMENTATION

By

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ABSTRACT: *A total number of 288 one – day old Golden Montazah males were used to study the effect of daily feeding time restriction and added enzyme preparation (Avizyme) on some productive and physiological traits, as well as the economic efficiency. The chicks were randomly divided into 6 experimental groups. Each group included 4 replicates of 12 chicks. Group 1: the birds were fed ad libitum or full-fed (FF) Group 2: FF+0.05% avizyme (FFE). Group 3: the birds were subjected to 4 hours feed restriction per day (4 FR). Group 4: 4 FR+0.05% avizyme (4 FRE). Group 5: the birds were subjected to 6 hours feed restriction per day (6 FR). Group 6: 6 FR +0.05% avizyme (6 FRE). The experiment lasted for 12 weeks. The results obtained could be summarized as follows: At 4 wks of age there was significant increase in live body weight (BW), body weight gain (BWG) and significant improvement in feed conversion (FCON) in feed restriction groups as compared to the full – fed group, while feed consumption (FC) was not affected. At 8 and 12 wks of age there were no significant differences in BW and BWG while FC was significantly decreased and FCON was significantly improved in groups of feed restriction comparing with that fed ad libitum. Regardless feed restriction, addition of avizyme significantly increased BW at 4 , 8 and 12 wks, BWG at periods of (0 – 4), (4 – 8) and cumulative(0 – 12) but, FC and FCON were not affected. Regarding the interaction between feeding regimen and avizyme addition, it can observed that. At 4 wks of age the highest BW and BWG and the best FCON were recorded for birds of 4FR and 4FRE treatments, while the lowest BW and BWG and the poorest FCON were recorded for birds of FF treatment. At 12 and 0 - 12 wks of age the highest BW and BWG were recorded for 6FRE and FFE treatments. All treatments of feed restriction either with or without added avizyme had recorded significantly less amounts of FC and the best*

FCON. The relative weights of carcass, empty gizzard and thymus were not affected by feed restriction either for 4 or 6 hrs/d. The relative weights of heart, liver and abdominal fat were significantly decreased by feed restriction as compared with full-fed regimen. On the other hand, the relative weight of carcass was increased but, heart, liver, empty gizzard, abdominal fat, and thymus percentages were not affected by avizyme addition. The relative weights of gizzard and thymus were not affected by any of the experimental treatments, meanwhile, the abdominal fat was significantly lowered by feed restriction treatments either with or without avizyme comparing with FF and FFE treatments. Plasma levels of cholesterol and triiodothyronine decreased significantly by feed restriction either for 4 or 6 hrs/d. Whereas, their levels increased significantly by avizyme addition. On the other hand, the glucose, AST and ALT values changed insignificantly by the both feed restriction testaments. Also, their levels not affected by avizyme addition. Concentrations of plasma, glucose, AST and ALT was not affected by any of the experimental treatments. The lowest concentrations of plasma cholesterol and T3 were recorded by 6FR treatment while the highest concentrations were recorded by FFE treatment. Economical efficiency (EE) was found to be increased by about 12 and 16 % for 4 and 6 hrs feed restriction regimens respectively comparing with full – fed regimen. Using dietary avizyme (0.05%) was found to be increased the EE by about 5% over the nonsupplemented diet. The highest EE was recorded for 6 FRE and 6 FR treatments valued about 24 and 20% respectively, followed by 4 FR and 4 FRE which were the same valued about 18% and the final FFE treatment valued about 11% over the FF treatment.

From this study it can be concluded that both feed restriction (4 and 6 hrs/day) regimens reduced the feed consumption, abdominal fat and plasma total cholesterol and improved both of feed conversion as well as economical efficiency and using 6 hrs daily feed restriction program with added 0.05% avizyme was more efficient in improving the performance of Golden Montazah male chicks .

INTRODUCTION

Meat production is one of the most important products. The production of the local breeds differ from exotic ones concerning their productive traits (Body weight, Body gain, feed consumption and feed conversion), but they are better for adaptation and disease resistance. Maximizing the production and reducing the feeding cost are the goal of poultry breeders.

In developed local strains, since there are abundant numbers of the chicken males over the breeding need, therefore these excess numbers could be used in meat production.

It is generally assumed that when birds eat more, they have get higher BW at market age (Urdaneta and Leeson., 2002). The improvement noted in market body weight has been attained due to an increased feed consumption, which is related to genetics and supported by nutrition (Havenstein *et al.*, 1993).

The improvement in body weight for-age of modern broiler chickens, due to an increased growth rate, led to more frequent occurrence of metabolic and skeletal disorders (Robinson *et al.*, 1999), sudden death syndrome (Gonzales *et al.*, 1998a), ascites (Julian, 1997) and increased fat deposition (Yu and Robinson, 1992). Feed restriction programs have shown the potential to reduce the incidence of such problems and they can be used to modify birds growth patterns by decreasing their maintenance requirements, which should improve feed efficiency (Urdaneta and Leeson, 2002). Early feed restriction resulted in an improvement in feed efficiency in broiler chicks (Plavnik and Hurwitz, 1988).

Enzymatic digestion is basic for feed utilization. Supplementation of poultry feed with extraneous enzymes can under circumstances improve digestibility and utilization efficiency of feed utilization (Ismail *et al.*, 1988).

Local strains are known to have slow growth rate and insufficient in feed utilization as well as tendency to consume large amounts of feed. Therefore, the objective of this study is to use continuous mild feed restriction program with added dietary enzyme preparation (avizyme) to reduce feed consumption and improve body weight, feed conversion and economic efficiency in males Golden Montazah chickens during the growing period.

MATERIALS AND METHODS

This work was carried out at Fayoum Poultry Breeding Research station, Animal Production Research Institute.

Birds and experimental design

A number of 288 day – old male Golden Montazah chicks were used. All birds were wing banded, individually weighed and distributed into six equal experimental treatments. Each treatment was replicated four times with 12 chicks per replicate. The average initial live BW of all replicates

were nearly similar. Replicates were randomly allocated in wire batteries of two – tiers system. The experimental treatments were as follows:

- 1) Feed was available for *ad libitum* (full-fed) consumption (FF).
- 2) Feed was available for *ad libitum* plus 0.05% supplemented avizyme (FFE).
- 3) Feed was removed for 4 hours daily from 8 a.m to 12 p.m (4 FR).
- 4) Feed was removed for 4 hours daily from 8 a.m to 12 p.m plus 0.05% supplemented avizyme (4 FRE).
- 5) Feed was removed for 6 hours daily from 8 a.m to 2 p.m (6 FR)
- 6) Feed was removed for 6 hours daily from 8 a.m to 2 p.m plus 0.05% supplemented avizyme (6 FRE).

* Avizyme is a commercial enzyme preparation contains 300 IU / g amylase, 400 IU/g protease and 400 IU / g exylanase.

Managements and feeding

All experimental birds were maintained under similar environmental conditions and continuous lighting with water available for *ad libitum* consumption throughout the 12 weeks experimental period. Birds were fed starter diets (0 – 4 wks) and then switched to grower diets to 12 weeks of age (Table 1).

Productive traits

Birds of each replicate were individually weighed and feed consumption was recorded every 4 weeks intervals. Body weight gain and feed conversion (g Feed / g gain) were calculated in four weeks intervals at 4, 8 and 12 weeks of age.

Blood sampling and analysis

Blood samples were collected from 48 chicks (8 chicks from each treatment) at the end of growing period (12 weeks of age). Blood samples about 3 ml were withdrawn from wing vein in a heparinized test tubes. Blood was then centrifuged at 3000 rpm for 10 min. Plasma was obtained and frozen at -20°C until the chemical analysis. Plasma total cholesterol, Glucose, aspartate amino transaminase (AST,GOT) and alanine amino transaminase (ALT,GPT) enzymes activities were determined colormetrically using available commercial kits. Plasma concentration of triiodothyronine (T3) was measured by radioimmunoassay (RIA) technic.

Carcass characteristics:

At the end of the experimental period (12 wks), eight chicks were randomly taken from each treatment (2 from each replicate). They were weighed individually and then slaughtered until complete bleeding, feathers were removed. The birds were weighed after removing heads, legs and viscera to determine the percentage of carcass weight included wings and necks. The heart, liver, empty gizzard, and thymus as well as abdominal fat were weighed and their percentages to live body weights were calculated.

Economic efficiency:

The economic parameters of production including feeding and enzyme costs, income and returns per bird were calculated while the other productive factors were disregarded since they were constant. Economic efficiency (EE) is defined as the net revenue per unit feed cost which calculated from input - output analysis.

Statistical analysis:

The obtained data were statistically analyzed using the general linear model SAS program (SAS, 1998) and differences among means were tested using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Body weight (BW):

Mean body weights (BW) were significantly ($P \leq 0.01$) higher for feed restricted birds than those of full – fed treatments at 4 wks of age (Table 2). At 8 and 12 weeks of age there were no significant differences in BW between feed restricted groups each others and full-feeding group. These results are in agreement with those of El- Sagheer and Makled (2005a) who found that no significant difference in final BW (7 weeks of age) between full- fed and 3, 6, and 9 hrs daily feed restricted broilers. Also our results were supported by the findings of Ibrahim and Elham (2005) who stated that at the end of the growing period (3 – 6 wks), there was significant increase ($P \leq 0.05$) in broilers body weight in group skipped 5 days compared to full – fed group.

Regardless feed restriction, it can be noted that birds fed diet plus avizyme recorded significantly ($P \leq 0.05$) heavier BW than those received diet without avizyme at all experimental periods. These increases are 8.1, 19.2 and 56.1 g at 4, 8 and 12 wks of age respectively. Similar results were obtained by Abou El- Wafa *et al.* (2002) who obtained a significant improvement in BW in broilers fed diet supplemented with avizyme.

A significant effect of interaction between avizyme supplementation and restricted feeding was found for BW. At 4 wks of age birds subjected to 6 hrs feed restriction had achieved a significant ($P \leq 0.01$) increase in BW when they fed diet supplemented with avizyme comparing with those of 6 FR treatment. On the other hand, the live BW of 4 FR treatment was not significantly affected by addition the avizyme. However, the highest means of body weight were recorded by birds of 4 FRE and 4 FR treatments, followed by those of 6FRE and FFE treatments. The lowest means of BW were recorded by birds of 6 FR and FF treatments. At 8 wks of age, there were no significant feed restrictionXavizyme supplementation interactions were detected between any of the experimental treatments. At 12 wks of age there were no significant differences in BW between all feed restriction treatments each others and FFE treatment, while they were recorded significantly ($P \leq 0.01$) higher BW than FF treatment. However, the highest BW was recorded for 6 FRE treatment, while the lowest one was recorded for birds of FF treatment. In this experiment restricted feeding for 4 or 6 hrs daily may be stored a growth potential in these restricted hours being high enough to attain the highest weights, especially with adding avizyme which give a good chance to the enzyme preparation to induce a complete digestion of dietary nutrients through the intestinal tract during the feed restricted hours resulted in good absorption and good compensatory growth. In addition the feeding restricted period used in the present study seemed to be mild, hence, restricted birds are able to overcome periods of feed restriction, moreover they accelerated their growth and sometimes exceeded those of fed *ad libitum* in body weights. Mc Murtry *et al.* (1988) suggested that sex and strain of chick may play an important role in compensatory growth after feed restriction periods. Plavnik and Hurwitz (1991) reported that male broilers have been shown to have a greater ability to exhibit compensatory growth than do females. Cherry *et al.* (1978) and plavnik and Hurwitz (1985) compared fast and slow growing broiler strains and found that the fast growing strains exhibited little compensatory growth. On the basis of the post reports the acceleration of growth for feed restricted birds in this experiment can be explained because our local strains are considered slow growing birds.

Body weight gain (BWG)

Birds subjected to either 4 or 6 hrs daily feed restriction exhibited significantly ($P \leq 0.01$) higher BWG valued about 7.0% and 3.2 % over the full – fed group during the period from 0 to 4 wks of age (Table 3). Also, it was found that the difference in BWG between the two feed restriction regimens (4 and 6 hrs) was significant ($P \leq 0.01$) in favor of 4 hrs

feed restriction regimen during that period. Cumulative (0 -12 wk) BWG was significantly ($P \leq 0.05$) increased in 6 hrs feed restricted treatment than both 4 hrs feed restriction and full-feeding groups, while at the periods of 4 -8 and 8 - 12 wks, there were no significant differences between all the experimental groups. The obtained results are in accordance with those recorded by El – Sagheer and Makled (2005a,b) who reported that broilers were subjected to early 6 hrs feed restriction gained significantly ($P \leq 0.05$) more weight than those of fed *ad libitum* at 4 weeks of age. Also, they observed no significant differences in the overall means of BWG between feed restricted (3, 6 , 9 hrs / day) birds and those fed *ad libitum* . In view of our results, it could be suggested that a tendency was noted toward higher BWG in those treatments in which restriction was imposed, this appears reasonable as more time was available after the feed restriction hours had ended for the birds to recoup weight losses. Herein even though, restricted birds were growing at a greater rate than the fed *ad libitum* ones during the first four weeks of age, they were not able to support this superiority after that. Thus, it appears that the use of the word " accelerated " versus compensatory growth (after hours of feeding restriction) would better characterize the observed increase in body gain specially in young ages.

Regardless feed restriction, birds received 0.05 avizyme in their diets had recorded significantly ($P \leq 0.05$) higher BWG than nonsupplemented ones at periods (0 – 4) , (4 – 8) and (0 - 12) wks of age, while from (8 – 12) wks of age, there was no appreciable improvement in BWG due to the addition of avizyme. The observed increase in BWG which resulted by avizyme addition may be due to the improvement of the availability and absorption of nutrients through increasing the digestibility of the ingested diets which reflects on body gain.

Concerning the interaction, it could be observed that BWG was significantly increased ($P \leq 0.05$) by adding avizyme to 6 FR treatment during the periods of 0 – 4 and 8 – 12 wks. Similar effect was recorded for 4 FR treatment during the period of 4 – 8 wks of age. The overall BWG (0 – 12 wks) of feed restricted treatments was not significantly affected by adding avizyme to their diets. However, the treatment of FF was recorded the lowest value for BWG comparing to all experimental groups.

Feed consumption (FC) :

Data presented in Table (4), show that there was no significant differences in the amounts of feed consumed could be observed between the three feeding regimens at 4 wks of age. On the other hand, birds subjected to 4 or 6 hrs daily feed restriction consumed significantly ($P \leq 0.05$) lesser

feed than those fed *ad libitum*. The rate of reduction in FC are 9.0 , 7.8 ,5.5 and 6.5% for both regimens respectively during the periods from 4 – 8 and 8 – 12 wks of age respectively. Overall FC to 12 wks of age was reduced by about 5.9 and 6.3% for 4 and 6 hours daily feed restricted groups respectively as compared with that fed *ad libitum*. Our results were supported by observation of Ibrahim and Elham (2005) who obtained significant decrease in FC in broilers skipped feed 6 and 10 days, as compared to the control fed *ad libitum*. However, the decrease in FC in this experiment which was recorded for feed restricted groups was not accompanied by any defect in BWG, but the opposite was true whereas, birds of feed restricted groups exhibited higher BW and BWG comparing with unrestricted ones. In this respect, Plavnik and Hurwitz (1989) suggested that FC does not limit the accelerated growth response after early feeding restriction.

Concerning dietary avizyme, the results showed that there were no significant differences in FC between dietary avizyme supplemented and nonsupplemented groups at any of the experimental periods. These findings confirmed by those obtained by Abo El – Wafa (1993) who reported that amounts of feed consumption did not significantly affected by using enzyme preparations in broiler diets.

Regarding the interaction, it could be observed that birds subjected to feed restriction consumed significantly ($P \leq 0.05$) less amounts of feed when they received avizyme in their diets comparing with those of FF treatment at all experimental periods except during the period from 0 to 4 wks of age the difference was not significant. However, the averages of feed consumption were almost similar for birds subjected to 4 or 6 hrs daily feed restriction either with or without supplemented avizyme. Generally, the lowest total amount of FC was recorded for birds of 6 FR treatment while the highest amount was observed for birds of FF treatment.

Feed conversion (FCON):

Birds subjected to feed restriction had significantly ($P \leq 0.05$) better FCON at all experimental periods compared to those eating *ad libitum* (Table 5). However the differences in FCON between both feed restricted groups were not significant, except during the period from 8 to 12 wks of age, it could be observed that birds were restricted for 6 hrs daily showed a significant advantage in FCON compared to the 4 hrs feed restriction and full- fed groups. These findings concur with the results reported by numerous of workers (Deaton, 1995; Ballay 1992 and Urdaneta and Leeson, 2002) who obtained an improvement in feed conversion in broilers

subjected to different dietary feed restriction programs. These results provide additional support for the ability of feed restricted birds to utilize more dietary nutrients than those fed *ad libitum*. On the other hand, Fontana *et al.* (1992) reported that birds subjected to feed restriction at an early age had significantly lower FCON at 28 and 49 days of age than birds eating *ad libitum*.

Regardless feed restriction, there was no appreciable improvement in feed conversion as a result of inclusion avizyme in the diet at all experimental periods. This result agree with that obtained by Abou El – Wafa , (2002) and Mohamed *et al.* (2005) who found that adding avizyme to broiler diets did not affect feed conversion.

Regarding the interaction, it could be observed that the differences in FCON between feed restriction groups (4 and 6 hrs daily) either with or without avizyme supplementation were not significant at all the experimental periods, except for 6FRE treatment which exhibited significant ($P \leq 0.01$) lower value of FCON comparing with 4 FR and 4FRE treatments during the period from 8 to 12 wks. Adding avizyme to diets of full-fed treatment was significantly improved FCON comparing with FF treatment during the periods of 8 – 12 and 0 – 12 wks of age. Generally, cumulative (0 - 12 wks of age) FCON was significantly ($P \leq 0.01$) better in the feed restriction treatments (with or without avizyme) compared to FF treatment. However, the best FCON was recorded for the 6FRE treatment while the poorest FCON was recorded for the birds which fed *ad libitum*.

Selected carcass traits:

The data of carcass, body organs and abdominal fat as a percentages of live BW are presented in Table (6). It was observed that feed time restriction had no significant effect on carcass, empty gizzard and thymus relative weights. Similar results were obtained by El – Sagheer and Makled (2005a) who revealed that feed time restriction (3,6, and 9 hrs / day) had no significant effect on carcass and gizzared percentages of broiler chickens.

Feed restriction had the most pronounced significant effect on heart, liver and, abdominal fat relative weights. Heart percent was found to be lowered significantly ($P \leq 0.05$) by 6 hrs feed restriction treatment comparing with 4 hrs feed restriction and full – fed treatments. Simerarly, Ibrahim and Elham (2005) obtained significant decrease in heart weight in birds skipped feed 10 days as compared with those fed *ad libitum*. On the other hand, liver and abdominal fat were significantly lower ($P \leq 0.05$) in birds of 4 and 6 hrs feed restricted groups than that of full – fed group. Liver percentages of restricted chickens (4 and 6 hrs) were decreased by about

14.1 and 9.1% respectively, while the percentages of decreasing in abdominal fat as a result of feed restriction were 72.6 and 70.5 for 4 and 6 hrs feed restriction groups respectively, less than the full – fed group. These results were confirmed by findings of Palo *et al.* (1995) who reported that broilers liver weights were reduced ($P \leq 0.01$) by feed restriction at 14 days of age as a result of reduction in liver cell numbers. The decrease in relative liver weight due to feed time restriction may as a result of glycogen depletion, Warris *et al.* (1988) found that liver glycogen was depleted to nearly zero following feed withdrawal of 6 hrs or more.

Regarding the abdominal fat percentages, our results are in the same trend of the previous findings of Petek, (1999) who reported that broilers abdominal fat was higher in full – feeding group than the 3 and 6 hrs feed removal groups. In addition Summers *et al.* (1990); and El- Sagheer and Makled (2005 a) tested different feed restriction programs, and found that abdominal fat was significantly decreased in birds subjected to feed restriction than those fed *ad libitum*. In this respect Rosenbrought *et al.* (1986) stated that the activities of the lipogenic enzymes were depressed during the period of feed restriction. Moreover, Summers *et al.* (1990) showed that the reduction in fat with early feed restriction was accompanied by a reduction in the number of fat cells at maturity. Zhong *et al.* (1995) reported that the lipogenesis of the restricted broilers was lower ($P \leq 0.05$) than that of the full – fed ones at 14 and 56 days of age. The previous authors returned the reduction in abdominal fat in the restricted broilers to the reduction of adipocyte volume, which may be due to decreased lipogenesis. On contrary, Fontana *et al.* (1993) and Deaton (1995) revealed that no significant differences were observed for abdominal fat weight between early restricted groups and the control. This contradiction in the above mentioned reports could be attributed to the severity and duration of feed restriction (Attia *et al.* 1995).

Irrespective of feed restriction, dietary avizyme supplementation had no significant effect on most of carcass traits studied (heart, liver, empty gizzard, abdominal fat, and thymus) relative weights. On the other hand, addition of avizyme was found to be significantly ($P \leq 0.05$) increased the carcass relative weight as compared with avizyme nonsupplemented group. These results are partly in agreement with the previous studies of Abou El - Wafa *et al.* (2002), and Mohamed *et al.* (2005) who found that adding avizyme to broiler diets did not affect heart, liver, and gizzard relative weights. The results of abdominal fat which reported by the previous authors were conflicted with our results. They found that the addition of avizyme to broiler diets caused great increase in abdominal fat as compared

with the control nonsupplemented treatment. This conflict may be returns to the difference of strain, sex and the level of enzyme addition.

Regarding the interaction between feed restriction and dietary avizyme supplementation it could be noticed that adding avizyme to diets of full- fed, 4 and 6 feed restriction treatments had no significant effect on carcass, heart, liver and abdominal fat compared with avizyme non-supplemented treatments. Generally, it could be observed that the FFE and 4 FRE treatments exhibited the highest carcass percentages being 65.6 and 65.4% respectively, meanwhile the lowest percent (62.4%) was recorded for birds of 6 FR treatment. The highest percent of heart relative weight (0.50 %) was recorded for 4 FR treatment, while the lowest percent (0.43%) was recorded for 6 FRE treatment. Relative weights of liver and abdominal fat were found to be significantly lower ($P \leq 0.05$) in birds of 4 FR ,4 FRE, 6 FR and 6 FRE treatments than that of FF and FFE. Thus, it appears that daily feed restriction in this experiment for 4 or 6 hrs (with or without avizyme) was successful in reducing abdominal fat. Also feed time restriction either with or without added avizyme had no significant effect on empty gizzard and thymus relative weights.

Physiological Performance:

Regardless avizyme supplementation, results presented in Table (7 show that feed restriction for 4 or 6 hrs daily caused a significant ($P \leq 0.01$) reduction in plasma cholesterol concentration valued about 7.3 and 7.5 % respectively comparing with those fed *ad libitum*. However the differences in plasma cholesterol levels between the two restricted groups were not significant. Similarly Ibrahim and Elham (2005) reported that the full-feeding regimen increased plasma cholesterol concentrations in broiler chickens comparing to the feed restricted regimens. The same authors added that the hypocholesteremia depending on the severity of feed restriction. Moreover, Sturkie, (1986) reported that plasma cholesterol levels of birds are strongly affected by heredity, nutrition, age, sex and environmental conditions.

Regarding the effect of avizyme, it could be observed that inclusion the avizyme in the diet significantly ($P \leq 0.05$) increased the concentration of plasma cholesterol by about 14.7% over the nonsupplemented diet. This result was agreed with that obtained by Abou El – Wafa *et al.* (2002) who reported that there was significant increase in plasma total cholesterol was observed with addition of avizyme to corn / soy broilers diet. The increase in plasma cholesterol concentrations due to added avizyme may be returns

to increase the nutrient digestion by the enzyme which increasing nutrient availability, absorption and metabolic rates.

Concerning the effect of interaction, it is clear that plasma cholesterol concentration was significantly ($P \leq 0.01$) increased by adding avizyme to diets of feed restricted birds (4 or 6 hrs / day) comparing with those subjected to feed restriction without avizyme. Moreover, adding avizyme to diets of full – feeding birds also caused a significant ($P \leq 0.01$) increase in plasma cholesterol content as compared with those fed *ad libitum* without avizyme. In general, the lowest value of plasma cholesterol concentration was recorded for 6 FR treatment being 97.6 g / dl meanwhile the highest values were recorded for FFE and 6 FRE treatments being 130.2 and 130.1 g/dl respectively.

Feed restriction either for 4 or 6 hrs reduced slightly the plasma glucose level by about 12.7 and 7.3% respectively. Whereas, adding avizyme elevated slightly the glucose level. However, these differences were insignificant (Table, 7). In this regard, Abou El- Wafa (1993) found no significant effect of adding enzyme in broiler diets on plasma glucose. Also, its clear that plasma glucose level in the present study not changed significantly by both feed restriction and avizyme supplementation or their interactions as shown in Table (7).

Sturkie (1986) reported that in birds during short-term starvation plasma glucose levels remain stable, he added that fasting causes almost immediat mobilization of hepatic carbohydrate reserves to librate free glucose to the plasma in support of the metabolic needs of certain tissues (brain, retina, adrenal medulla, etc). Thus, the normal blood glucose level is supported by hepatic glycogenolysis.

Liver function of Golden Montazah chicks as determined by AST and ALT activities was not affected significantly by both feed restriction regimens either for 4 or 6 hrs and by adding avizyme in their diets (Table, 7). These results are in agreement with those of Abou El-Wafa (1993), Abd El-Fattah *et al* (2003) and Ibrahim and Elham (2005). However, there were insignificant increase in AST and ALT values in restricted feed chicks for 6 hrs, meanwhile those restricted for 4 hrs showed almost similar values in comparison to those full-fed chicks.

Both enzymes (AST and ALT) showed slight changes and opposite trends by adding avizyme in chicks diets,where AST increased and ALT decreased (Table,7).

The treatments of interaction showed also insignificant effect on both enzymes activities.

It is well known that values of both AST and ALT are used to detect liver and heart functions (Smith *et al.* 1998). While, their increase than the normal values in blood indicate an impairment in these vital organs. Thus, it can be concluded that the use of feed time restriction in the present study had no adverse effects on liver functions as confirmed by insignificant alterations in AST and ALT values by the experimental treatments.

Plasma T3 level showed significant ($P \leq 0.05$) alterations and opposite trends by experimental treatments. Since, it was decreased by feed restriction and increased by avizyme addition in the diets in comparison with those fed *ad libitum* and those fed diets without avizyme.

However, the duration period (4 or 6 hrs/day) of feed restriction regimens had no significant effect on T3 level, where both times showed almost similar levels in restricted chicks (Table, 7). These results agree with that obtained by Nir *et al.* (1987) who found that plasma T3 levels were low on days of feed deprivations in broiler chicks.

Concerning the interaction effect, it could be noticed that adding avizyme to feed restriction and full-fed treatments significantly increased ($P \leq 0.05$) plasma concentrations of T3, while 4FRE treatment was not affected. Generally, birds of FFE treatment exhibited the highest value of plasma T3 being 145.0 ng / dl, while the lowest value was recorded for birds of 6 FR treatment being 122.8 ng /dl.

The increase in T3 level which observed in the current study by adding avizyme could be attributed to the observed improvement in FCON, (Table,5), this metabolic activity needs more secretion of thyroid hormones, particularly T3 hormone.

It is well known that thyroid hormones are essential for normal growth development and metabolism. Also, the biologically active hormone is T3 (Smith *et al.* 1998).

Economic efficiency (EE)

Results of economic evaluation are summarized in Table (8). It was observed that all restricted feed groups had the best net revenue per bird but full – fed group had the lowest value. The feed restricted groups (4 and 6 hrs / day) had higher EE by 12 and 16 % respectively than that of the full – fed group. These results are agreement with those reported by El – Sagheer and Makled (2005a) who reported that feed restriction (3, 6 and 9 hrs / day) in broiler chicks improved economical efficiency compared with control.

On the other hand, it could be observed that addition of avizyme to the diet improved the economic efficiency by about 5 % compared to avizyme nonsupplemented diet. Similarly, Abou El – Wafa *et al.* (2002) reported that addition of Avizyme to corn / soy diet improved economic efficiency compared to the control diet.

From economic viewpoint, it is clear that all groups of feed restriction either with or without added avizyme had better EE values compared with full – fed groups (FF and FFE). The improvement in EE ranged between 18 and 24 %. However, the 6 FRE treatment recorded the superiority value for net revenue and EE, as it increased EE by 24% as compared with FF treatment, because it recorded the highest BW and the best FCON. The increase in EE which was exhibited by the rest of the experimental treatments valued about 20, 18, 18, and 11 % for 6 FR, 4FR, 4 FRE and FFE groups respectively.

It can be concluded that, feed restriction (4 or 6 hr / day) caused appreciable improvement in EE, moreover, adding the enzyme preparation to diets of feed restricted birds increased the improvement in EE especially with 6 hrs feed restriction regimen.

The results of the present study suggest that feed restriction regimens used in this experiment were efficient in reducing feed consumption, abdominal fat and improving feed conversion and economical efficiency. The treatment of 6FRE had recorded the superiority values of productive performance and economic efficiency.

To our knowledge there were no available literatures on the study of the interaction between feed restriction and dietary added enzyme preparations, and their effect on productive and physiological performance as well as economical efficiency.

Table (1) : Composition of the experimental diets.

Ingredients	Starter (0 – 4 wks)	Grower (4- 12 wks)
Corn	62.5	62.5
Soybean meal (44%)	31.28	17
Wheat bran	2.60	15.5
Palm oil	----	1.0
Di – Cal - Phosphate	2.0	1.70
Limestone	0.88	1.5
Salt	0.38	0.40
DI - Methionine	0.06	0.05
Lysine	---	0.05
Vit and Mineral premix	0.30	0.30
Total	100	100
Calculated analysis		
C.P	19	15.0
ME Kcal / kg	2825	2900
C.F	4.0	3.83
Ca	0.91	0.97
Available phosphorus%	0.51	0.47
Methionine %	0.39	0.33
Meth + Cys%	0.71	0.59
Lysine	1.08	0.80

** According to ministerial decree (1996).

Table (2): Live body weight in males of Golden Montazah chicks as affected by feed restriction, Avizyme supplementation and their interaction.

Treatments	Live body Weight (g)		
	Age in Wks		
	4 wks	8 wks	12 wks
Feed Restriction			
Full - Fed	255.4 ± 3.50 ^c	825.7 ± 9.14	1451.3 ± 18.11
4 hrs feed restriction	271.1 ± 3.10 ^a	823.3 ± 7.72	1460.1 ± 12.27
6 hrs feed restriction	262.5 ± 3.03 ^b	828.4 ± 10.12	1486.5 ± 15.18
Avizyme Supplementation			
(0) Avizyme	258.9 ± 3.23 ^b	816.2 ± 5.79 ^b	1437.9 ± 8.90 ^b
(0.05 %) Avizyme	267.0 ± 2.73 ^a	835.4 ± 4.62 ^a	1494.0 ± 12.06 ^a
Interaction (FRXAV)			
FF	251.6 ± 4.29 ^d	817.6 ± 13.53	1407.8 ± 12.63 ^b
FFE	260.8 ± 4.34 ^{bc}	833.9 ± 12.73	1494.7 ± 10.63 ^a
4 FR	270.5 ± 5.75 ^a	809.1 ± 09.87	1455.7 ± 11.54 ^{ab}
4 FRE	271.6 ± 6.27 ^a	837.4 ± 13.43	1464.6 ± 11.83 ^{ab}
6 FR	256.4 ± 3.84 ^{cd}	821.9 ± 09.14	1450.2 ± 11.59 ^{ab}
6 FRE	268.6 ± 5.82 ^{ab}	834.9 ± 12.07	1522.8 ± 12.41 ^a

a, b, Means within the same column with different superscripts are significantly different ($P \leq 0.05$, $P \leq 0.01$)

FF = full-fed

4 FRE= 4 hours feed restriction plus avizyme

FFE= full-fed plus avizyme

6 FR= 6 hours feed restriction

4 FR= 4 hours feed restriction

6 FRE= 6 hours feed restriction plus avizyme

Table (3): Body weight gain in males of Golden Montazah chicks as affected by feed restriction, Avizyme supplementation and their interaction.

Treatments	Body Weight gain (g)			
	Experimental periods (wks)			
	0 - 4 wks	4 - 8 wks	8 -12 wks	0 -12 wks
Feed Restriction				
Full - Fed	224.4 ±3.44 ^c	569.0 ±9.04	603.4 ±18.44	1420.3 ± 24.41 ^b
4 hrs feed restriction	240.0 ±3.15 ^a	554.7 ±7.81	636.9 ±21.21	1429.1 ± 23.23 ^b
6 hrs feed restriction	231.5 ±3.02 ^b	557.9 ±8.10	666.1 ± 20.54	1455.5 ± 21.79 ^a
Avizyme Supplementation				
(0) Avizyme	227.9 ± 3.11 ^b	551.0 ± 7.66 ^b	627.0 ± 13.50	1406.9 ± 32.19 ^b
(0.05 %) Avizyme	236.0 ± 2.73 ^a	570.1 ± 4.47 ^a	643.8 ± 20.94	1463.0 ± 35.08 ^a
Interaction (FRXAV)				
FF	221.6 ± 5.01 ^c	565.0 ± 10.26 ^{ab}	590.2 ± 11.58 ^b	1376.8 ± 8.83 ^b
FFE	229.8 ± 4.34 ^b	573.1 ± 9.88 ^a	616.5 ± 13.56 ^b	1463.7 ± 7.36 ^a
4 FR	239.5 ± 5.75 ^a	538.6 ± 8.81 ^c	646.6 ± 13.66 ^b	1424.0 ± 9.49 ^{ab}
4 FRE	240.6 ± 5.54 ^a	570.9 ± 9.51 ^{ab}	627.1 ± 12.58 ^b	1433.6 ± 8.37 ^{ab}
6 FR	225.4 ± 5.68 ^{bc}	549.6 ± 10.30 ^{bc}	644.3 ± 12.61 ^b	1419.0 ± 10.29 ^{ab}
6 FRE	237.6 ± 5.18 ^a	566.3 ± 9.43 ^{ab}	687.9 ± 10.66 ^a	1491.2 ± 9.49 ^a

a, b, Means within the same column with different superscripts are significantly different ($P \leq 0.05$, $P \leq 0.01$)

FF = full-fed

4 FRE= 4 hours feed restriction plus avizyme

FFE= full-fed plus avizyme

6 FR= 6 hours feed restriction

4 FR= 4 hours feed restriction

6 FRE= 6 hours feed restriction plus avizyme

Table (4): Feed consumption in males of Golden Montazah chicks as affected by feed restriction, Avizyme supplementation and their interaction.

Treatments	Feed consumption (g/ bird) Experimental periods (wks)			
	0 - 4 wks	4 - 8 wks	8 -12 wks	0 -12 wks
Feed Restriction				
Full - Fed	669.9 ± 6.24	1759.2 ±16.50 ^a	2452.5 ±18.53 ^a	4881.6 ± 33.75 ^a
4 hrs feed restriction	674.3 ± 9.06	1600.1 ±14.48 ^b	2318.3 ±15.58 ^b	4592.7 ± 31.32 ^b
6 hrs feed restriction	659.6 ± 8.13	1621.5 ±17.73 ^b	2293.8 ± 20.41 ^b	4574.8 ± 27.43 ^b
Avizyme Supplementation				
(0) Avizyme	665.0 ± 6.61	1649.0 ± 26.84	2361.8 ± 23.41	4675.8 ± 53.87
(0.05 %) Avizyme	670.9 ± 6.96	1671.6 ± 22.31	2349.8 ±19.53	4692.3 ± 51.94
Interaction (FRXAV)				
FF	668.4 ± 9.33	1760.1 ±17.88 ^a	2482 ± 24.07 ^a	4910.5 ± 31.58 ^a
FFE	671.4 ± 13.16	1758.3 ±18.04 ^b	2423 ± 21.05 ^b	4852.7 ± 28.87 ^a
4 FR	668.9 ± 13.66	1597.5 ±21.43 ^c	2327 ± 23.57 ^{bc}	4593.6 ± 27.82 ^b
4 FRE	679.7 ± 13.31	1602.8 ±22.67 ^c	2309 ± 22.86 ^c	4591.7 ± 28.76 ^b
6 FR	657.6 ± 13.41	1589.4 ±18.32 ^c	2276 ± 22.59 ^c	4523.3 ± 27.59 ^b
6 FRE	661.5 ± 11.25	1653.6 ±21.09 ^c	2311 ± 20.87 ^{bc}	4626.4 ± 27.10 ^b

a, b, Means within the same column with different superscripts are significantly different ($P \leq 0.05$, $P \leq 0.01$)

FF = full-fed

4 FRE= 4 hours feed restriction plus avizyme

FFE= full-fed plus avizyme

6 FR= 6 hours feed restriction

4 FR= 4 hours feed restriction

6 FRE= 6 hours feed restriction plus avizyme

Table (5): Feed conversion in males of Golden Montazah chicks as affected by feed restriction, Avizyme supplementation and their interaction.

Treatments	Feed conversion (g feed /g gain)			
	Experimental periods (wks)			
	0 - 4 wks	4 - 8 wks	8 -12 wks	0 -12 wks
Feed Restriction				
Full - Fed	2.97 ± 0.06 ^a	3.10 ± 0.05 ^a	4.09 ± 0.07 ^a	3.44 ± 0.08 ^a
4 hrs feed restriction	2.81 ± 0.05 ^b	2.89 ± 0.07 ^b	3.66 ± 0.07 ^b	3.21 ± 0.05 ^b
6 hrs feed restriction	2.85 ± 0.05 ^b	2.91 ± 0.07 ^b	3.47 ± 0.08 ^c	3.14 ± 0.06 ^b
Avizyme Supplementation				
(0) Avizyme	2.91 ± 0.057	2.99±0.05	3.79 ± 0.10	3.32 ± 0.08
(0.05 %) Avizyme	2.84 ± 0.039	2.94±0.06	3.69 ± 0.09	3.20 ± 0.05
Interaction (FRXAV)				
FF	3.02 ± 0.10 ^a	3.12 ± 0.08 ^a	4.21 ± 0.08 ^a	3.57 ± 0.08 ^a
FFE	2.92 ± 0.08 ^{ab}	3.07 ± 0.09 ^{ab}	3.96 ± 0.23 ^b	3.32 ± 0.08 ^b
4 FR	2.80 ± 0.12 ^b	2.96 ± 0.10 ^{abc}	3.62 ± 0.17 ^c	3.22 ± 0.07 ^{bc}
4 FRE	2.83 ± 0.02 ^b	2.81 ± 0.10 ^c	3.71 ± 0.18 ^c	3.20 ± 0.07 ^{bc}
6 FR	2.90 ± 0.06 ^{ab}	2.90 ± 0.09 ^{bc}	3.54 ± 0.12 ^{cd}	3.18 ± 0.08 ^c
6 FRE	2.97 ± 0.08 ^b	2.92 ± 0.11 ^{abc}	3.39 ± 0.19 ^d	3.10 ± 0.09 ^c

a, b, Means within the same column with different superscripts are significantly different ($P \leq 0.05$, $P \leq 0.01$)

FF = full-fed

4 FRE= 4 hours feed restriction plus avizyme

FFE= full-fed plus avizyme

6 FR= 6 hours feed restriction

4 FR= 4 hours feed restriction

6 FRE= 6 hours feed restriction plus avizyme

Table (6) : Some carcass characteristics in males of Golden Montazah chicks as affected by feed restriction, Avizyme supplementation and their interaction.

Treatments	Carcass %	Heart %	Liver %	Empty Gizzard %	Abdominal Fat %	Thymus%
Feed Restriction						
Full - Fed	64.4± 0.75	0.48±0.02 ^a	1.98±0.06 ^a	2.50±0.16	0.95± 0.21 ^a	0.45±0.074
4 hrs feed restriction	64.9 ± 0.84	0.49±0.02 ^a	1.70±0.04 ^c	2.56±0.08	0.26± 0.10 ^b	0.46±0.095
6 hrs feed restriction	63.5± 0.54	0.44±0.01 ^b	1.80± 0.04 ^b	2.44±0.05	0.28±0.15 ^b	0.47±0.081
Avizyme						
Supplementation						
(0) Avizyme	63.3±0.36 ^b	0.48±0.02	1.83±0.04	2.49±0.11	0.49±0.14	0.51±0.079
(0.05 %) Avizyme	65.2±0.65 ^a	0.46±0.01	1.82±0.06	2.50±0.06	0.50±0.17	0.41±0.047
Interaction (FRXAV)						
FF	63.2±0.48 ^{ab}	0.48±0.02 ^{ab}	1.93±0.06 ^a	2.45±0.31	0.75±0.33 ^a	0.57±0.112
FPE	65.6±0.53 ^a	0.47±0.03 ^{ab}	2.03±0.11 ^a	2.58±0.16	1.15±0.25 ^a	0.33±0.058
4 FR	64.4±0.44 ^{ab}	0.50±0.04 ^a	1.73±0.08 ^c	2.68±0.13	0.34±0.14 ^{bc}	0.59±0.174
4 FRE	65.4±0.51 ^a	0.48±0.01 ^{ab}	1.70±0.06 ^{cd}	2.45±0.07	0.18±0.39 ^c	0.33±0.029
6 FR	62.4±0.52 ^b	0.46±0.01 ^{ab}	1.85±0.06 ^{bc}	2.35±0.04	0.39±0.26 ^{bc}	0.38±0.132
6 FRE	64.7±0.45 ^{ab}	0.43±0.02 ^b	1.75±0.06 ^c	2.53±0.06	0.17±0.17 ^c	0.57±0.087

a, b, ...: Means within the same column with different superscripts are significantly different (P ≤ 0.05, P ≤ 0.01)
 FF = full-fed
 FPE = full-fed plus avizyme
 4 FR = 4 hours feed restriction
 4 FRE = 4 hours feed restriction plus avizyme
 6 FR = 6 hours feed restriction
 6 FRE = 6 hours feed restriction plus avizyme

Table (7) : Some blood constituents in males of Golden Montazah chicks as affected by feed restriction, Avizyme supplementation and their interaction.

Treatments	Total Cholesterol mg /dl	Glucose mg /dl	AST IU /dl	ALT IU /dl	Triiodothyronine (T 3) ng /dl
Feed Restriction					
Full - Fed	123.2±4.51 ^a	245.7±2.81	28.7 ±0.017	7.4±0.01	137.3±9.32 ^a
4 hrs feed restriction	114.2±4.04 ^b	214.3±3.45	28.6±0.009	7.9±0.006	125.0±7.73 ^b
6 hrs feed restriction	113.9±6.84 ^b	227.6±3.00	31.8±0.029	9.0±0.014	126.3±7.29 ^b
Avizyme Supplementation					
(0) Avizyme	107.8±3.58 ^b	225.4±4.96	28.7±0.017	9.2±0.010	126.2±6.56 ^b
(0.05 %) Avizyme	126.4±3.20 ^a	233.0±3.89	30.7±0.016	7.0±0.006	132.9±6.72 ^a
Interaction (FRXAV)					
FF	116.3±4.63 ^{bc}	244.2±4.68	26.5±0.007	8.5±0.018	129.6±3.43 ^{bc}
FFE	130.2±6.40 ^a	247.2±3.67	30.9±0.032	6.3±0.009	145.0±4.46 ^a
4 FR	109.5±5.91 ^c	208.1±3.84	27.4±0.014	7.8±0.005	126.1±4.06 ^{bcd}
4 FRE	118.9±5.15 ^b	220.5±3.88	29.8±0.009	7.9±0.013	123.9±4.45 ^{cd}
6 FR	97.6±4.99 ^d	223.9±3.87	32.2±0.048	11.2±0.022	122.8±3.91 ^d
6 FRE	130.1±4.08 ^a	231.4±4.17	31.3±0.041	6.9±0.011	129.8±4.68 ^{bc}

a, b, Means within the same column with different superscripts are significantly different (P ≤ 0.05, P ≤ 0.01)
 FF = full-fed
 FFE= full-fed plus enzyme
 4 FR= 4 hours feed restriction
 4 FRE= 4 hours feed restriction plus enzyme
 6 FR= 6 hours feed restriction
 6 FRE= 6 hours feed restriction plus enzyme

Table (8) : Economical efficiency of Golden Montazah male chicks as affected by feed restriction, Avizyme supplementation and their interaction.

Treatments	Average feed consumed(g/brhd)		Enzyme Intake (g)	Feed costs (L.E/ brhd)		Enzyme costs (L.E/brhd)	Feed + Enzyme costs (L.E/brhd)	Average Live weight (g/brhd)	Price/kg Live weight (L.E) *	Total revenue	Net revenue	Econo- mic Effici- ency (EE)**	Relative econo- mic effice- ncy****
	Starter diet 0-4wks	Grower diet 4-12wks		Starter diet	Grower diet								
Feed Restriction													
Full – Fed	669.9	4211.7	2.44	1.312	7.013	0.066	8.391	1451.3	14	20.318	11.927	1.421	100
4 hrs feed restriction	674.3	3918.4	2.30	1.321	6.524	0.062	7.907	1460.1	14	20.441	12.534	1.585	112
6 hrs feed restriction	659.6	3915.3	2.29	1.292	6.519	0.062	7.873	1486.5	14	20.811	12.938	1.643	116
Avizyme													
Supplementation													
(0) Avizyme	665.0	4010.8	---	1.303	6.678	---	7.981	1437.9	14	20.131	12.150	1.522	100
(0.05 %) Avizyme	670.9	4019.4	2.35	1.314	6.692	0.063	8.069	1494.0	14	20.916	12.847	1.592	105
Interaction (FRXAV)													
FF	668.4	4242.1	---	1.309	7.063	---	8.372	1407.8	14	19.709	11.337	1.354	100
FPE	671.4	4181.3	2.43	1.315	6.962	0.066	8.343	1494.7	14	20.926	12.583	1.508	111
4 FR	668.9	3924.5	---	1.310	6.534	---	7.844	1455.7	14	20.380	12.536	1.598	118
4 FRE	679.7	3911.8	2.30	1.332	6.513	0.062	7.907	1464.6	14	20.504	12.597	1.593	118
6 FR	657.6	3865.4	---	1.288	6.436	---	7.724	1450.2	14	20.303	12.579	1.629	120
6 FRE	661.5	3964.6	2.31	1.296	6.601	0.062	7.959	1522.8	14	21.319	13.360	1.679	124

* According to the local market price at the experimental time (2008) # Price of 1 Kg Starter diet = 1.959 L.E
 ** Net revenue per unit food cost # Price of 1 Kg Grower diet = 1.665 L.E
 *** Assuming the EE of control diet equals 100 % # Price of 1 kg avizyme = 27 L.E
 FF = full-fed 4 FRE= 4 hours feed restriction plus avizyme
 FPE= full-fed plus avizyme 6 FR= 6 hours feed restriction
 4 FR= 4 hours feed restriction 6 FRE= 6 hours feed restriction plus avizyme

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الملخص العربي

تأثير تحديد الغذاء و اضافة الافييزيم على الاداء الانتاجي و الفسيولوجي لذكور كتاكيت المنتزه الذهبي

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أجرى هذا البحث على عدد 288 كتكوت ذكر عمر يوم من سلالة المنتزه الذهبي (سلالة محليه مستنبطه) لاستغلال الذكور الزائده عن حاجة التربية في انتاج اللحم مع العمل على تقليل كميته الغذاء المستهلك و تحسين الكفاءة التحويلية للغذاء عن طريق التحديد الغذائي و اضافه المستحضر الانزيمى (الافييزيم) و دراسة تأثيرهما على الاداء الانتاجى و الفسيولوجى و الكفاءة الاقتصادية . تم توزيع الكتاكيت عشوائيا على 6 مجموعات تجريبية بكل مجموعة 4 مكررات بكل مكرر 12 كتكوت كما يلي :

- ١ - المجموعة الأولى : غذيت الكتاكيت فيها إلى حد الشبع .
- ٢ - المجموعة الثانية : غذيت الكتاكيت فيها إلى حد الشبع مع اضافة المستحضر الانزيمى الافييزيم بمعدل 0.05% .
- ٣ - المجموعة الثالثة : تم حجب الغذاء عنها لمدة 4 ساعات يوميا ابتداء من الساعة الثامنة صباحاً حتى الساعة الثانية عشر ظهراً .
- ٤ - المجموعة الرابعة : تم حجب الغذاء عنها لمدة 4 ساعات مع اضافه الافييزيم بمعدل 0.05% .
- ٥ - المجموعة الخامسة : تم حجب الغذاء عنها لمدة 6 ساعات يوميا ابتداء من الساعة الثامنة صباحاً حتى الساعة الثانية عشر ظهراً .

٦ - المجموعة السادسة : تم حجب الغذاء عنها لمدة 6 ساعات يوميا مع اضافته الافيزيم بمعدل 0.05% .

استمرت التجربة من عمر يوم و حتى عمر 12 أسبوع . ويمكن تلخيص النتائج المتحصل عليها في نهاية التجربه كما يلي :

تأثير التغذية المحددة

- ١ - لم تكن هناك اختلافات معنويه في وزن الجسم الحى في حين وجد انخفاض معنوى في كميته الغذاء المستهلك و تحسن معنوى في كفاءة التحويل الغذائى لمجموعتى التغذية المحددة مقارنة بمجموعة التغذية لحد الشبع .
- ٢ - ارتفعت الزيادة الكلية في وزن الجسم ارتفاعا معنويا لطيور مجموعة التحديد الغذائى لمدة 6 ساعات يوميا مقارنة بمجموعتى التحديد الغذائى لمدة 4 ساعات و التغذية لحد الشبع .
- ٣ - لم تتأثر معنويا الاوزان النسبيه لكل من الذبيحه و القونصه و الغدة التيموسيه في مجموعات التحديد الغذائى في حين وجد انخفاض معنوى في الوزن النسبى لكل من القلب و الكبد و دهن البطن.
- ٤ - سجلت مجموعتى التحديد الغذائى (4، 6 ساعات يوميا) انخفاضا معنويا في تركيز كل من الكوليستيرول و هرمون الـ T3 في بلازما الدم بينما لم يتأثر تركيز الجلوكوز و الـ ALT و الـ AST.
- ٥ - استخدام نظام التحديد الغذائى لمدة 4 و 6 ساعات يوميا ادى إلى رفع الكفاءة الاقتصادية بنسبه 12 و 16% لكل من النظامين على الترتيب

تأثير الانزيم

- ١ - إضافة الافيزيم للعليقه أدى لحدوث ارتفاع معنوى في وزن الجسم و الزيادة الكليه و الوزن النسبى للذبيحه ، في حين لم يتأثر معنويا كل من كميته الغذاء المستهلكة و الكفاءة التحويلية و الوزن النسبى للقلب و الكبد و القونصه و دهن البطن و الغدة التيموسيه .
- ٢ - ادت اضافة الانزيم إلى حدوث ارتفاع معنوى في مستوى كل من الكوليستيرول و هرمون الـ T3 في بلازما الدم بينما لم تتأثر مستويات كل من الجلوكوز و انزيمى الـ AST و الـ ALT.
- ٣ - اضافته الانزيم للعليقه ادى إلى رفع الكفاءة الاقتصادية بمعدل 5% مقارنة بالعليقه الغير محتويه على الانزيم .

تأثير التداخل بين نظام التغذية و الانزيم

- ١ - سجلت مجموعتى الطيور التى حجب عنها الغذاء لمدة 6 ساعات و المغذاه لحد الشبع مع اضافته الانزيم لهما أعلى وزن و زيادة وزنية للجسم .
- ٢ - سجلت جميع معاملات التحديد الغذائى سواء بالانزيم او بدونه أقل كميته للغذاء المستهلك و افضل كفاءة تحويلية للغذاء بالاضافه إلى انخفاض نسبه دهن البطن.
- ٣ - سجلت معامله التحديد الغذائى لمدة 6 ساعات يوميا اقل تركيز لمستوى كلا من الكوليستيرول و هرمون الـ T3 في بلازما الدم .

٤ - سجلت مجموعتي الطيور التي حجب عنها الغذاء لمدة 6 ساعات سواء مع الانزيم او بدونه اعلى كفاءة اقتصادية بزيادة قدرها 24% ، 20% على الترتيب في حين تساوت في معاملتي التحديد الغذائي لمدة 4 ساعات بالانزيم او بدونه حيث بلغت 18% بينما سجلت معاملة التغذية لحد الشبع مع اضافة الانزيم اقل معدل للزيادة في الكفاءة الاقتصادية (11%) مقارنة بمجموعة التغذية لحد الشبع بدون انزيم .

* من هذه الدراسة يتضح ان نظامي التحديد الغذائي (4 و 6 ساعات / يوم) قد ادبا إلي خفض كميته الغذاء المستهلك و تركيز الكوليستيرول في البلازما و تحسين الكفاءة التحويلية للغذاء و زيادة الكفاءة الاقتصادية . و كان برنامج التحديد الغذائي بحجب الغذاء لمدة 6 ساعات يوميا مع اضافة الانزيم الاكثر كفاءة في تحسين اداء ذكور كتناكيت المنتزة الذهبي و تحقيق اعلى كفاءة اقتصادية .